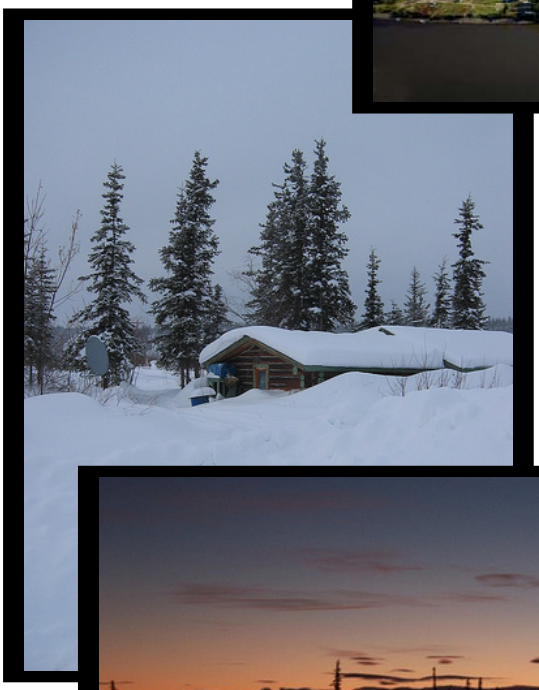
# The City of Allakaket
# Hazard Mitigation Plan



*Prepared by*
*The City of Allakaket*
*Mitigation Planning Team*

February 2010

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## Tables



## Figures



## Appendices

### Acronyms/Abbreviations

| | |
|---|---|
| °F | Degrees Fahrenheit |
| ACF | Administration of Children & Families |
| AFG | Assistance to Firefighters Grant |
| AHFC | Alaska Housing Finance Corporation |
| AICC | Alaska Interagency Coordination Center |
| ANA | Administration for Native Americans |
| ANCSA | Alaska Native Claims Settlement Act |
| ANTHC | Alaska Native Tribal Health Consortium |
| APA | American Planning Association |
| ARC | American Red Cross |
| ATV | all-terrain vehicle |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| CD | Compact Disc |
| CDBG | Community Development Block Grant |
| CFR | Code of Federal Regulations |
| CHEMS | Community Health and Emergency Medical Services |
| DCCED | Department of Commerce, Community, and Economic Development |
| DCRA | Division of Community and Regional Affairs |
| DEC | Department of Environmental Conservation |
| DEED | Department of Education and Early Development |
| DGGS | Division of Geological and Geophysical Survey |
| DHSS | Department of Health and Social Services |
| DHS | United States Department of Homeland Security |
| DHS&EM | Division of Homeland Security and Emergency Management |
| DMA 2000 | Disaster Mitigation Act of 2000 |
| DMVA | Department of Military and Veterans Affairs |
| DNR | Department of Natural Resources |
| DOE | Department of Energy |
| DOF | Division of Forestry |
| DOI | Department of Interior |
| DOL | Department of Labor |
| DOT/PF | Department of Transportation and Public Facilities |
| EFSP | Emergency Food and Shelter Program |
| EPA | Environmental Protection Agency |
| FAA | Federal Aviation Administration |

| | |
|---|---|
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FMA | Flood Mitigation Assistance |
| FP&S | Fire Prevention and Safety |
| ft | feet |
| FY | Fiscal Year |
| $g$ | gravity as a measure of peak ground acceleration |
| GIS | Geographic Information System |
| HAZUS-MH | Hazards U.S-Multi-Hazard |
| HMA | Hazard Mitigation Assistance |
| HMGP | Hazard Mitigation Grant Program |
| HWE | High Water Elevation |
| HMP | Hazard Mitigation Plan |
| HUD | Housing and Urban Development |
| IBHS | Institute for Business and Home Safety |
| IHBG | Indian Housing Block Grant |
| IRS | Internal Revenue Service |
| kW | kilowatt |
| M | Magnitude |
| MM | Modified Mercalli |
| mph | miles per hour |
| NAHASDA | Indian Housing Block Grant – Native American Housing Assistance and Self Determination Act |
| NFIP | National Flood Insurance Program |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| PDM | Pre-Disaster Mitigation |
| PGA | peak ground acceleration |
| RAGP | Rural Assistance Grant Program |
| RL | repetitive loss |
| RFC | repetitive flood claims |
| SAFER | Staffing for Adequate Fire and Emergency Response |
| SBA | Small Business Administration |
| SRL | severe repetitive loss |
| Stafford Act | Robert T. Stafford Disaster Relief and Emergency Assistance Act |
| STAPLEE | Social, Technical, Administrative, Political, Legal, Economic, and Environmental |
| URS | URS Corporation |
| US or U.S. | United States |

| | |
|---|---|
| USACE | United States Army Corps of Engineers |
| USDA | United States Department of Agriculture |
| USDA/RD | United States Department of Agriculture/Rural Development |
| USC | United States Code |
| USGS | United States Geological Survey |
| VFAGP | Volunteer Fire Assistance Grant Program |
| VPSO | Village Public Safety Officer |
| VSW | Village Safe Water |

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

## 1.1 HAZARD MITIGATION PLANNING

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

## 1.2 PLANNING REQUIREMENTS

### 1.2.1 Local Mitigation Plans

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

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

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

## 1.3 GRANT PROGRAMS WITH MITIGATION PLAN REQUIREMENTS

FEMA Hazard Mitigation Assistance grant programs provide funding to States, Tribes, and local entities that have a FEMA-approved State, Tribal, or Local Mitigation Plan. Two of the grants,

Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program, are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. As of June 19, 2008, the grant programs were segregated. The HMGP is a directly funded competitive disaster grant program. Whereas the remaining Hazard Mitigation Assistance Programs: PDM, Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) programs although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements.

> *"The Department of Homeland Security (DHS) FEMA Hazard Mitigation Assistance (HMA) grant programs present a critical opportunity to protect individuals and property from natural hazards while simultaneously* ***reducing reliance on Federal disaster funds.*** *The HMA programs provide pre-disaster mitigation grants annually to States, Territories, Tribes, and local communities. The statutory origins of the programs differ, but all share the common goal of reducing the loss of life and property due to natural hazards.*
>
> *The PDM program is authorized by the Stafford Act and focuses on mitigation project and planning activities that address multiple natural hazards, although these activities may also address hazards caused by manmade events. The FMA program, RFC program, and SRL program are authorized by the National Flood Insurance Act, and focus on reducing claims against the NFIP."* (FEMA 2006e)

### 1.3.1 Hazard Mitigation Assistance (HMA) Unified Programs

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

The PDM grant program provides funds to State, Tribes, and local entities, including universities, for hazard mitigation planning and mitigation project implementation prior to a disaster event. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of PDM funding available is appropriated by Congress on an annual basis. In Fiscal Year (FY) 2008, PDM program funding totaled approximately $54 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Particular emphasis for this program is placed on mitigating repetitive loss (RL) properties. The primary source of funding for this program is the National Flood Insurance Fund. Grant funding is available for three types of grants, including Planning, Project, and Technical Assistance. Project grants, which use the majority of the program's total funding, are awarded to States, Tribes, and local entities to apply mitigation measures to reduce flood losses to properties insured under the NFIP. In FY 2008, FMA funding totaled $32 million. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties is available in certain situations.

The City of Allakaket does not currently participate in the NFIP and is therefore ineligible for National Flood Insurance Act Grant Programs until they become a NFIP participant. This has been identified as a high priority action as a result of this hazard mitigation planning process, and the Village of Allakaket is investigating application to the NFIP program.

The SRL program provides funding to reduce or eliminate the long-term risk of flood damage to residential structures insured under the NFIP. Structures considered for mitigation must have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any 10-year period, and the cumulative amount of such claim payments exceeds $20,000; or for which at least two separate claim payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any 10-year period. Congress authorized $40 million for FY 2006 and FY 2007, $80 million for FY 2008, and $80 million for FY 2009. The cost-share for this grant is 75 percent Federal/25 percent non-Federal. However, 90 percent Federal/10 percent non-Federal to mitigate SRL properties is available when the State or Tribal plan addresses ways to mitigate SRL properties.

The RFC program provides funding to reduce or eliminate the long-term flood damage risk to residential and nonresidential structures insured under the NFIP. Up to $10 million is available annually to assist States and communities with reducing flood damages to structures which have had one or more claim payments for flood damages. All RFC grants are eligible for up to 100 percent Federal assistance.

## 1.4 HMP DESCRIPTION

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

**Prerequisites**

Section 2 addresses the prerequisites of plan adoption, which include adoption by the City of Allakaket (City). The adoption resolution is included in Appendix B.

**Community Description**

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

**Planning Process**

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

**Hazard Analysis**

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

**Vulnerability Analysis**

Section 6 identifies potentially vulnerable assets—people, residential and nonresidential buildings dwelling units (where available), critical facilities, and critical infrastructure—in the City. These data were compiled by assessing the potential impacts from each hazard using Geographic Information System (GIS) information. The resulting information identifies the full range of hazards that the City could face and potential social impacts, damages, and economic losses.

**Mitigation Strategy**

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

### Plan Maintenance

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

### References

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

### Appendix A

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

### Appendix B

Appendix B provides the adoption resolution for the City.

### Appendix C

Appendix C provides public outreach information, including newsletters.

### Appendix D

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

### Appendix E

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

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## 2.1 ADOPTION BY LOCAL GOVERNING BODIES AND SUPPORTING DOCUMENTATION

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

DMA 2000 REQUIREMENTS: PREREQUISITES

Local Plan Adoption

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

Element

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

*Source: FEMA, July 2008.*

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

The local governing body of the City adopted the HMP by resolution on Insert Date. A scanned copy of the resolution is included in Appendix B.

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

## 3.1 LOCATION, GEOGRAPHY, AND HISTORY

*"Allakaket is on the south bank of the Koyukuk River, southwest of its junction with the Allakaket River, approximately 190 air miles northwest of Fairbanks and 57 miles upriver from Hughes. The Native Village of Allakaket is located directly across the river. Allakaket lies at approximately 66.562610 North Latitude and -152.647560 West Longitude. (Sec. 14, T020N, R024W, Fairbanks Meridian.)"* (Division of Community and Regional Affairs [DCRA] 2009)

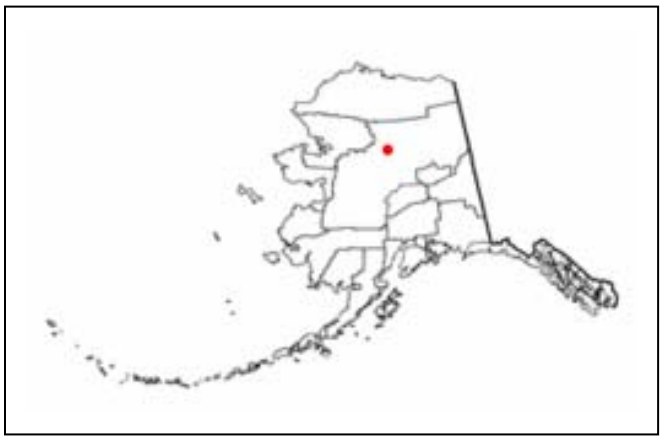

**Figure 3-1 Allakaket Location Map**

The City is mainly an Athabascan community located on the Koyukuk River and covers approximately 3.6 square miles of land and 0.7 square miles of water. "The area temperature varies from -40 degrees Fahrenheit (ºF) during the winter to 70 ºF during the summer. The City's highest temperature reached 94 ºF and the lowest was -75 ºF. The City experiences a 13 inch annual precipitation and annual snowfall of approximately 72 inches." (DCRA 2009)

The Koyukon Athabascan, Kobuk, Selawik, and Nunamiut Eskimos inhabited the area as nomadic tribes following game and fish food sources to support their subsistence lifestyle. The tribes began to co-settle at the future site of the Old Allakaket town site around 1851. The various bands established joint settlements after 1851. The old town site was a traditional trading center for Athabascans and Eskimos.

- 1906 – The first mission on the Koyukuk River, St. John's-in-the-Wilderness Episcopal Mission.
- 1925 – A post office was opened.
- 1938 – The name of the community was changed to Allakaket (the old name for the mission), and the name Allakaket was assumed by the small Eskimo community across the river.
- 1957 – The first public school established.
- 1964 – Spring flood impacted the majority of the community.
- 1975 – The community incorporated as a City.
- 1978 – A clinic and airport were built in 1978.
- 1979 – A new school and community roads were built in 1979.
- 1994 – the "1995 Fall Flood" event destroyed the City.

- 1995 Residents rebuilt near the old City site, but some new homes and facilities are now located outside of the incorporated City boundaries. New Allakaket and Allakaket are located outside of the City limits.

## 3.2 DEMOGRAPHICS

The 2000 census recorded 97 residents, of which the median age was 31.5 indicating an overall young population. The population of Allakaket is expected to grow at the same or accelerated rate because nearly one-third of the population is 18 years of age and younger. Allakaket is principally an Athabascan community, and about 93 percent of residents recognize themselves as such. The male and female composition is approximately 58.8 and 41.2 percent respectively. The 2000 census revealed that there are 61 households with the average household having approximately 2.37 individuals. The most recent 2008 DCRA estimated population is 96. Figure 3-2 illustrates the historic population of the City.

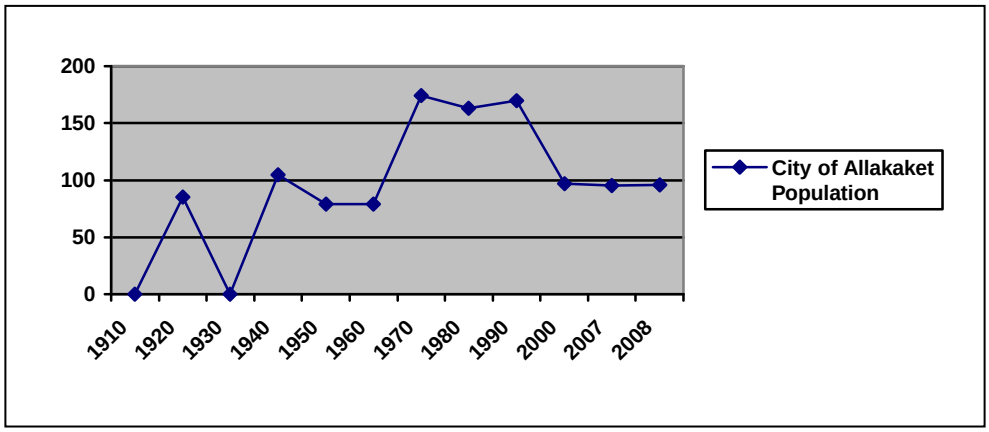


**Figure 3-2 Historic Population of the City of Allakaket**

## 3.3 ECONOMY

The City's economic structure is a mixture of cash and subsistence and is based on seasonal requirements with limited government based employment. Summer subsistence consists of harvesting salmon, whitefish, moose, caribou (when available), bear, small game, and berries. Trapping, crafts, construction projects, and Bureau of Land Management (BLM) firefighting along with government based work enables community members to earn much needed income. (DCRA 2009)

According to the 2000 census, the median household income in Allakaket was $16,563. Approximately 12 individuals (12.9 percent) were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in Allakaket was estimated to be 72, of which 28 were actively employed. In 2000 the unemployment rate was 25.0 percent; however, this rate included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

Figure 3-3 is a U.S. Army Corp of Engineers (USACE) provided aerial photograph of the City of Allakaket and the Native Village of Alatna showing their close proximity and relationship to the Koyukuk River.


**Figure 3-3 Aerial View of the City of Allakaket and the Native Village of Alatna**

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

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

DMA 2000 Requirements: Planning Process

Local Planning Process

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

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

Element

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

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

Element

- Does the plan provide a narrative description of the process followed to prepare the new or updated plan?
- Does the new or updated plan indicate who was involved in the planning process?
- Does the new or updated plan indicate how the public was involved?
- Does the new or updated plan discuss the opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?
- Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?
- *Does the updated plan document how the Planning Team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process? (Not applicable until 2014 update)*

*Source: FEMA, July 2008.*

## 4.1 OVERVIEW OF PLANNING PROCESS

The first step in the planning process began with the Mayor Eliza Ned appointing a local Planning Team in January 2009. Ms. Elizabeth Strassburg was selected as the Planning Team Leader during the Planning Team kickoff meeting on February 23, 2009. During the meeting, the team discussed City capabilities and proposed public meeting activities. The role of the Planning Team was also discussed to include: acting as an advocate for the planning process, assisting with gathering information, and support for the public meeting and other public participation opportunities. There was also a brief discussion about hazards that affect the community.

On March 5, 2009, the Planning Team held a public meeting. The hazard mitigation planning process was described and participants were asked to help identify hazards that affect the City and to also identify critical facilities.

In summary, the following five-step process took place from January through July 2009.

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 HMP.
2. Assess risks: The Planning Team identified the hazards specific to the City, and with the assistance of a hazard mitigation planning consultant (URS), developed the risk assessment for the six identified hazards. The Planning Team reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.
3. Assess capabilities: The Planning Team reviewed current administrative, technical, legal regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.
4. Develop a mitigation strategy: After reviewing the risks posed by each hazard, the Planning Team developed a comprehensive range of potential mitigation goals and actions. Subsequently, the Planning Team identified and prioritized the actions to be implemented.
5. 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.

## 4.2 HAZARD MITIGATION PLANNING TEAM

The Planning Team consists of Eliza Ned, Elizabeth Strassburg, Lucy Strassburg, Vincent Bergman, Vincent Simon, Gladys Bergman, and Julia Simon. The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight in coordination with DCRA who is managing a joint mapping project for the community. URS, DHS&EM's contractor, provided assistance to the Planning Team. Table 4-1 identifies the hazard mitigation Planning Team.

Ms. Lucy Strassburg replaced Elizabeth as the Planning Team Leader in July 2009 due to Elizabeth's relocation to a neighboring community.

**Table 4-1 Hazard Mitigation Planning Team**

| NAME | TITLE | ORGANIZATION | PHONE |
|---|---|---|---|
| Charlotte Mayo | Mayor | City of Allakaket | 968.2423 |
| Lucy Strassburg | Team Leader | Tribal Community Member | 968.2405 |
| Pamela Vent | Tribal EPA Project Coordinator | Allakaket Tribal Council | 968.2529 |
| Vincent Bergman | Tribal Chief | Allakaket Tribal Council | 968.2237 |
| Vincent Simon | Resident | Wood Vendor | 968.2386 |
| Gladys Bergman | Resident | Clinic Health Aide | 968.2248 |
| Julia Simon | Resident | Mental Health | 968.2210 |
| Scott Simmons | Planner/Consultant | URS Corporation | 562.3366 |
| Laura Young | Planner/Consultant | URS Corporation | 562.3366 |

**Table 4-1 Hazard Mitigation Planning Team**

| NAME | TITLE | ORGANIZATION | PHONE |
|---|---|---|---|
| Ervin Petty | Mitigation Specialist | DHS&EM | 428.2337 |
| Mark Roberts | State Hazard Mitigation Officer | DHS&EM | 428.2337 |
| Ruth St. Amour | Government Planner | DCRA | 269.4527 |
| Keith Jost | Natural Resources Specialist | DCRA | 269.4548 |

## 4.3 PUBLIC INVOLVEMENT AND OPPORTUNITIES FOR INTERESTED PARTIES TO PARTICIPATE

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

**Table 4-2 Public Involvement Mechanisms**

| Mechanism | Description |
|---|---|
| Newsletter Distribution (June 2009) | In January 2009, the jurisdiction distributed a newsletter describing the upcoming planning activity. The newsletter encouraged the whole community to provide hazard and critical facility information. It was delivered door-to-door to ensure everyone received a copy. |
| Public Meeting (June 2009) | The public meeting allowed community members to become involved with the planning process by providing essential historical and factual information for the vulnerability assessment. |
| Public Meeting (September 2009) | The public meeting allowed community members to view the Draft HMP. The Meeting also provided an opportunity for reviewing and prioritizing the identified mitigation actions which were based on the results of the hazard risk assessment. |

On January 23, 2009, a public meeting was held to introduce the hazard mitigation planning project to the community and other interested parties. An invitation was extended to all individuals and entities identified on the project mailing list via a project newsletter describing the planning process and announcing the upcoming public meeting. A newsletter was developed and was either faxed or emailed to relevant academia, nonprofits, and local, State, and Federal agencies on March 24, 2009. The newsletter was placed on the DSH&EM website and signs posted throughout the community announcing the public meeting.

During the meeting, URS led the attending public through a hazard identification and screening exercise. The attendees identified six potential hazards (earthquake, erosion, flood, permafrost, severe weather, and wildland fire).

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

After the community asset data was collected by the Planning Team over the spring of 2009, a risk assessment was completed that illustrated the assets that are exposed and vulnerable to specific hazards.

A second public meeting was held on September 21, 2009 to review and prioritize the mitigation actions identified based on the results of the risk assessment. A second newsletter was prepared and distributed on October 6, 2009, describing the process to date, presenting the prioritized mitigation actions, and announcing the availability of the Draft HMP for public review and comment.

## 4.4 INCORPORATION OF EXISTING PLANS AND OTHER RELEVANT INFORMATION

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

- *U.S. Army Corps of Engineers, Alaska Baseline Erosion Assessment, Erosion Information Paper – Allakaket, Alaska. December 11, 2007, defined the City's erosion threat.*
- *Allakaket, The Comprehensive Plan, A Constitutional Mandate for Long Term Survival, August 1995, defines the City's governance, floodplain, and future land use processes.*
- *The City of Allakaket Constitution, 1995, defines the City's governance.*
- *State of Alaska, Department of Commerce, Community and Economic Development Community Profile, defines the City's history, demographics, and capital improvement projects.*
- *City of Allakaket Floodplain Ordinance defined the City's floodplain development goals.*
- *City of Allakaket Flood Damage Resolution explained the City's relocation and future development policies.*
- *City of Allakaket Land Use Regulation defines the City's land use policies.*
- *City of Allakaket Local Permitting Process, 1995, explains the City's permitting process for post flood development.*
- *Fire Break Plan, 1995, explains the City's fire protection initiatives.*
- *Flood and Erosion Map of Alatna and Allakaket, Alaska, August 1994 (calculated 100 year flood), depicted the City's 1994 flood impacts.*

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

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

## 5.1 OVERVIEW OF A HAZARD ANALYSIS

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

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

## 5.2 HAZARD IDENTIFICATION AND SCREENING

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

DMA 2000 Requirements: Risk Assessment: Identifying Hazards

Identifying Hazards

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

Element

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

*Source: FEMA, July 2008.*

For the first step of the hazard analysis, the Planning Team identified 10 possible hazards that could affect the City. They then evaluated and screened the comprehensive list of potential hazards based on a range of factors, including prior knowledge or perception of the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected availability of information on the hazard (see Table 5-1). The Planning Team determined that six hazards pose the greatest threat to the City: earthquake, erosion, flood, permafrost, severe weather, and wildland fire. The remaining hazards excluded through the screening process were considered to pose a lower threat to life and property in the City due to the low occurrence likelihood or the low probability that life and property would be significantly affected.

**Table 5-1 Hazard Identification and Screening**

| Hazard type | Should it be profiled? *Yes / No* | Explanation *(How often does it occur)* |
|---|---|---|
| Avalanche (Snow) | No | This hazard does not exist for the City. |
| Earthquake | Yes | Periodic, unpredictable occurrences. |
| Erosion (Riverine) | Yes | During high water events and results from ice jam scouring. |
| Flood | Yes | Snowmelt and ice jam flooding occurs during spring thaw. Fall flooding events occur from soil saturation. |
| Landslide/Debris Flow | No | This hazard does not exist for the City. |
| Permafrost | Yes | Discontinuous permafrost is present throughout the community. |
| Tsunami | No | This hazard does not exist for the City. |
| Volcanic Hazards | No | This hazard does not exist for the City. |
| Weather (Severe) | Yes | Annual weather patterns, severe cold, freezing rain, and snow accumulations are predominate threats. The snowfall amount directly determines winter weather damages. Less snow causes frost line deepen resulting in frozen water and sewer pipes. More snow provides better ground insulation. Severe cold usually occurs during December-January. High winds typically occur from February-March and August-September. August experiences the most rain. Too much rain causes wild game to move to more distant dry ground way from the City increasing resident travel to harvest subsistence foods. Heavy rain and spring thaw causes high river water which reduces the City's residents' capability to harvest King salmon for subsistence needs. |
| Wildland Fire (Wildland/Urban Interface) | Yes | Historic wildfire occurrences during summer dry season (April-October). |
| Does this jurisdiction participate in the NFIP? | No | |
| Does this community participate in the Community Rating System (CRS))? | No | |

## 5.3 HAZARD PROFILE

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

DMA 2000 Requirements: Risk Assessment – Profiling Hazards

Profiling Hazards

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

Element

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

*Source: FEMA, July 2008.*

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

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

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

**Table 5-2 Hazard Probability Criteria**

| PROBABILITY | CRITERIA |
|---|---|
| *4 - Highly Likely* | Event is probable within the calendar year.<br>Event has up to 1 in 1 year chance of occurring (1/1=100 percent).<br>History of events is greater than 33 percent likely per year.<br>Event is "Highly Likely" to occur. |
| *3 - Likely* | Event is probable within the next 3 years.<br>Event has up to 1 in 3 years chance of occurring (1/3=33 percent).<br>History of events is greater than 20 percent but less than or equal to 33 percent likely per year.<br>Event is "Likely" to occur. |
| *2 - Possible* | Event is probable within the next 5 years.<br>Event has up to 1 in 5 years chance of occurring (1/5=20 percent).<br>History of events is greater than 10 percent but less than or equal to 20 percent likely per year.<br>Event could "Possibly" occur. |
| *1 - Unlikely* | Event is possible within the next 10 years.<br>Event has up to 1 in 10 years chance of occurring (1/10=10 percent).<br>History of events is less than or equal to 10 percent likely per year.<br>Event is "Unlikely" but is possible of occurring. |

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

**Table 5-3 Hazard Magnitude/Severity Criteria**

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

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

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

## 5.3.1 Earthquake

### *5.3.1.1 Nature*

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far

beyond the site of its occurrence. Earthquakes usually occur without warning and after only a few seconds can cause massive damage and extensive casualties. The most common effect of earthquakes is ground motion, or the vibration or shaking of the ground during an earthquake.

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

In addition to ground motion, the City can experience several secondary natural hazards 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 feet, 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 United States (U.S.) to measure intensity is the Modified Mercalli Intensity (MMI) Scale. As shown in Table 5-4, the MMI Scale consists of 12 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to

measure earthquake intensity by quantifying how hard the earth shakes in a given location. PGA can be measured as acceleration due to gravity (*g*) (see Table 5-4). (MMI 2009)

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

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

| MAGNITUDE | INTENSITY | PGA (% *g*) | PERCEIVED SHAKING |
|---|---|---|---|
| 0 – 4.3 | I | <0.17 | Not Felt |
| | II-III | 0.17 – 1.4 | Weak |
| 4.3 – 4.8 | IV | 1.4 – 3.9 | Light |
| | V | 3.9 – 9.2 | Moderate |
| 4.8 – 6.2 | VI | 9.2 – 18 | Strong |
| | VII | 18 – 34 | Very Strong |
| 6.2 – 7.3 | VIII | 34 – 65 | Severe |
| | IX | 65 – 124 | Violent |
| | X | 124 + | Extreme |
| 7.3 – 8.9 | XI | | |
| | XII | | |

(MMI 2009)

### *5.3.1.2 History*

Table 5-5 lists historical earthquakes from 1971 to present which exceeded M5.0 located within 100 miles of the City.

**Table 5-5 Historical Earthquakes for the City of Allakaket**

*(Highlight is earthquake of record)*

| CAT | YEAR | MO | DA | ORIG TIME | LAT | LONG | DEP | MAGNITUDE | DIST Km |
|---|---|---|---|---|---|---|---|---|---|
| PDE | 1985 | 02 | 14 | 050402.20 | 66.20 | -150.15 | 6.2 | 5.4 MLPMR | 80 |
| PDE | 1985 | 03 | 09 | 140804.38 | 66.24 | -150.03 | 6.8 | 6.0 MLPMR | 81 |
| PDE | 1985 | 03 | 09 | 141625.49 | 66.29 | -150.12 | 6.2 | 5.4 MLPMR | 78 |
| PDE | 1985 | 03 | 10 | 133029.53 | 66.14 | -150.15 | 6.2 | 5.6 MLPMR | 80 |
| PDE | 1985 | 03 | 16 | 133310.61 | 66.18 | -150.05 | 6.2 | 5.0 MLPMR | 82 |
| PDE | 1986 | 06 | 04 | 154820.80 | 65.64 | -152.60 | 6.2 | 5.7 MLPMR | 63 |
| PDE | 1986 | 06 | 24 | 204602.76 | 66.13 | -149.64 | 6.2 | 5.2 MLPMR | 94 |
| PDE | 1989 | 04 | 23 | 192106.47 | 66.96 | -156.29 | 3.7 | 5.3 MLPMR | 98 |

(USGS 2007)

The City has no history of damaging earthquakes. However, 511 earthquakes have been recorded within a 100 mile radius of the City since 1977. The average magnitude of these earthquakes is M3.0.

North America's strongest recorded earthquake occurred on March 27, 1964, measuring M9.2 and was felt by many residents throughout Alaska. The City felt ground motion resulting from this historic event; however, no local damage occurred. (Allakaket 2009)

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

***Location***

The entire geographic area of Alaska, to include the City of Allakaket, is prone to the effects of an earthquake. Peter Haeussler, Alaska Region U.S. Geological Survey (USGS) explained during a telephone conversation, the Kaltag Fault follows the Yukon River and is relatively centered on the Koyukuk/Yukon River confluence.

The Kobuk Fault Zone comprises a fault system of smaller faults; located north of the City of Allakaket running east to west along the border of the Brooks Range. (GSA 1998).

Of the 511 recorded earthquakes since 1977, eight exceeded M5.0 (USGS). The largest recorded for the area occurred on March 9, 1958, and measured M6.0, at a depth of 6.8 miles. The epicenter was located approximately 81 miles from the City. This earthquake caused no damage to critical facilities, residences, non-residential buildings, or infrastructure

Figure 5-2 shows the locations of active and potentially active faults in Alaska.

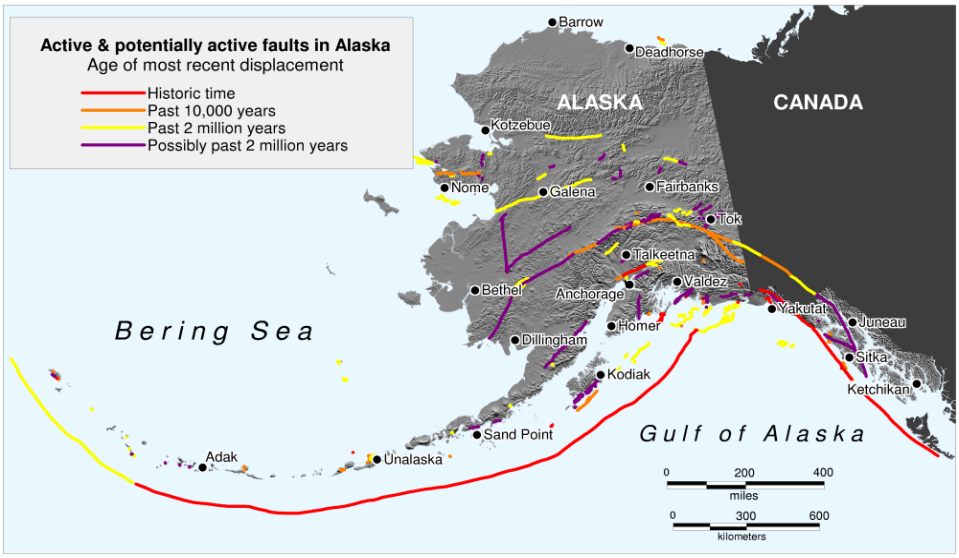


**Figure 5-1 Active and Potentially Active Faults in Alaska**

***Extent***

The Kaltag fault and Kobuk fault zone produce intraplate earthquake, which occur within a tectonic plate sometimes at great distance from the plate boundaries. These types of earthquakes can reach M7.0 and greater. Shallow earthquakes in the Fairbanks area are an example of intraplate earthquakes. (GSA 1998)

Earthquakes felt in the City area have not exceeded M6.0 in the past 31 years, and damage has never been reported due to an earthquake event.

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

***Impact***

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

***Probability of Future Events***

The City has no official record of significant earthquake activity resulting in damage or injuries. While it is not possible to predict when an earthquake will occur, Figure 5-2 was generated using the USGS Earthquake Mapping model and indicates approximately a 6 percent probability of a M5.0 or greater earthquake occurring within 10 years and 31 miles of the City.

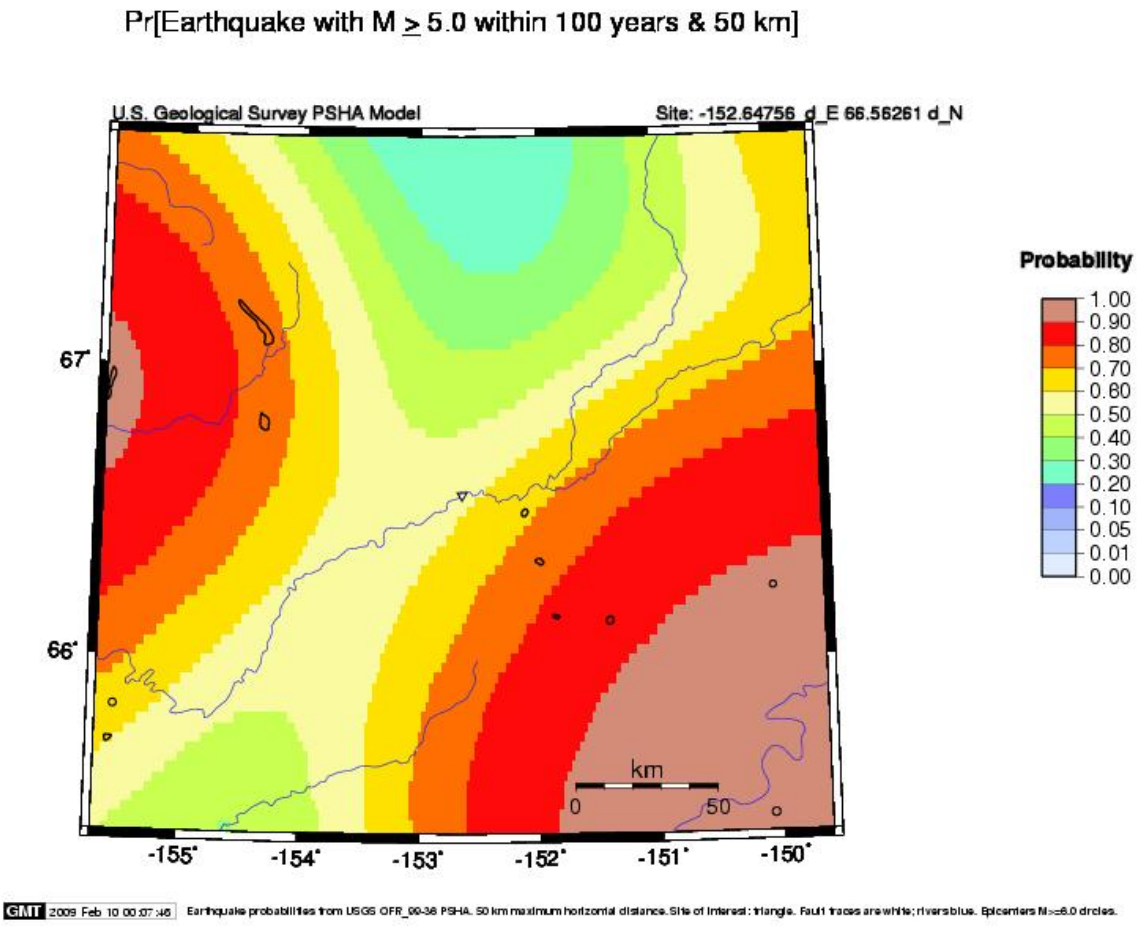


**Figure 5-2 Allakaket Earthquake Probability** (USGS 2009)

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

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

## 5.3.2 Erosion

### *5.3.2.1 Nature*

Erosion rarely causes death or injury. However, erosion causes the destruction of property, development and infrastructure. Erosion is the wearing away, transportation, and movement of land. It is usually gradual but can occur rapidly as the result of floods, storms, or other event or slowly as the result of long-term environmental changes. Erosion is a natural process, but its effects can be exacerbated by human activity.

Erosion is a problem in developed areas where the disappearing land threatens development and infrastructure. Only riverine erosion affects Allakaket's human activity at the Old Town site.

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

### *5.3.2.2 History*

Erosion has impacted the City from historical flood events. However very little documented erosion information is available.

The Federally declared 1994 Koyukuk Flood Disaster destroyed 17 homes, 24 homes received major damage, 16 received minor damage, and all public facilities were significantly damaged. Severe erosion occurred from high water flows and as buildings scoured the embankment as the high water flows relocated them from their original locations. The damage was so pervasive that the City relocated on higher ground about 2 miles inland and uphill from the old location. Not all residences and infrastructure relocated and remained at the "Old" Allakaket townsite.

The Alaska Baseline Erosion Assessment, Erosion Information Paper for the City of Allakaket states "Flooding and associated erosion caused by ice jams is a common occurrence in Allakaket. Major flood events occurred in 1937, 1938, 1939, 1964, 1966, 1968, 1989, and 1994. The [Old] Allakaket part of the community is on a low, flat area along the river that can easily flood. New Allakaket is on higher ground, above the floodplain [and not susceptible to erosion]." (USACE 2009b)

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

***Location***

The USACE, Alaska Baseline Erosion Assessment, Erosion Information Paper for the City of Allakaket states, "Erosion [occurs] along the Koyukuk River at the ballpark and picnic area near the old airstrip, where a step bank drops off to the river. The erosion area is about 200 yards long, with a 12-14 foot vertical bank." (USACE 2009b)

Riverine erosion hazards are known to affect the City. Factors that influence embankment erosion along the Koyukuk River include flooding, spring break-up, ice jam scour, and melting

permafrost. The riverbanks around Allakaket are essential to the lives of the residents and are susceptible to the effects of erosion (Figure 5-3).

Figure 3-3 is a USACE provided aerial photograph of the City showing its location adjacent to the Koyukuk River. The white areas adjacent to the river embankment are soil deposition locations resulting from flood and erosion events. These areas are good sources for the City's gravel needs.

**Figure 5-3 Aerial View of the City of Allakaket** (USACE 2009)

***Extent***

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

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

Erosion in the City usually removes small areas at a time. Significant events can threaten facilities at the old townsite situated adjacent to the Koyukuk River. The City ballpark picnic area and the old airstrip are susceptible to erosion. The City also reports that minor structures

like "outbuildings, sheds, and smokehouses along the river" are still threatened by erosion. (USACE 2009b)

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

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

***Impact***

Impacts from erosion include loss of land and any development on that land as what occurred during the catastrophic federally declared 1994 Koyukuk River Flood event where the community was essentially destroyed by high water flows and erosion. This significant event however, caused infrastructure, critical facilities, residences, and other buildings to succumb to the river's destructive forces.

Erosion can cause increased sedimentation of river channels and hinder navigation—affecting marine transport. Other impacts include reduction in water quality due to high sediment loads, loss of native aquatic habitats, damage to public utilities (fuel headers and electric and water/wastewater utilities), and economic impacts associated with costs trying to prevent or control erosion sites. Erosion damage is not usually something that happens immediately; rather it happens slowly over time.

***Probability of Future Events***

The City of Allakaket's Comprehensive Plan states the "erosion potential is medium to high." Based on the Planning Team's local knowledge of previous occurrences and applying the criteria identified in Table 5-2, it is likely that erosion will occur in the next three years (event has up to 1 in 3 years chance of occurring) as the history of events is greater than 20 percent but less than or equal to 33 percent likely per year.

## 5.3.3 Flood

### *5.3.3.1 Nature*

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

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

### *Rainfall-runoff Flood*

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

### *Snowmelt Flood*

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

### *Ice Jam Flood*

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

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

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

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

### *Ice Overflow (Aufeis) Flood*

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

***Timing of Events***

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

### *5.3.3.2 History*

The City of Allakaket's Comprehensive Plan states that "[f]loods in the Koyukuk River Basin generally result from spring snowmelt and summer rainfall. Spring flood usually occurs from extreme snowmelt events that are sometimes complicated by … ice jams at the convergence of several rivers. Rainfall flood often occur in the late summer [from] large frontal storms." Allakaket's most serious floods occurred in 1937, 1938, 1939, 1964, 1966, 1968, and 1989. (Allakaket 1995) Additional severe flood events are listed in Table 5-6.

Community team members stated during the hazard identification team meeting that the City declared a disaster emergency from a May 17-22, 1993 spring flood event where nine homes flooded and sustained damage to floors and insulation. Flood water also damaged the water utilidor, waste heat lines, sawmill, and the City Airfield. The August 26, 1994 flood disaster brought unprecedented flood losses to personal and public property. Residents were evacuated to Fairbanks during the recovery phase of the disaster. The month of August 1994 brought heavy rains resulting in serious flooding to the Koyukuk, Kobuk, and Noatak rivers. The City and the Village of Alatna were extensively damaged. Governor Hickel declared a disaster emergency (DR-1039-AK) for the 109 residents of both locations and other villages in the affected area.

> *"As a result of this flood, 57 of Allakaket's 61 habitable homes were damaged. Seventeen were destroyed, 24 suffered major damage, and 16 sustained minor damage. Twenty three home were moved off their foundations, with most traveling 10 to 200 feet. Several were moved one-half mile across the airport or two miles to what has become known locally as "South Allakaket" since the flood. One home floated 35 miles downstream.*
>
> *Nearly all public facilities were damaged. The airport runway was under 10 feet of high velocity water and became part of the river's channel. The historic St John's in the Wilderness Mission Church was moved off its foundation approximately 20 feet and sustained substantial damage. The health clinic, post office, store, and city lodge were destroyed. The 30-ton community center was moved three miles downstream and destroyed. The landfill, fuel tank farm, and maintenance facility were substantially damaged. The school received significant damage to insulation and the mechanical and electrical systems. Teacher housing, telecommunications, the new church, tribal office, VPSO/Mental Health Office, washeteria, power plant, and city offices all received some damage."* (Allakaket 1995)

Table 5-6 lists recorded flooding events for the National Weather Services' Bettles Weather Zone. Highest water recorded was in 1994 at an elevation of 499.0 ft, which is still within bank. Datum reference is the National Oceanic and Atmospheric Administration (NOAA) Profile River Gage. Bank full is at 90 ft and flood stage is at 99 ft. (USACE 2009)

**Table 5-6 Historic Flood Events**

| Zone(s) | Location(s) | Date(s) | Event | Description |
|---|---|---|---|---|
| AK004 | Alatna, Allakaket | 15-16-May-89 | Ice Jam Flood | Airport runway flooded |
| AK004 | Alatna , Allakaket, Hughes | 8-9-May-91 | Flood | Minor Flooding |
| AK004 | Alatna, Allakaket, Bettles, Hughes | FEMA declared (DR-1039) on September 12, 1994 | Flood<br>(Lake dam release up Alatna River contributed to flooding in Alatna/ Allakaket) | Rainfall caused flooding. The total estimate for restoration of the flooded villages on the rivers is $74K.<br>Governor declared disaster on 8/26/94. The communities of Alatna and Allakaket were evacuated by military CH-47 Chinook helicopters |

The flood of record occurred in August 1994 resulting from a rainfall event which lasted for almost 30 days with an elevation of 499 ft. This is also the worst and most recent flood event for the City. (USACE 2009)

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

***Location***

"The 100-year flood level elevation is 499 ft at the upstream end of town and 497 ft at the downstream end of runway. The elevation datum is assumed, and is consistent with the 1991 Alaska Department of Transportation/Public Facility (DOT/PF) topographic map. An apparent 80 ft difference exists between Flood Insurance Rate Map (FIRM) and the USGS 1 63,360 Scale topographic map (Bettles C-6). National Weather Service datum can be obtained by subtracting 462.53 ft." (USACE 2009)

City of Allakaket Flood Gauge

Flood Gauge Location

**Figure 5-4 City of Allakaket Flood Gauges** (USACE 2009)

***Extent***

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

The following factors contribute to riverine flooding frequency and severity:

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

Several of the City's critical infrastructure such as the air field, city maintenance buildings, health clinic, community hall, tank farm, AP&T power generation facility, washeteria, water treatment plant, and approximately 15 new Housing and Urban Development (HUD) residential structures were relocated during the 1994 Koyukuk River Flood City Relocation effort and are now located inland and above the floodplain. (Allakaket 1995b, c, d, e, and f)

However, several structures are still located at the Old Town Site well below the high water line of the 1994 flood. The City office, U.S. Post Office, School and school fuel tanks, Head Start building, mental health clinic, Denaakekookoyaah Store, five Teacher's quarters buildings, community roads, AP& T Storage Facility, two sewage lagoons and approximately 47 residential structures remain in the floodplain-wetlands of Old Town Allakaket. (Allakaket 1995)

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

***Impact***

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

- Structure flood inundation, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater damages.

- Sewage and hazardous or toxic materials release as wastewater treatment plants or sewage lagoons are inundated, storage tanks are damaged, and pipelines are severed.

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

Impacts and problems also related to flooding are deposition and stream bank erosion (erosion is discussed in detail in Section 5.3.2).

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

As stated above the majority of residential structures remain in the floodplain along with the school and teacher's quarters, the community store, and two sewage lagoons. This combination of infrastructure and residences poses a health threat to the community if the sewage lagoons are inundated and effluent spreads throughout Old Town impacting these essential facilities.

***Probability of Future Events***

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

## 5.3.4 Permafrost

### *5.3.4.1 Nature*

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

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

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

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

The City of Allakaket Comprehensive Plan states that permafrost within the City is "often ice rich [and] present throughout the region except under major waterways. The permafrost table is shallow and may extend to depths of several hundred feet. Thawing in summer only occurs in the top 3 to 4 ft" of the ground surface. (Allakaket 1995)

### *5.3.4.2 History*

There is no written record defining permafrost impacts for the City. However, the Planning Team stated, that uneven settling throughout the years within the City has damaged buildings and roads constructed in permafrost areas. Residents are able to repair minor damages and level buildings to reduce this natural hazard's impact. (Allakaket 2009)

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

***Location***

According to mapping completed by the State of Alaska's Division of Geological and Geophysical Survey, the entire City is underlain by discontinuous permafrost (Figure 5-5). The lower or "Old Town" section is more susceptible to permafrost damage than the new location on the hillside as Old Town is generally more wet due to its location adjacent to wetlands. (Allakaket 2009)

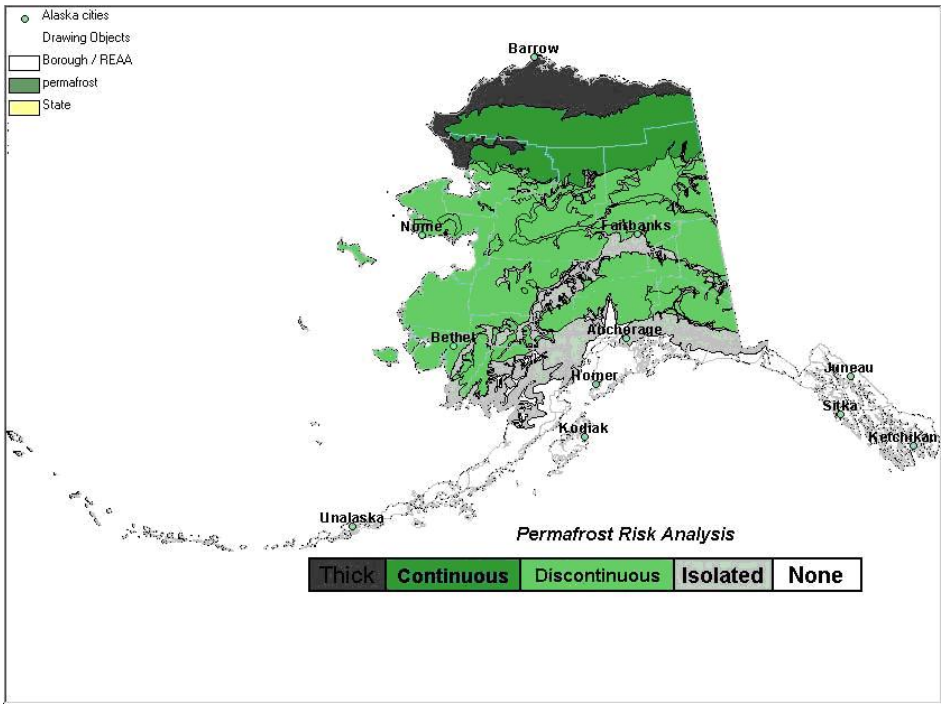


**Figure 5-5 DGGS Permafrost Map of Alaska** (DHS&EM 2007)

***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 past permafrost degradation events and the criteria identified in Table 5-3, the extent of permafrost degradation impacts in the City are considered negligible where injuries and/or illnesses are treatable with first aid, minor quality of life is lost, shutdown of critical facilities and services occurs for 24 hours or less, and less than 10 percent of property is severely damaged.

***Impact***

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

***Probability of Future Events***

Historical permafrost damage data is non-existent for the City of Allakaket However, the Planning Team stated that permafrost damage occurs annually to those structures and roads located in Old Town due to its location within the wetlands.

The Planning Team stated that the probability for permafrost occurring follows the criteria in Table 5-2, the probability of future damage resulting from permafrost is "possible" in the next five years (has up to 1 in 5 years of occurring) as the history of events is greater than 10 percent but less than or equal to 20 percent likely per year.

## 5.3.5 Weather (Severe)

### *5.3.5.1 Nature*

Severe weather in Alaska includes thunderstorms, lightening, hail, heavy and drifting snow, freezing rain/ice storm, extreme cold, and high winds. The City experiences the following.

***Heavy and Drifting Snow***

Heavy snow generally means snowfall accumulating to 4 inches or more in depth in 12 hours or less or 6 inches or more in depth in 24 hours or less. Drifting is the uneven distribution of snowfall and snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.

***Freezing Rain/Ice Storm***

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

***Extreme Cold***

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

***High Winds***

High winds occur in Alaska when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska. Alaska's high wind can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other characteristics of hurricanes. In Alaska, high winds (winds in excess of 60 miles per hour [mph]) occur rather frequently in Alaska, high winds (winds in excess of 60 mph) occur rather frequently over the interior due to strong pressure differences, especially where influenced by mountainous terrain.

### *5.3.5.2 History*

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

**Table 5-7 Severe Weather Events**

| Zone(s) | Location(s) | Date(s) | Event | Description |
|---|---|---|---|---|
| AK004 | Bettles | 10 Nov 85 | Heavy Snow | 8 inches (1-day). |
| AK004, AK008 | Various | 24-25 Feb 89 | Winter Storm | Wind and heavy snow in many areas, probably affected all villages. |
| AK004 | Alatna, Allakaket | 15-16 May 89 | Ice Jam Flood | Airport runway flooded. |
| AK004 | Bettles | 1-2 Mar 90 | Heavy Snow | 9-10 inches (1-day). |
| AK004 | Bettles | 1-5 Mar 91 | Heavy Snow | 13 inches (2-day). |
| AK004 | Alatna , Allakaket, Hughes | 8-9 May 91 | Flood | Minor Flooding. |
| AK004 | Alatna, Allakaket, Bettles, Hughes | FEMA declared (DR-1039) on Sept 12, 1994 | Flood | Major river flooding occurred on the Koyukuk, Kobuk, and Noatak Rivers. The total estimate for restoration of the flooded villages on the rivers is $74M. |
| AK004 | Alatna , Allakaket, Bettles, Evansville | 16-18 Feb 96 | Heavy Snow | A deepening storm, strong weather front produced snow. Bettles 7 inches. |
| AK004 | | 24-26 Feb 96 | High Wind | Strong winds in the passes of the Alaska and Brooks Ranges. |
| AK004 & AK008 | Alatna, Allakaket, Bettles, Evansville, Galena, Hughes, Huslia, Nulato Kaltag, Ruby | 26-29 Feb 96 | Heavy Snow | Widespread snow: Kaltag 12-16 inches, Galena 4 inches, Huslia 6-8 inches, Allakaket 9+ inches, Bettles 11 inches. |
| AK004 | Alatna , Allakaket, Bettles, Evansville | 17-19 Dec 96 | Winter storm | Heavy snow over parts of Zone 3 and eastern Zone 4. Bettles 6 inches. |
| AK004 | Alatna, Allakaket, Bettles, | 26-31 May | Snowmelt | Rain with rapid snowmelt caused flooding |

| Table 5-7 Severe Weather Events | | | | |
|---|---|---|---|---|
| Zone(s) | Location(s) | Date(s) | Event | Description |
| | Evansville, Hughes, Huslia | 98, 01 Jun 98 | Flood | on the Koyukuk and Chandalar Rivers. High water flooded 1,600 ft of a 4,000 ft gravel runway at Allakaket, some bank erosion also occurred though no structures were damaged. This event continued into June on the Koyukuk River only. |
| AK004 & AK008 | Alatna, Allakaket, Bettles, Evansville, Galena, Hughes, Huslia, Nulato Kaltag, Ruby | 22-24 Jan 99 | Heavy Snow | Blizzard Conditions and strong winds. Bettles 15 inches, Nulato 7 inches; Ruby 10.2 inches; Kaltag 12 inches. |
| AK004 & AK008 | Alatna, Allakaket, Bettles, Evansville, Galena, Hughes, Huslia, Kaltag, Ruby, Grayling | 29-31 Jan 99 | Extreme Cold | The lowest recorded temperatures and dates are Zone 4: Huslia: -67, Galena -64, and Grayling -58. |
| AK004 & AK008 | Alatna, Allakaket, Bettles, Evansville, Galena, Hughes, Huslia, Kaltag, Ruby, Grayling | 01-12 Feb 99 | Extreme Cold | Continuation of January event remained in the -50s and -60s one or more times. Galena -64, Kaltag -65, Ruby -58, Grayling -58. |
| AK004 & AK008 | Nulato, Kaltag | 22-24 Jan 00 | Winter Storm | Winter weather, heavy snow. |
| AK004 & AK008 | Bettles, Nulato, Galena, Kaltag | 9-11 Nov 00 | Winter Storm | Winter weather, cold air, blizzard conditions. |
| AK216 & AK219 | Bettles, Galena | 1-3 Mar 03 | Heavy Snow | The heaviest snow fell near Bettles, 11 inches. Galena measured 8 inches with near white out conditions for short periods as the heaviest snow fell. |
| AK219 | Bettles | 8 Nov 03 | Heavy Snow | Snow - Bettles reported 6.5 inches of snow |
| AK219 | Bettles | 22 Dec 03 | Heavy Snow | Snow - Bettles 9.0 inches. |
| AK219 | Bettles | 2 Feb 04 | Heavy Snow | Snow - Bettles 8.0 inches. |
| AK216-AK219 | Galena, Bettles | 2-5-Jan-05 | Heavy Snow | Arctic cold front with heavy snow. Galena 8 inches, Bettles 10.4 inches. |
| AK219 | Bettles | 4-6 Dec 08 | Winter Storm | Snowfall - Bettles 6.7 inches of snow. |
| AK216 & AK219 | Galena, Bettles | 1-12 Jan 09 | Extreme Cold/ Wind Chill | Cold snap did not produce any record low temperatures. It was the most prolonged cold snap across interior Alaska since 1999.<br>Galena: -51 ºF, Bettles:-51 ºF. |
| AK215, AK216 & AK219 | Alatna, Allakaket, Bettles, Galena, Hughes, Huslia | 13-16 Jan 09 | Winter Storm | Snow 8 to 12 inches of snow fell along the Nulato Hills. Near to above freezing temperatures, changed to freezing rain.<br>Snow – Bettles 9.7 inches. |

(Lingaas 2009)

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

***Location***

The entire City is subject to severe weather impacts. The National Weather Service has continued to modify their system for assigning weather zones to facilitate and more accurately confine weather patterns to relevant geographic areas. Consequently this data in Table 5-6 reflects different zone numbering patterns and should be used to depict weather events that have historically impacted the area; some of which may not have impacted the City as severely as other areas within the same zone.

***Extent***

Blizzard conditions and heavy snow depths for the entire City area can reach 12 inches per storm event; wind speed can exceed 49 mph; and extreme low temperatures have reached -85ºF. (Allakaket 2009)

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

***Impact***

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

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

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

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

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

increases during episodes of extreme cold, and carbon monoxide poisoning is possible as people use supplemental heating devices.

The City experience extensive permanent damage to water and sewer systems due to prolonged low temperatures averaging -85 ºF. (Allakaket 2009)

***Probability of Future Events***

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

## 5.3.6 Wildland Fire

### *5.3.6.1 Nature*

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

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

- **Topography:** As slope increases, the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridgetops may mark the end of wildland fire spread, since fire spreads more slowly or may even be unable to spread downhill.
- **Fuel:** The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the "fuel load"). The ratio of living to dead plant matter is also important. The risk of fire is increased significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.
- **Weather:** The most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. By contrast, cooling and higher humidity often signal reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent on other hazards, such as lightning, drought, and infestations (such as the damage caused by spruce-bark beetle infestations). If not promptly controlled, wildland fires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to

affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter.

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

### *5.3.6.2 History*

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

The Division of Forestry's Alaska Interagency Coordination Center (AICC) lists over 271 wildland fires occurred within 50 miles of the City. Table 5-8 lists 79 wildfires that exceeded 3,000 acres burned for the historical period of 69 years (i.e., from 1939 to 2008).

**Table 5-8 Wildfire Locations Since 1939**

| Fire Name | Fire Year | Estimated Acres | Specific Cause |
|---|---|---|---|
| John River | 2008 | 1660.5 | Unidentified |
| Goose Slough | 2008 | 2564.4 | Unidentified |
| Hatdolitna Hills | 2007 | 2179.9 | Lightning |
| Wild | 2007 | 2119.8 | Lightning |
| Old Dummy | 2005 | 231821.8 | Unidentified |
| Heart Mountain | 2005 | 2596.6 | Lightning |
| Hughes Creek | 2005 | 22435.1 | Unidentified |
| Alatna Hills | 2005 | 6232.5 | Lightning |
| Norutak Hills #2 | 2004 | 17397 | Unidentified |
| Clawanmenka Lake | 2004 | 108577 | Lightning |
| Lake Todatonten | 2004 | 12377 | Unidentified |
| Evansville | 2004 | 135627 | Unidentified |
| Jim River | 2002 | 23909 | Lightning |
| Death Valley | 2002 | 2163 | Lightning |
| Wild | 2000 | 4635 | Lightning |
| Hog Head | 1999 | 2140 | Lightning |
| Siruk Creek | 1999 | 3132 | Lightning |
| Reed River | 1997 | 4395 | Lightning |
| Mud Fire 731349 | 1997 | 24185 | Lightning |
| 532370 | 1995 | 6060 | Lightning |
| Btt S 49 | 1994 | 8240.2 | Lightning |
| Btt Ne 26 | 1994 | 6219 | Lightning |
| Btt S 48 | 1992 | 25600 | Lightning |
| 131655 | 1991 | 27000 | Lightning |
| Btt S 49 | 1991 | 51280 | Lightning |
| 131615 | 1991 | 16500 | Lightning |
| Btt Wsw 84 | 1991 | 184520 | Lightning |

**Table 5-8 Wildfire Locations Since 1939**

| Fire Name | Fire Year | Estimated Acres | Specific Cause |
|---|---|---|---|
| Dck E 65 | 1991 | 13290 | Lightning |
| 132614 | 1991 | 33920 | Lightning |
| Btt Ss 53 | 1991 | 14390 | Lightning |
| Btt S 17 | 1991 | 43952 | Lightning |
| 131569 | 1991 | 249784 | Lightning |
| 031039 | 1990 | 4100 | Lightning |
| Btt W 31 | 1990 | 3100 | Lightning |
| Btts S 40 | 1990 | 400182 | Lightning |
| Btt Se 59 | 1990 | 15170 | Lightning |
| Btt Sw 53 | 1990 | 29200 | Lightning |
| Hus Sw 15 | 1990 | 4444.2 | Lightning |
| Tal N 47 | 1990 | 58950 | Lightning |
| 032039 | 1990 | 2589.1 | Lightning |
| Tal Nw 85 | 1985 | 23500 | Lightning |
| Hus W 5 | 1981 | 12000 | Lightning |
| Todatonten | 1981 | 21000 | Lightning |
| Btt E 12 | 1977 | 10240 | Lightning |
| Btt Se 47 | 1977 | 75000 | Lightning |
| Btt W 47 | 1977 | 3500 | Lightning |
| Btt N 15 | 1977 | 9500 | Lightning |
| Tobuk Creek | 1972 | 3000 | Lightning |
| Bettles | 1972 | 3000 | Lightning |
| Bridge | 1972 | 243800 | Lightning |
| Bergman Creek | 1972 | 32000 | Lightning |
| Kurti Flats | 1972 | 25000 | Lightning |
| Rocky Bottom | 1972 | 5000 | Lightning |
| Ten Ten | 1971 | 6500 | Lightning |
| Niitltoktalogi | 1969 | 230000 | Unidentified |
| Holanada Creek | 1969 | 803470 | Lightning |
| Lake Creek | 1969 | 40000 | Lightning |
| Roosevelt | 1969 | 20480 | Lightning |
| Kilolitna | 1969 | 4000 | Lightning |
| John | 1969 | 93330 | Lightning |
| Todatontin | 1969 | 3000 | Lightning |
| Sithdonit | 1969 | 7800 | Lightning |
| Bananza | 1968 | 26000 | Lightning |
| Winter Trail | 1968 | 10000 | Lightning |
| Bettles #5 | 1959 | 3200 | Lightning |
| Bettles #1 | 1959 | 4500 | Lightning |
| Iniakuk Lake E-8 | 1959 | 19200 | Lightning |
| Bettles #2 | 1959 | 7700 | Lightning |
| Bettles W-40 | 1957 | 80000 | Lightning |
| Hughes Nw10 | 1954 | 3000 | Lightning |
| Allakaket | 1954 | 12120 | Lightning |

**Table 5-8 Wildfire Locations Since 1939**

| Fire Name | Fire Year | Estimated Acres | Specific Cause |
|---|---|---|---|
| Kanuti River | 1953 | 20000 | Lightning |
| Allakaket West 30 | 1952 | 12032 | Lightning |
| Kanuti - Bay Rivers | 1950 | 21500 | Lightning |
| Batza | 1946 | 14080 | Lightning |
| Kanuti Lake | 1946 | 195840 | Lightning |
| Arctic City | 1946 | 54400 | Lightning |
| Alatna River | 1946 | 30720 | Lightning |
| Betttles Field Fire | 1946 | 253952 | Lightning |

*(AICC 2009)*

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

***Location***

Under certain conditions wildland fires may occur in any area with fuel surrounding the City. Since fuels data is not readily available, for the purposes of this plan, all areas outside City limits are considered to be vulnerable to wildland fire impacts. The AICC lists mined that 271 wildland fire events have occurred since 1939 within 50 miles of the City (Figure 5-6).

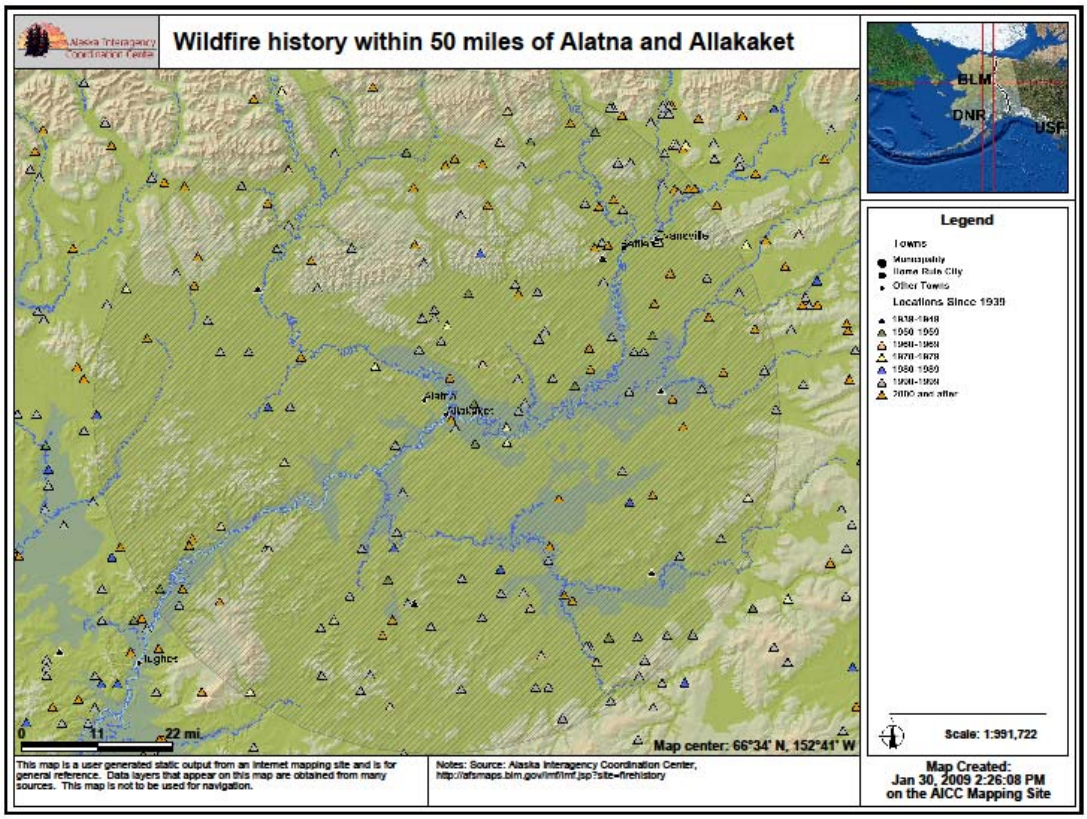


**Figure 5-6 City of Allakaket Wildfire Historical Locations** (AICC 2008)

***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 lightening 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.

During the past 69 years an average of 38,303 acres burned during each of the 79 wildland fire events from Table 5-8. Recent wildland fires appear to burn much smaller acreage per event. This may be due to the fact that the State's Division of Forestry (DOF) much more efficiently manage wildland fires using a four tiered suppression methodology based on infrastructure criticality while using more modern available resources as they respond to wildland fires which potentially threaten populated areas. (DOF 2009)

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

***Impact***

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

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

***Probability of Future Events***

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

response to the fire. In Alaska, the natural fire regime is characterized by a return interval of 50 to 200 years, depending on the vegetation type, topography, and location. Wildland fire records indicate the City has an average occurrence rate of approximately 3.9 wildland fires per year within a 50 mile radius.

Based on the history of wildland fires within 50 miles of the City and applying the criteria identified in Table 5-2, it is likely a wildland fire event will occur within the 50 mile radius in the next three years. The event has up to one in three years chance of occurring and the history of events is greater than 20 percent but less than or equal to 20 percent likely each year.

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

## 6.1 OVERVIEW OF A VULNERABILITY ANALYSIS

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

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

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

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview

Assessing Vulnerability: Overview

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

Element

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

Source: FEMA, July 2008.

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

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

Assessing Vulnerability: Addressing Repetitive Loss Properties

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

Element

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

Source: FEMA, July 2008.

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

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

Assessing Vulnerability: Identifying Structures

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

Element

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

*Source: FEMA, July 2008.*

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

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

Assessing Vulnerability: Estimating Potential Losses

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

Element

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

*Source: FEMA, July 2008.*

## 6.2 VULNERABILITY ANALYSIS: SPECIFIC STEPS

### 6.2.1 Asset Inventory

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

#### *6.2.1.1 Population and Building Stock*

Population data for the City were obtained from the 2000 U.S. Census. The City's total population for 2000 was 97 and Department of Community, Commerce, and Economic Development (DCCED)/DCRA's certified 2008 data reported a population of 96 (Table 6-1).

**Table 6-1 Estimated Population and Building Inventory**

| Population | | Residential Buildings | |
|---|---|---|---|
| 2000 Census | DCCED / DCRA 2008 Data | Total Building Count | Total Value of Buildings[1] |
| 97 | 96 | 61 | $3,861,300 |

*Sources: City of Allakaket, U.S. Census 2000, and DCCED/DCRA 2008 Certified Population.*
*[1] Average structural value of all single-family residential buildings is $63,300 per structure.*

Estimated numbers of residential buildings and replacement values for those structures, as shown in Table 6-1, were obtained from the City of Allakaket, the 2000 U.S. Census, and DCRA. A total of 61 single-family residential buildings were considered in this analysis.

#### *6.2.1.2 Repetitive Loss Properties*

The City does not currently participate in the NFIP and does not have an inventory of properties that meet the RL or SRL criteria. This has been identified as a high priority action as a result of the 1994 Koyukuk River Flood and this hazard mitigation planning process. The City is investigating application to the NFIP program.

#### *6.2.1.3 Existing Critical Facilities and Infrastructure*

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

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

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

**Table 6-2 City of Allakaket Critical Facilities**

| Occupancy Type | Facility Name | Location / Address | Structure value or Per Mile Replacement Cost | Size or Dimensions | Length, Total Miles, Gals, Occupants |
|---|---|---|---|---|---|
| **Government Facility** | City Office Building | A Street, Lot 11 | $144,000 | | 3 Occ |
| | Tribal Office Building | "A" Street, Tr. B | $$250,000 | | 7 Occ |
| | US Post Office | Store Street, Lot 19 | $250,000 | | 1 Occ |
| | City Garage/Storage Building | Airport Apron | $1,000,000 | 2400 sq ft | 0 Occ |
| | Small Red City Building | "A" Street, Lot 37 | $$50,000 | | 0 Occ |
| **Transportation Facilities** | Airfield Facilities | Airport Road | $7,232,000 | 4000'x 100' | 3 Occ |
| **Emergency Response Facility** | None | N/A | $0 | | 0 Occ |
| **Educational Facility** | Allakaket School | "D" Street, Lot 2 | $6,700,000 | 20,000 sq ft | 60 Occ |
| | School Class Room Building Annex | "A" Street, Lot 27 | $1,500,000 | | 20 Occ |
| | Headstart Building | A Street, Lot 4 | $200,000 | | 8 Occ |
| **Care Facility** | Allakaket Health Clinic | "A" Street, Lot 40 | 1,000,000 | | 4 Occ |
| | Mental Health Building | 3rd Avenue, Lot 15 | $164,000 | | 2 Occ |
| **Community Facility** | St Johns in the Wilderness Church (Historical) | St. John's Church, "A" Street | $700,000 | | 20 Occ |
| | Denaakekookoyaah Store | Store Street, Lot 13 | $444,000 | | 5 Occ |
| | Teacher's Quarters 1 | "D" Street, Lot 2 | $300,000 | | 5 Occ |
| | Teacher's Quarters 2 | "D" Street, Lot 2 | $300,000 | | 1 Occ |
| | Teacher's Quarters 3 | "D" Street, Lot 2 | $300,000 | | 1 Occ |
| | Teacher's Quarters 4 | "D" Street, Lot 2 | $300,000 | | 1 Occ |
| | Teacher's Duplex 1 | "D" Street, Lot 2 | $500,000 | | 8 Occ |
| | Community Hall | "A" Street, Tr. A | $400,000 | | 100 Occ |
| | Allakaket Village Freezer House | "A" Street, Tr. B | $200,000 | | 0 Occ |
| **Roads** | Roads (Bureau of Indian Affairs [BIA]) | N/A | $1,650,000 | 22' wide | 0 Occ |
| | Roads (Community) | N/A | $1,650,000 | | 0 Occ |

**Table 6-2 City of Allakaket Critical Facilities**

| Occupancy Type | Facility Name | Location / Address | Structure value or Per Mile Replacement Cost | Size or Dimensions | Length, Total Miles, Gals, Occupants |
|---|---|---|---|---|---|
| | Landfill Access Road | Airport Road | $1,400,000 | | 0 Occ, 5,400 ft |
| | Airport Access Road | Airport Road | N/A | 24' wide | 0 Occ, 1,550 ft |
| | Airport Wind Cone Road | Airport Road | N/A | 20' wide | 0 Occ, 175 ft |
| | Airport Haul Road | Airport Road | N/A | 24' wide | 0 Occ, 2,000 ft |
| **Bridges** (local, State, & Federal) | None | N/A | $0 | | 0 Occ |
| **Utilities** | Power Plant Fuel Tank | Airport Road, Lot 40 | $100,000 | | 0 Occ |
| | Intermediate Tank at Water Plant | "A" Street, Tr. C | $100,000 | | 0 Occ |
| | Tank Farm and Dispenser | Airport Road, Lot 40 | $734,000 | | 0 Occ |
| | Airport Off-loading Tanks | Airfield | $500,000 | | 0 Occ |
| | Airport to Tank Farm Line - Gas | Airport Road | $200,000 | 2" diameter | 0 Occ |
| | Airport to Tank Farm Line - Diesel | Airport Road | $200,000 | 2" diameter | 0 Occ |
| | Alaska Power Co. Generators | Airport Road, Lot 40 | $108,440 | | 1 Occ |
| | Proposed AP&T Power Plant | Airport Road, Lot 40 | $1,000,000 | | 2 Occ |
| | AP&T Storage Building | Mission Street | $350,000 | | 0 Occ |
| | Yukon/Koyukuk Schools Fuel Tanks | "D" Street, Lot 2 | $40,000 | | 0 Occ 11,000 gal |
| | Washeteria | "A" Street, Tr. B | $1,000,000 | | 10 Occ |
| | Washeteria Water Treatment Plant | "A" Street, Tr. C | $600,000 | | 2 Occ |
| | Water Tank | "A" Street, Tr. C | $40,000 | | 0 Occ |
| | Water Plant | "A" Street, Tr. C | $1,415,000 | | 0 Occ |
| | City Landfill, Class 3 | Landfill Road | $ 2,664,600 | 200'x200' | 1 Occ |

**Table 6-2 City of Allakaket Critical Facilities**

| Occupancy Type | Facility Name | Location / Address | Structure value or Per Mile Replacement Cost | Size or Dimensions | Length, Total Miles, Gals, Occupants |
|---|---|---|---|---|---|
| | Sewage Lagoon, City | Lagoon Road, Lot 37 | $410,000 | 1 acre | 0 Occ, 800,000 gal |
| | Sewage Lagoon (old), School | "D" Street, Lot 12 | $82,800 | | 0 Occ |
| | Community Wide, Water Main, 6" PE | Community Wide | $650,000 | 2,600 lineal feet | 0 Occ, (250/lineal ft) |
| | Water Main, 6" PE | Community Wide | $752,500 | 3,500 lineal feet | 0 Occ, (215/ lineal ft) |

*Notes: N/A = not available*

*Structure values for the infrastructure were obtained from the AK Critical Facilities Inventory (2004), capital projects database found on the DCRA website: (http://www.dced.state.ak.us/dca/commdb/CF_BLOCK.cfm), and estimated by the City of Allakaket's Planning Team.*

#### *6.2.1.4 Future Critical Facilities and Infrastructure*

Immediate plans for future development in the City includes four new single family homes, rehabilitate10 residential structures, generator plant upgrade, water and sewer systems upgrades, and major airport renovations.

### 6.2.2 Methodology

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

Critical facilities were identified by the Planning Team and were compared to locations where hazards are likely to occur. If any portion of the critical facility fell within a hazard area, it was counted as being exposed and vulnerable to the particular hazard.

Replacement structure values were developed for physical assets from the capital projects database or provided by the City. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value for each structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

### 6.2.3 Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to

understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

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

### 6.2.4 Exposure Analysis

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

**Table 6-3 City of Allakaket Potential Hazard Exposure Analysis**

| | | | Residential Structures | | Critical Facilities | | Total | |
|---|---|---|---|---|---|---|---|---|
| Hazard | Methodology | Population[a] | Number | Structure Value [b] | Number | Structure Value [b] | Structures | Value [b] |
| Earthquake* | Simplified exposure-level analysis | 96 | 61 | $3,861,300 | 50 | $37,781,300 | 111 | $41,642,600 |
| Erosion | Simplified exposure-level analysis | 11 | 6 | $379,800 | 4 | $914,000 | 10 | $1,293,800 |
| Flood | Simplified exposure-level analysis | 96 | 47 | $2,975,100 | 20 | $16,687,300 | 61 | $19,662,400 |
| Permafrost* | Simplified exposure-level analysis | 96 | 61 | $3,861,300 | 50 | $37,781,300 | 111 | $41,642,600 |
| Weather (Severe)* | Simplified exposure-level analysis | 96 | 61 | $3,861,300 | 50 | $37,781,300 | 111 | $41,642,600 |
| Wildland Fire* | Simplified exposure-level analysis | 96 | 61 | $3,861,300 | 50 | $37,781,300 | 111 | $41,642,600 |

* *All people, critical facilities, and residential structures are equally vulnerable to this hazard.*
*N/A = not available*
*(a) total population was based on DCCED/DCRA 2008 population data*
*(b) 2000 Census average property value of $63,300, or refined estimates from the Planning Team*

### *Earthquake*

Based on earthquake probability model maps produced by the USGS, the entire City area is at risk of experiencing the impacts from an earthquake. However, the probability is low (see Section 5.3.1.3). Impacts to the community such as significant ground movement that may result in infrastructure damage are not expected. The entire existing and future City population, residences, and critical facilities are exposed to the effects of an earthquake. This includes 96 people in 61 residences (worth $3,861,300) and 50 critical facilities (worth $37,781,300).

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

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same low impact level as the City is not located in an area with a high probability of strong shaking (i.e., >M4.8).

### *Erosion*

Based on local knowledge, areas within the City affected by erosion are the same areas affected by flood. There are four critical facilities (worth $914,000) located in areas exposed and historically prone to erosion. These include: the Head Start building, mental health building, Environmental Protection Agency (EPA) storage facility, and the AP&T storage building. There are approximately11 people in six residential buildings (worth $379,800) located in areas exposed and historically prone to erosion.

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

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

### *Flood*

Impacts associated with flooding in the City include water damage to roadbed, erosion and damage, boat strandings, areas of standing water in roadways, with minimal damage or displacement of fuel tanks, power lines, or other infrastructure.

Buildings on slab foundations, not located on raised foundations, and/or not constructed with materials designed to withstand flooding events (e.g., cross vents to allow water to pass through an open area under the main floor of a building) are more vulnerable to flooding impacts.

The City relocated 14 residential structures out of the floodplain as a result of the 1994 Spring Flood. However, the City has 96 people in 47 residences (worth approximately $2,975,100) and 20 critical facilities (worth approximately $16,687,300) which remain in the floodplain.

Impacts to future populations, residences, critical facilities, and infrastructure are anticipated at the same impact level and funding can be secured to elevate or relocate flood prone structures. As the City is not a NFIP participant, RL flood claim data is not available.

### *Permafrost*

According to mapping completed by the DGGS, the entire City is underlain by discontinuous permafrost, thus exposed to the impacts from this hazard. This includes 96 people in 61 residences (worth $3,861,300) and 50 critical facilities (worth $37,781,300).

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

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

### *Weather Severe*

Using information provided by the City and the National Weather Service, the entire existing and future City population, residences, and critical facilities are equally exposed to the effects of a severe weather event. This includes 96 people in 61 residences (worth $3,861,300) and 50 critical facilities (worth $37,781,300).

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

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

### *Wildland Fire*

According to the Alaska Fire Service, there are no areas within the City boundaries. However, 271 wildland fires have occurred since 1939 within a 50-mile radius of the City. There is potential for wildland fire to interface with the population center of the City. Thus, for the purposes of this exposure and vulnerability assessment, it is assumed that all structures within

the City are equally exposed to the impacts of a wildland fire event. This includes 96 people in 61 residences (worth $3,861,300) and 50 critical facilities (worth $37,781,300).

Impacts associated with a wildland fire event include the potential for loss of life and property. It can also impact livestock (such as sled dog teams) and pets, destroy forest and wildlife resources, and contaminate water supplies. Virtually all buildings within the town are threatened as they constructed with wood. Those closer to the outer edge of town and those with a lot of vegetation surrounding the structure are more vulnerable to wildland fire impacts.

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

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

Assessing Vulnerability: Analyzing Development Trends

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

Element

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

*Source: FEMA, July 2008.*

## 6.3 LAND USE AND DEVELOPMENT TRENDS

Land in the City of Allakaket not under direct City or individual homeownership belongs to a consortium of four native village corporations (Alatna, Allakaket, Hughes, and Huslia) formed under Alaska Native Claims Settlement Act (ANCSA) names "K'oyitl'ots'ina, Limited." The subsurface rights including the gravel, is owned by Doyon, Ltd., the regional Native Corporation for interior Alaska. (Allakaket 1995)

> *"Relocating the community to the new non-flood prone site at the base of the ridge [in 1995] was essential for the community's long term survival. The site just at the base of the ridge was selected by the Relocation Planning Committee early in the planning process for three reasons. First, since phasing was the only financially feasible strategy for the community's relocation, it was clear that for a period of what would likely be 5 to 15 years, some Allakaket residents would still be located at the old townsite as funding was sought to move the remainder of the houses. Village leadership wanted these residents to be assured relatively convenient access to the community facilities such as the post office and clinic during these transition years. Second, available geotechnical data suggested tat this area, while not ideal, would when coupled with the developable land on top of the ridge provide the overall acreage necessary to reestablish the community out of the floodplain. Third, the close proximity of the proposed new airport rendered this an ideal comprehensive community facility site. This area was in the 1'-2' water level zone in the 1994 flood; building in this zone is easily mitigated by the same foundations that are required by virtue of the fact that it is a permafrost zone (as is the rest of this region) as well."* (Allakaket 1995)

Land use in the City is predominately residential with few areas for commercial, services and community (or institutional) facilities. Suitable developable vacant land is in short supply within the boundaries of the City, and open space and various hydrological bodies border the New and

Old City to the north. Residential and City owned property vacated during the 1995 relocation are now deemed as open space for perpetuity to fulfill FEMA/State requirements for receiving relocation assistance. One area of town is classified as airport land use.

The City has no formal zoning or other land use controls. However, a variety of land uses exists in the City. There are a few areas of commercial land uses within the City that include facilities such as the Allakaket Co-op Store and Brice Construction Company.

HUD has approximately 15 homes (two from Allakaket and 13 from Allakaket Old Town) that were relocated to the new ridge top residential site following the 1994 flood disaster. (Allakaket 2009)

### *Development Trends*

Development trends in the City will likely remain relatively flat keep pace with their near flat population growth. Residents carry treated water and haul honeybuckets or use pit privies; no households have plumbing. Infrastructure improvements to provide a flush/haul system are continuing. A new landfill and access road are also under construction.

The following projects are in various stages from planning to completion:

**Table 6-4 Projects Under Development**

| Lead Agency | Fiscal Year | Project Status | Project Description |
|---|---|---|---|
| Federal Aviation Administration (FAA), Department of Transportation /Public Facilities (DOT/PF) | 2010 | Planned | Rehabilitate Runway 05/23 |
| FAA, DOT/PF | 2009 | Funded | Airport Improvements - Airport Improvement Program |
| Alaska Native Tribal Health Consortium (ANTHC) | 2008 | Funded | Water & Sewer Upgrades |
| FAA, DOT/PF | 2008 | Funded | Airport Improvements - Legislative Grant |
| Housing and Urban Development (HUD) | 2007 | Funded | Indian Housing Block Grant (IHBG) - Native American Housing Assistance and Self Determination Act (NAHASDA) administration, operation, and construction funds |
| HUD | 2006 | Funded | IHBG - NAHASDA administration, operating & construction funds |
| Department of Education and Early Development (DEED) | 2006 | Funded | Allakaket Restroom Renovation |
| ANTHC | 2005 | Funded | Water and Sewer Service. - Construct Sludge Lagoon, Lift Station and Force Main. Repair Groundwater Source Well, Heat Trace Electrical Pedestals, Washeteria Glycol Loop, and Washeteria Plumbing |
| DEED | 2005 | Funded | Allakaket Renovate Water/Sewer Facility |
| HUD | 2005 | Funded | IHBG - NAHASDA administration, operating & construction funds |
| Denali Commission | 2005 | Funded | Power House - Construct and install power generation module |

**Table 6-4 Projects Under Development**

| Lead Agency | Fiscal Year | Project Status | Project Description |
|---|---|---|---|
| | | | next to the washeteria/water treatment plant, with a generation capacity of 400 to 500 kilowatt (KW) |
| (DCCED) | 2005 | Funded | Community Projects & Improvements |
| Alaska Housing Finance Corp (AHFC) | 2005 | Funded | 4 single family units; 10 rehabs - Supplemental Housing |
| DCCED | 2003 | Funded | Street Lights - Capital Matching |
| DCCED | 2001 | Funded | City Lodge Renovation - Capital Matching |
| ANTHC | 2001 | Funded | Sanitation Facilities Improvement Plan. Analyze backup water supply option, sewer and water options, and develop site layout for new public facilities area |

*(DCRA 2009)*

A clinic and airport were built in 1978. A new school and community roads were built in 1979. In September 1994, flood waters destroyed and swept away nearly all of the community's buildings, homes, and food caches for the winter. Major components have been replaced -- a new washeteria, well and treatment plant, 100,000-gallon water storage tank, sewage lagoon, and force main have recently been completed. The lagoon is connected to the washeteria and school.

Residents rebuilt near the Old City site, but some new homes and facilities are now located outside of the incorporated City boundaries. New Allakaket and Alatna are located outside of the City limits. Table 6-5 lists recently funded and completed projects.

**Table 6-5 Completed Projects**

| Lead Agency | Fiscal Year | Project Status | Project Description |
|---|---|---|---|
| FAA, DOT/PF | 2008 | Complete | Airport Relocation - Legislative Grant |
| DCCED | 2006 | Complete | Conceptual Planning for a Multi-Use Facility - Multi-Use Facility Program -Funded by the Denali Commission |
| HUD | 2004 | Complete | IHBG - NAHASDA administration, operating & construction funds |
| AHFC | 2004 | Complete | 6 Single Family units - Supplemental Housing |
| HUD | 2003 | Complete | IHBG - NAHASDA administration, operating & construction funds |
| DCCED | 2002 | Complete | Purchase Refuse Pickup Truck |
| HUD | 2002 | Complete | IHBG - NAHASDA administration, operating & construction funds |
| FAA, DOT/PF | 2002 | Complete | Airport Reconstruction/Relocation, Phase I - Other Share - DOT/PF |
| ANTHC | 2002 | Complete | Clinic Design - Denali Commission Funding. Upgrade a recently constructed health clinic. Gravel will be added to the clinic site grading to improve water drainage. The scope of this project includes design and planning, site preparation, materials and equipment, construction, and labor. |
| Department of | 2001 | Complete | Sanitation Feasibility Study-Service Area 7 - EPA/IG - 2000 - |

**Table 6-5 Completed Projects**

| Lead Agency | Fiscal Year | Project Status | Project Description |
|---|---|---|---|
| Environmental Conservation /Village Safe Water (DEC/VSW) | | | $45,000. Feasibility Study for Area 7, across river from downtown |
| DEC/VSW, US Department of Agriculture/Rural Development (USDA/RD) | 2001 | Complete | Water and Sewer expansion/20 new homes - USDA/RD $397.5. Hook up 20 homes to existing water and sewer main. |
| DCCED | 2001 | Complete | Equipment Purchase (Front End Loader) |
| DCCED/ USDA/RD | 2000 | Complete | Equipment Purchase (Front End Loader) Local priority, from 1997 USDA/RD survey of villages |
| HUD | 2000 | Complete | IHBG - NAHASDA administration, operating & construction funds |

*(DCRA 2009)*

This section outlines the four-step process for preparing a mitigation strategy including: developing mitigation goals, identifying mitigation actions, evaluating mitigation actions, and implementing mitigation action plans. Within this section the Planning Team developed the mitigation goals and potential mitigation actions for the City of Allakaket.

## 7.1 DEVELOPING MITIGATION GOALS

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

DMA 2000 Requirements: Mitigation Strategy – Local Hazard Mitigation Goals

Local Hazard Mitigation Goals

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

Element

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

*Source: FEMA, July 2008.*

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

**Table 7-1 Mitigation Goals**

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

## 7.2 IDENTIFYING MITIGATION ACTIONS

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

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

Identification and Analysis of Mitigation Actions

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

Element

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

*Source: FEMA, July 2008.*

After mitigation goals and actions were developed, the Planning Team assessed the potential mitigation actions to carry forward in the mitigation strategy. Mitigation actions are activities, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. As listed in Table 7-2, 48 potential mitigation actions were developed, with a particular emphasis placed on projects and programs that reduce the effects of hazards on both new and existing buildings and infrastructure.

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

Identification and Analysis of Mitigation Actions: NFIP Compliance

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

Element

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

*Source: FEMA, July 2008.*

**Table 7-2 Mitigation Goals and Potential Actions**

| GOALS | | ACTIONS | |
|---|---|---|---|
| No. | Description | ID | Description |
| 1 | Promote recognition and mitigation of all natural hazards that affect the City of Allakaket. | **A** | Hold an annual or biennial "hazard meeting" to provide information to residents about recognition and mitigation of all natural hazards that affect the City. Presented in the form of a brochure or written media so that residents can take information with them after the meeting. Example Topics: NFIP program participation benefits, safe fire practices, to help prevent wildland fires, etc. |
| | | **B** | Identify and pursue funding opportunities to implement mitigation actions. |
| | | **C** | Establish a formal role for the Hazard Mitigation Planning Team to develop a sustainable process to implement, monitor, and evaluate community wide mitigation actions. |
| | | D | Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all natural hazards. |
| | | **E** | Join the NFIP to reduce monetary losses to individuals and the community. |
| | | F | 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. |
| | | G | Integrate the Mitigation Plan findings for enhanced emergency planning. |
| | | H | Develop and incorporate building ordinances commensurate with building codes to reflect survivability from flood, fire, wind, seismic, and other hazards to ensure occupant safety. |
| | | I | Develop and incorporate mitigation provisions and recommendations into zoning ordinances and community development processes to maintain the floodway and protect critical infrastructure and private residences from other hazard areas. |
| | | J | Identify and list repetitively flooded structures and infrastructures, analyze the threat to these facilities, and prioritize mitigation actions to protect the threatened population. |
| 2 | Cross reference mitigation goals and actions with other City of Allakaket planning mechanisms and projects. | **A** | The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration. |
| | | B | Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short term power disruption. (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.) |
| | | **C** | Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability. |

**Table 7-2 Mitigation Goals and Potential Actions**

| GOALS | | ACTIONS | |
|---|---|---|---|
| **No.** | **Description** | **ID** | **Description** |
| 3 | Reduce possibility of losses from all natural hazards that affect the City of Allakaket. | A | Increase power line wire size and incorporate quick disconnects (break away devices) to reduce ice load and wind storm power line failure during severe wind or winter ice storm events. |
| | | **B** | Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas. |
| | | **C** | Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages. |
| | | D | Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to a proposed project. |
| 4 | Reduce vulnerability of structures to earthquake damage. | **A** | Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits. |
| | | B | Develop outreach program to educate residents concerning benefits of increased seismic resistance and modern building code compliance during rehabilitation or major repairs for residences or businesses. |
| | | C | Inspect, prioritize, and retrofit any critical facility or public infrastructure that does not meet current State Adopted Building Codes. |
| | | D | Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction. |
| | | E | Encourage utility companies to evaluate and harden vulnerable infrastructure elements for sustainability. |
| 5 | Reduce possibility of damage and losses from erosion. | **A** | Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat. |
| | | **B** | Relocate buildings that are at risk of being affected by erosion. |
| | | **C** | Apply for grants/funds to implement riverbank protection methods. |
| | | D | Develop and provide information to all residents on riverbank erosion and methods to present it in an easily distributed format. |
| 6 | Reduce the possibility of damage and losses from flooding. | A | Develop and maintain GIS mapped critical facility inventory for all structures located within 100-year and 500-year floodplains. |
| | | B | Develop and maintain GIS mapped inventory, and develop prioritized list of residential and commercial buildings within 100-year and 500-year floodplains. |
| | | C | Develop and maintain GIS mapped inventory of repetitive loss properties to include the types and numbers of properties. |

**Table 7-2 Mitigation Goals and Potential Actions**

| GOALS | | ACTIONS | |
|---|---|---|---|
| **No.** | **Description** | **ID** | **Description** |
| | | D | Establish flood mitigation priorities for critical facilities and residential and commercial buildings located within the 100-year floodplain using survey elevation data. |
| | | E | Develop and maintain an inventory of locations subject to frequent storm water flooding based on most current USACE flood data. |
| | | **F** | Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures. |
| | | **G** | 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. |
| | | H | Develop, implement, and enforce floodplain management ordinances. |
| | | I | Develop outreach program to educate residents concerning flood proofed well and sewer/septic installation. |
| | | **J** | Acquire (buy-out), relocate, elevate, or otherwise flood-proof identified critical facilities and private properties. |
| 7 | Reduce possibility of damage and losses from permafrost. | **A** | Identify and map existing permafrost areas to assist in critical facility relocation siting. |
| | | B | Promote permafrost sensitive construction practices in permafrost areas. |
| 8 | Reduce vulnerability of structures to severe weather damage. | **A** Ongoing | Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms. |
| | | B | Develop critical facility list needing emergency back-up power systems, prioritize, seek funding, and implement mitigation actions. |
| | | **C** Ongoing | Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events. |
| | | D | Implement and enforce the most current State adopted building codes to ensure structures can withstand winter storm hazards such as high winds, rain, water, and snow. |
| 9 | Reduce possibility of damage and losses from wildland fires. | **A** | Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures. |
| | | B | Develop Community Wildland Fire Protection Plans for all at-risk communities. |
| | | C | Promote FireWise building siting, design, and construction materials. |
| | | D | Provide wildland fire information in an easily distributed format for all residents. |
| | | E | Develop outreach program to educate and encourage fire-safe construction practices for existing and new construction in high risk areas. |
| | | F | Identify, develop, implement, and enforce mitigation actions such as fuel breaks and reduction zones for potential wildland fire hazard areas. |

## 7.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

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

Element

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

*Source: FEMA, July 2008.*

The Planning Team evaluated and prioritized each of the mitigation actions 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 (erosion, flood, and severe weather).

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

**Table 7-3 STAPLEE Evaluation Criteria for Mitigation Actions**

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

On September 29, 2009, the hazard mitigation Planning Team prioritized each mitigation action that was chosen to be carried forward in the Mitigation Action Plan. To determine the priority of the mitigation action, the Hazard Mitigation Planning Team considered each hazard's history, extent, and probability. A rating system based on *high*, *medium*, or *low* was used. *High* priorities are associated with actions for hazards that impact the community on an annual or near annual basis and generate impacts to critical facilities and/or people. *Medium* priorities are associated with actions for hazards that impact the community less frequently, and do not typically generate impacts to critical facilities and/or people. *Low* priorities are associated with actions for hazards that rarely impact the community and have rarely generated documented impacts to critical facilities and/or people.

Prioritizing the mitigation actions in the Mitigation Action Plan was completed to provide the City with an approach to implementation of the plan. Table 7-4 provides a summary of the mitigation action priorities.

## 7.4 IMPLEMENTING A MITIGATION ACTION PLAN

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

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| 1A | Hold an annual or biennial "hazard meeting" to educate residents about recognizing and mitigating natural hazards that affect the City. | Medium | City of Allakaket, Allakaket Tribal Council (in order to obtain Admiistration for Native Americans [ANA] funding, the Tribe would need to be the applicant) | City of Allakaket, Allakaket Tribal Council, FEMA HMA, HMGP, FEMA Assistance to Firefighters Grant (AFG) Program's Fire Prevention and Safety Grant (FP&S) Program, and Staffing for Adequate Fire and Emergency Response (SAFER) Program, ANA Grant Programs, Emergency Food and Shelter Program (EFSP) | Ongoing | B/C: Sustained mitigation outreach program has minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters.<br>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. |
| 1B | Identify and pursue funding opportunities to implement mitigation actions. | High | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, Denali Commission, DCCED/CDBG | Ongoing | B/C: This ongoing activity is essential for the City as there are limited funds available to accomplish effective mitigation actions.<br>TF: This activity is ongoing demonstrating its feasibility. |
| 1C | Establish a formal role for the Hazard Mitigation Planning Team to develop a sustainable process to implement, monitor, and evaluate community wide mitigation actions. | Medium | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council | 1-3 years | B/C: The existing team has gained experienced throughout this process which can provide invaluable for ensuring a sustained effort toward mitigating natural hazard damages.<br>TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community. |

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| 1E | Join the NFIP to reduce monetary losses to individuals and the community. | Low | City of Allakaket | City of Allakaket, Allakaket Tribal Council | 1-2 years | NFIP participation and flood hazard mitigation is among FEMA's highest national priorities. Prior disaster assistance for structure relocations requires NFIP participation for future disaster funding eligibility. FEMA desires communities to focus on repetitive flood loss properties. This activity will ensure the City and Tribal Council focus on priority flood locations and risk reduction projects.<br>TF: Low to no cost makes this outreach activity very feasible. |
| 2A | The City will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration. | Medium | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, Denali Commission, DCCED/CDBG | 1-3 years | B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents.<br>TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community. |
| 2C | Develop vegetation projects to restore clear cut and riverine erosion damage and to increase landslide susceptible slope stability. | High | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council HMA, HMGP, AFG, FP&S, SAFER, ANA, Emergency Food and Shelter Program | 2-5 years | Improving slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. |

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| | | | | | | Technically feasible as the community has the skill to implement this action using native materials and equipment. |
| 3B, 6J | Acquire (buy-out), demolish, or relocate structures from hazard prone area. Property deeds shall be restricted for open space uses in perpetuity to keep people from rebuilding in hazard areas. | High | City of Allakaket, Allakaket Tribal Council | FEMA HMA, HMGP, Natural Resources Conservation Service (NRCS), ANA | 1-5 years | B/C: This project would remove threatened structures from the floodplain, eliminating future damage while keeping land clear for perpetuity.<br>TF: This project is feasible using existing staff skills, equipment, and materials. |
| 3C | Harden utility headers located along river embankments to mitigate potential flood, debris, and erosion damages. | Medium | City of Allakaket, Allakaket Tribal Council | FEMA HMA, HMGP, NRCS, ANA | 1-5 years | B/C: This project would protect threatened infrastructure from future damage.<br>TF: This project is feasible using existing staff skills, equipment, and materials. |
| 4A | Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits. | Medium | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, FEMA HMA, HMGP | 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.<br>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 |

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| | | | | | | feasibility. |
| 5A | Maintain and update erosion hazard locations, identify critical facilities potentially impacted and develop mitigation initiatives such as bank stabilization or facility relocation to prevent or reduce the threat. | Low | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, DCCED/CDBG, Denali Commission | 1-5 years | B/C: Pre-identification ensures that structures are not placed inappropriately and are built with the hazard as a focus.<br>TF: This is feasible using existing resources as the community has awareness of permafrost areas due to prior project reports and studies. |
| 5B | Relocate buildings that are at risk of being impacted by erosion. | High | City of Allakaket, Allakaket Tribal Council | FEMA HMA, HMGP, NRCS, ANA | 1-5 years | B/C: This project would remove threatened structures from the floodplain, eliminating future damage while keeping land clear for perpetuity.<br>TF: This project is feasible using existing staff skills, equipment, and materials. |
| 6F | Determine and implement most cost beneficial and feasible mitigation actions for locations with repetitive flooding and significant damages or road closures. | High | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council | 1-3 years | B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects.<br>TF: Low to no cost makes this outreach activity very feasible. |
| 6G | Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, | Low | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, FEMA HMA, HMGP, Denali Commission | 1-3 years | B/C: Flood hazard mitigation is among FEMA's highest national priorities. FEMA provides free publications for |

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| | and NFIP flood insurance availability to facilitate continued compliance with the NFIP. | | | | | community education purposes.<br>TF: Low to no cost makes this outreach activity very feasible. |
| 7A | Identify and map existing permafrost areas to assist in critical facility relocation siting. | Low | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, DCCED/CDBG, Denali Commission | 1-5 years | B/C: Pre-identification ensures that structures are not placed inappropriately and are built with the hazard as a focus.<br>TF: This is feasible using existing resources as the community has awareness of permafrost areas due to prior project reports and studies. |
| 8A | Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms. | Low | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, DCCED/CDBG, Denali Commission | Ongoing | B/C: Scheduling maintenance and implementing mitigation activities will potentially reduce severe winter storm damages caused by heavy snow loads and icy rain.<br>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. |
| 8C | Develop and implement tree clearing mitigation programs to keep trees from threatening lives, property, and public infrastructure from severe weather events. | Low | City of Allakaket, Allakaket Tribal Council | DOF: Volunteer Fire Assistance Grant Program (VFAGP), Rural Assistance Grant Program (RAGP) | Ongoing | B/C: Implementing this mitigation activity will potentially reduce ancillary damage from severe winter storms caused by heavy snow loads, icy rain, and wind. |

**Table 7-4 City of Allakaket Mitigation Action Plan Matrix**

| Action ID | Description | Prioritization | Responsible Department | Potential Funding | Timeframe | Benefit-Costs / Technical Feasibility |
|---|---|---|---|---|---|---|
| | | | | | | TF: This type activity is technically feasible within the community typically using existing labor, equipment, and materials. |
| 9A | Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures. | Medium | City of Allakaket, Allakaket Tribal Council | City of Allakaket, Allakaket Tribal Council, DOF: VFAG, RAGP | 1-2 years | B/C: This project will ensure the community looks closely at their wildland fire hazard to ensure they can safely evacuate their residents and visitors to safety preserving life.<br>TF: This is technically feasible using existing city and tribal resources. |

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This section describes a formal plan maintenance process to ensure that the HMP remains an active and applicable document. It includes an explanation of how the 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:

- Monitoring, evaluating, and updating the HMP
- Implementation through existing planning mechanisms
- Continued public involvement

## 8.1 MONITORING, EVALUATING, AND UPDATING THE HMP

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

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

Monitoring, Evaluating and Updating the Plan

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

Element

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

*Source: FEMA, July 2008.*

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

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

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

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

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

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

## 8.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

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

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

Incorporation into Existing Planning Mechanisms

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

Element

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

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

*Source: FEMA, July 2008.*

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

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

## 8.3 CITY OF ALLAKAKET CAPABILITY ASSESSMENT

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

**Table 8-1 City of Allakaket Regulatory Tools**

| REGULATORY TOOLS (ORDINANCES, CODES, PLANS) | EXISTING? | COMMENTS (YEAR OF MOST RECENT UPDATE; PROBLEMS ADMINISTERING IT, ETC) |
|---|---|---|
| Building code | No | The City can exercise this authority. |
| Special purpose ordinances | Yes | • City of Allakaket Flood Damage Assessment Ordinance No. 95-32(1995)<br>• Erosion Ordinance (1995)<br>• Hazardous Materials Ordinance (1995)<br>• Tribal Council Floodplain Resolution<br>• Land Use Regulation |
| Comprehensive Plan | Yes | Allakaket, The Comprehensive Plan, A Constitutional Mandate for Long Term Survival, August 1995 |
| Economic Development Plan | Yes | Preliminary Allakaket Business Plan Costs and Revenue Estimate (2004) |
| Emergency Response Plan | Yes | Fire Break Plan |
| Land Use Ordinance | Yes | Land Use Regulation |
| Land Use Plan | No | Local Permitting Process |
| Special Regulations | Yes | Bulk Fuel Regulation, 1995 |

**Federal Resources**

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

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:
  - How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements (http://www.fema.gov/fima/planhowto.shtm).
  - Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.
  - Mitigation Resources for Success compact disc (CD). FEMA 372, September 2001. This CD contains a wealth of information about mitigation and is useful for State and local government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.
  - A Guide to Federal Aid in Disasters. FEMA 262, April 1995. When disasters exceed the capabilities of State and local governments, the President's disaster assistance programs (administered by FEMA) is the primary source of Federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.
  - The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from

financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas.

- The FEMA Hazard Mitigation Assistance (HMA Unified Guidance, June 1, 2009. The guidance introduces the five HMA grant programs, funding opportunities, award information, eligibility, application and submission information, application review process, administering the grant, contracts, additional program guidance, additional project guidance, and contains information and resource appendices (FEMA 2009).

- Department of Agriculture (USDA). Assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.
- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.
- Department of Health and Human Services, Administration of Children & Families (DHHS/ACT, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria and the method of application. (http://www.acf.hhs.gov/programs/ana/ )
- Department of HUD, Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for Federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.
- Department of HUD, Community Development Block Grants (CDBG). Provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.
- Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance. Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.
- Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.

- Internal Revenue Service (IRS), Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous tax returns to reflect loss back to three years.
- U.S. Small Business Administration (SBA). May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to DHS&EM.
- USACE. The USACE, Alaska District's Civil Works Branch studies potential water resource projects in Alaska. They study, analyze, and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods. The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.

**State Resources**

- DHS&EM is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information, and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including the elevation, relocation, or acquisition of hazard-prone properties. DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://www.ak-prepared.com/plans/mitigation/mitigati.htm .
- Division of Senior Services: Provides special outreach services for seniors, including food, shelter, and clothing.
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims.
- Department of Military and Veteran's Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits.
- The Community Health and Emergency Medical Services (CHEMS) is a section within Division of Public Health within the Department of Health and Social Services (DHSS). DHSS is charged with promoting and protecting the public health and one of CHEMS' responsibilities is developing, implementing, and maintaining a statewide comprehensive emergency medical services system. The department's statutory mandate (Alaska Statute 18.08.010) requires it to:
  - Coordinate public and private agencies engaged in the planning and delivery of emergency medical services, including trauma care, to plan an emergency medical services system.
  - Assist public and private agencies to deliver emergency medical services, including trauma care, through the award of grants in aid.
  - Conduct, encourage, and approve programs of education and training designed to upgrade the knowledge and skills of health personnel involved in emergency medical services, including trauma care.

  - Establish and maintain a process under which hospitals and clinics can represent themselves to be trauma centers because they voluntarily meet criteria adopted by the department which are based on an applicable national evaluation system.

- DCRA within the DCCED. DCRA administers the CDBG, FMA, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses, throughout the State. This department also administers programs for State "distressed" and "targeted" communities.
- Division of Environmental Conservation (DEC). 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.
- DOT/PF. DOT/PF personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of Agreement and includes, but is not limited to: environmental reviews; archaeological surveys; and historic preservation reviews.

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

  Additionally, DOT/PF provides safe, efficient, economical, and effective operation of the State's highways, harbors, and airports. DOT/PF uses it's Planning, Design & Engineering, Maintenance & Operations, and Intelligent Transportation Systems resources to identify the hazard, plan and initiate mitigation activities to meet the transportation needs of Alaskans and make Alaska a better place to live and work. DOT/PF budgets for the temporary replacement bridges and materials necessary to make the multi-model transportation system operational following a natural disaster.
- Alaska Department of Natural Resources (DNR) administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR, the Division of Geological and Geophysical Survey (DGGS) is responsible for the use and development of Alaska's mineral, land, and water resources, and collaboration on earthquake mitigation.
  - DNR's DOF. DOF participates in a Statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires.
  - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program, the Community Forestry Program and the Volunteer Fire Assistance (VFA) and Rural Fire Assistance Grant

(RFAG) programs. Information can be found at http://forestry.alaska.gov/fire/current.htm.

**Other Funding Sources and Resources**

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

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

**Local Resources**

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

**Table 8-2 City of Allakaket Staff Resources**

| Staff / Personnel Resources | Y / N | Department / Agency and Position |
|---|---|---|
| Planner or engineer with knowledge of land development and land management practices | No | ANTHC Planners/Engineers |
| Engineer or professional trained in construction practices related to buildings and/or infrastructure | No | ANTHC Planners/Engineers |
| Planner or engineer with an understanding of natural and/or human-caused hazards | No | ANTHC Planners/Engineers |
| Floodplain Manager | No | Taunnie Boothby, State Floodplain Manager |
| Surveyors | No | City may hire surveying consulting services |
| Staff with education or expertise to assess the jurisdiction's vulnerability to hazards | No | ANTHC Planners/Engineers |
| Personnel skilled in Geospatial Information System and/or HAZUS | No | ANTHC Planners/Engineers |
| Scientists familiar with the hazards of the jurisdiction | No | USFWS local office; ADF&G local office |
| Emergency Manager | Yes | Mayor or Tribal Chief depending on facilities |

| | | |
|---|---|---|
| | | affected |
| Grant writers | Yes | Tribal Administrator |
| Public Information Officer | Yes | City Mayor and Tribal Administrator |

**Table 8-3 Financial Resources for Hazard Mitigation**

| Financial Resource | City of Allakaket | Tribal Council |
|---|---|---|
| | Effect on Hazard Mitigation | Effect on Hazard Mitigation |
| Community Development Block Grant Funds | Yes | No |
| Authority to levy taxes for specific purposes | Yes, with approval of the City Council | No |
| Incur debt through general obligation bonds | Yes, with approval of the City Council | No |
| Incur debt through special tax and revenue bonds | Yes, with approval of the City Council | No |
| Incur debt through private activity bonds | Yes, with approval of the City Council | No |
| Bureau of Indian Affairs Grant | No | Yes |
| State Sharing Funds (Community Development Block Grant-CDBG) Funds | The cash economy of Allakaket is very dependent on government spending, particularly State revenue funds to the City, State capital construction projects, and public assistance. Most cash employment opportunities are part-time jobs, season jobs, or self employment. | |
| Hazard Mitigation Grant Program (HMGP) | FEMA funding which is available to local communities after a Presidentially-declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects. | |
| Pre-Disaster Mitigation (PDM) grant program | FEMA funding which available on an annual basis. This grant can only be used to fund pre-disaster mitigation plans and projects only | |
| Flood Mitigation Assistance (FMA) grant program | FEMA funding which is available on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. | |
| 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. | |

## 8.4 CONTINUED PUBLIC INVOLVEMENT

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

DMA 2000 Requirements: Plan Maintenance Process - Continued Public Involvement

Continued Public Involvement

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

Element

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

*Source: FEMA, July 2008.*

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

The Planning Team will also identify opportunities to raise community awareness about the HMP and the hazards that affect the area. This effort could include attendance and provision of materials at 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.

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# Appendix A
# Crosswalk

To be inserted after provided by FEMA

.

# Appendix B
# Adoption Resolution

(To be completed following adoption by the City of Allakaket)

# Appendix C
# Public Outreach

URS

# Memo for Record

560 East 34th Avenue, Suite 100
Anchorage, AK 99503
Phone: 907.261.9706
Fax: 907.562.1297

**SUBJECT:** DHSEM HMP – Allakaket Kick-Off Meeting

**Community:** City of Allakaket, 968.2423

**Date/Time:** 02/23/09 – 10:15 a.m.

**From:** R. Scott Simmons

## Attendees:

- URS: Laura Young, Scott Simmons
- DCRA: Ruth St Amour
- Eliza Ned

**Comments:** Teleconference started a little late.

- **Subjects covered included:**
  - Discussed advantages of partnering with tribal organization to enable the community to access funding sources designated for both city and tribal governments eligible applicants.
- **Participant Introduction**
- **Project Description:**
  - DHSEM contractor
  - Local Mitigation Plan Development
    - FEMA requirements
    - FEMA/State Compliance
    - Hazard Identification – discussed the need to identify what hazards routinely affect the community.
    - Community Knowledge – best information source are the people in the community.
    - Project development – project selection is based on community needs and the hazards affecting Allakaket
    - Funding opportunities – both for city governments and tribal entities.
- **DCRA Community Profile Map Project**
  - Concurrent project

## Planning Steps

- Team Development/member selection
- Data Gathering
- Plan Writing
- Public Involvement
  - Public Meeting during development
  - Public comment period to review plan before plan adoption and FEMA approval
- FEMA/State Review

## Follow-up

- Call back the Mayor to obtain Team Leader and Team Member names for the newsletter and to set-up a call-in time to explain the process to the team.

# CITY OF ALLAKAKET HAZARD MITIGATION PLAN

**January 2009**

*This newsletter discusses the preparation of the Allakaket 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.ak-prepared.com.*

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 eleven Alaskan Communities. Allakaket was selected for participation in this effort.

Alaska Division of Community & Regional Affairs (DCRA) is collaborating with DHS&EM and the Interior Regional Housing Authority for preparing community profile maps as part of the hazard mitigation planning process. Examples of the maps can be viewed online at http://www.commerce.state.ak.us/dca/profiles/profile-maps.htm.

DCRA is working with DHS&EM, and their contractor URS Corporation, to share information and coordinate map preparation and hazard mitigation plan development efforts. Work on the maps is expected to begin in Spring 2009.

The Allakaket Hazard Mitigation Plan will identify all natural hazards, such as flood, earthquake, erosion, wildland fire, weather related hazards and others. The plan will also identify the people and facilities potentially at risk and ways to mitigate damage from hazards. The public participation and planning process will be documented as part of the project.

## What is Hazard Mitigation?

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

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

Hazard mitigation projects eliminate the risk or reduce the severity of hazards on 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, 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 either the Hazard Mitigation Assistance or disaster mitigation assistance programs. The City of Allakaket plans to apply for mitigation funds after our plan is complete.

The rules have changed. The Local government and Flood Hazard Mitigation Plans' requirements were consolidated into one planning mechanism. Additionally the Flood Mitigation Assistance (FMA), Repetitive Flood Loss (RL) and Severe Repetitive Flood Loss (SRL) programs were also consolidated with the Pre-Disaster Mitigation Grant Program under the newly developed Hazard Mitigation Assistance (HMA) program. Each of these programs must use the same application process and eligibility requirements for nationally competitive funding.

The Hazard Mitigation Grant Program (HMGP) is a disaster related assistance program. Applicants typically compete on a statewide basis.

## 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. Information about the requirements may be found on the Internet at: http://www.fema.gov/plan/mitplanning/index.shtm#2 under Laws, Regulations, and Guidance.

The DMA2000 requires the plan to document the following topics:

- Planning process
- Hazard identification
- Risk assessment
- Mitigation Strategy: Goals, actions, and projects
- A plan adoption resolution from the community
- State and FEMA approval

FEMA has prepared Planning Guidance and "How to" Guides that explain in detail how each of the DMA2000 requirements are met. These guides are available at http://www.fema.gov/plan/mitplanning/planning_resources.shtm#0. The Allakaket Hazard Mitigation Plan will be prepared following 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.

Our community is located in the Yukon-Koyukuk Census Area, and DHS&EM has previously identified natural hazards that occur in this area that may also occur specifically in Allakaket.

## The Planning Team

The planning team is being led by Elizabeth Strassburg and Mayor Eliza Ned with assistance from Vincent Simon, Gladys Bergman, Julia Simon, and Chief Vincent Bergman. URS Corporation has been contracted by DHS&EM to provide assistance and guidance to the planning team throughout the planning process.

## Public Participation

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

## We Need Your Help

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

| Allakaket Hazard Worksheet | | |
|---|---|---|
| **Hazard** | **Yukon-Koyukuk Census Area*** | **Allakaket** |
| Avalanche (Snow) | Y | |
| Earthquake | Y | |
| Erosion | Y | |
| Flood | Y | |
| Landslide | U | |
| Permafrost | Y | |
| Tsunami & Seiche | N | |
| Volcano | N | |
| Weather | Y | |
| Wildland Fire | Y | |
| **Hazard Matrix from the State of Alaska Hazard Mitigation Plan for the Yukon-Koyukuk Census Area* | | |

DHS&EM identified critical facilities within Allakaket as part of the Alaska Critical Facilities Inventory, but the list of critical facilities needs to be updated and the estimated value and location (lat/lon) determined. In addition, the number and value of structures, and the number of people living in each structure will need to be documented. Once this information is collected we will determine which critical facilities, residences, and populations are vulnerable to specific hazards in Allakaket. Please add additional facilities if needed.

| *Allakaket Critical Facilities* | |
|---|---|
| **Facility Type** | **Facility Name** |
| Airport | |
| Cemetery | |
| Church | Community Church |
| Community Hall | Community Center |
| Fuel Storage Tanks (>500gal) | Airport Offloading Tanks |
| Fuel Storage Tanks (>500gal | Intermediate Tank at Water Plant |
| Fuel Storage Tanks (>500gal | Power Plant Tank |
| Fuel Storage Tanks (>500gal | Tank Farm and Dispenser |
| Clinic | |
| Landfill/Incinerator | |
| Offices | City Office |
| Offices | Tribal Office |
| Oil or Natural Gas Pipeline-End | Airport to Tank Farm Line |
| Oil or Natural Gas Pipeline-Start | Airport to Tank Farm Line |
| Police Station | VPSO Office |
| Post Office | |
| Potable Water Production and Treatment Facility | Water Plant |
| Power Generation Facility | City Power Generators |
| Power Generation Facility | Proposed AP&T Power Plant |
| Reservoir/Water Supply | Allakaket Public WS |
| Reservoir/Water Supply | Water Tank |
| Satellite Dish | |
| School | ALLAKAKET SCHOOL |
| Service/Maintenance Shop | Airport Maintenance Garage |
| Service/Maintenance Shop | City Garage |
| Sewage Lagoon | |
| Store | City Store |
| Teachers Quarters | 1 |
| Teachers Quarters | 2 |
| Teachers Quarters | 3 |
| Teachers Quarters | 4 |
| Washeteria | |
| **AK Critical Facilities Inventory* | |

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

*We encourage you to take an active part in preparing the Allakaket Hazard Mitigation Plan and the DCCED Community Mapping effort. The purpose of this newsletter is to keep you informed and to allow you every opportunity to voice your opinion regarding these important projects. Please contact your community representative, URS planning coordinators, or the DCCED community mapping manager if you have any questions, comments, or requests for more information:*


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# CITY OF ALLAKAKET HAZARD MITIGATION PLAN

October 2009 Newsletter 2

*This newsletter discusses the preparation of the City of Allakaket 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.*

The City of Allakaket was one of eleven communities selected by the State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) for a Hazard Mitigation Planning development project. The plan identifies natural hazards that affect the community including earthquake, erosion, drought, flood, permafrost, severe weather, and wildland fire. The plan also identifies the people and facilities potentially at risk and ways to mitigate hazards. The public participation and planning process has been documented as part of the project. URS Corporation (URS) was hired as consultants to assist in preparing the plan.

## What is Hazard Mitigation?

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

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

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

## Why Do We Need A Hazard Mitigation Plan?

A community is only eligible to receive grant money for mitigation programs by preparing and adopting a hazard mitigation plan. Communities must have an approved mitigation plan to receive grant funding from the Federal Emergency Management Agency (FEMA) for eligible mitigation projects. The City of Allakaket plans to apply for grant funding after the plan is approved by DHS&EM and FEMA and adopted by the City.

## The Planning Process

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

The DMA2000 requires the plan to document the following topics:

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

FEMA has prepared Planning Guidance which is available at: http://www.fema.gov/library/viewRecord.do?id=3336; and "How to" Guides that explain in detail how each of the DMA2000 requirements is met. These guides are available at http://www.fema.gov/plan/mitplanning/resources.shtm. The Allakaket Hazard Mitigation Plan will follow those guidelines.

In January 2009 the planning process kicked-off by establishing a local planning committee and holding a public meeting. During the meeting the planning committee examined the full spectrum of hazards listed in the State Hazard Mitigation Plan and identified seven hazards that the Allakaket plan would address including earthquake, erosion, flood, permafrost, severe weather, and wildland fire.

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

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. Goals and 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/projects are undertaken in order to achieve your stated objectives. In June 2009, the local planning committee identified projects/actions for each hazard that focus on six categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. The mitigation actions identified as a high priority by the planning team are listed below, and explained in more detail in the plan.

The selected projects/actions will be implemented over the next five years. A maintenance plan has also been developed for the hazard mitigation plan. It outlines how the community will monitor progress on achievement of the projects/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 office and on the State website (http://www.ready.alaska.gov) for public review and comment. Comments should be made via email, fax, or phone to the contact person below and be received no later than July 24, 2009. The plan will be provided to DHS&EM and FEMA for their approval prior to formal adoption by the Allakaket City Council.

## The Planning Committee

The plan was developed with the assistance from a Planning Team consisting of a cross section of the community. Planning Team members who helped develop the plan include Lucy Strassburg and Mayor Eliza Ned with assistance from Elizabeth Strassburg, Pamela Vent, Vincent Simon, Gladys Bergman, Julia Simon, and Chief Vincent Bergman. URS Corporation and DHS&EM are also providing assistance to the Planning Team.

Sample of the City of Allakaket's Mitigation Actions.

*(Review the draft HMP for a complete list.)*

| | | |
|---|---|---|
| Hold a "hazard meeting" to educate residents about recognizing natural hazards that affect the City of Allakaket and mitigating them. | Identify and pursue funding opportunities to implement mitigation actions. | Disseminate FEMA pamphlets to educate and encourage homeowners concerning seismic structural and non-structural retrofit benefits. |
| Cross reference and incorporate mitigation planning provisions into all community planning processes to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration. | Acquire (buy-out), demolish, or relocate structures from hazard prone area. | Identify and map existing permafrost areas to assist in critical facility relocation siting. |
| Identify evacuation routes away from high hazard areas and develop outreach program to educate the public concerning warnings and evacuation procedures. | Identify and pursue funding opportunities to implement mitigation actions. | Develop an outreach program to educate public concerning NFIP participation benefits, floodplain development, land use regulation, and NFIP flood insurance availability. |

*We encourage you to learn more about the City of Allakaket'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 D
# Benefit–Cost Analysis Fact Sheet

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**Benefit-Cost Analysis Fact Sheet**

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

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

**All Benefit-Costs must be:**

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

**General Data Requirements:**

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

**Damage and Benefit Data**

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values MUST be documented and justified.
- The Level of Protection MUST be documented and readily apparent.
- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

**Building Data**

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

**Use Correct Occupancy Data**

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

**Questions to Be Answered**

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

**Common Shortcomings**

- Incomplete documentation.
- Inconsistencies among data in the application, BCA module runs, and the technical support data.
- Lack of technical support data.
- Lack of a detailed cost estimate.
- Use of discount rate other than FEMA-required amount of 7 percent.

- Overriding FEMA default values without providing documentation and justification.
- Lack of information on building type, size, number of stories, and value.
- Lack of documentation and credibility for FFEs.
- Use of incorrect Project Useful Life (not every mitigation measure = 100 years).

# Appendix E
# Plan Maintenance Documents

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## Annual Review Questionnaire

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

# Mitigation Action Progress Report



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

Project Title: _____ Project ID# _____

Responsible Agency: _____

Address: _____

City: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

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

Anticipated completion date: _____

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

_____

_____

_____

| Milestones | Complete | Projected Date of Completion |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Plan Goal (s) Addressed:

Goal: _____

Indicator of Success: _____

_____

_____

_____

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

_____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

_____

☐ Cost underrun*

*explain: _____

_____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

_____

_____

_____

_____

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

_____

_____

_____

_____

C. How was each problem resolved?

_____

_____

_____

_____

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

Other Comments: