By: Planning
Public Hearing: 03/13/18
Adopted: 03/13/18

WASILLA PLANNING COMMISSION
RESOLUTION SERIAL NO. 18-02

A RESOLUTION OF THE WASILLA PLANNING COMMISSION UPDATING THE 2012 CITY OF WASILLA HAZARD MITIGATION PLAN (PHASE I – NATURAL HAZARDS) AS PART OF THE FIVE YEAR HAZARD MITIGATION PLAN UPDATE.

WHEREAS, the City of Wasilla Hazard Mitigation Plan was originally adopted by the Wasilla City Council on May 9, 2005 and updated on June 11, 2012; and

WHEREAS, the City's Hazard Mitigation Plan requires that it be reviewed annually and updated every five years; and

WHEREAS, staff contacted various state and local agencies such as the State Office of Homeland Security, Federal EPA region 10, the Matanuska-Susitna Borough Emergency Services Department, the State Department of Forestry for input regarding updates to the 2012 Hazard Mitigation Plan; and

WHEREAS, the city staff worked with LeMay Engineering & Consulting, Inc., consultants contracted by Alaska Division of Homeland Security and Emergency Management and FEMA, to update the 2012 Hazard Mitigation Plan; and

WHEREAS, the Wasilla Planning Commission held a public hearing on March 13, 2018 to allow public input and discussion regarding the proposed updates to the 2012 Hazard Mitigation Plan;

NOW, THEREFORE BE IT RESOLVED, that the Wasilla Planning Commission hereby forwards their recommendation to the Wasilla City Council to adopt the updated Hazard Mitigation Plan, subject to review by the United States Environmental Protection Agency.

ADOPTED by the Wasilla Planning Commission on March 13, 2018.

APPROVED:

3/14/18

Jessica Dean, Chair Date

ATTEST:

Tina Crawford, AICP, City Planner

VOTE: Passed Unanimously

City of Wasilla
Hazard Mitigation Plan
(Phase I – Natural Hazards)

2018 Update by:
Wasilla Planning Commission

LeMay Engineering
& Consulting, Inc.

Acknowledgements

Wasilla City Council

Bert Cottle, Mayor
Glenda Ledford
Tim Burney
Stu Graham
Mike Dryden
Gretchen O'Barr
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Technical Assistance

Brent Nichols, CFM, SHMO, Alaska State DHS&EM

The preparation of this plan was financed by funds from a grant from the Alaska Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency.

Acronyms

°F	Degrees Fahrenheit
ADEC	Alaska Department of Environmental Conservation
AEIC	Alaska Earthquake Information Center
AFS	Alaska Fire Service
AHS	Alaska Hydrologic Survey
APA	Approved Pending Adoption
AS	Alaska State Statute
AKST	Alaska Standard Time
BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
DCCED	Department of Commerce, Community, and Economic Development (State of Alaska)
DHS&EM	Department of Homeland Security and Emergency Management
DMA	Disaster Mitigation Act
DOL	Department of Labor
EOC	Emergency Operation Center
EOP	Emergency Operations Plan
EQ	Earthquake
ER	Erosion
FEMA	Federal Emergency Management Agency
FL	Flooding
FMA	Flood Mitigation Assistance Program
HMA	Hazard Mitigation Assistance
HMP	Hazard Mitigation Plan
HMGP	Hazard Mitigation Grant Program
HW	High Wind
IA	Individual Assistance
LEPC	Local Emergency Planning Committee
M	Magnitude
MPH	Miles Per Hour
MSB	Matanuska-Susitna Borough
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic & Atmospheric Administration
NWS	National Weather Service
PA	Public Assistance
PDM	Pre-Disaster Mitigation Grant Program
PSA	Public Service Announcement
Risk MAP	FEMA Risk Mapping, Assessment, and Planning Program
SBA	Small Business Administration
SHMO	State Hazard Mitigation Officer
SOA	State of Alaska
SW	Severe Weather
USACE	United States Army Corps of Engineers
USC	United States Code

USFS	United States Forest Service
USGS	United States Geological Survey
VAF	Volcanic Ashfall
WF/UF	Wildland and Urban Fire

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Chapter I – Planning Process and Methodology

A. Introduction

Hazard mitigation is the process of profiling hazards, analyzing risk, and developing preventative actions. When preventative actions are implemented, risks are reduced or eliminated. This Hazard Mitigation Plan (HMP) for the City of Wasilla includes information to assist the City government and residents with planning to avoid future disaster losses. The HMP provides information on natural hazards that affect Wasilla, describes past disasters, and lists projects that may help the City prevent disaster losses. This HMP Update was developed to help the City make decisions regarding natural hazards that have the potential to affect Wasilla.

The intent of this 2018 planning process is to bring up to date information in the Phase I Natural Hazards portion of the HMP Update that was adopted by the State Office (SOA) Division of Homeland Security and Emergency Management (DHS&EM), the Matanuska-Susitna Borough (MSB) Department of Emergency Management, and the Wasilla City Council in 2005 and then updated in 2010 (approved in 2012).

2018 Updates to this Plan include:

- Updated data for previous hazard occurrences;
- Addition of climate change hazard;
- Removal of Phase II text (as Phase II was not completed);
- 2018 status update of mitigation actions/projects table that was developed in 2010; and
- Addition of required information per regulations.

Section 1. Purpose of the Plan

This is the 2018 Update to the first phase of an intended two-part HMP for the City of Wasilla. The first phase covers natural hazards and was originally adopted in 2005 and updated in 2010. It is the only phase that was completed.

The purpose of this HMP is to identify and coordinate risk mitigation efforts with State, Federal, and Local partners and to fulfill the requirements set forth by the Code of Federal Regulations (CFR), Title 44 "Emergency Management and Assistance", Part 201 "Mitigation Planning", Subsections 6 and 7 (44 CFR §201.6, §201.7):

> Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. As such, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding provided by Hazard Mitigation Assistance (HMA) programs in both the pre- and post-disaster timeframes.

Current Federal regulations 44 CFR §201.6 and §201.7 require Local communities and Tribes, except under Regional Administrator-approved "extraordinary circumstances" [§201.6(a)(3)], to have a Federal Emergency Management Agency (FEMA)-approved HMP for most of FEMA's grant programs [all but Public Assistance (PA) Categories A, B, and Individual Assistance (IA)]. Currently, Federal regulations require HMPs to be formally updated and approved by FEMA every five years.

In October 2007 and July 2008, FEMA combined and expanded flood mitigation planning requirements with Local HMPs (44 CFR §201.6). Furthermore, all HMA 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 HMPs now qualify communities for several Federal HMA grant programs.

This HMP complies with Title 44 CFR current as of March 11, 2015 and applicable guidance documents. Specific FEMA programs, such as PA Categories C through G, Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and the Hazard Mitigation Grant Program (HMGP) are detailed in Chapter IV, Section D, Eligible Projects for HMGP funding.

The purpose of this 2018 HMP Update is to produce a program of activities through actions and projects that will best address the City's potential hazard concerns, while meeting other community needs. This HMP Update will accomplish the following objectives consistent with FEMA planning process guidelines:

- Describe the planning process to include public involvement;
- Update an assessment of risks;
- Determine what facilities, or portions of infrastructure, are vulnerable to a disaster;
- Update a mitigation strategy to reduce potential losses and target resources;
- Describe how the City will periodically review, evaluate, monitor, maintain, and update the HMP; and
- Describe the process for implementing the HMP after adoption by the Wasilla City Council and receiving FEMA approval.

Section 2. Authority

On October 30, 2000, Congress passed the Disaster Mitigation Act (DMA) of 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 FEMA's mitigation plan requirements for mitigation grant assistance.

For implementation guidance, FEMA published the Final Rule in the Federal Register on September 16, 2009 [Docket ID FEMA-2006-0010], 44 CFR Part 201 with subsequent updates. The planning requirements for Local entities are described in detail throughout this chapter and are identified in their appropriate sections throughout this HMP.

The Wasilla HMP includes action items that will implement specific goals and objectives. The City is empowered to act through its status as a First-Class City incorporated under Alaska State Statutes (AS) and through AS Title 29, Municipal Government, including, but not limited to:

- AS 29.05.030 Emergency Ordinances, which permits the declaration that an emergency exists along with a statement of facts supporting the declaration;
- AS 29.35.010 General Powers, which provides the authority to develop and enforce ordinances and to expend money for a community purpose, facility, or service;
- AS 29.35.030 Eminent Domain, which authorizes the exercise of the powers of eminent domain to acquire property for public purposes;
- AS 29.35.040 Emergency Disaster Powers, permits a municipality, after the declaration of a disaster area by the Governor or President, to participate in and provide housing, urban renewal, and redevelopment;
- AS 29.35.055 Local Air Quality Control Program, which permits the establishment of a local air quality control program as provided in AS 46.14.400;
- AS 29.40.040 Land Use Regulations, which provides for the adoption of a comprehensive plan as a basis for the regulation governing the use and occupancy of land; and
- AS 29.45.230 Tax Adjustments on Property Affected by a natural disaster, which provides for reassessment and reduction of taxes for property destroyed, damaged, or otherwise reduced in value by a disaster.

B. Plan Development

The methodology used in updating the HMP consisted of the following tasks:

- Coordination with other agencies and organizations;
- Public involvement;
- Verifying probable hazards;
- Identifying affected areas;
- Determining probability of occurrence;
- Reviewing and analyzing possible mitigation activities;
- Setting goals and identifying potential actions that would mitigate hazards;
- Submitting the Draft HMP Update to the State Hazard Mitigation Officer (SHMO) for review;
- Adoption of the HMP by the City Council following a public hearing;
- Implementation of the HMP and evaluation of the actions;
- Reviewing annually and updating the HMP every five years; and
- Providing for periodic HMP maintenance.

The HMP summarizes the effects of hazards in the City of Wasilla such as earthquake, high wind, severe weather, fire, volcanic ashfall, erosion, and flood and recommends mitigation strategies and activities. The HMP also contains a list of mitigation activities and projects and a brief rationale, or explanation, of how each activity or project contributes to the overall hazard mitigation strategy outlined in this HMP.

The HMP will be reviewed annually and updated every five years by the City of Wasilla Planning Commission. In addition, the HMP will be evaluated, as appropriate, when a disaster occurs that significantly affects the City, to determine whether it receives a state or federal

declaration. This evaluation and possible update will be completed as soon as possible, but no later than 12 months following the date the disaster occurs.

Section 1. Project Staff

The City of Wasilla Planning Commission ("Commission") is the lead agency responsible for developing or updating plans, gathering public input, and making recommendations on the adoption of plans to the City Council. They have also acted as the lead agency in developing this HMP and its updates. The Commission in 2018 is comprised of five members who are appointed by the Wasilla City Mayor and confirmed by the Council. Planning Commission members who worked on the HMP Update are:

2018
Eric Bushnell, Seat A
Darrell L. Breese, Seat B
Jessica Dean, Seat C
Simon Brown, Seat D
Brian L. Mayer, Seat E

For the 2018 Update, LeMay Engineering & Consulting, Inc. worked with:
Tina Crawford, Wasilla Planner
Tahirih DesJardin, Wasilla Planning Clerk

Section 2. Plan Research

This Update was financed from a grant from the DHS&EM and FEMA. The DHS&EM's contractor, LeMay Engineering & Consulting, Inc., guided the Planning Commission through the process. The City Planning Department coordinated with other agencies including the Alaska DHS&EM, MSB Planning Department, MSB Emergency Services Department, City Public Works Department, and the Alaska Department of Commerce, Community, and Economic Development (DCCED). These agencies provided information from existing plans, which included the 2013 State of Alaska HMP, 2013 MSB HMP, City of Wasilla Emergency Operations Plan (EOP), and flood mitigation measures. A complete list of references used for the Update is included in the Bibliography.

Section 3. Public Involvement
Table 1 provides information regarding public involvement during the update of the Wasilla HMP.

Table 1. Public Involvement Mechanisms

Mechanism	Description
Newsletter Distribution (March 5, 2018)	The City of Wasilla distributed a newsletter describing the planning process and opportunities for public involvement. The newsletter encouraged the community to review the Draft HMP Update and provide feedback and to attend the March 12 Planning Commission meeting. The newsletter was posted on the City's webpage and in public locations throughout the community.
Planning Team Meeting (March	A public hearing on the Draft HMP Update was held as an agenda item at the Planning Commission meeting. The Planning Team reviewed the Draft

Mechanism	Description
13, 2018)	HMP Update, specifically the mitigation actions, and sought public feedback as to how the Draft HMP Update may be revised to best meet the needs of the community.

An invitation was extended to individuals via a project newsletter describing the HMP update process and announcing the upcoming public meeting.

The Planning Team held their first meeting on February 22. During the meeting, the Planning Team confirmed the hazards identified in development of the 2010 HMP remain the same in nature and intensity: earthquake, high wind, severe weather, wildland and urban fire, volcanic ashfall, erosion, and flood. The Planning Team decided that climate change was not a hazard in Wasilla and chose not to add climate change as an eighth hazard.

Following the hazard screening process, the Planning Team reviewed and updated the list of critical facilities in the 2010 HMP. LeMay Engineering & Consulting, Inc. also described the specific information needed from the Planning Team and public to update the risk assessment, including the locations and values of critical facilities in the community.

After the community asset data was collected by the Planning Team in 2018, an updated risk assessment was completed that illustrated the assets that are exposed and vulnerable to specific hazards. Mitigation actions were also reviewed, and new actions were developed and added to the mitigation action matrix based on the results of the risk assessment.

At the second meeting on March 13, the 2018 Planning Team reviewed the Draft HMP Update for accuracy – ensuring it met the City's needs. The meeting was productive with the Team highlighting several minor corrections or refinements.

Section 4. Incorporation of Existing Plans

The City of Wasilla has existing plans, studies, reports, and technical information that were reviewed in the development of the HMP. This information identified City goals, implementation strategies, and public comments received in development of these documents. The following is a list of the major plans reviewed in developing and updating the HMP:

1) **Wasilla Comprehensive Plan**
   The City has a Comprehensive Plan that provides guidance and direction to the physical development of Wasilla. Its policies and ordinances cover land use development, recreational trails, parks and recreational facilities, other public facilities and services, and transportation. The original 1982 Comprehensive Plan was revised in 1986 and 1992, and elements were added or updated in 1996, 1999, 2004, and 2011. The 2011 Comprehensive Plan has a 10-year expected useful life that will end in 2021.

2) **Capital Improvement Plan**
   The City's Capital Improvement Plan (updated annually) lists approved street, building, water, sewer, and storm water capital improvement needs, their estimated costs, and priority for funding. Capital improvement projects identified for hazard mitigation will be determined following the adoption of the HMP Update by the City Council.

3) Emergency Operations Plan

Wasilla has an EOP, completed in 2004. This strategic planning guide coordinates the City's preparedness and response to an emergency or disaster. Selected City staff members are receiving training based on the operating procedures outlined in the EOP.

4) Sewer Master Plan

The Sewer Master Plan, completed in 1999, evaluates sewer-related issues, both short- and long-term, including potential community growth through 2050. Short-term issues include how to improve treatment at the current sewer treatment plant. Long-term issues include a shift away from the current Septic Tank Effluent Pumping system that uses septic tanks and force mains for collection, an outfall to Knik Arm, and a new sewer treatment plant near Knik Arm.

5) Water Master Plan

The Water Master Plan was completed in 2001 and evaluates short-term and long-term drinking water issues and includes potential community growth through 2015. Short-term issues include building in system backups, while long-term issues include meeting demand as it occurs through 2015.

6) Storm Water Master Plan

The Storm Water Master Plan was completed in 2001. The plan identifies major storm water issues facing the City, which include failing drywells in City streets and failing water quality in Wasilla Lake, Lake Lucille, and Cottonwood Creek. It also categorizes long-term capital projects to replace the dry wells and protect the community's water quality.

7) FEMA Risk Report - MSB and Incorporated Cities of Houston, Palmer, and Wasilla

The FEMA Risk Report was completed in 2016 and showcases the results of an in-depth risk assessment for flood, earthquake, landslide, and wildfire hazards in the MSB. This assessment was performed through the FEMA Risk Mapping, Assessment, and Planning (Risk MAP) program.

C. Plan Maintenance

The City of Wasilla will implement this HMP by incorporating elements into the City of Wasilla Comprehensive Plan by ordinance. As well as guiding development, the Wasilla Comprehensive Plan provides continuity in the decision-making process and in development of City policy. In addition, a cost/benefit ratio analysis will be used to prioritize projects selected for implementation based on community goals, planning objectives and funding availability, environmental concerns, and public support. The City Mayor is responsible for implementing the HMP Update as resources allow. Projects selected for funding will follow a public process, with the Wasilla Planning Commission making recommendations to the City Council.

In making their recommendations to the City Council, the Planning Commission will review and report on projects using the following criteria:

1. The project addresses life-saving or personal safety concerns.
2. The project is consistent with adopted community plans including the Wasilla Comprehensive Plan, the City Capital Improvement Plan, and the City of Wasilla EOP.

3. The Cost/Benefit ratio analysis of the project(s). The FEMA publication includes information regarding how to determine cost effectiveness of projects and how to calculate the cost-benefit ratio (Appendix D).

The Planning Commission shall annually and as needed undertake an overall review of the Comprehensive Plan including the HMP element and update it as necessary as required by State of Alaska Title 29.40.030. At a minimum, the hazard mitigation element of the Comprehensive Plan will be evaluated and updated every five years. The Planning Commission will begin the evaluation and updating process two years before the end of each five-year cycle.

The City Planner will be responsible for ensuring that reviews are completed. The City Planner will notify the general public of opportunities to review the HMP and its Updates using newspaper, radio, brochures, and/or flyers to advertise the opportunities and solicit involvement. Public involvement is essential to ensure that the mitigation goals, objectives, and action items are addressing the community's needs.

Section 1. Incorporation into Existing Planning Mechanisms

The Planning Team will incorporate planning mechanisms into their HMP through the following activities:

- Research the community's regulatory tools when implementing mitigation planning initiatives.
- Involve pertinent agencies when integrating hazard mitigation concepts.
- Update or amend existing planning mechanisms as necessary.
- The City Planner will be responsible for providing a list of all City of Wasilla documents to contractors focused on developing new or updating existing City Plans and ensuring that this HMP is incorporated into plans as applicable.

The City Council will involve the public to continually reshape and update this HMP. A paper copy of this plan will be available at the City office as well as the Library. This Plan will also be stored on the State Department of Commerce, Community, and Economic Development Community and Regional Affairs, (DCCED/DCRA) plans website for public reference, http://commerce.alaska.gov/web/dcra/PlanningLandManagement/CommunityPlansAndInfrastructure.aspx after plan approval and adoption.

Section 2. Continued Public Involvement

Each year in March, the City will include a natural hazard survey in its water bill that asks for residents' input into the planning process (Appendix E). Completed surveys will be filed and evaluated on an annual basis. The City Planner will schedule a review of the plan on an annual basis and will post fliers inviting the public to participate. Any public comments regarding this HMP will be collected by the City Planner, included in the annual report, and considered during future HMP updates.

Section 3. Monitoring, Evaluating and Updating the Plan

> Section §201.6(c)(4)(i) of the mitigation planning regulation requires that 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.

Monitoring the Plan: The City Planner will review the HMP in June of each year to determine if projects identified by the HMP have been completed and to ensure that new projects are reflected in the HMP as well as to track and note new hazard events (Appendix E). Upon finding that changes are necessary, the Planner will forward a list of the recommended HMP changes to the Planning Commission. The Planning Commission will conduct a public hearing on the proposed changes and forward their recommendation to the City Planner for review and comment. The City Council will act on incorporation of the change into the HMP.

The City Planner with the assistance of the various department heads, the Local Emergency Planning Committee (LEPC), and other personnel will review the HMP within 90 days of the issuance of a natural disaster declaration affecting the City, to determine if changes to the HMP are necessary. Upon finding that changes are necessary, the Planner will forward a list of the recommended changes to the Planning Commission no later than 12 months following the date the disaster occurs. The Planning Commission will conduct a public hearing on the proposed changes and forward their recommendation to the SHMO for review and comment. Once the State has authorized the recommended change, the City Council will act on incorporation of the changes into the HMP.

After City Council approval of recommended changes, the Planner will ensure that:

- Revisions are incorporated into all copies of the HMP;
- Paper and electronic copies of the HMP are available for viewing by the public and interested agencies; and
- An electronic copy of the approved HMP, including all subsequent revisions, is safely stored at an off-site location.

Updating the Plan: HMPs must be updated and resubmitted to FEMA for approval every five years in order to continue eligibility for FEMA HMA programs. HMP Updates must demonstrate that progress has been made in the past five years to fulfill commitments outlined in the previously approved HMP. This involves a comprehensive review and update of each section of the HMP and a discussion of the results of evaluation and monitoring activities described above. HMP Updates may validate the information in the previously approved HMP or may involve a major HMP rewrite. A HMP Update may not be an annex to this HMP; it must stand on its own as a complete and current HMP.

The tasks required to monitor, evaluate, and update the HMP are illustrated on Figure 1.

Section 4. State and FEMA Review and Technical Assistance

Draft HMPs are submitted to the SHMO for review. The SHMO reviews the plan for consistency with the State HMP and the DMA 2000 regulations. The primary guidance is the State

Mitigation Plan Review Guide, March 9, 2015. The State assists the community with any necessary revisions and then forwards the plan to FEMA Region 10 for final review. If no further revisions are necessary, FEMA issues an "approval pending adoption" (APA) letter to the City Council.

Section 5. Formal Plan Adoption and Assurances

The City Council will formally adopt the HMP by a resolution. Once the plan is adopted, the SHMO forwards a copy of the adoption resolution to FEMA Region 10 for final approval. FEMA sends the final approval letter to the City and the State for their records. Finally, the SHMO places a copy of the FEMA-approved HMP in DHS&EM files and on the State website for reference.

Once pre-approval has been obtained from FEMA, the HMP will be forwarded to the Wasilla City Council for their adoption. The HMP, including documentation of this adoption, will be sent back to the State and subsequently to FEMA for final approval. The HMP will be incorporated as a chapter of the Wasilla Comprehensive Plan by City Council ordinance. The HMP will be evaluated and updated as described in this section.

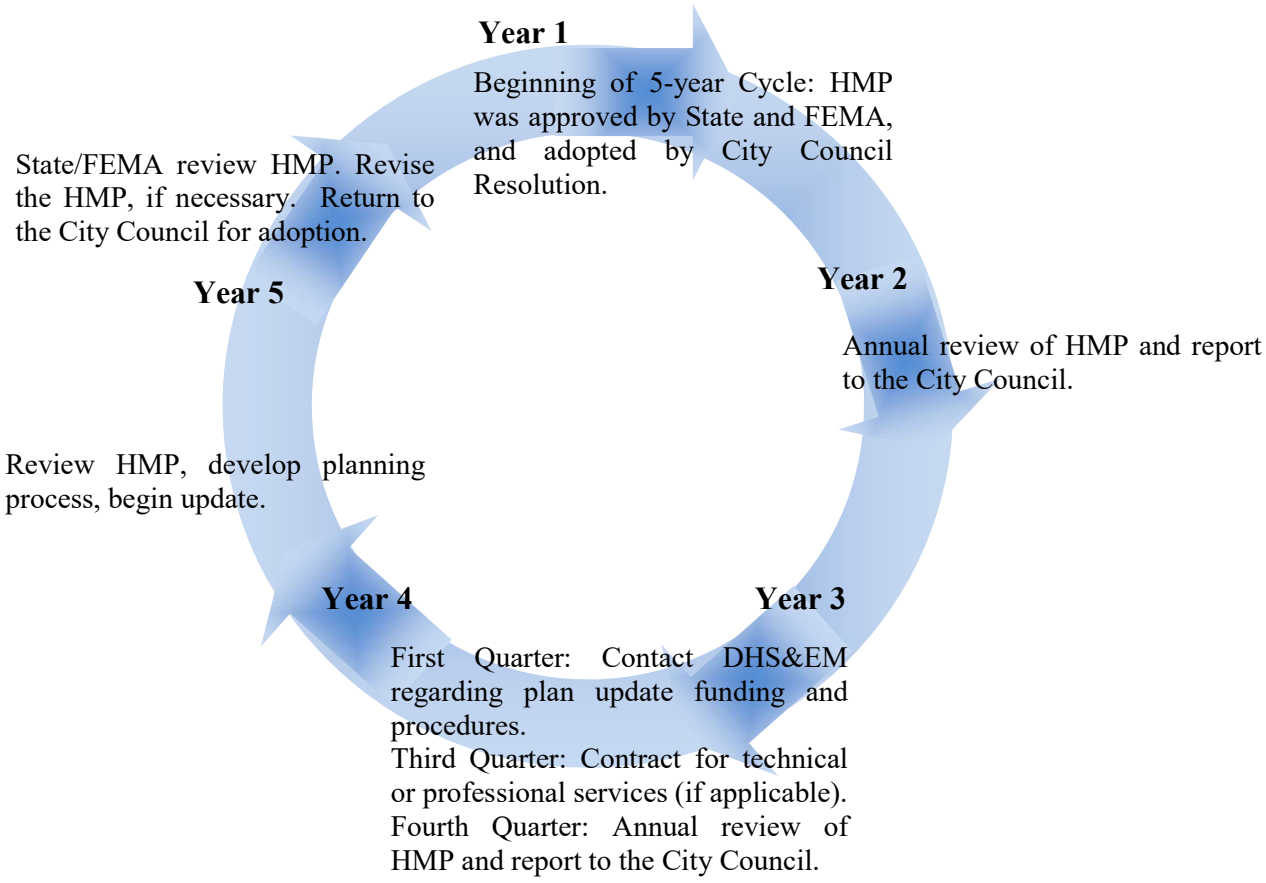


Figure 1. Hazard Mitigation Planning Cycle

Chapter II – Community Profile

A. Location

The City of Wasilla is located midway between the Matanuska and Susitna Valleys in southcentral Alaska on the George Parks Highway at 61º 58' North Latitude and 149º 43' West Longitude. The City lies south of the Talkeetna Mountains and about 12 miles north of the Knik Arm on the Cook Inlet and is located along the Alaska Railroad main line from Anchorage to Fairbanks. Wasilla is approximately 43 miles north of Anchorage, which is about one hour's drive depending on the time of year and weather conditions. The City boundaries encompass approximately 11.7 square miles of land and 0.7 square miles of water.

Current Population: 8,704 (2016 DCCED Certified estimate)

Pronunciation: wah sill' uh
Incorporation Type: 1st Class City
Borough: Matanuska-Susitna Borough
Census Area: Matanuska-Susitna Census Area

Table 2. Local and Regional Contact Information for Wasilla

Community Information	Contact Information and Type
City of Wasilla	City of Wasilla 290 East Hering Ave. Wasilla, AK 99654 Jamie Newman, MMC, City Clerk Phone: (907) 373-9050 Fax: (907) 373-9096 Email: cityofwasilla@ci.wasilla.ak.us; jnewman@ci.wasilla.ak.us Website: http://www.cityofwasilla.com
Borough Located In:	Matanuska-Susitna Borough
Electric Utility	Matanuska Electric Association, Inc. P.O. Box 2929 Palmer, AK 99645
School District	Matanuska-Susitna Borough School District 501 N Gulkana St. Palmer, AK 99645 Phone: (907) 746-9200

B. History

The area surrounding Wasilla was called "Benteh", meaning many lakes, by the Dena'ina, the Athabaskans who lived in this part of Alaska until the latter part of the 19th century. The numerous lakes and streams in the area provided ample fishing for indigenous populations, and the area became a popular wintering ground for small semi-permanent native villages. Trails connected these villages to hunting grounds in the Susitna Valley and the Talkeetna Mountains, while others linked the villages to the Ahtna people north of the Matanuska River.

The town site of Wasilla is named after Chief Wasilla, a local Dena'ina chief and shaman, who died in 1907. Wasilla's history as a community dates back to 1916 when the Alaska Engineering Commission constructed a work camp at the intersection of the Alaska Railroad and the Carle Wagon trail (now known as Wasilla-Fishhook Road) which linked the coastal community of Knik with the Willow Creek mining district. The work camp housed men engaged in surveying, clearing, and establishing the rail line that would eventually connect the port of Seward to Fairbanks. After platting the town site in June 1917, the Alaska Engineering Commission auctioned off town site lots from the railroad platform in Wasilla. This new community led to the demise of the older settlement at Knik. Once established, Wasilla became the most important distribution point in the Valley.

Homesteading and the founding of the Matanuska Colony under President Roosevelt's New Deal increased the population in the area. Several colony farms were located near Wasilla. World War II ended the mining boom, and drained workers from local farms and businesses. However, economic activity increased during this period due to an influx of military personnel to area bases. Many of these soldiers chose to stay, or returned to the Wasilla area, at the end of their enlistment. These residents formed farms and other businesses.

Construction of the George Parks Highway through Wasilla in the early 1970s provided direct access to and from Anchorage. This enabled workers and their families to live in the Wasilla area and commute to jobs in Anchorage. Support and service industries began to develop in the area to meet the needs of these new residents. The Parks Highway is also heavily used throughout the year by tourist and resident Alaskans traveling between Anchorage and Fairbanks and to Denali National Park. The City of Wasilla was incorporated in 1974 as a second-class City under Alaska statutes, and has continued to develop as the retail and commercial hub of the central Matanuska-Susitna Valley. Wasilla became a first-class City in 1984.

C. Population

Wasilla's 2016 population was estimated to be 8,704 by the Alaska DCCED. The 2010 U.S. Census data indicated that the population of Wasilla increased by 43.2% from 2000 to 2010, which was more than double Alaska's statewide increase of 13.3%. Figure 2 provides historical census data for the City of Wasilla.

Wasilla's population growth rate between 2010 and 2016 was approximately 1.8% per year with a sustained annual rate of 3.19% since 1990. In 2009, the State projected that Wasilla would grow at an average annual rate of 3.1% until 2034. The MSB has had an average 2.37% population increase annually from 2010 to 2016. From 1990-2016, there was an average population increase of 1.12% annually within the State of Alaska.

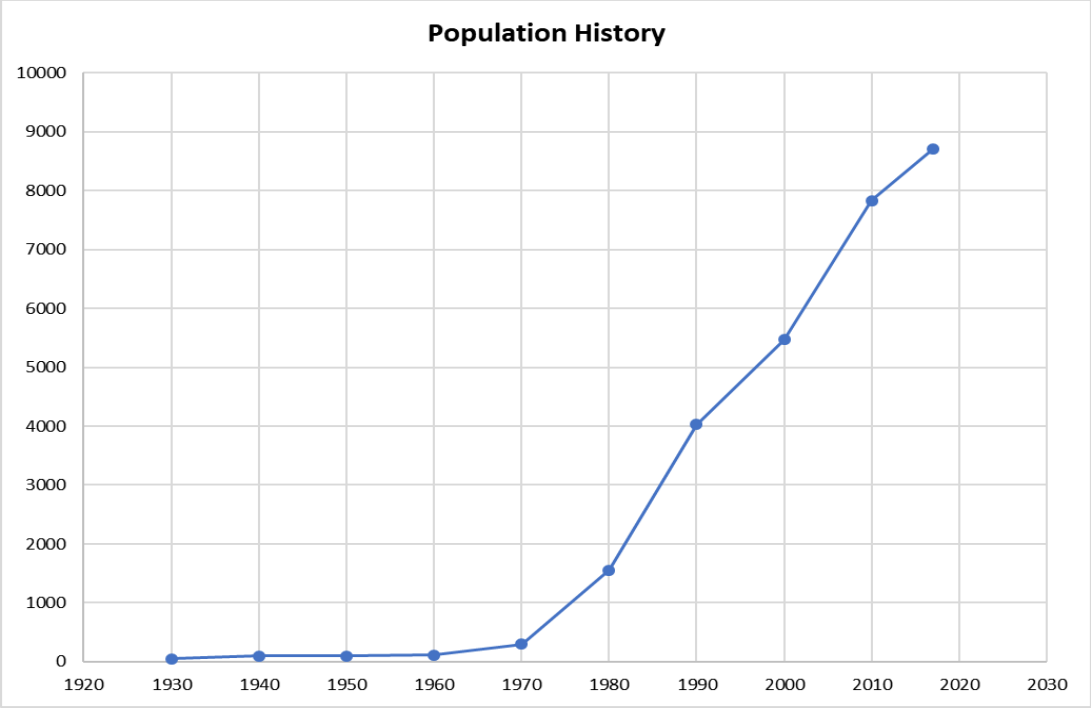


Figure 2. Historical Census Data

Wasilla's population is young compared to state and national averages. The 2010 U.S. Census found that 29% of the City's population was younger than 19 as compared to 29.2% for Alaska as a whole and 27.0% for the nation. The median age in 2010 for Wasilla residents was 33.

Like the rest of the state, Wasilla's population is aging. In 2000, the U.S. Census reported 6.7% of the City's residents were age 65 or older. By 2010, the percentage of residents 65 or older in Wasilla had grown to 10.3%. The 2010 Census found 7.9% of the MSB's population to be 65 or older. The continued development of quality senior residential facilities centered around the core area of the City may maintain this trend during this decade. Facilities include the Wasilla Senior Center off of Knik-Goose Bay Road, the Primrose Retirement community on Lucille Street, and the Vista Rose Senior Apartments on Lucille Street.

D. Economy

The total potential work force provided by the Department of Labor (DOL) Division of Research and Analysis in 2015 was 5,979; 3,458 residents were employed. The unemployment rate provided in the 2013 State HMP is 11.16% although practical unemployment or underemployment is likely to be significantly higher. Approximately 11% of residents live below the poverty line. The per capita income is $28,704 with a median household income of $62,622.

E. Transportation

Wasilla is well-connected by land to surrounding communities. The George Parks Highway and Glenn Highway connect Wasilla to Anchorage, Fairbanks, Denali National Park, and Palmer, as well as a number of smaller communities. The Alaska Railroad serves Wasilla on the Anchorage to Fairbanks route, while Mat-Su Valley Public Transportation provides bus service between

Wasilla, Palmer, and Anchorage. Commercial air service is available at Anchorage International Airport, located 45 miles away. Wasilla's municipal airport has a paved runway with parking for transient aircraft. Numerous additional private airstrips also operate in the vicinity. Float planes land at Wasilla Lake, Jacobsen Lake, and Lake Lucille.

F. Climate

Wasilla's climate is transitional between the extremes of Interior Alaska and the wet maritime conditions found along the coastal areas. The Chugach and Talkeenta Mountains, and the Alaska Range generally protect Wasilla from the extreme cold experienced by Interior Alaska. The City averages 15.27 inches of precipitation per year, and an average of 47.7 inches of snowfall per year. On average, temperatures range from 4.5 to 21.6 degrees Fahrenheit (°F) in January and from 48.2ºF to 67.4ºF in July. The frost-free period in spring and summer averages 115 days, with the first frost usually arriving by September 1 each year.

G. Natural Environment

Wasilla is surrounded by the Talkeetna and Chugach mountain ranges. The area owes its varied setting to the glacial forces that shaped the area during the end of the last ice age. Several glacial advances and retreats left a complex system of hills, ridges, glades, and lowlands that define the topography. Landforms in and around Wasilla consist of undulating ridges of glacial till and flat benches of sand and gravel. Elevation varies from 300 to 500 feet above sea level within the City boundaries. Generally, the terrain gradually rises from south to north. The downtown area is relatively flat.

The most prominent water features are Wasilla Lake and Lucille Lake. Cottonwood Creek, Lucille Creek, and several smaller streams traverse the area.

Moose are abundant in the Wasilla area and are found in stream valleys, lowlands, and south-facing hills foraging on willow, birch, and aspen. All five species of pacific salmon are present as King, Coho, Sockeye, Pink, and Chum salmon pass through the City streams and lakes each year. Wasilla's lakes, creeks and streams provide important habitat for migration, spawning, and rearing of these anadromous fish. Rainbow, Dolly Varden, and Cutthroat trout are also present. Spawning salmon draw both brown and black bears to the Wasilla area each year where they take advantage of this readily available food source. Small game such as fox, rabbit, coyote, mink, weasel, muskrat, and beaver are also abundant.

H. Land Use and Development Trends

The population density for Wasilla in 2010 was 632.6 persons per square mile, up from 466.8 in 2000. The State of Alaska has a population density of 1.2 persons per square mile while MSB has approximately 3.6 persons per square mile.

Between 2000 and 2010, the number of housing units in the City increased by 54.6% from 2,119 to 3,277 units. In 2010, 52.9% of the housing units in Wasilla were owner-occupied while 47.1% were renter-occupied. Only 1.2% of Wasilla's population lives in group quarters. The overall MSB data for 2010 showed 58.5% owner-occupied housing units with 18.49% renter occupancy and 1.5% in group quarters.

Between 2000 and 2010, the City received an average of 42 single-family residence, nine multi-family residence, and 19 commercial building permit applications per year. Figure 3 illustrates the number of building permit applications from 2000 to 2010.

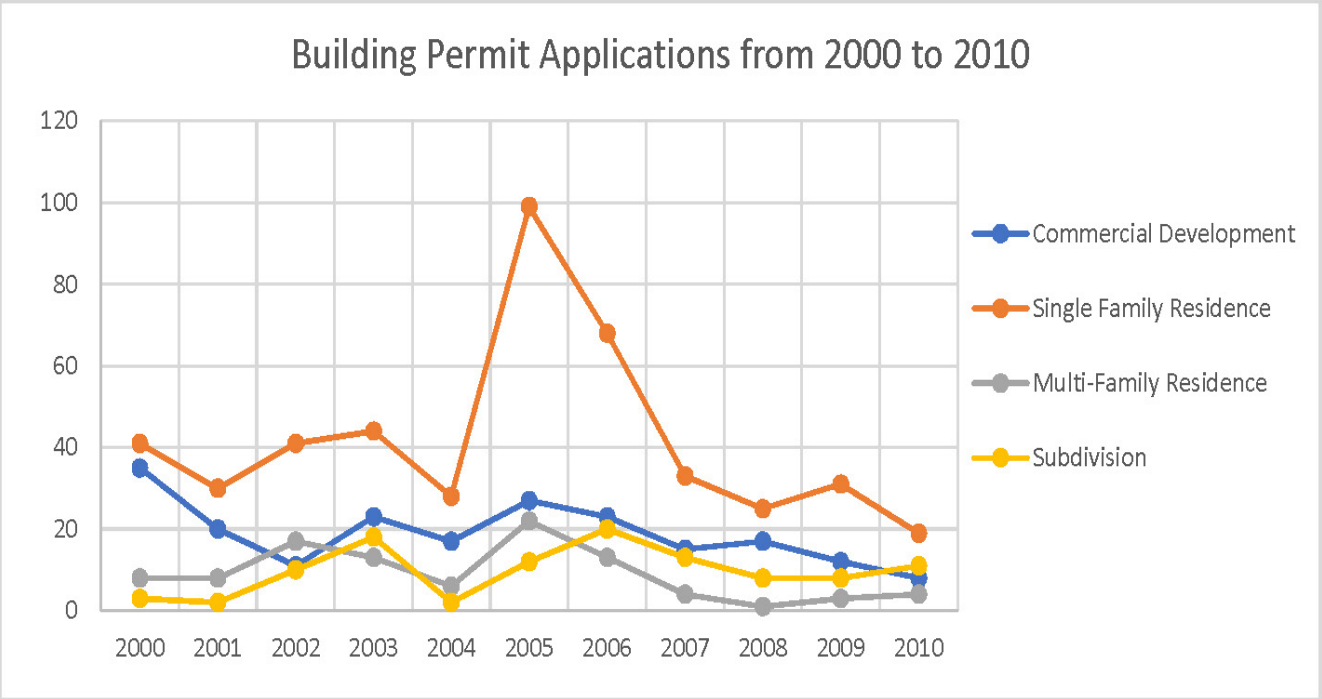


Figure 3. Wasilla Building Permit Applications

According to the Comprehensive Plan developed in 2011, the City spans approximately 13 square miles and the land area is dominated by private ownership. As of 2010, approximately 37.9% of the land within the City limits is undeveloped. Some of these lands include wetlands or other unsuitable and expensive areas to develop. The major land use in the City is residential at 32.7%, which includes a mix of low-density rural residential and single-family subdivisions. Approximately 4% contains more-dense residential including townhouse, duplex, and multi-family. Commercial land use occupies a fairly-limited land area at approximately 6.8%; although, because of its high visibility and linear development along major roadways, it is perceived as more dominant. Industrial uses comprise 1.6%, and remaining uses, including institutional, parks, and limited state and federal public parcels, comprise 16.6% of overall land use.

According to the MSB Assessor's Office as of January 2017, there are 2,896 properties with improvements in the City of Wasilla, with a total value of $1,305,406,397. Number of structures and value, by type, are shown in Table 3.

Table 3. Property Values

Structure	Number	Value ($)
Housing		
• Single family	2,025	371,264,774
• Duplex	374	42,718,600
• Multi-family	990	64,785,098
• Mobile homes	52	1,118,000

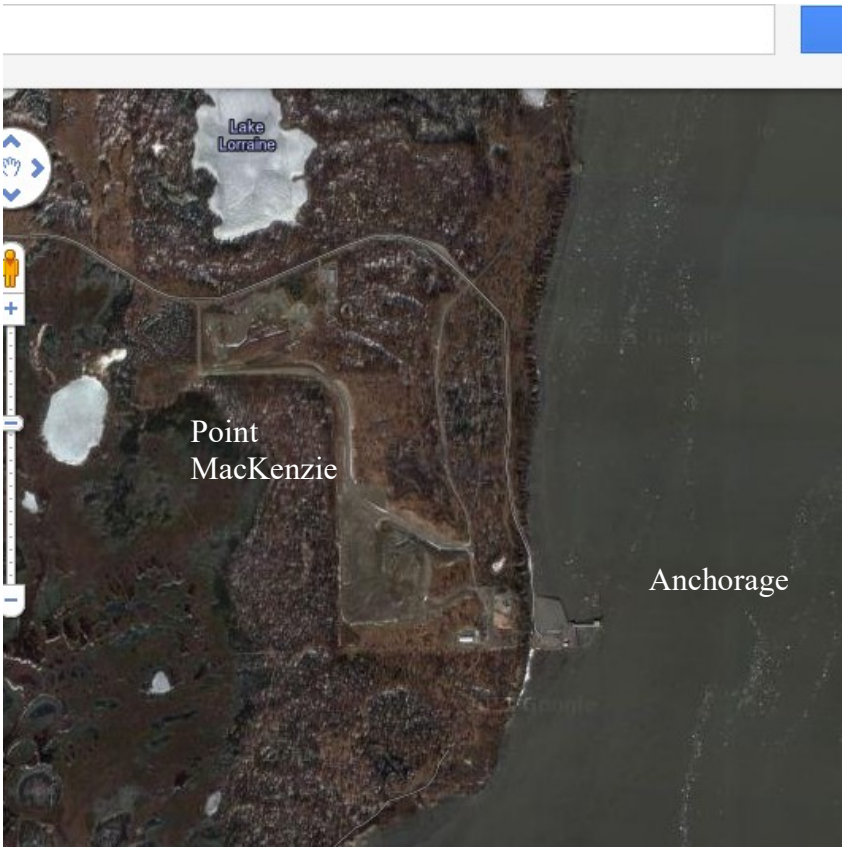
Commercial	402	345,633,453
Other		499,694,000
	Total	1,305,406,397

The City is growing to the east along its two main transportation corridors, the Parks Highway and the Palmer-Wasilla Highway. Since this HMP was originally adopted in 2005, Wasilla has seen much new development including a new Lowe's Home Improvement Store, demolition of the former Cottonwood Creek Mall with replacement by a Target store as an anchor surrounded by Famous Footwear, GameStop, Walgreens Pharmacy, and other stores in the complex. Sportsman's Warehouse and the Wal-Mart Superstore addition were added in 2007. 2009 brought additions to both Fred Meyers and Alaska Industrial Hardware while 2010 brought the Coming Attractions Theatres 12-plex cinema just south of the Wal-Mart Superstore. 2015 brought the Valley Family Fun Center next to the Valley Cinema. The Parks Highway north of Wasilla was widened in a multi-phase project that will conclude in 2018, which includes improvements spanning from Lucus Street to the Big Lake cut-off. A utility service area agreement with the City of Palmer extends Wasilla's potential expansion area four miles east to the vicinity of Trunk Road. The extension of City utility service along these corridors will intensify interest in urban density development east along these two major transportation routes (see Map 1).

Map 1. Aerial View of Wasilla

The MSB's commitment of resources toward construction of a deep-water dock addition to the port facilities, the study of a rail spur from Willow to Port Mackenzie, and the construction of the Goose Bay Correctional facility has intensified interest in development of residential and commercial property along Knik-Goose Bay Road (see Map 2).

Map 2. Aerial View of Point MacKenzie and Anchorage



The City established five land-use goals in its Comprehensive Plan in 2011. These goals are to:

- Provide balanced land use patterns that support the community's future growth.
- Encourage development opportunities that support the City's role as a regional commercial center.
- Encourage a variety of residential housing opportunities.
- Promote positive neighborhood identities and build a strong civic base to enhance residents' quality of life.
- Continue to expand the City's borders as needed to allow economic development and growth in the future.

The City does not have any future development planned in areas with high vulnerability to hazards. More information on the City's vision of where and how development will take place is contained in the City's Comprehensive Plan and other ordinances, documents, and plans.

Chapter III – Risk Assessment

A. Requirements

> Section §201.6(c)(2) of the mitigation planning regulation requires local jurisdictions to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards (FEMA 386-8).

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, and disruption to local and regional economies, environmental damage and disruption, and the amount of public and private funds spent to assist with recovery. Mitigation efforts begin with a comprehensive risk assessment. A risk assessment measures the potential loss from a disaster event caused by an existing hazard by evaluating the vulnerability of buildings, infrastructure, and people. It identifies the characteristics and potential consequences of hazards and their impact on community assets.

Federal regulations for HMPs outlined in 44 CFR Section §201.6(c)(2) include a requirement for a risk assessment. This risk assessment requirement is intended to provide information that will help the City identify and prioritize mitigation activities that will prevent or reduce losses from identified hazards. The Federal criteria for risk assessments and information on how the Wasilla Plan meets those criteria are outlined below.

Table 4. Risk Assessment - Federal Requirements

Section §201.6(c)(2) Requirement	Where requirement is addressed in Wasilla HMP
Identifying Hazards §201.6(c)(2)(i) The risk assessment *shall* include a description of the type . . . of all natural hazards that can affect the jurisdiction . . .	Chapter III, Section B, Subsection 3 identifies earthquake; Chapter III, Section B, Subsection 4 identifies high wind; Chapter III, Section B, Subsection 5 identifies severe weather; Chapter III, Section B, Subsection 6 identifies wildland and urban fire; Chapter III, Section B, Subsection 7 identifies volcanic ashfall; Chapter III, Section B, Subsection 8 identifies erosion; and Chapter III, Section B, Subsection 9 identifies flood as the natural hazards with the potential to be present in Wasilla. Chapter III, Section B, Subsection 10 discusses all potential natural hazards not included in this HMP and the rationale for not including them.

Section §201.6(c)(2) Requirement	Where requirement is addressed in Wasilla HMP
Profiling Hazards §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.	Chapter III, Section B, Subsections 3-9 include hazard-specific sections of the Wasilla HMP and describe how the natural hazards have the potential to affect the community. The HMP includes **location, extent, impact,** and **probability** for each natural hazard identified. The HMP also provides hazard-specific information on **previous occurrences** of hazard events.
Assessing Vulnerability: Overview §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.	Chapter III, Section B, Subsection 1 contains an overall summary of each hazard and its impacts on the City. Summaries are contained in hazard-specific sections in Chapter III.
Assessing Vulnerability: Addressing Repetitive Loss Properties §201.6(c)(2)(ii) The risk assessment in all plans approved after October 1, 2008 must also address NFIP-insured structures that have been repetitively-damaged in floods.	Wasilla participates in the NFIP. See Chapter III, Section B, Subsection 9 for information.
Assessing Vulnerability: Identifying Structures §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 identified hazard areas.	Chapter III, Section B, Subsection 2, Table 10 lists structures, infrastructure, and critical facilities located in the identified hazard areas.
Assessing Vulnerability: Estimating Potential Losses §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.	Chapter III, Section B, Subsection 2, Table 11 estimates potential dollar losses to vulnerable structures.

Section §201.6(c)(2) Requirement	Where requirement is addressed in Wasilla HMP
Assessing Vulnerability: Land Uses and Development Trends §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.	Chapter II, Section H contains this information.

B. Vulnerability Assessment Methodology

The purpose of a vulnerability assessment is to identify the assets of a community that are susceptible to damage should a hazard incident occur.

Critical facilities are described in the Community Profile Section (Chapter II) of this HMP. A vulnerability matrix table of critical facilities as affected by each hazard is provided in Table 10.

Facilities were designated as critical if they are: (1) vulnerable due to the type of occupant (children or elderly, for example); (2) critical to the City's ability to function (roads, power generation facilities, water treatment facilities, etc.); (3) have a historic value to the City (cemetery); or (4) critical to the City in the event of a hazard occurring (emergency shelter, etc.).

This HMP includes an inventory of critical facilities from Wasilla records. The following assessment includes the following subsections:

Section 1. Identifying Hazards
Section 2. Assessing Vulnerability: Overview and Potential Losses
Section 3. Earthquake
Section 4. High Wind
Section 5. Severe Weather
Section 6. Wildland and Urban Fire
Section 7. Volcanic Ashfall
Section 8. Erosion
Section 9. Flood
Section 10. Hazards Not Profiled in the 2018 Wasilla HMP Update

The description of each of the identified hazards includes a narrative of the following information:

- The **location** in the City that would be affected. The location of identified hazards is described by a map wherever appropriate or in some cases with a narrative statement.
- The **extent** (i.e. magnitude or severity) of potential hazard events is determined. The following table is used to rank the extent of each hazard. Sources of information to

determine the extent include the 2013 State HMP, 2016 *State Disaster Cost Index*, historical or previous occurrences, and information from the location of the hazard.

Table 5. Extent of Hazard Ranking

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

- The **impact** of the hazard or its potential effects on the community is described.

- The **probability** of the likelihood that the hazard event would occur in an area. The following table, taken from the 2013 State HMP, categorizes the probability of a hazard occurring. Sources of information to determine the probability include the 2013 State HMP, historical or previous occurrences, and information from the location of the hazard.

Table 6. Probability Criteria Table

Probability	Criteria
4 - Highly Likely	▪ Event is probable within the calendar year. ▪ Event has up to 1 in 1 year's chance of occurring (1/1=100%). ▪ History of events is greater than 33% likely per year. ▪ Event is "Highly Likely" to occur.
3 – Likely	▪ Event is probable within the next three years. ▪ Event has up to 1 in 3 year's chance of occurring (1/3=33%). ▪ History of events is greater than 20% but less than or equal to 33% likely per year. ▪ Event is "Likely" to occur.
2 – Possible	▪ Event is probable within the next five years. ▪ Event has up to 1 in 5 year's chance of occurring (1/5=20%). ▪ History of events is greater than 10% but less than or equal to 20% likely per year. ▪ Event could "Possibly" occur.
1 – Unlikely	▪ Event is possible within the next ten years. ▪ Event has up to 1 in 10 year's chance of occurring (1/10=10%). ▪ History of events is less than or equal to 10% likely per year.

	▪ Event is "Unlikely" but is possible of occurring.

- The **previous occurrences** of natural events are described for identified natural hazards. Information about previous occurrences was obtained from the 2013 State HMP, 2016 *State Disaster Cost Index*, City records, other state and federal agency reports, newspaper articles, and web searches.

Section 1. Identifying Hazards

The first step in the risk assessment process was to identify potential hazards that might present a risk to people and property in Wasilla and to describe or profile their possible effects on the City of Wasilla. Hazards were identified by researching local archives and libraries, newspapers and web databases, by interviewing local officials involved in emergency and disaster management, through the Borough's household survey, and by input from the public.

This section identifies and describes the hazards likely to affect Wasilla. The City used the following sources to identify the hazards present in the community: the 2013 State HMP, interviews with experts and long-time residents, and previous occurrences of events.

Table 7 is taken from the 2013 State HMP. This table refers to the MSB, a relatively large area, so not all hazards listed as being present necessarily affect the City of Wasilla.

Table 7. Hazard Matrix

Hazard Matrix – Matanuska-Susitna Borough				
Flood	**Wildland Fire**	**Earthquake**	**Volcano**	**Avalanche**
Y-H	Y-H	Y – H	Y-M	Y-M
Severe Weather	**Ground Failure**	**Erosion**	**Tsunami & Seiche**	
Y-M	Y-L	Y-M	N	

Source: 2013 State of Alaska Hazard Mitigation Plan, Matrices – Matanuska-Susitna Borough

Hazard Identification:

- Y: Hazard is present in jurisdiction but probability unknown.
- Y-L: Hazard is present with a low probability of occurrence within the next 10 years. Event has up to 1 in 10 year's chance of occurring.
- Y-M: Hazard is present with a moderate probability of occurrence within the next three years. Event has up to 1 in 3 year's chance of occurring.
- Y-H: Hazard is present with a high probability of occurrence within the next one year. Event has up to 1 in 1 year's chance of occurring.
- N: Hazard is not present.

Identification of Natural Hazards Present in Wasilla

Based on consultation with the Alaska DHS&EM, Table 7 from the 2013 State HMP, 2016 *State Disaster Cost Index*, Wasilla plans and reports, and interviews, Wasilla community members identified the following hazards to be profiled, noted below in Table 8.

Table 8. Hazards Identification and Decision to Profile

Hazard	Yes/No	Decision to Profile Hazard
Flood	Yes	Designated as a hazard with high probability of occurrence in the 2013 State HMP and confirmed by the 2016 FEMA Risk MAP Study; Wasilla has the potential to experience many different types of flooding.
Erosion	Yes	Designated as a hazard with moderate probability of occurrence in the 2013 State HMP; Wasilla is subject to both wind and water erosion.
Earthquake	Yes	Designated as a hazard with high probability of occurrence in the 2013 State HMP and confirmed by the 2016 FEMA Risk MAP Study.
Volcano	Yes	Designated as a hazard with moderate probability of occurrence in the 2013 State HMP; Wasilla is susceptible to volcanic ashfall from nearby volcanoes.
Avalanche	No	Designated as a hazard with moderate probability of occurrence in the 2013 State HMP; Wasilla has chosen not to profile this hazard.
Tsunami & Seiche	No	Hazard is designated as not present in the 2013 State HMP; Wasilla is located away from the coastline.
Severe Weather	Yes	Designated as a hazard with moderate probability of occurrence in the 2013 State HMP; designated as a hazard due to extensive history of previous severe weather events; Wasilla chose to profile high wind events as a separate hazard.
Ground Failure	No	Designated as a hazard with low probability of occurrence in the 2013 State HMP and confirmed by the 2016 FEMA Risk MAP Study; Wasilla has chosen not to profile this hazard.
Wildland and Urban Fire	Yes	Designated as a hazard with high probability of occurrence in the 2013 State HMP and confirmed by the 2016 FEMA Risk MAP Study; Wasilla is susceptible to wildland and urban fires.
Climate Change	No	The City does not view climate change as a hazard.

See Section 10, Hazards Not Present in Wasilla, for more information on the hazards not profiled in this HMP. The hazards seen as a significant risk to the City are profiled in hazard-specific sections.

Section 2. Assessing Vulnerability

Overview

The vulnerability overview section is a summary of Wasilla's vulnerability to the hazards identified in Table 8. The summary includes the types of hazard and the types of structures, infrastructure, and critical facilities affected by the hazards. Some hazards are area-wide in scope while others impact certain areas of the community to a greater or lesser extent. Table 9 provides an overview of the City's vulnerability.

Table 9. Vulnerability Overview for City of Wasilla

Hazard	Percent of Wasilla's Geographic Area	Percent of Population	Percent of Building Stock	Percent of Community Facilities and Utilities
Flood	**5**	**5**	**5**	**5**
Erosion	**5**	**5**	**5**	**5**
Earthquake	**33**	**33**	**33**	**33**
Severe Weather	**33**	**33**	**33**	**33**
High Wind	**33**	**33**	**33**	**33**
Wildland Fire	**33**	**33**	**33**	**33**
Volcano	**10**	**10**	**10**	**10**

Since a hazard does not always affect the entire City equally, it was also important to determine the area, or areas, within the City that would be most vulnerable to each type of hazard event. The identification of vulnerability (the people and property that are likely to be affected) for each hazard event is the second step taken in updating the risk assessment for this HMP Update. The Planning Commission identified critical facilities as part of this step in the assessment process.

Identification of Assets

The Hazard Vulnerability Matrix in

Table 10 includes a list of facilities, utilities, and businesses in Wasilla, and whether, based on its location, each has a low, moderate, or high vulnerability to the natural hazards identified in this HMP. Abbreviations for the hazards are noted as: earthquake (EQ), high wind (HW), severe weather (SW), wildland and urban fire (WF/UF), volcanic ashfall (VAF), erosion (ER), and flood (FL).

The following table identifies the critical facilities for the City of Wasilla. Without these facilities, loss of life and human suffering are more likely to occur.

Table 10. Hazard Vulnerability Matrix

Name	Location	Reason	EQ	HW	SW	WF/UF	VAF	ER	FL
Government Buildings									
Wasilla City Hall	290 E. Herning Ave.	Coordination of emergency resources, information to the public	H	H	H	M	L	N	N
U.S. Post Office	401 N. Main St.	Communication with areas outside the City of Wasilla will need to continue following hazard event.	H	H	H	M	L	N	N
Public Works Shop Building	835 Blind Nick Drive	Ability to repair/service equipment will be necessary to recovery following hazard event.	M	H	H	M	L	N	N
Emergency Services									
Police Station	1800 E. Parks Hwy.	Building houses Emergency Dispatch Center & City Emergency Operation Center (EOC).	H	H	H	M	L	N	N
Fire Station	101 W. Swanson St.	Building houses emergency response equipment and Matanuska-Susitna Borough EOC.	H	H	H	M	L	N	N
Medical Facilities									
Mat-Su Regional Outpatient Care Facility	950 E. Bogard Rd.	Treat injuries and life-threatening illnesses following hazard emergency	H	H	H	M	L	N	N
Wasilla Medical Clinic	1700 E. Parks Hwy.	Treat injuries and life-threatening illnesses following hazard emergency	M	H	H	M	L	N	N
Benteh Nuutah Valley Native Primary Care Center	1001 Knik-Goose Bay Rd.	Treat injuries and life-threatening illnesses following hazard emergency	M	H	H	M	L	N	N
Shelters									
Wasilla High School	701 E. Bogard Road	Building able to provide emergency shelter for evacuees or victims of hazard event	H	H	H	M	L	N	N
Wasilla Middle School	650 E. Bogard Road	Building able to provide emergency shelter for evacuees or victims of hazard event	M	H	H	M	L	N	N
Iditarod Elementary School	455 E. Carpenter Cir.	Building able to provide emergency shelter for evacuees or victims of hazard event	H	H	H	M	L	N	N
Burchell High School	1775 W. Parks Hwy.	Building able to provide emergency shelter for evacuees or victims of hazard event	H	H	H	M	L	N	N
Multi-Use Sports Complex	1001 S. Clapp St.	Building designated as emergency shelter and food	M	H	H	M	L	N	N

		preparation area for evacuees or victims of hazard event							
Transportation Facilities									
Wasilla Airport	900 S. Beacon Street	Airlifting supplies & emergency personnel and evacuating injured	M	H	H	M	L	N	N
Mat-Su Community Transit (MASCOT)	225 W, Riley Ave.	Evacuation transportation	M	H	H	M	L	N	N
Alaska Railroad	(Tracks through town)	Transport of supplies, equipment and emergency personnel	M	H	H	M	L	N	N
Utilities & Communication									
Wastewater Treatment	2880 E. Jude St.	Prevent contamination of water supply and to prevent spread of illnesses.	M	H	H	M	L	N	N
Spruce Well & Reservoir	190 E. Spruce Ave.	Provide potable water supply is critical to human existence.	M	H	H	M	L	N	N
Bumpus Well & Reservoir	2050 W. Mystery Ave.	Provide potable water supply is critical to human existence.	M	H	H	M	L	N	N
Iditarod Well & Reservoir	603 E. Carpenter Cir.	Provide potable water supply is critical to human existence.	M	H	H	M	L	N	N
MTA Sub-station	477 E. Susitna Ave.	Communication with areas outside Wasilla will need to continue following hazard event.	M	H	H	M	L	N	N
MEA Herning Sub-station	Denali St.	Provide electrical power to vital service operations	M	H	H	M	L	N	N

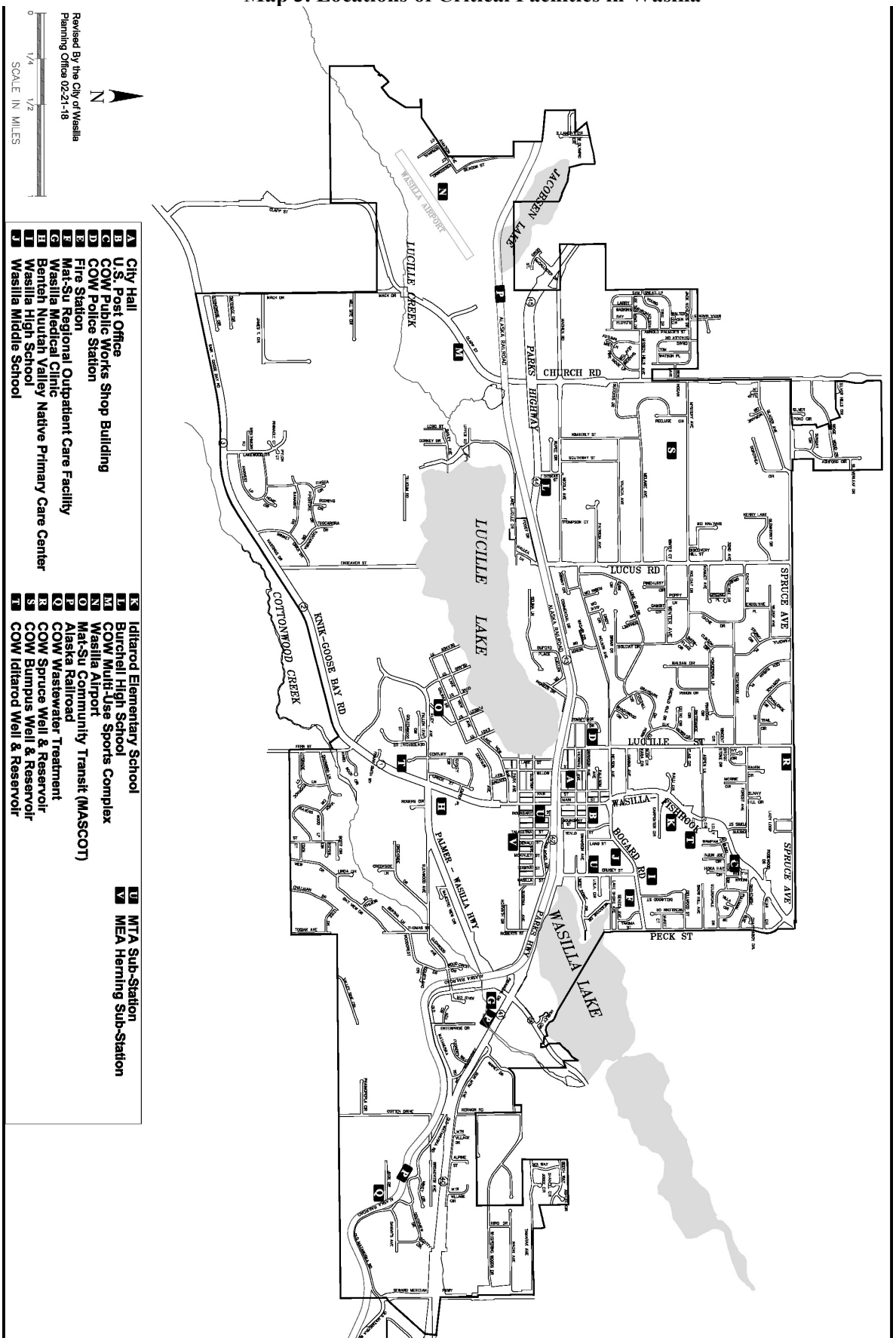
Note: The December 2016 *Risk Report, FEMA Region X – Matanuska-Susitna Borough, Alaska and the Incorporated Cities of Houston, Palmer, and Wasilla* prepared by FEMA; the Alaska Department of Commerce, Community, and Economic Development; and Alaska Geological and Geophysical Surveys determined that the following buildings in Wasilla were most affected by a Magnitude 7.5 Castle Mountain earthquake scenario:

- Iditarod Elementary School;
- Wasilla Middle School;
- Central Mat-Su PSB 6-1;
- Mat-Su Regional Urgent Care;
- Burchell High School;
- Mat-Su Central School;
- Wasilla Police Department;
- Wasilla U.S. Post Office;
- Wasilla City Hall;
- Mat-Su Water Rescue;
- Wasilla Library;
- Jake Wright DES Fleet Maintenance Facility;
- Dorothy Page Museum/Historic Townsite;
- Wasilla CCS Early Learning Head Start Preschool;
- Wasilla Senior Campus, Senior Housing and Community Center;
- Valley Performing Arts Center; and

- Museum of Alaska Transportation and Industry.

Map 3 displays the locations of the critical facilities in Wasilla.

Map 3. Locations of Critical Facilities in Wasilla



Summary

Table 11 summarizes the results of the vulnerability analysis. According to the 2016 FEMA Risk Report for the MSB, the City has 3,423 buildings with an estimated value of $1.9 billion for the structures and contents. The summary below provides a descriptive analysis of the hazards affecting the City, unless otherwise noted.

Table 11. Hazard Vulnerability Summary

	Earthquake	High Winds	Severe Weather	Wildland & Urban Fires	Volcanic Ash Fall	Erosion	Flood
History	High (20 pts.)	High (20 pts)	Moderate (10 pts)	Low (2 pts)	High (20 pts.)	Low (2 pts)	Moderate (10 pts.)
Vulnerability	High (50 pts.)	Moderate (25 pts.)	Moderate (25 pts.)	Moderate (25 pts)	High (50 pts.)	Low (5 pts)	Moderate (25 pts)
Probability	Moderate (33 pts.)	Moderate (33 pts.)	Moderate (33 pts.)	Moderate (33 pts.)	Low (10 pts.)	Low (10 pts)	Low (10 pts.)
Location	Entire City	Entire City	Entire City	Entire City - urban fire; large parcels and fringe of City boundary-wildfire	Entire City	Wind – Entire City Water – Creek & stream banks	Along Cottonwood Creek and low-lying intersections during spring thaw
At-Risk Pop.	2,176	4,352	4,352	2,176	435	435	174
At-Risk Buildings	1,130	1,130	1,130	1,130	342	342	342
At-Risk Building Value	$627 Million	$627 Million	$627 Million	$627 Million	$190 Million	$190 Million	$190 Million
Risk Assessment							
Consequence to People	Injuries or death from structural collapse; fires; secondary diseases due to poor sanitation	Injury caused by flying debris; hardship due to disruption of vital services, transportation, utilities	Injuries or death from structural collapse, prolonged exposure to low temperatures	Injuries or death due to fire, heat, smoke and structure collapse	Illness & death from respiratory distress; injuries & death caused by accidents due to lower visibility	Respiratory distress due to flying dust, reduced visibility may cause injury & death; sudden water erosion.	Injury & death, hardship due to disruption of essential services, loss of shelter
Consequence to Property	Structural damage to buildings, fuel supplies, communications, utilities, emergency facilities	Damage to roofs, buildings, utility lines, traffic signals & vehicles	Damage to roofs, utility lines, disruption of fuel and essential supplies, disruption of communications	Structural damage to buildings, loss of critical facilities, loss of power lines	Structural damage due to weight of ash, damage to electronic equipment & machinery	Wind erosion removes top soil; Water erosion under cuts foundations, footings and stream banks	Downed utility lines, damage to structures, vehicles & equipment;
Consequence to Environment	Alteration of landforms, water degradation due to fuel spills; fire, landslides	Possible damage to flora and fauna caused by flying debris or deposits of sand and dust	Possible damage to flora & fauna	Pollution of streams and lakes, loss of vegetative cover; injury & death of fauna	Damage to plants caused by lower solar penetration, or suffocating layer of ash	Pollution of streams and lakes	Damage to flora & fauna; degradation of water quality

*Note: The December 2016 *Risk Report, FEMA Region X – Matanuska-Susitna Borough, Alaska and the Incorporated Cities of Houston, Palmer, and Wasilla* estimated the damages from a 1-percent-annual-

chance flood event to be $160,000 and from a Magnitude 7.5 Castle Mountain Earthquake Scenario to be $120 million.

Section 3. Earthquake

Hazard Description

Approximately 11% of the world's earthquakes occur in Alaska, making it one of the most seismically active regions in the world. Three of the 10 largest earthquakes in the world since 1900 have occurred here. Earthquakes of magnitude (M) 7.0 or greater occur in Alaska on average of about once a year; M 8.0 earthquakes average about 14 years between events.

Most large earthquakes are caused by a sudden release of accumulated stresses between crustal plates that move against each other on the earth's surface. Some earthquakes occur along faults that lie within these plates. The dangers associated with earthquakes include ground shaking, surface faulting, ground failures, and snow avalanches. The extent of damage is dependent on the magnitude of the earthquake, the geology of the area, distance from the epicenter, and structure design and construction. A main goal of an earthquake hazard reduction program is to preserve lives through economical rehabilitation of existing structures and constructing safe new structures.

Ground shaking is due to the three main classes of seismic waves generated by an earthquake. Primary waves are the first ones felt, often as a sharp jolt. Shear or secondary waves are slower and usually have a side to side movement. They can be very damaging because structures are more vulnerable to horizontal than vertical motion. Surface waves are the slowest, although they can carry the bulk of the energy in a large earthquake. Damage to buildings depends on how the specific characteristics of each incoming wave interact with the buildings' height, shape, and construction materials.

Earthquakes are usually measured in terms of their magnitude and intensity. Magnitude is related to the amount of energy released during an event while intensity refers to the effects on people and structures at a particular place. Earthquake magnitude is usually reported according to the standard Richter scale for small to moderate earthquakes.

Large earthquakes, like those that commonly occur in Alaska, are reported according to the moment-magnitude scale because the standard Richter scale does not adequately represent the energy released by these large events.

Intensity is usually reported using the Modified Mercalli Intensity Scale. This scale has 12 categories ranging from not felt to total destruction. Different values can be recorded at different locations for the same event depending on local circumstances such as distance from the epicenter or building construction practices. Soil conditions are a major factor in determining an earthquake's intensity, as unconsolidated fill areas will have more damage than an area with shallow bedrock. Surface faulting is the differential movement of the two sides of a fault. There are three general types of faulting.

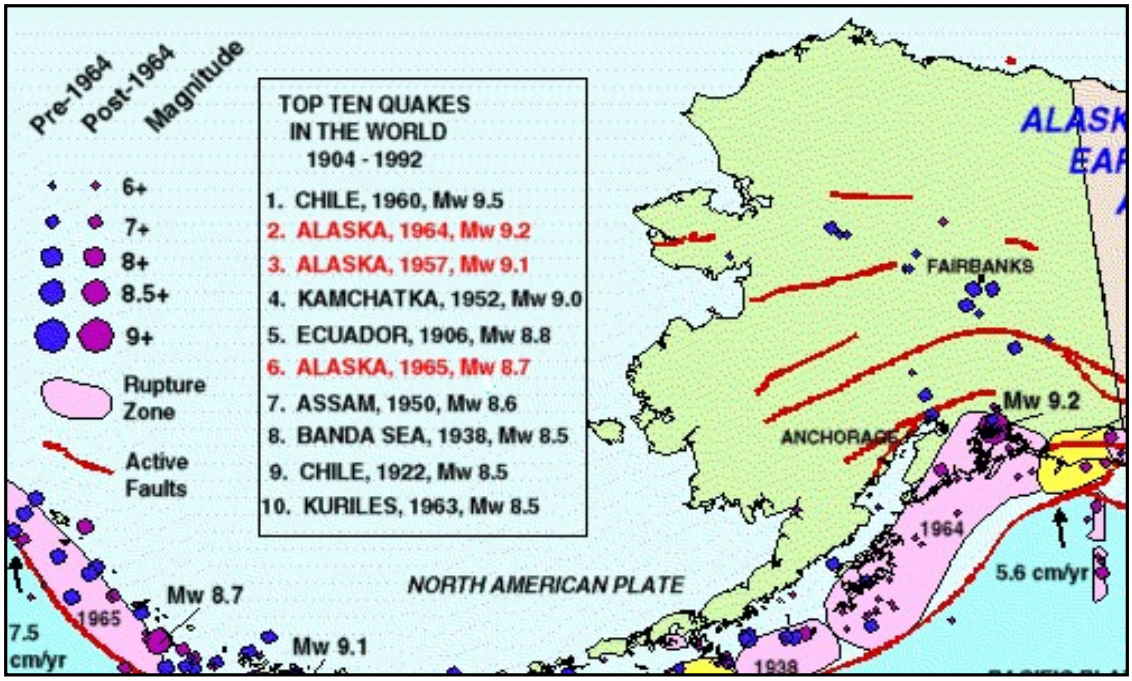
Strike-slip faults are where each side of the fault moves horizontally. Normal faults have one side dropping down relative to the other side. Thrust (reverse) faults have one side moving up and over the fault relative to the other side.
Earthquake-induced ground failure is often the result of liquefaction, which occurs when soil (usually sand and course silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid.

Location

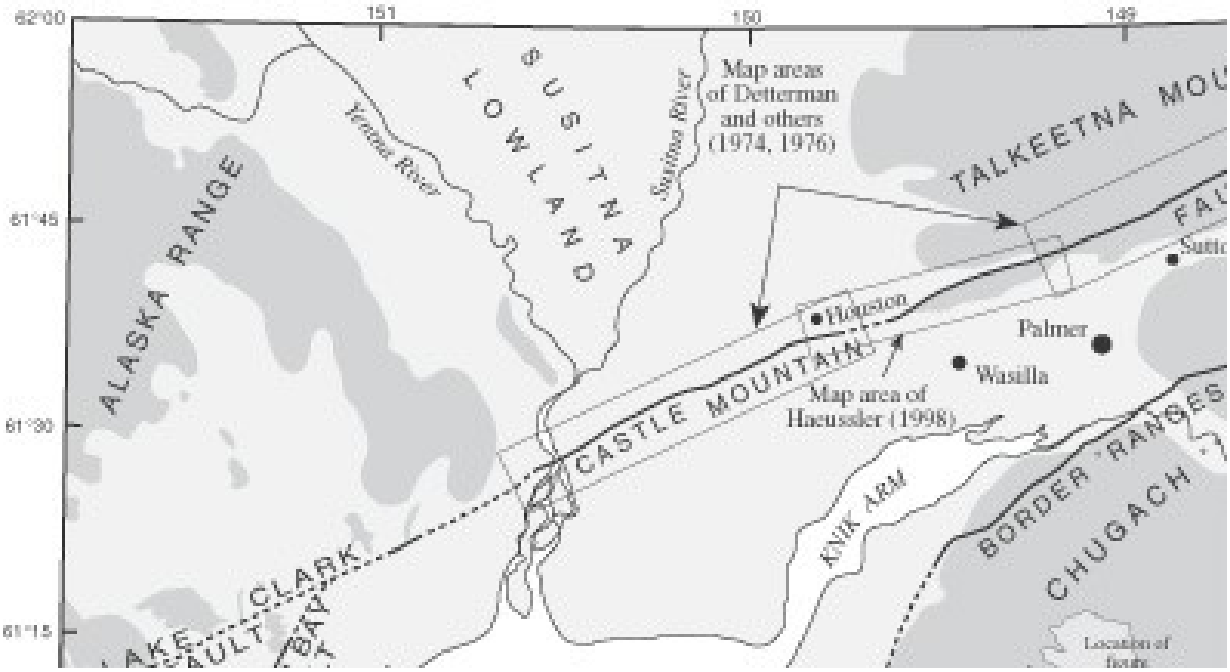
Wasilla is in the Cook Inlet basin. The Cook Inlet basin is a northeast-trending fore arc basin located between the Chugach and Kenai Mountains to the south and the Alaska Range and the Aleutian volcanic arc to the north and west. Major fault zones are close to the margin of the basin: the Castle Mountain fault to the north, the Bruin Bay fault to the northwest, and the Border Ranges fault along the south. Folds in the basin are complex, discontinuous structures that have variable shape and convergence and are commonly anchored by blind thrust faults. These are thrust faults that do not rupture all the way up to the surface so there is no evidence of it on the ground. They are "buried" under the uppermost layers of rock in the crust. Maps 4 and 5 show the major faults in the Wasilla area.

Source: University of Alaska, Fairbanks, and Alaska Earthquake Information Center (AEIC) website

Map 4. AEIS Earthquake Active Faults



Map 5. Location of Major Faults in the Palmer-Wasilla-Houston Area



Source: U.S. Geological Survey website

Extent

The extent of an earthquake in Wasilla could be **critical**; Table 5 uses the following criteria to determine the extent of possible damage: injuries and/or illnesses that result in permanent disability, complete shutdown of critical facilities for at least two weeks, and/or more than 25% of property is severely damaged.

Intensity is a subjective measure of the strength of the shaking experienced in an earthquake. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter.

The "intensity" reported at different points generally decreases away from the earthquake epicenter. Local geologic conditions strongly influence the intensity of an earthquake; commonly, sites on soft ground or alluvium have intensities two to three units higher than sites on bedrock. The Richter scale expresses magnitude as a decimal number. A M 5.0 earthquake is a moderate event, a M 6.0 characterizes a strong event, a M 7.0 is a major earthquake, and a great earthquake exceeds M 8.0. The scale is logarithmic and open-ended.

A M 2.0 or less is called a microearthquake; they cannot even be felt by people and are recorded only on local seismographs. Events with Ms of about 4.5 or greater are strong enough to be recorded by seismographs all over the world. But the magnitude would have to be higher than M 5.0 to be considered a moderate earthquake, and a large earthquake might be rated as M 6.0 and major as M 7.0. Great earthquakes (which occur once a year on average) have Ms of 8.0 or higher (British Columbia 1700, Chile 1960, and Alaska 1964). The Richter Scale has no upper limit, but for the study of massive earthquakes, the moment magnitude scale is used. The modified Mercalli Intensity Scale is used to describe earthquake effects on structures.

Maps 4 and 5 show active fault lines in Alaska and specifically in the Houston-Wasilla-Palmer area. Since all of Alaska is at risk for an earthquake event, Wasilla could be at risk for an earthquake or have secondary impact from an earthquake in the region.

Most earthquake injuries and fatalities occur within buildings from collapsing walls and roofs, flying glass, and falling objects. As a result, the extent of Wasilla's risk depends not just upon its location relative to a known fault, and its underlying geology and soils, but also on the design of its structures. Buildings that have not been constructed to meet seismic standards can pose major threats to life and the continued functioning of key public services during an earthquake.

Impact

An earthquake could affect the entire City of Wasilla. The exact number and location of impacted structures would depend on the size, location, and frequency of the earthquake. The type of building would also play a role.

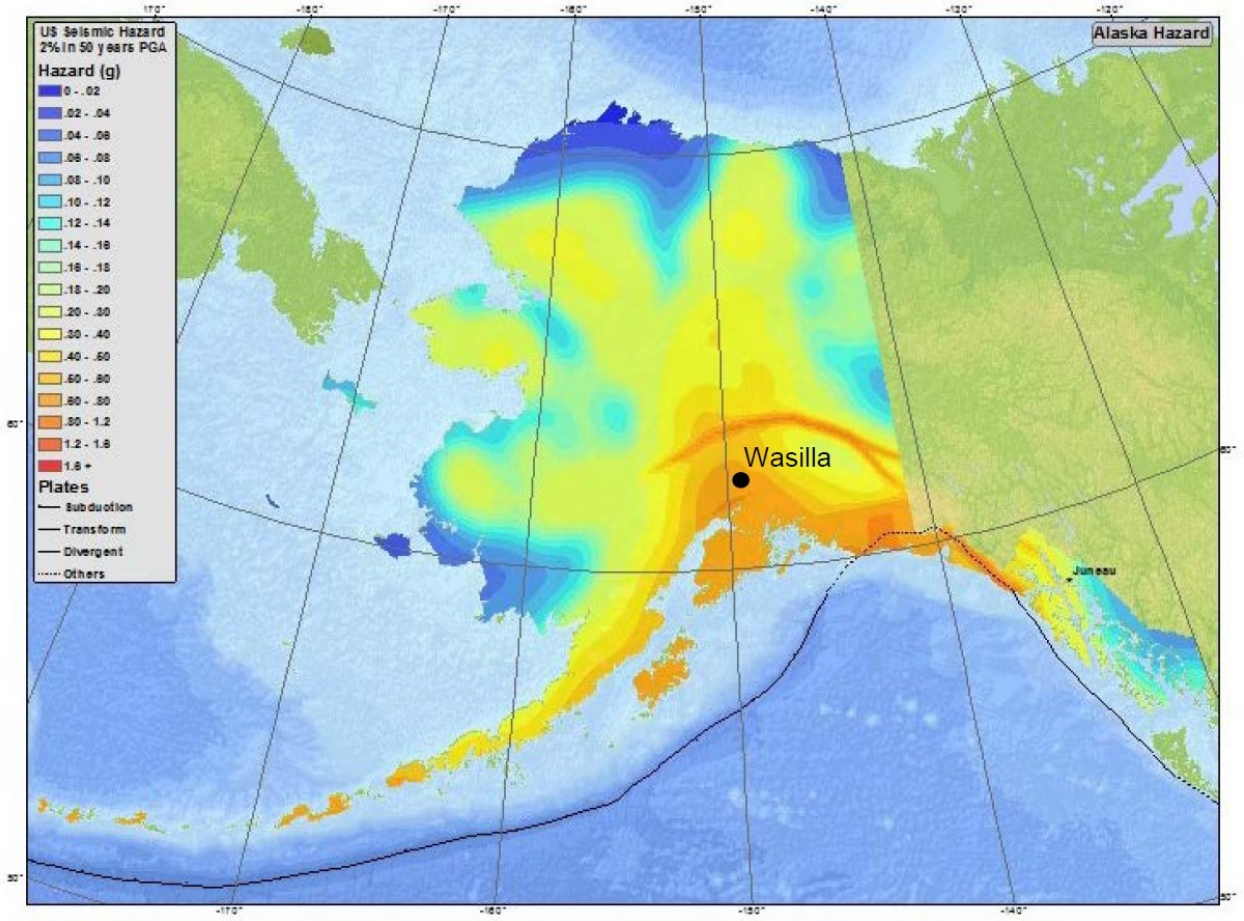
Earthquake damage would be area-wide with potential damage to critical infrastructure including the complete abandonment of key facilities.

Probability

Wasilla has a **likely** probability of an earthquake. Table 6 lists the following criteria for a likely probability: the hazard is present with a probability of occurrence within the next three years; the event has up to 1 in 3 year's chance of occurring (33%); the history of events is greater than 20% but less than or equal to 33% likely per year; and event is "likely" to occur.

While it is not possible to predict an earthquake, the United States Geological Society (USGS) has developed earthquake probability maps that use the most recent earthquake rate and probability models. These models are derived from earthquake rate, location, and magnitude data from the USGS National Seismic Hazard Mapping Project. Map 6 indicates that the USGS earthquake probability model places the probability of an earthquake with a likelihood of experiencing severe shaking (0.80 g to 1.20 g peak ground acceleration) at a 2% probability in 50 years, based on the USGS Alaska hazard model.

Map 6. USGS Wasilla Earthquake Probability Map



Previous Occurrences

Many of the blind thrust faults may be active. Of 28 identified blind thrust faults, 22 are of sufficient size that, if active, could generate a M 6.0 or greater earthquake. A fault beneath a fold in the Cook Inlet generated a M 7.0 earthquake on April 26, 1933. One hundred eighty earthquakes greater than M 4.0 have occurred within a 50-mile (80 km) radius of Wasilla since 1957.

Table 12 lists earthquakes greater than M 5.0 that have occurred within a 50-mile (80 km) radius of Wasilla.

Table 12. Seismic Occurrences Impacting Wasilla.

Date (YYYY-MM-DD)	Latitude	Longitude	Depth (km)	Magnitude
1966-10-07	61.58	-150.126	55	5.6
1974-12-29	61.597	-150.511	67	5.6
1974-12-30	61.982	-149.686	62	5.1
1975-01-01	61.909	-149.738	66	5.9
1979-11-14	61.381	-150.094	57	5.1
1981-08-28	61.738	-150.452	70.9	5.1
1984-08-14	61.857	-149.104	19.7	5.8
1985-12-30	61.541	-150.34	62.1	5.5
1987-04-18	61.374	-150.656	68	5.3

1990-12-07	61.621	-150.451	66.4	5
1991-04-26	61.25	-150.153	38.2	5.2
1993-05-18	61.031	-149.953	51.1	5.2
1995-02-17	61.793	-148.446	6.3	5
1995-05-24	61.007	-150.119	41.8	5.6
1996-07-04	61.852	-150.83	54.5	5.4
1997-05-06	61.564	-149.718	31.2	5.3
1998-09-27	61.568	-149.656	34.8	5
1999-07-22	61.297	-149.385	45.6	5.3
2000-03-16	61.399	-149.892	39.8	5
2002-02-06	61.171	-149.728	35.4	5
2002-02-06	61.181	-149.726	36	5.1
2002-08-06	61.416	-150.355	55.9	5
2006-07-27	61.156	-149.678	23.2	5
2009-06-22	61.939	-150.704	64.6	5.5
2012-12-04	61.237	-150.76	62.2	5.8

According to the USGS website, other major earthquakes in this region of the state not mentioned in the table above include:

- July 22, 1937 – An earthquake measuring 7.3 struck Central Alaska and was felt in the Wasilla area.
- October 15, 1947 – An earthquake measuring 7.3 struck Central Alaska and was felt in the Wasilla area.
- July 9, 1958 – An earthquake measuring 7.9 struck Southeast Alaska and was felt in the Wasilla area.
- March 27, 1964 – An earthquake initially reported at 8.5 and recalibrated to 9.2 struck the Anchorage area causing 115 deaths and major damage in Anchorage and shook Wasilla.
- March 7, 1979 – An earthquake measuring 6.9 struck southeast Alaska at 11:27 AM. However, very little damage was reported, but hundreds of aftershocks were felt. One aftershock registered 5.4 at 9:08 PM, and one felt on March 8, 1979 registered 5.4.
- 1984 – An earthquake measuring 5.7 was felt in Sutton and was generated from the Castle Mountain fault.
- November 3, 2002 - The Denali fault earthquake, registering 7.9, shook Alaska and was felt in Wasilla. The event occurred in a remote location and no injuries or property damage in Wasilla were reported as a result of the earthquake.
- January 23, 2018 – An earthquake measuring 7.9 was generated south of Kodiak Island. Shaking was felt in Wasilla.

Section 4. High Wind

Hazard Description

Wind is defined as the motion of air relative to the earth's surface. Winds vary from zero at ground level to 200 miles per hour (MPH) in the upper atmospheric jet stream, which is six to eight miles above the earth's surface. The mean annual wind speed in the contiguous United States is reported by FEMA to be 8 to 12 MPH, with frequent speeds of 50 MPH and occasional wind speeds greater than 70 MPH.

The general design and construction of buildings does not always consider wind resistance. Near-surface winds and associated pressure effects can exert pressure on walls, doors, windows, and roofs causing the structural components to fail. Debris carried by extreme winds can directly contribute to injury or loss of life and indirectly contribute to the failure of building envelope components (a building envelope consists of the walls, foundation, doors, windows, and roof – all the surfaces that are the barrier between the indoors and the outdoors). Upon impact, wind-driven debris can rupture a building.

Various wind scales equate wind speed to expected damages. Two widely-used wind scales are the Beaufort Scale of Wind Strength and the Saffir-Simpson Scale, further explained below in Table 13 and Table 14.

Table 13. Beaufort Scale of Wind Strength

Force	Wind Speed (mph)	Damages
9	47 – 54	Chimneys blown down, slate & tiles torn from roofs.
10	55 – 63	Trees broken or uprooted.
11	64 – 75	Trees uprooted, cars overturned.
12	75+	Wide-spread devastation, buildings damaged or destroyed.

Table 14. Saffir-Simpson Scale

Category	Wind Speed (mph)	Storm Surge (feet)	Damages
1	74 - 95	4 – 5	Trees, shrubs, unanchored mobile homes, signs damaged.
2	96 – 110	6 – 8	Trees toppled, roof coverings damaged, major damage to mobile homes.
3	111 – 130	9 – 12	Large trees toppled, structural damage to roofs, mobile homes destroyed, structural damage to homes and utility buildings.
4	131-155	13 – 18	Extensive damage to roofs, windows, and doors, roof systems may completely fail.
5	155+	18+	Damage is considerable and widespread, window and door damage are severe, extensive glass failure, building may fall.

Location

In Wasilla, high winds (winds more than 60 MPH) occur frequently. They can reach hurricane force and have the potential to seriously damage community infrastructure especially aboveground utility lines.

Extent

A high wind event could cause a **limited** situation to develop in Wasilla. Table 5 defines a limited extent as: injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; and/or more than 10% of property is severely damaged.

Impact

High winds and damage due to wind gusting is considerable and widespread throughout the City of Wasilla. The people most vulnerable to high-wind related deaths, injuries, and property damage are those residing in mobile homes and in deteriorating or poorly-constructed homes. Mobile homes represent 1.3% of the City's occupied housing stock (American Community Survey 2016).

Probability

The City of Wasilla has a **likely** probability of experiencing a high wind hazard event. Table 6 defines a likely probability as: the event is probable within the next three years; the event has up to 1 in 3 year's chance of occurring (33%); the history of events is greater than 20% but less than or equal to 33% likely per year; and the event is "likely" to occur.

Previous Occurrences

The 2016 *State Disaster Cost Index* does not include any information regarding high wind events in Wasilla; however, the events listed below were noted by Wasilla residents and/or the Severe Weather events database maintained by the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS). Wind gusts up to 60 MPH occur frequently; only wind gusts above 60 MPH are bulleted below.

- Feb. 7-14, 1979 – Heavy winds hit the Valley with gusts of more than 65 MPH. The Parks Highway was closed to travel in the Wasilla area. A large, metal "Road Closed" sign erected at Wasilla Lake on the Parks Highway was removed in an unexpected manner on Monday. A motorist reported witnessing the sign, weighted with truck tire chains, being picked up by the wind and blown across the railroad tracks paralleling the highway. (Frontiersman, Feb. 7, 1979). A truck camper was blown on top of a 10-foot snow pile in front of the Wasilla airport mall. The storm demolished two airplanes at the Wasilla Airport and heavily damaged six more.
- Dec. 23-24, 1998 – Wind gusts reached 60 MPH at a new mesonet site near Colony High School in the Matanuska-Susitna Valley. Forecast zones affected: Susitna Valley.
- Dec. 27-30, 1998 – Strong northeast wind, again set off by cold air moving into the area from the east and northeast behind a vigorous cold front, began across the Matanuska-Susitna Valley just after noon Sunday…finally diminishing Tuesday morning. Wind

gusts reached 69 mph at Colony High School mesonet site. Gusts reached 53 MPH at Wasilla and 61 at Palmer airport early Monday. At the Tony Chevrolet Buick dealership, the cars had to be dug out of the snow. A few miles west, a metal frame was all that was left of the menu board by the drive-through lane at Wendy's.

- Jan. 21-23, 1999 – A major storm brought high winds and snow to Cook Inlet and the Susitna Valley. 61 MPH winds were recorded in Wasilla.
- March 5-7, 1999. 63 MPH winds were reported at the Palmer airport and as high as 67 MPH early Saturday morning between 2 AM and 3 AM.
- Jan. 22-24, 2000 – Southeast wind gusts were reported around the Matanuska-Susitna Valley. One report of 70 MPH winds and whiteout conditions was received on the Willow side of Hatcher Pass.
- March 11, 2000 – Gusty northeast winds reached 66 MPH at the Wasilla fire station. Wind gusts were less than 60 MPH in the afternoon.
- March 13, 2000 – Modified arctic air continued to move southeastward toward Cook Inlet Monday and Tuesday. Peak winds of 64 MPH recorded.
- March 19, 2000 – Locally brisk northeast winds gusted to 64 MPH around the Wasilla fire station.
- March 28-29, 2000 – Northeast wind gusts of 69 MPH were recorded at the Wasilla fire station between 6 AM and 6:30 AM Wednesday.
- April 20-21, 2000 – Strong 'Matanuska' winds began gusting above 60 MPH just after 2 PM Thursday. Winds peaked at 74 MPH between 2 PM and 2:30 PM Thursday… finally diminishing below 60 MPH at 3 AM Friday.
- Aug. 15-16, 2000 – Strong northeast winds were observed in the Matanuska Valley on Tuesday and Wednesday. Strongest winds were reported by a NWS system at the Wasilla fire station…co-located with the emergency manager's group. Wind gusts above 60 MPH began just after 3 AM, Tuesday at the Wasilla site, and a high wind warning was issued an hour later. Wind gusts built to a peak of 98 MPH between 11 AM and 11:30 AM, Tuesday. On Wednesday, peak winds reached 79 MPH between 2 AM and 2:15 AM. The high winds downed trees and disrupted power to many areas. Repairs to power lines were slowed due to large distances between the outages, which were mainly along tap lines. Property damage $20,000.
- Oct. 4-5, 2000 – Wind gusts at the Wasilla fire station of 60 MPH or higher and peaking at 67 MPH.
- Oct. 7, 2000 – The strong pressure rises moved into the area from the east, bringing gusts above 60 MPH. Peak winds at the Wasilla fire station reached 71 MPH.
- Oct. 13-14, 2000 – Winds at the Wasilla fire station peaked at 62 MPH. Forecast zones affected: Cook Inlet and Susitna Valley.
- Oct. 21-22, 2000 – Strong northeast Matanuska winds reported at 60 MPH and peaking at 86 MPH on Saturday. Peak winds of 75 MPH reported on Sunday. Magnitude: 75 knots.
- Oct. 24-25, 2000 – Wind gusts at the Wasilla fire station above 60 MPH on Tuesday. Peak wind Tuesday was 68 MPH gust, occurring between 10 PM and 10:30 PM. Wednesday, easterly wind gusts above 60 MPH were again recorded, peaked at 66 MPH.
- Oct. 30, 2000 – Brisk northeast winds were reported at the Wasilla fire station remote sensor. Gusts reached 76 MPH between 7:45 AM and 8:00 AM on Monday.
- Nov. 2-5, 2000 – Gusts of 61 MPH at the Wasilla fire station.
- Nov. 6-7, 2000 – Northeast wind above 60 MPH began around the Wasilla/Glenn Highway area early Monday. Peak wind reached 84 MPH, Monday between 4 and 4:15 PM. Gusts finally diminished below 60 MPH at 5:45 AM, Tuesday.

- Nov. 12-13, 2000 – Another strong low moved northeast out of the Pacific affecting Cook Inlet and the Susitna Valley. Wind gusts were channeled by terrain in the Matanuska Valley, where easterly gusts reached 73 MPH at the Wasilla fire station Monday ahead of the front.
- Nov. 16-18, 2000 – Easterly wind gust reached 77 MPH at the Wasilla fire station just after 5:15 PM, Friday.
- Nov. 21, 2000 – Brisk northeast winds gusted to 71 MPH at the Wasilla fire station. Winds peaked between 10:15 and 10:30 AM, Tuesday.
- Nov. 24, 2000 – Gusty northeast winds to 64 MPH were observed at the Wasilla fire station Thursday ahead of a moderate east-west front approaching Kenai Peninsula from the south southeast.
- Dec. 13, 2000 – Brisk northeast wind gusts above 60 MPH began at the Wasilla Fire Station between 3:15 and 3:30 PM Wednesday.
- Dec. 17, 2000 – Gusty northeast winds reached 62 MPH around 10 AM in the Matanuska Valley.
- March 18, 2001 – Locally strong winds were reported near the Matanuska River. These winds were caused by moderate to strong high-pressure in the eastern Alaskan interior and moderate low pressure in the Gulf of Alaska. Northeast wind gusts reached 71 MPH Sunday between 10 and 10:30 AM.
- March 22, 2001 – Another Matanuska wind event was set up by moderate, cold high pressure in the Copper River Basin and complex low pressure in the Gulf of Alaska. Modified arctic air spilled through the Matanuska Glacier/River toward Cook Inlet. Gusts reached 66 MPH Friday and 69 MPH Saturday. Although the last wind gust of 60+ MPH at the Wasilla fire station was reported at 2 AM Friday, winds at the site again gusted to 59 MPH Saturday. With these Matanuska wind cases, it is known that higher winds blow further up-river (where there are no gauges to measure speeds).
- April 2-3, 2002 – Gusty northeast "Matanuska" winds to 67 MPH were recorded at the Wasilla fire station. Winds below 10 MPH were reported just prior to the onset of 60+ MPH gusts at 12:30 am, however, gusts approaching 60 MPH were recorded early Wednesday evening. At 5 am Thursday, gusts briefly reached 68 MPH.
- Nov. 29, 2002 – A Matanuska wind event began Saturday evening, continuing through the next day. Winds developed when pressure gradients built up between inland high pressure and a strong 954 mb low southwest of Kodiak Island. Winds of 60+ MPH, however, were very short-lived in the area.
- March 14, 2003 – Hurricane force winds with gusts to 100 MPH wreaked havoc in the MSB. High winds were sustained for several days with temperatures at 0°F making for a wind-chill factor of -53°F. The winds damaged buildings and forced relocation of the MSB EOC. Due to extreme dry conditions, the fire departments responded to over 80 calls in four days including several that threatened to become catastrophic.
- Dec. 1, 2003 – Wind gusts up to 72 MPH were reported in Wasilla.
- March 18-19, 2004 – Wind gusts up to 75 MPH in Mat-Su Valley late Thursday and peak wind of 72 MPH at 11 AM in Wasilla.
- Jan. 18, 2005 – Wind peaked at 93 MPH in Wasilla, which caused a tractor trailer to blow onto its side on the northbound ramp of the Parks Highway to Trunk Road.
- March 20-21, 2005 – Wind peaked at 81 MPH in Wasilla and knocked down McDonald's sign and trees in the area.
- Sept. 24, 2010 – A strong low moved into the Gulf of Alaska. This storm, coupled with high-pressure over interior Alaska produced strong north winds across the region and

through the channeled terrain of south central Alaska. Over 10,000 people lost electric power in the southcentral region as a result of the high wind. The strongest wind observed was a 78-MPH gust in the Palmer-Wasilla area. This strong wind event occurred early in the fall while trees still had leaves on them. This resulted in an uncharacteristically high number of trees being blown down, some of which fell across power lines causing the unusually high number of power outages. Based upon insurance company information, it is estimated that $500,000 of damage occurred from this storm in the Matanuska Valley to the Anchorage area.

- Dec. 15, 2010 – A strong storm in the Gulf of Alaska combined with deep cold arctic air and high-pressure over interior Alaska and resulted in strong north gap winds across south central Alaska. Along with the strong wind, low temperatures resulted in low wind chills across much of the south central and southeast mainland regions of Alaska. The peak measured wind was 87 MPH in the Wasilla area. Gusts very likely reached around 100 MPH during this event based upon the damage and power outages associated with this event in the Palmer-Wasilla area.
- March 12, 2013 – A large area of high-pressure centered near the Arctic Coast combined with a low in the Gulf of Alaska and produced a strong pressure gradient over Southern Alaska on March 12. This strong pressure gradient produced warning level winds in the Matanuska Valley and in various places along the north coast of the Gulf of Alaska.
- February 5-6, 2015 – Locations around the Mat-Su Valley experienced wind gusts of up to 75 MPH. A plane parked at the Palmer Airport was damaged as a result of the event.

Section 5. Severe Weather

Hazard Description

Weather is the result of four main features: the sun, the planet's atmosphere, moisture, and the structure of the planet. Certain combinations can result in severe weather events that have the potential to become a disaster.

In Alaska, there is great potential for weather disasters. High winds can combine with loose snow to produce a blinding blizzard and wind chill temperatures to 75°F below zero. Extreme cold (-40°F to -60°F) and ice fog may last a week at a time. Heavy snow accumulations can collapse roofs. A quick thaw means certain flooding.

Winter Storms

A severe winter storm is one that drops four or more inches of snow during a 12-hour period, or six or more inches during a 24-hour period. The NWS issues winter storm advisories when at least five inches of snow or any amount of ice is projected to occur over a 24-hour period. A winter storm warning means forecasters expect at least seven inches of snow or half an inch of ice.

Winter storms originate as mid-latitude depressions or cyclonic weather systems. High winds, heavy snow, and cold temperatures usually accompany them. To develop, they require:

- Cold air - Subfreezing temperatures (below 32°F) in the clouds and/or near the ground to make snow and/or ice.
- Moisture - The air must contain moisture in order to form clouds and precipitation.
- Lift - A mechanism to raise the moist air to form the clouds and cause precipitation. Lift may be provided by any or all of the following:
  - The flow of air up a mountainside.
  - Fronts, where warm air collides with cold air and rises over the dome of cold air.
  - Upper-level low-pressure troughs.

Extreme winter storms bring the following hazards:

1. Extreme cold, causing wind chill factors dangerous to humans and animals;
2. Snow accumulation causing blocked transportation routes and possible residual flooding;
3. Reduced visibility and slick surfaces, causing hazardous driving and walking conditions; and

SNOW TERMINOLOGY

Snow is defined as a steady fall of snow for several hours or more.

Heavy Snow generally means:

- Snowfall accumulating to four inches or more in depth in 12 hours or less
- Snowfall accumulating to six inches or more in depth in 24 hours or less

Snow Squalls are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.

A **Snow Shower** is a short duration of moderate snowfall.

Snow Flurries are an intermittent light snowfall of short duration with no measurable accumulation.

Blowing Snow is wind-driven snow that reduces surface visibility. Blowing snow can be falling snow or snow that already has accumulated but is picked up and blown by strong winds.

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

A **Blizzard** means that the following conditions are expected to prevail for a period of three hours or longer:

- Sustained wind or frequent gusts to 35 miles/hour or greater
- Considerable falling and/or blowing snow reducing visibility to less than 1/4 mile
- Freezing rain or drizzle occurs when rain or drizzle freezes on surfaces such as the ground, trees, power lines, motor vehicles, streets, highways, etc.

4. Ice covering power lines and tree limbs, causing disruption in power and telephone service.

Heavy Snow

Heavy snow, generally more than 12 inches of accumulation in less than 24 hours, can immobilize a community by bringing transportation to a halt. Until the snow can be removed, airports and major 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. The weight of the snow can cause roofs to collapse and cause damage to homes and vehicles, and roadside berms left by snow plows create a hazard for pedestrians attempting to cross roads. Heavy snow can also damage light aircraft. A quick thaw after a heavy snow can cause substantial flooding, especially along small streams and in urban areas. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on the City of Wasilla.

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

Extreme Cold

What is considered an excessively cold temperature varies according to the normal climate of a region. In Alaska, extreme cold usually involves temperatures below –40 degrees Fahrenheit. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

Frostbite is damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in the extremities.

Hypothermia is low body temperature. Normal body temperature is 98.6ºF. When body temperature drops to 95ºF, however, immediate medical help is needed. Hypothermia also can occur with prolonged exposure to temperatures above freezing.

Extreme cold can bring transportation to a halt across Alaska for days or sometimes weeks at a time. Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access as well as the flow of supplies. The greatest danger from extreme cold is to 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.

Ice Storms

The term ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. They can be the most devastating of winter weather phenomena and are often the cause of automobile accidents, power outages, and personal injury. Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces.

Aufeis

The prolonged extreme cold and presence of groundwater moving down slope, especially above the permafrost table that is needed to produce Aufeis, sometimes called glaciation or icing, is not present in Wasilla due to the City's sheltered position between the Talkeetna and Chugach mountain ranges.

Thunderstorms & Lightning

Wasilla does not experience severe thunderstorms and lightning. Alaska has a relatively low frequency of thunderstorm occurrence. In a typical year, Alaska has fewer than 20 days with thunderstorms, and they do not occur uniformly over the State.

Hail

Hailstorms are rare in Alaska and cause little damage, unlike the hailstorms in Midwestern states. The extreme conditions of atmospheric instability needed to generate hail of a damaging size (greater than ¾ inch diameter) are highly unusual in Wasilla although small pea-sized hail is observed periodically.

Location

The City of Wasilla is subject to winter storms, heavy snow, extreme cold, and potential ice storms, as is much of Southcentral Alaska. However, because of its location, the City of Wasilla is not subject to aufeis, thunderstorms and lightning, or hail storms.

Extent

The extent of severe weather in Wasilla could be **limited**; Table 5 uses the following criteria to determine the extent of possible damage: injuries and/or illnesses that do not result in permanent disability; complete shutdown of critical facilities for more than one week; and/or more than 10% of property is severely damaged.

Impact

Heavy snowfall can also damage infrastructure and critical facilities. Heavy snowfalls make transportation difficult, especially by road, and result in more money spent on snow plow services. High numbers of injuries and fatalities are not expected with a heavy snow event. Heavy snow can have a greater impact on people who need access to medical services, emergency services, pedestrians, and people who rely on public transportation. The cost of fuel to heat homes during times of heavy snow can be a financial burden on populations with low or fixed incomes.

The most vulnerable Wasilla residents to any of the hazards of severe weather are the homeless who lack adequate shelter and those on fixed incomes who may not be able to adequately heat their homes. According to the 2012-2016 American Community Survey 5-Year Estimates, approximately 16% of families in Wasilla with children under five years of age were listed as living below the poverty level.

Probability

The City of Wasilla has a **likely** probability of experiencing a severe weather hazard event. Table 6 defines a likely probability as: the event is probable within the next three years; event has up to 1 in 3 year's chance of occurring (33%); history of events is greater than 20% but less than or equal to 33% likely per year; and an event is "likely" to occur.

Previous Occurrences

The 2016 *State Disaster Cost Index* does not include any information regarding severe weather hazard events in Wasilla; however, the events listed below were noted by Wasilla residents and/or the Severe Weather events database maintained by NOAA and the NWS.

Winter Storms:

- Feb. 2, 1979 – Winter storm dropped 12 inches of snow. Winds blew down trees, clipping power lines and causing power outages for four days. Schools were closed due to snow drifts.
- Nov. 29, 1979 – 10 inches of snow fell in parts of the Matanuska Valley.
- Dec. 15, 1998 – 7-10 inches fell in the Core Area, 10-12 inches on Knik River Road.
- Jan. 21-24, 1999 – A major storm brought high winds and snow to Cook Inlet, and the Susitna Valley. 28 inches of snow fell at the Palmer airport and 36 inches at Oilwell Road.
- April 4, 1999 – Heavy snow fell from Wasilla to Cantwell, picking up 4-6 inches in a 6 to 9 hour period.
- Jan. 21-28, 2000 – 12" of new snow fell in Wasilla. Snow machine death in Big Lake, primarily weather related. Property damage $6,000.
- March 29 - 31, 2000 – Northeast wind gusts of 69 MPH recorded at Wasilla Fire Station. Along and immediately behind the front, heavy snows were locally reported. Well behind the original front, arctic air began to move toward Cook Inlet and the Susitna Valley.
- Oct. 24-25, 2000 – Just to the south of the heavy snow area, easterly wind gusts at the Wasilla Fire Station at or above 60 MPH were reported from just after 10 pm Tuesday until 6:30 AM Wednesday. Peak wind Tuesday was a 68 MPH gust occurring between 10 PM and 10:30 PM. From 3 AM to 6:30 AM Wednesday, easterly wind gusts above 60 MPH were again recorded, peaking at 66 MPH just after 6 AM Wednesday.
- Jan. 25, 2002 – 29.61 inches of snow fell in Wasilla.
- Sept. 14, 2002 – 25.59 inches of snow fell in Wasilla.
- Nov. 23, 2003 – A strong low in the northern Bering Sea had a trailing front that extended across the eastern Bering Sea and pushed into southwest Alaska Sunday. Cold air already in place over the Southcentral Region coupled with the inflow of moisture associated with this front and the formation of a low along the front resulted in localized areas of heavy snowfall in the Matanuska Valley. The Alaska and West Coast Tsunami Warning center reported a storm total of 20 inches over a 16-hour period.
- Feb. 10, 2006 – Light freezing rain and moderate rainfall created treacherous driving conditions along the Glenn Highway, causing numerous vehicle accidents and $10,000 in property damage.
- March 08, 2010 – Heavy snow with no damage reported.

Extreme Cold:

- February 3, 1999 – Locations around Wasilla recorded air temperatures as low as -42°F.
- March 14, 2003 – Hurricane force winds with gusts to 100 MPH wreaked havoc in the MSB. High winds were sustained for several days with temperatures at 0°F; Wind-chill -53°F.

Ice Storms:

- Feb. 5, 1993 – a winter storm warning for ice (freezing rain) accumulations of one-quarter inch or more was issued for the Susitna Valley.
- Oct. 5, 2000 – Wind gusts at the Wasilla Fire Station of 60 MPH or higher, peaking at 67 MPH. Additionally, freezing rain was reported prompting a travel advisory from the Department of Transportation, along the Parks Highway.
- Nov. 17, 2001 – A moderate ridge, building northwestward from Canadian British Columbia into Prince William Sound, accompanied by moderate pressure rises (2.5 - 4.5 mbs/hour) and a northwestward moving arctic front in the area, produced locally very gusty easterly winds around Turnagain Arm, along higher elevations of the mountains east of Anchorage and along much of the Matanuska River. Starting about 5 p.m. the northbound Glenn Highway backed up after motorists lost traction on the Eagle River hill. Scores of cars, with estimates ranging from 30 to 75, also got stuck on Eagle River Loop road, further jamming the Glenn at the Hiland Road exit. Police struggled to get sanding trucks in place. Tow trucks got stuck. The National Weather Service issued a freezing rain warning at 5:30 pm after a meteorologist reported a quarter-inch of ice coating her car in Birchwood. Most of Anchorage got a thin coating of freezing rain, as did Palmer. Alaska State Troopers reported a few minor accidents in Palmer and Wasilla.
- Nov. 22, 2010 – A storm in the Bering Sea resulted in strong warm and moist southerly winds off the North Pacific. This warm moist air flowed over entrenched cold air over Southcentral Alaska and resulted in freezing rain that deposited over one quarter inch of ice across portions of south central Alaska.
- Nov. 21, 2013 - A storm produced snow and blowing snow across the Chugach Mountains, freezing rain over the Kenai Peninsula to the southern Susitna Valley, and areas of snow and freezing rain across southwest Alaska. The freezing rain resulted in school closures from Anchorage to the Palmer and Wasilla area. The Wasilla School District Transportation Department reported significant ice accumulation. Several school buses slid off the road, and one bus flipped on its side in the Wasilla area due to the icy roads.

Hail:

- Aug. 18, 2015 – Severe thunderstorms developed over the Matanuska and Susitna Valleys before moving over Cook Inlet and dying out. One storm over populated areas produced large hail. Another thunderstorm appeared severe on radar but was not in a populated area and did not produce any local storm reports.

Section 6. Wildland Fire and Urban Fire

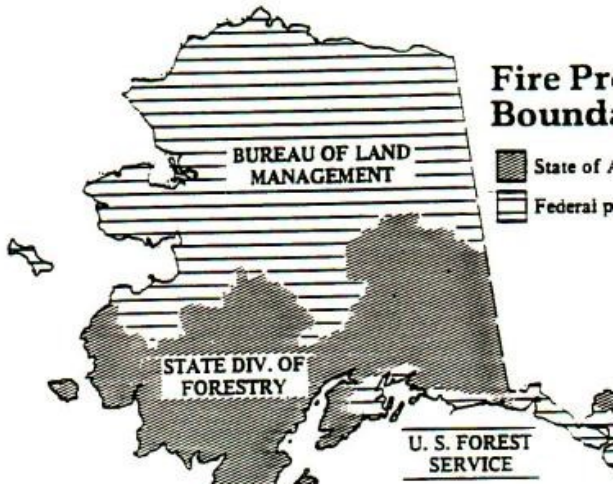
Hazard Description

Wildland Fire

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. 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, and natural and cultural resources threatened.

Fires can be divided into the following categories:

- Prescribed fires: ignited under predetermined conditions to meet specific objectives, to mitigate risks to people and their communities, and/or to restore and maintain healthy, diverse ecological systems.
- Wildland fire: any non-structure fire, other than prescribed fire, that occurs in the wildland.
- Wildland Fire Use: a wildland fire functioning in its natural ecological role and fulfilling land management objectives.
- Wildland-Urban Interface Fires: fires that burn within the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The potential exists in areas of wildland-urban interface for extremely dangerous and complex fire burning conditions which pose a tremendous threat to public and firefighter safety.



Fire Protection Areas. Image courtesy of Division of Forestry.

Fuel, weather, and topography influence wildland fire behavior. Wildland fire behavior can be erratic and extreme, causing fire whirls and firestorms that can endanger the lives of the firefighters trying to suppress the blaze. 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. Temperature and humidity also affect fire behavior. High temperatures and low humidity encourage fire activity while low temperatures and high humidity help retard fire behavior. Wind affects the speed and direction of a fire. Topography directs the movement of air, which can also affect fire behavior. When the terrain funnels air, like what happens in a canyon, it can lead to faster spreading. Fire can also travel up slope quicker than it goes down slope.

In Alaska, wildland fire management is the responsibility of three agencies: Division of Forestry, Bureau of Land Management (BLM) (through the Alaska Fire Service (AFS)) and USFS. Each agency provides fire-fighting coverage for a portion of the State regardless of land ownership. These agencies have developed the Interagency Fire Management Plan. This Plan provides for a range of suppression responses from aggressive control and extinguishment to surveillance.

Urban Fires

Fire is quick-moving and can become out of control in less than 30 seconds and can engulf a house within minutes. The heat alone from fire is deadlier than the actual flames with temperatures ranging from 100°F at the floor to 600°F at eye level. The heat can burn one's lungs and can melt one's clothes to their skin. If a room becomes hot enough from fire, it can create a flashover in which everything in the room ignites at once. Smoke and toxic gases, both products of fire, kill more people than the flames themselves. Oxygen is consumed, creating an atmosphere of colorless and odorless fumes that can cause drowsiness, disorientation, and shortness of breath and can lull a person into a deeper sleep without allowing enough time to escape. Fire itself may be bright, but the smoke that it produces can make evacuation from a building difficult or impossible. ("This is Fire," United States Fire Administration)

Location

Wasilla is within an area designated as *Critical Protection Level*, the highest level of suppression action provided for a wildland fire in the Alaska Interagency Fire Management Plan. Suppression activity is provided on wildland fires that threaten human life, inhabited property, designated physical developments and structural resources such as designated National Historic Landmarks. The objective in this category is to provide complete protection to identify sites and to control the fire to the smallest acreage reasonably possible. The allocation of resources to fires threatening critical sites in this category is given the highest priority.

Extent

A wildland or conflagration fire event could result in a **critical** situation in Wasilla. Table 5 defines critical extent as: injuries and/or illness could result, and/or a complete shutdown of critical facilities for at least two weeks, with more than 25% of property severely damaged.

Impact

Wildland fires have not directly affected the City of Wasilla, but the threat still remains for Wasilla and the surrounding area. Wasilla experienced smoke from the Miller's Reach fire in 1996, sheltered many of the people who were evacuated, and hosted the incident command center at the Creekside Plaza Mall. The Miller's Reach fire took almost two weeks to be contained and, during this time, it burned 37,336 acres and destroyed 344 structures. This fire demonstrates the vulnerability of the Wasilla area to wildfire.

All structures in the City are vulnerable to urban fires. Wasilla firefighters respond to calls for structure fires and for natural vegetation fires in relatively proportional numbers. The City has aggressively installed fire hydrants as part of its water system improvements program. The

Central Mat-Su Fire Department has an ISO rating of 4 within the City limits and ISO rating of 8B outside the City limits as a result of the availability of fire hydrants within the City.

Probability

Based upon the 2013 State HMP, shown below in Figure 4, the City of Wasilla is located in an area with moderate probability of wildland fires. In relation to the probability criteria established in Table 6, a moderate probability is equivalent to **likely** probability, defined as: the event is probable within the next three years, the event has up to 1 in 3 year's chance of occurring (33%), history of events is greater than 20% but less than or equal to 33% likely per year, and an event is "likely" to occur.

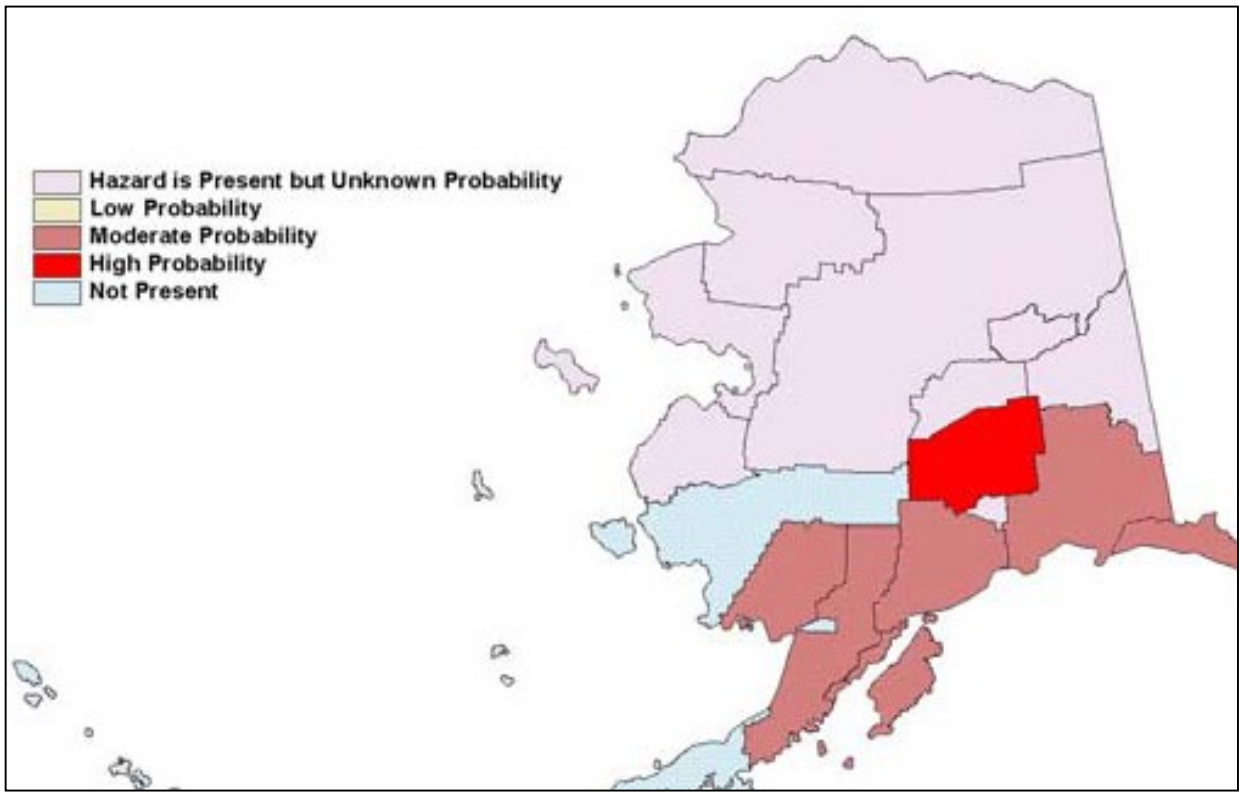


Figure 4. 2013 *State of Alaska Hazard Mitigation Plan* – Fire Risk Map

Previous Occurrences

The 2013 *Matanuska-Susitna Borough Hazard Mitigation Plan* states, "From 1990 to 2013, about 40 of 1,900 or so wildfires in the MSB were managed as one of a modified or limited priority category. The majority of wildfires were managed as critical or full priority wildfires, with about 1,600 fires in the former and over 230 fires in the latter category." Since 1939, 562 fires have occurred within the City of Wasilla. Of these fire events, 55 fires have burned an acre or more of land. Figure 5 below provides a visualization of the fire events that have occurred in this area.

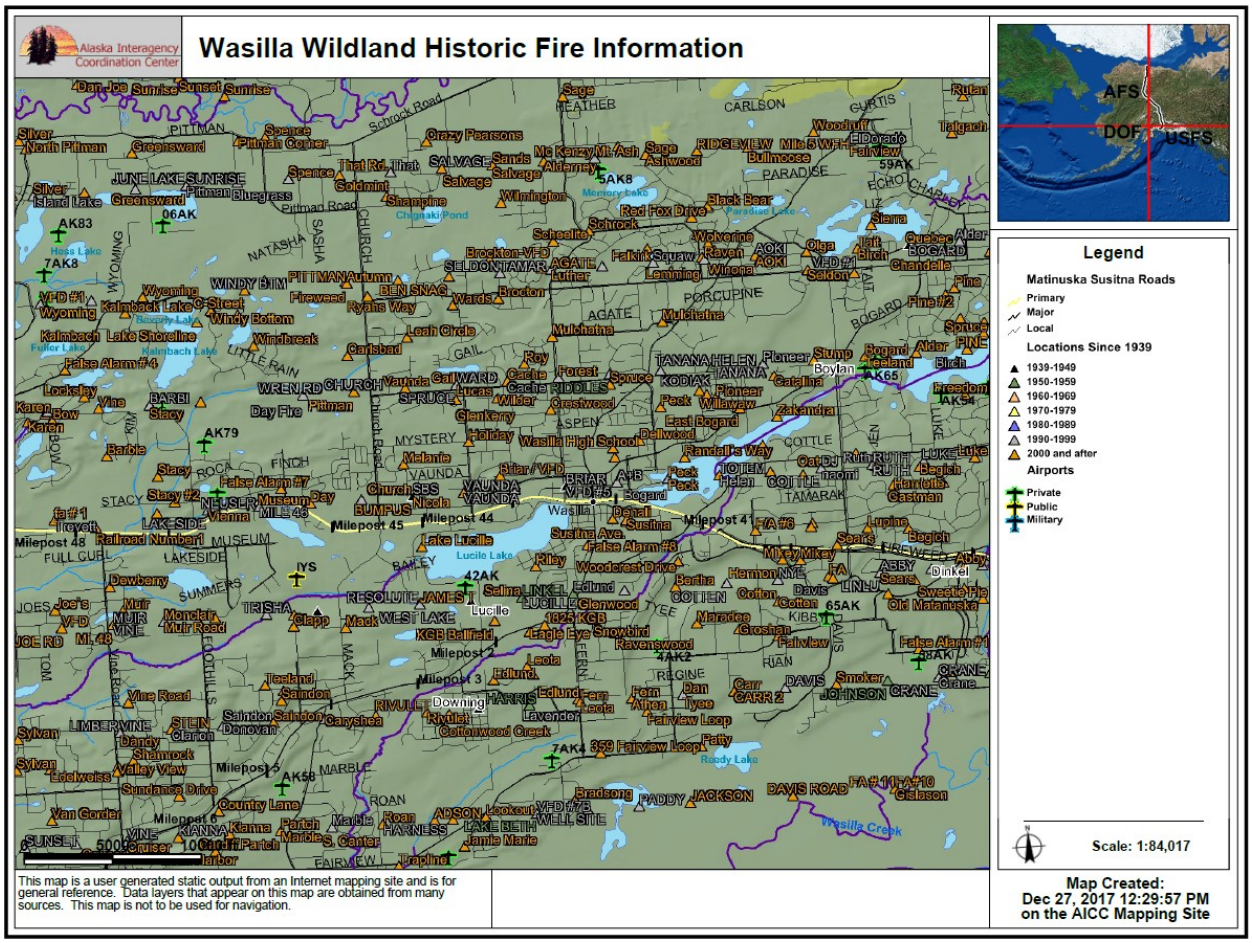


Figure 5. Wasilla Wildland Historic Fire Information

The fire events listed below were events noted by the City of Wasilla:

- May 1-9, 1979 – Six wildfires occurred in the Matanuska-Susitna areas with a total of 51.5 acres destroyed.
- April 25, 1980 – State fire crews from Big Lake and Eagle River responded to a fire on Schrock Road. Approximately 25 people, four ground tankers, and one all-terrain vehicle were involved in containing the 20-acre blaze.
- June 1996 – Miller's Reach fire destroyed 450 buildings in the Big Lake area west of Wasilla. Wasilla became the Incident Command center for the fire. Smoke and ash from the fire drifted to Wasilla.
- May 27, 2006 – Point Mack Mile 5 burned 461 acres that threatened numerous homes and structures in the Point McKenzie Road area and had the possibility of threatening many more. Both the Division of Forestry and the MSB fire departments suppressed the fire and prevented loss of homes and structures. Evacuation centers were opened for the local residents in the City of Wasilla.
- June 20, 2007 – Su River Fire outside the community of Willow, threatened the residents on Trapper Lake, and some local residents were evacuated from the area of Trapper Lake. This fire produced some smoke in Wasilla. Some local Wasilla vendors were used to support this fire.
- June 15, 2015 – The Sockeye Fire, exacerbated by record high temperatures, strong winds, and low humidity, caused widespread damage to the community of Willow and surrounding

areas of the MSB. In total, the fire burned 7,220 acres and damaged or destroyed over 50 structures. Smoke and ash from the fire drifted into Wasilla.

- Numerous small fires have been suppressed by the Division of Forestry and the Central Fire Department in and around the City of Wasilla, but all of them have been kept to a small size.

The State of Alaska, Division of Forestry responds to wildland fires within the MSB; 80% of the wildland fires that they respond to in the MSB are located within the cities of Houston, Palmer, and Wasilla, or the Core Area.

Section 7. Volcanic Ash Fall

Hazard Description

A volcano is a vent at the Earth's surface through which magma (molten rock) and associated gases erupt, and the landform is built by effusive and explosive eruptions.

Volcanoes display a wide variety of shapes, sizes, and behavior; however, they are commonly classified among three main types: cinder cone, composite, and shield.

Volcanoes are also categorized according to the age of their eruptive activity. Active volcanoes are those that are currently erupting or showing signs of unrest, such as unusual earthquake activity or significant new gas emissions. Dormant volcanoes are those that are not currently active, but could become restless or erupt again. Extinct volcanoes are those that are considered unlikely to erupt again. This can be difficult to determine as a volcano could go tens of thousands of years, or longer, between eruptions. There are over 80 volcanic centers in Alaska, but only 41 are considered active.

Volcanic ash, a type of tephra, is rock that has pulverized into dust or sand by volcanic activity that is ejected into the air by a volcanic explosion or rising hot air. Volcanic ash is hot near the volcano but is cool when it falls at greater distances. Ash fall can block sunlight and reduce visibility and causes respiratory problems for the elderly, infants, and others with breathing difficulties. It can also jam machinery, clog ventilation, water supplies, and drains, and cause electrical short circuits, including power outages. It is also very heavy and can cause roofs to collapse, is slippery when wet, and is corrosive and abrasive.

Location

The most likely source of a volcanic hazard to the City of Wasilla is Hayes, Redoubt, and Mount Spurr. Hayes is located 97 air miles northwest of the City, Mount Spurr is located 95 miles west of Wasilla, and Redoubt is approximately 70 miles southwest of Spurr. Both Hayes and Spurr are within the rugged, glacier-clad Tordrillo Mountains on the northwest side of Cook Inlet. The primary hazard to Wasilla from these three volcanoes is volcanic ash fall.

Extent

A volcanic ashfall event could create a **negligible** event for Wasilla, defined in Table 5 as an event where injuries and/or illnesses are treatable with first aid, minor quality of life is lost, shutdown of critical facilities and services is for 24 hours or less, and less than 10% of property is severely damaged.

Impact

Ash fall is a general event that may affect all residents of Wasilla. The elderly, the chronically ill, and the very young would experience the most severe respiratory distress. Poor visibility would endanger anyone having to travel, walk, or operate equipment during an ash fall event. It can also cause slippery roadway conditions, if wet, and may cause power outages.

Probability

Because of the several active volcanoes that are relatively close to the City of Wasilla, the potential for volcanic ashfall to impact the City is **possible**. A possible probability is defined in Table 6 as: the event is probable within the next five years; the event has up to 1 in 5 year's chance of occurring (20%); the history of events is greater than 10% but less than or equal to 20% likely per year; and an event could "possibly" occur.

Previous Occurrences

Wasilla has experienced volcanic ash in 1989, 1990, and 1992 from Mt. Redoubt and Mt. Spurr. These eruptions disrupted transportation and industry, particularly jet aircraft. Figure 6 shows the areas affected by the ash fall events.

Figure 6. Areas Affected by Volcanic Ashfall

Section 8. Erosion

Hazard Description

Erosion is a process that involves the wearing away, transportation, and movement of land. Erosion rates can vary significantly as erosion can occur quite quickly as the result of a flash flood, intense wind, or other event. It can also occur slowly as the result of long-term environmental changes. Erosion is a natural process, but its effects can be exacerbated by human activity. Erosion rarely causes death or injury. However, erosion causes the destruction of property, development, and infrastructure.

Wind Erosion

Wind erosion is when wind is responsible for the removal, movement, and redepositing of land. It occurs when soils are exposed to high-velocity wind. The wind will pick up the soil and carry it away. Wind erosion can cause a loss of topsoil, which can hinder agricultural production. Loess, deposits of silt laid down by wind action, can reduce visibility causing automobile accidents, hinder machinery, and have a negative effect on air and water quality, creating animal and human health concerns. Wind erosion also causes damage to public utilities and infrastructure.

Soils

The most extensive soils in this area include the Knik and Kalambach silt loams. Approximately 60% of the area consists of Knik soils and 30% Kalambach. Minor components include poorly drained soils in depressions and soils on escarpments.

The Knik and Kalambach silt loams are very deep, well-drained soils formed in silty loess over gravelly glacial drift. The surface layer of both the Knik and Kalambach soils is typically silt loam, 12 to over 24 inches thick. The substratum of Knik soils is extremely gravelly-coarse sand. Kalambach soil is very gravelly loam or very gravelly and sandy loam in the substratum. A thin layer of fibrous and partially decomposed litter covers the soil surface. Although silty loess is deposited on the soil surface on a regular basis, the Knik and Kalambach soils are sufficiently stable for the development of brown subsurface horizons.

In winter, strong winds blow the soil surface free of insulating snow cover, and these soils tend to freeze to considerable depths. Frozen soils result in ponding in depressional areas for a short period of time during the spring of most years.

Land Use

The soils in this unit are mainly used for urban development, hayland and cropland, wildlife habitat, gravel source areas, and occasionally forestry. Major soil limitations for urban development include frost action and restricted permeability. Stream terrace positions adjacent to rivers have a stream bank erosion hazard.

Water Erosion

Water erosion, not to be confused with water flooding, is negligible in Wasilla. The land here is fairly flat and what water erosion that occurs is the slow process of soils eroding away as a result of the natural environmental changes along the stream banks. Soil erosion can and does occur during construction or along roadside ditches. These events are generally only temporary and require re-vegetation.

The MSB and the Alaska Department of Fish and Game received Alaska Coastal Management Program grants for the fiscal years of 1998 – 2000, (FY98-$50,000; FY99-$50,000; FY2000-$75,000) to study the impacts of shore land development along Cottonwood Creek. The end product of those grants was a report entitled *Landowners Guide to Fish Habitat Conservation and Restoration Practices (March 2001).* This publication describes how to avoid erosion, but there is no data establishing natural water erosion as a problem.

Cottonwood Creek, Lucille Creek, and Wasilla Creek are not movable bed type of creeks and do not have the standard erosion problems that are found in the Knik River, Little Susitna River, or the Matanuska River.

Cottonwood Creek Watershed:
The following two paragraphs were previously taken from the Wasilla Soil and Water Conservation District's website regarding Cottonwood Creek Watershed:

"Cottonwood Creek starts from several lakes northwest of Wasilla and flows for approximately 33 river miles through the heart of Wasilla to drain into the mudflats at Knik Arm. It hosts salmon runs, trout species, and provides important wildlife habitat. Cottonwood Creek is becoming a very urban stream with development along its shores. During its route to the Knik Arm, Cottonwood Creek flows through several lakes (Cottonwood, Mud, and Wasilla Lakes).

The watershed helps control flood water, filters pollutants, supports recreation, and has scenic landscape features. Unfortunately, this natural rich area is becoming increasingly threatened by population pressures and increasing resource demands."

Location

Wind erosion is a significant problem for the Wasilla area as it experiences frequent wind with gusts of up to 100 MPH. Dust from the Matanuska and Knik river drainage systems can cause dust storms that greatly exceed national health-based standards. Sources of particulate come from river drainages, volcanoes, wildfires (ash), burned-over areas (wildfires), gravel pits, agriculture plowing, road sanding, wood stoves, open burning, unpaved roads, and bare soil/erosion. April thru June and August are the months most prevalent to dust storms.

The City of Wasilla lies in the Knik-Kalambach Association (Eastern Matanuska Valley Glacial Uplands). This area includes the area between Palmer and Wasilla and approximates the western and northern margin of the Knik and Matanuska wind corridors. Windblown loess from the Knik and Matanuska Rivers is deposited in this area.

Baseline erosion assessments completed by the United States Army Corps of Engineers (USACE) indicated that Wasilla had no report of erosion problems during the Community

Erosion Survey, and no erosion damages were reported by the City of Wasilla. Lucille Creek and Cottonwood Creek flood periodically, but there have not been reports of erosion problems.

Extent

Based upon the USACE erosion assessment, the extent of a water erosion event would be **negligible**. Based upon previous events, the extent of a wind erosion event would be **negligible**. A negligible event is defined in Table 5 as the following criteria: injuries and/or illnesses are treatable with first aid; minor quality of life is lost; shutdown of critical facilities and services for 24 hours or less; and less than 10% of property is severely damaged.

Impact

Those most affected by wind erosion are persons with existing heart or respiratory ailments, children, and the elderly (i.e. sensitive groups). Children are more at risk because they breathe 50% more air per pound of body weight than adults, and tend to spend more time outdoors involved in fairly vigorous activity.

Water erosion affects only those properties along lake shores, streams, and creeks in Wasilla.

Probability

Wind erosion is **likely** in the Wasilla area based on the history of high-wind events and the erodible soils in the area. According to Table 6, likely probability refers to: the event is probable within the next three years; the event has up to 1 in 3 year's chance of occurring (1/3=33%); the history of events is greater than 20% but less than or equal to 33% likely per year.

Natural water erosion is **unlikely** in the creeks located in the City of Wasilla. As more development occurs, the shorelines will be more threatened by human disturbance. According to Table 6, unlikely probability refers to: the event is possible within the next 10 years; the event has up to 1 in 10 year's chance of occurring (1/10=10%); the history of events is less than or equal to 10% likely per year; and an event is "unlikely" but is possible of occurring.

Previous Occurrences

In response to a variety of public concerns over degradation of air quality in the Matanuska-Susitna Valley, the Alaska State Department of Environmental Conservation (ADEC) conducted two preliminary studies of particulate matter concentrations during the summer of 1993 and 1994. Based on the results of the initial monitoring, ADEC believed that concentrations of particulate matter due to airborne dust could be exceeding the health standard in the Palmer area. In 1996-97, the MSB partnered with ADEC to monitor the air quality in the eastern part of the Mat-Su Valley. Two monitoring stations were erected, one in the Butte area, the other near Colony High School. The station near the high school was severely damaged in a wind storm and has never been replaced. The Butte station measures the particulate matter in the air on an hourly basis. Whenever the wind appears to be picking up, MSB staff monitor the particulate rating. Health Advisory/Press Releases are issued when the reading is over 100. The releases are sent to local newspapers, radio and TV stations, ADEC, Public Health, and the MSB School District. The general public can access the Air Quality Alert System at any time, day or night, by calling (907) 352-DUST (907-352-3878).

According to the Natural Resources Conservation Service, there are no recorded measurable water erosion events in the City of Wasilla. If soil erosion occurred during a severe weather event, the damage that occurred would be described as part of that event and not as a soil erosion problem.

Section 9. Flood

Hazard Description

Flooding is a natural event and damages occur when humans interfere with the natural process by altering the waterway, developing in watersheds, or building inappropriately within the floodplain. Flooding in Wasilla can be broken into several categories including rainfall-runoff floods, snowmelt floods, groundwater flooding, and fluctuating lake levels. These are not exclusive categories as a flood event could have elements of more than one type. There are no river systems within the City boundaries. Cottonwood Creek, Lucille Creek, and several smaller streams traverse the area. The most prominent water features in the City are Wasilla Lake and Lucille Lake.

The City of Wasilla participates in the NFIP, and the MSB acts as the Floodplain Manager for the City. To date, the City has not experienced any repetitive losses due to flooding events.

Types of Flooding:

Rainfall-Runoff Floods
A typical rainfall event occurs in mid- to late-summer. The rainfall intensity, duration, distribution, and geomorphic characteristics of the watershed all play a role in determining the magnitude of the flood. Runoff flooding is the most common type of flood. They usually result from weather systems that have prolonged rainfall associated with them.

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

Groundwater Floods
Groundwater flooding occurs when water accumulates and saturates the soil. The water-table rises and floods low-lying areas, including homes, septic tanks, and other facilities. When high water is impounded, the water table rises and floods low-lying areas. Groundwater flooding also occurs in basements of structures when a stream stage remains high for more than a few days.

Ice Jam Floods
Ice jams can form during fall freeze up, in midwinter when stream channels freeze and form anchor ice, and during spring breakup, when the existing ice cover gets broken into pieces, and the pieces get stuck at culverts or other constrictions. When the ice jam fails, it releases the collected water. Sudden ice jam failures that cause downstream flooding are not typically a problem in Wasilla. Spring break-up in Wasilla is typically the result of Chinook winds, warm rapidly moving surface winds that quickly melt the ice on Cottonwood Creek, Lucille Creek, and several smaller streams that traverse the area.

Flash Floods
These floods are characterized by a rapid rise in water. They are often caused by heavy rain on small stream basins, ice jam formation, or by dam failure. They are usually swift moving and debris filled, causing them to be very powerful and destructive.

Fluctuating Lake Level Floods

Generally, lakes buffer downstream flooding due to the storage capacity of the lake; however, when lake inflow is excessive, flooding of the area around the lake can occur.

Location

Lucille Creek and Cottonwood Creek are subject to flooding periodically and are the areas of concern for this HMP.

Properties unaffected directly by flooding will suffer due to road closures, impacts to public safety (access and response capabilities), limited availability of perishable commodities, and isolation.

Extent

The extent (i.e. magnitude or severity) of the flood hazard is measured in this HMP by using statistics from the NFIP, historical past events, and the 2013 State HMP. Based on these factors and using the criteria established in Table 5, the City of Wasilla has a **limited** extent, further defined as: injuries and/or illnesses do not result in permanent disability; complete shutdown of critical facilities for more than one week; and/or more than 10% of property is severely damaged.

The function of the NFIP is to provide flood insurance at a reasonable cost to homes and businesses located in floodplains. In trade, the City of Wasilla regulates new development and substantial improvement to existing structures in the floodplain, or requires developers to build safely above flood heights to reduce future damage to new construction. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year) flood elevations.

Table 15. FIRM Zone Definitions

Firm Zone	*Explanation*
A	Areas of 100-year flood; base flood elevations and flood hazard not determined.
AO	Areas of 100-year shallow flooding where depths are between one and three feet, average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one and three feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one foot or where the contributing drainage area is less than one-square mile; or areas protected by levees from the base flood.
C	Areas of minimal flooding.
D	Areas of undetermined, but possible, flood hazards.

Flood insurance purchase may be required in A, AO, AH, A-numbered zones as a condition of loan or grant assistance. An Elevation Certificate is required as part of the development permit.

The Elevation Certificate is a form published by FEMA, required to be maintained by communities participating in the NFIP. According to the NFIP, local governments maintain records of elevations for all new construction or substantial improvements in floodplains and must keep certificates on file.

Elevation Certificates are used to:

1. Record the elevation of the lowest floor of all newly-constructed buildings, or substantial improvement, located in the floodplain.
2. Determine the proper flood insurance rate for floodplain structures.
3. Local governments must insure that elevation certificates are completed correctly for structures built in floodplains. Certificates must include:
   - The location of the structure (tax parcel number, legal description, and latitude and longitude) and use of the building.
   - The Flood Insurance Rate Map panel number and date, community name, and source of base flood elevation date.
   - Information on the building's elevation.
   - Signature of a licensed surveyor or engineer.

Table 16. Current NFIP Statistics for Matanuska-Susitna Borough

Emergency Program Date Identified	**Regular Program Entry Date**	**Map Revision Date**	**NFIP Community Number**	**CRS Rating Number**	**Total # of Current Policies (11/30/17)**
02/28/1978	05/01/1985	03/17/2011	020021	-	242
Total Premiums	**Total Loss Dollars Paid**	**Average Value of Loss**	**AK State # of Current Policies**	**AK State Total Premiums**	**AK Total Loss Dollars Paid**
$883	$9,711,985.03	$15,319	2,493	$2.2 million	$9.7 million
Mat-Su Average Premium	**AK State Average Premium**	**Repetitive Loss Claims**	**Dates of Rep. Losses**	**Total Rep. Loss**	**Average Rep. Loss**
$1,162	$893	0	0	$0	$0

Table 17. State and Local Floodplain Coordinators

Wasilla Floodplain Coordinator	Matanuska-Susitna Borough Contact: Taunnie Boothby Planning and Land Use Dept. 350 E Dahlia Ave Palmer, AK 99645 Phone:907-861-8526 E-Mail: taunnie.boothby@matsugov.us

State of AK Floodplain Coordinator	Floodplain Management Programs Coordinator Division of Community and Regional Affairs Department of Commerce, Community & Economic Development Contact Person: Jimmy C. Smith 550 West 7th Avenue, Suite 1640 Anchorage, AK 99501 Phone: (907) 269-4132 E-Mail: jimmy.smith@alaska.gov Website: https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/FloodplainManagement.aspx

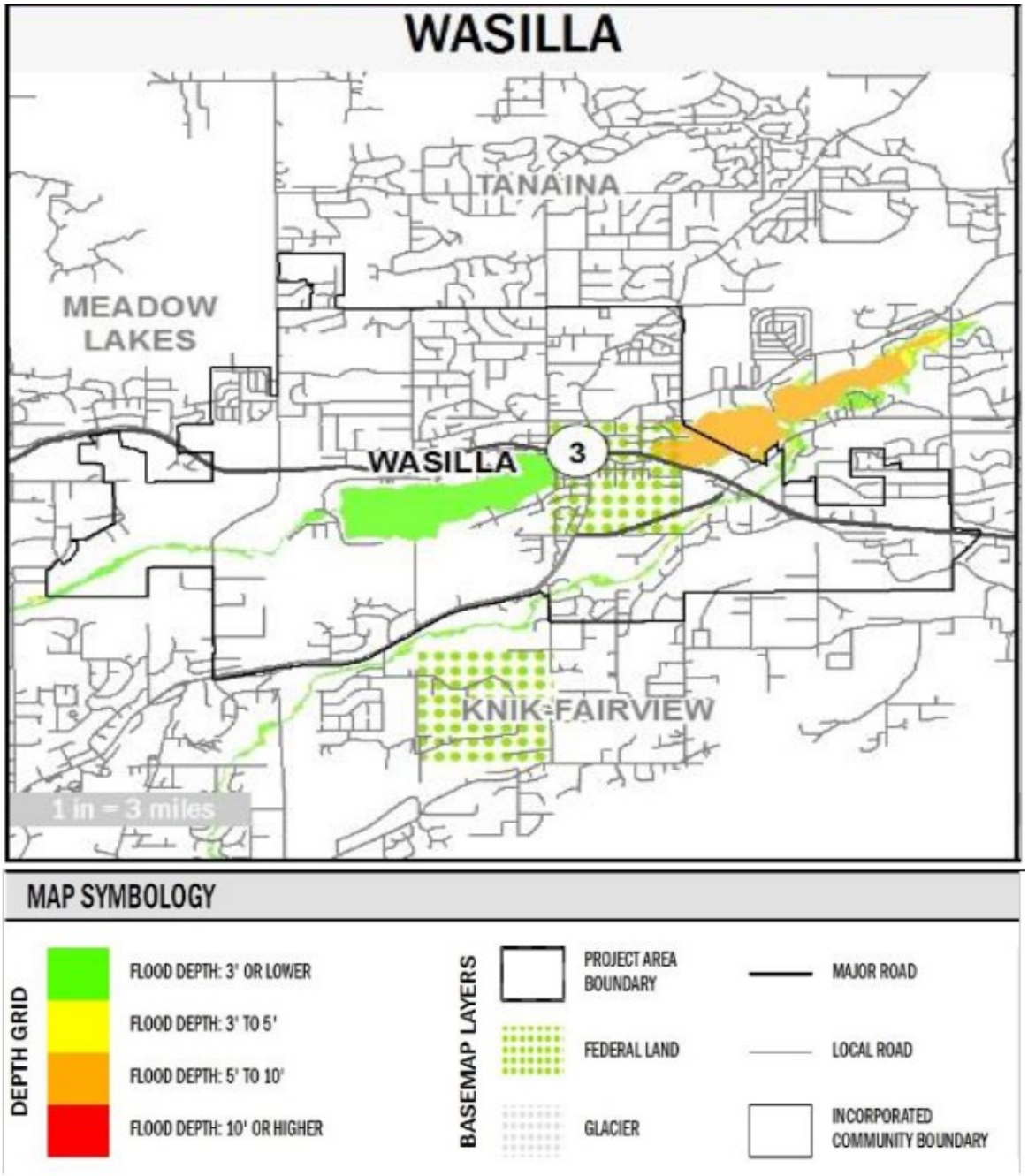
Impact

Local flooding in low-lying areas of Wasilla due to spring breakup affects less than 1% of the property in the City. Roads and utilities are the systems generally impacted by this hazard event.

Houses along Lucille Creek in the Buena Vista Subdivision may be subject to flooding in the event that the Alaska Fish & Game outlet structure located at the outlet of Lake Lucille were to fail. The structure was originally constructed in 1955 and replaced in 1967. The Lake Lucille Study prepared for the City of Wasilla by J.M. Eilers in 1993 states that this outlet structure raised the lake level approximately two and a half feet. The lake has a surface level of approximately 362 acres.

In 2011, FEMA created a new Flood Insurance Rate Map for the MSB. The map indicates there are no structures within the FIRM 100-year flood zone. Map 7 shows the estimated impact of a 1-percent annual chance flood on the City of Wasilla.

Map 7. Estimated Flood Depths for a 1-Percent-Annual-Chance Flood Event



Source: 2016 FEMA Region X – Matanuska-Susitna Borough, Alaska Risk Report

Probability

Based on the 2013 State HMP, NFIP, City records, and past historical events, Wasilla has a **possible** probability of flooding. Table 6 lists criteria used for determining possible probability as: the hazard is present with a probability of occurrence within the next five years; the event has up to 1 in 5 year's chance of occurring; the history of events is greater than 10% but less than or equal to 20% likely per year; and the event could "possibly" occur.

Previous Occurrences

- April 11, 1979 – Valley area streams flowed high according to the U.S. Department of Agriculture Soil Conservation snow surveyors. The course near Independence Mine had 105 inches of snow containing 33 inches of water as of March 28.
- July 12, 1979 – There was a power outage from Wasilla to Knik River when high water swept a main transmission tower from its pilings in the Matanuska River, causing the lines to fall and short out.
- July 1981 – Three weeks of rain created flooding and mini lakes in parking lots and various other areas. Roads were closed, and culverts were damaged.
- July 23, 1981 Three weeks of intermittent rain caused local flooding in low-lying areas of Wasilla.
- October 12, 1986 – Record rainfall in Southcentral Alaska caused widespread flooding in the MSB. The President declared a major disaster implementing all public and individual assistance programs, including SBA disaster loans, and disaster unemployment insurance benefits.
- August 12, 1999 – Several reports of more than two inches of rainfall (much of which occurred in a 12 to18-hour period) were recorded in the Susitna Basin.
- April 27- May 30, 2002 - A presidential disaster declaration was used in response to spring breakup flooding in the MSB. Funds were provided to pay 75% of eligible costs of repairing or replacing damaged public facilities. The declaration also made cost-shared funds available to the State for approved projects that reduce future disaster risks.
- April 13, 2004 – Flooding caused by spring breakup led to the cancellation of a Wasilla High School Track and Field event when snow drifts as high as eight feet were suddenly melted by warm winds.
- Aug. 18-24, 2006 – Heavy rains up to six inches on gauged and ungauged rivers caused flooding and road wash outs throughout the Mat-Su Valley area. Little Susitna River crested at almost 14 feet (tentative flood of record for this river.)
- Sept. 16, 2012 – A series of strong, wet storm systems hit Southcentral Alaska in mid-September. This resulted in widespread flood damage over a large area. Storm total precipitation ranged from 21 to 27 inches along the eastern Kenai Peninsula, while further inland between 6-12 inches of rain fell along the Talkeetna Mountains north to the headwaters of the Nenana River. A large number of roads and bridges were affected; damage to the Alaska Railroad was severe enough to shut down the rail service for several days. Almost 60 homes were either severely damaged or destroyed and over 700 other homes were either affected or sustained minor damage; most of the damage occurred along the Little Susitna River and Willow Creek. State estimates of damage to individual property approached $3.5 million, public infrastructure exceeded $19 million statewide, and the military base in Anchorage sustained an addition $3.5 million in flood damages. There was one fatality associated with the flooding. On September 24, a 51-year-old man died while attempting to cross a swollen creek on his ATV.

Section 10. Hazards Not Profiled in the 2018 Wasilla HMP

Avalanche

Alaska experiences many snow avalanches every year. The exact number is undeterminable as most occur in isolated areas and go unreported. Avalanches tend to occur repeatedly in localized areas and can sheer trees, cover communities and transportation routes, destroy buildings, and cause death. Alaska leads the nation in avalanche accidents per capita. Areas near Wasilla are subject to avalanches; however, the City itself does not consider avalanches to be a hazard.

Tsunami and Seiche

A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteor impacts, or onshore slope failures can cause this displacement. Most tsunamis originate in the Pacific "Ring of Fire," the area of the Pacific bounded by the eastern coasts of Asia and Australia and the western coasts of North America and South America that is the most active seismic feature on earth. Wasilla is located in an area not directly impacted by tsunamis or seiches.

Ground Failure

Permafrost is frozen ground in which a naturally occurring temperature below 32°F has existed for two or more years. According to the 2013 State HMP, permafrost is isolated or absent in the Wasilla area. Wasilla does not generally experience ground failure related to permafrost.

Climate Change

For this HMP, climate change refers to the long-term variation in atmospheric composition and weather patterns on a global scale. Global climate change may occur gradually due to small variations or rapidly due to large catastrophic forces. Greenhouse gasses, especially carbon dioxide (CO_2) and methane (CH_4), are commonly regarded as the most significant factors influencing the Earth's current climate. Climate change has the potential to exacerbate the effects of other hazards; however, the City itself does not see climate change as a hazard.

Chapter IV–Goals, Objectives, & Mitigation Actions

The goal of mitigation is to reduce the future impacts caused by natural or technological hazards including death, injuries, property damage, disruption of local government and local economies, and the amount of public and private funds spent to assist with recovery.

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. Mitigation measures save lives, prevent or reduce injuries, and prevent or decrease financial losses. Actions employed to mitigate hazards can vary from public education to structural changes in buildings. Mitigation measures can be grouped into three main categories:

- Protective;
- Preventative; and
- Educational.

Protective

Protective measures or actions are undertaken to try to protect a structure or to minimize the damage a structure or facility may experience during a hazard event. Protective actions reduce exposure to hazard damage by implementation of structural improvements to a facility. An example of this type of action would be the reinforcement of a City water tower. This type of action may be very expensive as it may involve engineering and maintenance. Retrofitting or rehabilitating existing facilities is another way to protect and/or preserve the functionality of facilities. This type of action can also be expensive. However, in some cases, the work can be done incrementally or as part of routine maintenance.

Preventative

Preventative measures try to limit exposure to hazards which prevents damage from occurring. Examples of preventative measures include regulating the placement of development to prevent or limit new development in hazardous areas. The adoption of building codes is another example of a preventative measure. Their purpose is to establish minimum building requirements based on the physical properties of construction materials, geologic data for the area, and the use of a structure.

Education

Educating the residents about natural and technological hazards in the Wasilla area and what they can do to protect themselves and their property is an important part of any mitigation strategy. Examples of ways Wasilla may educate its residents are through community meetings, school activities and presentations, inserts in utility bills, newspaper ads, and distribution of brochures and pamphlets from booths at local fairs and the home show.

In Table 18, the City of Wasilla has listed their primary goals and objectives, as well as those of the 2013 State HMP. Specific goals and objectives follow, and the chapter is concluded with the benefit-cost analysis of these goals and objectives.

Table 18. Statewide and Citywide Hazard Mitigation Goals & Objectives.

State of Alaska HMP Goals & Objectives	City of Wasilla HMP Goals & Objectives
Primary goals: • Minimize loss of life and injuries; • Minimize damages; • Restore public services; and • Seek mitigation solutions that are effective in Alaska. To attain these goals the State Plan includes information to: 1. Save lives and reduce injuries; 2. Prevent or reduce property damage; 3. Maintain critical facilities in functional order; 4. Assist local communities with preparing a Local HMP; 5. Protect infrastructure from damage; 6. Minimize social dislocation and stress; 7. Protect legal liability of government and public officials; and 8. Reduce economic losses.	Primary goals: • Minimize loss of life and property from natural hazard events; • Increase public awareness of risk from natural disasters; • Protect public health and safety; and • Promote rapid hazard disaster recovery. To attain these goals, the City will: 1. Identify hazards and assess risk for Wasilla by considering historic incidence and frequency; 2. Educate the public on building construction that will reduce the dangers of natural disasters; 3. Improve government and public response to hazard disasters; 4. Provide for emergency shelter during hazard events, as needed; 5. Inform and educate the public on how to deal with hazard conditions; 6. Protect government services and critical facilities/buildings vital to emergency response and recovery efforts, such as police and fire stations; and 7. Improve disaster preparedness.

A. Specific Goals, Objectives, and Mitigation Actions

The mitigation actions below are composed of ongoing mitigation actions from previous versions of this HMP with past and current updates on the status of these mitigation actions, and new mitigation actions. Mitigation actions that were completed or marked for deletion at the time of the 2010 update have been removed.

All Hazards

Goal: Create a safer environment and provide the public with information in the event of a natural disaster.

1. Objective: Protective Measures
- Designate emergency shelter sites, provide for emergency needs to be met at the locations, publicize location of shelters.
  - 2010 Update: The Curtis Menard Sports Center has been designated as the official Emergency Shelter, and the City added kitchen facilities and back-up power generators.
  - 2018 Update: The Curtis Menard Sports Center continues to be the official Emergency Shelter.
- On an annual basis, confirm list of private owners of heavy-equipment that are willing to supply equipment during emergency.
  - 2010 Update: The City confirmed that adequate equipment is available.
  - 2018 Update: The City maintains a list of heavy-equipment owners and has blanket purchase agreements in place with local vendors that can be used in a disaster.

2. Objective: Preventive Measures
- Encourage new construction to use national building codes.
  - 2018 Update: The City encourages local contractors to build in accordance with the International Building Code. The MSB Fire Marshal is responsible for code enforcement and inspection.
- Pursue consolidation of the City of Wasilla HMP into the MSB HMP.

3. Objective: Public Education and Awareness
- Develop method of publicizing when a shelter is open and the types of services each shelter can provide (e.g. food, showers, medical assistance).
  - 2010 Update: The City has established an emergency callout procedure that publicizes emergency procedures when required.
  - 2018 Update: The City maintains the emergency callout procedure stated in the 2010 update.
- Create a City of Wasilla web page dedicated to potential local hazards. The site will provide links to information on a variety of hazards and useful tips on how to avoid harm or damage.
  - 2018 Update: The City has a web page that discusses basic emergency and preparation for natural disasters, including making a basic emergency kit and having a family plan. The site directs users to FEMA, DHS&EM, and the Alaska Department of Fish and Game for more information.
- Coordinate with the media to make periodic Public Service Announcements (PSAs) regarding status, duration, or areas to avoid for any hazard that can be forecast.
  - 2018 Update: Local media coordinates with state and federal agencies for PSAs. Additionally, warnings for severe threats/disasters are also transmitted via smart-phones to users in the vicinity.

Earthquakes

Goal: Build public awareness of risks and preparedness for earthquakes to minimize harm to the public and damage to property from earthquakes.

1. Objective: Protective Measures
- Distribute building code information with permits for new buildings to encourage construction of structures that are designed to withstand tremors.
  - 2018 Update: The City and MSB encourage homeowners to build up to International Building Codes, but the City does not distribute building code information with permits for new buildings.
- Require earthquake awareness as a part of the General Approval Criteria in WMC 16.16.050.
  - 2018 Update: WMC 16.16.050 does not require earthquake awareness as part of the General Approval Criteria.
- Install back-up electric generation for emergency shelters.
  - 2018 Update: This action is complete. The City has a back-up generator system in place at the Menard Sports Complex.

2. Objective: Preventive Measures
- Encourage owners of critical facilities to brace equipment (such as mechanical equipment, emergency generators, and elevators) whose failure may disrupt the operations of a critical facility.
  - 2010 Update: This now a part of the initial building review by the Borough Fire Marshal.
  - 2018 Update: The MSB Fire Marshal continues to have this as part of the building review process.
- Distribute information on simple measures homeowners can take to strengthen structures before the next earthquake with each development permit issued (for example, FEMA's *Avoiding Earthquake Damage: A Checklist for Homeowners*).
  - 2018 Update: The City has copies of FEMA's checklist available to the public.
- Analyze and strengthen public utility facilities as necessary to ensure public health through continuance of the ability to provide clean water and dispose of wastewater.
  - 2018 Update: The 2016 FEMA Risk Report provided information about City utility system vulnerabilities. The City has performed a number of utility improvements since the 2010 HMP Update, including the installation of new sewer effluent pumps, to ensure that the utilities function in the event of a disaster. The City also pursued using a Remotely Operated Vehicle to inspect underwater utilities and tanks in 2014, but this action is under evaluation.

3. Objective: Public Education and Awareness
- Distribute educational information similar to *Are You Prepared for the Next Big Earthquake in Alaska?* to schools, churches, civic organizations, and the general public.

- 2018 Update: The City distributed information about emergency preparedness, including a FEMA-sponsored guide to creating a family disaster supply kit.

High Wind

Goal: Institute measures that will improve resistance of buildings to high winds, ensure the availability of utility services, and protect the public during high wind events.

1. Objective: Protective Measures
- Develop a system to inform builders, homeowners, and businesses that building with additional bracing for roof trusses, reinforced columns and bond beams, protected building openings, and securely-mounted roof equipment including cowlings and flashing suffer fewer and less costly damages than other buildings as part of the land use permit process.
  - 2010 Update: Local contractors have been advised to follow the International Building Code for residential structures.
  - 2018 Update: Local contractors are encouraged to follow code. All commercial buildings and residential structures larger than a 4-plex are required to have a building inspection by a MSB official.
- Encourage the installation of damage-resistant glass in vulnerable critical facilities.
  - 2018 Update: The MSB Fire Official inspects commercial buildings to ensure that they are built up to International Building Code. Part of this code includes wind-load and impact ratings for windows. The City and MSB encourage residents to follow the same code for residential buildings.

2. Objective: Preventive Measures
- Conduct a survey of critical facilities and make recommendations on wind proofing projects that might reduce damage caused by high winds (selected tree removal, tie-down or anchor equipment and materials that might become airborne, etc.).
  - 2018 Update: The City works to ensure trees threatening critical facilities are removed. The MSB Fire Marshal is responsible for building inspections.
- Develop a community campaign to encourage residents to cut back trees that might fall on buildings, check and refasten roof sheathing when patching or repairing roof, and select wind-resistant exterior wall finish.
  - 2018 Update: A community campaign has not been undertaken, but residents are encouraged to maintain their properties and clear brush that has the potential to damage their buildings.
- Identify schools, medical facilities, senior centers, day care centers, and other public buildings vulnerable to loss from high winds and suggest measures that will lessen damage from windstorms.
  - 2018 Update: The MSB is responsible for building inspection; therefore, the City does not have a formal list of identified facilities.
- Encourage routine trimming of trees to reduce power outages during storms.

- 2010 Update: Coordinate with the Matanuska-Susitna Borough and MEA programs that currently address these issues.
- 2018 Update: MEA has a right-of-way clearing program in place and conducts regular tree trimming.

3. Objective: Public Education and Awareness
- When high winds occur, inform the public through the City website and PSAs about where to access current weather updates on the severity and duration of the winds.
  - 2018 Update: Local media coordinates with state and federal agencies for PSAs. Additionally, warnings for severe threats/disasters are transmitted via smart-phones to users in the vicinity.

Severe Weather

Goal: Reduce personal injury and property damage and provide protection and aid as needed during severe weather conditions such as winter storms, heavy snow, extreme cold, or ice storms.

1. Objective: Protective Measures
- Educate the public about construction standards to ensure that City utilities are available during times of severe weather.
  - 2018 Update: Both Enstar and MEA have educational pages on their website that explain how to maintain utilities to ensure they are functioning in a severe weather event and proper actions to reduce hazards.
- Provide NOAA weather radios to all government buildings, schools, medical facilities, and work with staff to develop a process to disseminate information to ensure early warning of potential weather events.
  - 2018 Update: Most facilities have access to weather updates and weather warnings via television, radio, internet, or telephone. Schools and other facilities have severe weather policies in place that can close the schools or dismiss student early if a severe weather event is growing in magnitude.
- Work with the senior center and/or other community organizations to identify elderly and indigent citizens who may be at risk during winter storms and develop method of informing them of expected weather events.
  - 2010 Update: The City cooperates with the Wasilla Senior Center to meet the needs of the seniors.
  - 2018 Update: The City continues to cooperate with the Wasilla Senior center to meet the needs of seniors.

2. Objective: Preventive Measures
- Seek ways to reduce or eliminate ice on public roads caused by wind blowing snow and/or ice storms. Specifically, reduce or eliminate glaciation on the Parks Highway caused by wind blowing across the frozen surface of Wasilla Lake by constructing a seasonal snow fence/wind screen.
  - 2010 Update: The State of Alaska maintains the Parks Highway.

    - 2018 Update: The DOT/PF has made changes to the Parks Highway to improve safety in severe weather, but has not specifically addressed this issue on the Parks Highway.
- Review accident report information for roads and intersections with a high number of weather-related accidents to determine if change or enhancement of road design will reduce accidents or severity of accidents. Assign City Public Works Department to work with Alaska Department of Transportation & Public Facilities to fund identified changes.
    - 2010 Update: Ongoing review.
    - 2018 Update: The DOT/PF has completed many roadway improvements, including widening the Parks Highway going west out of Wasilla. The DOT/PF is also working on the right-of-way acquisition to widen Knik-Goose Bay Road going out of downtown Wasilla.

3. Objective: Public Education and Awareness

- Inform the public through the City web site and PSAs about where to access current weather updates.
    - 2018 Update: Local media coordinates with state and federal agencies for PSAs; the City is not involved. Additionally, warnings for severe threats/disasters are transmitted via smart-phones to users in the vicinity.
- Provide tourist-related businesses with information on where to find NOAA Weather Radio broadcast and on warning signs of frostbite or hypothermia to educate winter travelers.
    - 2010 Update: Ongoing.
    - 2018 Update: The Mat-Su Visitors Bureau provides links to road conditions and travel weather on their website.

Wildland and Urban Fire

Goals: Reduce fire injuries and damage to structures from wildland fires.

1. Objective: Protective Measures

- Add criteria to the City's Land Development Code to ensure that subdivisions in Wasilla provide more than one means of access into and out of developing areas through the subdivision review process.
    - 2010 Update: This is incorporated into the Borough's platting procedures.
    - 2018 Update: Since the MSB and not the City of Wasilla is responsible for this, this action will be deleted in the next HMP update.
- Incorporate the use of "defensible space" as a part of the landscape design criteria for the construction of homes and businesses in rural areas of the City and seek other ways to reduce personal and property damage due to wildfires.
    - 2018 Update: There is no clause about defensible space in WMC.

2. Objective: Preventive Measures

- Educate the public on City ordinance requiring property owners to post addresses on all structures to reduce response time during an emergency, and enforce the ordinance.
    - 2010 Update: The new Ordinance requires this.

    - 2018 Update: As part of a new address assignment, a letter is sent to the property owner to educate them about the requirements of posting an address on their structure.
- Notify absent landowners whose property is at high risk for fire due to weeds and trash and encourage them to remedy the problem.
    - 2010 Update: The City has taken enforcement action to remove trash and junk and to require reclamation of lands where the ground has been disturbed.
    - 2018 Update: The City continues to enforce this action.
- Alert the public when fire risk is greatest by posting "Fire Danger" signs on major roads at the City limits similar to those used by the Forests Service.
    - 2010 Update: Signs installed by the State.
    - 2018 Update: A Fire Danger sign is located by the Parks Highway on Wasilla Lake, which displays the level of Fire Danger.
- Identify neighborhoods especially vulnerable to fire and work with volunteer firefighters to conduct neighborhood meetings on fire safety and "defensible space" concepts and work with the MSB to create Community Wildfire Protection Plans.
    - 2010 Update: Coordinate with the Matanuska-Susitna Central Fire District for projects within the City.
    - 2018 Update: The Mat-Su Central Fire Department coordinates this action under the MSB. The MSB has an umbrella Community Wildfire Protection Plan in place, but not one specific to the Wasilla area.
- Encourage homeowners and businesses to use fire-resistant materials in construction of buildings and structures.
    - 2010 Update: Commercial buildings reviewed by the State Fire Marshal.
    - 2018 Update: Commercial buildings and residential structures larger than a 4-plex are reviewed by the MSB Fire Marshal. Local contractors are encouraged to build in accordance with International Building Code.

3. Objective: Public Education and Awareness
- Work with schools and Fire Department to distribute educational material on fire prevention (i.e. FIREWISE pamphlets and website).
    - 2010 Update: Ongoing.
    - 2018 Update: The City distributes a wildfire preparedness pamphlet. The local fire department coordinates with local schools to provide information on fire prevention and fire safety.
- Include a link to local fire danger information on the City website.
    - 2018 Update: There is not an easily accessible link to the local wildfire danger on the City website.

Volcanic Ash Fall

Goal: Reduce human health problems and equipment damage caused by volcanic ash.

1. Objective: Protective Measures
- Inform those at risk of preventive measures in advance of ash fall danger by developing public education campaign.

    - 2018 Update: Information about volcanic ash fall danger is undertaken by interagency cooperation between the NWS, DHS&EM, FAA, and the AVO through local communication networks and media outlets. The City may assist in reaching those who are not reachable by normal media.
- Maintain a supply of dust masks or other breathing apparatus for City workers required to maintain City facilities during an ash fall event.
    - 2018 Update: The City has a supply of dust masks sufficient for the City workers required to maintain City facilities during an ash fall event.
- Coordinate with the emergency crews and the senior center to aide those with breathing problems.
    - 2018 Update: The MSB EMS is responsible for this. The City does not know of any coordination.

2. Objective: Public Education and Awareness

- Distribute educational material on hazard to electrical & mechanical equipment and to roofs due to weight of ash and on increased danger of falls and auto accidents due to decreased visibility and slippery walking and driving conditions caused by ash.
    - 2010 Update: State responsibility.
    - 2018 Update: The distribution of information about volcanic ash is undertaken by interagency cooperation between the NWS, DHS&EM, FAA, and the AVO. The City may assist in reaching those who are not reachable by normal media.
- Provide information on where to access information about the wind direction and the amount of ash in the atmosphere.
    - 2018 Update: In the event of an ashfall event, the NWS, DHS&EM, FAA, and AVO will coordinate to disseminate information. This information will be posted on the internet, broadcast on radio and television, and available by phone from local forecasting offices.

Erosion

Goal: Monitor property damage caused by erosion.

1. Objective: Protective Measures

- Develop a map of areas in Wasilla most likely to experience wind erosion using information from the Wasilla Soil and Water Conservation District and other state and federal agencies.
    - 2018 Update: The City is continuing to investigate mapping wind erosion, but has focused resources on other mitigation activities.

2. Objective: Preventive Measures

- Include conditions that would control timing of land clearing to reduce wind erosion before and during construction.
    - 2018 Update: As part of WMC, the City requires that no lot may be cleared of native vegetation prior to permits being issued. WMC also requires all landscaping be done prior to occupancy. These clauses give the City some control over the timing of land clearing.

- Continue to enforce WMC requirements for mitigation, including reseeding areas cleared during construction.
    - 2018 Update: WMC 16.33.050 requires that existing vegetation be preserved to the greatest practical extent, and has minimum vegetation requirements to ensure cleared land is reseeded. This code is enforceable by the City.

3. Objective: Public Education and Awareness

- Identify properties susceptible to wind erosion and provide information to property owners of potential problems and preventative measures.
    - 2018 Update: The City has not identified any properties as being susceptible to wind erosion.

Flood

Goal: Monitor property loss and injuries caused by flooding.

1. Objective: Protective Measures

- Seek grant or FEMA assistance in updating flood information on FIRM maps.
    - 2010 Update: FEMA was in final stages of updating FIRM maps
    - 2018 Update: Done. This mitigation action was completed with the release of updated FIRM maps in 2011.
- Identify the location of any hazardous material storage (anchor & elevate if it is located in a floodplain or flood zone).
    - 2018 Update: There is no known hazardous material storage in the flood zone.

2. Objective: Preventive Measures

- Work with FEMA to overlay new flood plain information on aerial photographs. Flood plain information should include all land in the City limits, the future utility service area, and show flood elevations.
    - 2010 Update: FEMA was in final stages of approval of FIRM maps. Once completed, staff will work to overlay on aerial maps of City.
    - 2018 Update: FEMA updated the FIRM maps in 2011. The City has not overlaid floodplain information onto area photographs in the manner defined by this action.
- Identify buildings at risk from 100 and 500-year storms and inform owners/residents of flood-proofing alternatives.
    - 2018 Update: The MSB is responsible for floodplain development and information. The City refers all questions about flood zones and building recommendations/requirements to the MSB office.

3. Objective: Public Education and Awareness

- Identify property in the path of flood waters that could cause erosion and provide information to property owners of potential problems, preventative measures, and use of flood insurance to mitigate public cost of rebuilding.
    - 2018 Update: The City has identified properties at risk of flooding through the FIRM map update and FEMA Risk Report. Due to the small number

of susceptible properties, the City has focused resources on other mitigation actions.

B. 2018 Update Summary

For the 2018 HMP Update, the mitigation action plan was consolidated into a single section. Ongoing mitigation actions from the previous update were merged into the new mitigation action plan. Several action items were deleted because the primary responsibility belonged to another agency, it was no longer a priority, or the action item had been completed as of the 2010 update. The City added one new action item for this HMP update. These ongoing items were carried into a consolidated mitigation action plan. The Planning Commission will review the action items on an annual basis and recommend whether to continue items, add new items, or delete items.

C. Benefit - Cost Review

This section of the HMP outlines Wasilla's overall strategy to reduce its vulnerability to the effects of the hazards studied. Currently, the planning effort is limited to the hazards determined to be of the most concern; earthquake, high winds, severe weather, volcanic ashfall, erosion, flood, and climate change; however, the mitigation strategy will be regularly updated as additional hazard information is added and new information becomes available.

The projects listed in Table **20**19, were prioritized using a listing of benefits and costs review method as described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Therefore, the most cost-effective actions for implementation will be pursued for funding first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

The City of Wasilla considered the following factors in prioritizing mitigation projects. Due to the dollar value associated with both life-safety and critical facilities, the prioritization strategy represents a special emphasis on benefit-cost review because the factors of life-safety and critical facilities steered the prioritization towards projects with likely good benefit-cost ratios (BCRs).

- Extent to which benefits are maximized when compared to the costs of the projects, the BCR must be 1.0 or greater.
- Extent the project reduces risk to life-safety.
- Project protects critical facilities or critical city functionality.
- Hazard probability.
- Hazard severity.

Other criteria that were used in developing the benefits – costs listing depicted in Table 19:

- Vulnerability before and after Mitigation.
- Number of people affected by the hazard, area wide or specific properties.
- Areas affected (acreage) by the hazard.

- Number of properties affected by the hazard.
- Loss of use.
- Loss of life (number of people).
- Injury (number of people).
- List of Benefits.
- Risk reduction (immediate or medium time frame).
- Other community goals or objectives achieved.
- Easy to implement.
- Funding available.
- Politically or socially acceptable.
- Costs.
- Construction cost.
- Programming cost.
- Long time frame to implement.
- Public or political opposition.
- Adverse environmental effects.

This method supports the principle of benefit-cost review by using a process that demonstrates a special emphasis on maximization of benefits over costs. Projects that demonstrate benefits over costs and that can start immediately were given the highest priority. Projects that the costs somewhat exceed immediate benefit and that can start within five years (or before the next update) were given a description of medium priority, with a timeframe of one to five years. Projects that are very costly without known benefits probably cannot be pursued during this plan cycle, but are important to keep as an action were given the lowest priority and designated as long-term.

After the HMP has been approved, the projects must be evaluated using a Benefit-Cost Analysis (BCA) during the funding cycle for disaster mitigation funds from DHS&EM and FEMA.

A description of the BCA process follows. Briefly, BCA is the method by which the future benefits of a mitigation project are determined and compared to its cost. The result is a BCR, which is derived from a project's total net benefits divided by its total cost. The BCR is a numerical expression of the cost-effectiveness of a project. Composite BCRs of 1.0 or greater have more benefits than costs, and are therefore cost-effective.

Benefit-Cost Review vs. Benefit-Cost Analysis (FEMA 386-5) states in part:
Benefit-Cost Review for mitigation planning differs from the BCA used for specific projects. BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action. To assess and demonstrate the cost-effectiveness of mitigation actions, FEMA has developed a suite of BCA software, including hazard-specific modules. The analysis determines whether a mitigation project is technically cost-effective. The principle behind the BCA is that the benefit of an action is a reduction in future damages.
DMA 2000 does not require HMPs to include BCAs for specific projects, but does require that a Benefit-Cost Review be conducted in prioritizing projects.

D. Benefit-Cost Analysis

The following section is reproduced from a document prepared by FEMA, which demonstrates on how to perform a BCA. The complete guidelines include a BCA document, and BCA technical assistance is available online at http://www.fema.gov/benefit-cost-analysis.

Facilitating BCA

Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training that simplify the process of preparing BCAs. FEMA has a suite of BCA software for a range of major natural hazards: earthquake, fire (wildland/urban interface fires), flood (riverine, coastal A-Zone, Coastal V-Zone), hurricane wind (and typhoon), and tornado.

Sometimes there is not enough technical data available to use the BCA software mentioned above. When this happens, or for other common, smaller-scale hazards or more localized hazards, BCAs can be done with the Frequency Damage Method (i.e., the Riverine Limited Data module), which is applicable to any natural hazard as long as a relationship can be established between how often natural hazard events occur and how much damage and losses occur as a result of the event. This approach can be used for coastal storms, windstorms, freezing, mud/landslides, severe ice storms, snow, tsunami, and volcano hazards.

Applicants and sub-applicants must use FEMA-approved methodologies and software to demonstrate the cost-effectiveness of their projects. This will ensure that the calculations and methods are standardized, facilitating the evaluation process. Alternative BCA software may also be used, but only if the FEMA Regional Office and FEMA Headquarters approve the software.

To assist applicants and sub-applicants, FEMA has prepared the *FEMA Mitigation BCA Toolkit* CD. This CD includes all of the FEMA BCA software, technical manuals, BCA training courses, data-documentation templates, and other supporting documentation and guidance.

The *Mitigation BCA Toolkit* CD is available free from FEMA Regional Offices or via the BCA Helpline (at bchelpline@fema.dhs.gov or toll-free number at (855) 540-6744.

The BCA Helpline is also available to provide BCA software, technical manuals, and other BCA reference materials as well as to provide technical support for BCA.

For further technical assistance, applicants or sub-applicants may contact their State Mitigation Office, the FEMA Regional Office, or the BCA Helpline. FEMA and the BCA Helpline provide technical assistance regarding the preparation of a BCA.

Eligible Projects for PDM Funding

The PDM Grant Program is federally funded through FEMA at 75% of the plan or project and requires a 25% local fund match. Small, impoverished communities may be eligible for up to a 90% Federal cost share in accordance with the Stafford Act. The program is annual, nationally-competitive, and is intended to reduce overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants include Hazard Mitigation Planning Grants and Hazard Mitigation Project Grants.

- A Hazard Mitigation Planning Grant is available for communities to create a FEMA/State-approved and community-adopted All-Hazard Mitigation Plan.
- A Hazard Mitigation Project Grant is only available for communities who have a FEMA/State-approved and community-adopted Hazard Mitigation Plan.

Hazard Mitigation Projects are intended to reduce risk to life and property, examples include:

- Elevation of flood-prone structures;
- Structural and non-structural seismic retrofits of public facilities;
- Voluntary acquisition or relocation of structures out of the floodplain;
- Natural hazard protective measures for utilities, water and sanitary sewer systems; and
- Localized storm water management and flood control projects.

Eligible Projects for HMGP Funding

These criteria are designed to ensure that the most appropriate projects are selected for funding. Projects may be of any nature that will result in protection of public or private property from natural hazards. Some types of projects that **may be eligible** include:

- Acquisition of hazard-prone property and conversion to open space;
- Retrofitting existing buildings and facilities;
- Elevation of flood-prone structures;
- Vegetative management/soil stabilization;
- Infrastructure protection measures;
- Stormwater management;
- Minor structural flood control projects; and
- Post-disaster code enforcement activities.

The following types of projects **may not be eligible** under the HMGP:

- Retrofitting places of worship (or other projects that solely benefit religious organizations);
- Projects in progress; and
- New structures or infrastructure.

There are five minimum criteria that all projects must meet to be considered for funding:

- Conforms with the State Hazard Mitigation Plan;
- Provides beneficial impact upon the designated disaster area;
- Conforms with environmental laws and regulations;
- Solves a problem independently or constitutes a functional portion of a solution; and,
- Is cost-effective.

E. Benefit – Costs Review Listing Table and Mitigation Action Priority Ranking

The projects listed in Table 19 list the benefits or pros of a potential project and the costs or cons of a potential project. The review method is further described in the FEMA *How-To-Guide Benefit-Cost Review in Mitigation Planning* (FEMA 386-5).

Priority Definitions in Table 19:

"High" - Clearly it is a life/safety project, or benefits clearly exceed the cost or can be implemented in under one year.

"Medium" - More study is required to designate it as a life/safety project, or benefits may exceed the cost, or can be implemented in one to five years.

"Low" - More study is required to designate it as a life/safety project, or it is not known if benefits exceed the costs, or it is a long-term project and implementation will not occur for over five years.

Table 19. Mitigation Action Plan

City of Wasilla Mitigation Action Plan - ACTIONS or PROJECTS Implementation, Potential Funding Sources and Responsible Agencies or Departments													
Mitigation Action/Project	**Type of Action/ Projects**	**Priority**	**Resources Needed (Administrator/ Lead Agency shown in bold)**	**Potential Funding Source(s)**	**BCR >1.0 Required**	**Applicable Hazards**						
						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Create a City of Wasilla web page dedicated to potential local hazards. The site will provide links to information on a variety of hazards and useful tips on how to avoid harm or damage.	Public Education & Awareness	Medium	**Mayor**, City Planning, LEPC	HMGP, FEMA, PDM, City	√	√	√	√	√	√	√	√
Encourage new construction to use national building codes	Preventive	Medium	Mayor, **MSB Planning**, City Planning, City Planning Commission, LEPC, City Council	PDM, City, MSB	√	√	√	√	√	√	√	√
Designate emergency shelter sites, provide for emergency needs to be met at the locations, publicize location of shelters.	Protective	High	**Mayor**, City Council, City Emergency Services, MSB Emergency Services	PDM, City, MSB	√	√	√	√	√	√	√	√
Publicize the location of the designated emergency shelter sites and develop a method of publicizing when a shelter is open, and the types of services each shelter can provide (e.g. food, showers, medical)	Public Education & Awareness	High	MSB Emergency Services, City Public Works, **Mayor**, City Planning	EMPG, HMGP, PDM, City	√	√	√	√	√	√	√	√
Coordinate with the media to make periodic Public Service Announcements (PSAs) regarding status, duration, or areas to avoid for any hazard that can be forecast	Public Education & Awareness	High	MSB Emergency Services, Mayor, **DHS&EM**	EMPG, HMGP	√	√	√	√	√	√	√	√

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
On an annual basis, confirm a list of private owners of heavy equipment that are willing to supply equipment during an emergency.	Protective	High	**City Public Works**	City, MSB	√	√	√	√	√	√	√	√
Pursue consolidation of the City of Wasilla HMP into the MSB HMP.	Preventive/ Planning	Medium	City Planning, **MSB Planning**	City, MSB, HMGP	√	√	√	√	√	√	√	√
Distribute building code information with permits for new buildings to encourage construction of structures that are designed to withstand tremors.	Protective	Medium	City Planning, **MSB Fire Marshall,** Mat-Su Home Builders. Assn.	EHRSAP, City, Mat-Su Home Builders Assn.	√	√						
Require earthquake awareness as a part of the General Approval Criteria in WMC 16.16.050.	Protective	Medium	City Planning staff, City Planning Commission, **City Council**	City, Mat-Su Home Builders Assn.	√	√						
Install back-up electric generation for emergency shelters.	Protective	High	**City Public Works,** MSB Emergency Services	PDM, City	√	√	√	√	√	√	√	√
Encourage owners of critical facilities to brace equipment (such as mechanical equipment, emergency generators, and elevators) whose failure may disrupt the operations of a critical facility.	Preventive	High	City Public Works, **MSB Fire Marshall**, MSB Emergency Services, LEPC	HMGP, PDM, EHRSAP, FEMA, City	√	√						

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Distribute information on simple measures homeowners can take to strengthen structures before next earthquake with each development permit issued. (For example, FEMA's *Avoiding Earthquake Damage: A Checklist for Homeowners*)	Preventive	Low	Mayor, **City Planning**, MSB Planning, MSB Emergency Services	EHRSAP, City	√	√						
Analyze and strengthen public utility facilities as necessary to ensure public health through continuance of the ability to provide clean water and dispose of wastewater.	Preventive	High	**City Public Works**	PDM, City	√	√						
Distribute educational information similar to *Are You Prepared for the Next Big Earthquake in Alaska?* to schools, churches, civic organizations, and the general public.	Public Education & Awareness	Medium	Mayor, City Emergency Services, **MSB Emergency Services**	FEMA, EHRSAP, City, MSB	√	√						
Develop a system as part of the land use permit process to inform builders, homeowners, and businesses that building with additional bracing for roof tresses, reinforced columns and bond beams, protected building openings, and securely mounted roof equipment, including cowlings and flashing, suffer fewer and less costly damages than other buildings	Protective	Medium	**City Planning**, MSB Planning, MSB Fire Chief	PDM, FEMA, MSB	√		√	√				

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Encourage the installation of damage-resistant glass in vulnerable critical facilities.	Protective	Medium	MSB Emergency Services, Mayor, **MSB Fire Marshall,** City Public Works	HMGP, PDM, City, MSB	√		√					
Conduct a survey of critical facilities and make recommendations on wind proofing projects that might reduce damage caused by high winds (selected tree removal, tie-down or anchor equipment and materials that might become airborne, etc.).	Preventive	Medium	MSB Emergency Services, Mayor, **MSB Fire Marshall**, City Public Works,	HMGP, PDM, City, MSB	√		√					
Develop community campaign to encourage residents to cut back trees that might fall on buildings, check and refasten roof sheathing when patching or repairing roof, and select wind resistant exterior wall finish.	Preventive	Medium	MSB Emergency Services, **Mayor**, City Public Works	HMGP, PDM, City, MSB	√		√					
Identify schools, medical facilities, senior centers, day care centers, and other public buildings vulnerable to loss from high winds and suggest measures that will lessen damage from windstorms.	Preventive	Medium	MSB Emergency Services, Mayor, MSB School Board, **MSB Fire Marshall**	HMGP, PDM, FEMA, City	√		√					
Encourage routine trimming of trees to reduce power outages during storms.	Preventive	High	City Public Works, **Power Company (MEA)**	City, MSB, HMGP	√		√	√				

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
When high winds occur, inform the public through the City website and PSAs about where to access current weather updates on the severity and duration of the winds.	Public Education & Awareness	High	MSB Emergency Services, **Mayor**	FEMA, City, MSB	√		√					
Educate the public about construction standards to ensure that City utilities are available during times of severe weather.	Public Education & Awareness	Medium	**City Public Works**, MSB Fire Chief	HMGP, PDM	√			√				
Provide NOAA weather radios to all government buildings, schools, medical facilities and work with staff to develop a process to disseminate information to ensure early warning of potential weather events.	Protective	Medium	MSB Emergency Services, Mayor, **LEPC**	PDM, City, MSB	√			√				
Work with the senior center and/or other community organizations to identify elderly and indigent citizens who may be at risk during winter storms and develop method of informing them of expected weather event.	Protective	Low	MSB Emergency Services, **Mayor,** LEPC, Senior Center	MSB, City	√			√				
Seek ways to reduce or eliminate ice on public roads caused by wind blowing snow and/or ice storms. Specifically, reduce or eliminate glaciation on the Parks Highway caused by wind blowing across the frozen surface of Wasilla Lake by constructing a seasonal snow fence/wind screen.	Preventive	Medium	**City Public Works,** DOT&PF	City, DOT&PF	√			√				

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Inform the public through the City web site and PSAs about where to access current weather updates.	Public Education & Awareness	Low	MSB Emergency Services, **Mayor**	HMGP, PDM, City	√			√				
Provide tourist related businesses with information on where to find NOAA Weather Radio broadcast and on warning signs of frostbite or hypothermia to educate winter travelers.	Public Education & Awareness	Low	MSB Emergency Services Mayor, City Council, City LEPC, **Mat-Su Visitors Bureau**	HMGP, PDM, City				√				
Add criteria to the City's Land Development Code to ensure that subdivisions in Wasilla provide more than one means of access into and out of developing areas through the subdivision review process.	Protective	Medium	City Planning, **MSB Planning,** Planning Commission, City Council	City, MSB	√	√						√
Review accident report information for roads and intersections with a high number of weather related accidents to determine if change or enhancement of road design will reduce accidents or severity of accidents. Assign City Public Works Department to work with DOT&PF to fund identified changes.	Preventive	Medium	City Planning, City Public Works, MSB Planning, **DOT&PF**	City, MSB, DOT&PF	√			√				
Notify absent landowners whose property is at high risk for fire due to weeds and trash and encourage them to remedy the problem.	Preventive	Medium	MSB Fire Marshall, **Mayor**, City Planning	City, MSB	√							√

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Incorporate the use of "defensible space" as a part of the landscape design criteria for the construction of homes and businesses in rural areas of the City and seek other ways to reduce personal and property damage due to wildfires.	Protective	High	**City Planning**, MSB Planning, Planning Commission, City Council	PDM, City	√							√
Educate the public on City ordinance requiring property owners to post addresses on all structures to reduce response time during an emergency, and enforce the ordinance.	Preventive	Medium	City Public Works, **City Planning**, MSB Fire Marshall	City, MSB	√	√	√	√	√	√	√	√
Work with schools and Fire Department to distribute educational material on fire prevention (i.e. FIREWISE pamphlets and website).	Public Education & Awareness	Medium	Mayor, **MSB Emergency Services,** MSB Fire Chief, MSB School Board	MSB, City	√							√
Include a link to local fire danger information on the City website.	Public Education & Awareness	Low	**Mayor,** MSB Fire Chief	City	√							√
Inform those at risk of preventive measures in advance of ash fall danger by developing public education campaign.	Protective	Medium	**MSB Emergency Services**, Mayor	City	√				√			
Maintain a supply of dust masks or other breathing apparatus for City workers required to maintain City facilities during an ash fall event.	Protective	High	**City Public Works**	City	√				√			

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Coordinate with the emergency crews and the Senior Center to aid those with breathing problems.	Protective	Medium	Mayor, **MSB Emergency Services**, Senior Center	City, MSB	√				√			
Provide information on where to access information about the wind direction and the amount of ash in the atmosphere.	Public Education & Awareness	Medium	Mayor, **MSB Emergency Services**, NWS, DHS&EM	City, MSB	√				√			
Develop a map of areas in Wasilla most likely to experience wind erosion using information from the Wasilla Soil and Water Conservation District and other state and federal agencies.	Protective	Low	**City Planning,** MSB Planning, Soil & Water Conservation, NRCS	HMGP, PDM, EWP, City, MSB	√						√	
Include conditions that would control the timing of land clearing to reduce wind erosion before and during construction.	Public Education & Awareness	Medium	City Planning, **City Council**, Mayor	City	√						√	
Continue to enforce WMC requirements for mitigation, including reseeding areas cleared during construction.	Preventive	Medium	City Code Enforcement, **City Planning**	City	√						√	
Identify property susceptible to wind erosion and provide information to property owners of potential problems and preventative measures.	Public Education & Awareness	Medium	City Public Works, **City Planning**, MSB Planning, MSB Emergency Services	HMGP, PDM, EWP, City	√						√	

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Work with FEMA to overlay new flood plain information on aerial photographs. Floodplain information should include all of land in the City limits, the future utility service area, and show flood elevations.	Preventive	Medium	**MSB Floodplain Manager,** MSB Planning, City Planning, FEMA	FMA, FEMA, MSB	√					√		
Identify the location any hazardous material storage (anchor & elevate if in floodplain or flood zone).	Protective	High	City Public Works, **MSB Floodplain Manager**	FMA, EWP, City, MSB	√					√		
Identify buildings at risk from 100 and 500-year storms and inform owners/residents of flood-proofing alternatives.	Preventive	Medium	Mayor, **MSB Floodplain Manager**	FMA, EWP, City	√					√		
Identify property in the path of flood waters that could cause erosion and provide information to property owners of potential problems, preventative measures, and use of flood insurance to mitigate public cost of rebuilding.	Public Education & Awareness	Medium	Mayor, **MSB Floodplain Manager**	FMA, EWP, City	√					√		
Alert the Public when fire risk is greatest by posting “Fire Danger” signs similar to those used by the Forest Service on major roads at the City limits.	Preventive	Medium	DOF, **Mayor**, City Public Works	DOF, City, MSB, PDM	√							√

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						EQ	**HW**	**SW**	**VAF**	**FL**	**ER**	**WF/UF**
Identify neighborhoods especially vulnerable to fire and work with volunteer firefighters to conduct neighborhood meetings on fire safety and "defensible space" concepts and work with the borough to create Community Wildfire Protection Plans.	Preventive	Medium	**MSB Fire Chief**, MSB Planning, City Planning, Mayor	PDM, MSB, HMGP, City	√							√

F. City Capability Assessment

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

Table 20. City Capability Overview

Regulatory Tools (ordinances, codes, plans)	Existing for City?	Comments (Year of most recent update; problems administering it, etc.)
Building codes	No	The MSB is responsible for commercial building codes and enforcement.
Zoning ordinances	Yes	Wasilla Municipal Code Title 16.20.
Subdivision ordinances or regulations	No	The MSB is responsible for platting.
Special purpose ordinances	No	
Comprehensive Plan	Yes	Adopted in 2011 for the years 2011 thru 2021.
Economic Development Plan	No	
Emergency Response Plan	Yes	The City EOP was last updated in 2004.
Land Use Ordinance	Yes	Wasilla Municipal Code Title 16.
Land Use Plan	Yes	Downtown Wasilla Area Plan, adopted in 2013 for the years 2013 thru 2028. Also, a section of the Comprehensive Plan is devoted to Land Use.

Table 21. City Staff Resources Overview

Staff/Personnel Resources and Position	Y/N	Department/Agency
Planner or engineer with knowledge of land development and land management practices	Yes	Departments of Public Works and Planning and Land Use
Engineer or professional trained in construction practices related to buildings	Yes	Department of Public Works
Planner or engineer with an understanding of natural and/or human-caused hazards	Yes	Department of Planning and Land Use
Floodplain Manager	No	Flood Plain Management through MSB and State.
Surveyors	No	
Staff with education or expertise to assess the jurisdiction's vulnerability to hazards	Yes	Multiple Departments
Personnel skilled in Geospatial Information System (GIS) and/or Hazards Us-Multi Hazard (Hazus-MH) software	Yes	Planning Department
Scientists familiar with the hazards of the	No	

jurisdiction		
Emergency Manager	Yes	Emergency Services Department
Grant Writers	Yes	Departments of Planning, Emergency Services
Public Information Officer	Yes	Administration

Table 22. City Financial Resources

Funding Resources	Y/N	Has the source been used in the past? Could it be used in the future?
Capital Improvement Project Funding	Yes	$1 million annually in local revenue is dedicated to the City's CIP.
Authority to levy taxes for special purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	
Impact fees for new development	No	
Storm water utility fee	No	
Incur debt through general obligation bonds and or special tax bonds	Yes	
Community Development Block Grant	Yes	
Other federal funding programs	Yes	
State funding programs	Yes	

Bibliography

1. *State of Alaska Hazard Mitigation Plan 2013*, prepared by and for DHS&EM, October 2013.
2. *State of Alaska Current Disaster Cost Index*, February 17, 2016.
3. *DCRA Community Information*: http://commerce.state.ak.us/dnn/dcra/Home.aspx.
4. *City of Wasilla Comprehensive Plan*, adopted October 2011.
5. *City of Wasilla's Hazard Mitigation Plan,* adopted by Wasilla City Council resolution in May 2012.
6. *FEMA-TO 08-J-0011, Alaska Critical Facilities Inventory, December, 2008*
7. *Matanuska-Susitna Borough Core Area Comprehensive Plan*, prepared by Matanuska-Susitna Borough Department of Planning and Land Use, 2007 Update.
8. *Matanuska-Susitna Borough Hazard Mitigation Plan*, prepared by Matanuska-Susitna Borough, 2013.
9. *Mat-Su Comprehensive Economic Development Strategy,* prepared by Matanuska-Susitna Borough Department of Planning and Land Use, 2008.
10. *Risk Report, FEMA Region X – Matanuska-Susitna Borough, Alaska and the Incorporated Cities of Houston, Palmer, and Wasilla*, prepared by FEMA; the Alaska Department of Commerce, Community, and Economic Development; and Alaska Geological and Geophysical Surveys in December 2016.
11. City of Wasilla Website: http://www.cityofwasilla.com/
12. *Fire History Map*, maintained by the AICC: https://afsmaps.blm.gov/imf_firehistory/imf.jsp?site=firehistory
13. *Historic Earthquake Catalog,* maintained by the USGS: https://earthquake.usgs.gov/earthquakes/map/
14. *Storm Events Database,* maintained by NOAA/NWS: https://www.ncdc.noaa.gov/stormevents/ftp.jsp
15. FEMA How-To Guides:
    - *Getting Started: Building Support for Mitigation Planning* (FEMA 386-1)
    - *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2)
    - *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies* (FEMA 386-3)

- *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan* (FEMA 386-4)
- *Using Benefit-Cost Review in Mitigation Planning* (FEMA 386-5)

Web Sites with General Hazard Planning Information:

American Planning Association: http://www.planning.org

Association of State Floodplain Managers: http://www.floods.org

Federal Emergency Management Agency: http://www.fema.gov

Community Rating System: http://www.fema.gov/national-flood-insurance-program-community-rating-system

Flood Mitigation Assistance Program: https://www.fema.gov/flood-mitigation-assistance-grant-program

Hazard Mitigation Grant Program: http://www.fema.gov/hazard-mitigation-grant-program

Individual Assistance Program: http://www.fema.gov/individual-assistance-program-tools

Interim Final Rule: https://www.fema.gov/media-library/assets/documents/4590

National Flood Insurance Program: http://www.fema.gov/national-flood-insurance-program

Public Assistance Program: http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/

A-Zones	A-Zones are found on all Flood Hazard Boundary Maps (FHBMs), Flood Insurance Rate Maps (FIRMs), and Flood Boundary and Floodway Maps (FBFMs). An A-Zone is an area that would be flooded by the Base Flood, and is the same as a Special Flood Hazard Area (SFHA) or a 100-year floodplain. These areas may be unnumbered as AE, AH, or AO Zones. Numbered A-Zones indicates an area's risk to flooding.
Acquisition	Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.
Alluvial Fan	Area of deposition where steep mountain drainages empty into valley floors. Flooding in these areas often has characteristics that differ from those in riverine or coastal areas. (See Alluvial Fan Flooding)
Alluvial Fan Flooding	Flooding that occurs on the surface of an alluvial fan (or similar landform) that originates at the apex of the fan and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.
Anabatic Wind	Any wind blowing *up* an incline; the opposite to katabatic wind.
Asset	Any man-made or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
Aufeis	When new ice continues to form on top of older ice. Ice-forming situations occur wherever there are continuous sources of water and freezing temperatures.
Avalanche	Mass of snow and ice falling suddenly down a mountain slope and often taking with it earth, rocks,

	trees, and rubble of every description.
Base Flood	A term used in the National Flood Insurance Program to indicate the minimum size of a flood. This information is used by a community as a basis for its floodplain management regulations. It is the level of a flood which has a one-% chance of occurring in any given year. Also known as a 100-year flood elevation or one-% chance flood.
Base Flood Elevation (BFE)	The elevation for which there is a one-% chance in any given year that flood water levels will equal or exceed it. The BFE is determined by statistical analysis for each local area and designated on the Flood Insurance Rate Maps. It is also known as 100-year flood elevation.
Base Floodplain	The area that has a one % chance of flooding (being inundated by flood waters) in any given year.
Borough	The Matanuska-Susitna Borough, a basic unit of local government in Alaska.
Building	A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.
Building Code	The regulations adopted by a local governing body setting forth standards for the construction, addition, modification, and repair of buildings and other structures for the purpose of protecting the health, safety, and general welfare of the public.
Chinook	A warm down-slope wind.
Community	The City of Wasilla. Any state, area or political subdivision thereof, or any Indian tribe or tribal entity that has the authority to adopt and enforce statutes for areas within its jurisdiction.
Community Rating System (CRS)	The Community Rating System is a voluntary

	program that each municipality or county government can choose to participate in. The activities that are undertaken through CRS are awarded points. A community's points can earn people in their community a discount on their flood insurance premiums.
Critical Facility	Facilities that are critical to the health and welfare of the population and that are especially important during and after a hazard event. Critical facilities include, but are not limited to, shelters, hospitals, and fire stations.
Designated Floodway	The channel of a stream and that portion of the adjoining floodplain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.
Development	Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or of equipment or materials.
Digitize	To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for computer use.
Disaster Declaration	The formal action taken by a local government (City, borough, state). This action is required by AS 29.05.030 to request resources or financial assistance from the state or federal government. Cities must declare a disaster and request assistance from a borough. If the borough does not have the resources and financial ability for assistance, they must adopt a disaster declaration and request assistance from the state.
Disaster Mitigation Act	DMA 2000 (public Law 106-390) is the latest legislation of 2000 (DMA 2000) to improve the planning process. It was signed into law on October 10, 2000. This new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.
Earthquake Swarm	A collection of earthquakes that is frequent in time. There is no identifiable main shock.
Elevation	The raising of a structure to place it above flood waters on an extended support structure.
Emergency Operations Plan	A document that: describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated.
Erosion	The wearing away of the land surface by running water, wind, ice, or other geological agents.
Federal Disaster Declaration	The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended. Same meaning as a Presidential Disaster Declaration.
Federal Emergency Management Agency (FEMA)	A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.
Flash Flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate. It is often the result of heavy rainfall in a localized area.
Flood	A general and temporary condition of partial or complete inundation of water over normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Control	Keeping flood waters away from specific developed or populated areas by the construction of flood storage reservoirs, channel alterations, dikes and levees, bypass channels, or other engineered structures.
Flood Disaster Assistance	Flood disaster assistance includes development of comprehensive preparedness and recovery plans, program capabilities, and organization of Federal agencies and of State and local governments to mitigate the adverse effects of disastrous floods. It may include maximum hazard reduction, avoidance, and mitigation measures, as well policies, procedures, and eligibility criteria for Federal grant or loan assistance to State and local governments, private organizations, or individuals as the result of the major disaster.
Flood Elevation	Elevation of the water surface above an establish datum (reference mark), e.g. National Geodetic Vertical Datum of 1929, North American Datum of 1988, or Mean Sea Level.
Flood Frequencies	Frequencies are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. The frequency is the chance of a flood occurring during a given timeframe. It is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1% chance and the 10-year flood has a 10% chance of occurring in any given year.
Flood Fringe	That portion of the floodplain that lies beyond the floodway and serves as a temporary storage area for floodwaters during a flood. This section receives waters that are shallower and of lower velocities than those of the floodway.
Flood Hazard	Flood Hazard is the potential for inundation and involves the risk of life, health, property, and natural value. Two reference base are commonly used: (1) For most situations, the Base Flood is that flood which has a one-% chance of being exceeded in any given year (also known as the 100-year flood); (2) for critical actions, an activity for which a one-% chance

	of flooding would be too great, at a minimum the base flood is that flood which has a 0.2 % chance of being exceeded in any given year (also known as the 500-year flood).
Flood Hazard Boundary Map	Flood Hazard Boundary Map (FHBM) means an Official (FHBM) map of a community, issued by the Administrator, where the boundaries of the flood, mudslides (i.e., mudflow) related erosion areas having special hazards have been designated as Zones A, M, and/or E.
Flood Insurance Rate Map	Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study	Flood Insurance Study or Flood Elevation Study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluations and determination of mudslide (i.e., mudflow) and/or flood-related' erosion hazards.
Floodplain	A "floodplain" is the lowland adjacent to a river, lake or ocean. Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood. The 100-year floodplain by the 100-year flood.
Floodplain Management	The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.
Floodplain Management Regulations	Floodplain Management Regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which

	provide standards for the purpose of flood damage prevention and reduction.
Flood Proofing	Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved property, water and sanitary facilities, structures and their contents.
Floodway	Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.
Flood Zones	Zones on the Flood Insurance Rate Map (FIRM) in which a Flood Insurance Study has established the risk premium insurance rates.
Flood Zone Symbol	A Area of special flood hazard without water surface elevations determined. A1-30, AE Area of special flood hazard with water surface elevations determined. AO Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet. A-99 Area of special flood hazard where enough progress has been made on a protective system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. AH Area of special flood hazard having shallow water depths and/or unpredictable flow paths between one and three feet and with water surface elevations determined. B, X Area of moderate flood hazard. C, X Area of minimal hazard. D Area of undetermined but possible flood hazard.
Freeboard	Freeboard means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for many unknown factors that could contribute to flood heights greater than the height calculated for a

	selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.
Geographic Information System	A computer software application that relates physical features of the earth to a database that can be used for mapping and analysis.
Governing Body	The Wasilla City Council.
Hazard	A source of potential danger or adverse condition. Hazards in the context of this Plan will include naturally occurring events such as floods, earthquakes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Mitigation	Any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. (44 CFR Subpart M 206.401).
Hazard Mitigation Grant Program	The program authorized under section 404 of the Stafford Act, which may provide funding for mitigation measures identified through the evaluation of natural hazards conducted under §322 of the Disaster Mitigation Act 2000.
Hazard Profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
Hazard and Vulnerability Analysis	The identification and evaluation of all the hazards that potentially threaten a jurisdiction and analyzing them in the context of the jurisdiction to determine the degree of threat that is posed by each.
Hydrology	The science of the behavior of water in the

	atmosphere, on the earth's surface, and underground.
Infrastructure	The public services of a community that have a direct impact to the quality of life. Infrastructure refers to communication technology such as phone lines or Internet access, vital services such as public water supply and sewer treatment facilities, and includes an area's transportation system, regional dams or bridges, etc.
Intensity	A measure of the effects of a hazard event at a particular place.
Interferometer	A method employing the interference of electromagnetic radiation to make highly precise measurements of the angle between the two rays of light.
Inundation	The maximum horizontal distance covered by flood water, a seich or a tsunami.
Katabatic wind	Any wind blowing down an incline; the opposite to anabatic wind.
Knot	A unit of measurement equaling 1 nautical mile per hour. This is roughly 1.15 statute miles per hour or 1.852 kilometers per hour.
Landslide	Downward movement of a slope, soil, and other materials or debris under the force of gravity.
Liquefaction	The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like a thick or viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.
Local Emergency Planning Committee (LEPC)	LEPCs consist of community representatives and are appointed by the State Emergency Response Commissions (SERCs), as required by Superfund Amendments and Reauthorization Act (SARA), Title III. They develop an emergency plan to prepare for and respond to a chemical emergency. They are also responsible for coordinating with local facilities to

	find out what they are doing to reduce hazards, prepare for accidents, and reduce hazardous inventories and releases. The LEPC serves as a focal point in the community for information and discussion about hazardous substances, emergency planning, and health and environmental risks.
Local Government	Any borough, municipality, school district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency, or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity, for which an application for assistance is made by a State or political subdivision of a State.
Magnitude	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.
Mitigate	To cause something to became less harsh or hostile, to make less severe or painful.
Mitigation Plan	A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the State and includes a description of actions to minimize future vulnerability to hazards.
Municipality	The City of Wasilla, a political subdivision incorporated under the laws of the State as a 1st class City.
National Flood Insurance	The Federal program, created by an act of Congress in 1968, that makes flood insurance available in communities that enact satisfactory floodplain management regulations.
National Weather Service (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to federal and State entities in preparing

	weather and flood warning plans.
Natural Disaster	Any natural catastrophe, including any hurricane, tornado, storm, high water, wind, driven water, tsunami, earthquake, volcanic eruption, landslide, snowstorm, fire, or drought. (44 CFR Subpart M 206.401).
New Construction	New construction means structures for which the "start of construction" on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvement to such structures.
Nonstructural Floodplain	Those measures, such as flood proofing, employed to Management Measures to modify the exposure of buildings to floods and use planning, warning, schemes, and insurance as opposed to structural measures (such as dams, levees, and channel modifications).
One Hundred (100)-Year	The flood elevation that has a one-% chance of occurring in any given year. It is also known as the Base Flood.
Orthophoto	An aerial photo that has been corrected to eliminate the effects of camera tilt and relief displacement. The ground geometry is recreated as it would appear from directly above each and every point.
Overlay Zone	Overlay zones (overlay districts) create a framework for conservation or development of special geographical areas. In a special resource overlay district, overlay provisions typically impose greater restrictions on the development of land, but only regarding those parcels whose development, as permitted under the zoning, may threaten the viability of the natural resource. In a development area overlay district, the provisions may impose restrictions as well, but also may provide zoning incentives and waivers to encourage certain types and styles of development. Overlay zone provisions are often complemented by the adoption of other innovative zoning techniques, such as floating zones, special

	permits, incentive zoning, cluster development and special site plan or subdivision regulations, to name a few.
Permeability	The property of soil or rock that allows water to pass through it.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.
Preparedness	The steps taken to decide what to do if essential services break down, developing a plan for contingencies, and practicing the plan. Preparedness ensures that people are ready for a disaster and will respond to it effectively. Actions that strengthen the capabilities of government, citizens, and communities to respond to disasters.
Presidential Disaster Declaration	The formal action by the President to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Recovery	The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.
Regulatory Floodplain	That portion of the floodplain subject to floodplain regulations (usually the floodplain inundated by one-% chance flood).
Regulatory Floodway	Regulatory Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.
Regulatory Power	Local jurisdictions have the authority to regulate certain activities in their jurisdiction. With respect to mitigation planning, the focus is on such things as

	regulating land use, development, and construction through zoning, subdivision regulations, design standards, and floodplain regulations.
Relocation	The moving of a structure from a flood area to a new location, normally to one where there is no threat of flooding.
Repetitive Loss Property	A property that is currently ensured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978.
Response	Those activities and programs designed to address the immediate and short-term effects of the onset of an emergency or disaster.
Retrofit	The strengthening of structures to reduce or eliminate (mitigate) future disaster risks.
Richer Scale	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.
Rift Zone	A rift zone is an elongated system of crustal fractures associated with an area that has undergone extension (the ground has spread apart).
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Riverine	Relating to, formed by, or resembling rivers (including tributaries), streams, creeks, brooks, etc.
Riverine Flooding	Flooding related to or caused by a river, stream, or tributary overflowing its banks due to excessive

	rainfall, snowmelt or ice.
Runoff	That portion of precipitation that is not intercepted by vegetation, absorbed by land surface, or evaporated, and thus flows overland into a depression, stream, lake, or ocean (runoff, called immediate subsurface runoff, also takes place in the upper layers of soil).
Scale	A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.
Seismicity	Describes the likelihood of an area being subject to earthquakes.
Special Flood Hazard Area	An area within a floodplain having a 1 % or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designation that include the latter A or V.
Special Hazard Area	Special Hazard Area means an area having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards, as shown on a FHBM or FIRM as Zone A, AOA, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E.
Stafford Act	1) The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended. 2) The Stafford Act provides an orderly and ongoing means of assistance by the Federal Government to State, local and tribal governments in carrying out their responsibilities to alleviate the suffering and damage which result from disaster.
Stakeholder	Individual or group that will be affected in any way by an action or policy. They include businesses, private organizations, and citizens.
Standard Project Flood	A term used by the U.S. Army Corps of Engineers to designate a flood that may be expected form the most severe combination of meteorological and hydrological conditions that is considered reasonably

	characteristics of the geographical area in which the drainage basin is located, excluding extremely rare combinations. The peak flow for a standard project flood is generally 40 to 60 % of the probable maximum flood for the same location.
State Coordinating Agency	State Coordinating Agency means the agency of the State government, or other office designated by the Governor of the State or by State Statute at the request of the Administrator to assist in the implementation of the National Flood Insurance Program in that State.
State Disaster Declaration	A disaster emergency shall be declared by executive order or proclamation of the Governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or that the disaster has been dealt with to the extent that emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation. Along with other provisions, this declaration allows the governor to utilize all available resources of the State as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation and destinations in connection with evacuation and control ingress and egress to and from disaster areas. It is required before a Presidential Disaster Declaration can be requested.
State Hazard Mitigation Officer (SHMO)	The SHMO is the representative of State government who is the primary point of contact with FEMA, other State and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.
Stream	A body of water flowing in a natural surface channel. Flow may be continuous or only during wet periods. Streams that flow only during wet periods are termed “intermittent streams.”
Structure	Something constructed. (see also Building)

Structural Floodplain	Those physical or engineering measures employed to modify the way floods behave; examples included dams, dikes, levees, channel enlargements, and diversions.
Structural Mat Slab	The concrete slab of a building that includes structural reinforcement to help support the building's structure.
Structure	A walled and roofed building, including a gas or liquid storage tank, that is principally above ground and mounted to a permanent site, as well as a manufactured home.
Subdivision Regulations	Ordinances or regulations governing the subdivision of land with respect to things such as adequacy and suitability of building sites and utilities and public facilities.
Subsidence	Sinking of the land surface, usually due to withdrawals of underground water, oil, or minerals.
Subsidized Rates	Subsidized rates mean the rules established by the Administrator involving in the aggregate subsidization by the Federal Government.
Substantial Damage	Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceeds 50 recent of the market value of the structure before the damage.
Substantial Improvement	Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 % of the market value of the structure before the "start of construction" of the improvement. This term includes structures, which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either: (1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are

	the minimum necessary to assure safe living conditions or (2) Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."
Tectonic Plate	Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.
Topography	The contour of the land surface. The technique of graphically representing the exact physical features of a place or region on a map.
Tribal Government	A Federally recognized governing body of an Indian or Alaska Native Tribe, band, nation, pueblo, village or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.
Variance	Variance means a grant of relief by a community from the terms of a floodplain management regulation.
Vent	Vents are openings in the Earth's crust from which molten rock and volcanic gases escape onto the ground or into the atmosphere. Vents may consist of a single circular-shaped structure, a large elongated fissure and fracture, or a tiny ground crack.
Vulnerability	Describes how exposed or susceptible to damage an asset it. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. The vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Other, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment	The extent of injury and damage that may result from hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.
Watercourse	A natural or artificial channel in which a flow of water occurs either continually or intermittently.
Watershed	An area that drains to a single point. In a natural basin, this is the area contributing flow to a given place or stream.
Water Surface Elevation	Water surface elevation means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where specified) of floods of various magnitudes and frequencies in the floodplains of coastal riverine areas.
Water Table	The uppermost zone of water saturation in the ground.
Wetlands	Areas that are inundated or saturated frequently and for long enough to support vegetative or aquatic life requiring saturated or seasonally saturated soil conditions for growth and reproduction.
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
Zoning Ordinance	An ordinance under the City's police powers that divides an area into districts and, within each district, regulates the use of land and buildings, height, and bulk of buildings or other structures.