



# City of Soldotna

All Hazard Mitigation Plan

2016 Update

Annex to the Kenai Peninsula Borough

All Hazard Mitigation Plan 2014 Update

# Table of Contents

<b>Introduction.....</b>	<b>2</b>
Purpose .....	2
Plan Elements .....	2
Background on the City of Soldotna .....	3
Location.....	3
History .....	3
Economy .....	3
Geology and Soils.....	4
Topography.....	5
Climate .....	5
Flora and Fauna .....	5
Wetlands and Drainage .....	5
Steep Slopes.....	6
The Kenai River.....	6
<b>Element A – Planning Process.....</b>	<b>7</b>
Element A1, A2 – Involvement of Neighboring Jurisdictions and Regional Agencies.....	7
Element A3 – Opportunities for Public Involvement .....	8
Element A4 – Review and Incorporation of Existing Plans and Studies .....	8
<b>Element B – Hazard Identification and Risk Assessment.....</b>	<b>10</b>
Hazard Identification Matrix .....	10
Elements B1, B2, B3 – Descriptions of Type, Location, and Impact of Natural Hazards; Historic Information; Probability of Future Hazards .....	10
Flood.....	10
Wildland Fire .....	12
Earthquake.....	14
Volcano.....	16
Weather.....	17
Critical Facilities.....	20
Critical Facilities Matrix .....	21
<b>Element C – Mitigation Strategy .....</b>	<b>22</b>
Element C1 - Existing Authorities, Policies, Programs, and Resources; Integrating Mitigation Plan Objectives into Other Planning Mechanisms.....	22
Element C2 – NFIP Requirements.....	23
Element C3, C4, C5 – Action Plan Matrix (Including B/C & TF Review) .....	24
<b>Element D – Plan Review, Evaluation, and Implementation.....</b>	<b>28</b>
Element D1 – Revisions to Reflect Changes in Development.....	28
Elements D2, D3 – Revisions to Reflect Progress in Location Mitigation Efforts and Changes in Priorities.....	28
Appendix A – Status Update of All Goals Listed in the 2010 Update .....	29
<b>Element E – Plan Adoption.....</b>	<b>32</b>
Element E1 – Documentation of Governing Body Adoption (Appendix B).....	32

# Introduction

## Purpose

The purpose of the All Hazard Mitigation Plan is to fulfill the FEMA requirement under The Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act), Section 322, Mitigation Planning enacted by Section 104 of the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390). This initiative provides new and revitalized approaches to mitigation planning. Section 322 emphasizes the need for state, local, and tribal entities to closely coordinate mitigation planning and implementation efforts. As part of the process of implementing the DMA, FEMA prepared an Interim Final Rule (the Rule) to clearly establish the mitigation planning criteria for states and local and tribal governments. This Rule was published in the Federal Register on February 26, 2002, at 44 CFR Part 201.

The Disaster Mitigation Act of 2000 (DMA 2000), Section 322 (a-d), as implemented through 44 CFR Part 201.6, requires that local governments, as a condition of receiving federal disaster mitigation funds, have a mitigation plan that describes the process for identifying hazards, risks and vulnerabilities, identifying and prioritizing mitigation actions, encouraging development of local mitigation and providing technical support for those efforts.

This plan is an update to the City of Soldotna All Hazard Mitigation Plan adopted by the Soldotna City Council on June 23, 2004 (Resolution 2004-038) and updated in 2010 (Resolution 2010-029). It is an annex to the Kenai Peninsula Borough (KPB) All Hazard Mitigation Plan, which was approved by the KPB Assembly in a 2014 Update, and therefore information relevant to the City of Soldotna may also be found in that document, which may be found at <http://www.kpb.us/emergency-mgmt>.

The mitigation plan is intended to be evaluated and updated every five years. In addition, the plan will be updated, as appropriate, when a disaster occurs that significantly affects the City of Soldotna, whether or not it receives a Presidential Declaration. The update will be completed as soon as possible, but no later than twelve months following the disaster occurrence.

## Plan Elements

The plan discusses various environmental, geographic, social, and political elements of the City of Soldotna within the Introduction.

The plan also documents the planning process undertaken to develop this plan update in Element A, including who was involved, how the plan was prepared, opportunities for input from other agencies, public involvement, review of existing plans, and ongoing maintenance and participation.

Within Element B, the plan develops a hazard identification matrix for the City of Soldotna, with additional background information, historic occurrences, and risk assessment performed for each identified hazard.

Element C provides a mitigation strategy, including 1) a discussion of how the All Hazard Mitigation Plan interfaces with other planning documents and policy decisions of the City of Soldotna; and 2) an action plan matrix with benefit/cost analysis and technical feasibility guides.

Element D discusses revisions undertaken in this plan to reflect changes in development patterns, progress made in local hazard mitigation efforts (also found in Appendix A), and changes in priorities from the last plan update.

Documentation of the public hearings, as well as the formal adoption by local governing bodies is provided in Element E (Appendix B).

## **Background on the City of Soldotna**

**Location.** The City of Soldotna is located along the Kenai River in Southcentral Alaska at the junction of the Sterling and Kenai Spur Highways. By road, Soldotna is 150 miles from Anchorage, 11 miles from Kenai, 78 miles from Homer and 93 miles from Seward. Soldotna's municipal airport is 58 air miles from Anchorage International Airport.

**History.** The history of the City of Soldotna begins with homesteading that occurred in the late 1940's, although Native Alaska Athabaskan peoples had lived and used the area around the Kenai River for many thousands of years prior to the City's establishment. After World War II, veterans were given priority in homesteading in this area and settlement began to grow. The construction of the Sterling Highway from Anchorage and the Kenai Spur Highway occurred in the late 1940s and early 1950s, which resulted in increased settlement in the area. A post office for Soldotna was established in 1949. Oil was discovered at the nearby Swanson River area in 1957, giving the population and economy of the area another major boost. Soldotna's location at the junction of the Sterling and Kenai Spur highways resulted in the area becoming a major location for retail trade, services and government on the Kenai Peninsula.

The City of Soldotna was incorporated as a first-class city in 1967 with an area of approximately 7.5 square miles. Most of Soldotna was still unsettled at this time, with few residents in the surrounding territory. Soldotna was mostly built up and already near its current population by the end of the early 1980s building boom. By then, most still-vacant land in the City was parklands, wetlands, or tracts with some development limitations. Since incorporation in 1960, Soldotna's population has grown to over 4,300 residents (US Census Bureau, ACS 2014 5-Year Estimates). In 2016, Soldotna citizens voted to become a Home Rule city.

**Economy.** Soldotna serves as an economic hub for the Kenai Peninsula, with a significant employment base and several large employers, including the KPB and the KPB School District administrative offices, Central Peninsula Hospital, Peninsula Community Health Services, Kenai Peninsula College, Fred Meyer, and a variety of regional offices of state, federal, and local government.

Soldotna's economy is solidly based in industries that have shown strong growth over the last decade and which are projected to continue to grow in the near future. The Healthcare & Social Assistance industries accounted for largest sector of employment

for the City in 2012, with 24% of the total, with Retail making up another 23% and Arts, Entertainment, Recreation, Accommodation & Food Services making up 18%. The State projects that Healthcare & Social Services will be the highest growth sector in the number of jobs in the state between 2012 and 2022, providing a good opportunity for growing employment in the area. Soldotna's other top industries, including Retail Trade and Accommodation & Food Services, are also ranked in the top 10 for growth according to the State's projections (AK Dep't of Labor & Workforce Development).

The emergence of the health care industry as a primary industry for the Soldotna area provides the City with significant opportunities for the future. The industry provides high-paying jobs and draws an educated work force. It also contributes to the attraction of retirees who want to live outside the "urban Southcentral Alaska" area but still want high quality medical care similar to that found in Anchorage.

The City also serves as a tourism hub for visitors, hunters, and fishing enthusiasts. Facilities such as the Kenai National Wildlife Refuge, the Kenai River, and both public and private campgrounds and RV parks helps to attract thousands of visitors to the area each year. Gross sales in visitor-related businesses is over \$32 million annually, including over \$25 million from restaurants and bars (KPB Sales Tax Department). The tourism industry is growing, with the State of Alaska forecasting in 2016 the continuation of steady growth recently witnessed in visitor numbers.

Soldotna's strong economy is evidenced by the City's low poverty rate (3.5%). The median household income of \$63,068 was roughly equivalent to the KPB as a whole (\$63,099), but lower than the State of Alaska overall (\$71,583). The per capita income for the City (\$32,892) was higher than for the borough (\$31,611), and lower than the State of Alaska (\$33,129) (US Census Bureau, ACS 2014 5-Year Estimates).

**Geology and Soils.** Soldotna is based on unconsolidated glacial deposits which range in depth from 300 to 700 feet deep. This material is unsorted and varies in size from silt to boulders. Thick alluvial deposits of silt, sand and gravel are found along the Kenai River.

The National Resources Conservation Service classifies three broad series of soils in the Soldotna area: the Soldotna, Tustumena and Kenai. The Soldotna series are found in the developed area of town from the "Y" west to the Kenai River. The Kenai series dominate the hilly region north of Soldotna and the Tustumena series is found south of the Kenai River. Both the Soldotna and Tustumena series are well-drained silt loam underlain by gravely sand or sand at a depth of 15 to 25 inches. These soils include a silty clay loam and are slightly less suited for development because of drainage problems. Significant areas of peat are found both north and east of the "Y" between Soldotna Creek and the Kenai River, and south of the Kenai River, downstream from the bridge. These soils are generally unsuited for development, except with special precautions.

**Topography.** The community is located just five miles from Cook Inlet, and the elevation at the airport is 107 feet above sea level. Broad level plains characterize the landscape and rolling hills, which are the result of repeated episodes of glacial advances and retreats. Small lakes, peat bogs and wetlands are common.

**Climate.** Soldotna lies within a transitional climatic zone influenced by both the maritime Gulf of Alaska and Prince William Sound regions, and the continental climate

of Interior Alaska. Average annual precipitation is about 26 inches, with the greatest rainfall occurring in August and September<sup>1</sup>. Average annual snowfall in Soldotna is about 64 inches. Average January temperatures range from 4 degrees F (low) to 22 degrees F (high). Average July temperatures range from 44 degrees F (low) to 66 degrees F<sup>1</sup>. Extremes of -47 degrees to +90 degrees F have been recorded in the area. The maritime effects commonly cause some days of above-freezing temperatures in the winter.

**Flora and Fauna.** Soldotna is surrounded on three sides by the Kenai National Wildlife Refuge, which supports extensive populations of moose, brown and black bear, upland game animals and waterfowl. Important species of birds include grouse, ducks, geese, eagles, and ptarmigan. Small animals include fox, lynx, coyote, rabbits and squirrels. According to the Natural Resources Conservation Service, the Kenai River corridor is home to 32 different types of mammals, not counting humans.

Trees found in the Soldotna area in large quantities include white spruce, Kenai paper birch and quaking aspen. Cottonwood, willows, and alders are found in wetter areas. Black Spruce is found in muskeg areas, and also in previously burned upland areas. Open muskegs support a thick mat of low shrubs and sphagnum moss.

The Kenai River drainage is considered to be the major Sockeye salmon producing system in Cook Inlet. Two salmon runs occur annually, the first in late May and the second in late June. King, Pink, and Coho salmon also spawn in the Kenai River system. Other sport fish supported by the Kenai River and its tributaries include Rainbow Trout, Lake Trout, Steelhead, Dolly Varden and Arctic Char.

**Wetlands and Drainage.** There are approximately 200 acres of mapped wetlands within the City boundaries. The majority of the wetlands lie in the vicinity of Soldotna Creek between the Sterling Highway and the Kenai River. Wetlands are also found along Slikok Creek on the west side of the City. These wetlands provide for water recharge, water quality improvement, habitat for waterfowl and wildlife. Other wetlands are located between the Sterling and Kenai Spur highways at the north end of the City and along the river at the west end of the City.

Placement of fill and structures in wetlands are regulated by the U.S. Army Corps of Engineers under the Clean Water Act. Depending on the type of activity and function and value of wetland, development may be subject to nation-wide or individual state and federal permits, and mitigation may be required as a condition of development. Maintenance of drainage patterns, whether involving surface runoff or identified creeks is an additional development consideration. Disruption or diversion of drainage can cause flooding, erosion, and damage to roads and structures.

**Steep Slopes.** Areas of excessively steep slopes are found in specific areas of the City, and can present limitations to development. Such limitations include location and grade of access and internal subdivision roads, drainage, and structure foundation considerations. Improper road and foundation cuts on hillsides, or disturbances to drainage patterns can create slope instability and accelerated runoff and erosion, damaging roads, drainage structures, and buildings.

---

<sup>1</sup> NOAA 1981-2010 Temperature-Related Pseudonormals, Soldotna Station.

**The Kenai River.** The Kenai River is a major community asset as well as a viable economic engine. The superior natural setting of Soldotna is due in large part to the Kenai River, which runs through the center of town, providing ample economic and recreational opportunities for the community and visitors as well as valuable habitat for wildlife.

The land along the banks of the river is owned and managed by a variety of public and private owners. Property within one hundred feet of the ordinary high water mark for the Kenai River is designated as the Kenai River Overlay District and has special permitting requirements under Title 17 (Zoning Code) of the Soldotna Municipal Code. The City continues to incorporate habitat protection into management of city lands and parks, and has completed projects at Soldotna Creek Park and Centennial Park to preserve and protect riparian habitat.

The Alaska Department of Natural Resources manages activities on the river and adjacent state land through the Kenai River Management Plan. The KPB Code of Ordinances contains Chapter 21.18, Anadromous Waters Habitat Protection Ordinance, which was created to ensure measures for the protection of salmon spawning and rearing habitat within the KPB.

As use of the river, utilization of its fishery stocks, and development along its banks have grown, so have concerns over the effects of increasing use. Of particular concern are the impacts of individual activities and the cumulative effects of use and development along the river. A number of local, state, federal, and private organizations have initiated studies and programs to address specific and regional problems along the Kenai River. There are strong desires to protect the river and provide sound and increased access for residents and visitors alike.

## Element A – Planning Process

### Elements A1, A2. Planning Process; Involvement of Neighboring

#### Jurisdictions and Local and Regional Agencies [Requirements 201.6(c)(1), 201.6(b)(2)]

The City of Soldotna's All-Hazard Mitigation Plan 2016 Update was developed primarily by the City's Economic Development & Planning Department, with input from other City departments, other agencies, and the public.

The City's steering committee (below) met twice during April-May 2016 to review and revise the existing plan update (2010). The committee updated hazard identification, risk assessment information, and mitigation strategies; reviewed the list of critical facilities for accuracy; analyzed any newly produced planning, policy, or technical documents; compared the 2010 update goals and strategies with projects and developments that have occurred; and added new mitigation projects for implementation to meet the needs of the mitigation strategy. The compiled document was circulated to the steering committee for any final review or modification prior to its submittal.

#### City of Soldotna All-Hazard Mitigation Plan 2016 Update Steering Committee

- Austin Johnson, Planning/GIS Technician
- John Czarnecki, City Planner
- Kyle Kornelis, City Engineer / Airport Manager / Utilities
- Ralph Linn, Building Official
- Stephanie Queen, Director of Economic Development & Planning
- Scott Sundberg, Roads/Maintenance Department Manager
- Rick Wood, Utilities Department Manager

Additionally, the City's steering committee coordinated with a core group of municipal and local officials on an as-needed and ongoing basis during the crafting of the 2016 update. This core group included:

- State of Alaska Division of Forestry (Hans Rinke, Area Forester, Kenai-Kodiak area, and Howard Kent, Fire Management Officer) to review the wildland fire portion of the plan for accuracy or supplemental information, for more information on wildland-urban interface fires, and for updates on any forestry management programs in the Soldotna area.
- Kenai Peninsula Borough Office of Emergency Management (Dan Nelson, Program Coordinator, and Scott Walden, Emergency Management Coordinator) to review the plan in its entirety for accuracy or supplemental information, for updates on hazards occurring since the last plan update, to review the list of critical facilities for any errors or omissions, and for discussion on any human caused hazards such as bulk storage of hazardous materials.
- Kenai Peninsula Borough Planning Department (Bruce Wall, Planner) to review the plan for any coordination opportunities with the Borough and for accuracy.
- Kenai Peninsula Borough Spruce Bark Beetle Mitigation Program (Wade Wahrenbrock, Forestry and Fire Behavior Specialist) for information on the spruce aphid and its potential impacts on Soldotna area forests.



- Donald E. Gilman River Center (Bryr Harris, Floodplain Administrator) for more information on the National Flood Insurance Program, the floodway and floodplain in the City of Soldotna, and on any dwelling units within those areas.
- Kenai Peninsula Borough Geographic Information Systems division (Chris Clough, Manager, and Bobbi Lay, GIS Specialist) for additional technical information related to flood hazard zones in the City of Soldotna.

Because this information was gathered on a sporadic and case-by-case basis, there were no traditional “meetings” of this core external group. Information was solicited via email or phone calls from individual professionals working at each of these agencies or organizations. Additionally, the City’s 2015 update is an annex to the Kenai Peninsula Borough’s All Hazard Mitigation Plan 2014 Update, which includes coordination from and information about Soldotna as well as all adjacent and nearby agencies and organizations.

**Element A3. Opportunities for Public Involvement** [Requirement 201.6(b)(1)]

Public comments, questions, and feedback were solicited at the September 7, 2016, meeting of the Soldotna Planning & Zoning Commission, during which the 2016 update was advertised in a public hearing (see documentation in Appendix A). The public and commissioners were able to see a draft version of the plan before its submittal to the State of Alaska and FEMA and provide any necessary questions, comments, or other input.

Following initial submittal to the State of Alaska and FEMA, the plan was revised to incorporate feedback from those agencies and was submitted to subsequent meetings of the Soldotna Planning & Zoning Commission, the Soldotna City Council, the Kenai Peninsula Borough Planning Commission, and the Kenai Peninsula Borough Assembly (see Appendix A for specific advertising/public notice, resolutions, and meeting minutes). Each of these opportunities presented additional space for public questions, comments, or other input.

These meetings were advertised in the local newspaper, the *Peninsula Clarion*, and advertised on the City of Soldotna website. The City’s public outreach is intended to supplement the larger public outreach effort of the KPB during the creation of the Borough’s All Hazard Mitigation Plan 2014 Update. More information on the Borough’s planning effort is provided in Chapter 1, Introduction, of the Borough’s plan.

**Element A4. Review and Incorporation of Existing Plans, Studies, & Technical Information** [Requirement 201.6(b)(3)]

The City Steering Committee consulted various adopted planning documents and other technical studies during the review and revision of the All Hazard Mitigation Plan 2016 Update. The City’s Streets Inventory and Management Plan (2016); Water, Sewer, and Stormwater Master Plan (2016); Recreation and Trails Master Plan (2014), and Municipal Airport Master Plan Update (2004) were reviewed for any recommended projects, priorities, or goals that should be incorporated and included in the All-Hazard Mitigation Plan 2016 Update. The KPB All-Hazard Mitigation 2014 Update was reviewed

for relevant information to the Soldotna region as a basis of information for this 2016 Update.

The Soldotna/Ridgeway Area Community Wildfire Protection Plan (2009) was reviewed by the Steering Committee for any recommended projects, priorities, or goals that could inform the City's efforts to mitigate hazards or disasters, such as coordinating media outreach to educate the public about wildland fire hazards, to remove beetle killed trees along the river and in campgrounds, or develop fuel breaks in certain locations. This information was directly incorporated into the City's 2016 Update goals.

The City's Comprehensive Plan (2010), Envision Soldotna 2030, was also reviewed and projects identified for consideration and/or inclusion into the 2016 update include:

- Analysis of critical roadway connections, especially for necessary emergency transportation or evacuation, including a secondary crossing of the Kenai River in Soldotna (West Redoubt Ave to East Poppy Lane) and a secondary exit of East Redoubt Avenue beyond its intersection with the Sterling Highway. (Comprehensive Plan Transportation Goals 2, 5)
- Regional growth goals as they pertain to restoration and permitting along the Kenai River in the City's Overlay District (Comprehensive Plan Regional Growth Goal 1)

**Elements A5, A6. Maintenance Procedures** [*Requirements 201.6(c)(4)(i), 201.6(c)(4)(iii)*]

The All Hazard Mitigation Plan will be updated at a minimum of every five years, or 90 days after a presidentially declared disaster. The City Planner will be responsible for ensuring that reviews are completed, the planning commission and the general public will be notified of opportunities to review the plan and provide comment, questions, or other input by written invitation through the use of newspaper advertising, as is the standard practice for public meetings and public hearings for Soldotna.

Public involvement is essential to ensure that the mitigation goals, objectives and action items are addressing the community's needs. Ongoing public input regarding community planning and community threats to natural hazards is critical. The City will continue to provide opportunities for public comment at Planning and Zoning Commission and City Council meetings.

The All Hazard Mitigation Plan as adopted will be circulated annually to all City departments with requests for comments with regard to initiated projects, completed projects, or newly identified projects/hazards. Any necessary additions or corrections to the adopted plan will follow the same procedure for public input and official adoption as the original plan update. Any projects marked as completed or initiated will be further reviewed to analyze impacts on the community, as an important aspect of the ongoing planning process.

## Element B – Hazard Identification and Risk Assessment

The City of Soldotna has identified five hazards which are present in our community and determined to pose a threat to property, infrastructure, and lives. The plan focuses on these five hazards which include: floods, wildland fires, earthquakes, volcano eruptions, and weather.

### Hazard Identification Matrix

Flood	Wildland Fire	Earthquake	Volcano	Snow Avalanche	Tsunami & Seiche
Y/H	Y/M	Y/M	Y/M	N	N
Weather	Landslide	Erosion	Drought	Technological	Economic
Y/M	N	N	N	U/L	U/L

#### Key:

- Y: Hazard is present in jurisdiction
- N: Hazard is not present
- U: Unknown if the hazard occurs in the jurisdiction

#### Risk:

L:	Low probability of occurrence
M:	Moderate probability of occurrence
H:	High probability of occurrence

### Elements B1, B2, B3. Descriptions of Type, Location, and Impact of Natural Hazards; Historic Information; Probability of Future Hazards [Requirements 201.6(c)(2)(i), 201.6(c)(2)(ii)]

**Flood.** Flooding damage occurs when humans interfere with natural processes by altering waterways and/or building inappropriately within the floodplain or flood hazard area. Many of Alaska’s communities and transportation facilities are located along waterways such as oceans, bays, inlets, or large rivers and are subject to flooding. This flooding has serious implications on public health and safety and causes extensive property loss.

Flooding in Alaska can be broken into a number of categories, including surface water runoff floods, snowmelt floods, ground-water flooding, ice jam floods, flash floods, fluctuating lake levels, alluvial fan floods and jokulhaups. Alaska also experiences coastal flooding from storm surge, but this will be discussed in the Weather section. These are not exclusive categories, as a flood event could have elements of more than one type.

The City of Soldotna regulates development within 100 feet of the Kenai River (known as the Kenai River Overlay District under the Soldotna Municipal Code), but the City has no special development review or permitting process for construction specifically related to location within a floodplain or floodway.

Additionally, the City of Soldotna does not participate in the National Flood Insurance Program (NFIP). There are a few small areas of the city which are subject to flooding along the Kenai River, Soldotna Creek, and Slikok Creek. Because Soldotna does not participate in NFIP, data is not available on vulnerability in terms of the types and numbers of repetitive loss properties. Chapter 2.0 of the KPB 2014 All-Hazard Mitigation Plan Update includes information about historic flood events along the Kenai River dating from 1964, as well as other flood events such as surface water runoff floods.



**Image 1. Photo of the Kenai River boardwalk at Soldotna Creek Park. Photo courtesy City of Soldotna, 2009. Stairways are raised during the winter months to prevent damage due to flooding and ice flows.**

No major flooding has occurred in the City of Soldotna for the 2010 - 2016 period. In September 2012, damage to some infrastructure at the Kenai River Center was associated with wide-scale flooding on the Kenai Peninsula, resulting in a Federal declaration for Public Assistance for the KPB. The following year, during an extended storm and rainfall event in September and October 2013, the Kalifornsky Beach area to the west of the City of Soldotna experienced high surface and ground water conditions, also resulting in a Federal declaration for Public Assistance for the KPB.



**Image 2. Kenai River at the Sterling Highway bridge in Soldotna after the January 19, 1969 release of Skilak Lake (courtesy Kenai Peninsula Borough All Hazard Mitigation Plan, 2014 update, p. 78)**

Kenai River winds through the city, the banks are high and the 100-year floodplain is fairly confined. A majority of the developed property within the city was excluded from the FEMA Flood Insurance Study because it was believed to be at minimal flood risk.”

Most of the possible damage from flood events is limited to accessory structures located along the banks of the Kenai River, such as sheds, access stairs, docks, or elevated walkways, in addition to transportation infrastructure that interfaces with the

The KPB All Hazard Mitigation Plan 2014 Updates states on p. 79, “Many of the Central Zone’s critical facilities, including police and fire service, the Central Peninsula General Hospital, numerous medical clinics and a number of schools are located within the city of Soldotna. Although the

Kenai River, such as the Sterling Highway Bridge. The following table compiles City investment into riverfront infrastructure since the last plan update.

Project Description	Project Date	Total Cost
Centennial Park to Visitors' Center Trail Connection	2013	\$13,630*
Soldotna Creek Park Design & Construction Final Phases	2013	\$1,269,418
Centennial Park to Regional Sports Complex Trail Connections	2014	\$98,520

*\* Note: Centennial Park to Visitors' Center Trail Connection was designed and surveyed in 2013 but implementation/construction is currently ongoing during Fiscal Year 2016. Additional investment into this resource will be captured in the subsequent All Hazard Mitigation Plan Update.*

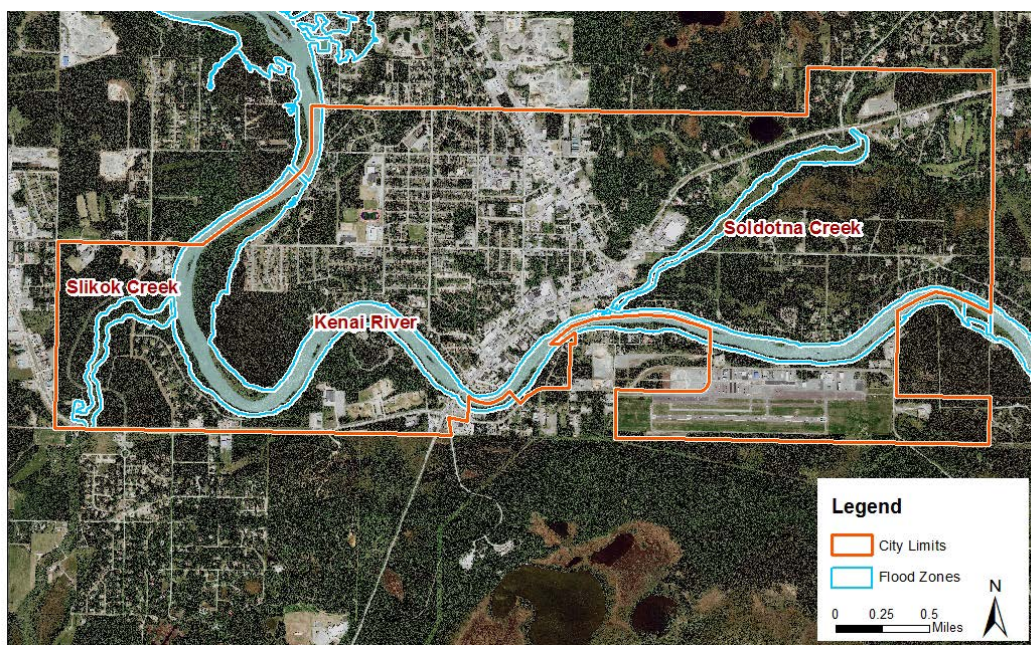


Figure 1. Kenai River Flood Zone Limits in the City of Soldotna (City of Soldotna, 2016)

**Wildland Fire.** Wildland fires occur in every state in the country, and Alaska is no exception. Each year, between 600 and 800 wildland fires, mostly between March and October, burn across Alaska causing extensive damage.

Fuel, weather, and topography influence wildland fire behavior. Wildland fire behavior can be erratic and extreme causing firewhirls 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 more quickly than it goes down.

Wildland fire risk has increased in Alaska due to a spruce bark beetle infestation that recently occurred. This infestation killed many trees, which then dry out and become highly combustible. Additionally, according to the State of Alaska Division of Forestry, the greatest increase in risk associated with wildland fire in the greater Soldotna area is an uptick in urban development, which increases the risk of fires in the Wildland-Urban interface (as defined in the box, at right).

Fire is recognized as a critical feature of many ecosystems. It is essential to maintain the biodiversity and long-term ecological health of the land. In Alaska, the natural fire regime is characterized by a return interval of 50 to 200 years, depending on the vegetation type, topography and location. 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, as well as natural and cultural resources threatened. These and other values dictate the appropriate management response to the fire. Firefighter and public safety is always the first and overriding priority for all fire management activities.

Wildland fire management in Alaska is the responsibility of three agencies: Division of Forestry, Bureau of Land Management (BLM) (through the Alaska Fire Service (AFS)) and the U.S. Forest Service (USFS). Each agency provides fire-fighting coverage for a

## **Fire Categories**

### **Structure Fire**

Originate in and burn a building, shelter or other structure.

### **Prescribed Fire**

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. A Wildland Fire Use is a wildland fire functioning in its natural ecological role and fulfilling land management objectives.

### **Wildland-Urban Interface Fire**

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.

portion of the State regardless of land ownership. These agencies have cooperated to develop a state-wide interagency wildland fire management plan.

In 2009, the *Soldotna/Ridgeway Community Wildfire Protection Plan (CWPP)* was developed to identify wildfire hazards, and propose ways to mitigate the risk. The plan identifies fuel hazards, values at risk from wildfire, and the fire history for the area. The graphic (below) is an excerpt of the hazard rating map for the plan which shows the relative hazard ratings for the Soldotna area.

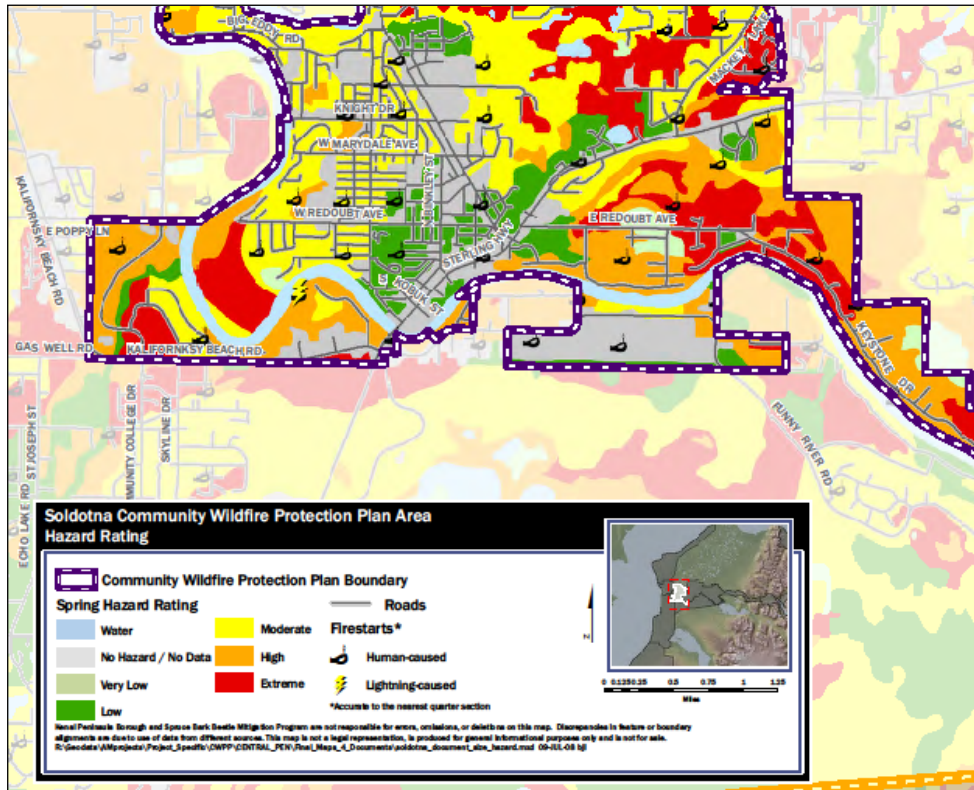


Figure 2. Area Hazard Rating. Image Courtesy *Soldotna Ridgeway Area Community Wildfire Protection Plan*, Dec. 2009.

Wildland fires on the Kenai Peninsula central corridor, including the Soldotna/Ridgeway area, are usually human-caused. Human-caused wildland fires account for 98% of fire ignitions on the Kenai Peninsula over a recent fifteen year period. However, lightning strikes have increased in frequency in recent years, with numerous strikes recorded in 2005, resulting in 22 detected fires<sup>2</sup>. In 2015, the Card Street Fire in nearby Sterling burned over 8,800 acres, and in 2014 the Funny River Fire burned nearly 200,000 acres ranging from areas close to Soldotna south to the shores of Tustumena Lake. Although no properties within the city limits were affected, emergency management teams utilized City resources such as the airport and Regional Sports Complex for transportation and staging.

Contributing to the conducive environment for wildland fire are dead, dying, or otherwise compromised trees. According to the State’s Division of Forestry, the Spruce Bark beetle infestation since the mid-1970s has killed mature spruce trees on 1.2 million acres of the Kenai Peninsula, or about 50 percent of the Peninsula’s forested land. The infestation reached epidemic levels in the 1990s. An additional beetle, the

<sup>2</sup> Soldotna/Ridgeway Community Wildfire Protection Plan, December 2009, Pg. 18.

Spruce Aphid is currently infesting trees in the Southern Kenai Peninsula, around the Kachemak Bay region. According to the State's Division of Forestry, the risk level to the Central Kenai Peninsula is low, due to the typically cooler winters (below 15 degrees F) that the Central Kenai region experiences. However, with a future warming climate, the Green Spruce Aphid may pose a bigger threat to the Soldotna area's forests and trees.

**Earthquake.** 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, snow avalanches, seiches and tsunamis. The extent of damage is dependent on the magnitude of the quake, 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. P (primary) waves are the first ones felt, often as a sharp jolt. S (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. The 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 coarse silt with high water content) loses strength as a result of the shaking and acts like a viscous fluid. Liquefaction causes three types of ground failures: lateral spreads, flow failures, and loss of bearing strength. In the 1964

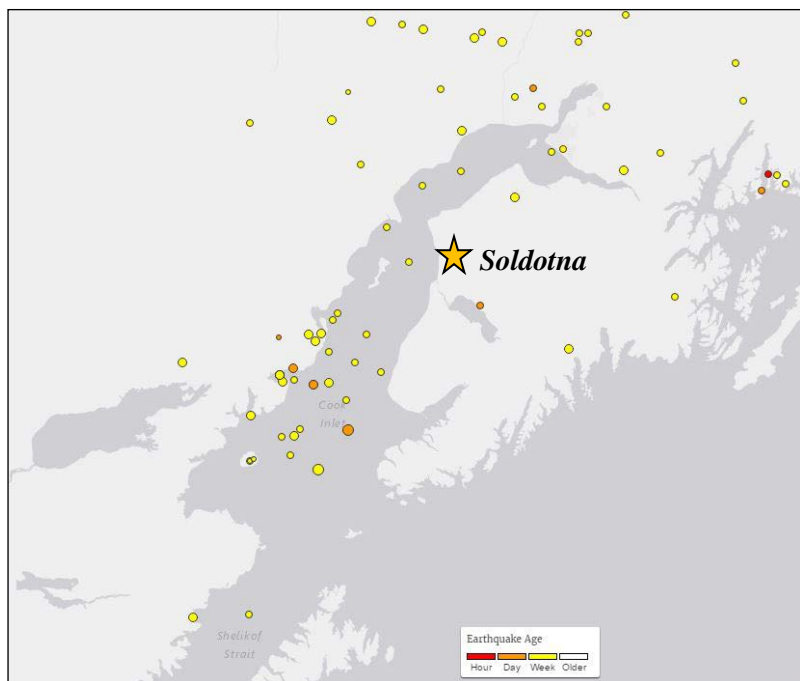


earthquake, over 200 bridges were destroyed or damaged due to lateral spreads. Flow failures damaged the port facilities in Seward, Valdez and Whittier. Similar ground failures can result from loss of strength in saturated clay soils, as occurred in several major landslides that were responsible for most of the earthquake damage in Anchorage in 1964. Other types of earthquake-induced ground failures includes slumps and debris slides on steep slopes.

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 ten largest quakes in the world since 1900 have occurred here. Earthquakes of magnitude 7 or greater occur in Alaska on average of about once a year; magnitude 8 earthquakes average about 14 years between events.

Figure 3 (below) is a map showing examples of earthquakes (all magnitudes) that occur in the region in a typical week. The City of Soldotna is located in a seismically active zone, and is vulnerable to damage from earthquakes. The City feels there is a moderate risk of damage to all areas of Soldotna from a severe earthquake, and there is a risk of damage to buildings and infrastructure during major earthquake activity.

In January 2016, a magnitude-7.1 earthquake struck approximately 50 miles west of Anchor Point, which caused some damage in the City. Retail stores experienced disruption to business with fallen stock and shelves. A city wide damage assessment was conducted to verify conditions. Outside city limits, additional damage occurred. Kalifornsky Beach Road in the nearby Kasilof community suffered cracked pavement, resulting in the temporary closure of the road. A gas leak in the City of Kenai led to two separate explosions which burned four homes and three vehicles. No injuries were reported due to an evacuation of the affected area.



*Figure 3. USGS earthquake map (from the week of 08/2016), modified to identify the location of Soldotna.*

**Volcano.** Volcanic ash is made up of fine fragments of solidified lava ejected into the air by an explosion or rising hot air. The fragments range in size, with the larger falling nearer the source. In Soldotna, structures could be damaged due to the weight of accumulated ash, visibility in general could be decreased, and respiratory issues could become present caused by inhaling the fine ash. Ash will also interfere with the operation of mechanical equipment, such as the City's equipment fleet or aircraft. In the event of an eruption, significant risk could become present to the Soldotna

Municipal Airport, which may have to be temporarily closed to take-offs or landings of aircraft.

Redoubt Volcano is located across Cook Inlet, and ash from its eruptions can reach the City of Soldotna. Potential damage would not be limited to a specific geographic area of the City, but would affect all areas of the City equally during an eruption.

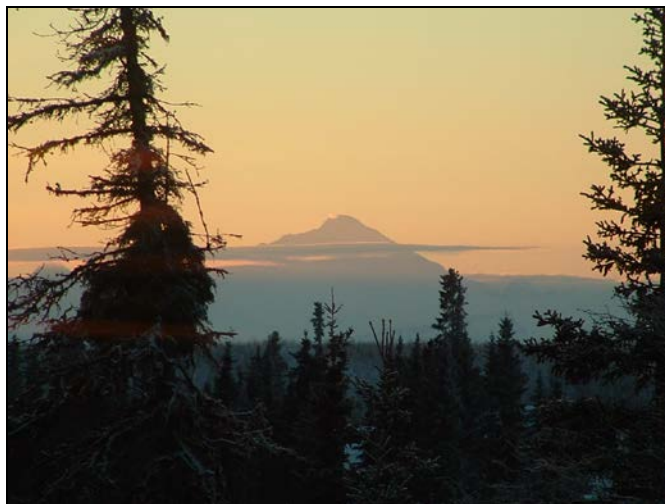


Image 2, Mount Redoubt as seen from the City's Karen Street Water Reservoir (2006).

The only significant volcanic events to occur during the update period (since 2010) as observed by the Alaska Volcano Observatory (AVO) occurred at volcanoes in the Andreanof and Fox Islands regions, far removed from the Kenai Peninsula. Previous to this study update (before 2010), Mt. Redoubt began erupting on March 15, 2009. The eruption was characterized by powerful ash explosions with resulting plumes between 30,000 and 60,000 feet above sea level. The AVO observed eleven major explosive events during the first week, with a total of 19 events over the 14 day explosive eruptive period in March and early April.

**Weather.** In Alaska, there is great potential for weather disasters. Heavy snow can impact the interior and is common along the southern coast. Heavy snow accumulations in the mountains builds glaciers, but can also cause avalanches or collapse roofs of buildings throughout the state. A quick thaw means certain flooding.

Potential damage from extreme weather would not be limited to a specific geographic area of the City, but would affect all areas of the City equally. The City is at moderate risk of damage due to extreme weather, and is especially vulnerable to damage to infrastructure from freeze-thaw cycles. Of primary concern is potential freeze-ups of the City's municipal water supply system to ensure residents maintain access to potable water.

**Winter Storms.** A series of severe winter storms in December 1999 and January 2000 triggered avalanches and flooding in Southcentral Alaska and resulted in a Federal Disaster Declaration. The Municipality of Anchorage, the KPB, the Matanuska-Susitna Borough, and the Valdez-Cordova census area received funding to supplement the recovery needs of the local governments to pay for debris removal, emergency services, and repair and replacement costs for damaged public facilities related to the storms.

Due to the unique geography of the Kenai Peninsula, the Seward Highway remains the primary link, and the sole surface transportation route, to Anchorage and its distribution hub. A second-hand risk exists to the City of Soldotna if this corridor were to be closed due to avalanche, either from earthquake or from particularly heavy snow events.

**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. Heavy snow can also damage light aircraft and sink small boats. In the mountains, heavy snow can lead to avalanches. 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 cities and towns.

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 caused by overexposure to the cold weather.

Heavy snow can impact interior Alaska, but it is most common along the southern coasts. During the winter, Alaska's weather is greatly influenced by large areas of high pressure that can persist for weeks at a time over Siberia, interior Alaska, and northwestern Canada. While a well-developed mass of cold air dominates the interior, storms crossing the North Pacific often move into the Gulf of Alaska dumping large amounts of precipitation over the southern coastal region. The most frequent heavy snowfalls occur along the north Gulf coast from Prince William Sound to the southeastern Panhandle. Snowfalls of one to two feet are common in coastal communities such as Valdez and Yakutat, and these same events can bring up to six feet of snow in the mountains nearby.



Image 3. An airplane at the City of Soldotna airport covered in snow (2006).

High winds, especially across the Arctic coast, can combine with loose snow to produce blinding blizzard conditions and dangerous wind chill temperatures.

Record heavy snow occurred in Anchorage on March 17, 2002 when two to three feet of snow fell in less than 24 hours over portions of the city. Ted Stevens International Airport recorded a storm total of 28.7 inches, and an observer near Lake Hood measured over 33 inches. The city of Anchorage was essentially shut down during the storm, which fortunately occurred on a Sunday morning when a minimal number of businesses were open. Both military bases, universities, and many businesses remained closed the following day, and Anchorage schools remained closed for two days. It took four days for snow plows to reach all areas of the city.

The most recent winters in the Soldotna area have been mild, with average to less-than-average snowfall. With a warming climate, the threat of heavy snows remains, but may be less impactful than in the past.

**Extreme Cold.** What is considered an excessively cold temperature varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In Alaska, extreme cold usually involves temperatures below -40 degrees F. Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

Extreme cold can bring transportation to a halt across interior 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 to northern villages. Long cold spells can cause rivers to freeze, disrupting shipping and increasing the likelihood of ice jams and associated flooding.

Extreme cold also interferes with a community's infrastructure. It causes fuel to congeal in storage tanks and supply lines, stopping electric generation. Without electricity, heaters do not work, causing water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase, affecting buried pipes. 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.

Generally the risk of extreme cold is restricted to the interior region of Alaska, bounded by the Alaska Range to the south and the Brooks Range to the north. During January of 1989, a fairly widespread extreme cold event occurred across the interior part of the state. The city of Fairbanks came to a virtual halt for fourteen days when bitter cold and ice fog gripped the area. During the cold spell, Tanana recorded a low temperature of -76°F, McGrath followed closely with -75°F, and the record for the highest barometric pressure reading ever recorded in North America occurred in Northway at 31.85 inches of mercury. Aircraft were grounded for more than 6 days during the event.

**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 supercooled and freezes upon impact with

cold surfaces. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

Freezing rain develops as falling snow encounters a layer of warm air in the atmosphere deep enough for the snow to completely melt and become rain. As the rain continues to fall, it passes through a thin layer of cold air just above the earth's surface and cools to a temperature below freezing. The drops themselves do not freeze, but rather they become supercooled. When these supercooled drops strike the frozen ground, power lines, tree branches, etc., they instantly freeze. The atmospheric conditions that can lead to ice storms occur most frequently in Southwestern Alaska along the Alaska Peninsula and around Cook Inlet. Brief instances of freezing rain occur frequently along the southern coast of Alaska, but these events generally produce very light precipitation with less than ¼ inch of ice accumulation.

**Hail.** Hailstorms are an outgrowth of thunderstorms in which ball or irregular shaped lumps of ice greater than 0.75 inches in diameter fall with rain. The size and severity of the storm determine the size of the hailstones. In Alaska, hailstorms are fairly rare and cause little damage, unlike the hailstorms in Mid-western states. The extreme conditions of atmospheric instability needed to generate hail of a damaging size (greater than ¾ inch diameter) are highly unusual in Alaska. Small hail of pea-size has been observed periodically.

In August of 2000, an intense thunderstorm moved across the community of Sitka, dumping pea- to dime-sized hail over the downtown area. The hail covered the ground and plugged up storm drains causing minor street flooding until it melted.

### **Critical Facilities**

The City of Soldotna participated in the State of Alaska Division of Homeland Security and Emergency Management's (DHS-EM) Security Vulnerability Assessment (SVA) in 2013. The SVA is used to identify a level of protection necessary to adequately mitigate identified risks from critical infrastructure assets. The DHS-EM's Critical Infrastructure and Key Resources planning team uses this process to identify specific security countermeasures designed to protect a community's continuity of operations, critical assets, population, and visitors. These countermeasures are then included in the State of Alaska DHS-EM planning and preparation framework.

The following table describes critical facilities for the City of Soldotna and identifies hazards that could negatively impact their function or existence.

	Flood	Wild-fire	Earth-quake	Volcano	Snow Avalanche	Tsunami & Seiche	Weather	Landslides	Erosion	Drought	Techno-logical	Economic
0. Airport		X	X	X			X					
1. Fire		X	X	X			X					
2. Police		X	X	X			X					
3. Hospital		X	X	X			X					
4. Health Clinic												
5. School		X	X	X			X					
6. Tank (fuel) Farm												
7. Electric		X	X	X			X					
8. Telephone		X	X	X			X					
9. Satellite												
10. Washeteria												
11. Harbor/Dock/Port												
12. Landfill/Incinerator												
13. Museum		X	X	X			X					
14. Library		X	X	X			X					
15. Road	X	X	X	X			X					
16. City Hall		X	X	X			X					
17. Park	X	X	X	X			X					
18. Civic Center												
19. Cemetery		X	X	X			X					
20. Offices												
21. Tannery												
22. Sewage Lagoon												
23. Teachers Quarters												
24. Store												
25. Service/Maintenance		X	X	X			X					
26. Bridge	X	X	X	X			X					
27. Post Office		X	X	X			X					
28. Radio Transmitter												
29. Reservoir / Supply		X	X	X			X					
30. Senior Center		X	X	X			X					
31. Church												
32. Community Freezer												
33. Generator												
35. Comm. Storage Shed												
36. Boardwalk	X	X	X	X			X					
99. Other (Wastewater Plant)	X	X	X	X			X					

## Element C – Mitigation Strategy

### **Element C1. Existing Authorities, Policies, Programs and Resources: Integrating Mitigation Plan Objectives into Other Planning Mechanisms**

*[Requirements 201.6(c)(3), 201.6(c)(4)ii]*

**Policies.** The City of Soldotna operates under the Soldotna Municipal Code, which includes sections appurtenant to the All Hazards Mitigation Plan: Title 12 (Streets, Sidewalks & Public Places), Title 13 (Public Services), Title 15 (Buildings and Construction) and Title 17 (Zoning). Any large-scale rewrites of these guiding policies will be in consultation with the City's adopted All-Hazard Mitigation Plan to identify opportunities for mitigating exposure of the City, its residents, or its infrastructure to hazards.

**Planning Opportunities.** Most City capital projects are coordinated on the 5-Year Capital Improvement Plan (CIP), a document which is developed for long-range capital improvement planning and budgeting. These projects are typically in excess of \$50,000 that result in tangible fixed assets. Projects included on the CIP may or may not be selected for inclusion on the City's annual Capital Budget, depending on the urgency of the project, priorities of the City, and availability of funding sources. The CIP is reviewed and updated annually to reflect the needs and desires of the City and the community. During each annual review, a variety of planning documents, including the All-Hazard Mitigation Plan, will be reviewed to analyze and prioritize projects. Projects identified in the All-Hazard Mitigation Plan may be included on the 5-Year Capital Improvement Plan depending on City resources.

The City completed a comprehensive plan in 2010. During any updates to the comprehensive plan, the Economic Development & Planning department will consult the All-Hazard Mitigation Plan to provide a framework of knowledge around planning priorities that involve hazard mitigation.

**City Staff.** The City of Soldotna staff which may be involved in the review, maintenance, and implementation of strategies in this document consist of the following entities.

- **Economic Development & Planning Department:** administers Title 17 of the Soldotna Municipal Code, coordinates City-wide long range planning through the Envision 2030 Comprehensive Plan, and serves as professional staff for the City's Planning & Zoning Commission. All long-range planning efforts performed by ED&P will be in consultation with the City's adopted All-Hazard Mitigation Plan.
- **Public Works Department (including Building Official):** administers the adopted building code, coordinates with the fire marshal, manages the Municipal Airport, and plays a key role in City projects such as road construction and maintenance, construction of new facilities, and utility infrastructure construction and maintenance. All capital projects performed by the Public Works department will be in consultation with the City's adopted All-Hazard Mitigation Plan.
- **Streets & Maintenance Department:** ensures city infrastructure and facilities (including streets) are properly maintained to ensure health and safety of users. Planning for all activities performed by the Streets & Maintenance Department will be in consultation with the City's adopted All-Hazard Mitigation Plan.
- **Utility Department:** administers certain sections of Title 13 (Public Services) of the Soldotna Municipal Code and manages the connection to, supply of, and

maintenance of City water and sewer services, including supply wells, lift stations, and the wastewater treatment plant. All capital projects performed by the Utility department will be in consultation with the City's adopted All-Hazard Mitigation Plan.

City Council, Boards & Commissions. The City is governed by the elected City Council & Mayor. The Mayor appoints members to associated boards and commissions, subject to approval by Council. The appurtenant bodies for the All Hazards Mitigation Plan include the Planning & Zoning Commission, the Parks & Recreation Advisory Board, and the Airport Commission. These bodies are tasked variously with managing land use development, comprehensive plans, strategic plans, capital improvement plans, and City budget documents and policies. Generally, the projects and policies brought enacted by these boards and commissions are generated by City staff, who will consult with the City's adopted All-Hazard Mitigation Plan to identify opportunities for initiation or implementation of projects listed in this document as appropriate.

### **Element C2. NFIP Requirements** *[Requirement 201.6(c)(3)(ii)]*

The City does not participate in the National Flood Insurance Program at this time.



**Elements C3, C4, C5. Action Plan Matrix (including Benefit/Cost & Technical Feasibility Review)** [Requirements 201.6(c)(3)(i), 201.6(c)(3)(ii), 201.6(c)(3)(iii), & 201.6(c)(3)(iv)]

The City of Soldotna’s All-Hazard Mitigation Plan 2016 Update summarizes specific mitigation strategies, priorities for implementation, responsible agency or department, funding sources, and benefit/cost and technical feasibility analyses into one matrix.

ID	Description	Priority (High, Medium, Low) & Timeframe	Responsible and Coordinating Agency or Department	Potential Outside Funding Sources	(B/C) Benefit-Costs (TF) Technical Feasibility
<b>Goal 1: Reduce the vulnerability of properties and infrastructure along the Kenai River to flooding and ice damage.</b>					
1-A	Continue to review development proposals within the KROD (Kenai River Overlay Zoning District) to ensure compliance with regulations and control for erosion and adverse activity within the riparian habitat.	Low - Ongoing	COS (City of Soldotna) Planning Department  Coordination with KPB Gilman River Center Agencies	N/A; departmental budget for staff time.	B/C: Sustained enforcement program has minimal cost (staff time) and will help build an area-wide development pattern which reduces the impact to permanent structures in flooding and ice events and preserves riparian habitats that mitigate high water events.  TF: Ongoing activity demonstrates its feasibility.
1-B	Review the existing KROD code to determine its adequacy in addressing building standards near the Kenai River.	Medium - 1 Year	COS Planning & Public Works Departments	Possible departmental budget allocation for public outreach campaign.	B/C: Updates to code have minimal cost outside of staff time, advertising, and salaries for commissioners. Will maintain an easily understood and enforceable set of standards around Kenai River development.  TF: Technically feasible for COS to complete and involves staff resources.
1-C	Investigate whether COS should participate in the National Flood Insurance Program; Determine which additional COS resources would be required to adopt an adequately manage a floodplain management ordinance.	Low - Ongoing	COS Planning, Public Works, Building Inspections	N/A; departmental budget for staff time.	B/C: Investigation of benefits of joining NFIP are an inherent part of this objective, therefore, it is unknown at this time what the exact benefits to COS and its citizens would be. Costs would most likely include dedicated and ongoing staff time for a period of time.  TF: Technically feasible for COS to complete in conjunction with KPB assistance (Gilman River Center staff).

ID	Description	Priority (High, Medium, Low) & Timeframe	Responsible and Coordinating Agency or Department	Potential Outside Funding Sources	(B/C) Benefit-Costs (TF) Technical Feasibility
<b>Goal 2: Reduce the City's and its residents' vulnerability to wildland fires.</b>					
2-A	Reduce the amount of hazardous fuels around Soldotna; provide fire breaks in and around Soldotna (including KNWR); work with KNWR, KPB, and Division of Forestry to identify projects.	Medium - Ongoing	COS Planning, Public Works, Building Inspections, Parks & Recreation	TBD	<p>B/C: Reduction in fuels for wildland fires will directly reduce risk to City residents and landowners. Costs vary depending on individual program goals.</p> <p>TF: Parks &amp; Rec crews could potentially assist other staff (such as KNWR or Forestry) in tree cutting and brush clearing.</p>
2-B	Promote education and awareness among homeowners about wildland fires, structural ignition, and mitigation steps that individuals can implement by providing information on the Firewise program during the building permit and/or zoning permit process.	High - 1 Year	COS Planning, Public Works, Building Inspections	N/A; departmental budget for staff time.	<p>B/C: Ensures homeowners and private property owners have the information to take essential steps to provide firebreaks around structures for which the City or other agencies can't affect change, at no or very low cost to COS.</p> <p>TF: Involves interdepartmental coordination during permitting processes.</p>
2-C	Ensure defensible areas surrounding vital COS public facilities by clearing brush and other wildland fire fuels.	Medium - Ongoing	COS Maintenance & Parks/Rec	TBD	<p>B/C: Ensures security of vital facilities that protect life and health of population in the event of an emergency.</p> <p>TF: Technically feasible for the City to complete in-house.</p>

**Goal 3: Reduce the City's and its residents' vulnerability to damage from earthquakes.**

3-A	List COS facilities in Pub Works software. Identify facilities critical to area residents; determine retrofits or backup systems needed to protect the structures in the event of earthquake.	Medium - 1-2 Years	COS Public Works, Building Inspections, Utilities  Coordinate with KPB OEM	N/A; departmental budgets for staff time.	B/C: Continuity in service of vital facilities for area residents. Step one of a multi-step process, including securing funding for any retrofits or backup systems as necessary.  TF: Technically feasible. Software already purchased and staff trained.
ID	Description	Priority (High, Medium, Low) & Timeframe	Responsible and Coordinating Agency or Department	Potential Outside Funding Sources	(B/C) Benefit-Costs (TF) Technical Feasibility
3-B	Provide generators to operate water supply well pumps at Wells C & E.	Medium - Ongoing; Determined by Availability of Funding	COS Public Works & Utilities	TBD; Grant Dependent	B/C: Strategic step to ensure continuous supply of fresh water in the event of power failure, likely funded by grant funding.  TF: Technically feasible for COS to complete and involves staff resources.
3-C	Continue work to provide standby generators to operate vital facilities.	Medium - Ongoing	COS Maintenance & Public Works	TBD; Grant Dependent	B/C: Provision of continuous power supply necessary in the event of wide-scale power failure to ensure public health and safety and may reduce losses and damage to structures.  TF: Technically feasible with contract work for outside firm for installation of any permanent generators.
3-D	Investigate alternate water/sewer utility line crossing for the Kenai River other than the Sterling Hwy Bridge.	Low - 5+ Years	COS Public Works, Planning	TBD; Grant Dependent	B/C: In the event of damage to the Sterling Hwy bridge, would ensure that fresh water and waste water supply is provided to COS residents south of the Kenai River.  TF: Technically feasible, likely in conjunction with other agencies for funding and for project realization.

3-E	List earthquake preparedness resources and locations of shelter facilities, on a COS web page or in collaboration with KPB.	High - 1 Year	COS Planning, Administratio n  Possible in collaboration with KPB	N/A; departmental budget for staff time.	B/C: Provision of information will increase public education and awareness about next steps in the event of an earthquake.  TF: Technically feasible for COS to complete and involves staff resources.
ID	Description	Priority (High, Medium, Low) & Timeframe	Responsible and Coordinating Agency or Department	Potential Outside Funding Sources	(B/C) Benefit-Costs (TF) Technical Feasibility
<b>Goal 4: Reduce the City's and its residents' risk to extreme weather events.</b>					
4-A	Increase public awareness of severe weather events and mitigation, through posting information about educational programs such as Winter Weather Awareness Week, the Tsunami Alert System, and Flood Awareness Week on the COS web page and social media outlets.	High - 1 Year + Ongoing	COS Planning, Administratio n	N/A	B/C: Providing information about educational programs such as Winter Weather Awareness Week, the Tsunami Alert System, and Flood Awareness Week will engage citizenry and pre- mobilize in the event of severe weather, at a minimal cost of occasional staff time to maintain staff awareness of weather events and educational programs.  TF: Technically feasible for COS to complete and involves staff resources.
4-B	Promote awareness of 511.alaska.gov through COS web page and social media outlets and encourage drivers to use the service to check road conditions before utilizing the Seward or Sterling Highways for long-distance trips.	High - 1 Year + Ongoing	COS Planning, Administratio n	N/A	B/C: Increasing the exposure of COS residents to information about potential road hazards such as mud or landslides, flooding, or avalanches in the mountain passes, will reduce the possibility that residents are exposed to these risks.  TF: Technically feasible for COS to complete and involves staff resources.

## Element D – Plan Review, Evaluation, and Implementation

### **Element D1. Revisions to Reflect Changes in Development** [Requirement 201.6(d)(3)]

***Population Changes.*** There are no forecasted declines or increases in population to such a degree that the safety or health of the City of Soldotna or its residents would be impacted.

***Development & Land Use Patterns.*** The following changes in development and land use were analyzed for possible hazards or inclusion into the hazard planning matrix.

***Eastern Soldotna.*** The City of Soldotna has mostly reached its development capacity in terms of large tracts of vacant, developable land, except in the eastern portion of the City. Much of the vacant land along East Redoubt Avenue has development limitations such as a lack of utilities and street network or the presence of wetlands or high water table. Since the last plan update, the City has continued to see small-scale, infill development on streets like Yupik Road and River Estates Drive. RuRAL CAP (Rural Alaska Community Action Program) has proceeded with a subdivision and phased development of land along Jay Street at Hester Avenue, adjacent to identified wetlands and adjacent to a neighborhood which is currently experiencing high water tables and stormwater management issues.

***Northern Soldotna.*** Turnbuckle Terrace Road has been completed since the last plan update. This rural, residential street provides an important emergency bypass of the core of Soldotna, if the Kenai Spur Hwy / Sterling Hwy junction were to become inaccessible due to a hazard.

***Western Soldotna.*** At the western terminus of Redoubt Avenue, the Westgate subdivision has reached its maximum development capacity since the last plan update. Wetlands and flood hazard areas exist to the south and west of this subdivision; however, the affected lands are held by the City of Soldotna and the Department of Natural Resources, and are unlikely to ever be developed in a commercial, institutional, or residential capacity.

***South & West of the Kenai River.*** No development in these areas impact the City's overall vulnerability. Since the last plan update, a small section of Funny River Road was rerouted and upgraded to contemporary street construction standards to accommodate an expansion of the Soldotna Municipal Airport.

### **Elements D2, D3. Revisions to Reflect Progress in Local Mitigation Efforts and Changes in Priorities** [Requirement 201.6(d)(3)]

A status report on accomplished goals from the Soldotna All Hazard Mitigation Plan 2010 Update is provided as Appendix A on the following page. Goals identified as ongoing or not yet initiated were carried over for inclusion into this 2016 Update. The priorities for the City with regard to local political, social, environmental, and/or economic changes have stayed the same between the last plan update (2010) and the current plan update (2016).

## APPENDIX A

### Status Update of All Goals Listed in the Soldotna All Hazard Mitigation Plan 2010 Update

Goal	Status	Comments
1. Reduce vulnerability of properties and infrastructure along the Kenai River to flooding and ice damage		
A. Continue to review development proposals within the Kenai River Overlay District (KROD)	Ongoing	Remains a goal in the current plan. The City regularly reviews development proposals within the KROD.
B. Consider possible revisions to the Zoning Code regarding building within the 100-ft overlay district	Ongoing	Remains a goal in the current plan. The City will consider addressing the Zoning Code KROD standards with the Planning & Zoning Commission.
C. Consider joining the NFIP	Ongoing	
2. Reduce the City's vulnerability to wildland fires		
A. Reduce the risk of structural ignitions by promoting education and awareness among homeowners	Ongoing	Remains a goal in the current plan. Information will continue to be made available through the City's Building Official during the building permit process.
B. Reduce the amount of hazardous fuels in and around Soldotna	Ongoing	The Spruce Bark Beetle office of the KPB worked with COS Parks & Recreation and Maintenance Departments on clearing around Marydale Avenue, in City parks, and around the Regional Sports Complex.
3. Reduce the City's vulnerability to damage from earthquakes		
A. Prepare a list of all City facilities and identify those which are critical to area residents	Ongoing	Remains a goal in the current plan. City facilities are being incorporated into new PubWorks software for cataloging.
B. Determine whether retrofits are necessary to protect structures	Ongoing	
C. Prepare disaster supply kits for City buildings and vehicles	<b>Complete</b>	
D. Establish water supply facilities at artesian well houses	Ongoing	
E. Purchase generators to run water well pumps at well houses B and E	Ongoing	Generator purchased and in place at well house B. Continuing to plan for possible future generator at well house E.
F. Utilize a water reservoir tank south of the Kenai River in case of disruption to main lines under the Sterling Highway bridge	<b>Complete</b>	Reservoir constructed and online off Kalifornsky Beach Road

G. Provide standby generators to operate vital facilities	Ongoing	Remains a goal in the current plan. Generator installed at City Hall to power vital network & telecommunications for various services (such as City of Soldotna Police). Generator installed at the new sewer system lift station on Binkley Street which serves the hospital. Standby generators have been acquired and are on stand-by to power other lift stations as needed.
H. Provide road maintenance equipment on both sides of the Kenai River in case of disruption to the Sterling Highway bridge	<b>Complete</b>	Equipment is stored at both the Funny River maintenance shop (south of the bridge) and the main maintenance building off the Kenai Spur Hwy (north of the bridge).
I. Investigate alternate water/sewer utility lines crossing the Kenai River	Ongoing	An alternate crossing of the Kenai River likely would be included on a pedestrian and emergency access bridge linking West Redoubt Avenue and East Poppy Lane. This infrastructure facility is included on the City's 5-Year Capital Improvement Plan (CIP) in Year 2021, but currently has no appropriated funding.
J. Provide public education and awareness about earthquake preparedness and location of emergency shelter facilities	Ongoing	
4. Reduce the City's risk to severe weather events		
A. Increase public awareness of severe weather events and potential mitigation activities	Ongoing	



APPENDIX B

Meeting Documentation from the  
Soldotna Planning & Zoning Commission (9/7/2016 and 1/18/2017);  
Soldotna City Council (1/25/2017);  
Kenai Peninsula Borough Planning Commission (TBD); and  
Kenai Peninsula Borough Assembly (TBD)  
*(Materials to be inserted as they are generated)*