



CHUGACH MOUNTAINS IN MAT-SU VALLEY: MAT-SU, ALASKA. PHOTO BY STATE OF ALASKA

Risk Report

FEMA Region X – Matanuska-Susitna Borough, Alaska

Matanuska-Susitna Borough and the incorporated Cities of Houston, Palmer, and Wasilla



FEMA



**DEPARTMENT OF
COMMERCE, COMMUNITY
AND ECONOMIC DEVELOPMENT**



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Executive Summary

This Risk Report discusses risk for the Matanuska-Susitna Borough and its incorporated cities, including Houston, Palmer, and Wasilla. This Risk Report has two goals: (1) inform communities of their risks related to natural hazards, and (2) enable communities to act to reduce their risk. State and local officials can use the data provided in this Risk Report to update a variety of local plans and regulations, communicate risk, inform the modification of development standards, identify mitigation projects, and ultimately take action to reduce risk.

This Risk Report showcases the results of an in-depth risk assessment for flood, earthquake, landslide, and wildfire hazards in the Matanuska-Susitna Borough, performed by the project team for a Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program project. The risk assessment, which analyzes how a hazard affects the built environment, population, and local economy, has been used as the basis for developing mitigation strategies and identifying mitigation actions. The project team completed the risk assessments in this report using the free FEMA risk assessment tool, Hazus, which estimates losses for specific buildings due to floods and/or earthquakes. The project team incorporated a complete list of buildings in the Matanuska-Susitna Borough into the Hazus model. For two other hazards, landslide and wildfire, the team performed a vulnerability assessment. The information collected to assess potential community losses included local assets or resources at risk from certain hazards, the physical features and human activities that contribute to that risk, and the location and severity of the hazard. The loss data from Hazus and the vulnerability assessment highlight areas that would be affected, which provides State and local officials an opportunity to prioritize mitigation actions in these areas.

Summaries of each hazard assessed by the project team are provided below. For more in-depth analysis and spatial and tabular data, please reference the individual hazard sections in this report.

Flood Risk Assessment

In the Matanuska-Susitna Borough, the project team projected flood losses to be \$61 million for each recurrence interval modeled. At 24.44 percent, the area of the City of Houston has the highest economic loss ratio of structures in the Special Flood Hazard Area (SFHA), the area subject to inundation by the 1-percent-annual-chance flood. Point Mackenzie has the largest total estimated building and content losses at over \$9 million. Per State and community request and the FEMA Risk MAP program project, these communities have new Flood Insurance Rate Maps and 1-percent-annual-chance depth grids.

Earthquake Risk Assessment

Earthquake assessments based on the Magnitude (M) 7.1 earthquake event (referred to as Border Ranges Scenario), the M7.5 Castle Mountain Scenario, and the M9.2 1964 Great Alaskan Earthquake Scenario, were created to simulate the estimated potential loss in regard to the identified event. The project team modeled building and content losses at \$323 million for the Border Ranges Scenario, \$550 million for the M7.5 Castle Mountain Scenario, and \$179 million for the M9.2 1964 Great Alaskan Earthquake Scenario. For all simulations, the heaviest losses occurred in the City of Wasilla, with estimated building and content losses of \$34 million for the M7.1 Border Ranges Scenario, \$120 million for the M7.5 Castle Mountain Scenario, and \$20 million for the M9.2 1964 Great Alaskan Earthquake Scenario. The team also projected losses for transportation systems (highways, railways, light rail, buses, ports, ferries, and airports), utility systems (potable water, wastewater, natural gas, crude and refined oil, electric power, and communication facilities), and essential facilities (educational, fire, government, health care, and police).

Landslide Risk Assessment

Certain areas of the Matanuska-Susitna Borough are vulnerable to landslide, depending on ground failure susceptibility. Landforms in and around Wasilla consist of undulating ridges of glacial till and flat benches of sand and gravel. Elevation gradually rises from south to north from about 300 feet to 500 feet above sea level within the city limits.

Existing data are not sufficient to assess landslide risk within the Matanuska-Susitna Borough. Based on the Hazard Mitigation Plan and mitigation action items identified within the area, landslide risk is not classified as significant. Additional risk data and assessments may be explored as more data become available.

Wildfire Risk Assessment

The Matanuska-Susitna Borough is at risk of wildfires due to the forestry and fuel, weather, and topography of the Borough. The Alaska Division of Forestry responds to wildland fires within the Borough. Eighty percent of the wildland fires that they respond to in the Borough occur within the Cities of Houston, Palmer, and Wasilla or the Core Area (Wasilla Hazard Mitigation Plan, 2004). From February 2003 through January 2004, the Central Matanuska-Susitna Fire Station received and responded to 931 calls, 254 of which were related to fire. The remaining 677 calls were related to rescue and emergency medical service incidents, service calls, good intent calls, false alarms, and severe weather and natural disaster assessment (Wasilla Hazard Mitigation Plan, 2004).

Risk Assessment Conclusion

The results of this risk assessment, including the loss data from Hazus, the exposure analysis, and the building code analyses, highlight the areas most affected by the hazards noted above. State and local officials should use this information to identify areas for mitigation projects, as well for additional outreach efforts to educate the Matanuska-Susitna Borough residents on the hazards that affect the Borough. The areas of greatest hazard impact are identified in Section 7, Areas of Mitigation Interest, which can serve as a starting point for identifying and prioritizing actions communities can take to reduce their risks.

1. Introduction

This Risk Report outlines the risk assessment results and findings for the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program project. All results, databases, and maps used to generate this report are provided in the Risk Assessment Database included with this report. The Risk Report has two goals: (1) inform communities of their risks related to certain natural hazards, and (2) enable communities to act to reduce their risk. State and local officials can use the summary information provided in this report, in conjunction with the data in the Risk Assessment Database, to do the following:

- **Update local hazard mitigation plans, shoreline master plans, and community comprehensive plans** – Community planners can use the information in this Risk Report when developing or updating hazard mitigation plans, comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes can be changed to provide for more appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans** – Emergency managers can use the information in this Risk Report to identify low-risk areas for potential evacuation and sheltering. Risk assessment information may show vulnerable areas, facilities, and infrastructure for which planning for continuity of operations plans, continuity of government plans, and emergency operations plans would be essential.
- **Communicate risk** – Local officials can use the information in this Risk Report to communicate with property owners, business owners, and other citizens about risks and areas of mitigation interest (AOMIs).
- **Inform the modification of development standards** – Community planners and public works officials can use the information in this Risk Report to support the adjustment of development standards for certain locations.
- **Identify mitigation projects** – Community planners and emergency managers can use the information in this Risk Report to identify specific mitigation projects. For example, a floodplain manager may identify critical facilities that need to be elevated or removed from the Special Flood Hazard Area shown on the National Flood Insurance Program (NFIP) map.

The intended audience for this report includes, but is not limited to, the following:

- Local elected officials
- Community planners
- Emergency managers
- Public works officials

2. Risk Assessment

A risk assessment analyzes how hazards affect the built environment, population, and local economy. In hazard mitigation planning, risk assessments are the basis for mitigation strategies and actions. A risk assessment defines the hazard and enhances the decision-making process. The risk assessments in this Risk Report were completed using a free FEMA risk assessment tool, Hazus, which estimates flood and earthquake losses for specific buildings. The project team incorporated a complete list of buildings in the Matanuska-Susitna Borough into the Hazus model. The team assessed other hazards by performing a vulnerability assessment. To assess potential community losses, the team collected the following information:

- Local assets or resources at risk to the hazard
- Physical features and human activities that contribute to that risk
- Location and severity of the hazard

This Risk Report contains the results from the following types of risk analysis to help individuals describe and visualize the risk in their jurisdictions:

1. Flood Risk Assessment: Hazus Estimated Loss Information
2. Earthquake Risk Assessment: Hazus Estimated Loss Information

This Report also includes hazard profiles for the following, where spatial data were not readily available:

1. Landslide Risk Assessment: Vulnerability Assessment
2. Wildfire Risk Assessment: Vulnerability Assessment

For the basis of this assessment, economic loss is summarized for non-vacant parcels where at least one structure has been identified. Parcels with at least one structure may be referred to throughout this report as “improved parcels” or more generally “buildings.” Additionally, total values and economic losses consider the replacement value of the building and its contents. A detailed methodology of the risk assessment is listed in the appendix.

3. Matanuska-Susitna Borough Risk MAP Overview

A flood study project updating riverine flood hazards in select portions of the Matanuska-Susitna Borough is currently ongoing. FEMA’s Production and Technical Services provider, the Strategic Alliance for Risk Reduction (STARR); FEMA’s Community Engagement and Risk Communication provider, *Resilience Action Partners*; and the Alaska Department of Community and Regional Affairs are contributing to this project.

Project Milestones

Project milestones are the estimated completion timeframes for key tasks or events that must be accomplished to complete a Risk MAP project phase. They serve as progress indicators and are the basis for planning future Risk MAP meetings. However, all project milestones are subject to change due to changes in scope, delays in data acquisition, and other unforeseen complexities within a study. The project timeline is shown in Table 1.

Table 1: Project Timeline

TASK NAME	MATANUSKA-SUSITNA BOROUGH RISK MAP TIMELINE
RISK MAP DISCOVERY MEETING	APRIL 23, 2013
FLOOD STUDY KICK-OFF MEETING	DECEMBER 13, 2013
DRAFT MAP RELEASE	AUGUST 28, 2015
FLOOD RISK REVIEW (FRR) MEETING	JANUARY 20, 2016
PRELIMINARY DFIRM/FIS RELEASE	AUGUST 19, 2016
CONSULTATION COORDINATION OFFICERS (CCO) MEETING	JANUARY 4, 2017*
PUBLIC MEETING/WORKSHOP	WINTER 2017*
DRAFT MULTI-HAZARD RISK REPORT	WINTER 2017*
APPEAL PERIOD STARTS	EARLY 2017*
APPEAL PERIOD ENDS	SPRING 2017*

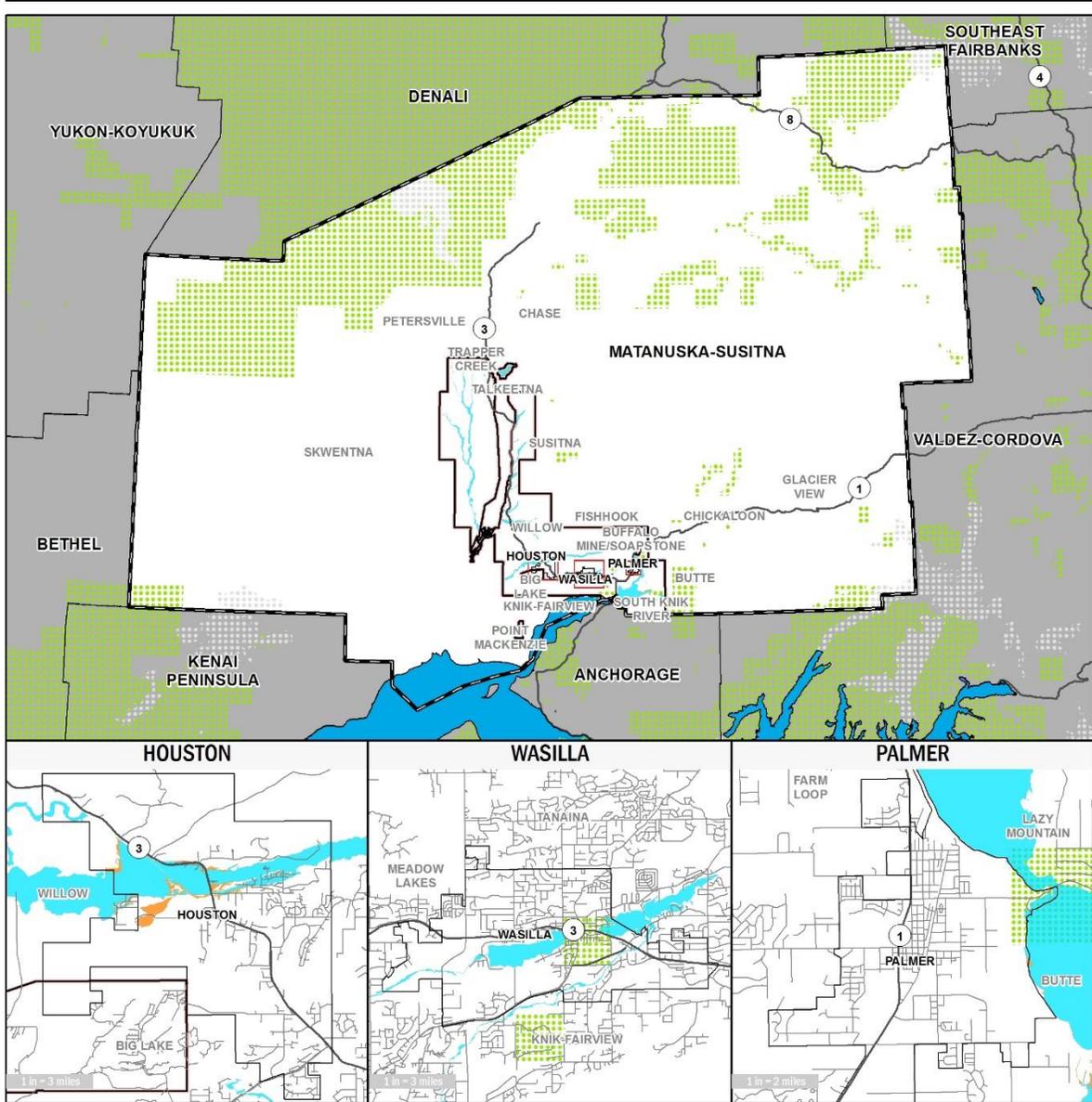
TASK NAME	MATANUSKA-SUSITNA BOROUGH RISK MAP TIMELINE
RISK MAP RESILIENCE WORKSHOP	SPRING 2017*
DELIVERY OF FINAL RISK REPORT AND RISK ASSESSMENT DATABASE	SPRING/SUMMER 2017*
LETTER OF FINAL DETERMINATION (LFD)	FALL 2017*
MAPS AND FIS BECOME EFFECTIVE	EARLY 2018*

*projected

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Map 1: Project Area and Flood Hazard Areas

PROJECT AREA



MAP SYMBOLOLOGY

FLOOD HAZARD AREA 0.2% ANNUAL CHANCE FLOOD HAZARD 1% ANNUAL CHANCE FLOOD HAZARD FLOOD STUDY PROJECT AREA	BASEMAP LAYERS FEDERAL LAND GLACIER	PROJECT AREA BOUNDARY	MAJOR ROAD
		LOCAL ROAD	INCORPORATED COMMUNITY BOUNDARY

ABOUT

THIS MAP DISPLAYS PRELIMINARY FLOOD HAZARD DATA IN AVAILABLE REGIONS ACROSS MATANUSKA-SUSITNA BOROUGH.

1 in = 37 miles

1:2,344,320

SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

There are three required meetings between FEMA, the State, and the jurisdictions as part of this Risk MAP Project; they are the Flood Risk Review (FRR), Consultation Coordination Officer (CCO), and Resilience Meetings. The input data, methodology, and draft maps will be presented at the FRR meeting. Preliminary results of the Flood Insurance Study are reviewed and discussed with community officials at the CCO meeting. At the request of the Borough, meetings for the public will also be held. Finally, a Resilience meeting is anticipated to be held in spring 2017. The purpose of a Resilience meeting is to continue to build local capacity for implementing the most important mitigation activities within the watershed.

Project Scope

The Matanuska-Susitna Borough Risk MAP flood study included the study of coastal and riverine flood hazards at select areas (See Flood Study Scope in the Appendix). Riverine flood hazard areas are mapped along the Answer Creek, Birch Creek, Bodenbug Creek, Caswell Creek, Cottonwood Creek, Gate Creek, Kashwitna River, Knik River, Kroto Creek, Lake Creek, Little Susitna River, Little Willow Creek, Lucile Creek, Matanuska River, Montana Creek, Moose Creek, Ninemile Creek, Question Creek, Rabideux Creek, Sheep Creek, Sunshine Creek, Trapper Creek, Upper Matanuska River, Wasilla Creek, and Willow Creek.

Additional Project Deliverables

The Matanuska-Susitna Borough Risk MAP study includes Flood Risk Datasets (Changes since Last FIRM, Flood Depth and Analysis Grids), a Multi-Hazard Database, and Risk Report. These Risk MAP datasets will be delivered as part of this report.

1. Socioeconomic Vulnerability

Risk assessments are characterized by an analysis of the physical extent of hazards and their corresponding locations. However, it is important to highlight additional factors that play a role in a community's ability to be resilient after a natural disaster and the feasibility of enacting mitigation actions. Socioeconomic factors can both amplify and dampen the community's susceptibility to loss, and understanding these factors can help communities allocate resources effectively and equitably to more vulnerable populations. Individuals' ability to prepare and respond to hazards will affect evacuation times and their ability to reach recovery centers and to afford hazard prevention techniques and repairs to their home and property.

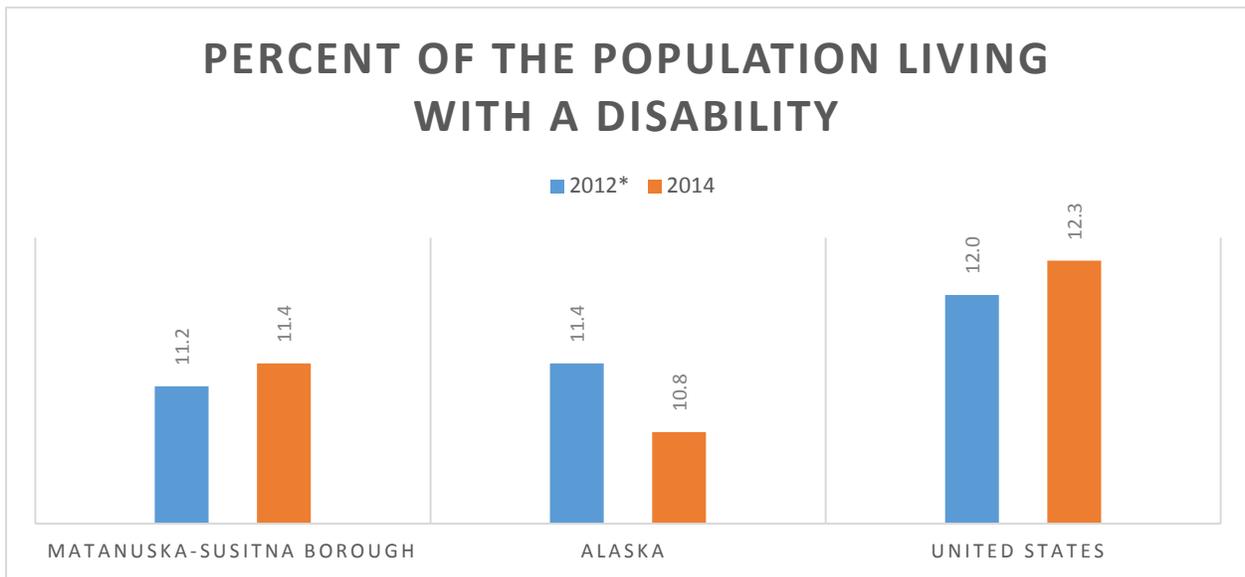
Understanding the population of the Matanuska-Susitna Borough, relative to statewide and national populations, and how that population is changing over time, is necessary to effectively improve current communication programs that target individuals at risk from the natural hazards that affect the area. Demographic data, which is analyzed below, was obtained from the U.S. Census Bureau and is searchable through the American Fact Finder advanced search. Data from 2000 is provided through those years' census counts. Statistics provided in 2014 are from the American Community Survey, which is an ongoing statistical survey conducted by the U.S. Census Bureau. For 2010, the report makes use of census counts when possible and survey estimates otherwise.

Vulnerable Population Groups

People over the age of 65 or under the age of 18 are classified as vulnerable age groups. These individuals may be dependent on others or on assistive devices to fulfill the activities of daily living. Children rely on caregiving adults, while elderly populations may have transportation and mobility limitations. The Matanuska-Susitna Borough is a younger community compared to both the State of Alaska and the United States. Roughly 29.0 percent of individuals residing in Houston, Palmer, and Wasilla are under the age of 18. This percentage is higher than the Borough (28.0 percent), Alaska (25.8 percent), and the United States (23.5 percent). Of the total population, 8.7 percent of Borough residents are over the age of 65. The cities of Houston and Palmer have the highest percentage of elderly residents, at 9.4 percent and 9.3 percent, respectively.

Additionally, individuals characterized as living with a disability may require more equitable services with regard to hazard presentation, preparation, mitigation, and repairs. The percentage of residents living with a disability in the Matanuska-Susitna Borough exceeds both the Alaska and national percentages (Figure 1). The Borough reported 11.4 percent of its population living with a disability. Amongst the three project area cities the cities of Houston, Palmer, and Wasilla reported 12.7 percent, 13.7 percent, and 13.8 percent of residents living with a disability, respectively.

Figure 1: Percentage of the Population Living with a Disability



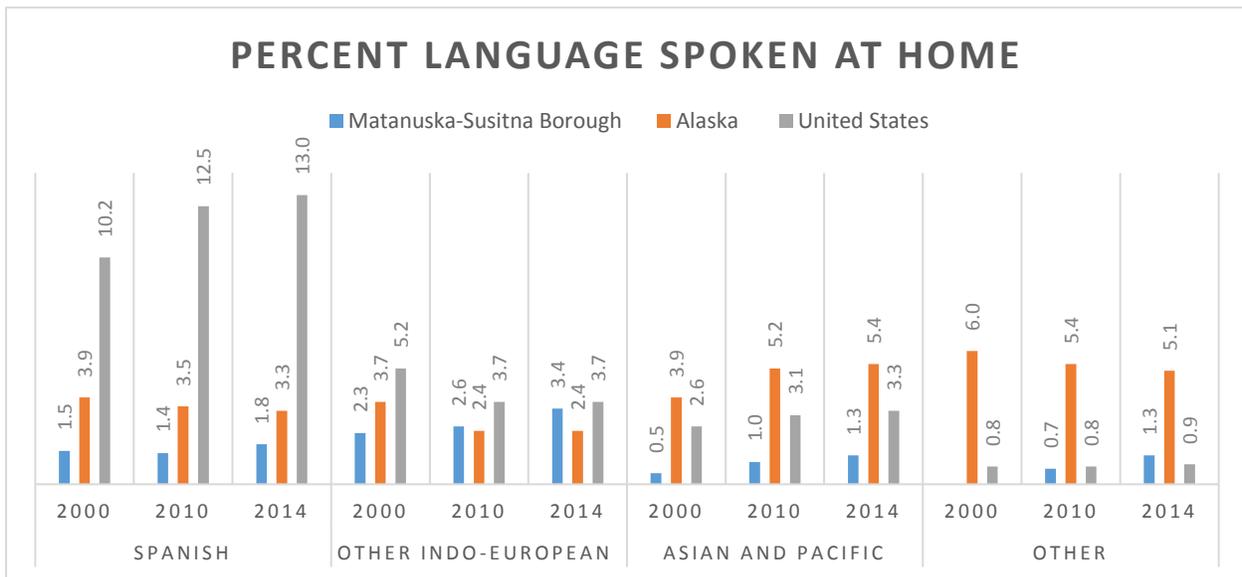
*Note: Data from the 2010 to 2014 American Community survey was only available for the years 2012 through 2014, and did not include 2010.

Culture and Language

The U.S. Census Bureau categorizes the language spoken at home in five main categories: English, Spanish, other Indo-European languages, Asian and Pacific languages, and other languages. Cultural and linguistic differences can impact natural hazard communication and outreach efforts, and may require additional local community buy in, translation, and other culturally competent approaches to equitably communicate hazard vulnerabilities. Approaching hazard mitigation and response efforts with a comprehensive understanding of cultural behaviors, attitudes, and language barriers will increase the success rates of hazard prevention, preparation, and response in culturally diverse communities.

Within the Matanuska-Susitna Borough, more than 90.0 percent of the population speaks English. For all other language categories, excluding Other Indo-European, the percentage of speakers in the Borough is far below the rate for Alaska and the United States. The category with the largest percentage of speakers is Other Indo-European, spoken by an estimated 3.4 percent of Borough residents. These languages can include, but are not limited to, languages spoken in Europe, and Western and Southern Asia. In the City of Wasilla, 10.0 percent of residents speak languages other than English at home. Only 4.0 to 6.0 percent of residents in the Borough and the cities of Houston and Palmer speak languages other than English at home. Due to the fact that the majority of residents living in the Matanuska-Susitna Borough speak English and the percentage of non-English speakers is lower than the national average, communicating risk to communities may be low. Ideally, all jurisdictions should approach community engagement and risk communication with cultural competency to ensure that outreach and education equally spans all communities.

Figure 2: Percentage of Non-English Languages Spoken



Note: Data were not available for the 'Other' category in 2000 for the Matanuska-Susitna Borough.

Economic Vulnerability

Knowing the economic characteristics of a community can assist in the analysis of the community's ability to prepare, respond, and rebuild after a natural hazard event. Categorizing economic vulnerability can encompass many factors, including median household income, poverty rates, employment and unemployment rates, housing tenure, and community building inventory.

Median household income and poverty rates measure individual economic stability. Communities with a larger portion of their population living paycheck to paycheck may have more individuals finding it difficult to rebuild after a disaster. Alternatively, wealthier communities may be less affected by a disaster because they have the financial means to prepare, prevent, and rebuild stronger after a disaster. In 2014, the median household income for the Matanuska-Susitna Borough was just over \$72,000 (figure 3). This income is higher than what was estimated for both Alaska and the United States. The City of Houston has the lowest median household income of roughly \$52,000, while the cities of Palmer and Wasilla have median household incomes hovering around \$60,000. While the median household incomes of residents living in the Borough has steadily increased since the year 2000, the employment rates have decreased (see further discussion below). The rise in household income could be attributed to inflation, fewer better paying jobs, or an influx of retired individuals collecting retirement, but no longer working. In addition to median household income, the Matanuska-Susitna Borough reported 10.2 percent of residents living below the Federal poverty level. The largest percentage of residents living in poverty was found in the City of Houston at 15.8 percent. The Cities of Palmer and Wasilla reported poverty rates at 10.3 percent and 11.2 percent, respectively (Figure 4).

Figure 3: Median Household Income Between 2000 and 2014

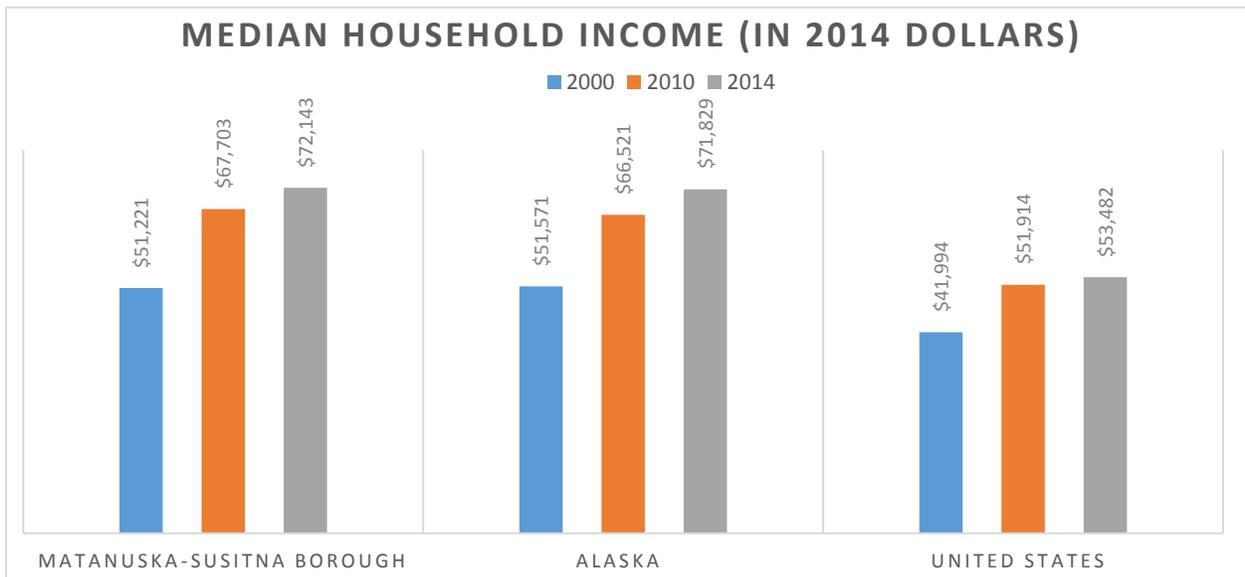
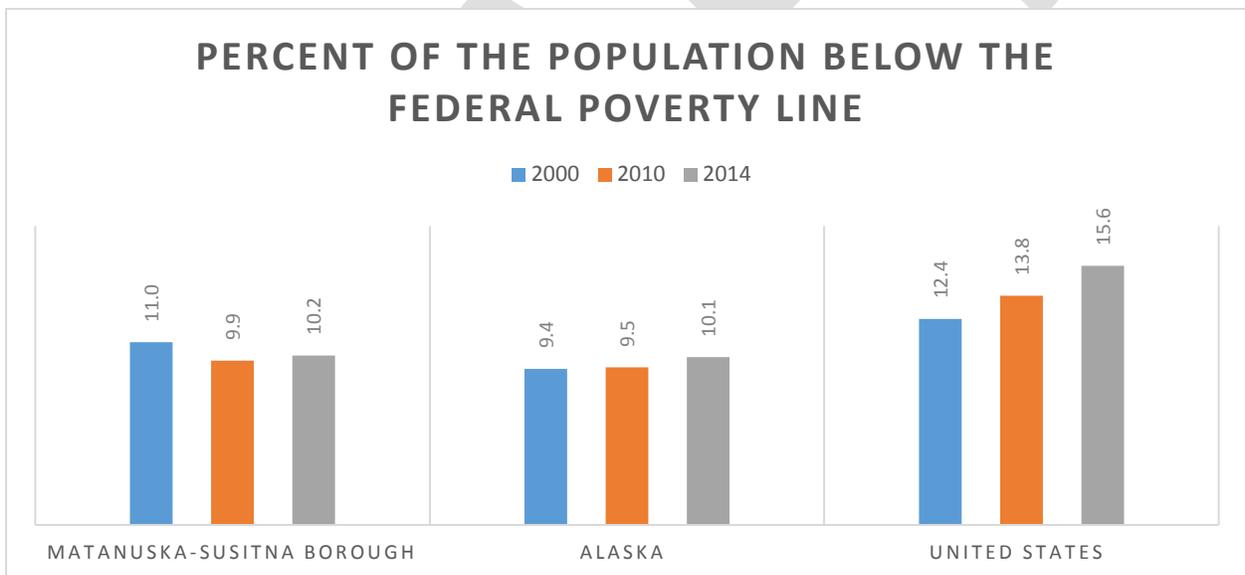
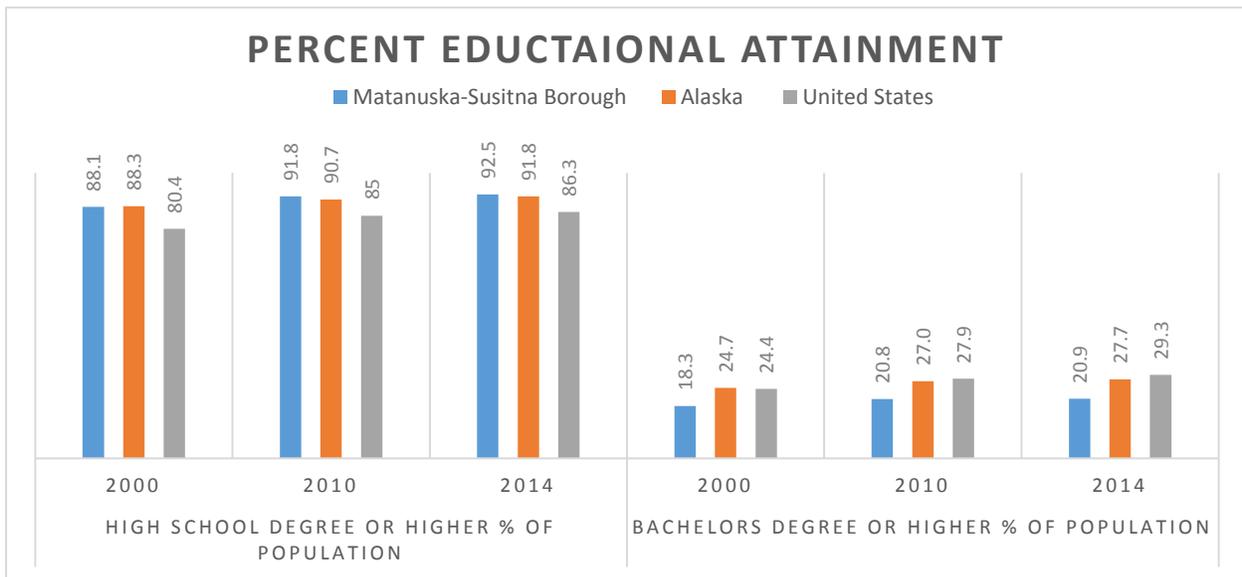


Figure 4: Percentage of Population Living below the Poverty Line Between 2000 and 2014



Educational attainment is a measure of how many individuals have received a high school degree or higher, or a bachelor’s degree or higher. Obtaining a higher education may result in higher wages and more financial stability. Within the Matanuska-Susitna Borough the average percent of residents graduating with a high school degree or higher is aligned with the statewide average at roughly 92 percent, approximately 5 percent higher than the nationwide estimate (Figure 5). However, when analyzing the percentage of individuals obtaining a bachelor’s degree or higher, the numbers for the Borough are much lower, at only 20.9 percent when compared to the statewide (27.8 percent) and national (29.3 percent) numbers.

Figure 5: Percentage of Population with High School Degree or Higher Between 2000 and 2014

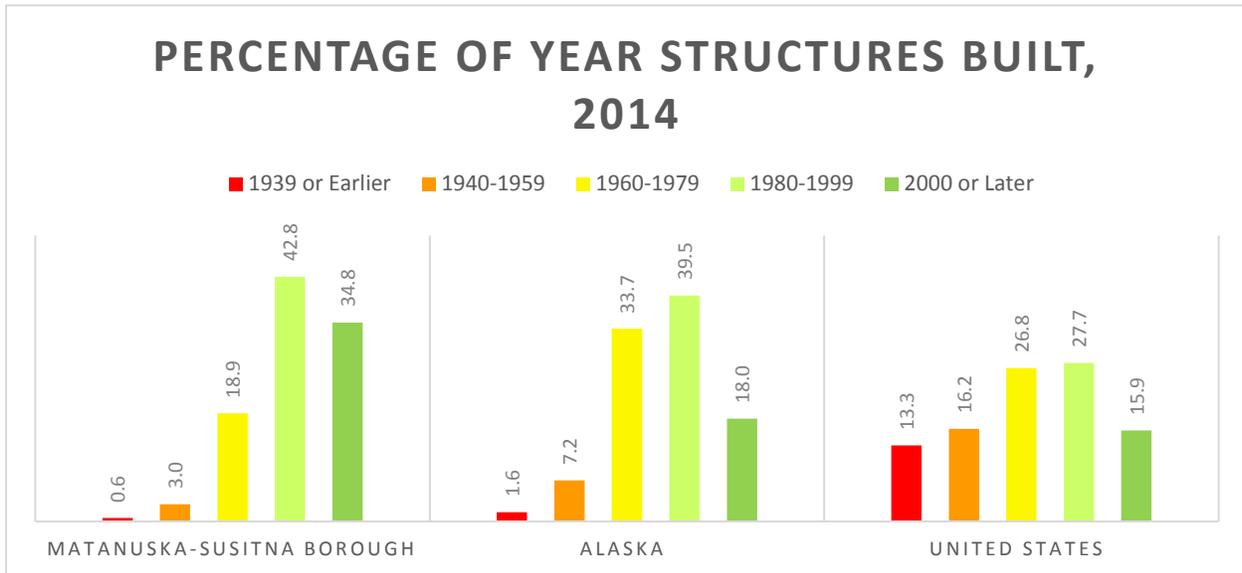


In the Matanuska-Susitna Borough, the majority of the population is living above the poverty line allowing more individuals to become home owners. Homeownership allows individuals to make structural alterations to their homes to prepare for disasters and mitigate potential damages. Between the years 2010 and 2014, the percentage of Borough residents owning their own homes declined by 3.0 percent. However, the Borough has maintained a higher percentage of owner occupied households, at 76.2 percent, when compared to Alaska (63.3 percent) and the United States (64.4 percent). Renters account for 23.8 percent of the households in the Borough, 21.8 percent in the City of Houston, 40.9 percent in the City of Palmer, and 46.6 percent in the City of Wasilla. Of the renters, the percentage of households spending more than 35.0 percent of their income towards rent is five percent higher in the Matanuska-Susitna Borough than the rest of Alaska. The cities of Houston, Palmer, and Wasilla reported 45.3 percent, 41.5 percent, and 44.5 percent of households spending more than 35.0 percent of their income towards rent, respectively. Spending more of their income on rent may prevent these individuals from having the financial ability to prepare for natural disasters, access reliable transportation, and rebuild stronger after a hazard event.

Economic sustainability is encouraged through employment and job security. On an individual level, financial stability increases with the increase of employment rates. In addition, a healthy job market brings economic growth to communities. In 2014, the employment rate for the Matanuska-Susitna Borough was equal to the national rate at roughly 57.0 percent. However, when compared to Alaska, the Borough's employment rate was 5.0 percent lower. The lowest rate of employment was found in the City of Houston, with only 48.2 percent of the labor force employed. Since 2000, the employment rates have declined in the Matanuska-Susitna Borough. Between 2010 and 2014, the percent of employment decreased by 3.1 percent. Additionally, the Matanuska-Susitna Borough has a significantly higher rate of unemployment compared to Alaska and the United States. In 2014, unemployment rates were at 10.0 percent Borough wide while the City of Houston reported 18.2 percent unemployment, and the cities of Palmer and Wasilla estimated an unemployment rate of 10.0 percent. Mitigation strategies involving personal preparedness, and structural retrofits should be communicated with the understanding that many working age individuals may be temporally out of work and lack financial stability.

Regardless of the employment factors, the Matanuska-Susitna continues to grow. The majority of the Borough's structures were built after the 1980s (Figure 6). Of the cities within the Borough, Houston has the largest percentage of structures built before the 1980s at 10.6 percent. This recent development, regulated to modern seismic building codes and standards, has resulted in building stock that may be more resilience to natural hazards.

Figure 6: Building Stock by Time Period



Socioeconomic Conclusion

Learning more about how to provide and effectively communicate multi-hazard risk information to residents is crucial when implementing hazard mitigation strategies. With the available demographic information, FEMA can assist community representatives in establishing better connections and delivery methods to keep the public informed, engaged, and aware of the risks presented by multiple hazards in the area, while understanding the audience the Agency wishes to reach.

2. Flood Risk Assessment

Flood Hazard Overview

The Matanuska-Susitna Borough identified 34 sources of flooding that could occur independently or together. Flooding could result from heavy rainfall, urban stormwater overflow, rapid snowmelt, rising groundwater, chronic debris deposition, ice jamming, flash flooding, fluctuating lake levels, alluvial fan flooding, glacial lake outbursts, subglacial release, coastal storm surges, and tsunamis.

The varying sources of local flooding make this hazard a regular occurrence in the region. The city of Wasilla Hazard Mitigation Plan tracks historical flood events back to the late 1970s and highlights several flood events along the Knik River, Matanuska River, and additional streams within the Matanuska-Susitna Valley. The three flood events that received Presidential Disaster Declarations, with the most recent occurrence in 2012, are highlighted in the following paragraphs.

Table 2: Presidential Flood Disaster Declaration History

DISASTER NUMBER	DECLARATION DATE	DISASTER TYPE	INCIDENT TYPE	TITLE	INCIDENT BEGIN DATE	INCIDENT END DATE
4094	11/27/2012	DR	Flood	SEVERE STORM, STRAIGHT-LINE WINDS, FLOODING, AND LANDSLIDE	09/15/2012	09/30/2012
1423	06/26/2002	DR	Flood	FLOODING	04/27/2002	05/30/2002
782	10/27/1986	DR	Flood	SEVERE STORMS, FLOODING	10/10/1986	10/13/1986

DR-4094

On November 27, 2012, Federal disaster aid was made available to the State of Alaska to support State, Tribal, and local recovery efforts in the Matanuska-Susitna Borough areas affected by flooding on September 15-30, 2012. In addition to Public Assistance funding, \$3.1 million was made available in the State of Alaska through the FEMA Hazard Mitigation Grant Program (HMGP). The purpose of the HMGP is to help communities implement hazard mitigation measures following a Presidential major disaster declaration. Hazard mitigation is any action taken to reduce or eliminate long-term risk to people and property from natural hazards.

Table 3: DR-4094 Public Assistance - Dollars Approved

	TOTAL PUBLIC ASSISTANCE GRANTS - DOLLARS OBLIGATED*	EMERGENCY WORK (CATEGORIES A-B) - DOLLARS OBLIGATED*	PERMANENT WORK (CATEGORIES C-G) - DOLLARS OBLIGATED*
Total Amount	\$11,024,415.21	\$1,866,197.93	\$8,870,563.28

DR-1423

On June 26, 2002, Federal disaster aid was made available to the Matanuska-Susitna Borough due to flooding caused by spring break-up flooding. This resulting in flooding from April 27 to May 30, 2002. In addition to Public Assistance funding, \$495,432 was made available in the State of Alaska through the FEMA HMGP.

Table 4: DR-1423 Public Assistance - Dollars Approved

	TOTAL PUBLIC ASSISTANCE GRANTS - DOLLARS OBLIGATED*	EMERGENCY WORK (CATEGORIES A-B) - DOLLARS OBLIGATED*	PERMANENT WORK (CATEGORIES C-G) - DOLLARS OBLIGATED*
Total Amount	\$3,266,024.79	\$337,529.94	\$2,783,374.44

DR-782

On October 27, 1986, Federal disaster aid was made available to the Matanuska-Susitna Borough following a series of severe storms. The Matanuska-Susitna Borough experienced record rainfall causing widespread flooding. The flooding resulted in a Presidentially Disaster Declaration for flooding from October 10-13, 1986. No FEMA based financial assessments are publicly available for Public Assistance. However, \$325,364 was made available in the State of Alaska through the FEMA HMGP.

Studying Flood Hazards with the Risk MAP Program

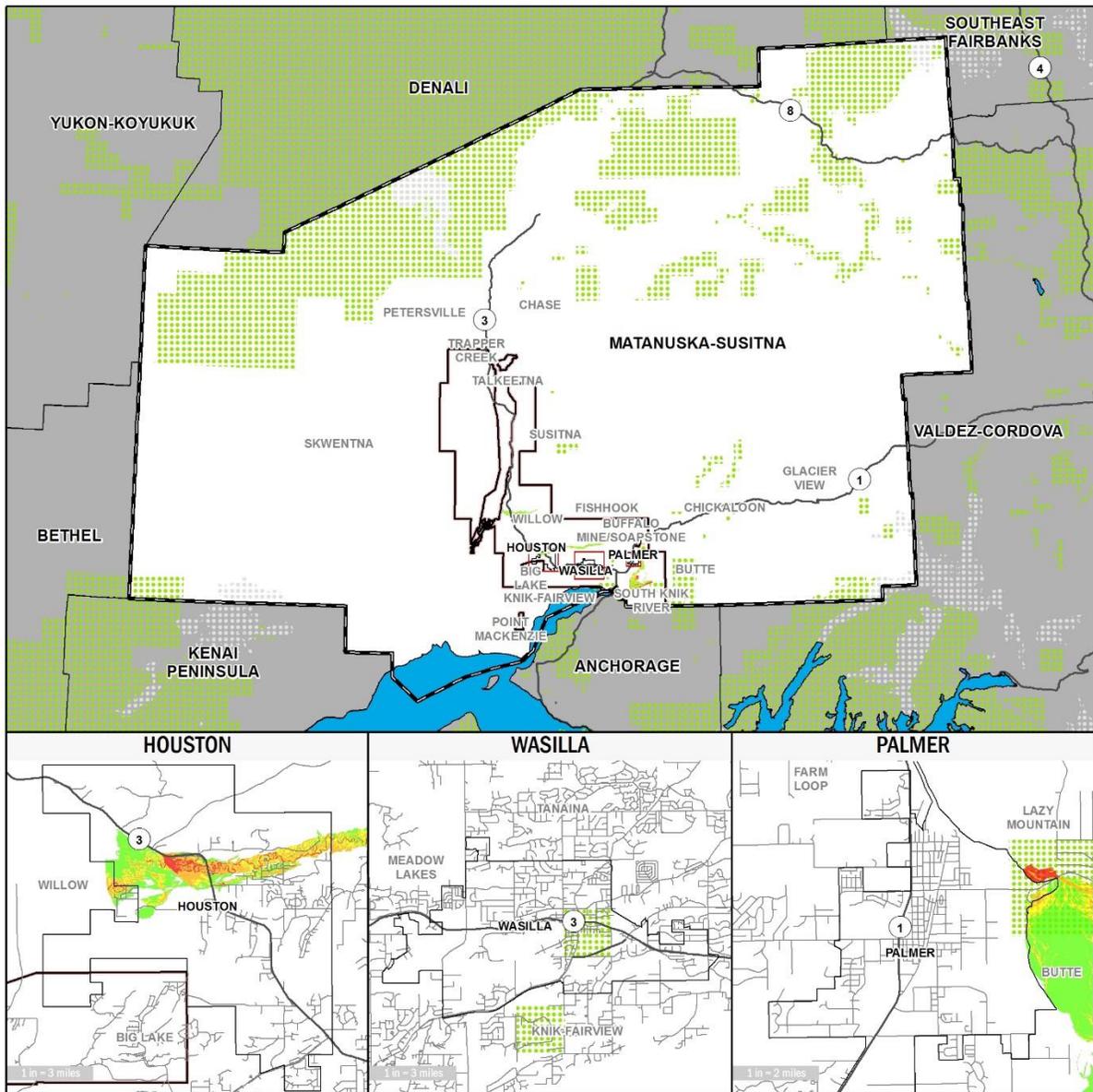
In 2016, FEMA created a new Flood Insurance Rate Map (FIRM) for the Matanuska-Susitna Borough. New riverine flood modeling was performed. Areas subject to inundation by the 1-percent-annual-chance flood, or Special Flood Hazard Areas (SFHAs), based on existing modeling were mapped for the Cities of Houston, Palmer, and Wasilla. Future determinations of SFHAs could be necessitated by changed conditions affecting applicable communities (i.e., annexation of new lands) or the availability of new scientific or technical flood hazard data.

In addition to a new FIRM, flood risk assessment products were developed and used to prepare this Risk Report. Depth grids for the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance flood events were created for select riverine areas. Depth grids, which display the flood depth in feet, were used in this risk assessment to determine which properties would be affected by flooding. The flood frequency depth grids for the project area are shown in Map 2 through 6.

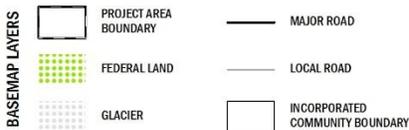
A depth grid can also be used as an outreach tool to show the hazards of flooding. Properties shown to be affected by a flood event would be excellent locations for mitigation projects. Some of these potential mitigation projects are highlighted in the section of this report for each community.

In addition to the depth grids, water surface elevation grids for each frequency were created. These tools provide Base Flood Elevations at various frequencies and are summarized in the Percent Annual Chance Flood Map (Map 7). The grid datasets can be used for future land use and comprehensive planning. These products are meant to guide local communities with quick flood elevation determinations.

0.2 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DEPTH



MAP SYMBOLOLOGY



ABOUT

THIS MAP DISPLAYS FLOOD DEPTHS IN A 0.2 PERCENT ANNUAL CHANCE FLOOD EVENT.

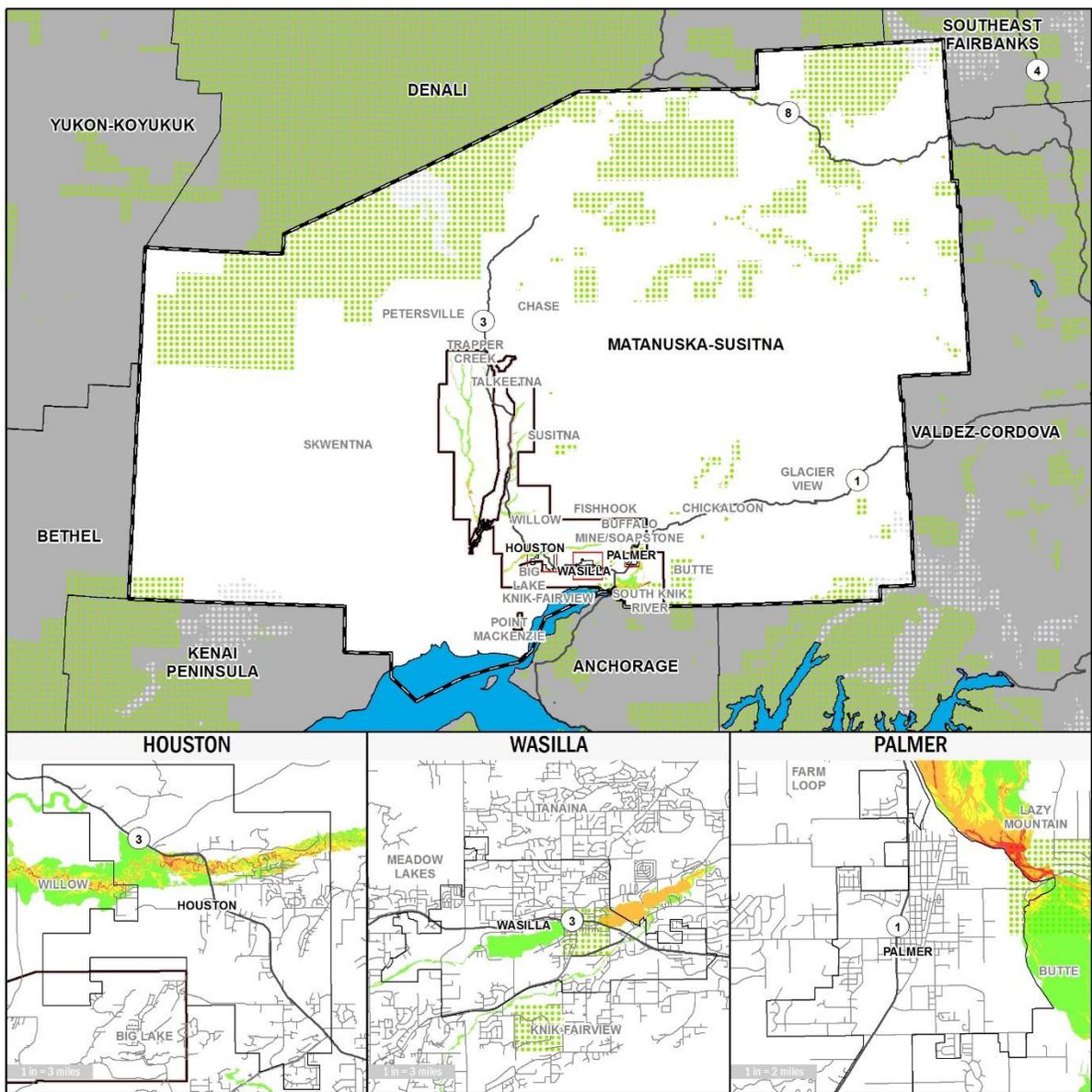
1 in = 37 miles

1:2,344,320

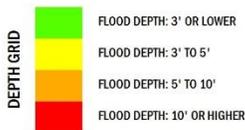
SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

Map 3: 1-Percent-Annual-Chance Depth Grid (in feet)

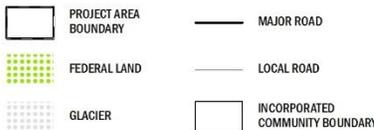
1 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DEPTH



MAP SYMBOLOLOGY



BASEMAP LAYERS



ABOUT

THIS MAP DISPLAYS FLOOD DEPTHS IN A 1 PERCENT ANNUAL CHANCE FLOOD EVENT.

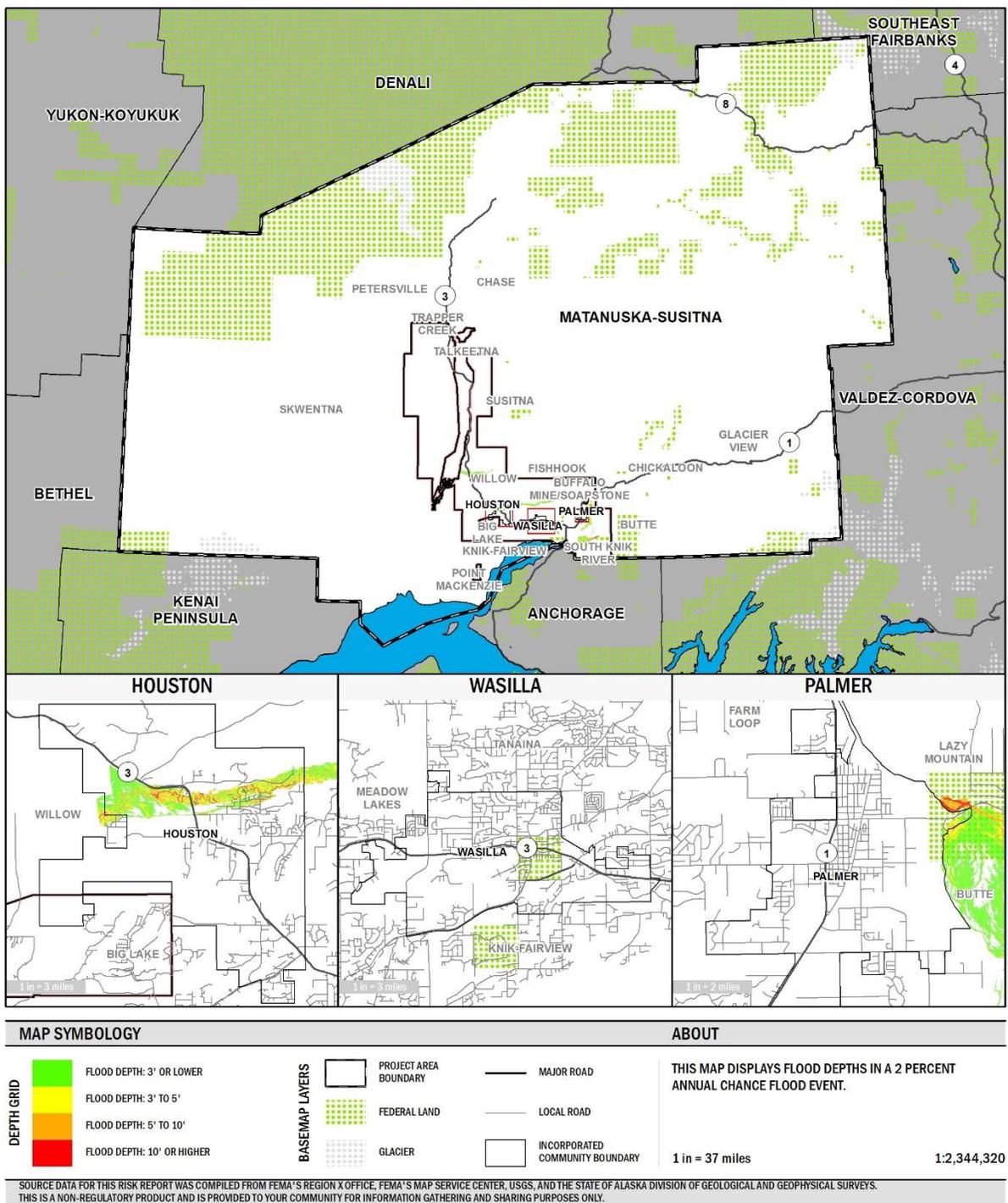
1 in = 37 miles

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SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

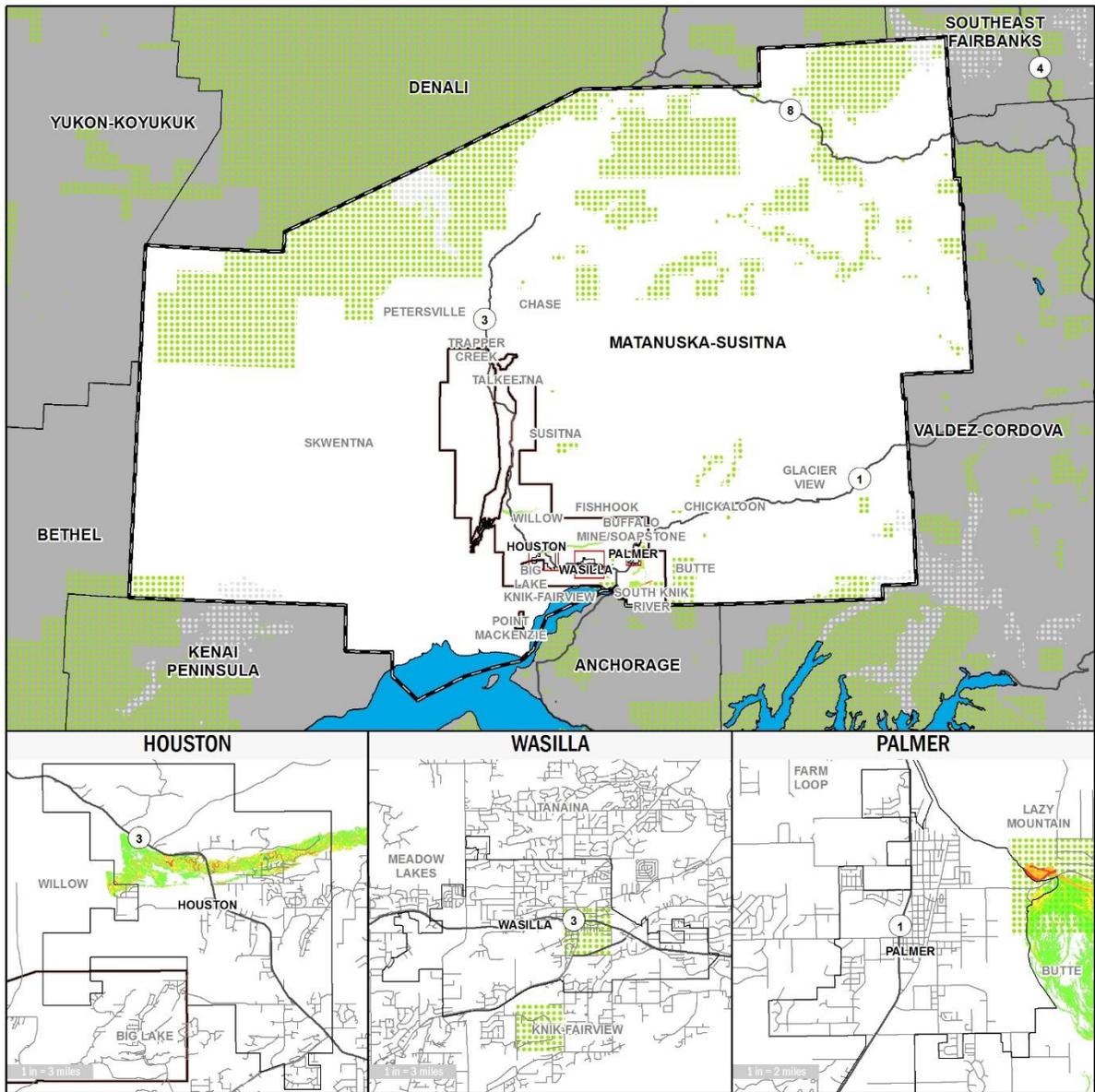
Map 4: 2-Percent-Annual-Chance Depth Grid (in feet)

2 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DEPTH

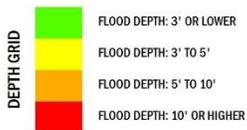


Map 5: 4-Percent-Annual-Chance Depth Grid (in feet)

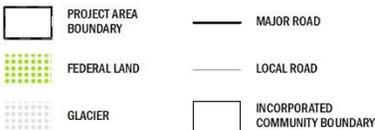
4 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DEPTH



MAP SYMBOLOLOGY



BASEMAP LAYERS



ABOUT

THIS MAP DISPLAYS FLOOD DEPTHS IN A 4 PERCENT ANNUAL CHANCE FLOOD EVENT.

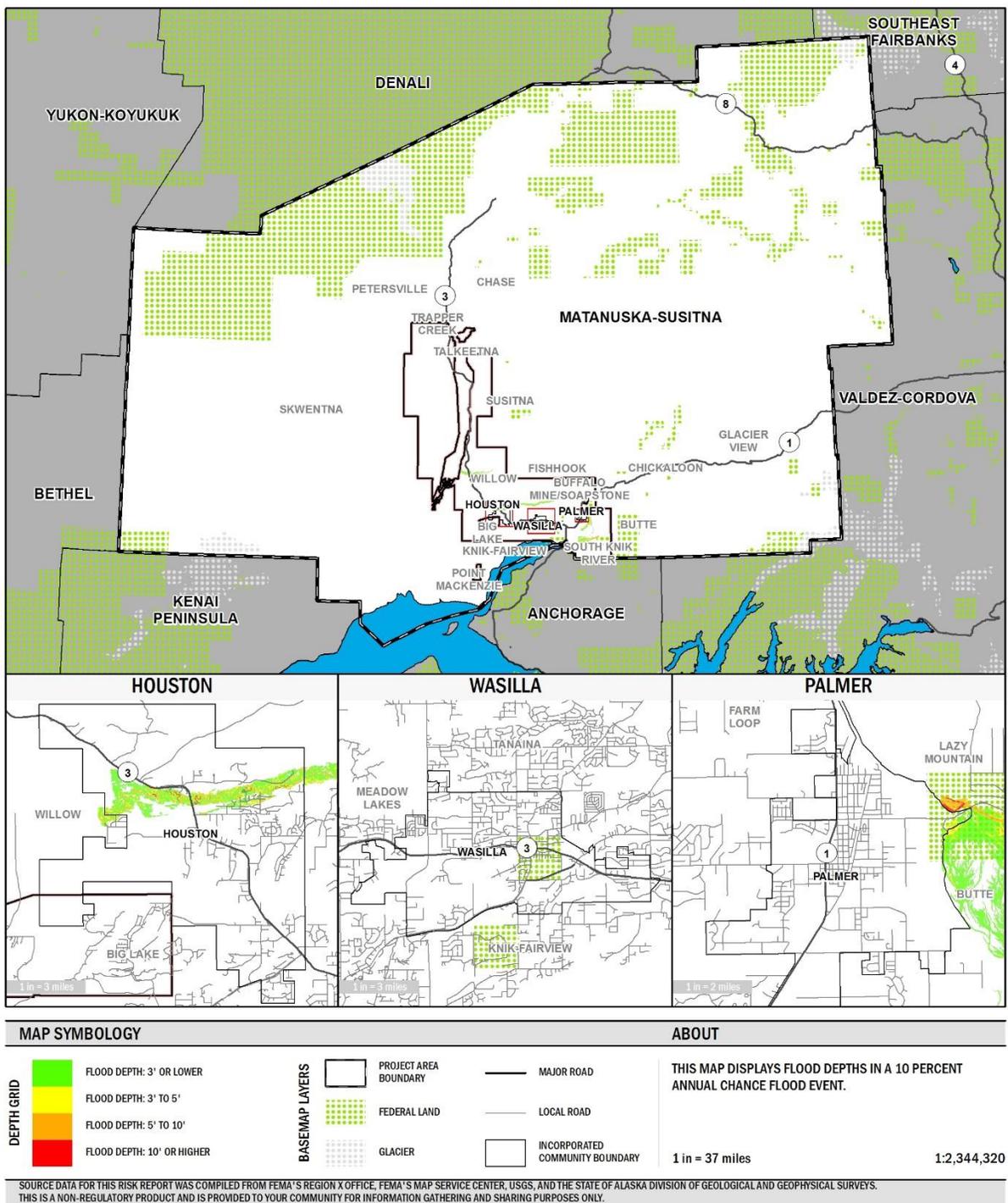
1 in = 37 miles

1:2,344,320

SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

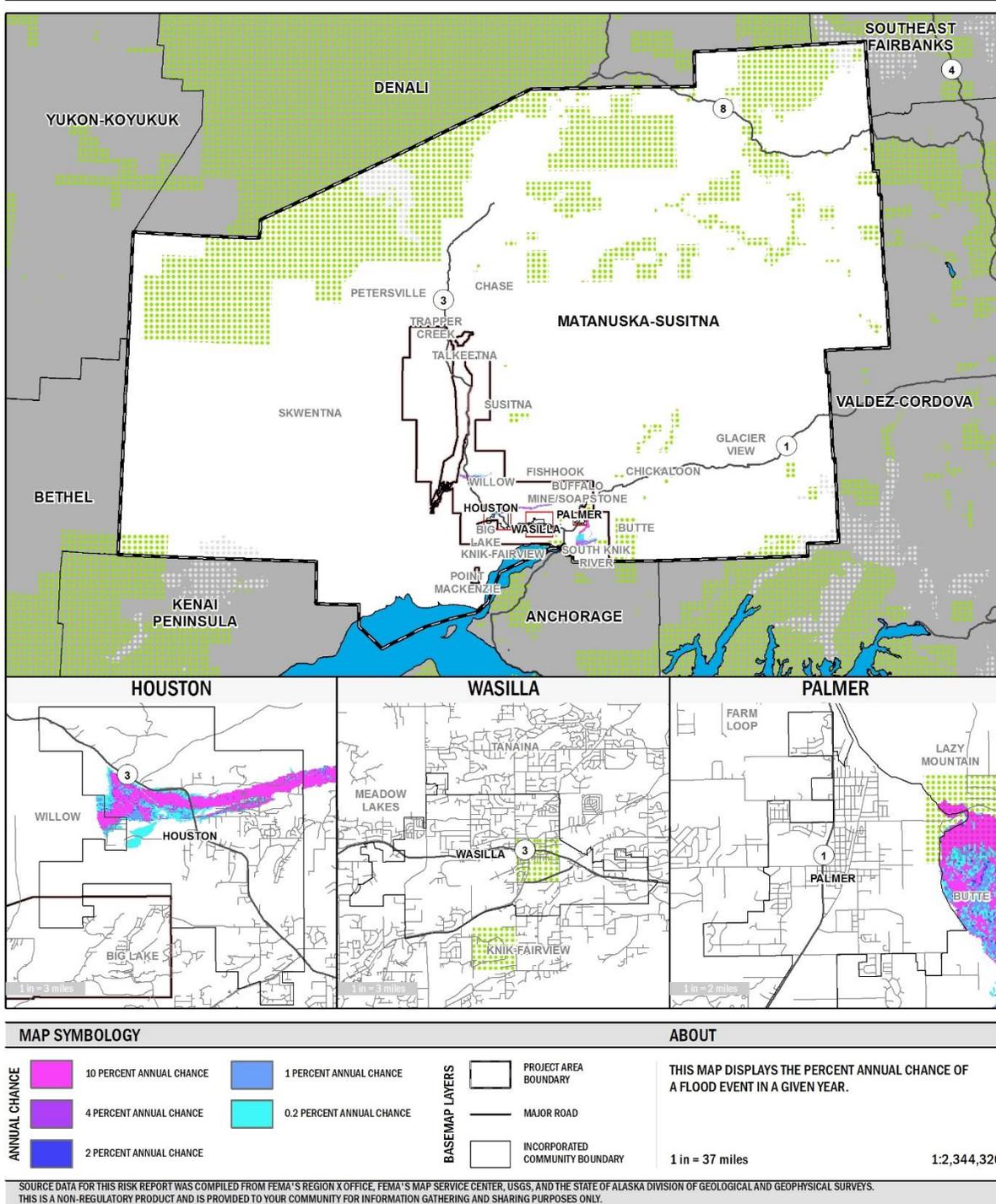
Map 6: 10-Percent-Annual-Chance Depth Grid (in feet)

10 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DEPTH



Map 7: Percent Annual Chance of Flood Events

PERCENT ANNUAL CHANCE OF FLOOD EVENTS



Flood Risk Assessment Overview

This flood risk assessment includes the communities shown in Table 2Table 5:

Table 5: Community Characteristics

COMMUNITY NAME	TOTAL POPULATION (2015 EST.)	CRS COMMUNITY	FLOOD CLAIMS	REPETITIVE LOSS PROPERTIES	TOTAL POLICIES	TOTAL INSURANCE COVERAGE
Matanuska-Susitna Borough	82,817	No	78	6	282	\$64,094,400
Houston, City of*	2,206	No	--	--	--	--
Palmer, City of*	6,788	No	--	--	--	--
Wasilla, City of*	9,284	No	--	--	--	--

- (no data available)

Note: Population estimate from US Census. American FactFinder. Insurance data from FEMA Community Information System platform.

The information in Table 5 can be used to highlight communities that are already affected by flooding, including repetitive loss properties and flood claims. In addition, the insurance coverage can be to the dollar losses shown in

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Table 6 to determine if enough coverage exists for a specific event.

The flood risk assessment was completed using Hazus-MH 3.2, FEMA's loss estimation software, with individual parcel data provided by the Borough. Only properties with buildings (improvements) were incorporated into the analysis; therefore, no impacts to vacant land were assessed. Depth grids derived from the Risk MAP project were also used for this analysis. For this assessment, coastal and riverine depth grids were used where available, as shown in Map 2. Buildings in areas where depth grids were available were incorporated into Hazus, which provided building, content, and/or inventory loss values.

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Table 6 highlights the building value and loss ratios of parcels within the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance floodplains, by community. Parcels with buildings intersecting any SFHA are also summarized by community, where the flood hazard data was available.

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Table 6: SFHA Assessments and Building Value and Loss Ratios of Parcels

COMMUNITY	NUMBER OF ANALYZED BUILDINGS	TOTAL ESTIMATED BUILDING VALUE	0.2% ANNUAL CHANCE FLOOD EVENT		1% ANNUAL CHANCE FLOOD EVENT		2% ANNUAL CHANCE FLOOD EVENT		4% ANNUAL CHANCE FLOOD EVENT		10% ANNUAL CHANCE FLOOD EVENT	
			BUILDING DOLLAR LOSS	LOSS RATIO	BUILDING DOLLAR LOSS	LOSS RATIO	BUILDING DOLLAR LOSS	LOSS RATIO	BUILDING DOLLAR LOSS	LOSS RATIO	BUILDING DOLLAR LOSS	LOSS RATIO
Big Lake	1	\$370.0K	--	--	\$60.0K	16.22%	--	--	--	--	--	--
Butte	59	\$10.7M	\$2.2M	21.68%	\$1.1M	16.47%	\$780.0K	16.99%	\$840.0K	18.30%	\$690.0K	18.00%
Fishhook	77	\$11.6M	\$2.0M	18.18%	\$1.7M	15.31%	\$1.2M	15.96%	\$1.0M	13.81%	\$620.0K	13.70%
Gateway	48	\$14.1M	--	--	\$1.2M	12.75%	--	--	--	--	--	--
Houston, City of	93	\$10.3M	\$3.0M	28.85%	\$2.0M	24.44%	\$1.5M	21.79%	\$1.1M	17.15%	\$620.0K	12.90%
Knik-Fairview	8	\$2.1M	--	--	\$370.0K	17.96%	--	--	--	--	--	--
Meadow Lakes	78	\$11.1M	\$2.9M	26.46%	\$2.4M	21.88%	\$2.0M	19.25%	\$718.0K	19.08%	\$1.3M	15.70%
Palmer	2	\$220.0K	\$20.0K	9.09%	\$40.0K	18.18%	\$10.0K	4.55%	--	--	\$30.0K	13.60%
Point Mackenzie	1	\$17.7M	--	--	\$9.5M	53.56%	--	--	--	--	--	--
South Kink River	58	\$11.1M	\$1.4M	12.20%	\$370.0K	3.97%	\$330.0K	9.14%	\$200.0K	10.10%	\$10.0K	2.60%
South Lakes	27	\$9.6M	--	--	\$650.0K	6.81%	--	--	--	--	--	--
Susitna	72	\$6.0M	--	--	\$800.0K	13.25%	--	--	--	--	--	--
Tanaina	51	\$7.0M	\$1.1M	16.06%	\$840.0K	14.09%	\$770.0K	15.28%	\$560.0K	16.09%	\$420.0K	15.20%
Trapper Creek	19	\$1.9M	--	--	\$270.0K	14.44%	--	--	--	--	--	--
Unincorporated Areas	28	\$6.3M	--	--	\$970.0K	14.43%	--	--	--	--	--	--
Wasilla, City of	5	\$3.8M	--	--	\$160.0K	4.22%	--	--	--	--	--	--
Willow	205	\$16.9M	\$3.2M	22.02%	\$3.1M	20.32%	\$2.0M	16.99%	\$1.5M	16.56%	\$1.2M	15.10%
Total	832	\$140.9M	\$15.6M	20.95%	\$26.0M	20.10%	\$8.6M	17.20%	\$7.0M	16.59%	\$4.9M	14.90%

Note: Dollar losses (in millions (M) or thousands (K) are reported, as well as a loss ratio, which is calculated as the total building losses/total building value. The loss values are for building and contents only; additional damages to infrastructure are not captured in this table.

The preliminary flood hazard data available for select locations throughout the Matanuska-Susitna Borough was used for a flood risk assessment. The Hazus flood analysis was based on the 832 structures identified within a riverine hazard area with an accompanying depth grid. A majority of those buildings are located in Willow, however, Point Mackenzie was assessed with the most building and content loss. Willow, located in the northern area of the Matanuska-Susitna Borough, has 205 buildings within the assessed area. The city of Houston and the unincorporated area of Meadow Lakes have 93 and 78 structures, respectively. Of the 832 buildings, 763 are located in 1-percent-annual-chance flood event. The highest projected building losses are in Willow, which accounts for 25 percent of the losses in the Borough. An estimated \$26 million of at-risk facilities could be lost during a 1-percent-annual-chance flood event. Other vulnerable areas include Point Mackenzie, with a projected \$9.5 million loss, Meadow Lakes with a potential \$2.4 million loss, and the city of Houston with a projected loss of \$1.9 million.

When comparing structures at risk in

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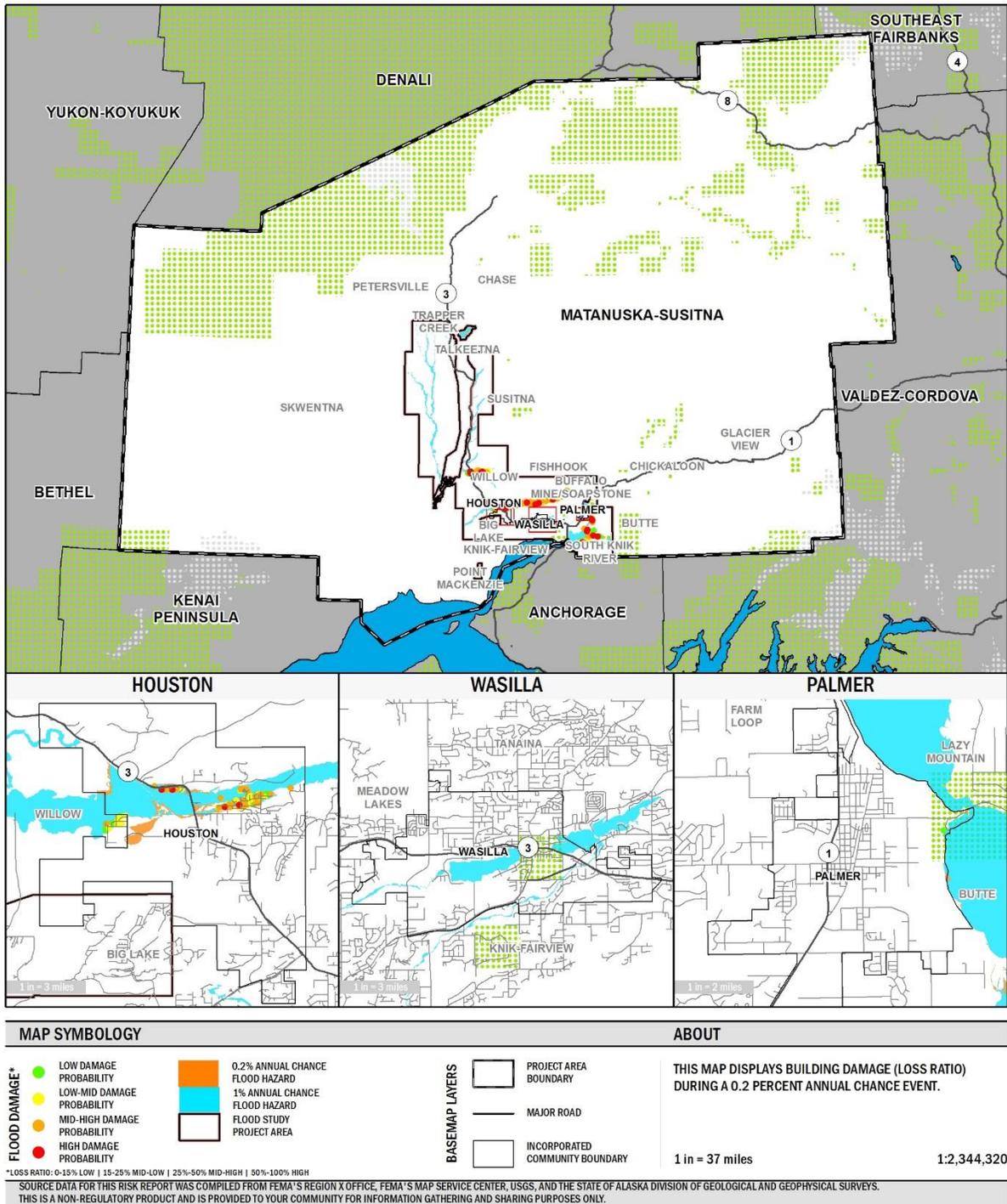
Table 6 to insurance policies in Table 5, the number of flood insurance policies in the Borough (282) is lower than the number of properties in the 1-percent-annual-chance study area (763). Communities should look to have a comparable level of insurance for their risk. Additional outreach promoting flood insurance is essential, as it covers both riverine and coastal flooding.

The community results shown above give an idea of where the largest flooding concerns are. This risk assessment includes information for every structure in each community within studied flood zones. The risk assessment can be used to determine which parcels in a community have the highest flood risk. Maps 8 through 13 show the potential losses during various flood frequencies within the Matanuska-Susitna Borough. Parcels shown in red and orange have the potential to be significantly damaged during a flood event, based on the depth of flooding at their location and the first floor elevation of the building.

The loss data from Hazus and the exposure analysis, which highlight the areas affected by flooding, can be used to identify properties for mitigation projects as well as areas to target for additional outreach. These areas of greatest impacts and potential mitigation actions will be highlighted in the community sections of this report. All results, databases, and maps are provided in the Risk Assessment Database included with this report.

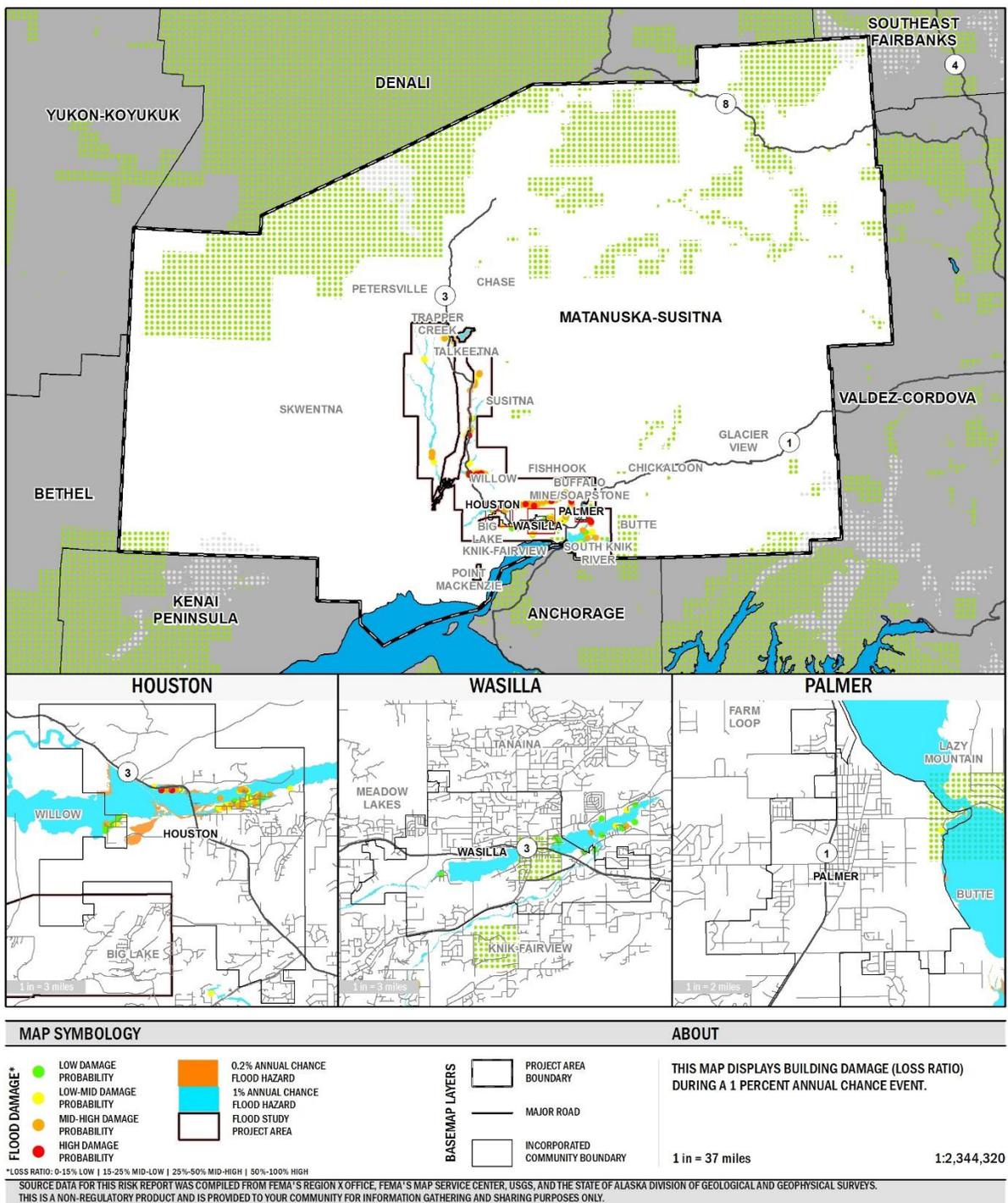
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0.2 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DAMAGE



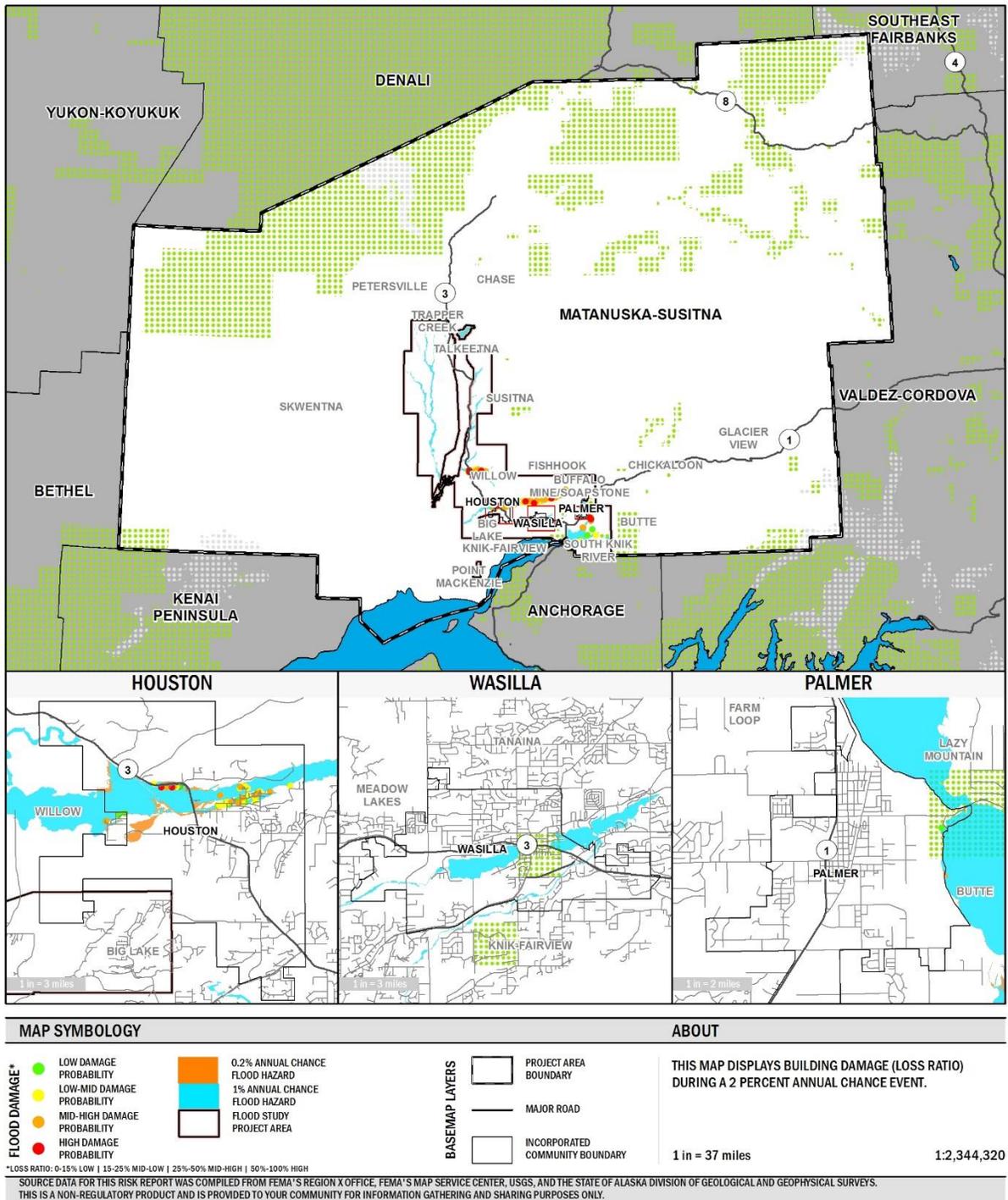
Map 9: Building Damage Percentage (Loss Ratio) for a 1-Percent-Annual-Chance Flood Event

1 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DAMAGE



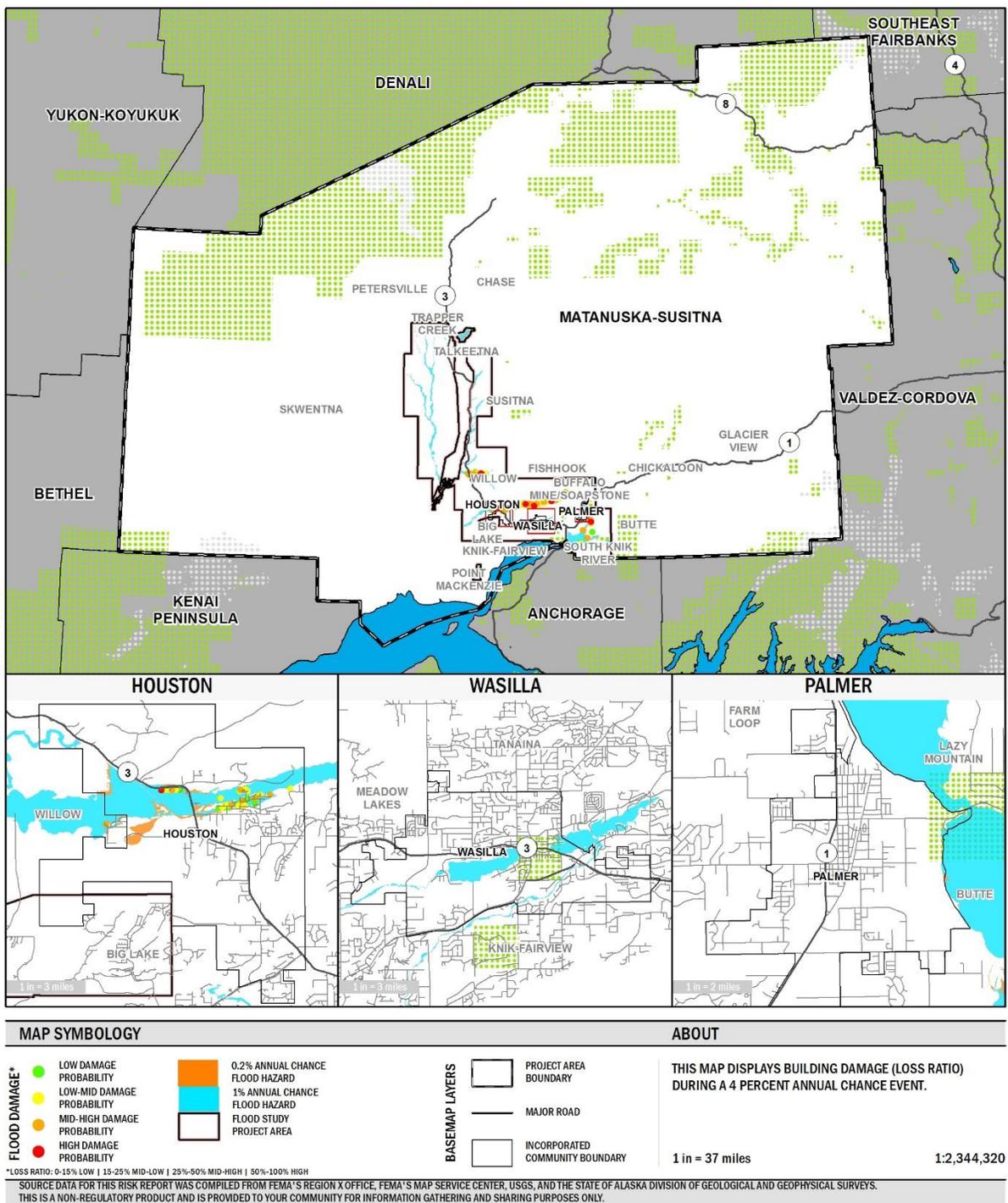
Map 10: Building Damage Percentage (Loss Ratio) for a 2-Percent-Annual-Chance Flood Event

2 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DAMAGE



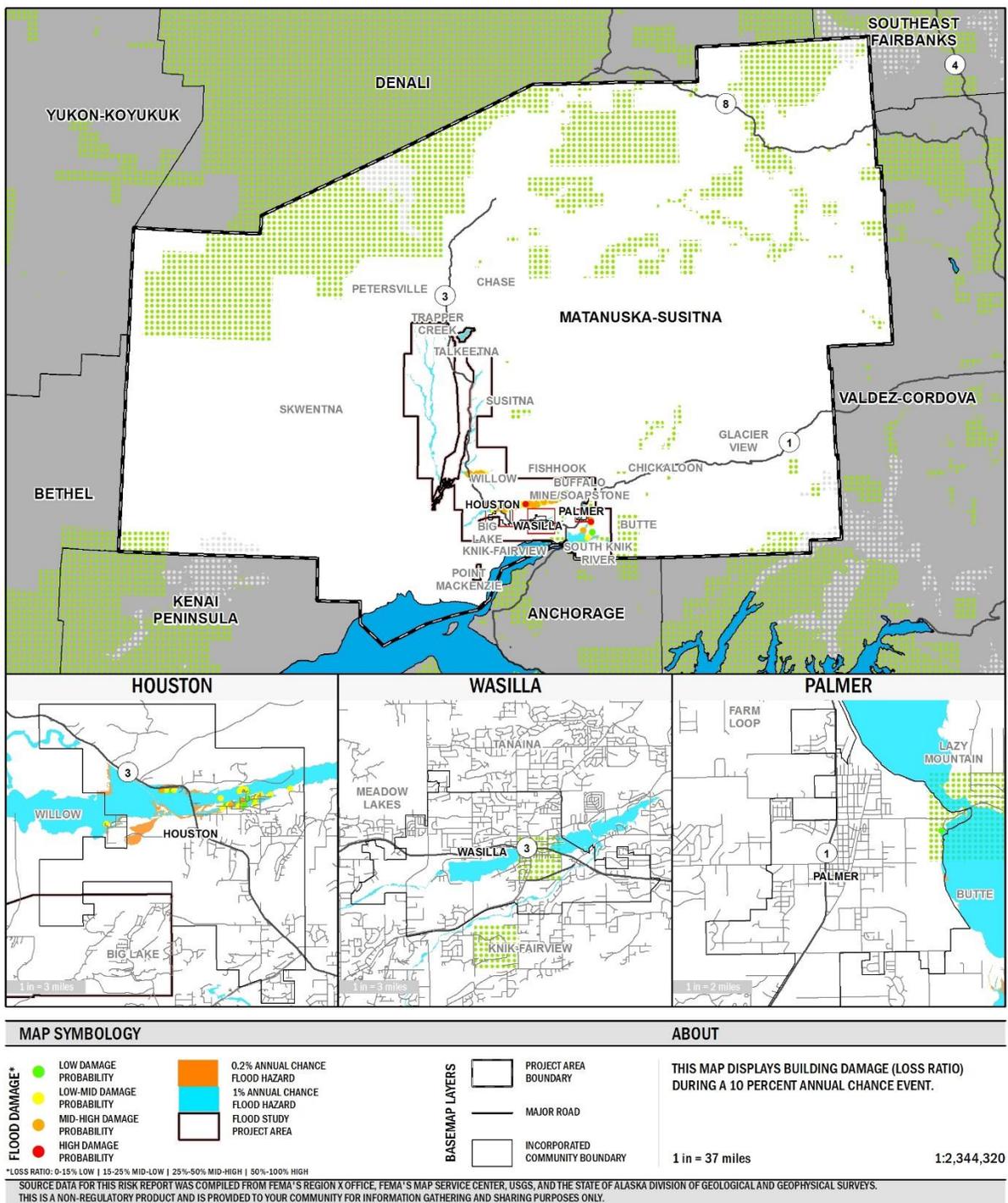
Map 11: Building Damage Percentage (Loss Ratio) for a 4-Percent-Annual-Chance Flood Event

4 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DAMAGE

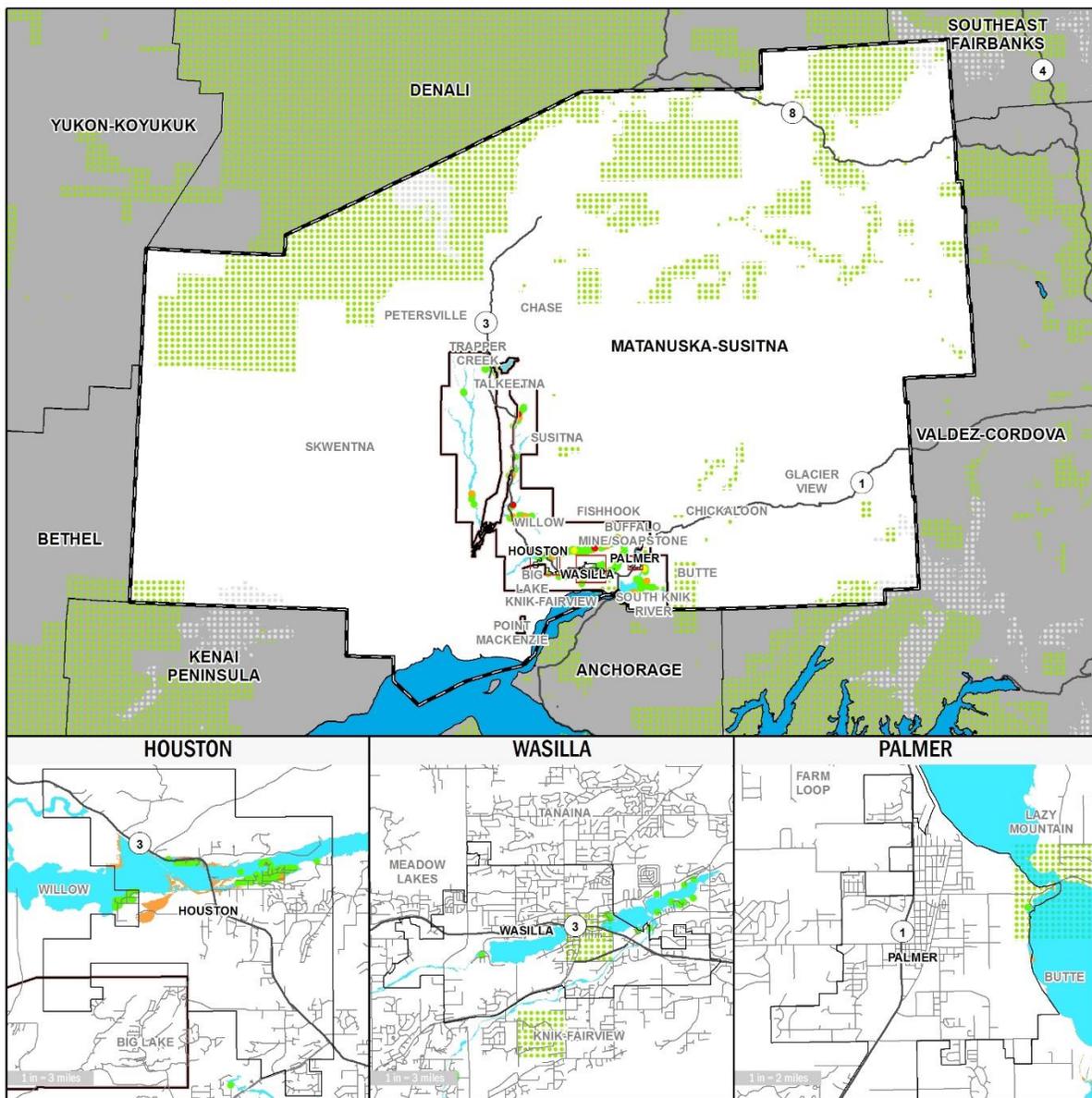


Map 12: Building Damage Percentage (Loss Ratio) for a 10-Percent-Annual-Chance Flood Event

10 PERCENT ANNUAL CHANCE FLOOD EVENT FLOOD DAMAGE



ANNUALIZED LOSS FLOOD DAMAGE



MAP SYMBOLOGY

- | | |
|--|---|
| <p>FLOOD DAMAGE*</p> <ul style="list-style-type: none"> ● LOW DAMAGE PROBABILITY ● LOW-MID DAMAGE PROBABILITY ● MID-HIGH DAMAGE PROBABILITY ● HIGH DAMAGE PROBABILITY | <ul style="list-style-type: none"> ■ 0.2% ANNUAL CHANCE FLOOD HAZARD ■ 1% ANNUAL CHANCE FLOOD HAZARD FLOOD STUDY PROJECT AREA |
|--|---|

- BASEMAP LAYERS**
- PROJECT AREA BOUNDARY
 - MAJOR ROAD
 - INCORPORATED COMMUNITY BOUNDARY

ABOUT

THIS MAP DISPLAYS BUILDING DAMAGE (LOSS RATIO) AS AN ANNUALIZED LOSS TO ESTIMATE DAMAGES OVER A PERIOD OF TIME.

1 in = 37 miles

1:2,344,320

*LOSS RATIO: 0-15% LOW | 15-25% MID-LOW | 25%-50% MID-HIGH | 50%-100% HIGH

SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

3. Earthquake Risk Assessment

Earthquake Hazard Overview

The Matanuska-Susitna Borough is subject to numerous earthquake events of varying magnitudes. The region faces significant risk from earthquakes resulting from the Pacific Plate subduction beneath the North American Plate. Since 1900, three out of the ten largest earthquakes in the world have occurred within Alaska (Wasilla Hazard Mitigation Plan, 2004).

The largest earthquake in the region occurred on March 27, 1964 known as the 1964 Great Alaska Earthquake. This 9.2 Magnitude (M) earthquake is the largest ever recorded in North America and the second largest in the world. The shaking lasted between four and five minutes and was felt over an area of approximately seven million square miles. The ground shaking caused a significant amount of ground deformation as well as triggering landslides and tsunamis. Two earthquake-related Presidential Disasters were declared in the State of Alaska, and are described below.

Table 7: Presidential Earthquake Disaster Declaration History for Alaska

DISASTER NUMBER	DECLARATION DATE	DISASTER TYPE	INCIDENT TYPE	TITLE	INCIDENT BEGIN DATE	INCIDENT END DATE
1440	11/2002	DR	Earthquake	EARTHQUAKE	11/3/2002	11/20/2002
168	3/1964	DR	Earthquake	EARTHQUAKE	03/28/1964	03/28/1964

DR-1440

On November 3, 2002, the 7.9M Denali earthquake struck Alaska with an epicenter roughly 150 miles north of Anchorage. The shock of the earthquake was the strongest ever felt in the interior of Alaska. Roads and bridges in undeveloped areas were affected the most by shaking and liquefaction. Both public and individual FEMA assistance grants were approved for affected communities in the State of Alaska. In addition to Public and Individual Assistance, FEMA HMGP grants were made available to the State of Alaska. In total, Alaska received just under \$3 million and the Matanuska-Susitna Borough was awarded with \$2,500 for seismic non-structural retrofits.

Table 8: DR-1440 Public Assistance - Dollars Approved

	TOTAL PUBLIC ASSISTANCE GRANTS - DOLLARS OBLIGATED*	EMERGENCY WORK (CATEGORIES A-B) - DOLLARS OBLIGATED*	PERMANENT WORK (CATEGORIES C-G) - DOLLARS OBLIGATED*
Total Amount	\$1,415,493.42	\$144,537.96	\$1,179,241.37

Table 9: DR-1440 Individual Assistance - Dollars Approved

	TOTAL PUBLIC ASSISTANCE GRANTS - DOLLARS OBLIGATED*	EMERGENCY WORK (CATEGORIES A-B) - DOLLARS OBLIGATED*	PERMANENT WORK (CATEGORIES C-G) - DOLLARS OBLIGATED*
Total Amount	\$1,415,493.42	\$144,537.96	\$1,179,241.37

ShakeMaps

Maps depicting the shaking intensity and ground motion produced by an earthquake, called ShakeMaps, can be produced in near-real time for events or created for specific scenarios by regional seismic network operators in cooperation with the U.S. Geological Survey (USGS). ShakeMaps can be used for response, land use, and emergency planning purposes. In this case, FEMA, the Matanuska-Susitna Borough, the Alaska Division of Geological and Geophysical Survey (DGGS), and the University of Alaska Fairbanks Alaska Earthquake Center (AEC) worked together to develop ShakeMaps for the following three earthquake scenarios:

1. M7.1 Border Ranges Scenario
2. M7.5 Castle Mountain Scenario
3. M9.2 1964 Great Alaskan Earthquake Scenario

The heaviest shaking and economic losses occurred during the M7.5 scenario within the Matanuska-Susitna Borough, specifically in the southern portion of the Borough where instrumental intensity reached 8.2, defined as *strong* shaking. Instrumental intensity observed during the M9.2 scenario were highest in the Cities of Houston, Palmer, and Wasilla, producing shaking intensities of 7.4.

Earthquake Risk Assessment Overview

Three earthquake risk assessments were performed using Hazus for this Risk Report. The first assessment uses a ShakeMap created for a magnitude 7.1 Scenario for the Border Ranges Fault. The second assessment uses a ShakeMap created for a magnitude 7.5 Scenario for the Castle Mountain Fault. The third assessment uses a ShakeMap created for a magnitude 9.2 Scenario for the 1964 Great Alaska Earthquake. All three earthquake risk assessments were completed using local parcel data from the Matanuska-Susitna Borough and the ShakeMaps as shown in Maps 14, 15, and 16. For this study, individual parcel data from the Borough was incorporated into Hazus to allow losses to be reported at the parcel level. Only properties with buildings (improvements) were incorporated into the analysis; therefore, no impacts to vacant land were assessed. Please refer to the appendix for a detailed methodology on incorporating local data into Hazus. The building loss from the earthquake assessments are summarized below in Table 10 and displayed in Maps 17 - 19.

Table 10: Hazus Earthquake Results

COMMUNITY NAME	TOTAL ESTIMATED VALUE (BUILDINGS AND CONTENTS)	TOTAL NUMBER OF BUILDINGS	M7.1 BORDER RANGES SCENARIO		M7.5 CASTLE MOUNTAIN SCENARIO		M9.2 1964 SCENARIO	
			TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)	TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)	TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)
Big Lake	\$660.0M	3,496	\$3.0M	0.41%	\$30.0M	4.64%	\$3.0M	0.43%
Buffalo Mine/Soapstone	\$90.0M	549	\$2.0M	2.15%	\$3.7M	4.32%	\$2.0M	1.78%
Butte	\$390.0M	1,702	\$9.0M	2.31%	\$5.0M	1.28%	\$10.0M	1.61%
Chase	\$14.0M	247	--	0.00%	--	0.03%	--	0.00%

COMMUNITY NAME	TOTAL ESTIMATED VALUE (BUILDINGS AND CONTENTS)	TOTAL NUMBER OF BUILDINGS	M7.1 BORDER RANGES SCENARIO		M7.5 CASTLE MOUNTAIN SCENARIO		M9.2 1964 SCENARIO	
			TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)	TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)	TOTAL DOLLAR LOSS	LOSS RATIO (DOLLAR LOSSES / TOTAL VALUE)
Chickaloon	\$30.0M	410	\$50.0K	0.13%	\$870.0K	2.35%	\$300.0K	0.89%
Farm Loop	\$140.0M	528	\$4.0M	3.22%	\$3.9M	2.90%	\$2.0M	1.49%
Fishhook	\$480.0M	1,960	\$7.0M	1.52%	\$20.0M	4.26%	\$4.0M	0.81%
Gateway	\$1.4B	2,517	\$47.0M	3.41%	\$30.0M	2.25%	\$20.0M	1.64%
Glacier View	\$70.0M	450	\$10.0K	0.01%	\$140.0K	0.21%	\$1.0M	1.60%
Houston	\$250.0M	1,122	\$1.0M	0.41%	\$10.0M	5.44%	\$1.0M	0.37%
Knik-Fairview	\$2.1B	7,110	\$22.0M	1.07%	\$50.0M	2.48%	\$10.0M	0.59%
Lazy Mountain	\$170.0M	760	\$5.0M	3.14%	\$3.8M	2.19%	\$3.0M	1.59%
Meadow Lakes	\$920.0M	4,341	\$6.0M	0.62%	\$50.0M	4.93%	\$4.0M	0.45%
North Lakes	\$680.0M	2,314	\$12.0M	1.76%	\$20.0M	3.05%	\$10.0M	0.90%
Palmer	\$1.2B	2,203	\$99.0M	8.58%	\$40.0M	3.24%	\$40.0M	3.23%
Petersville	\$15.0M	261	--	0.00%	--	0.02%	--	0.00%
Point Mackenzie	\$560.0M	430	\$4.0M	0.65%	\$10.0M	2.22%	\$5.0M	0.84%
Skwentna	\$50.0M	875	--	0.00%	\$80.0K	0.15%	--	0.00%
South Knik River	\$60.0M	457	\$1.0M	1.18%	\$440.0K	0.64%	\$1.0M	1.43%
South Lakes	\$620.0M	1,716	\$16.0M	2.50%	\$30.0M	4.10%	\$10.0M	1.20%
Susitna	\$240.0M	1,952	\$50.0K	0.02%	\$660.0K	0.28%	\$100.0K	0.04%
Sutton	\$130.0M	628	\$1.0M	1.13%	\$10.0M	9.91%	\$2.0M	1.26%
Talkeetna	\$190.0M	1,128	\$10.0K	0.00%	\$210.0K	0.11%	\$10.0K	0.01%
Tanaina	\$940.0M	3,271	\$9.0M	0.95%	\$40.0M	3.91%	\$10.0M	0.54%
Trapper Creek	\$60.0M	742	--	0.00%	\$40.0K	0.06%	--	0.01%
Unincorporated	\$1.6B	6,039	\$41.0M	2.50%	\$60.0M	3.58%	\$20.0M	1.23%
Wasilla	\$1.9B	3,423	\$34.0M	1.82%	\$120.0M	6.69%	\$20.0M	1.00%
Willow	\$410.0M	3,001	\$1.0M	0.12%	\$10.0M	1.48%	\$500.0K	0.12%
TOTAL	\$15.3B	53,632	\$323.0M	2.11%	\$550.0M	3.57%	\$179.0M	1.17%

Note: This table shows the total estimated parcel value (in millions (M) or thousands (K) by community. The total estimated value of improved parcels are only parcels with buildings. The total estimated value of parcels is the total building and content value on that parcel. Content value was estimated based on a percentage of the building value, as defined in the Hazus model. Dollar

losses are also reported as a loss ratio, which is calculated by the total losses (including building and contents loss)/total building and contents value. Estimated loss values are for the M7.1, M7.5, and M9.2 scenarios.

The Matanuska-Susitna Borough’s number of building values total \$15 billion and are highest in Knik-Fairview (\$2 billion). The City of Wasilla (\$1.9 billion) and the Unincorporated Areas (\$1.6 billion) represent the second and third highest total building and content values.

Losses estimated from the M7.1 Border Ranges Scenario were high across eastern jurisdictions and communities. The total building and content dollar loss was estimated to be close to \$323 million with a municipality-wide loss ratio of 2.11 percent. Gateway (3.41 percent), Farm Loop (3.22 percent), and Lazy Mountain (3.14 percent) have the highest loss ratios. The largest total loss values are projected for the Cities of Palmer (\$99 million) and Gateway (\$74 million).

The impacts of the M7.5 Castle Mountain Scenario are more than those of the M7.1 Border Ranges Scenario. Total losses from the M7.5 Castle Mountain Scenario are estimated to be \$550 million, with a municipality-wide loss ratio of 3.57 percent. Loss ratios are highest in Wasilla (6.69 percent) and Meadow Lakes (4.93 percent). Of the \$550 million in projected losses, the City of Wasilla had the largest amount of losses at \$120 million with a loss ratio of 6.69 percent. The Unincorporated Areas have \$60 million in total projected losses resulting in a loss ratio of 3.58 percent.

The M9.2 1964 Great Alaskan Earthquake Scenario resulted in loss estimates for most jurisdictions and communities within the Matanuska-Susitna Borough. Total losses for the Borough from the M9.2 1964 Great Alaskan Earthquake Scenario are \$178 million with a loss ratio of 1.17 percent. In regard to the total estimated value of improved parcels, the City of Palmer should expect the largest loss amount (\$40 million) resulting in a loss ratio of 3.23 percent. The unincorporated community of Gateway, the City of Wasilla, and the unincorporated areas of the Matanuska-Susitna Borough have the second highest loss amounts (\$20 million) during the M9.2 1964 Great Alaskan Earthquake Scenario.

Essential Facilities

Essential facilities identified by the Matanuska-Susitna Borough were extracted from the building analysis and shown in Table 11, Table 12 12, and Table 13 to determine the level of earthquake vulnerability after the identified earthquake event scenarios.

Table 11: Essential Facility Damage for the M7.1 Border Ranges Scenario

ESSENTIAL FACILITY	TOTAL FACILITIES (HAZUS OUTPUT AVAILABLE)	TOTAL FACILITIES VALUE (BUILDING AND CONTENTS)	FACILITIES WITH 5% LOSS RATIO OR HIGHER	PERCENT FACILITIES WITH 5% LOSS RATIO OR HIGHER	TOTAL LOSS	LOSS RATIO
ADMINISTRATIVE	7	\$69.1M	4	57.1%	\$8.4M	12.1%
ANIMAL CARE	1	\$6.9M	0	0.0%	\$235.5K	3.4%
CITY HALL	2	\$4.9M	0	0.0%	\$81.5K	1.7%
COMMUNITY CENTER	6	\$3.5M	0	0.0%	\$34.5K	1.0%
CORRECTIONAL FACILITY	4	\$456.6M	1	25.0%	\$4.0M	0.9%
COURTHOUSE	1	\$7.6M	1	100.0%	\$3.1M	40.8%
LIBRARY	7	\$25.0M	0	0.0%	\$440.1K	1.8%

ESSENTIAL FACILITY	TOTAL FACILITIES (HAZUS OUTPUT AVAILABLE)	TOTAL FACILITIES VALUE (BUILDING AND CONTENTS)	FACILITIES WITH 5% LOSS RATIO OR HIGHER	PERCENT FACILITIES WITH 5% LOSS RATIO OR HIGHER	TOTAL LOSS	LOSS RATIO
MEDICAL	5	\$203.2M	0	0.0%	\$6.7M	3.3%
MUSEUM	7	\$2.7M	2	28.6%	\$189.9K	7.1%
O&M	2	\$2.3M	0	0.0%	\$91.9K	4.1%
PERFORMING ARTS	3	\$30.5M	0	0.0%	\$1.1M	3.7%
POST OFFICE	13	\$16.0M	0	0.0%	\$412.5K	2.6%
PUBLIC SAFETY	47	\$113.4M	2	4.3%	\$3.5M	3.0%
SCHOOL	48	\$1.2B	4	8.3%	\$42.2M	3.5%
SENIOR COMM CENTER	4	\$17.0M	0	0.0%	\$622.6K	3.7%
SENIOR HOUSING	7	\$28.8M	1	14.3%	\$1.3M	4.5%
SOLID WASTE	11	\$24.2M	1	9.1%	\$779.3K	3.2%
TOTAL	175	\$2.2B	16	9.1%	\$73.2M	3.3%

Table 12: Essential Facility Damage for the M7.5 Castle Mountain Scenario

ESSENTIAL FACILITY	TOTAL FACILITIES (HAZUS OUTPUT AVAILABLE)	TOTAL FACILITIES VALUE (BUILDING AND CONTENTS)	FACILITIES WITH 5% LOSS RATIO OR HIGHER	PERCENT FACILITIES WITH 5% LOSS RATIO OR HIGHER	TOTAL LOSS	LOSS RATIO
ADMINISTRATIVE	7	\$69.1M	2	28.6%	\$2.5M	3.6%
ANIMAL CARE	1	\$6.9M	0	0.0%	\$141.7K	2.1%
CITY HALL	2	\$4.8M	0	0.0%	\$195.7K	4.0%
COMMUNITY CENTER	6	\$3.5M	1	16.7%	\$55.7K	1.6%
CORRECTIONAL FACILITY	4	\$456.6M	1	25.0%	\$5.9M	1.3%
COURTHOUSE	1	\$7.6M	1	100.0%	\$725.6K	9.6%
LIBRARY	7	\$25.0M	1	14.3%	\$2.0M	8.1%
MEDICAL	5	\$203.2M	0	0.0%	\$4.0M	1.9%
MUSEUM	7	\$2.7M	1	14.3%	\$92.0K	3.4%
O&M	2	\$2.3M	0	0.0%	\$37.2K	1.6%
PERFORMING ARTS	3	\$30.5M	1	33.3%	\$673.6K	2.2%
POST OFFICE	13	\$16.0M	2	15.4%	\$2.0M	12.5%
PUBLIC SAFETY	47	\$113.4M	7	14.9%	\$10.5M	9.3%
SCHOOL	48	\$1.2B	8	16.7%	\$59.1M	4.9%
SENIOR COMM CENTER	4	\$17.0M	1	25.0%	\$297.0K	1.8%
SENIOR HOUSING	7	\$28.7M	0	0.0%	\$659.5K	2.3%

ESSENTIAL FACILITY	TOTAL FACILITIES (HAZUS OUTPUT AVAILABLE)	TOTAL FACILITIES VALUE (BUILDING AND CONTENTS)	FACILITIES WITH 5% LOSS RATIO OR HIGHER	PERCENT FACILITIES WITH 5% LOSS RATIO OR HIGHER	TOTAL LOSS	LOSS RATIO
SOLID WASTE	11	\$24.2M	0	0.0%	\$546.3K	2.3%
TOTAL	175	\$2.2B	26	14.9%	\$89.4M	4.0%

Table 13: Essential Facility Damage for the M9.2 1964 Great Alaskan Earthquake Scenario

ESSENTIAL FACILITY	TOTAL FACILITIES (HAZUS OUTPUT AVAILABLE)	TOTAL FACILITIES VALUE (BUILDING AND CONTENTS)	FACILITIES WITH 5% LOSS RATIO OR HIGHER	PERCENT FACILITIES WITH 5% LOSS RATIO OR HIGHER	TOTAL LOSS	LOSS RATIO
ADMINISTRATIVE	7	\$69.1M	2	28.6%	\$2.3M	3.3%
ANIMAL CARE	1	\$6.9M	0	0.0%	\$117.1K	1.7%
CITY HALL	2	\$4.8M	0	0.0%	\$53.0K	1.1%
COMMUNITY CENTER	6	\$3.5M	0	0.0%	\$19.5K	0.6%
CORRECTIONAL FACILITY	4	\$456.6M	1	25.0%	\$3.4M	0.7%
COURTHOUSE	1	\$7.6M	1	100.0%	\$455.1K	6.0%
LIBRARY	7	\$25.0M	0	0.0%	\$304.7K	1.2%
MEDICAL	5	\$203.2M	0	0.0%	\$3.4M	1.7%
MUSEUM	7	\$2.7M	1	14.3%	\$48.6K	1.8%
O&M	2	\$2.3M	0	0.0%	\$46.1K	2.0%
PERFORMING ARTS	3	\$30.5M	0	0.0%	\$568.0K	1.9%
POST OFFICE	13	\$16.0M	0	0.0%	\$248.4K	1.6%
PUBLIC SAFETY	47	\$113.4M	0	0.0%	\$1.9M	1.6%
SCHOOL	48	\$1.2B	2	4.2%	\$16.3M	1.3%
SENIOR COMM CENTER	4	\$17.0M	0	0.0%	\$309.6K	1.8%
SENIOR HOUSING	7	\$28.7M	0	0.0%	\$695.2K	2.4%
SOLID WASTE	11	\$24.2M	0	0.0%	\$431.1K	1.8%
TOTAL	175	\$2.2B	7	4.0%	\$30.6M	1.4%

Note: The total estimated facilities value is the total building and content value on that parcel divided equally by the number of facilities on an improved parcel. Content value was estimated based on a percentage of the building value, as defined in the Hazus model. Dollar losses are reported as well as a loss ratio, which is calculated as the total losses (including building and contents loss)/total building and contents value.

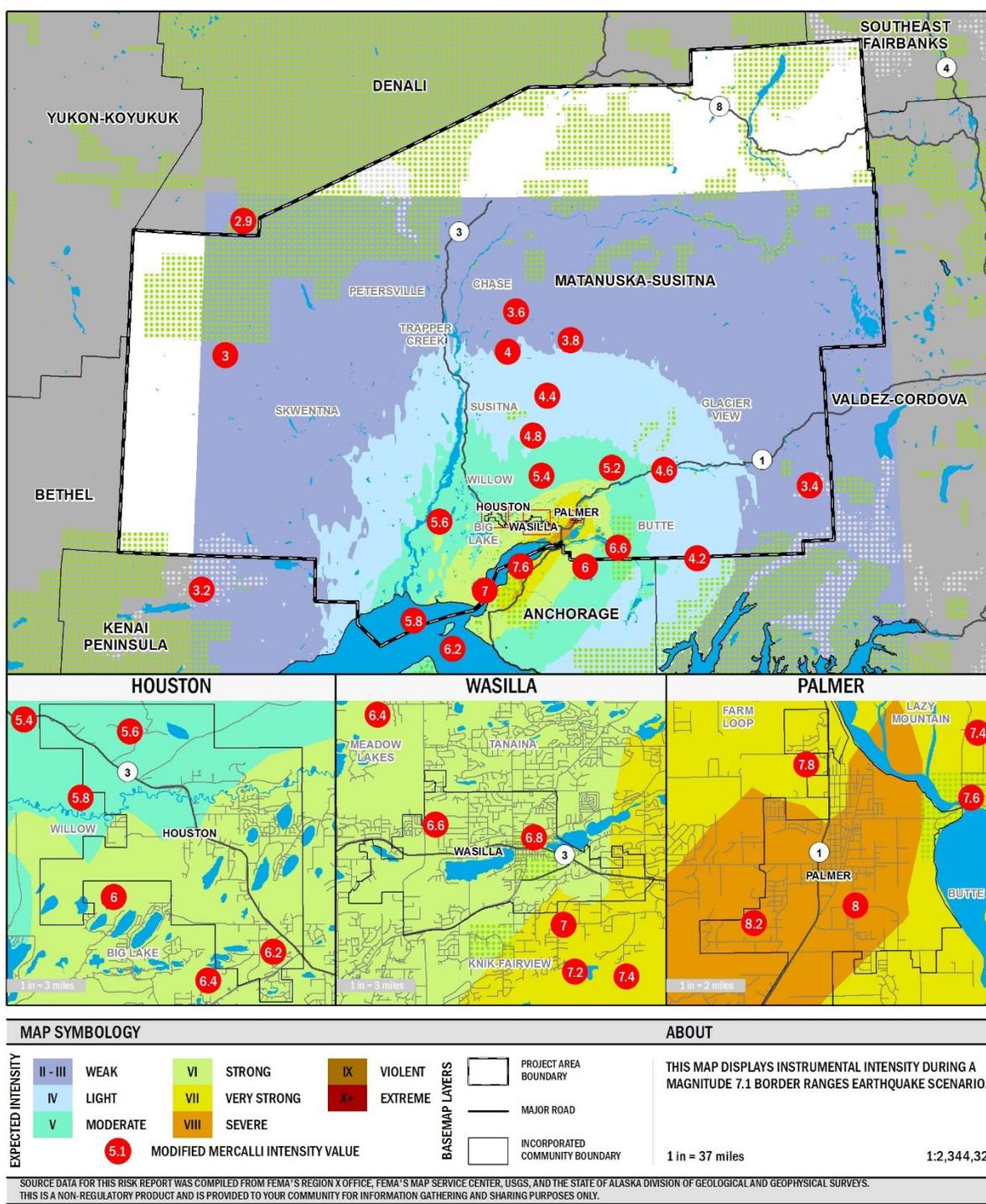
For the essential facilities with a Hazus earthquake output, the M7.5 Castle Mountain Scenario projects the highest total loss at \$89 million. This accounts for nearly 4.0 percent of all defined facilities within the Borough. The M7.5 Castle Mountain Scenario estimated 175 facilities with a 12.5-percent or higher loss ratio. Schools have the highest total loss values of all defined facilities. A detailed breakout of facilities is

available in the Area of Mitigation Interest tables in Section 7. Additional information is also available in the Risk Database.

DRAFT

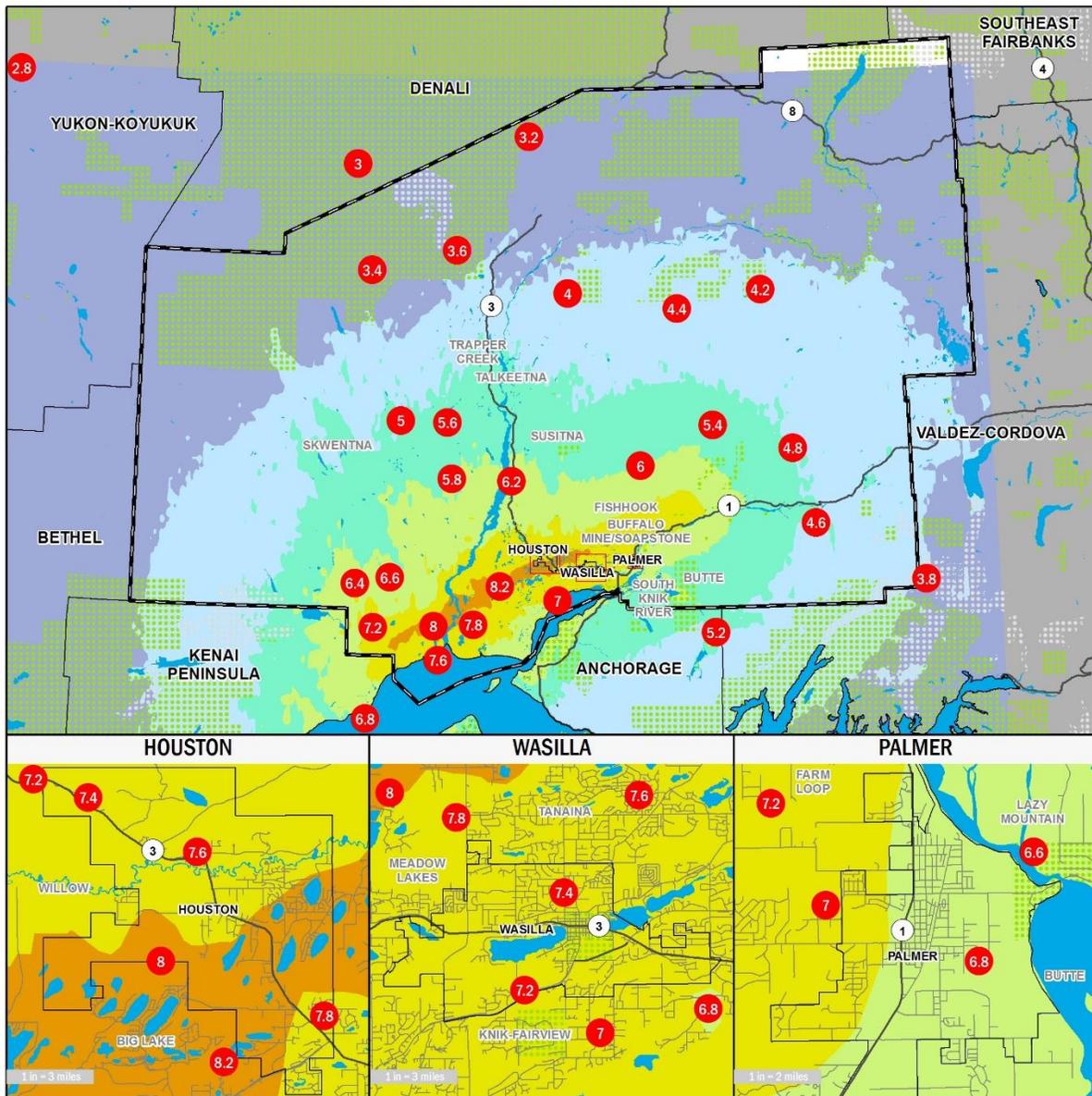
Map 14: USGS ShakeMap for the M7.1 Border Ranges Scenario

SHAKEMAP: M7.1 SCENARIO



Map 15: USGS ShakeMap for the M7.5 Castle Mountain Scenario

SHAKEMAP: M7.5 SCENARIO



MAP SYMBOLOLOGY

EXPECTED INTENSITY	II - III	WEAK	VI	STRONG	IX	VIOLENT
	IV	LIGHT	VII	VERY STRONG	X+	EXTREME
	V	MODERATE	VIII	SEVERE		
			5.1	MODIFIED MERCALLI INTENSITY VALUE		

BASEMAP LAYERS	[Symbol]	PROJECT AREA BOUNDARY
	[Symbol]	MAJOR ROAD
	[Symbol]	INCORPORATED COMMUNITY BOUNDARY

ABOUT

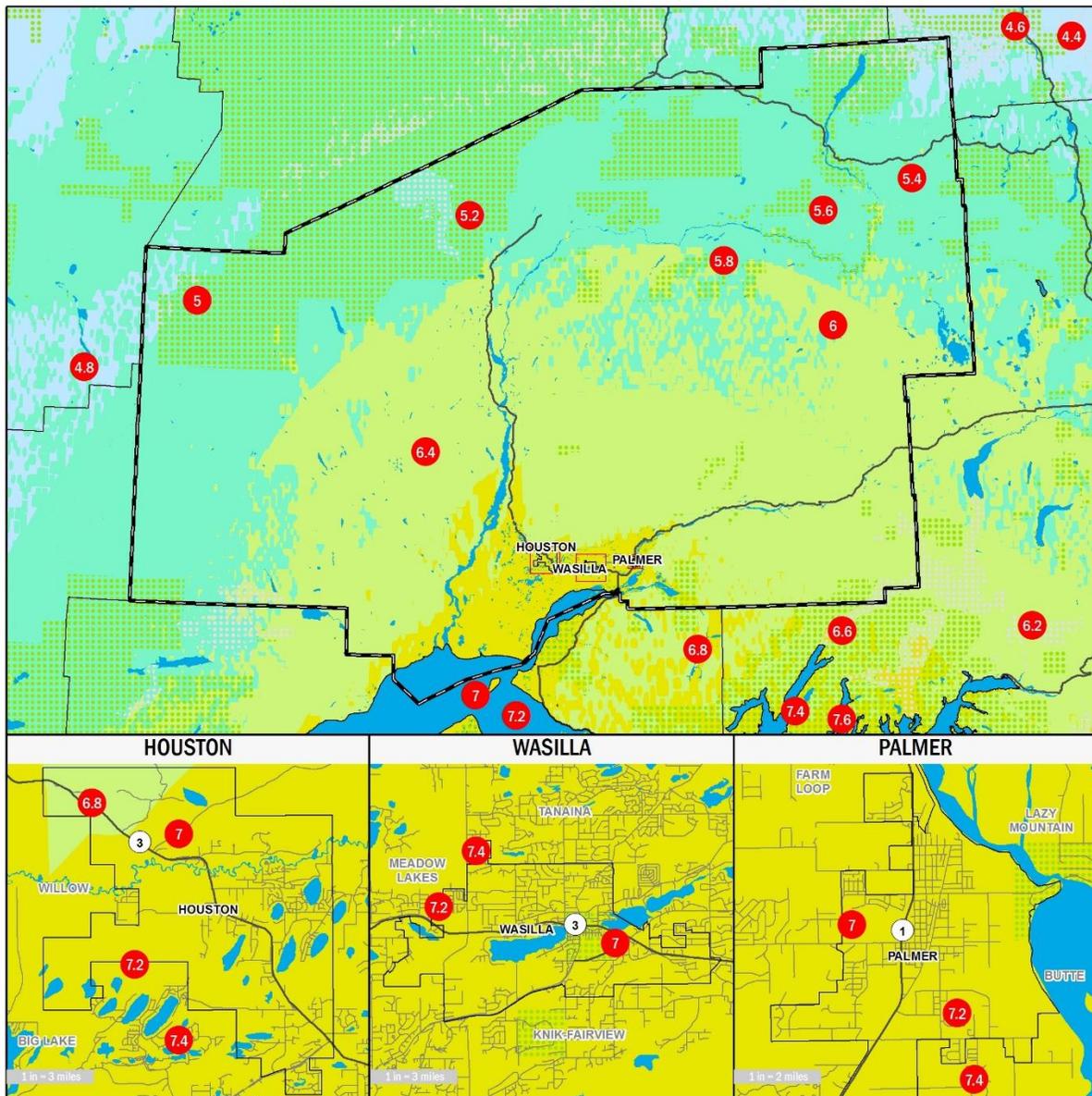
THIS MAP DISPLAYS INSTRUMENTAL INTENSITY DURING A MAGNITUDE 7.5 CASTLE MOUNTAIN EARTHQUAKE SCENARIO.

1 in = 37 miles

1:2,344,320

SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

SHAKEMAP: M9.2 SCENARIO



MAP SYMBOLOLOGY

EXPECTED INTENSITY	II - III	WEAK	VI	STRONG	IX	VIOLENT
	IV	LIGHT	VII	VERY STRONG	X+	EXTREME
	V	MODERATE	VIII	SEVERE		
	5.1	MODIFIED MERCALLI INTENSITY VALUE				
					BASEMAP LAYERS	
						MAJOR ROAD
						INCORPORATED COMMUNITY BOUNDARY

ABOUT

THIS MAP DISPLAYS INSTRUMENTAL INTENSITY DURING A MAGNITUDE 9.2 GREAT ALASKA EARTHQUAKE SCENARIO.

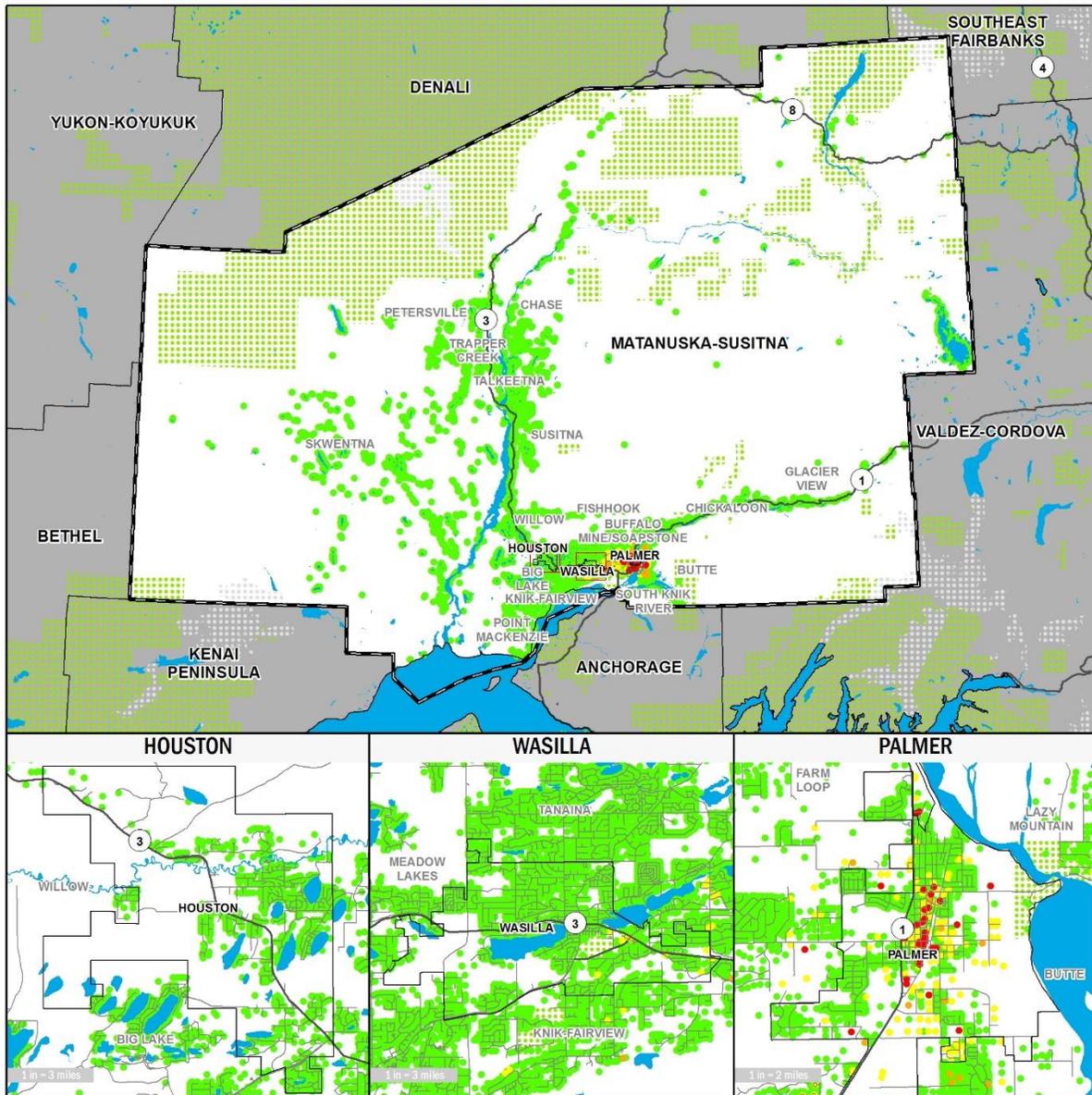
1 in = 37 miles

1:2,344,320

SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.

Map 17: Building Damage Referenced as Loss Ratio for the M7.1 Border Ranges Scenario*

BUILDING DAMAGE - M7.1 EVENT EARTHQUAKE DAMAGE

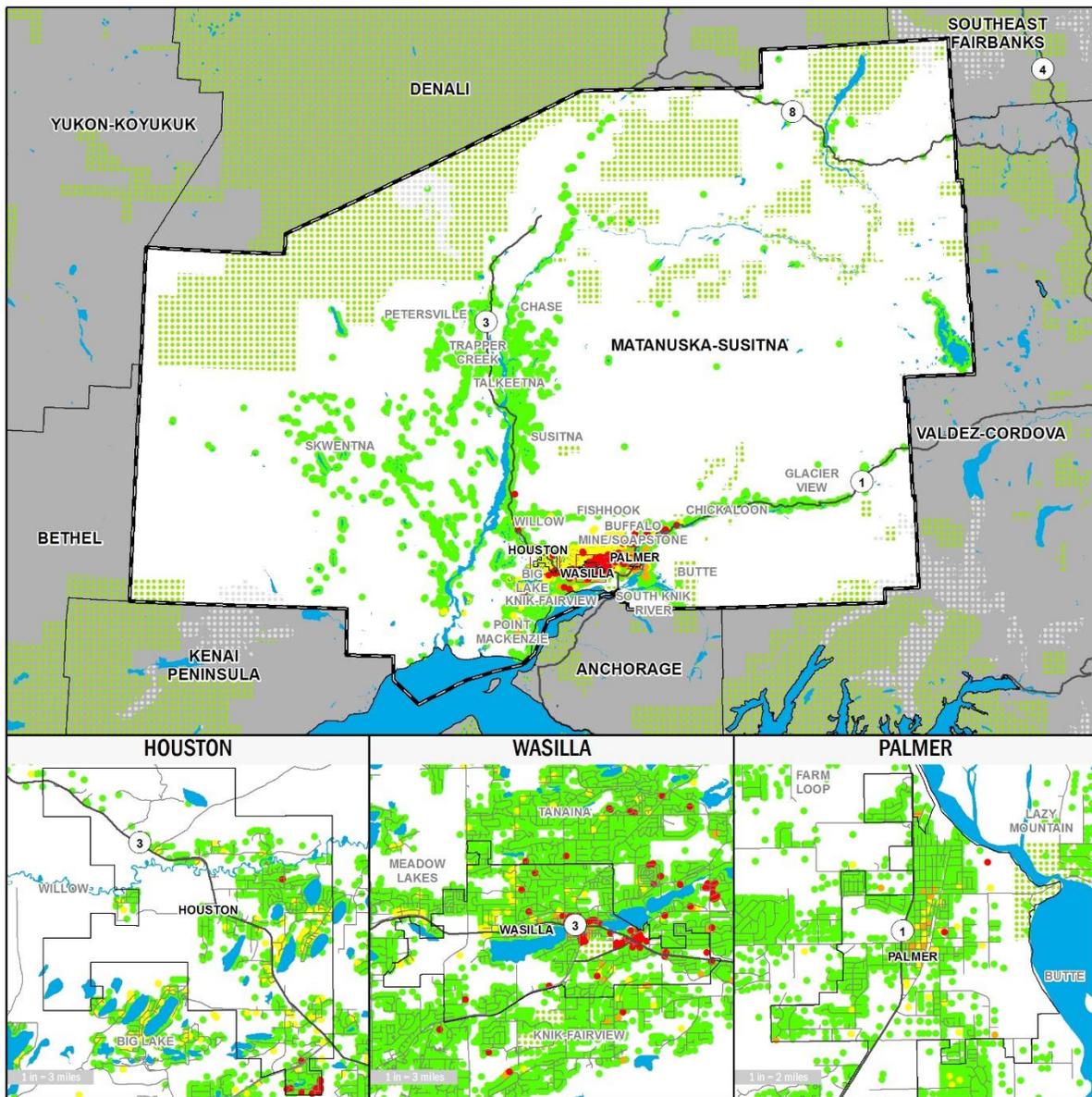


MAP SYMBOLOGY		ABOUT	
EARTHQUAKE DAMAGE*	● LOW DAMAGE PROBABILITY	BASEMAP LAYERS	 PROJECT AREA BOUNDARY
	● LOW-MID DAMAGE PROBABILITY		 MAJOR ROAD
	● MID-HIGH DAMAGE PROBABILITY		 INCORPORATED COMMUNITY BOUNDARY
	● HIGH DAMAGE PROBABILITY	THIS MAP DISPLAYS A LOSS RATIO (BUILDING DAMAGE IN RELATION TO TOTAL VALUE) IN A MAGNITUDE 7.1 BORDER RANGES EARTHQUAKE SCENARIO.	
	*LOSS RATIO 0-10% LOW 10-25% MID-LOW 25%-50% MID-HIGH +50% HIGH		1 in = 37 miles 1:2,344,320
SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.			

*Damage does not factor collateral effects like landslides, land subsidence, liquefaction, fire, flooding, or tsunami.

Map 18: Damage Referenced as Loss Ratio for the M7.5 Castle Mountain Scenario*

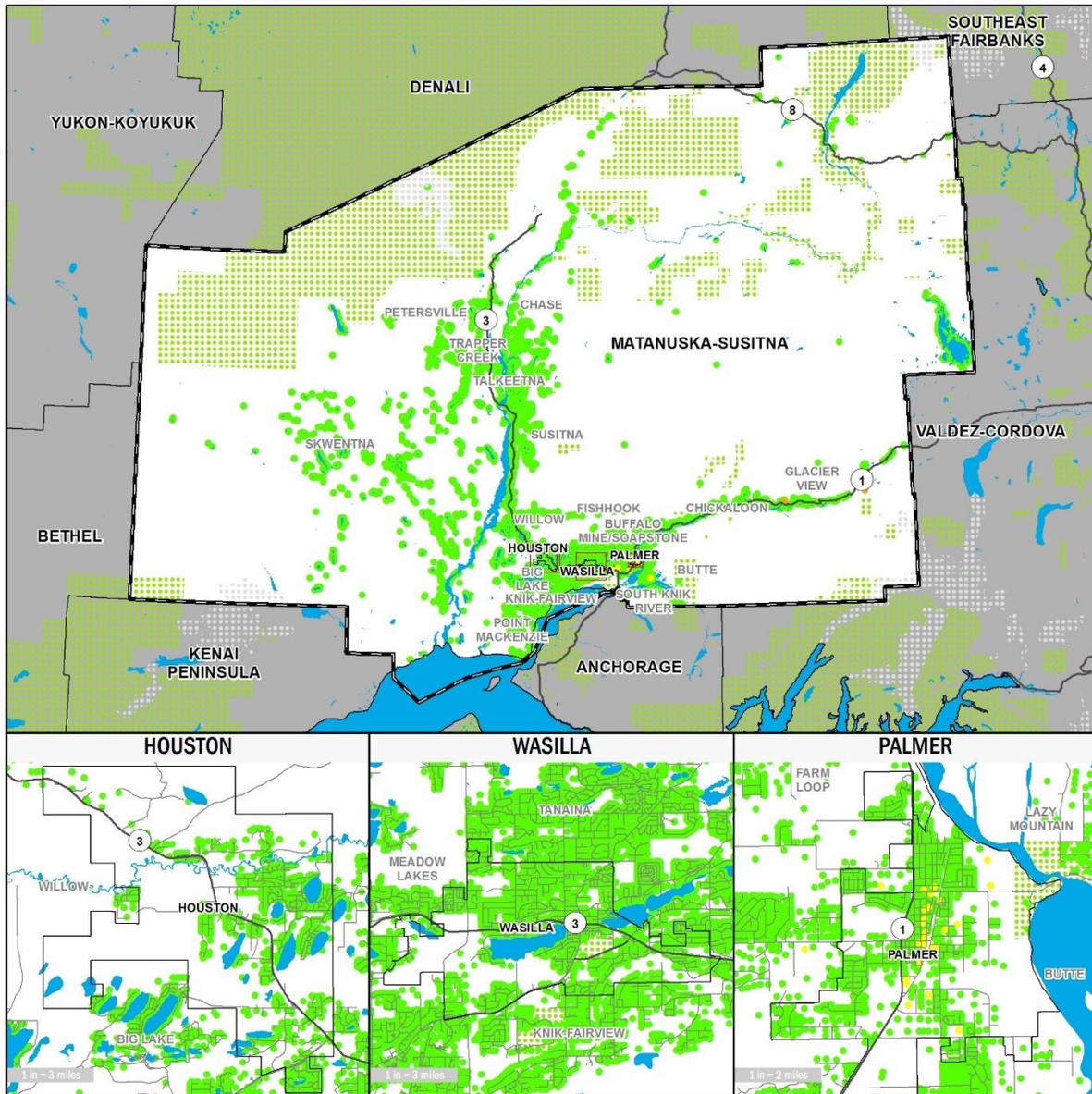
BUILDING DAMAGE - M7.5 EVENT EARTHQUAKE DAMAGE



MAP SYMBOLOGY		ABOUT	
EARTHQUAKE DAMAGE*	● LOW DAMAGE PROBABILITY	BASEMAP LAYERS	 PROJECT AREA BOUNDARY
	● LOW-MID DAMAGE PROBABILITY		 MAJOR ROAD
	● MID-HIGH DAMAGE PROBABILITY		 INCORPORATED COMMUNITY BOUNDARY
	● HIGH DAMAGE PROBABILITY		THIS MAP DISPLAYS A LOSS RATIO (BUILDING DAMAGE IN RELATION TO TOTAL VALUE) IN A MAGNITUDE 7.5 CASTLE MOUNTAIN EARTHQUAKE SCENARIO.
	*LOSS RATIO 0-10% LOW 10-25% MID-LOW 25%-50% MID-HIGH +50% HIGH		1 in = 37 miles
SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.			

*Damage does not factor collateral effects like landslides, land subsidence, liquefaction, fire, flooding, or tsunami.

BUILDING DAMAGE - M9.2 EVENT EARTHQUAKE DAMAGE



MAP SYMBOLOGY		ABOUT	
EARTHQUAKE DAMAGE* <ul style="list-style-type: none"> ● LOW DAMAGE PROBABILITY ● LOW-MID DAMAGE PROBABILITY ● MID-HIGH DAMAGE PROBABILITY ● HIGH DAMAGE PROBABILITY 	<ul style="list-style-type: none"> PROJECT AREA BOUNDARY MAJOR ROAD INCORPORATED COMMUNITY BOUNDARY 		<p>THIS MAP DISPLAYS A LOSS RATIO (BUILDING DAMAGE IN RELATION TO TOTAL VALUE) IN A MAGNITUDE 9.2 GREAT ALASKA EARTHQUAKE SCENARIO.</p> <p>1 in = 37 miles</p> <p>1:2,344,320</p>
	<p><small>*LOSS RATIO 0-10% LOW 10-25% MID-LOW 25%-50% MID-HIGH +50% HIGH</small></p> <p><small>SOURCE DATA FOR THIS RISK REPORT WAS COMPILED FROM FEMA'S REGION X OFFICE, FEMA'S MAP SERVICE CENTER, USGS, AND THE STATE OF ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS. THIS IS A NON-REGULATORY PRODUCT AND IS PROVIDED TO YOUR COMMUNITY FOR INFORMATION GATHERING AND SHARING PURPOSES ONLY.</small></p>		
	<p>BASEMAP LAYERS</p>		
	<p>1 in = 3 miles</p>		
	<p>1 in = 2 miles</p>		

*Damage does not factor collateral effects like landslides, land subsidence, liquefaction, fire, flooding, or tsunami.

Transportation and Utility Assessment

Hazus also provides an analysis on transportation systems (highways, railways, light rail, buses, ports, ferries, and airports) and utility systems (potable water, wastewater, natural gas, crude and refined oil, electric power, and communications facilities). The project team took the transportation and utility information from the original Hazus database. No local updates were applied; therefore, the number of facilities could vary greatly from what actually exists. Table 14 provides an overview of potential damage to transportation systems in the event of the M7.1 Border Ranges Scenario. Table 15 provides an overview of potential damage to transportation systems in the event of the M7.5 Castle Mountain Scenario. Table 16 identifies potential transportation losses from the M9.2 1964 event. Table 17 provides an overview of the utility systems in the event of a M7.1 scenario earthquake. Table 18 and Table 19 offers overviews of the utility systems impacted in the event of a M7.5 and M9.2 earthquake, respectively.

Table 14: Transportation System Impacts for the M7.1 Border Ranges Scenario

TRANSPORTATION SYSTEM	COMPONENT	LOCATIONS / SEGMENTS	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Highway	Segments	9/553	0	9	9	\$1.9B	0	--
	Bridges	76/45604	13	70	74	\$950.0M	\$45.6M	4.80%
	Tunnels	--	--	--	--	--	--	--
Railway	Segments	192/270	--	192	192	\$240.0M	--	--
	Bridges	1/42	47	1	1	\$150.0K	-	--
	Facilities	2	1	2	2	\$5.4M	\$1.9M	35.4%
Light Rail	Segments	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
Bus	Facilities	1	1	1	1	\$1.3M	\$360.0K	26.87%
Ferry	Facilities	--	--	--	--	--	--	--
Port	Facilities	1	1	1	1	\$2.7M	\$110.0K	4.10%
Airport	Runways	64	0	61	65	\$2.4B	--	--
	Facilities	65	19	64	64	\$435.7M	\$71.0M	16.30%
TOTAL		411/46,469	63	401	409	\$6.0B	\$119.0M	2.0%

Table 15: Transportation System Impacts for the M7.5 Castle Mountain Scenario

TRANSPORTATION SYSTEM	COMPONENT	LOCATIONS / SEGMENTS	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Highway	Segments	9/553	3	9	9	\$1.7B	--	--
	Bridges	76/45604	3	74	75	\$950.0M	\$41.7M	4.39%
	Tunnels	--	--	--	--	--	--	--

TRANSPORTATION SYSTEM	COMPONENT	LOCATIONS / SEGMENTS	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Railway	Segments	192/270	0	192	192	\$240.0M	--	--
	Bridges	1/42	0	1	1	\$150.0K	\$40.0K	26.67%
	Facilities	2	1	1	2	\$5.4M	\$1.3M	25.00%
Light Rail	Segments	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
Bus	Facilities	1	0	1	1	\$1.3M	\$510.0K	38.06%
Ferry	Facilities	--	--	--	--	--	--	--
Port	Facilities	1	0	1	1	\$2.7M	\$112.0K	
Airport	Runways	64	0	64	64	\$2.4B	--	--
	Facilities	65	5	65	65	\$435.7M	\$111.1M	--
TOTAL		411/46,469	12	408	410	\$6.0B	\$155.8M	2.62%

Table 16: Transportation System Impacts for the M9.2 1964 Great Alaskan Earthquake Scenario

TRANSPORTATION SYSTEM	COMPONENT	LOCATIONS / SEGMENTS	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Highway	Segments	9/553	0	9	9	\$1.9B	--	--
	Bridges	76/45,604	40	39	44	\$950.0M	\$223.0M	23.47%
	Tunnels	--	--	--	--	--	--	--
Railway	Segments	192/270	0	192	192	\$240.0M	--	--
	Bridges	1/42	0	1	1	\$150.0K	\$20.0K	13.33%
	Facilities	2	1	1	2	\$5.4M	--	--
Light Rail	Segments	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
	Facilities	--	--	--	--	--	--	--
Bus	Facilities	1	0	0	1	\$1.3M	\$360.0K	26.87%
Ferry	Facilities	--	--	--	--	--	--	--
Port	Facilities	1	0	1	1	\$2.7M	\$110.0K	4.10%
Airport	Runways	64	0	64	64	\$2.4B	0	--
	Facilities	65	5	65	65	\$435.7M	\$71.0M	16.30%
TOTAL		411/46,469	46	372	379	\$6.0B	\$294.4M	4.96%

Losses of more than \$100 million for transportation systems are projected for the M7.1 Border Ranges Scenario. While the total losses are certainly high, the losses are a small percentage of the overall

transportation infrastructure. High degrees of loss to these systems are observed from the M7.5 Castle Mountain Scenario and the M9.2 1964 Great Alaskan Earthquake Scenario, but do not represent high loss ratios. At the greatest risk for losses are highway bridges and port and airport facilities. Highway and railway bridges and bus and airport facilities see relatively high loss ratios ranging from 10 to 30 percent.

Table 17: Utility System Impacts for the M7.1 Border Ranges Scenario

UTILITY SYSTEM	COMPONENT	FACILITIES / SEGMENTS (KM)	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Potable Water	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Waste Water	Facilities	1	1	0	0	\$82.0M	\$14.1M	17.26%
	Pipelines	--	--	--	--	--	--	--
Oil Systems	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Natural Gas	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Electric Power	Facilities	--	--	--	--	--	--	--
Communication	Facilities	13	11	10	13	\$1.6M	\$320.0K	20.00%
TOTAL		14	12	--	--	\$83.5M	\$14.5M	17.32%

Table 18: Utility System Impacts for the M7.5 Castle Mountain Scenario

UTILITY SYSTEM	COMPONENT	FACILITIES / SEGMENTS (KM)	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Potable Water	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Waste Water	Facilities	1	1	0	1	\$81.9M	\$14.1M	17.26%
	Pipelines	--	--	--	--	--	--	--
Oil Systems	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Natural Gas	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Electric Power	Facilities	--	--	--	--	--	--	--
Communication	Facilities	13	11	10	13	\$1.6M	\$320.0K	20%
TOTAL		14	12	--	--	\$83.5M	\$14.5M	17.32%

Table 19: Utility System Impacts for the M9.2 1964 Great Alaskan Earthquake Scenario

UTILITY SYSTEM	COMPONENT	FACILITIES / SEGMENTS (KM)	MODERATE DAMAGE OR GREATER	FUNCTIONALITY		INVENTORY VALUE	ECONOMIC LOSS	LOSS RATIO
				After Day 1	After Day 7			
Potable Water	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Waste Water	Facilities	1	0	0	0	\$82.0M	0	--
	Pipelines	--	--	--	--	--	--	--
Oil Systems	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Natural Gas	Facilities	--	--	--	--	--	--	--
	Pipelines	--	--	--	--	--	--	--
Electric Power	Facilities	--	--	--	--	--	--	--
Communication	Facilities	13	0	0	0	\$1.6M	0	--
TOTAL		14	0	0	0	\$83.5M	0	--

The utility system loss estimation capabilities require a great deal of user input and modification to model the inventory, which was beyond the scope of this report.

Building Code Analysis

The loss data from Hazus and the design code analysis can highlight the buildings and areas potentially affected by earthquakes and can be used to identify properties for mitigation projects and areas for additional outreach. Highlighted areas of greatest impacts and potential mitigation actions are shown in Section 7, Areas of Mitigation Interest.

An additional analysis identified how many buildings were constructed according to specific building codes. Hazus identifies key changes in earthquake building codes, based on year. The National Earthquake Hazard Reduction Program United States Seismic Zone Map from the 1997 Edition of the Universal Building Code identifies the Matanuska-Susitna Borough in Zone 4. Using the Hazus-MH guidelines based on seismic zone, the following designations were assumed:

1. Structures (except those with a wood frame and under 5,000 square feet) and structures built prior to 1941 are considered pre-code.
2. Structures constructed between 1941 and 1975 or built prior to 1941 (with a wood frame and under 5,000 square feet) are considered moderate code and may include some earthquake building components.
3. Buildings built after 1975 are considered high code.

The dates for local building codes may be slightly different than the dates shown below. However, the information can be used as a general planning tool until more information on the local building code can be acquired. The results of each code type are summarized in Table 20.

These assumptions are based off of Hazus-HM guidelines. Alaska statewide adoption of building codes did not occur until September 2005 for commercial structures, and the building codes have yet to be adopted for residential structures. Local enforcement of building codes may vary by jurisdiction. For this Risk Assessment effort, no additional guidance was provided by local building officials.

High loss ratios in earthquake events are typically attributed to the number of pre-code structures in each community. Because of their age and pre-code status, these buildings would not perform as well in an earthquake. Contrarily, high-code buildings will fare much better in the event of an earthquake. The Borough has 4 pre-code buildings (built before 1941, without a wood frame), and just over 11.0 percent of all facilities are determined to be moderate-code. The remaining 89.0 percent were designated high-code. The areas with the highest percentage of moderate-code buildings are the unincorporated communities of Glacier View (22.7 percent) and Sutton (20.9 percent). The jurisdiction containing the most moderate-code buildings, at 825 structures, is the unnamed unincorporated areas of the Matanuska-Susitna Borough. Areas with the highest percentage of high-code buildings include unincorporated areas of Petersville (96.9 percent), Tanaina (96.6 percent), and Knik-Fairview (95.0 percent). By volume, the community with the most high-code buildings is Knik-Fairview (6,757).

Table 20: Building Codes for Structures

COMMUNITY NAME	TOTAL NUMBER OF BUILDINGS	TOTAL PRE-CODE BUILDINGS	PERCENTAGE OF PRE-CODE BUILDINGS	TOTAL MODERATE-CODE BUILDINGS	PERCENTAGE OF MODERATE-CODE BUILDINGS	TOTAL HIGH-CODE BUILDINGS	PERCENTAGE OF HIGH-CODE BUILDINGS
HOUSTON, CITY OF	1,122	0	0.00%	155	13.81%	967	86.19%
PALMER, CITY OF	2,203	2	0.09%	481	21.83%	1,720	78.08%
WASILLA, CITY OF	3,423	0	0.00%	270	7.89%	3,153	92.11%
BIG LAKE	3,496	0	0.00%	754	21.57%	2,742	78.43%
BUFFALO MINE/SOAPSTONE	549	0	0.00%	57	10.38%	492	89.62%
BUTTE	1,702	0	0.00%	382	22.44%	1,320	77.56%
CHASE	247	0	0.00%	31	12.55%	216	87.45%
CHICKALOON	410	0	0.00%	68	16.59%	342	83.41%
FARM LOOP	528	0	0.00%	93	17.61%	435	82.39%
FISHHOOK	1,960	0	0.00%	112	5.71%	1,848	94.29%
GATEWAY	2,517	0	0.00%	157	6.24%	2,360	93.76%
GLACIER VIEW	450	0	0.00%	102	22.67%	348	77.33%
KNIK-FAIRVIEW	7,110	0	0.00%	353	4.96%	6,757	95.04%
LAZY MOUNTAIN	760	0	0.00%	119	15.66%	641	84.34%
MEADOW LAKES	4,341	0	0.00%	469	10.80%	3,872	89.20%

COMMUNITY NAME	TOTAL NUMBER OF BUILDINGS	TOTAL PRE-CODE BUILDINGS	PERCENTAGE OF PRE-CODE BUILDINGS	TOTAL MODERATE-CODE BUILDINGS	PERCENTAGE OF MODERATE-CODE BUILDINGS	TOTAL HIGH-CODE BUILDINGS	PERCENTAGE OF HIGH-CODE BUILDINGS
NORTH LAKES	2,314	0	0.00%	134	5.79%	2,180	94.21%
PETERSVILLE	261	0	0.00%	8	3.07%	253	96.93%
POINT MACKENZIE	430	0	0.00%	69	16.05%	361	83.95%
SKWENTNA	875	0	0.00%	78	8.91%	797	91.09%
SOUTH KNIK RIVER	457	0	0.00%	65	14.22%	392	85.78%
SOUTH LAKES	1,716	0	0.00%	115	6.70%	1,601	93.30%
SUSITNA	1,952	0	0.00%	198	10.14%	1,754	89.86%
SUTTON	628	0	0.00%	131	20.86%	497	79.14%
TALKEETNA	1,128	0	0.00%	164	14.54%	964	85.46%
TANAINA	3,271	0	0.00%	101	3.09%	3,170	96.91%
TRAPPER CREEK	742	0	0.00%	92	12.40%	650	87.60%
UNINCORPORATED	6,039	1	0.02%	825	13.66%	5,213	86.32%
WILLOW	3,001	1	0.03%	499	16.63%	2,501	83.34%
UNINCORPORATED TOTAL	46,884	2	0.00%	5,176	11.04%	41,706	88.96%
TOTAL	53,632	4	0.01%	6,082	11.34%	47,546	88.65%

4. Landslide Risk Assessment

Landslide Hazard Overview

Landslides occur throughout the U.S and can be caused by a variety of factors including earthquakes, storms, volcanic eruptions, fire, and human modification of land. Landslides can occur quickly. Especially during wet winter months. Landslides typically occur in steep areas, but not exclusively. Occurrence can happen at ground failure points of river bluffs, cut-and-fill failures associated with road and building excavations, collapse of mine-waste piles, and slope failures associated with open-pit mines and quarries. Underwater landslides usually involve areas of low relief and slope gradients such as in lakes and reservoirs or in offshore marine settings.

The Matanuska-Susitna Borough is vulnerable to landslides in certain areas of the Borough depending on ground failure susceptibility. Landforms in and around Wasilla consist of undulating ridges of glacial till and flat benches of sand and gravel. Elevation gradually rises from south to north from about 300 feet to 500 feet above sea level within the city limits. The 1964 Good Friday earthquake triggered a wide variety

of falls, slides, and flows through Southcentral Alaska; however, Wasilla and adjacent areas are not significantly vulnerable to landslides (Wasilla Hazard Mitigation Plan, 2004).

Although the Matanuska-Susitna Borough has not had any Presidentially Declared Disasters with the incident type classified as “Landslide” in the past, landslides have occurred in other types of Presidentially Declared Disasters impacting the Borough. The declarations in which landslides occurred are listed in Table 21.

Table 21: Recent Presidential Disaster Declarations Including Landslides

DISASTER NUMBER	DECLARATION DATE	INCIDENT TYPE	TITLE	PUBLIC ASSISTANCE-DOLLARS APPROVED	HMGP - STATEWIDE TOTAL	HMGP-MATANUSKA-SUSITNA BOROUGH
4094	11/27/2012	Severe Storm(s)	SEVERE STORM, STRAIGHT-LINE WINDS, FLOODING, AND LANDSLIDES	\$11,024,415.21	\$3,105,001.00	--
1663	10/16/2006	Severe Storm(s)	SEVERE STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES	\$9,169,973.30	\$1,627,428.00	\$91,944.00

Note: Dashes represent non-applicable data

Landslide Risk Assessment

Existing data are not sufficient to assess landslide risk in the Matanuska-Susitna Borough. Based on Hazard Mitigation Plan and mitigation action items identified within the area, landslide risk is not classified as significant. Additional risk data and assessments may be explored as more data become available.

5. Wildfire Risk Assessment

Wildfire Hazard Overview

Wildfires are defined as fires that rage out of control in the wilderness, like a forest or countryside. Wildfires are common in wildland settings where the initiation may often begin unnoticed promoted by outside influences such as lightening or human caused disturbance. These hazard events can occur at any time throughout the year but have higher potential during periods of drought or little rainfall. High winds can also contribute to the spreading of fire. Wildfires spread quickly, igniting brush, trees, and homes.

The Matanuska-Susitna Borough is at risk for wildfires due to the forestry located throughout. Fuel, weather, and topography influence wildland fire behavior. Fuel determines how much energy the fire releases, how quickly the fire spreads, and how much effort is needed to contain the fire. The primary fuels in wildland fires are living and dead vegetation. Weather is the most variable and uncontrollable factor in wildland fire fighting. Weather includes temperature, relative humidity, wind, and precipitation. High temperatures and low humidity encourage fire activity, while low temperatures and high humidity help retard fire behavior. Wind dramatically effects fire behavior and is a critical factor in fire spread and control. Topography directs the movement of air, which can also affect fire behavior. When the terrain funnels air, as in a canyon, it can lead to faster spreading.

Table 22: Wildfire Hazard History

DATE	DESCRIPTION
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 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.

Wildfire Risk Assessment

No declared wildfire disasters have been identified to date in the Matanuska-Susitna Borough. However, the potential exists. The Alaska Division of Forestry responds to wildland fires within the Borough. Eighty percent of the wildland fires that they respond to in the Borough are located within the cities of Houston, Palmer, and Wasilla or the Core Area (Wasilla Hazards Mitigation Plan, 2004).

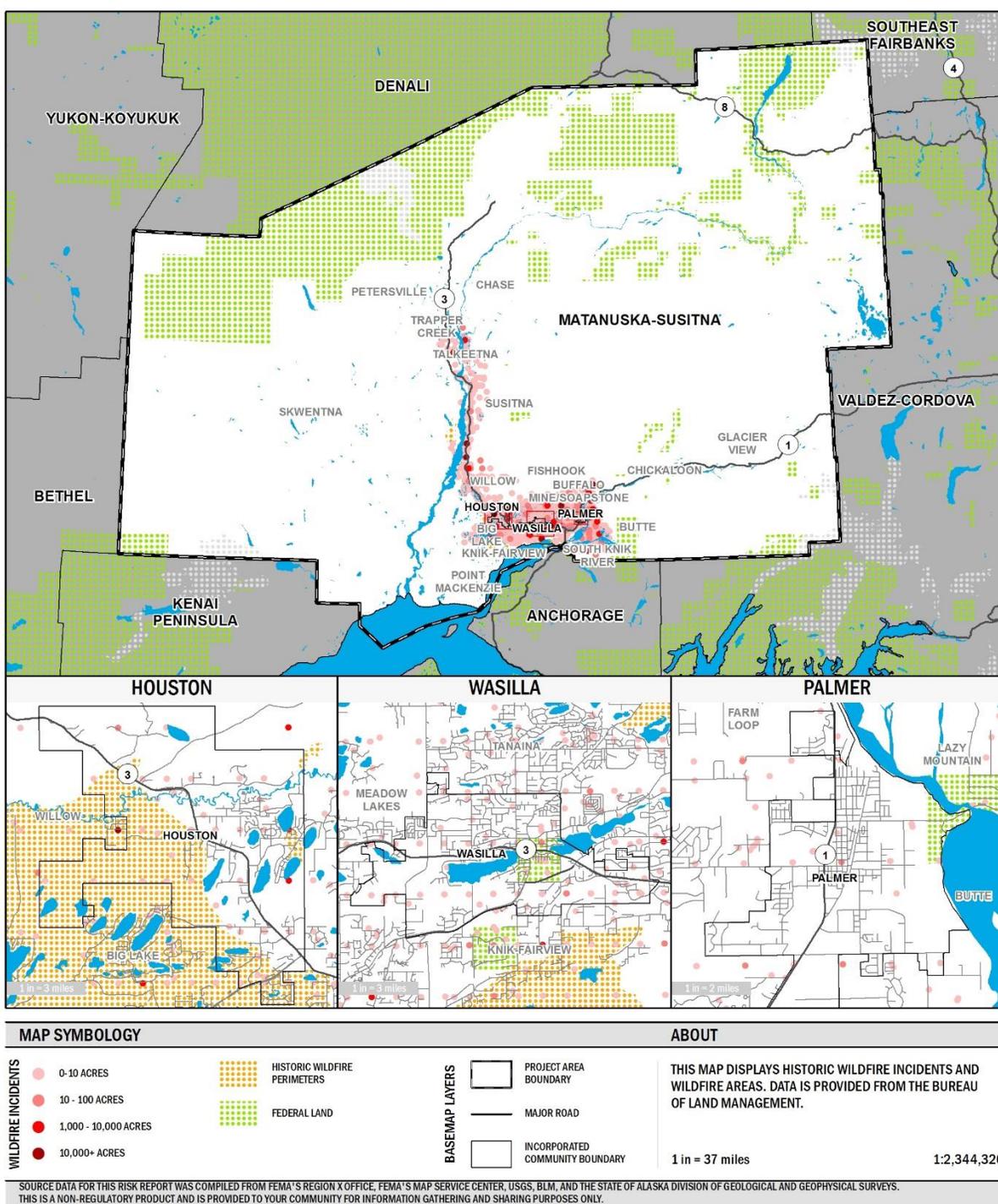
The Central Matanuska-Susitna Fire Station is the primary responder to all fire incidents. In addition to responding to incidents, the fire station responds in a backup capacity to any incident adjacent to the area limits. From February 2003 through January 2004, the station received and responded to 931 calls of which 254 were related to fire. The remaining 677 calls were related to rescue and emergency medical

service incidents, service calls, good intent calls, false alarms, and severe weather and natural disaster assessment (Wasilla Hazard Mitigation Plan, 2004). Map 20 displays historic fire incidents and fire areas.

Table 23: Alaska Division of Forestry Fire Statistics

YEAR	NUMBER OF FIRES	ACRES
1990	96	55.0
1991	116	1,267.4
1992	111	155.3
1993	121	134.7
1994	95	36.2
1995	90	163.1
1996	186	37,871.0
1997	149	155.9
1998	77	52.9
1999	106	781.1
2000	108	57.2
2001	106	398.1
2002	151	1,771.8

WILDFIRE INCIDENTS



6. Plan Integration

The information in this risk report is intended to support the ongoing planning processes within the Borough, including those for the Comprehensive Plan and the Hazard Mitigation Plan (HMP). Because the cities included in the Borough-wide Hazard Mitigation Plan regulate their own land-use planning, this risk report focuses on both unincorporated and incorporated resiliency strategies for the Borough jurisdictions. Through visiting 18 of the 21 active Community Councils and addressing local hazards impacting communities, the Borough acknowledges that residents may support local zoning options, especially if the requirements are streamlined and easy to obtain.

The Borough's Comprehensive Plan is strongly unique in that natural hazards, and discussing natural systems, geology, and natural resource conservation are already integrated into the plan and strategies are provided for addressing hazard risk through land-use planning. The information in the resilience strategies could support future updates to these sections in the Comprehensive Plan, as well as updates to hazard mitigation plans. Further plan integration in hazard mitigation plan update is encouraged. HMP goals that align with integration are:

- Develop an approach for responding to natural and human caused hazards, including the development of a Borough-wide Hazard Mitigation Plan;
- Adequately prepare for natural and human caused emergencies, including response trainings, and public information campaigns on emergency preparedness;
- Protect natural systems and features from the potentially negative impacts of human activities, including, but not limited to, land development; and
- Manage the natural and built environments to achieve minimal loss of the functions and values of all drainage basins; and, where possible, enhance and restore functions, values, and features. Retain lakes, ponds, wetlands, streams, and rivers and their corridors substantially in their natural condition.

The HMP goals complement the objectives of the Borough's Comprehensive Plan, which are to ensure an adequate supply of land that is designed to:

- Minimize loss of life and injuries,
- Minimize damages,
- Facilitate the restoration of public services, and
- Promote economic development.

The information in this Risk Report is provided to support the Borough's ongoing land-use planning and hazard mitigation efforts. The resiliency strategies included in Section 7, Areas of Mitigation Interest, were developed to fit in with the goals and purpose of the HMP and the Comprehensive Plan. The information included in this Risk Report and suggested in the resiliency strategies are intended to support the Borough's ongoing and future efforts to address natural hazards through both hazard mitigation and land-use planning. Page 15 of the Comprehensive Plan lists connections to other existing planning mechanisms. While hazards are clearly described later in the plan, this would be a strategic opportunity to write in a stronger connection to the Borough's HMP. The resiliency strategies also recognize the changes in population growth across the Borough. In the last 25 years, the Matanuska-Susitna Borough has averaged 3.4 percent growth per year. The largest change in demographics was the increase in people aged 65 or older, and the decrease in individuals aged under 18. This change is relevant to mitigation strategies pertaining to evacuation routes, new structures for long-term care, access to utilities during and after an event, and siting or designing new structures. The strategies also recognize nuances in land ownership

across the Peninsula among the Borough, Federal, Municipal, Native, Private, and State lands. Because the most effective resiliency strategies will be tailored specifically to small geographic areas, the strategies provide information that could be used in a number of different ways. This information is intended to be integrated into the Borough's ongoing hazard mitigation efforts, including updates to building codes, ordinances, or any other mechanism intended to reduce risks to life, infrastructure, and natural resources, or in whatever form will be most politically, economically, and socially feasible at the local level.

The Borough's Comprehensive Plan describes existing planning mechanisms that help to manage development. As one of these, the HMP is listed under "Comprehensive Planning in the Matanuska-Susitna Borough" as a resource for responding to natural and human caused hazards. The AOMI resilience strategies were developed through a lens of these land-use planning goals while incorporating primary components of the HMP, including stakeholder engagement, public participation, hazard profiles, and mitigation actions. The stakeholder engagement and public participation in the Borough's HMP is inclusive and strong. These relationships can be used to help disseminate the information found in this report for each community's plan update as it comes available. These relationships can also be the foundation for community outreach and hazard awareness campaigns that aim to increase preparedness for many types of natural hazards.

The same outlets used to gather public participation and provide comment (names, community council meetings, surveys, organizations, etc. are included in the Borough's HMP) are existing avenues to use for reaching out with this updated information. These contacts could be used to form Community Rating System User Groups, to develop hazard outreach events that coincide with annual community events, and to use the same libraries or public spaces where existing hazard brochures have been circulated. These networks could also be used to identify local Community Emergency Response Teams (CERTs) and other local champions who are passionate about reducing risk in their communities, where they have unique knowledge about how to reach out to different audiences.

The following resiliency strategies were developed using the land-use and hazard mitigation information in the local plans. These strategies are designed to be as consistent as possible with the existing planning mechanism and with the goals and objectives of both plans. These strategies are also intentionally written to provide supportive information to help all communities update both plans.

7. Areas of Mitigation Interest

Matanuska-Susitna Borough Unincorporated Areas of

Areas of Mitigation Interest and Recommended Resilience Strategies

An assessment of the Matanuska-Susitna Borough was completed based on Hazus earthquake and flood risk models for the M7.1 Border Ranges Fault Scenario, the M7.5 Castle Mountain earthquake scenario, and a 1-percent-annual chance flood event. Table 24 highlights facilities in the unincorporated areas of Matanuska-Susitna Borough that are most affected by these hazards.

Table 24: Areas of Mitigation Interest for the Unincorporated Areas of the Matanuska-Susitna Borough

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
UNINCORPORATED	SCHOOL	VALLEY PATHWAYS SCHOOL	\$32.0M	\$1.4M	4.4%	\$562.4K	1.8%	EARTHQUAKE
UNINCORPORATED	SCHOOL	LARSON ELEMENTARY	\$21.8M	\$889.3K	4.1%	\$12.0M	54.9%	EARTHQUAKE
UNINCORPORATED	SCHOOL	TEELAND MIDDLE SCHOOL*	\$50.0M	\$711.6K	1.4%	\$1.5M	3.1%	EARTHQUAKE
UNINCORPORATED	SCHOOL	MAT-SU CAREER AND TECHNICAL HIGH SCHOOL*	\$50.0M	\$711.6K	1.4%	\$1.5M	3.1%	EARTHQUAKE
UNINCORPORATED	POST OFFICE	WASILLA ANNEX US POST OFFICE	\$5.7M	\$245.3K	4.3%	\$1.7M	29.6%	EARTHQUAKE
UNINCORPORATED - BIG LAKE	SCHOOL	BIG LAKE ELEMENTARY	\$16.3M	\$100.7K	0.6%	\$838.0K	5.1%	EARTHQUAKE
UNINCORPORATED - BIG LAKE	PUBLIC SAFETY	BEECH PSB 8-1	\$2.8M	\$13.7K	0.5%	\$132.7K	4.8%	EARTHQUAKE
UNINCORPORATED - BIG LAKE	LIBRARY	BIG LAKE LIBRARY	\$2.2M	\$8.8K	0.4%	\$86.4K	3.9%	EARTHQUAKE
UNINCORPORATED - BIG LAKE	POST OFFICE	BIG LAKE US POST OFFICE (CPU)	\$575.3K	\$3.7K	0.6%	\$33.5K	5.8%	EARTHQUAKE
UNINCORPORATED - BUTTE	PUBLIC SAFETY	WILLIAM BARNHARD PSB 2-1	\$3.0M	\$62.8K	2.1%	\$32.0K	1.1%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
UNINCORPORATED - CHICKALOON	PUBLIC SAFETY	CHICKALOON VFD KING MOUNTAIN STATION	\$326.0K	\$490	0.1%	\$9.8K	3.0%	EARTHQUAKE
UNINCORPORATED - FARM LOOP	PUBLIC SAFETY	HAROLD STEPHAN PSB 3-2	\$1.2M	\$38.2K	3.2%	35.7K	3.0%	EARTHQUAKE
UNINCORPORATED - FISHHOOK	PUBLIC SAFETY	PALMER FISHHOOK PSB 3-5	\$2.1M	\$32.3K	1.5%	105.6K	5.0%	EARTHQUAKE
UNINCORPORATED - GATEWAY	MEDICAL	MAT-SU REGIONAL MEDICAL CENTER	\$169.6M	\$6.4M	3.8%	3,.1M	1.9%	EARTHQUAKE
UNINCORPORATED - GATEWAY	SCHOOL	COLONY MIDDLE SCHOOL*	\$66.0M	\$2.0M	3.0%	1.5M	2.3%	EARTHQUAKE
UNINCORPORATED - GATEWAY	SCHOOL	COLONY HIGH SCHOOL*	\$66.0M	\$2.0M	3.0%	1.5M	2.3%	EARTHQUAKE
UNINCORPORATED - GATEWAY	PUBLIC SAFETY	PSB 5-1	\$16.1M	\$1.4M	8.8%	1.3M	8.3%	EARTHQUAKE
UNINCORPORATED - GATEWAY	SCHOOL	FRED AND SARA MACHETANZ ELEMENTARY	\$29.5M	\$1.3M	4.4%	977.7K	3.3%	EARTHQUAKE
UNINCORPORATED - GATEWAY	PERFORMING ARTS	GLENN MASSEY THEATRE	\$30.0M	\$1.1M	3.8%	627.3K	2.1%	EARTHQUAKE
UNINCORPORATED - GATEWAY	SOLID WASTE	CENTRAL LANDFILL	\$11.0M	\$414.8K	3.8%	230.2K	2.1%	EARTHQUAKE
UNINCORPORATED - GATEWAY	SOLID WASTE	VALLEY COMMUNITY FOR RECYCLING SOLUTIONS	\$7.0M	\$350.5K	5.1%	258.6K	3.7%	EARTHQUAKE
UNINCORPORATED - GATEWAY	ANIMAL CARE	ANIMAL CARE AND REGULATION	\$6.9M	\$235.6K	3.4%	141.7K	2.1%	EARTHQUAKE
UNINCORPORATED - GATEWAY	PUBLIC SAFETY	DONALD BREEDEN PUBLIC SAFETY	\$1.6M	\$67.9K	4.1%	27.6K	1.7%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
		STORAGE BUILDING						
UNINCORPORATED - KNIK-FAIRVIEW	SCHOOL	DENA'INA ELEMENTARY	\$36.8M	\$572.3K	1.6%	1.4M	3.7%	EARTHQUAKE
UNINCORPORATED - KNIK-FAIRVIEW	SCHOOL	GOOSE BAY ELEMENTARY*	\$27.7M	\$341.5K	1.2%	1.1M	3.9%	EARTHQUAKE
UNINCORPORATED - KNIK-FAIRVIEW	SCHOOL	KNIK ELEMENTARY*	\$27.7M	\$341.5K	1.2%	1.1M	3.9%	EARTHQUAKE
UNINCORPORATED - KNIK-FAIRVIEW	PUBLIC SAFETY	FAIRVIEW LOOP PSB 6-6	\$2.9M	\$112.0K	3.9%	407.1K	14.2%	EARTHQUAKE
UNINCORPORATED - KNIK-FAIRVIEW	PUBLIC SAFETY	HORIZON PSB 6-3	\$4.0M	\$104.0K	2.6%	364.0K	9.2%	EARTHQUAKE
UNINCORPORATED - LAZY MOUNTAIN	PUBLIC SAFETY	WALTER T. PHILLIPS PSB 3-3	\$1.2M	\$42.9K	3.6%	26.7K	2.2%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	PUBLIC SAFETY	MAT-SU WEST TROOPER POST	\$11.8M	\$128.6K	1.1%	735.6K	6.2%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	SCHOOL	MEADOW LAKES ELEMENTARY	\$21.8M	\$109.1K	0.5%	1.1M	4.9%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	SCHOOL	MIDNIGHT SUN FAMILY LEARNING CENTER	\$7.7M	\$38.2K	0.5%	331.6K	4.4%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	SENIOR HOUSING	MEADOW LAKES SENIOR HOUSING	\$1.6M	\$10.7K	0.7%	66.0K	4.1%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	PUBLIC SAFETY	MARTY J. FINE PSB 7-1	\$1.5M	\$8.3K	0.6%	76.4K	5.1%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	PUBLIC SAFETY	PITTMAN PSB 7-2	\$849.7K	\$6.8K	0.8%	42.4K	5.0%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	PUBLIC SAFETY	SPRING PSB 7-3	\$777.0K	\$4.1K	0.5%	32.6K	4.2%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	SCHOOL	AMERICAN CHARTER ACADEMY*	\$152.7K	\$964	0.6%	6.1K	4.0%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
UNINCORPORATED - MEADOW LAKES	SCHOOL	MEADOW LAKES CCS HEAD START PRESCHOOL*	\$152.7K	\$964	0.6%	6.1K	4.0%	EARTHQUAKE
UNINCORPORATED - MEADOW LAKES	POST OFFICE	MEADOW LAKE US POST OFFICE (CPU)	\$153.5K	\$808	0.5%	5.9K	3.8%	EARTHQUAKE
UNINCORPORATED - SUTTON	SCHOOL	SUTTON ELEMENTARY*	\$10.0M	\$207.3K	2.1%	3.6M	36.3%	EARTHQUAKE
UNINCORPORATED - SUTTON	SCHOOL	SUTTON-PALMER CCS HEAD START PRESCHOOL*	\$10.0M	\$207.3K	2.1%	3.6M	36.3%	EARTHQUAKE
UNINCORPORATED - SUTTON	LIBRARY	SUTTON LIBRARY	\$5.0M	\$113.0K	2.3%	1.7M	34.7%	EARTHQUAKE
UNINCORPORATED - SUTTON	PUBLIC SAFETY	SUTTON PSB 1-1*	\$1.2M	\$11.7K	0.9%	42.7K	3.4%	EARTHQUAKE
UNINCORPORATED - SUTTON	SOLID WASTE	SUTTON TRANSFER STATION*	\$1.2M	\$11.7K	0.9%	42.7K	3.4%	EARTHQUAKE
UNINCORPORATED - SUTTON	PUBLIC SAFETY	SUTTON PSB 1-2	\$600.0K	\$5.1K	0.8%	19.4K	3.2%	EARTHQUAKE
UNINCORPORATED - SUTTON	POST OFFICE	SUTTON US POST OFFICE	\$218.8K	\$1.7K	0.8%	7.5K	3.4%	EARTHQUAKE

Note: Hazards are considered identified if the following applies

1. Earthquake: Subject has a M7.1 or a M7.5 Earthquake Loss Ratio greater than 3 percent

*Facilities share the same parcel, values equally distributed

Hazard Mitigation Plan and Comprehensive Plan Analysis

The Matanuska-Susitna Borough All-Hazard Mitigation Plan, effective July 2004, and the 2005 Matanuska-Susitna Borough Comprehensive Development Plan identify some of the following hazard mitigation projects that can be aided by information in this Risk Report.

Table 25: All-Hazard Mitigation Plan and Comprehensive Development Plan Analysis for the Unincorporated Areas of the Matanuska-Susitna Borough

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
Flood Hazard Area: Spatial data identifies flood hazard areas for 1-	Hazard Mitigation Plan	Flood-Objective 1.3	Reduce vulnerability of structures within flood zones.	Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus

<p>percent- and 0.2-percent-annual-chance events.</p> <p>Depth Grid: Spatial data identifies flood depth for the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance flood events were created for select riverine areas.</p> <p>BFE+ Grid: Spatial data identifies 1-foot increases in base flood elevations.</p> <p>Hazus Flood Output: Spatial and tabular data provides specific building and content loss data for properties affected by riverine flooding.</p>	Comprehensive Development Plan	Policy CQ1-3	Guide development along the Borough’s many glacially braided rivers such as the Matanuska River to preserve the resources and ecology of the water and shorelines, avoid natural hazards, minimize erosion and associated property damage and public welfare and safety.	<p>Flood Output and AOMI section for areas most vulnerable to flooding. Regulate and/or restrict new development, and prioritize surveys of existing structures to identify mitigation measures and educational outreach efforts.</p> <p>Host or link to new flood hazard data and Hazus flood outputs on local permitting websites. Use data to prioritize development standards, code enforcement, NFIP enrollment, and educational outreach. Promote new flood hazard data to public through existing local events. Show flood hazard areas, the depth of flooding in select locations, and how development decisions are made based on hazard information.</p>
	Hazard Mitigation Plan	Earthquake Goal 2	Promote adoption of building codes to require earthquake-resistant construction practices and materials.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Prioritize structural and nonstructural retrofitting projects. Regulate new development to higher building code standards.
<p>Earthquake ShakeMap: Spatial data provides shaking intensity and ground motion following an earthquake. Data provided for the M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario.</p> <p>Hazus Earthquake Output: Spatial and tabular data provides specific building and content loss data, including building code analysis, for properties affected by a M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario. The Hazus outputs also provide tabular data analysis of transportation and utility functionality following the earthquake scenarios.</p>	Comprehensive Development Plan	Policy CQ1-5	Make information concerning natural systems and associated regulations available to property owners, prospective property owners, developers, and the general public.	Host or link to earthquake hazard data and Hazus outputs on local websites. Use data to prioritize development standards, code enforcement, and educational outreach. Promote hazard data, personal preparedness, and structural/non-structural retrofitting mitigation options to public through existing local events or websites.
	Hazard Mitigation Plan	Wildfire Objective 1.2	Qualify the Matanuska-Susitna Borough as a FireWise community.	Use the spatial and historical information provided in this Risk Report to support the necessary qualifications for the FireWise program
<p>Wildfire Hazard Area: Spatial data and fire statistics provide historical wildfire information and hazard areas.</p>	Comprehensive Development Plan	Policies H2-1, H2-2, H2-3	Conduct regular multi-agency emergency response training workshops. Ensure Borough employees are adequately trained for emergency response. Conduct regular public information campaigns on emergency preparedness.	Use spatial and tabular historical data to educate residents and business owners occupying areas prone to wildfires. Conduct community outreach efforts to inform individuals on ways to prevent wildfires to protect their property, and how to best respond to a wildfire event.

Recommended Resilience Strategies

Based on the assessment above, the following strategies are recommended. Additional strategies can be found by referencing FEMA’s *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* or by clicking [here](#).

Table 26: Recommended Resilience Strategies for the Unincorporated Areas of the Matanuska-Susitna Borough

HAZARD	PROBLEM STATEMENT	RECOMMENDED STRATEGIES
Multi-Hazard	<p>The percentage of residents living with a disability in the Matanuska-Susitna Borough exceeds both the Alaska and national percentages, at 11.4 percent.</p> <p>Additionally, the unemployment rate for the Borough was higher than both the State and Nation estimates at 10.0 percent.</p>	<ul style="list-style-type: none"> • Know where vulnerable populations are located and assist with personal preparedness, appropriate evacuations, and after-event repairs. • Mitigation strategies involving personal preparedness, and structural retrofits should be communicated with the understanding that many working age individuals may be temporarily out of work and lack financial stability.
Flood	<p>Within the Matanuska-Susitna borough, there have been 78 flood claims, with six repetitive loss properties reported to the NFIP with a total insurance coverage of roughly \$64M.</p> <p>It is estimated that a 1-percent-annual-chance flood event would result in \$970K in building dollar losses within the unincorporated Matanuska-Susitna Borough; this is equivalent to a 14.4% loss ratio.</p>	<ul style="list-style-type: none"> • Consider limiting additional development in flood hazard zones. • Develop a priority list for essential facility flood capability enhancements. • Develop a buyout program for repetitive loss properties. • Provide outreach to homeowners and business-owners regarding flood risk.
Earthquake	<p>Hazus results estimate that the Matanuska-Susitna Borough would be most impacted by the Castle Mountain M7.5 earthquake scenario with a total dollar loss of \$60M and a loss ratio of 3.6 percent.</p>	<ul style="list-style-type: none"> • Adopt and enforce updated building code provisions that reduce earthquake risk. • Develop a priority list for essential facility earthquake retrofits. • Develop an outreach program about earthquake risk and mitigation activities for homes, schools, and businesses.
Wildfire	<p>The Matanuska-Susitna Borough is at risk of wildfires due to the forestry and fuel, weather, and topography of the Borough. From February 2003 through January 2004, the Central Matanuska-Susitna Fire Station received and responded to 931 calls of which 254 were related to fire.</p>	<ul style="list-style-type: none"> • Mitigate future losses by regulating development in wildfire hazard areas through land use planning. • Develop a wildland-urban interface code to regulate for safer construction and incorporate mitigation consideration into the permitting process. • Create defensible space around structures and infrastructure. • Implement a Fuels Management Program. • Participate in the FireWise program.

While Federal funding for these projects is limited, FEMA recommends incorporating them into your Natural Hazards Mitigation Plan in case disaster funds become available. Additional funding may be available through your community’s Capital Improvement Planning process, bond authority, or other local, State, or private funding source. More information on how to mitigate the effects of natural hazards can be found in FEMA’s *Local Mitigation Planning Handbook*:

<http://www.fema.gov/media-library/assets/documents/31598?id=7209>

Additional information on integrating your Hazard Mitigation Plan with the local planning process can be found here:

<http://www.fema.gov/media-library/assets/documents/19261?id=4267>

Houston, City of

Areas of Mitigation Interest and Recommended Resilience Strategies

An assessment of the City of Houston within the Matanuska-Susitna Borough was completed based on Hazus earthquake and flood risk models for the M7.1 Border Ranges Fault Scenario, the M7.5 Castle Mountain earthquake scenario, and a 1-percent-annual-chance flood event. Table 27 highlights facilities in the City of Houston that are most affected by these hazards.

Table 27: Areas of Mitigation Interest for the City of Houston

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
HOUSTON	POST OFFICE	HOUSTON US POST OFFICE (CPU)	\$257.0K	\$855	0.3%	\$9.9K	3.8%	EARTHQUAKE & FLOOD**
HOUSTON	SCHOOL	HOUSTON MIDDLE SCHOOL*	\$42.0M	\$168.5K	0.4%	\$2.1M	4.9%	EARTHQUAKE
HOUSTON	SCHOOL	HOUSTON HIGH SCHOOL*	\$42.0M	\$168.5K	0.4%	\$2.1M	4.9%	EARTHQUAKE
HOUSTON	PUBLIC SAFETY	HOUSTON PSB 9-2	\$925.0K	\$5.1K	0.6%	\$43.3K	4.7%	EARTHQUAKE
HOUSTON	CITY HALL	HOUSTON CITY HALL*	\$985.6K	\$3.5K	0.4%	\$39.3K	4.0%	EARTHQUAKE
HOUSTON	PUBLIC SAFETY	HOUSTON PSB 9-1*	\$985.6K	\$3.5K	0.4%	\$39.3K	4.0%	EARTHQUAKE
HOUSTON	SENIOR COMMUNITY CENTER	MID VALLEY SENIOR CENTER	\$400.3K	\$1.8K	0.5%	\$21.4K	5.3%	EARTHQUAKE
HOUSTON	COMMUNITY CENTER	HOMESTEADERS COMMUNITY CENTER	\$105.2K	\$731	0.7%	\$7.6K	7.3%	EARTHQUAKE

Note: Hazards are considered identified if the following applies

1. Earthquake: Subject has a M7.1 or M7.5 Earthquake Loss Ratio greater than 3.0 percent
2. **Flood: Subject is in a 1-percent-annual-chance flood hazard area - Building Dollar Loss: \$74,016; Loss Ratio: 28.8%

*Facilities share the same parcel, values equally distributed

Hazard Mitigation Plan and Comprehensive Plan Analysis

The Matanuska-Susitna Borough All-Hazard Mitigation Plan, effective July 2004, and the 2003 City of Houston Comprehensive Plan identify some of the following hazard mitigation projects that can be aided by information in this Risk Report.

Table 28: All-Hazard Mitigation Plan and Comprehensive Plan Analysis for the City of Houston

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
<p>Flood Hazard Area: Spatial data identifies flood hazard areas for 1- and 0.2-percent-annual-chance events.</p> <p>Depth Grid: Spatial data identifies flood depth for the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance flood events were created for select riverine areas.</p> <p>BFE+ Grid: Spatial data identifies 1-foot increases in base flood elevations.</p> <p>Hazus Flood Output: Spatial and tabular data provides specific building and content loss data for properties affected by riverine flooding.</p>	Hazard Mitigation Plan	Flood-Objective 2.1	Participate in Federal and State programs designed to aid communities such as the NFIP and CRS which adjusts insurance rates based on mitigation measures undertaken by the community.	Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and AOMI section for areas most vulnerable to flooding. Use updated NFIP maps, and encourage insurance participation through community outreach and education efforts.
	Comprehensive Plan	Community Environmental Objective	Establish and implement engineering standards (including accurate flood plain maps) for drainage planning and improvements, and flood plain management.	Use new NIFP maps and additional products released with this Risk Report. Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and AOMI section for areas most vulnerable to flooding. Regulate and/or restrict new development accordingly.
<p>Earthquake ShakeMap: Spatial data provides shaking intensity and ground motion following an earthquake. Data provided for the M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario.</p> <p>Hazus Earthquake Output: Spatial and tabular data provides specific building and content loss data, including building code analysis, for properties affected by a M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario. The Hazus outputs also provide tabular data analysis of transportation and utility functionality following the earthquake scenarios.</p>	Hazard Mitigation Plan	Earthquake Goal 2	Promote adoption of building codes to require earthquake-resistant construction practices and materials.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Prioritize structural and nonstructural retrofitting projects. Regulate new development to higher building code standards.
	Comprehensive Plan	Community Environmental Objective	Increase awareness of land within the Castle Mountain Fault region.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Communicate earthquake risk to communities most affected. Prioritize structural and non-structural retrofitting projects.
<p>Wildfire Hazard Area: Spatial data and fire statistics provide historical wildfire information and hazard areas.</p>	Hazard Mitigation Plan	Wildfire Goal 2	Improve fire suppression capability of Borough firefighters.	Use spatial and historical data to coordinate cross-agency wildfire suppression and mitigate efforts to ensure that all incorporated and unincorporated areas of the Borough are adequately supported.
	Comprehensive Plan	Public Service Goal	Encourage increased presence and utilization of law enforcement and fire protection services.	Use spatial and tabular historical data to educate residents and business owners occupying areas prone to wildfires. Conduct community outreach efforts to inform individuals on ways to prevent wildfires to protect their

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
				property, and how to best respond to a wildfire event. Encourage cross-agency communication to create a holistic approach to hazard outreach and mitigation.

Recommended Resilience Strategies

Based on the assessment above, the following strategies are recommended. Additional strategies can be found by referencing FEMA’s *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* or by clicking [here](#).

Table 29: Recommended Resilience Strategies for the City of Houston

HAZARD	PROBLEM STATEMENT	RECOMMENDED STRATEGIES
Multi-Hazard	<p>The percentage of residents living with a disability in the City of Houston exceeds the Borough, Alaska, and national percentages, at 12.7 percent.</p> <p>The largest percentage of residents living below the Federal poverty level within the project area is found in the City of Houston at 15.8 percent.</p>	<ul style="list-style-type: none"> • Know where vulnerable populations are located and assist with personal preparedness, appropriate evacuations, and after-event repairs. • Mitigation strategies involving personal preparedness, and structural retrofits should be communicated with the understanding that many individuals may lack financial stability.
Flood	<p>The City of Houston shows the largest loss ratio following a 0.2-percent-annual-chance flood event at 28.9 percent (\$2.7M building dollar loss).</p>	<ul style="list-style-type: none"> • Consider limiting additional development in flood hazard zones. • Develop a priority list for essential facility flood capability enhancements. • Develop a buyout program for repetitive loss properties. • Provide outreach to homeowners and business-owners regarding flood risk.
Earthquake	<p>Hazus results estimate that the City of Houston would be most impacted by the Castle Mountain M7.5 earthquake scenario with a total dollar loss of \$10M and a loss ratio of 5.4 percent.</p>	<ul style="list-style-type: none"> • Adopt and enforce updated building code provisions that reduce earthquake risk. • Develop a priority list for essential facility earthquake retrofits. • Develop an outreach program about earthquake risk and mitigation activities for homes, schools, and businesses.
Wildfire	<p>The Matanuska-Susitna Borough is at risk of wildfires due to the forestry and fuel, weather, and topography of the Borough. Eighty percent of the wildland fires that the Alaska Division of Forestry responds to are located within the cities of Houston, Palmer, and Wasilla. From February 2003 through January 2004, the Central Matanuska-Susitna Fire Station received and responded to 931 calls of which 254 were related to fire.</p>	<ul style="list-style-type: none"> • Mitigate future losses by regulating development in wildfire hazard areas through land use planning. • Develop a wildland-urban interface code to regulate for safer construction and incorporate mitigation consideration into the permitting process. • Create defensible space around structures and infrastructure. • Implement a Fuels Management Program. • Participate in the FireWise program.

While Federal funding for these projects is limited, FEMA recommends incorporating them into your Natural Hazards Mitigation Plan in case disaster funds become available. Additional funding may be available through your community’s Capital Improvement Planning process, bond authority, or other

local, State, or private funding source. More information on how to mitigate the effects of natural hazards can be found in FEMA’s *Local Mitigation Planning Handbook*:

<http://www.fema.gov/media-library/assets/documents/31598?id=7209>

Additional information on integrating your Hazard Mitigation Plan with the local planning process can be found here:

<http://www.fema.gov/media-library/assets/documents/19261?id=4267>

Palmer, City of

Areas of Mitigation Interest and Recommended Resilience Strategies

An assessment of the City of Palmer within the Matanuska-Susitna Borough was completed based on Hazus earthquake and flood risk models for the M7.1 Border Ranges Fault Scenario, M7.5 Castle Mountain earthquake scenario and a 1-percent-annual-chance flood event. Table 30 highlights facilities in the City of Palmer that are most affected by these hazards.

Table 30: Areas of Mitigation Interest for the City of Palmer

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
PALMER	SCHOOL	SCHOOL DISTRICT ADMINISTRATION	\$18.70M	\$11.8M	62.9%	\$5.6M	29.8%	EARTHQUAKE
PALMER	SCHOOL	ACADEMY CHARTER SCHOOL	\$18.7M	\$4.8M	25.4%	\$1.8M	9.6%	EARTHQUAKE
PALMER	SCHOOL	PALMER HIGH SCHOOL	\$82.6M	\$3.6M	4.4%	\$1.6M	1.9%	EARTHQUAKE
PALMER	COURTHOUSE	PALMER COURTHOUSE*	\$7.6M	\$3.1M	40.8%	\$725.6K	9.6%	EARTHQUAKE
PALMER	ADMINISTRATIVE	AK DEPARTMENT OF TRANSPORTATION*	\$7.6M	\$3.1M	40.8%	\$725.6K	9.6%	EARTHQUAKE
PALMER	ADMINISTRATIVE	PALMER STATE OFFICE BUILDING*	\$7.6M	\$3.1M	40.8%	\$725.6K	9.6%	EARTHQUAKE
PALMER	SCHOOL	ALASKA JOB CORPS	\$49.5M	\$2.0M	4.0%	\$786.5K	1.6%	EARTHQUAKE
PALMER	SCHOOL	PALMER JR MIDDLE SCHOOL	\$36.3M	\$2.0M	5.4%	\$874.7K	2.4%	EARTHQUAKE
PALMER	ADMINISTRATIVE	DOROTHY SWANDA JONES MATANUSKA-	\$30.0M	\$1.8M	6.0%	\$787.8K	2.6%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
SUSITNA BOROUGH BUILDING								
PALMER	CORRECTIONAL FACILITY	MAT-SU YOUTH FACILITY / MAT-SU SECONDARY SCHOOL	\$5.8M	\$1.5M	25.1%	\$392.8K	6.8%	EARTHQUAKE
PALMER	SCHOOL	SWANSON ELEMENTARY	\$20.5B	\$1.1M	5.6%	\$585.1K	2.9%	EARTHQUAKE
PALMER	SENIOR HOUSING	ALASKA VETERANS AND PIONEERS HOME (PALMER)	\$13.2B	\$785.2K	6.0%	\$340.2K	2.6%	EARTHQUAKE
PALMER	SENIOR COMM CENTER	PALMER SENIOR CITIZENS CENTER	\$13.6M	\$607.5K	4.5%	\$244.5K	1.8%	EARTHQUAKE
PALMER	LIBRARY	PALMER LIBRARY	\$6.6M	\$289.3K	4.8%	\$116.5K	1.9%	EARTHQUAKE
PALMER	PUBLIC SAFETY	ALASKA DIVISION OF FORESTRY	\$6.1M	\$253.6K	4.2%	\$115.3K	1.9%	EARTHQUAKE
PALMER	SENIOR HOUSING	PALMER SENIOR HOUSING (COLONY ESTATES)	\$5.3M	\$249.6K	4.7%	\$101.0K	1.9%	EARTHQUAKE
PALMER	SENIOR HOUSING	PALMER SENIOR HOUSING (CHUGACH ESTATES)	\$5.3M	\$241.0K	4.6%	\$98.7K	1.9%	EARTHQUAKE
PALMER	SCHOOL	SCHOOL DISTRICT WAREHOUSE*	\$4.0M	\$160.9K	4.0%	\$63.7K	1.6%	EARTHQUAKE
PALMER	SCHOOL	SGT KURTIS D.K. ARCALA NUTRITION SERVICES CENTER*	\$4.0M	\$160.9K	4.0%	\$63.7K	1.6%	EARTHQUAKE
PALMER	MUSEUM	PALMER MUSEUM OF HISTORY AND ART & VISITOR'S CENTER	\$551.0K	\$155.3K	28.2%	\$37.5K	6.8%	EARTHQUAKE
PALMER	ADMINISTRATIVE	AK DEPARTMENT OF FISH AND GAME	\$2.1M	\$94.0K	4.6%	\$33.5K	1.6%	EARTHQUAKE
PALMER	O&M	MSB PUBLIC WORKS O&M BUILDING	\$2.0M	\$91.9K	4.7%	\$37.0K	1.9%	EARTHQUAKE
PALMER	CORRECTIONAL FACILITY	MAT-SU PRETRIAL	\$1.5M	\$71.1K	4.6%	\$31.7K	2.1%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
PALMER	PUBLIC SAFETY	DANIEL M. CONTINI PSB 3-1	\$1.3M	\$59.4K	4.8%	\$25.9K	2.1%	EARTHQUAKE
PALMER	PUBLIC SAFETY	PALMER TROOPER POST*	\$1.3M	\$58.0K	4.6%	\$25.9K	2.1%	EARTHQUAKE
PALMER	PUBLIC SAFETY	PALMER POLICE DEPARTMENT*	\$1.3M	\$58.0K	4.6%	\$25.9K	2.1%	EARTHQUAKE
PALMER	PUBLIC SAFETY	ALASKA WILDLIFE TROOPERS	\$1.1M	\$49.3K	4.5%	\$18.0K	1.6%	EARTHQUAKE
PALMER	PUBLIC SAFETY	PALMER AMBULANCE 3-9	\$770.6K	\$43.7K	5.7%	\$23.0K	3.0%	EARTHQUAKE
PALMER	POST OFFICE	PALMER US POST OFFICE	\$720.7K	\$34.4K	4.8%	\$15.1K	2.1%	EARTHQUAKE
PALMER	COMMUNITY CENTER	PALMER COMMUNITY CENTER & HISTORIC TRAIN DEPOT	\$740.0K	\$31.7K	4.3%	\$19.5K	2.6%	EARTHQUAKE
PALMER	ADMINISTRATIVE	MSB CAPITAL PROJECTS BUILDING	\$300.0K	\$16.4K	5.5%	\$7.3K	2.4%	EARTHQUAKE
PALMER	PUBLIC SAFETY	PALMER AIRPORT PSB 3-4*	\$242.6K	\$10.3K	4.2%	\$4.2K	1.7%	EARTHQUAKE
PALMER	PUBLIC SAFETY	PALMER FIRE ADMINISTRATION & TRAINING GROUNDS*	\$242.6K	\$10.3K	4.2%	\$4.2K	1.7%	EARTHQUAKE
PALMER	ADMINISTRATIVE	CITY OF PALMER COMMUNITY DEVELOPMENT*	\$242.6K	\$10.3K	4.2%	\$4.2K	1.7%	EARTHQUAKE
PALMER	MUSEUM	COLONY HOUSE MUSEUM / PALMER HISTORICAL SOCIETY	\$166.3K	\$8.8K	5.3%	\$3.8K	2.3%	EARTHQUAKE

Note: Hazards are considered identified if the following applies

1. Earthquake: Subject has a M7.1 or M7.5 Earthquake Loss Ratio greater than 4 percent

*Facilities share the same parcel, values equally distributed

Hazard Mitigation Plan and Comprehensive Plan Analysis

The Matanuska-Susitna Borough All-Hazard Mitigation Plan, effective July 2004, and the 2006 City of Palmer Comprehensive Plan identify some of the following hazard mitigation projects that can be aided by information in this Risk Report.

Table 31: Hazard Mitigation Plan and Comprehensive Plan Analysis for the City of Palmer

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
<p>Flood Hazard Area: Spatial data identifies flood hazard areas for 1- and 0.2-percent-annual-chance events.</p> <p>Depth Grid: Spatial data identifies flood depth for the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance flood events were created for select riverine areas.</p> <p>BFE+ Grid: Spatial data identifies 1-foot increases in base flood elevations.</p> <p>Hazus Flood Output: Spatial and tabular data provides specific building and content loss data for properties affected by riverine flooding.</p>	Hazard Mitigation Plan	Flood-Objective 2.1	Participate in Federal and State programs designed to aid communities such as the NFIP and CRS which adjusts insurance rates based on mitigation measures undertaken by the community.	Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and AOMI section for areas most vulnerable to flooding. Use updated NFIP maps, and encourage insurance participation through community outreach and education efforts.
	Comprehensive Plan	Goal 9	Maintain a positive connection with Palmer’s natural setting; maintain the quality of the natural environment - particularly stream corridors, lakes, and watershed areas.	Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and AOMI section for areas most vulnerable to flooding. Regulate and/or restrict new development in flood hazard areas.
<p>Earthquake ShakeMap: Spatial data provides shaking intensity and ground motion following an earthquake. Data provided for the M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario.</p> <p>Hazus Earthquake Output: Spatial and tabular data provides specific building and content loss data, including building code analysis, for properties affected by a M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario. The Hazus outputs also provide tabular data analysis of transportation and utility functionality following the earthquake scenarios.</p>	Hazard Mitigation Plan	Earthquake Goal 2	Promote adoption of building codes to require earthquake-resistant construction practices and materials.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Prioritize structural and nonstructural retrofitting projects. Regulate new development to higher building code standards.
	Comprehensive Plan	Goal 2 - Objective E	Encourage Rehabilitation of Older Residential Structures	Use Hazus earthquake output and AOMI section to review loss ratios to both residential and critical facilities for both earthquake scenarios. Use information to prioritize rehabilitation and retrofitting projects.
<p>Wildfire Hazard Area: Spatial data and fire statistics provide historical wildfire information and hazard areas.</p>	Hazard Mitigation Plan	Wildfire Goal 2	Improve fire suppression capability of Borough firefighters.	Use spatial and historical data to coordinate cross-agency wildfire suppression and mitigate efforts to ensure that all incorporated and unincorporated areas of the Borough are adequately supported.
	Comprehensive Plan	Public Services Objective B	Provide adequate fire protection measures and services in Palmer to respond to current and future anticipated emergency service needs.	Use spatial and tabular historical data to educate residents and business owners occupying areas prone to wildfires. Conduct community outreach efforts to inform individuals on ways to prevent wildfires to protect their property, and how to best respond to a wildfire event. Encourage cross-agency communication to create a

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
				holistic approach to hazard outreach and mitigation.

Recommended Resilience Strategies

Based on the assessment above, the following strategies are recommended. Additional strategies can be found by referencing FEMA’s *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* or by clicking [here](#).

Table 32: Recommended Resilience Strategies for the City of Palmer

HAZARD	PROBLEM STATEMENT	RECOMMENDED STRATEGIES
Multi-Hazard	<p>The percentage of residents living with a disability in the City of Palmer exceeds the Borough, Alaska and national percentages, at 13.7 percent.</p> <p>Almost half (40.9 percent) of residents in the City of Palmer rent their homes.</p>	<ul style="list-style-type: none"> Know where vulnerable populations are located and assist with personal preparedness, appropriate evacuations, and after-event repairs. Address personal preparedness and structural/non-structural mitigation opportunities targeted toward renters. Additionally, provide information to landlords to help protect their properties and investments.
Flood	<p>It is estimated that Palmer will experience damage from multiple flooding scenarios; 0.2% annual chance flood event (9.1%), 1% annual chance flood event (18.2%), 2% annual chance flood event (4.6%), and the 10% annual chance flood event (13.60%).</p>	<ul style="list-style-type: none"> Consider limiting additional development in flood hazard zones. Develop a priority list for essential facility flood capability enhancements. Develop a buyout program for repetitive loss properties. Provide outreach to homeowners and business-owners regarding flood risk.
Earthquake	<p>The City of Palmer would be most impacted by the Border Rangers M7.1 scenario with a building dollar loss of \$99M, and a loss ratio of 8.6%.</p>	<ul style="list-style-type: none"> Adopt and enforce updated building code provisions that reduce earthquake risk. Develop a priority list for essential facility earthquake retrofits. Develop an outreach program about earthquake risk and mitigation activities for homes, schools, and businesses.
Wildfire	<p>The Matanuska-Susitna Borough is at risk of wildfires due to the forestry and fuel, weather, and topography of the Borough. Eighty percent of the wildland fires that the Alaska Division of Forestry responds to are located within the cities of Houston, Palmer, and Wasilla. From February 2003 through January 2004, the Central Matanuska-Susitna Fire Station received and responded to 931 calls of which 254 were related to fire.</p>	<ul style="list-style-type: none"> Mitigate future losses by regulating development in wildfire hazard areas through land use planning. Develop a wildland-urban interface code to regulate for safer construction and incorporate mitigation consideration into the permitting process. Create defensible space around structures and infrastructure. Implement a Fuels Management Program. Participate in the FireWise program.

While Federal funding for these projects is limited, FEMA recommends incorporating them into your Natural Hazards Mitigation Plan in case disaster funds become available. Additional funding may be available through your community’s Capital Improvement Planning process, bond authority, or other

local, State, or private funding source. More information on how to mitigate the effects of natural hazards can be found in FEMA’s *Local Mitigation Planning Handbook*:

<http://www.fema.gov/media-library/assets/documents/31598?id=7209>

Additional information on integrating your Hazard Mitigation Plan with the local planning process can be found here:

<http://www.fema.gov/media-library/assets/documents/19261?id=4267>

Wasilla, City of

Areas of Mitigation Interest and Recommended Resilience Strategies

An assessment of the City of Wasilla within the Matanuska-Susitna Borough was completed based on Hazus earthquake and flood risk models for the M7.1 Border Ranges Fault Scenario, the M7.5 Castle Mountain earthquake scenario, and a 1-percent-annual-chance flood event. Table 33 highlights facilities in the City of Wasilla that are most affected by these hazards.

Table 33: Areas of Mitigation Interest for the City of Wasilla

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
WASILLA	SCHOOL	WASILLA MIDDLE SCHOOL	\$63.6M	\$1.1M	1.7%	\$2.3M	3.7%	EARTHQUAKE
WASILLA	SCHOOL	IDITAROD ELEMENTARY	\$36.0M	\$895.1K	2.5%	\$1.9M	5.4%	EARTHQUAKE
WASILLA	PUBLIC SAFETY	CENTRAL MAT-SU PSB 6-1	\$10.8M	\$424.8K	3.9%	\$5.3M	49.4%	EARTHQUAKE
WASILLA	MEDICAL	MAT-SU REGIONAL URGENT CARE	\$20.4M	\$281.2K	1.4%	\$616.0K	3.0%	EARTHQUAKE
WASILLA	SCHOOL	BURCHELL HIGH SCHOOL	\$13.3M	\$266.0K	2.0%	\$711.8K	5.4%	EARTHQUAKE
WASILLA	SCHOOL	MAT-SU CENTRAL SCHOOL	\$8.1M	\$107.3K	1.3%	\$224.7K	2.8%	EARTHQUAKE
WASILLA	PUBLIC SAFETY	WASILLA POLICE DEPARTMENT	\$2.6M	\$101.2K	3.9%	\$763.4K	29.6%	EARTHQUAKE
WASILLA	POST OFFICE	WASILLA US POST OFFICE	\$4.8M	\$97.3K	2.0%	\$195.2K	4.1%	EARTHQUAKE
WASILLA	CITY HALL	WASILLA CITY HALL	\$3.9M	\$78.0K	2.0%	\$156.4K	4.1%	EARTHQUAKE

LOCATION	CATEGORY	NAME	TOTAL VALUE (BUILDING AND CONTENTS)	ESTIMATED LOSS FROM M7.1 EARTHQUAKE	LOSS RATIO FROM M7.1 EARTHQUAKE	ESTIMATED LOSS FROM M7.5 EARTHQUAKE	LOSS RATIO FROM M7.5 EARTHQUAKE	IDENTIFIED HAZARDS
WASILLA	PUBLIC SAFETY	MAT-SU WATER RESCUE	\$1.5M	\$33.9K	2.3%	\$73.4K	4.9%	EARTHQUAKE
WASILLA	LIBRARY	WASILLA LIBRARY	\$1.3M	\$27.4K	2.1%	\$54.7K	4.2%	EARTHQUAKE
WASILLA	PUBLIC SAFETY	JAKE WRIGHT DES FLEET MAINT FACILITY*	\$1.2M	\$24.9K	2.0%	\$47.0K	3.9%	EARTHQUAKE
WASILLA	MUSEUM	DOROTHY PAGE MUSEUM / HISTORIC TOWN SITE*	\$1.2M	\$24.9K	2.0%	\$47.0K	3.9%	EARTHQUAKE
WASILLA	SCHOOL	WASILLA CCS EARLY LEARNING HEAD START PRESCHOOL	\$1.3M	\$20.0K	1.6%	\$31.6K	2.5%	EARTHQUAKE
WASILLA	SENIOR HOUSING	WASILLA SENIOR CAMPUS*	\$989.7K	\$13.1K	1.3%	\$27.4K	2.8%	EARTHQUAKE
WASILLA	SENIOR COMM CENTER	WASILLA SENIOR CAMPUS*	\$989.7K	\$13.1K	1.3%	\$27.4K	2.8%	EARTHQUAKE
WASILLA	PERFORMING ARTS	VALLEY PERFORMING ARTS	\$420.3K	\$8.0K	1.9%	\$46.2K	11.0%	EARTHQUAKE
WASILLA	MUSEUM	MUSEUM OF ALASKA TRANSPORTATION AND INDUSTRY	\$50.0K	\$727	1.5%	\$2.4K	4.8%	EARTHQUAKE

Note: Hazards are considered identified if the following applies

1. Earthquake: Subject has a M7.1 or M7.5 Earthquake Loss Ratio greater than 2.0 percent

*Facilities share the same parcel, values equally distributed

Hazard Mitigation Plan and Comprehensive Plan Analysis

The Matanuska-Susitna Borough All-Hazard Mitigation Plan, effective July 2004, and the 2011 City of Wasilla Comprehensive Plan draft identify the following hazard mitigation projects that can be aided by information in this Risk Report.

Table 34: All-Hazard Mitigation Plan and Comprehensive Plan Analysis for the City of Wasilla

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
Flood Hazard Area: Spatial data identifies flood hazard areas for 1-	Hazard Mitigation Plan	Flood- Objective 1.3	Reduce vulnerability of structures within flood zones.	Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus

RISK REPORT DATA	RISK REPORT DATA CAN SUPPORT THE FOLLOWING			RISK REPORT LINK
	PLAN TYPE	PLAN LINK	PROJECTS	
<p>and 0.2-percent-annual-chance events.</p> <p>Depth Grid: Spatial data identifies flood depth for the 0.2-, 1-, 2-, 4-, and 10-percent-annual-chance flood events were created for select riverine areas.</p> <p>BFE+ Grid: Spatial data identifies 1-foot increases in base flood elevations.</p> <p>Hazus Flood Output: Spatial and tabular data provides specific building and content loss data for properties affected by riverine flooding.</p>				Flood Output and AOMI section for areas most vulnerable to flooding. Regulate and/or restrict new development, and prioritize surveys of existing structures to identify mitigation measures and educational outreach efforts.
	Comprehensive Plan	Future Land Use 3.2	Adopt policies that allow increased residential densities in appropriate areas necessary to accommodate future growth.	Use new NIFP maps and additional products released with this Risk Report. Incorporate new flood hazard area, depth, and BFE+ grids for local assessments. Use Hazus Flood Output and AOMI section for areas most vulnerable to flooding. Regulate and/or restrict new development accordingly.
	Hazard Mitigation Plan	Earthquake Goal 2	Promote adoption of building codes to require earthquake-resistant construction practices and materials.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Prioritize structural and nonstructural retrofitting projects. Regulate new development to higher building code standards.
	Comprehensive Plan	Future Land Use 4.1	Encourage a minimum housing safety standard to minimize decreased property values, neighborhood blight, and health and safety problems.	Use Hazus earthquake output and AOMI section to review loss ratios to critical facilities for both earthquake scenarios. Communicate earthquake risk to communities most affected. Incorporate and/or update building code standards. Prioritize structural and non-structural retrofitting projects.
<p>Earthquake ShakeMap: Spatial data provides shaking intensity and ground motion following an earthquake. Data provided for the M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario.</p> <p>Hazus Earthquake Output: Spatial and tabular data provides specific building and content loss data, including building code analysis, for properties affected by a M1.7 Border Ranges Fault Scenario, M7.5 Castle Mountain Scenario, and M9.2 1964 Scenario. The Hazus outputs also provide tabular data analysis of transportation and utility functionality following the earthquake scenarios.</p> <p>Wildfire Hazard Area: Spatial data and fire statistics provide historical wildfire information and hazard areas.</p>	Hazard Mitigation Plan	Wildfire Goal 2	Improve fire suppression capability of Borough firefighters.	Use spatial and historical data to coordinate cross-agency wildfire suppression and mitigate efforts to ensure that all incorporated and unincorporated areas of the Borough are adequately supported.
	Comprehensive Plan	Intergovernmental Coordination 1.3	Encourage cooperation and coordination at many levels on mutually beneficial endeavors.	Use spatial and tabular historical data to educate residents and business owners occupying areas prone to wildfires. Encourage cross-agency communication to create a holistic approach to wildfire response systems, hazard outreach, and mitigation efforts.

Recommended Resilience Strategies

Based on the assessment above, the following strategies are recommended. Additional strategies can be found by referencing FEMA’s *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* or by clicking [here](#).

Table 35: Recommended Resilience Strategies for the City of Wasilla

HAZARD	PROBLEM STATEMENT	RECOMMENDED STRATEGIES
Multi-Hazard	<p>The percentage of residents living with a disability in the City of Wasilla exceeds the Borough, Alaska, and national percentages, at 13.7 percent.</p> <p>Within the City of Wasilla, 10.0 percent of residents speak languages other than English. This is the largest non-English speaking population included in this project area.</p> <p>Almost half (46.6 percent) of residents in the City of Wasilla rent their homes.</p>	<ul style="list-style-type: none"> • Know where vulnerable populations are located and assist with personal preparedness, appropriate evacuations, and after-event repairs. • Provide outreach materials and presentations in all required languages. • Address personal preparedness and structural/non-structural mitigation opportunities targeted toward renters. Additionally, provide information to landlords to help protect their properties and investments.
Flood	<p>The City of Wasilla is estimated to experience a total building dollar loss of \$160K and a loss ratio of 4.2% during a 1-percent-annual-chance flood event.</p>	<ul style="list-style-type: none"> • Consider limiting additional development in flood hazard zones. • Develop a priority list for essential facility flood capability enhancements. • Develop a buyout program for repetitive loss properties. • Provide outreach to homeowners and business-owners regarding flood risk.
Earthquake	<p>The City of Wasilla would be most impacted by the Castle Mountain M7.5 earthquake scenario. The city would experience a building dollar loss of \$120M and a loss ratio of 6.7%.</p>	<ul style="list-style-type: none"> • Adopt and enforce updated building code provisions that reduce earthquake risk. • Develop a priority list for essential facility earthquake retrofits. • Develop an outreach program about earthquake risk and mitigation activities for homes, schools, and businesses.
Wildfire	<p>The Matanuska-Susitna Borough is at risk of wildfires due to the forestry and fuel, weather, and topography of the Borough. Eighty percent of the wildland fires that the Alaska Division of Forestry responds to are located within the cities of Houston, Palmer, and Wasilla. From February 2003 through January 2004, the Central Matanuska-Susitna Fire Station received and responded to 931 calls of which 254 were related to fire.</p>	<ul style="list-style-type: none"> • Mitigate future losses by regulating development in wildfire hazard areas through land use planning. • Develop a wildland-urban interface code to regulate for safer construction and incorporate mitigation consideration into the permitting process. • Create defensible space around structures and infrastructure. • Implement a Fuels Management Program. • Participate in the FireWise program.

While Federal funding for these projects is limited, FEMA recommends incorporating them into your Natural Hazards Mitigation Plan in case disaster funds become available. Additional funding may be available through your community’s Capital Improvement Planning process, bond authority, or other local, State, or private funding source. More information on how to mitigate the effects of natural hazards can be found in FEMA’s *Local Mitigation Planning Handbook*:

<http://www.fema.gov/media-library/assets/documents/31598?id=7209>

Additional information on integrating your Hazard Mitigation Plan with the local planning process can be found here: <http://www.fema.gov/media-library/assets/documents/19261?id=4267>

Earthquake Hazus Analysis

For this analysis, the project team applied the Hazus Advanced Engineering Building Module (AEBM). The underlying approach to AEBM procedures is a combination of the nonlinear static (pushover) analysis methods of the National Earthquake Hazards Reduction Program Guidelines and other sources (namely the ATC 40 document: Seismic Evaluation and Retrofit of Concrete Buildings, CSSC, 1996), with Hazus loss estimation methods. Seismic/structural engineers, having performed detailed pushover analysis of a specific building, are expected to have a much better understanding of a building's potential failure modes, overall response characteristics, structural and nonstructural system performance, and the cost required to repair damaged components.

The software architecture of the AEBM has two main components (or databases), AEBM Inventory and AEBM Profiles. The AEBM Inventory is structured to accept a "portfolio" of individual buildings, each uniquely defined by location (latitude/longitude), number of occupants, size, replacement cost, and other building-specific financial data. The AEBM Profiles describe an extensive set of building performance characteristics, including damage and loss function parameters. To run the AEBM, each building in the AEBM Inventory must be linked to one of the AEBM Profiles, but an AEBM Profile can be used for more than one building of the AEBM Inventory. Applications of the AEBM include evaluating individual buildings or a group of buildings of a similar type.