

2019
Salt Lake County
Hazard Mitigation Plan

SALT LAKE COUNTY EMERGENCY MANAGEMENT
3380 S 900 W
SALT LAKE CITY, UTAH

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EXECUTIVE SUMMARY

It is an undeniable fact that the number of natural hazards has increased in recent years. Due to increased population density, natural hazards also have a greater effect. It is the responsibility of government to be prepared for these natural hazards. Government, by definition, has the responsibility for the planning and creation of mitigation strategies to lessen the damaging effects that disasters have on the community. Government at all levels is not only responsible for creating these mitigation strategies with citizen involvement, but is also responsible for their timely and cost-effective implementation.

With this in mind, Salt Lake County was awarded a federal grant to continue the hazard mitigation process following the creation of the Wasatch Front Regional Council's Natural Hazards Pre-Disaster Mitigation Plan that was approved on November 20, 2009 and expired on November 20, 2014. The plan was again updated in 2014-2015, and became the 2015 Salt Lake County Multi-Jurisdictional Multi-Hazard Mitigation Plan. In 2019, Salt Lake County updated the mitigation plan to include five (5) new participating jurisdictions.

As part of the 2019 update, 24 jurisdictions located within Salt Lake County (23 cities/towns/townships and Salt Lake County itself) agreed to participate in the plan. At this point, planning teams were created, with Salt Lake County Emergency Management (SLCo EM) having the responsibility to complete the updated plan. Public Works, universities, GIS specialists, city administrators, emergency managers, and the public were all involved with the creation of the plan.

This plan consists of two parts. **Volume 1** contains the general Salt Lake County overview including hazard history, previous mitigation strategies, and the new mitigation strategies for the next five-year period. **Volume 2** contains the Individual Jurisdictional annexes with their respective hazard histories and previous mitigation strategies that have been newly initiated, still exist from prior years, or have been completed. New mitigation strategies have been designed based on the changing requirements of each jurisdiction moving forward for the next five-year period. There is some carry-over from plan to plan as ideas and strategies were created in groups, but they are also jurisdictionally specific, as every community will face different hazards and use unique strategies on how to combat these hazards.

Combined, both volumes make up the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan (**MJ-HMP or Plan**). This plan and the implementation of these strategies will help Salt Lake County and its jurisdictions become better-prepared and more resilient communities. The plan was created to prevent and/or reduce the impacts of disasters on our citizens and communities.

PROMULGATION

This plan is promulgated as the "Salt Lake County's Multi-Jurisdictional Hazard Mitigation Plan." The plan is designed to comply with all applicable Federal, State and local ordinances and resolutions, and provides guidance to be followed to prepare for and mitigate hazards that threaten the community.

This plan has been constructed with the best information available and from a planning perspective. It is recognized that as new information becomes available, decisions and actions may be different than the plan envisioned at the time the plan was developed.

The County of Salt Lake gives full support to the plan and urges all officials, employees, and others involved in the total emergency management effort, individually and collectively, doing their share in making the Salt Lake County a disaster-resistant and resilient community.

This plan supersedes all previous hazard mitigation plans.

Promulgated this _____ day of _____, _____.

Authority

Federal Authority

Public Law (PL) 93-288 as amended, established the basis for federal hazard mitigation activity in 1974. A section of this act requires the identification, evaluation and mitigation of hazards as a prerequisite for state receipt of future disaster assistance outlays. Since 1974, many additional programs, regulations and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government. When the Stafford Act amended PL 93-288, several additional provisions were added that provide for the availability of significant mitigation measures in the aftermath of presidentially declared disasters. The current Stafford Act is the "Robert T. Stafford Disaster Relief and Emergency Assistance Act", as amended, August 2016.

State Authority

- The Governor's Emergency Operation Directive
- The Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to Public Law 93-288, as amended.
- Title 44, CFR, Federal Emergency Management Agency Regulations, as amended.
- State Emergency Management Act of 1981, Utah Code 53-2, 63-5.
- Disaster Response Recovery Act, 63-5A.
- Executive Order of the Governor, Executive Order 11
- Emergency Interim Succession Act, 63-5B.

Utah State Code

In Utah Code 53-2-104, it is stated that the Utah Division of Emergency Management shall: (c) prepare, implement, and maintain programs and plans to provide for:

1. Prevention and minimization of injury and damage caused by disasters
2. Identification of areas particularly vulnerable to disasters
3. Coordination of hazard mitigation and other preventive and preparedness measures designed to eliminate or reduce disasters
4. Assistance to local officials in designing local emergency action plans
5. Coordination of federal, state, and local emergency activities; (vii) Coordination of emergency operations plans with emergency plans of the federal government; and
6. (x) Other measures necessary, incidental, or appropriate to this chapter.

Local Authority

Local governments play an essential role in implementing effective mitigation. For the purposes of this plan, local governments include not only cities and counties, but also special service districts with elected boards. Each local government will review all present or potential damages, losses and related impacts associated with natural hazards to determine the need or requirement for mitigation action and planning. In the cities within Salt Lake County, the local executives are responsible for carrying out plans and policies, including the county council and city or town mayors and administrators. Local governments must be prepared to participate in the post-disaster hazard mitigation team process and pre-mitigation planning as outlined in this document in order to effectively protect their citizens. All jurisdictions in Salt Lake County participated in the development of this plan.

INTRODUCTION

Purpose and Scope

The four purposes of this Plan are:

1. To identify threats to the community
2. To create mitigation strategies to address those threats
3. To develop long-term mitigation planning goals and objectives
4. To fulfill federal, state and local hazard mitigation planning obligations

Mitigation actions in particular would serve to minimize conditions that have an undesirable impact on our citizens, the economy, environment, and the wellbeing of Salt Lake County and surrounding municipalities. This Mitigation Plan is intended to enhance the awareness for elected officials, agencies and the public of these hazards and their associated threat to life and property. The Plan also details what actions can be taken to help prevent or reduce hazard vulnerability to each jurisdiction.

Often, hazard mitigation is a neglected aspect within emergency management. When local governments place a low priority on mitigation implementation activities relative to the perceived threat, some important mitigation measures may be neglected in favor of higher priority activities. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is the key to greatly reducing long-term risk to people and property from natural hazards and their effects.

Salt Lake County and all participating jurisdictions, coupled with their respective citizens, stakeholders, and partner agencies, prepared this local hazard mitigation plan with the goal of guiding hazard mitigation planning in reducing the casualties and costs of natural disasters by providing comprehensive hazard identification, risk assessment, capability and vulnerability analysis, mitigation strategies, and an implementation schedule. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Salt Lake County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program and Pre-Disaster Mitigation program, and to earn points for the National Flood Insurance Program's Community Rating System (CRS), which could lower flood insurance premiums in CRS communities.

This mitigation plan is a revision of the 2015 Salt Lake County Multi-Jurisdictional Multi-Hazard Mitigation Plan. The 2015 plan was reviewed to evaluate its strengths, weakness and utility. The hazards, vulnerabilities, and risks were reviewed as to their impact, how hazards may affect the population, and their severity. Updates also describe hazard impacts that have occurred since the last plan revision. The planning team considered

previously unidentified hazards to include in the plan update. A capabilities assessment was conducted to identify potential mitigation needs and to further align the mitigation plan with other community planning efforts. The revision process also included a review of proposed mitigation goals, objectives and actions and to determine their validity and how effective they have been/or will be at reducing vulnerability in the county. New priorities have been set to support changes that were identified. The Mitigation Plan was also evaluated to support the State Mitigation Plan goals and objectives, as well as other local planning efforts. Finally, an implementation strategy and timeline will assign the responsibility and schedule for tracking implementation of the identified mitigation actions. The Mitigation Plan will be adopted through the normal legal process and will establish authority and guide all mitigation activities outlined in the plan.

This plan also utilized current county, city, and applicable private hazard mitigation, emergency operations plans, census data, and available GIS and assessor's data as resources for the planning team. SLCo EM staff, planning team members, county, city, and applicable emergency managers/planners, subject matter experts, recruits from other jurisdictions such as other local government units, private sector, non-governmental, academia, airports, and the military were consulted during this planning activity. This plan also demonstrates that there has been a proactively offered opportunity for participation in the planning process by the public and all community stakeholders (examples of participation include relevant involvement in an any planning process, attendance at meetings, contributing research, data, other information, commenting on drafts of the plan).

This plan was developed in accordance with the requirements of the FEMA Section 322 regulations, 44 CFR Part 201, the Utah Division of Emergency Management (UDEM) and local planning agencies. Regulations set forth by FEMA were followed during the development of this Plan. Future monitoring, evaluating, updating and implementation will occur annually or following any natural disaster. A major revision will occur every five years. Annual or any interim Plan review, updates and revisions will be the responsibility of each adopting jurisdiction.

Background

Salt Lake County is vulnerable to natural and technological (human-caused) hazards that threaten the health, welfare, and security of our citizens. Action taken to reduce or eliminate the long-term risk to human life and property from these hazards is known as mitigation. The losses and life and property, as well as the cost of response to and recovery from potential disasters can be substantially reduced when attention is turned to mitigation of the impacts and effects before they occur or re-occur.

Hazard mitigation planning is the process of identifying hazard risks and vulnerabilities, and establishing goals, policies and procedures to implement risk-reducing actions. This plan represents a collaborative effort of many participants in our community with the mission to engage community stakeholders in developing a comprehensive approach to reduce long-term hazard risk by identifying and implementing effective mitigation strategies.

Mitigation planning creates safer communities by reducing loss of life and property damage, and protecting community assets from the negative impacts of hazards. Implementing mitigation strategies can also reduce the cost of disaster response and recovery by:

- Identifying cost-effective actions that reduce risk
- Focusing resources on the greatest vulnerabilities
- Building partnerships between jurisdictions
- Increasing public awareness of hazards and risk
- Communicating planning priorities
- Aligning risk-reduction efforts with other community plans and objectives
- Establishing eligibility for mitigation grant programs.

Hazard mitigation is any cost-effective action that has the effect of reducing, limiting, or preventing the vulnerability of people, property and/or the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation actions, which can be used to eliminate or minimize the risk to life and property, fall into three categories:

1. Those that keep the hazard away from people
2. Those that keep people, property, and structures away from the hazard
3. Those that do not address the hazard, but rather reduce the impact of the hazard on the victims, such as insurance.

Local mitigation plans are required to be updated every five years. This plan will be an update to the 2015 Salt Lake County Multi-Jurisdictional Multi-Hazard Mitigation Plan. The Mitigation Plan is a collaborative effort, which will serve all of Salt Lake County, including each of the participating jurisdictions, as well as special service districts within the county. The revision of this plan supports the State Hazard Mitigation Plan mission, which is "to permanently reduce the region's vulnerability to natural hazards."

The Plan is intended to promote sound public policy and protect or reduce the vulnerability of the citizens, critical facilities, infrastructure, private property and the natural environment within the region. The framework of this plan will now serve as a tool to guide, plan, and allocate resources across multi-jurisdictional boundaries. It will assist jurisdictions in making good assessments of their resilience to disasters and disruptions. It will serve as a guide to prioritize mitigation and preparedness efforts, allocate funding and guide development in innovative ways and to effectively utilize and share scarce resources. It is a representation of the county's commitment to reduce risks from natural hazards.

How to Navigate this Plan

This plan has been set up in two volumes so that elements that are jurisdiction-specific can easily be distinguished from those that apply to the whole planning area:

- Volume 1 includes all federally required elements of a disaster mitigation plan that apply to the entire planning area. This includes the description of the planning process, public involvement strategy, goals and objectives, countywide hazard risk assessment, countywide mitigation actions, and a plan maintenance strategy. The following appendices at the end of Volume 1 include information or explanations to support the main content of the plan:
    - Appendix A - Acronyms and Definitions
    - Appendix B - Plan Process and Development Documentation
    - Appendix C - Public Participation Documentation
    - Appendix D - Plan Adoption Resolutions from Planning Partners
    - Appendix E - References
- Volume 2 includes all federally required jurisdiction-specific elements, in annexes for each participating jurisdiction.

All planning partners will adopt Volume 1 in its entirety and their respective jurisdiction-specific annex within (Volume 2).

PLANNING PROCESS AND METHODOLOGY

To update the 2019 Salt Lake County, the County followed a process that had the following primary objectives:

- Form a planning team
- Engage the Steering Committee
- Establish a planning partnership with local jurisdictions and coordinate with other agencies
- Engage the public
- Define/Reassess the planning area
- Review existing data, programs, and prior plans
- Assess/Update the risk, vulnerabilities, capabilities within the planning area
- Formulate/update mitigation strategies to address identified areas of concern.
- Successfully meet all State and Federal requirements

These objectives are discussed in the following sections.

Planning Teams and Jurisdiction Participation

Core Planning Team

Salt Lake County hired Integrated Solutions Consulting (ISC) to assist with the update and implementation of the plan. The Integrated Solutions Consulting project manager and lead project planner reported directly to a County-designated project manager. A planning team was formed to lead the planning effort, made up of the following members:

- Clint Mecham, Division Chief, Salt Lake County Emergency Manager
- Keith Bevan, Deputy Emergency Manager, Planning Officer, Salt Lake County Emergency Manager
- Kristen Hansen, Planning Section, Administrator Coordinator, Salt Lake County Emergency Manager
- Sheldon Baumgartner, GIS Specialist, Salt Lake County Emergency Manager
- John McClure, Intelligence Specialist
- Tina Brown, PIO/Joint Information Center Manager
- Val Greensides, ECC Coordinator

The Steering Committee

Hazard mitigation planning enhances collaboration and support among diverse parties whose interests can be affected by hazard losses. In 2019, a steering committee was formed to oversee all phases of the plan.

The Steering Committee with representatives from each city and other major service districts provided extensive contributions to the information included in this plan. Other local and state agencies that have aided in the process include; city and county geographic information system (GIS) departments, elected officials, local officials, emergency managers, fire and law enforcement departments, planning departments, public works/engineering departments and other local government agencies. The planning process was based on

Section 322 requirements of the Disaster Mitigation Act of 2000 (DMA 2000) and supporting guidance documents developed by FEMA and the Utah Division of Emergency Management (UDEM).

Table: Steering Committee Membership 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update			
Name	**Title**	**Committee Position**	**Agency/Organization**
Chris Cawley	Emergency Manager	Jurisdiction Representative	Town of Alta
Natalie Hall	Emergency Manager	Jurisdiction Representative	City of Bluffdale
Dan Knopp	Mayor	Jurisdiction Representative	Brighton
Jeff Boss	Council Member	Jurisdiction Representative	Brighton
Paul Brenneman	Emergency Manager	Jurisdiction Representative	Cottonwood Heights
Julie Sutch	Assistant Emergency Manager	Jurisdiction Representative	Cottonwood Heights
Robert Lambert	Emergency Manager	Jurisdiction Representative	Draper City
Bart Vawdrey	Deputy Fire Chief	Jurisdiction Representative	Draper City
Monte Johnson	Emergency Manager	Jurisdiction Representative	Herriman City
Tina Giles	Deputy Emergency Manager	Jurisdiction Representative	Herriman City
David Chisolm	Emergency Manager	Jurisdiction Representative	Holladay
Brandon Smith	Emergency Manager	Jurisdiction Representative	Midvale City
Julie Harvey	Emergency Management Planner	Jurisdiction Representative	Midvale City and Holladay
Andrew Clark	Emergency Manager	Jurisdiction Representative	Millcreek City
Joey Mittelman	Assistant Chief, Fire Marshall, Emergency Manager	Jurisdiction Representative	City of Murray
Jeff Puls	Paramedic, Assistant Emergency Manager	Jurisdiction Representative	City of Murray
Scott Chatwin	Emergency Manager	Jurisdiction Representative	Riverton City
Trace Robinson	Public Works Director	Jurisdiction Representative	Riverton City
Pam Lofgreen	Emergency Manager	Jurisdiction Representative	Salt Lake City
Jeffory Mulcahy	Emergency Manager	Jurisdiction Representative	City of Sandy
Aaron Sainsbury	Emergency/Safety Manager	Jurisdiction Representative	City of South Jordan
Blaine Daimaru	Emergency Manager	Jurisdiction Representative	City of South Salt Lake
Donny Gasu	Emergency Response Coordinator	Jurisdiction Representative	City of Taylorsville

Jared Smith	Emergency Manager	Jurisdiction Representative	West Jordan City
John Evans	Fire Chief and Emergency Services Director	Jurisdiction Representative	West Valley City
Chris Beichner	Deputy Fire Chief	Jurisdiction Representative	West Valley City
Sean Clayton	Mayor	Jurisdiction Representative	Copperton Metro Township
Joe Smolka	Mayor	Jurisdiction Representative	Emigration Metro Township
Jennifer Hawkes	Deputy Mayor	Jurisdiction Representative	Emigration Metro Township
Kelly Bush	Mayor	Jurisdiction Representative	Kearns Metro Township
Tina Snow	Deputy Mayor	Jurisdiction Representative	Kearns Metro Township
Greg Schulz	Engineer	Jurisdiction Representative	Magna Metro Township
Dan Peay	Mayor	Jurisdiction Representative	Magna Metro Township
Paulina Flint	Mayor	Jurisdiction Representative	White City Metro Township
Lisa L. Schwartz	Emergency Manager	Jurisdiction Representative	Salt Lake Community College

Representatives not only attended the meetings, but also participated by gathering appropriate data and historical information, completed the community preparedness survey, participated in their community hazard analysis, identified new mitigation strategies, updated past mitigation strategies, and participated in other efforts (i.e. webinars, phone interviews, and reviewing drafts).

A monthly stakeholder Hazard Mitigation meeting was held on the 2nd Monday of each month. Meetings started in May 2019 and went through December 2019. All jurisdictional representatives and regional stakeholders were invited.

Additional Partners and Stakeholders that participated in the plan included:

- Rick Graham, Metro Township Executive at Salt Lake County
- Scott Baird, Director, Public Works & Municipal Services
- Kevyn Smeltzer, Director of Operations, Public Works & Municipal Services
- Leon Barret, Operations, Public Works & Municipal Services
- Tamaran Woodland, Flood Control, Public Works & Municipal Services
- Bart Barker, General Manager, Greater Salt Lake Municipal Services District
- Brian Hartsell, Associate General Manager, Greater Salt Lake Municipal Services District
- Kathy Holder, State Floodplain Manager, Utah Division of Emergency Management
- Lisa Bagley, Chair, VOAD Region 2
- Scott Neal, South Valley Sewer District
- Tara Behunin, Utah Division of Emergency Management
- Karen Wiley, Community Development Manager, Salt Lake County
- Beth Todd, Deputy Director, Salt Lake Valley Emergency Communications Center
- Jim Woodward, Emergency Management Planner/Municipal Services, Salt Lake County Emergency Management

- Julie Harvey, Emergency Management Planner/Municipal Services, Salt Lake County Emergency Management

Coordination with other Agencies, Partners, and Stakeholders

The following agencies and partners were instrumental in the update process:

- American Red Cross
- VOAD
- National Weather Service
- Federal Emergency Management Agency (How-to Guides)
- National Weather Service (hazard profile)
- National Climate Data Center (hazard profile)
- Sewer Districts
- Utah Division of Emergency Management (GIS data, flood data, HAZUS data for flood and earthquake)
- Utah Geologic Survey (GIS data, geologic information, various hazard reports)
- Utah Division of Forestry Fire and State Lands (fire data)
- Utah Avalanche Center, Snow and Avalanches, Annual Reports
- Utah Department of Transportation (traffic data and information)
- University of Utah Seismic Station (earthquake data)
- Utah State University (climate data)
- Salt Lake County Departments and municipalities (Emergency Operations Plans, histories, mitigation actions, public input, GIS, assessor, transportation, property and infrastructure)

Neighboring counties (Davis County, Utah County, Tooele County, Wasatch County, and Summit County) were granted access to the Plan for review and feedback via the online planning system at https://ut-slc.isc-cemp.com. An additional e-mail was sent to the designated emergency manager for each county with a link to the draft plan. Additionally, hazard mitigation plans for the adjacent counties (specifically Davis County and Tooele County and the Mountainland Pre-Disaster Hazard Mitigation Plan), as well as the planning for all other nearby counties were reviewed to determine region-wide risks and mitigation opportunities. Public input of residents who reside in surrounding counties (4.6%), but indicated they commute and work in the County was also analyzed and compared to residents who indicated they live in Salt Lake County.

A meeting to specifically address flooding in the County and related public works and engineering initiatives was held with Public Works & Municipal Services on December 2, 2019 to review existing flood mitigation projects, and to also identify new flood mitigation initiatives based on recent flood-related studies (i.e. Rose Creek Study) and other known issues. Please double-click the link below to access the sign-in sheet of attendees. The planning team also coordinated with the State Floodplain Manager to obtain information regarding repetitive loss data needed for the plan. During the annual review of the plan, and per the Plan Implementation and Maintenance section, efforts will be made to ensure all relevant stakeholders have continued input and participation in the MJ-HMP.



PWMunicipalServices-2Dec2019.pdf

Local Jurisdiction Plan Participation

The following local jurisdictions in Salt Lake County participated in the 2019 MJ-HMP:

Table: Participating Jurisdictions		
Jurisdiction	**Participating Jurisdiction in 2015**	**Participating Jurisdiction in 2019**
Town of Alta	Yes	Yes
City of Bluffdale	Yes	Yes
Brighton	No (Unincorporated)	Yes
Cottonwood Heights	Yes	Yes
Draper City	Yes	Yes
Herriman City	Yes	Yes
City of Holladay	Yes	Yes
Midvale City	Yes	Yes
City of Murray	Yes	Yes
Riverton City	Yes	Yes
Salt Lake City	Yes	Yes
City of Sandy	Yes	Yes
City of South Jordan	Yes	Yes
City of South Salt Lake	Yes	Yes
City of Taylorsville	Yes	Yes
West Jordan City	Yes	Yes
West Valley City	Yes	Yes
Copperton Metro Township	No (Unincorporated)	Yes
Emigration Metro Township	No (Unincorporated)	Yes
Magna Metro Township	No (Unincorporated)	Yes
City of Millcreek	No (Unincorporated)	Yes
Kearns Metro Township	No (Unincorporated)	Yes
White City Metro Township	No (Unincorporated)	Yes
Salt Lake Community College	No	No, but the Community College's annex is included as an appendix in Volume 2.
Salt Lake County	Yes	Yes

Local Outreach Meetings

The Core Planning Team worked with individual jurisdictions and planning partners in order to provide one-on-one guidance and support. Local outreach meetings occurred with every participating jurisdiction.

Mitigation Workshops

Two (2) workshops were held to identify hazards and update and consider new mitigation strategies.



2019 Salt Lake County Mitigation Plan

Local Jurisdiction Workshops

What: These in-person workshops will give your jurisdictional planning team an opportunity to work with planning staff from the Salt Lake County Unified Fire Authority to identify local hazards and areas of concern, review previously identified mitigation actions, develop future mitigation projects, prioritize mitigation projects moving forward, and provide input/update for your jurisdiction's section of the *2019 Salt Lake County Mitigation Plan*.

Why: Participating in updates to the mitigation plan is a *FEMA Requirement* to be eligible for some federal disaster funding before and after disasters. By bringing your local planning team to one of these workshops, you will be fulfilling that requirement.

Who: *EVERY* jurisdiction within Salt Lake County should attend one workshop; recommended attendees from local jurisdictions include representatives from the following disciplines:

- **Building Code Enforcement**
- **Municipal Administration & Management**
- **Elected Officials**
- **Fire & Law Enforcement**
- **Floodplain Administrator**
- **Legal**
- **Treasurer/Tax Assessor**
- **Parks & Recreation**
- **Planning/Community Development/GIS**
- **Public Works/Transportation (Roads & Bridges)**
- **Sanitation/Storm Water Management/Utility Districts**
- **School Districts & Universities**

When & Where (*ATTEND ONLY ONE*):

- Hazard Mitigation Planning Workshop | Monday, August 12, 2019 (9:00 a.m.-11:30 a.m.) | 3380 S 900 W, Salt Lake City, UT 84119 | Salt Lake County Emergency Management
- Hazard Mitigation Planning Workshop | Monday, August 12, 2019 (1:30 p.m.- 4:00 p.m.) | 3380 S 900 W, Salt Lake City, UT 84119 | Salt Lake County Emergency Management

To Register Go To: http://www.isc-registration.com/saltlakecounty.html

Please contact Keith Bevan, Planning and Intelligence Section at **kbevan@unifiedfire.org or 801-743-7200,** for assistance with registration, and/or with any questions.

Salt Lake County
2019 Hazard Mitigation Plan (HMP) Update
Local Jurisdiction Workshops

August 12, 2019
Session 1: 9:00 AM - 11:30 AM
Session 2: 1:30 PM – 4:00 PM

Agenda

Meeting Purpose:

The purpose of this meeting is to engage and collect information from the individual jurisdictions of Salt Lake County.

- **Introductions**
- **Mitigation Overview**
- **Hazards**
- **Jurisdiction Hazard Summary Worksheet**
- **Mitigation Goals**
- **Mitigation Strategies**
- **Review Ongoing Mitigation Actions/Projects**
- **Identify New Mitigation Actions**
- **Salt Lake County Knowledge Management System**

2019 Municipal HMP Annex

As part of the 2019 MJ-HMP update, all participating jurisdictions were required to create and/or update their respective Municipal HMP Annex. 2019 jurisdiction-specific annexes can be found in Volume II.

New Mitigation Actions

Each participating jurisdiction was required to consider and submit at least one new mitigation action as part of the 2019 MJ-HMP. New mitigation actions are documented in each respective annex.

Online Planning System

The Online Planning System used to draft the plan, gave members of the Steering Committee and Local Planning Team access to the previous plan and the 2019 MJ-HMP update and resources, including documents and forms, instructions and examples, and contact for Core Planning Team members. In addition, the Online Planning System featured real-time access to the Plan and comment functionality. Crucially, the latter provided users the ability to directly interact with the Core Planning Team, encouraging engagement throughout the planning process and collaboration. The comment function was intuitive, allowing users to quickly acclimate to the system:

- To make a comment, users were instructed to click on the Comment link on the bottom of the content page and a pop-up box would appear. The person used the drop-down box to designate whether the comment was a Feedback or an Observation. After entering the comment, they clicked the Send Comments button to submit.
- The comments tool allowed the user to make comments on any page within the Plan.
- The comments for pages were visible to all administrators and users who had editing privileges for the specific page.
- An email notification was sent to users who were designated to receive a comment notification.



Table: Plan Participation						
Jurisdiction	**Attended at least one monthly meeting**	**Represented at Mitigation Workshop**	**Met with Core Planning Team**	**Reviewed and approved Hazard Risk Ranking**	**Submitted at least One New Mitigation Action**	**Completed Municipal Annex (Volume II)**
Town of Alta	Yes	Yes	Yes	Yes	Yes	Yes
City of Bluffdale	Yes	Yes	Yes	Yes	Yes	Yes
Brighton	-	-	Yes	Yes	Yes	Yes
Cottonwood Heights	Yes	Yes	Yes	Yes	Yes	Yes
Draper City	Yes	Yes	Yes	Yes	Yes	Yes
Herriman City	Yes	Yes	Yes	Yes	Yes	Yes
City of Holladay	Yes	Yes	Yes	Yes	Yes	Yes
Midvale City	Yes	Yes	-	Yes	Yes	Yes
City of Murray	Yes	Yes	Yes	Yes	Yes	Yes
Riverton City	Yes	Yes	Yes	Yes	Yes	Yes
Salt Lake City	Yes	Yes	Yes	Yes	Yes	Yes
City of Sandy	Yes	Yes	Yes	Yes	Yes	Yes
City of South Jordan	Yes	Yes	Yes	Yes	Yes	Yes
City of South Salt Lake	Yes	Yes	Yes	Yes	Yes	Yes
City of Taylorsville	Yes	Yes	Yes	Yes	Yes	Yes
West Jordan City	Yes	Yes	Yes	Yes	Yes	Yes
West Valley City	Yes	Yes	Yes	Yes	Yes	Yes
Copperton Metro Township	-	-	-	Yes	Yes	Yes
Emigration Metro Township	-	-	Yes	Yes	Yes	Yes
Magna Metro Township	Yes	Yes	Yes	Yes	Yes	Yes
City of Millcreek	Yes	Yes	Yes	Yes	Yes	Yes
Kearns Metro Township	-	-	Yes	Yes	Yes	Yes
White City Metro Township	-	-	Yes	Yes	Yes	Yes
Salt Lake Community College	Yes	-	Yes	Yes	Yes	Yes
Salt Lake County	Yes	Yes	Yes	Yes	Yes	Yes

Public Involvement

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). SLCo EM partnered with Integrated Solutions Consulting, Inc. (ISC) to engage Salt Lake County stakeholders and its citizens prior to and throughout the 2019 MJ-HMP update process. Per Federal Emergency Management Agency (FEMA) Comprehensive Preparedness Guide 101 (CPG 101) and Local Hazard Mitigation guidance, the public outreach efforts encompassed all jurisdictions, leveraging professional expertise to educate the population and engage them in developing new mitigation actions. The following section details the public outreach strategy, including a combination of in-person and virtual methods.

Salt Lake County Hazard Mitigation Questionnaire

In accordance with best practices as outlined in CPG 101 and the Local Hazard Mitigation Guide, this public-private effort engaged the whole community as part of its public outreach strategy, reaching citizens and key stakeholders across all jurisdictions via a combination of in-person and virtual methods. Elements of virtual public outreach included the 2019 Salt Lake County Preparedness Survey (http://prepare.community/slc), and social media engagement through mediums like Twitter and Nextdoor.

The 2019 survey included 31 questions and concluded with mitigation and preparedness resources for the public. The survey was shared electronically with the option of a hard copy survey upon request. 556 total residents participated. 428 residents completed the entire 31-question survey. On average, residents spent 12 minutes to complete the questionnaire. The survey and related public outreach invitations were shared through multiple sources including:

- Nextdoor, Facebook, and Twitter
- County and municipal web sites
- Individual jurisdiction social media and e-mail lists
- County e-mail lists
- Press release

Figure: SLCo EM Website Promoting the Survey

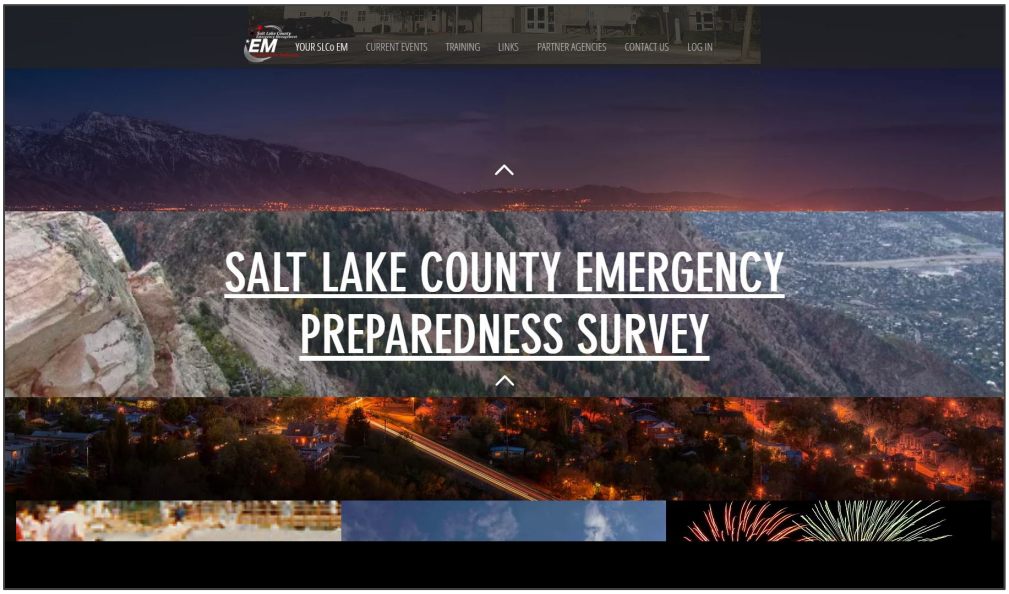
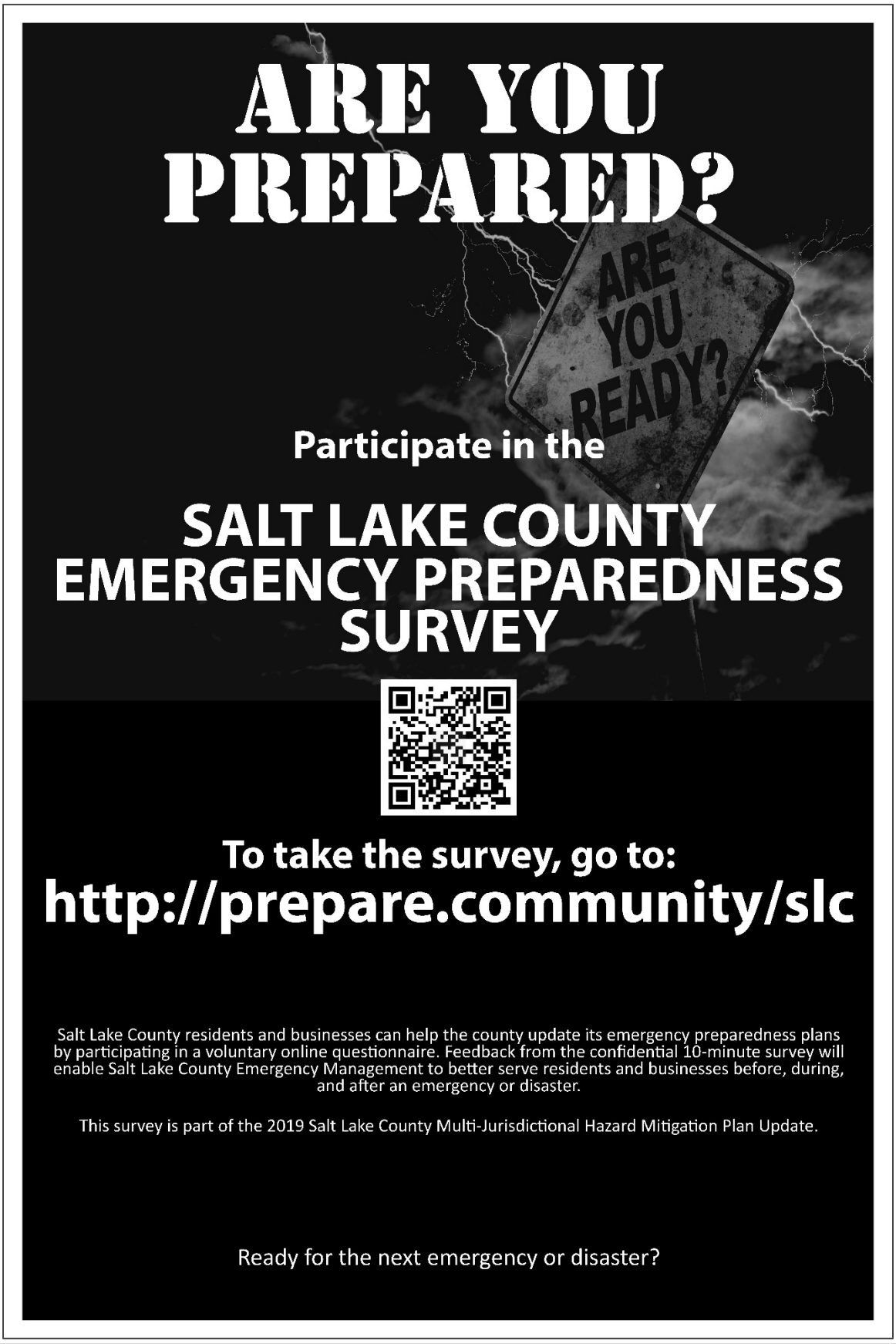


Figure: Poster Utilized as Various Events to Promote the Survey



Based on survey analytics, the greatest number of participants live in Salt Lake City, Millcreek, Riverton, and West Valley, which correlates with the larger populations in these jurisdictions.

Table: Public Participation by Jurisdiction	
Jurisdiction	**Percent**
Alta	0.2%
Bluffdale	6.2%
Cottonwood Heights	0.9%
Draper	1.3%
Herriman	4.3%
Holladay	2.1%
Midvale	0.4%
Murray	1.1%
Riverton	13.2%
Sandy	4.3%
Salt Lake City	14.1%
South Salt Lake	1.5%
South Jordan	4.1%
Taylorsville	10.0%
West Jordan	3.6%
West Valley	13.7%
Copperton	0.4%
Kearns	1.3%
Magna	0.4%
White City	0.2%
Millcreek	15.4%
Other [Unincorporated]	1.3%

Note: At the time the survey was conducted, Brighton was not an incorporated community.

Salt Lake County Hazard Mitigation Public Review

After the draft plan was completed, a link to the plan was placed on the SLCo EM website. A digital copy was also sent to the Utah Division of Emergency Management (UDEM) with a completed crosswalk for a pre-draft review. At the same time, public notices were distributed announcing the availability of the plan for review and comment. The draft plan remained on the SLCo EM website until the FEMA-approved and formally adopted Plan was made available. Upon formal adoption of the Plan, the public engagement strategy shifted toward continual engagement of the public by soliciting and offering the public an opportunity and forum to provide input regarding known hazards and risks, and implementation of identified mitigation strategies.

Throughout the plan development process, public input (townhall meetings, outreach activities, Community Mitigation Questionnaire) was incorporated into the Plan.

Appendix C: Public Participation Documentation details the specific activities and results from the Planning Team's public outreach efforts.

How Public Input was Incorporated into the Plan

When asked to what degree of emphasis the public would expect their jurisdiction to mitigate hazards, these hazards received the highest percentages of “high priority” in the survey:

- Earthquake (73.1%)
- Utility Failure (43.5%)
- Severe Weather (37%)
- Violent Mass Casualty Incident (36.6%)
- Wildfires (36.6%)
- Major Transportation Accident/Incident (35.5%)
- Drought (27.2%)
- Infrastructure Failure (26.7%)
- Structural Failure (23.3%)

Open-ended responses by the public offered greater insight to the damages experienced while residing in Salt Lake County.

These, and related findings, helped the planning team determine meaningful mitigation projects. For example, some communities recognized the importance of creating greater resiliency and redundancy to mitigate power failure. Public input also validated the County’s plans to develop a region-wide notification system.

Plan Development Milestones

Appendix B: Plan Process and Development Documentation provides a more comprehensive documentation of the necessary detail of the various plan development activities that took place during the update of the 2019 Salt Lake County MJ-HMP.

The appendix details plan participation validation for local jurisdictions. In accordance with best practices as outlined in CPG 101 and the Local Hazard Mitigation Guide, SLCo EM and its partners embraced the whole community approach throughout the 2019 MJ-HMP Update process, involving civic leaders, community representatives/organizations, and the general public. Understanding that critical infrastructure and key resources, as well as public opinion and hazard likeliness, can dramatically change in a five-year period, SLCo EM and its partners leveraged in-person, on-site outreach opportunities to educate stakeholders and collect and validate the information. To support the 2019 MJ-HMP Update process, the following were facilitated for jurisdiction leaders and POCs:

- Letters of Intent
- Local Government Meetings
- Webinars
- Hazard Mitigation Planning Workshops

In summary, the planning process consisted of the following key tasks:

Task 1: Organize Resources

SLCo EM created a planning team to attend meetings, gather data and historical information, review drafts, and participate in mitigation brainstorming sessions. In addition to the core planning team, a steering committee was formed to provide overall guidance and direction throughout the mitigation planning process. Monthly steering committee meetings were held throughout the Plan update. Participating jurisdictions were invited to form Local Planning Teams to ensure their jurisdiction's mitigation needs and priorities were addressed. Mitigation Workshops were held in August, which provided local planning teams an opportunity to update hazards, identify new mitigation actions, and update past mitigation strategies.

Task 2: Risk Assessment

The planning team identified the natural and technological hazards to include in this Plan, as well as hazard event profiles to address the possible magnitudes and severities associated with each hazard. The team then used local resources to inventory the county's assets and estimate losses. The steering committee provided input and subject-matter expertise throughout this process. A standardized risk ranking methodology was developed, approved by the Steering Committee, and was applied to the County and all participating jurisdictions. Previously, each jurisdiction had their own risk ranking process and methodology. To enable stakeholders to compare risk from one jurisdiction to the other, a standardized methodology was created that measured and weighed the following variables: probability, population exposure, property exposure, property damages, economic impact, and catastrophic potential. A quantitative assessment was first conducted, followed by input from key stakeholders from that community. Minor adjustments were made, if needed. The countywide assessment provides a wholistic risk ranking of the entire county, whereas the individual jurisdiction assessments provide a very specific and unique view of risk as it pertains to that community.

Task 3: Public Involvement

A comprehensive public survey that reached over 500 residents was conducted. Additionally, after the planning team made final edits, the plan was posted on the SLCo EM web site, and the county sent a press release and used social media to invite the public to review the plan and submit comments.

Task 4: Develop Mitigation Strategies

The planning team met with representatives of each community (Local Planning Team) to develop and prioritize mitigation strategies and action items that would reduce the costs of disaster response and recovery, protect people and infrastructure, and minimize overall disruption to the county in the event of a disaster (see *Volume II*).

Task 5: Complete the Plan

The planning team compiled all of the relevant sections of the Plan to produce a draft plan for review. The Plan was submitted to the UDEM and FEMA for approval.

Task 6: Plan Adoption

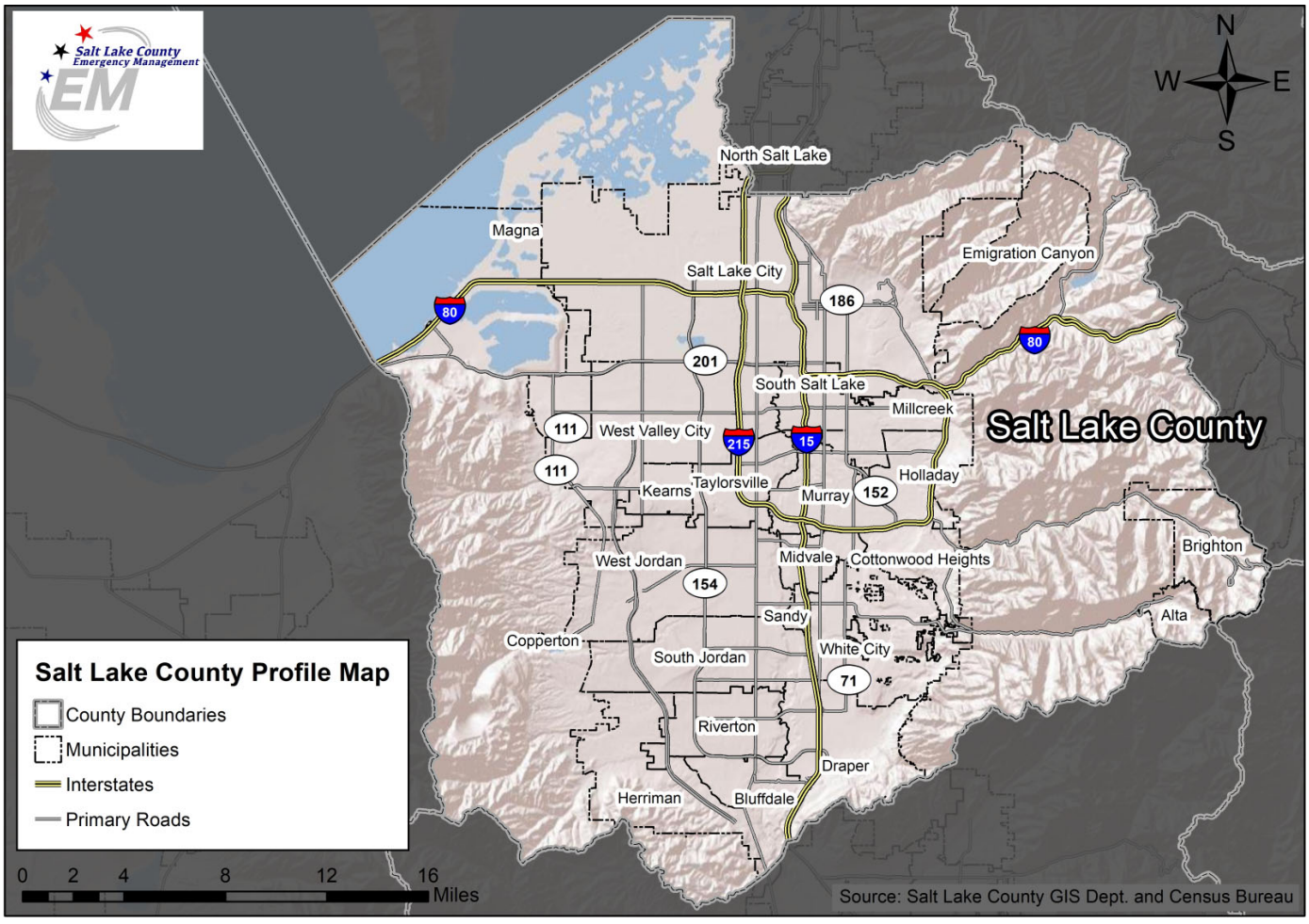
The SLCo EM coordinated the effort to ensure the Plan was formally adopted by each participating jurisdiction (see *Plan Adoption*).

Defining the Planning Area

All partners to this plan have jurisdictional authority within this planning area. The jurisdictions that meet these criteria include:

- Town of Alta
- City of Bluffdale
- Brighton
- Cottonwood Heights
- Draper City
- Herriman City
- City of Holladay
- Midvale City
- City of Murray
- Riverton City
- Salt Lake City
- Salt Lake County
- City of Sandy
- City of South Jordan
- City of South Salt Lake
- City of Taylorsville
- West Jordan City
- West Valley City
- Copperton Metro Township
- Emigration Metro Township
- Magna Metro Township
- City of Millcreek
- Kearns Metro Township
- White City Metro Township

The planning area was defined as all incorporated and unincorporated areas of Salt Lake County, as displayed below.



Review of Data, Programs, and Prior Plans

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (44 CFR, Section 201.6(b)(3)). The following table contains key resources that were heavily used or integrated into the plan to affect mitigation in the planning area. A comprehensive list of every resource used within this plan can be found in Appendix E: References. In addition, in-text citations and sources have been inserted throughout the plan in order to better facilitate referencing or further study.

Source	Integration into Plan
2015 Salt Lake County Hazard Mitigation Plan	Used as a starting framework, which the 2019 SLC MJ-HMP updated and built upon. This source helped inform the choice of included hazards, key community profile sections to expand, and provided information for this plan's Existing Mitigation Actions section.
2015 Salt Lake County Integrated Watershed Plan (Revised 2017)	This document provided valuable watershed information.
2015 Salt Lake County Stormwater Management Plan	Used this document to review codes, ordinances, regulations and capabilities.
2019 Utah State Hazard Mitigation Plan	Used to supplement existing hazard descriptions, frequencies, and vulnerability data. This source was also used to provide data for comparing Salt Lake County vulnerabilities to other Utah counties.
2016 Tooele County Pre-Disaster Mitigation Plan	Reviewed to determine region-wide risks and opportunities for mitigation actions
2016 Davis County Natural Hazard Pre-Disaster Mitigation Plan	Reviewed to determine region-wide risks and opportunities for mitigation actions.
2017 Mountainland Pre-Disaster Hazard Mitigation Plan	Reviewed to determine region-wide risks and opportunities for mitigation actions.
National Oceanic and Atmospheric Administration (NOAA) Storm Events Database.	Used extensively to determine date, frequency, location, casualty, and cost information for natural hazard events. The Risk Assessment portion of this plan directly informed the Mitigation Strategies portion of the plan.
Wasatch Front Regional Council, Wasatch Choice: 2019 - 2050 Regional Transportation Map	Used to inform critical facilities, land use, and future development portions of this plan.
Utah Wildfire Risk Assessment Portal and West Wide Wildfire Risk Assessment	Used to quantify the magnitude of wildland fire risk to provide a baseline for quantifying mitigation activities and to monitor change over time.
National Inventory of Dams and National Levee Database	Used to map locations of dams and levees throughout the County.
Community Improvement Projects	Identify desired projects relating to mitigation in various communities

Capability Assessment Strategy

An assessment of all planning partners' legal, regulatory, fiscal, administrative, and technical capabilities to implement hazard mitigation actions is presented in the individual jurisdiction-specific annexes in Volume 2. Each planning partner contributed to the evaluation and development of their respective capability assessments. This process also encouraged planning partners to review the state of existing plans, studies, reports or other technical information with city planners, engineers, administrators and other individuals who contribute to decision making and community planning.

Risk Assessment Strategy

The natural hazards identified and investigated as part of the Risk Assessment for the Salt Lake County Multi-Hazard Mitigation Plan include:

- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flooding (Urban/Flash and Riverine Flooding)
- Landslide and Slope Failure
- Public Health Epidemic/Pandemic
- Radon
- Severe Weather
- Severe Winter Weather
- Tornado
- Wildfire

Other hazards of interest were identified as having some potential to impact the planning area. Other plans in the County specifically address the response and strategies for manmade hazards; however, mitigation strategies were identified by the County and participating communities that directly and indirectly result in greater resiliency to the hazards below. These hazards included:

- Civil Disturbance
- Cyber Attack
- Hazardous Materials Incident (Transportation and Fixed Facility)
- Terrorism (Including Active Shooter Events)

It should be noted that some jurisdictional annexes in Volume II identify unique hazards that are very specific to a jurisdiction. The Steering Committee approved the hazards that would be included for all jurisdictions and allowed for unique hazards to still be addressed in individual annexes.

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact the County. They are:

- Hurricanes
- Sea Level Rise
- Storm Surge
- Tsunami

The risk assessment describes the risks associated with each identified hazard of concern. Each section describes the hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - General background of the hazard
  - Range of Magnitude and the possible extent of the hazard
  - Geographic areas most affected by the hazard
  - Records of past events and frequency estimates
  - Possible secondary hazard events
  - Vulnerability assessment for the impacts of a significant hazard event
- **Determine exposure to each hazard and assess the vulnerability of exposed assets**—Exposure was determined by analyzing hazard maps, historical occurrences, and an inventory of structures, facilities, and systems to determine which of them would be exposed to each hazard. Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and FEMA's hazard-modeling program called Hazus-MH were used to perform this assessment for the flood, dam failure, and earthquake hazards. Outputs similar to those from Hazus were generated for other hazards, using maps generated by the Hazus program.

Mitigation Strategy Development and Prioritization

Developing the mitigation strategies was a process in which all of the previous steps were taken into account. Each participating jurisdiction consulted internally, evaluated the hazard profiles and vulnerabilities presented by the planning team, and submitted mitigation strategies appropriate for their jurisdiction. The previous strategies from the 2015 Salt Lake County Hazard Mitigation Plan were also reviewed to identify which projects had been completed and integrate those which were still ongoing. The planning team met several times to brainstorm additional strategies and improve upon the existing strategies. Each mitigation strategy developed was evaluated to determine that actions were cohesive with the overall purpose and scope of this plan, as stated in the Introduction.

State Review

UDEM created a formal Plan review committee to ensure local plans met the requirements of DMA 2000. This committee reviewed the Plan subsequent to submission to FEMA for final review and acceptance.

COMMUNITY PROFILE

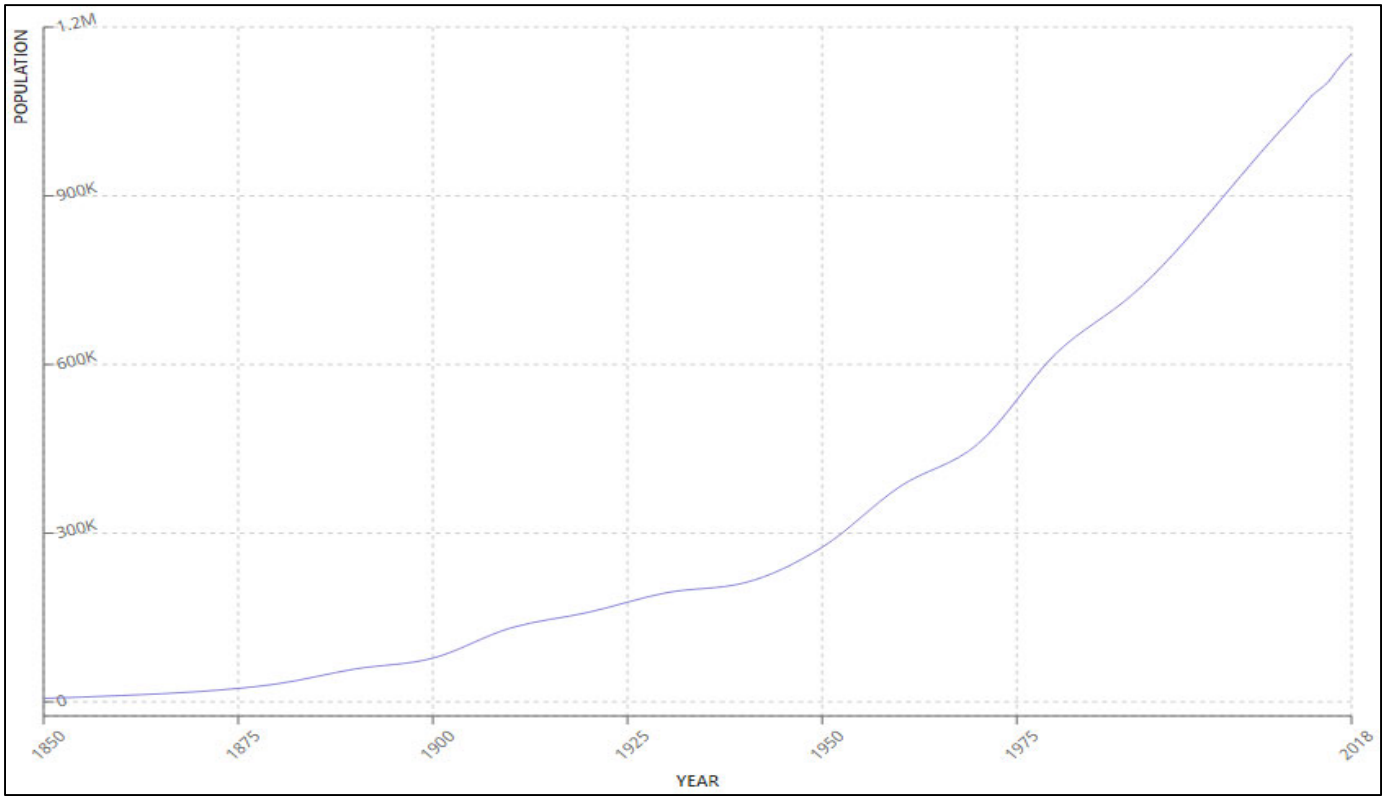
Demographics

Population

Salt Lake County continues to be the most populous county in the state, with a 2010 population of 1,029,655, according to the Census, that has continued to steadily grow over the past decade as can be seen below.

Salt Lake County, Utah Population

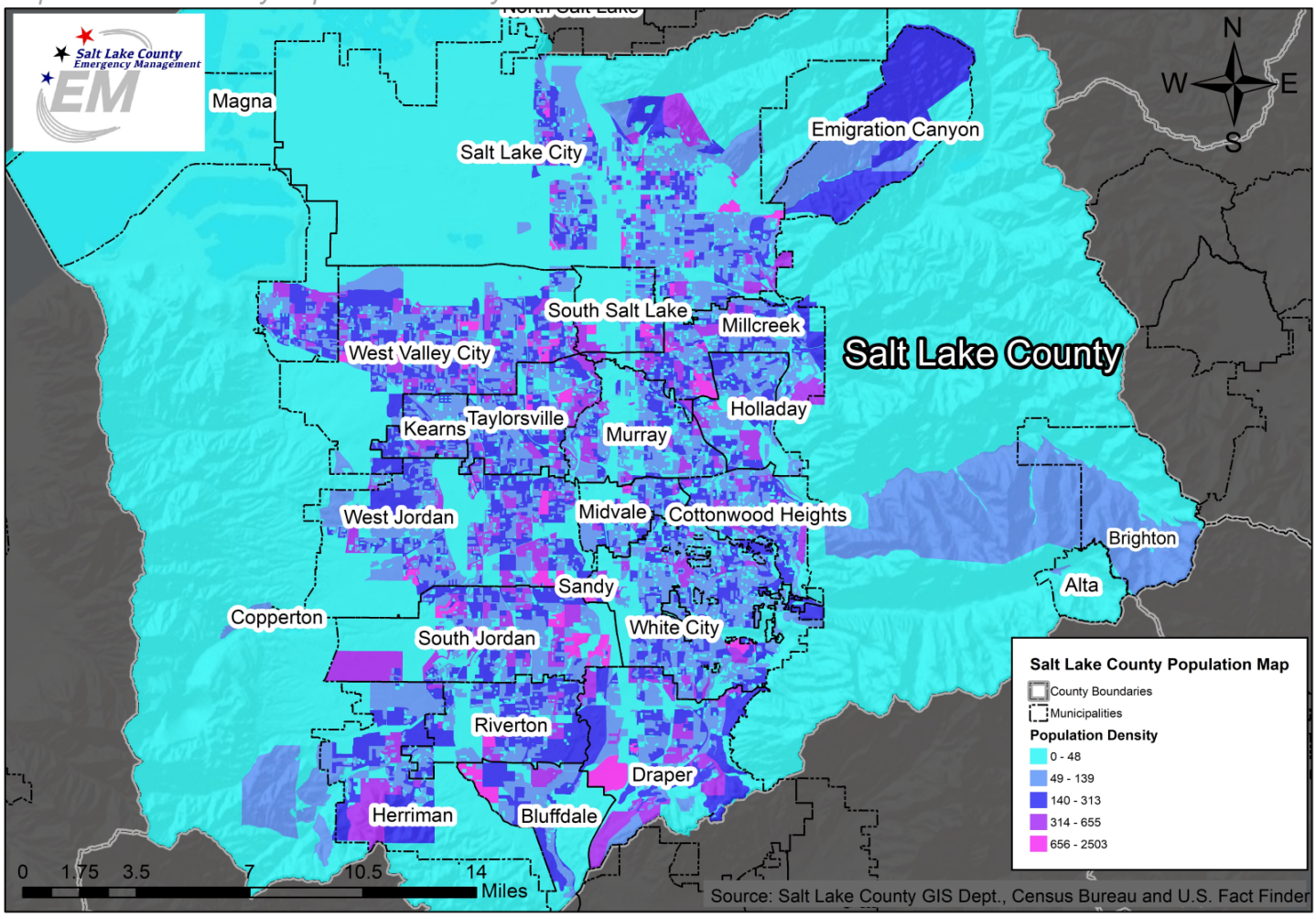
Year	Population	Growth	Growth Rate
2018	1,152,633	14,813	1.30%
2017	1,137,820	17,136	1.53%
2016	1,120,684	18,055	1.64%
2015	1,102,629	12,372	1.13%
2014	1,090,257	10,714	0.99%
2013	1,079,543	15,522	1.46%
2012	1,064,021	16,464	1.57%
2011	1,047,557	14,578	1.41%



Source: http://worldpopulationreview.com

Salt Lake County contains two of the largest cities in the state: Salt Lake City with approximately 194,188 people and West Valley City with 135,546, according to the 2017 American Community Survey. The map below shows the current population density throughout the County.

Map: Salt Lake County Population Density



As can be seen in the tables below, the population of Salt Lake County is projected to continue to grow by 55% from 2015 - 2065, according to the Kem C. Gardner Policy Institute.

Table: Salt Lake County Population Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	1,094,650	1,249,961	1,361,099	1,470,574	1,594,804	1,693,513	598,863	55%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

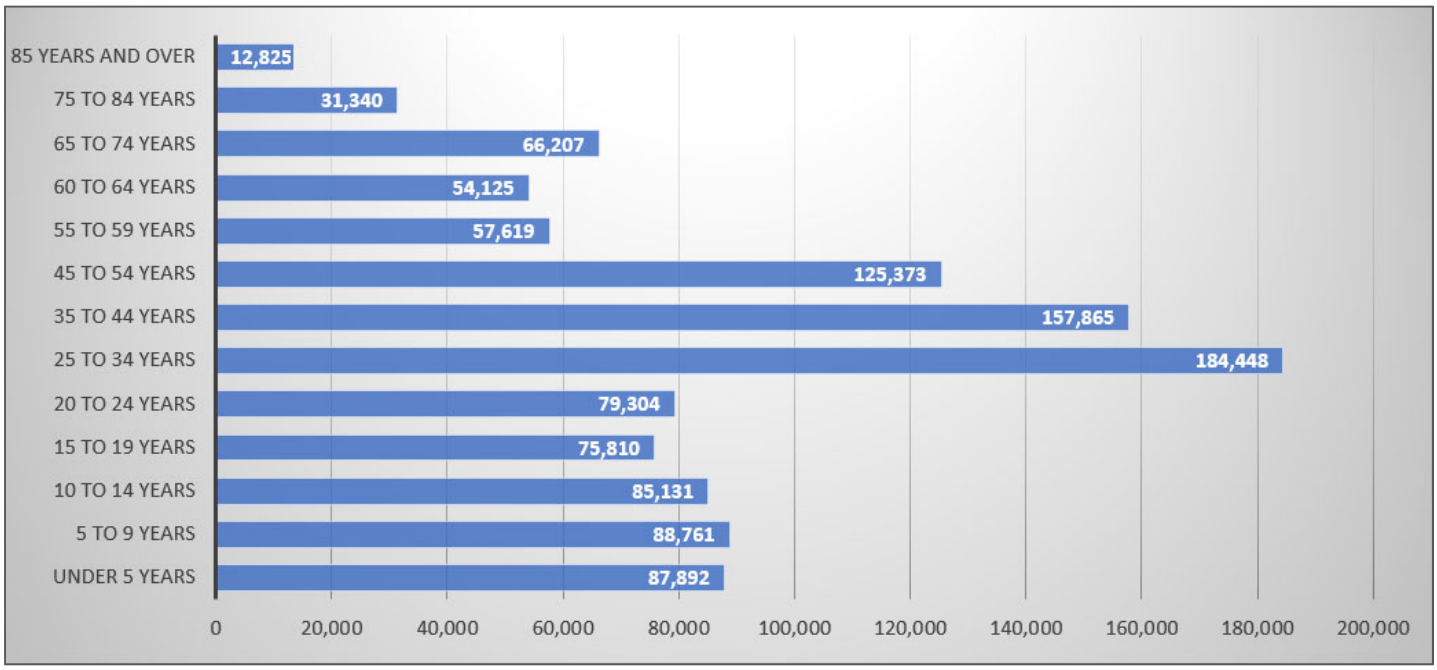
Table: Salt Lake County Household Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	379,320	454,929	521,352	579,472	635,143	689,490	310,170	82%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

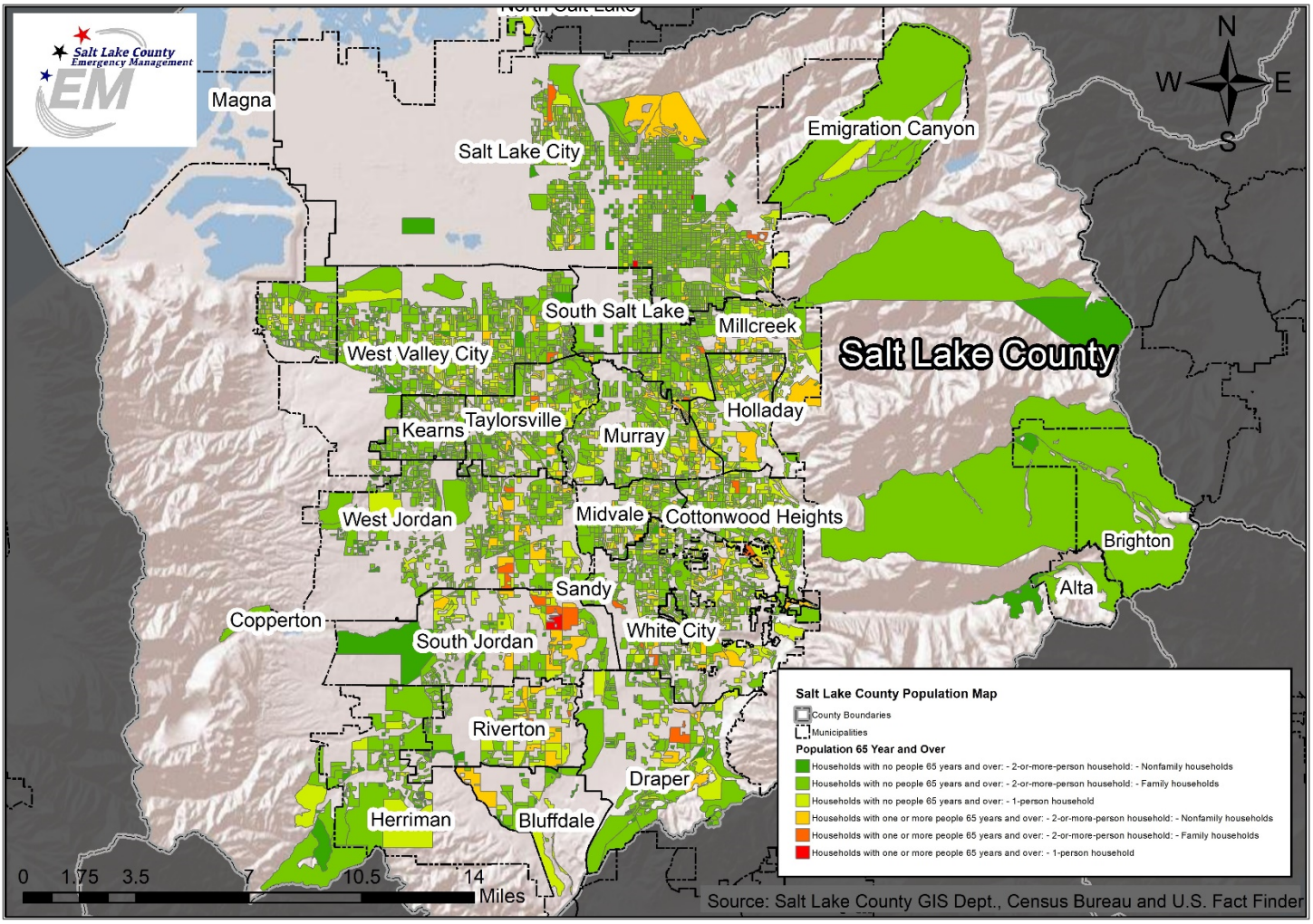
Age

	Number	Percent	National Avg
Under 5 years	87,892	7.9%	6.2%
5 to 9 years	88,761	8.0%	6.4%
10 to 14 years	85,131	7.7%	6.5%
15 to 19 years	75,810	6.9%	6.6%
20 to 24 years	79,304	7.2%	7.0%
25 to 34 years	184,448	16.7%	13.7%
35 to 44 years	157,865	14.3%	12.7%
45 to 54 years	125,373	11.3%	13.4%
55 to 59 years	57,619	5.2%	6.7%
60 to 64 years	54,125	4.9%	6.0%
65 to 74 years	66,207	6.0%	8.6%
75 to 84 years	31,340	2.8%	4.4%
85 years and over	12,825	1.2%	1.9%
Median age (years)	32.4		



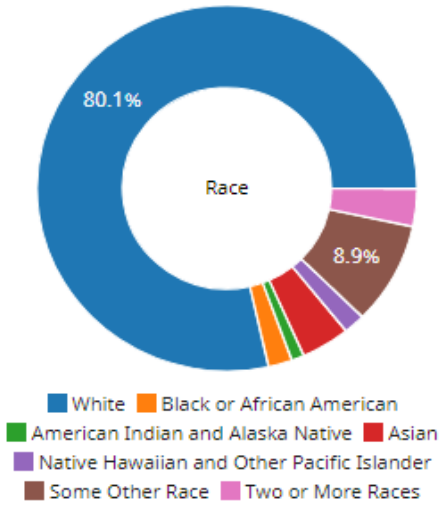
Source: 2017 American Community Survey

Map: Salt Lake County, Population 65 Years and Older



Race

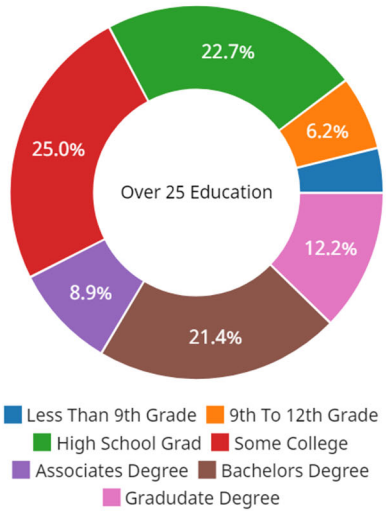
Race	Population	Percentage
White	887,004	80.15%
Some Other Race	98,444	8.90%
Asian	43,052	3.89%
Two or More Races	33,854	3.06%
Black or African American	19,098	1.73%
Native Hawaiian and Other Pacific Islander	16,935	1.53%
American Indian and Alaska Native	8,313	0.75%



Source: 2017 American Community Survey

Educational Attainment

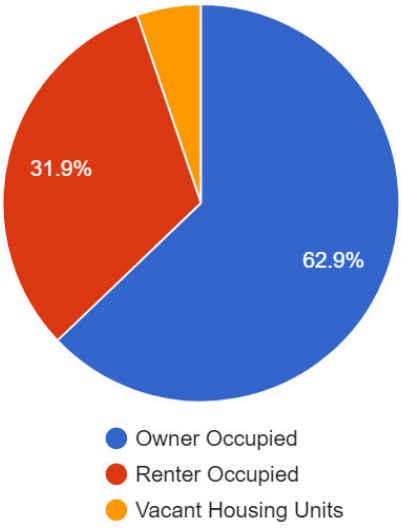
Education Attained	Count	Percentage
Less Than 9th Grade	24,879	3.61%
9th to 12th Grade	42,848	6.21%
High School Graduate	156,804	22.73%
Some College	172,232	24.97%
Associates Degree	61,140	8.86%
Bachelors Degree	147,726	21.42%
Graduate Degree	84,173	12.20%



Source: 2017 American Community Survey

Housing

Housing Occupancy	Number	Percent	National Avg
Total Housing Units			
Occupied Housing Units	366,239	94.8%	87.6
Owner Occupied	242,933	66.3%	63.1
Renter Occupied	123,306	33.7%	36.9
Vacant Housing Units	20,195	5.2%	12.4
Homeowner Vacancy Rate	1	0.0%	0.0
Rental Vacancy Rate	5	0.0%	0.0
Average household size of owner-occupied unit	3.2	0.0%	2.7
Average household size of renter-occupied unit	2.7	0.0%	2.5



Source: www.homefacts.com

Economy

Employment

Salt Lake County is the backbone of Utah's economy, making up approximately 39% of the labor force and 47% of the non-farm job market. The trade and transportation industry, the largest employment division within the County, supplies approximately 20% of the County's employment share. Trade is the second major component followed by government and education, health, and social services. Salt Lake is a regional center for finance, health care, and high tech industries as well. Major employers include the University of Utah, the State of Utah, Intermountain Healthcare, Granite School District, Jordan School District, Salt Lake County, Wal-Mart, Discover Financial Services Inc., Delta Airlines, the United States Postal Service, Salt Lake City School District, and Salt Lake City.

Table: Employment Share within Salt Lake County (Non-Farm Jobs)

Industry	Employment Share
Trade/Transport/Utilities	20%
Prof/Business Services	18%
Government	15%
Education/Health/Social Services	11%
Leisure/Hospitality	8%
Financial Activities	8%
Manufacturing	8%
Construction	6%
Information	3%
Other Services	3%
Mining	<1%

Source: Department of Workforce Services

According to the Bureau of Labor Statistics, the unemployment rate in Salt Lake County in September, 2018, was 2.9%, but had dropped to 2.0% by September, 2019. Looking ahead, the table below shows the employed population within the County are projected to increase by 72% from 2015 to 2065.

Table: Salt Lake County Employment Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	844,316	1,053,362	1,182,092	1,293,225	1,385,240	1,454,567	610,251	72%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

Income

According to the Bureau of Labor Statistics, the average weekly wages for all industries within the Salt Lake City area is $1,130. A further income breakdown can be seen below.

	Number	Percent	National Avg.
Total households	363,058	-	
Less than $10,000	15,516	4.3%	6.7%
$10,000 to $14,999	11,481	3.2%	4.9%
$15,000 to $24,999	25,869	7.1%	9.8%
$25,000 to $34,999	29,505	8.1%	9.5%
$35,000 to $49,999	45,206	12.5%	13.0%
$50,000 to $74,999	72,896	20.1%	17.7%
$75,000 to $99,999	54,190	14.9%	12.3%
$100,000 to $149,999	61,450	16.9%	14.1%
$150,000 to $199,999	23,214	6.4%	5.8%
$200,000 or more	23,731	6.5%	6.3%
Median household income	$67,922		
Mean household income	$88,315		

Source: 2017 American Community Survey

Poverty

A breakdown of poverty numbers by gender and age, race and ethnicity, education, employment status, and income for the County, according to 2015 ACS data, can be seen in the following figure.

Figure: Salt Lake County Poverty Breakdown

Gender & Age	Salt Lake County Poverty Rates	State of Utah Poverty Rates	United States Poverty Rates
Overall	12.4%	12.3%	15.5%
Children (under 5)	17.3%	15.7%	24.5%
Children (under 18)	16.2%	14.3%	21.7%
Adults (18-64 yrs)	11.4%	12.2%	14.5%
Seniors (65 and older)	6.8%	6.5%	9.4%
Men	11.5%	11.4%	14.2%
Women	13.2%	13.2%	16.7%
Race & Ethnicity			
White Alone, not Hispanic or Latino	8.2%	9.5%	10.8%
Hispanic or Latino	24.6%	24.8%	24.3%
African American	25.9%	23.2%	27.0%
Asian	17.1%	17.8%	12.6%
American Indian and Alaska Native	31.5%	31.7%	28.3%
Hawaiian or Pacific Islander	25.4%	22.3%	21.0%
Education (25 years & older)			
Less than high school graduate	23.5%	23.2%	27.5%
High school graduate (and equiv.)	11.8%	11.2%	14.3%
Some college, associate's degree	8.0%	8.5%	10.5%
Bachelor's degree or higher	4.5%	4.5%	4.5%
Employment Status (16 years & older)			
Employed Men	6.2%	6.9%	6.3%
Employed Women	7.5%	8.9%	8.4%
Unemployed Men	29.6%	27.2%	30.3%
Unemployed Women	34.5%	32.7%	36.4%
Income and Benefits (by household)			
Less than $10,000	4.8%	4.9%	7.2%
$10,000 to $14,999	3.6%	3.8%	5.3%
$15,000 to $24,999	8.5%	8.6%	10.6%
$25,000 to $34,999	8.9%	9.2%	10.1%
$35,000 to $49,999	13.3%	13.8%	13.4%
$50,000 to $74,999	20.5%	21.1%	17.8%
$75,000 to $99,999	14.8%	15.0%	12.1%
$100,000 to $149,999	15.0%	14.6%	13.1%
$150,000 to $199,999	5.3%	4.8%	5.1%
$200,000 or more	5.1%	4.2%	5.3%

Source: 2015 U.S. Census, American Community Survey; Data Compiled by Weber.edu.

Critical Facilities and Infrastructure

State-Owned Facilities

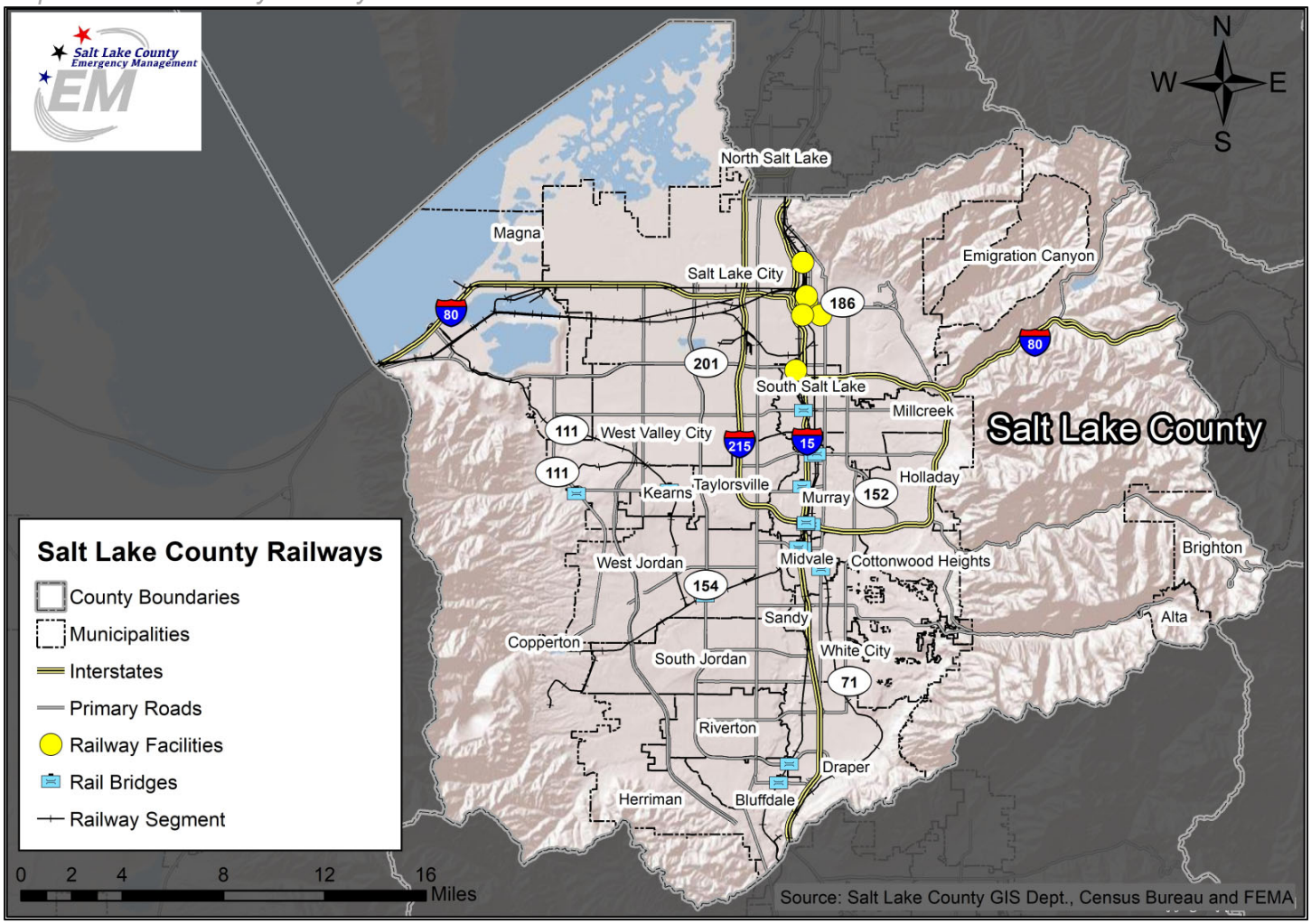
There are currently 1,463 state-owned facilities within Salt Lake County, with a total insured value of approximately $7.3 billion.

Transportation

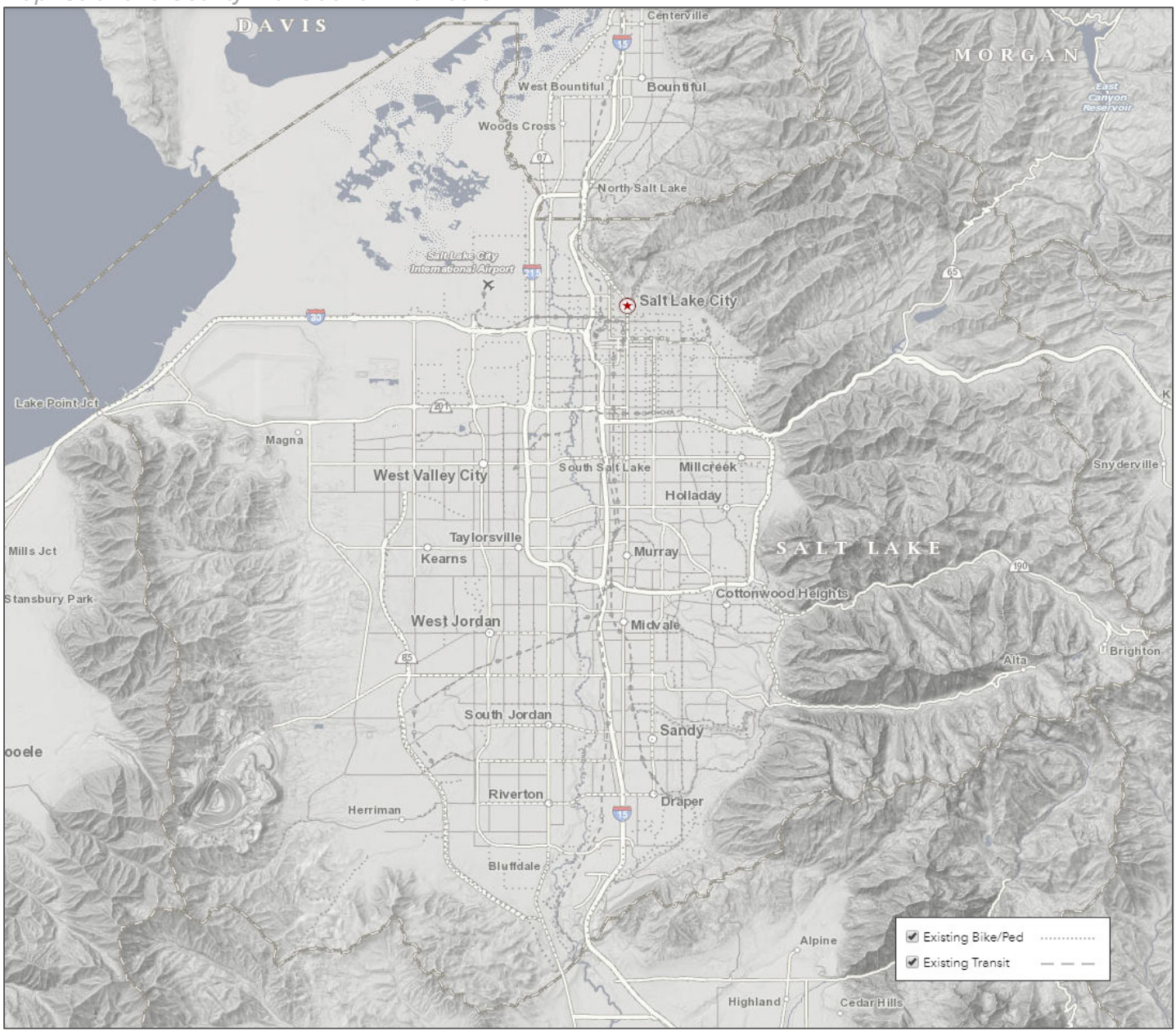
As of 2018, the Salt Lake County International Airport was the 23rd busiest airport in the United States, operating as a major hub for both Delta Air Lines and SkyWest Airlines. Although not visible in the image below, the South Valley Regional Airport is also available for public use and is located in West Jordan.

As can be seen in the image below, Salt Lake County can be traversed by several Interstate Highways, including I-15, I-80, and I-215. Numerous other freeways, expressways, and significant arterial routes interconnect within the County, including routes like SR-68, SR-201, and SR-154. The County also contains numerous bike paths for active transportation.

Map: Salt Lake County Railways

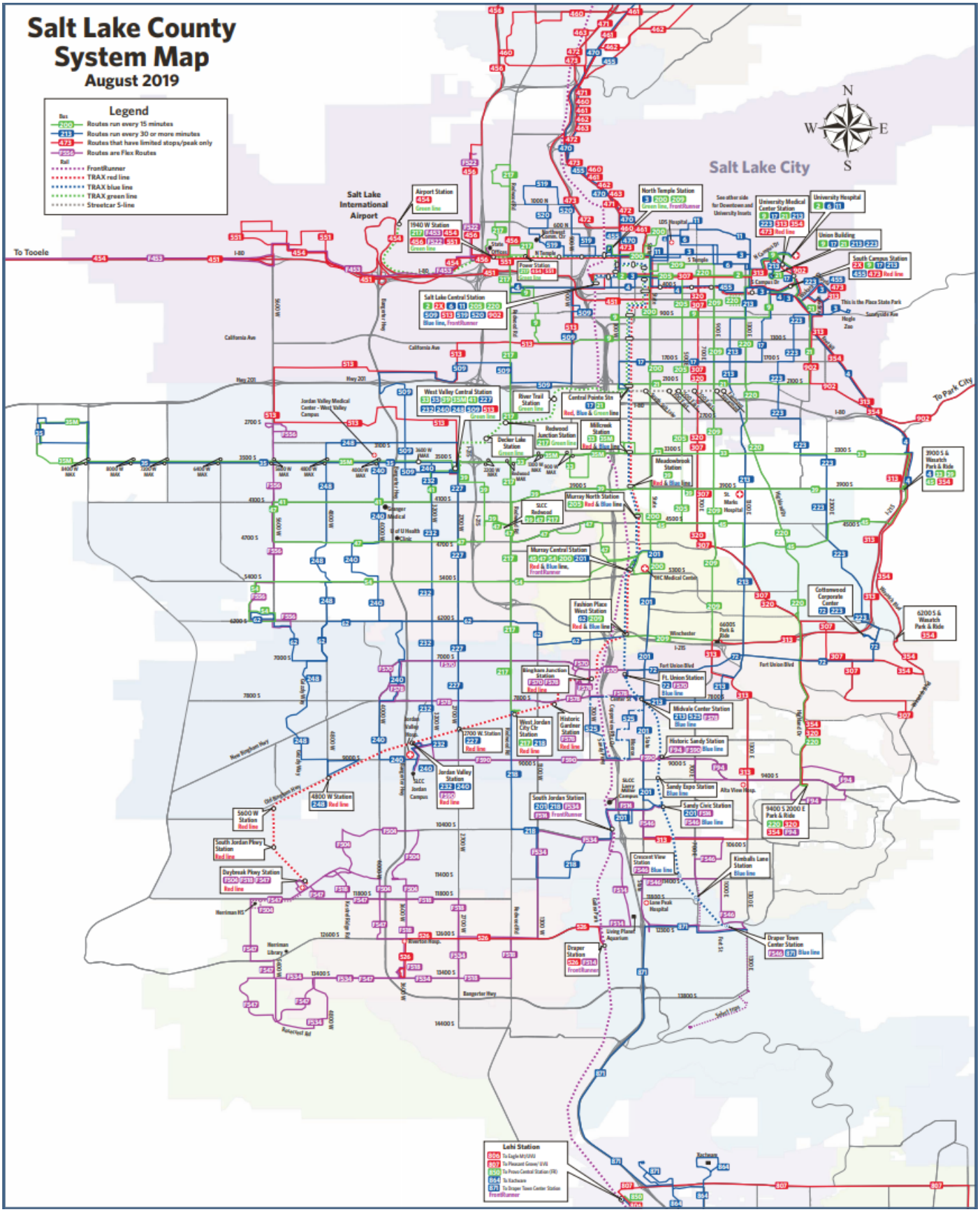


Map: Salt Lake County Transit and Bike Paths



Source: Wasatch Choice: 2019 - 2050 Regional Transportation Map

The County is also heavily networked with bus and commuter rail lines operated by the Utah Transit Authority (UTA). The *FrontRunner* commuter rail line, TRAX light rail system, S-Line historic streetcar, and numerous bus routes are all used for public transportation throughout Salt Lake County.



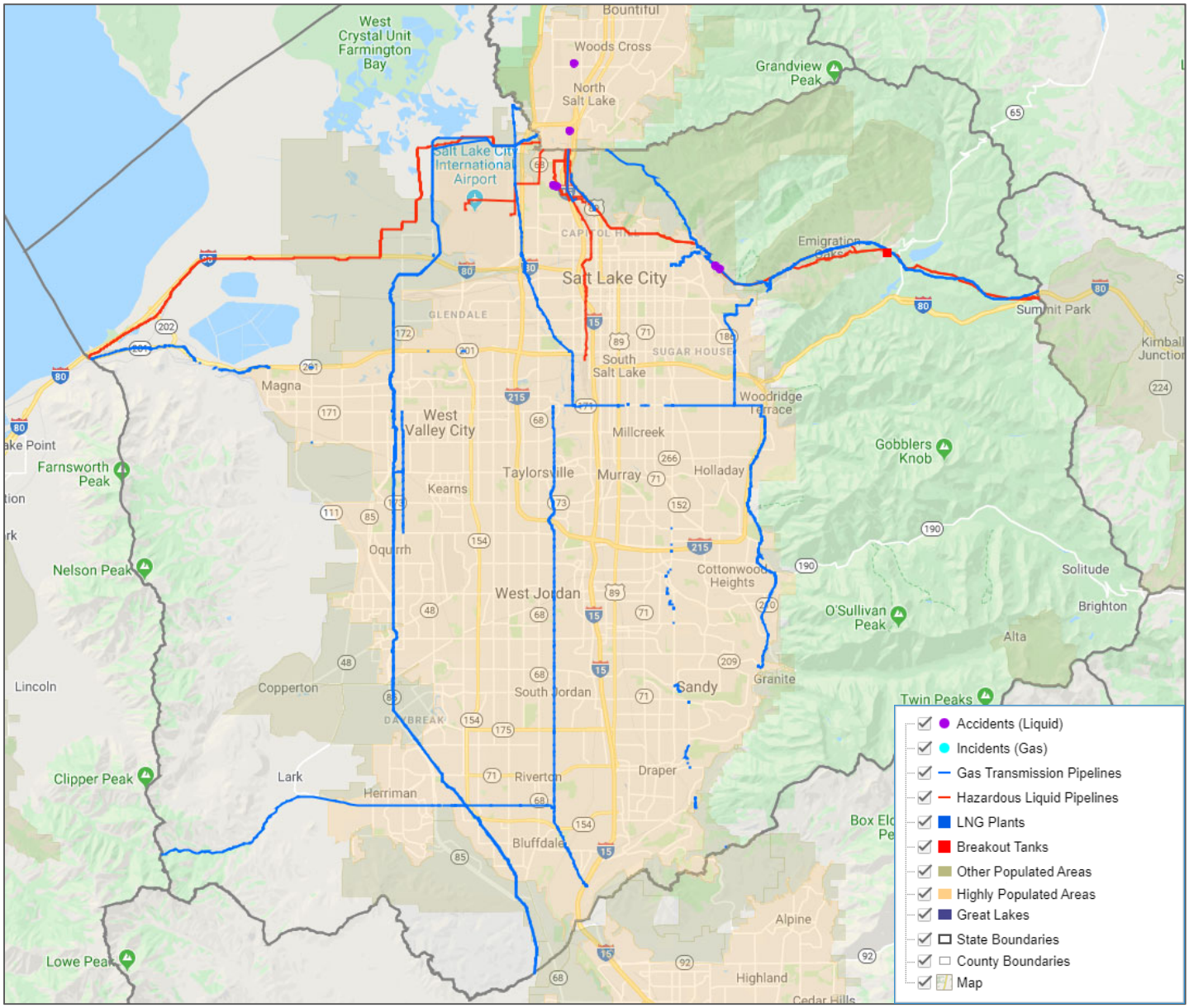
Source: www.RideUTA.com

Water Control Structures

According to the 2019 Utah State Hazard Mitigation Plan, there are approximately 282 dam structures within Salt Lake County. The National Levee Database also maps 5 levee systems (160 levee structures) within the County.

Pipelines

The National Pipelines Mapping System has a public map viewer that can be used to view the gas transmission and hazardous liquid pipelines within Salt Lake County, as can be seen in the image below.



Source: https://pvnpms.phmsa.dot.gov/PublicViewer/

Communications

The major newspapers within the County include the *Salt Lake County Tribune* and *Deseret News*, although numerous others are in circulation within the County. There are approximately 17 full-power television stations in the Salt Lake City market. There are also approximately 30 Trunked Radio Systems in Salt Lake County, as can be seen in the image below.

System Name	Type	City
Alta Ski Lifts Company	Motorola Type II Smartnet	Alta
Brian Leifson	Motorola Type II Smartnet	Salt Lake City
Church of Jesus Christ of Latter Day Saints	Project 25 Phase I	Salt Lake City
City Creek Center	DMR Motorola Capacity Plus Single Site (TRBO)	Salt Lake City
Delta Air Lines, Inc.	Motorola Type II Smartnet	Salt Lake
DMR-Utah Amateur Radio Network	DMR Conventional Networked	Multiple
Hill Air Force Base	Project 25 Phase I	Various
Intel Corporation	Motorola Type II	Salt Lake City
Intermountain Health Care Hospital	NXDN NEXEDGE 4800	Various
Kennecott Utah Copper (Capacity Plus)	DMR Motorola Capacity Plus Multi Site (TRBO)	Magna
Kennecott Utah Copper (Connect Plus)	DMR Motorola Connect Plus (TRBO)	Magna
Kennecott Utah Copper (P25)	Project 25 Phase I	Magna
Kilgore Companies	NXDN Icom IDAS Type C	Various
Little America	DMR Motorola Capacity Plus Multi Site (TRBO)	Salt Lake City
McIntosh Communications (Ensign Peak)	LTR Standard	Salt Lake City
National Security Agency Data Centers	Project 25 Phase I	Multiple
Peak Wireless Services	NXDN NEXEDGE 9600	Multiple
Questar-Dominion DT3	DMR Tier 3	Multiple
RPAI Southwest Management	DMR Motorola Capacity Plus Single Site (TRBO)	Salt Lake City
Salt Lake City Public Safety	Motorola Type II	Salt Lake City
Salt Lake County Public Works	Motorola Type II Smartnet	Salt Lake City
Sun Communications	DMR Motorola Capacity Plus Single Site (TRBO)	Salt Lake City
Tesoro Refinery	Motorola Type II	Salt Lake City
UCS Wireless	Motorola Type II Smartnet	Salt Lake City
Unified Fire Authority	Project 25 Phase I	Salt Lake City
Unified Fire Authority (BD10)	Motorola Type II	Salt Lake City
University of Utah Hospitals	NXDN NEXEDGE 4800	Salt Lake City
Utah Communications Authority	Motorola Type II SmartZone Omnilink	Various
Utah Communications Inc	DMR Motorola Connect Plus (TRBO)	
Utah Transit Authority	MPT-1327 Standard	Salt Lake City

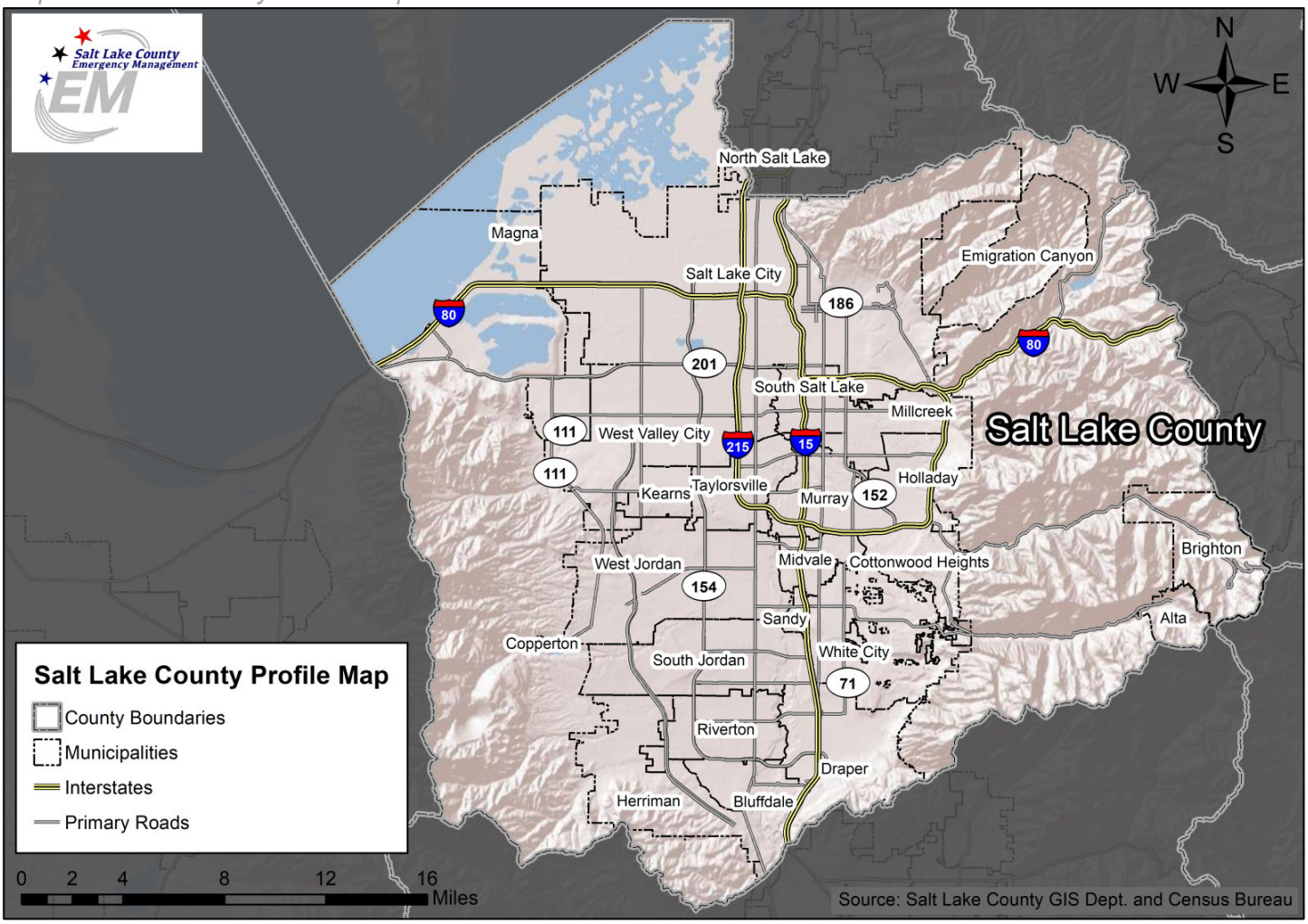
Source: www.radioreference.com

Geography, Land Use, and Development

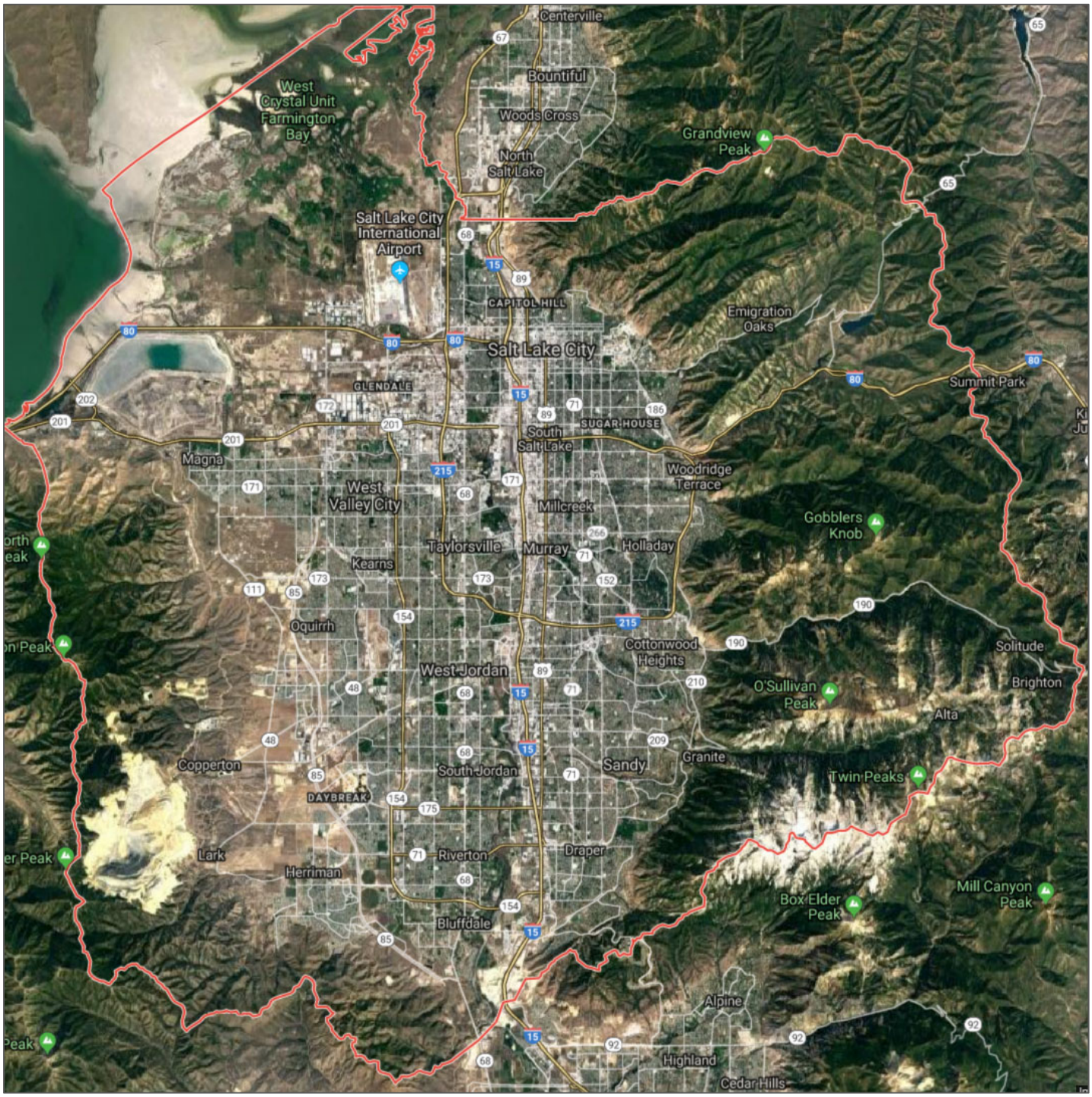
Geography

At approximately 807.37 square miles, including 65.09 square miles of water area, Salt Lake County is the fifth smallest county in Utah by land area. Tooele County borders Salt Lake County to the West while Summit County borders to the East. To the North, lie Davis and Morgan Counties with Utah County to the South. The Great Salt Lake occupies much of the northwest corner of the county. The Wasatch and Oquirrh Mountains form the East and West borders of the County respectively, as can be seen in the image below.

Map: Salt Lake County Profile Map



Map: Salt Lake County Topographical View

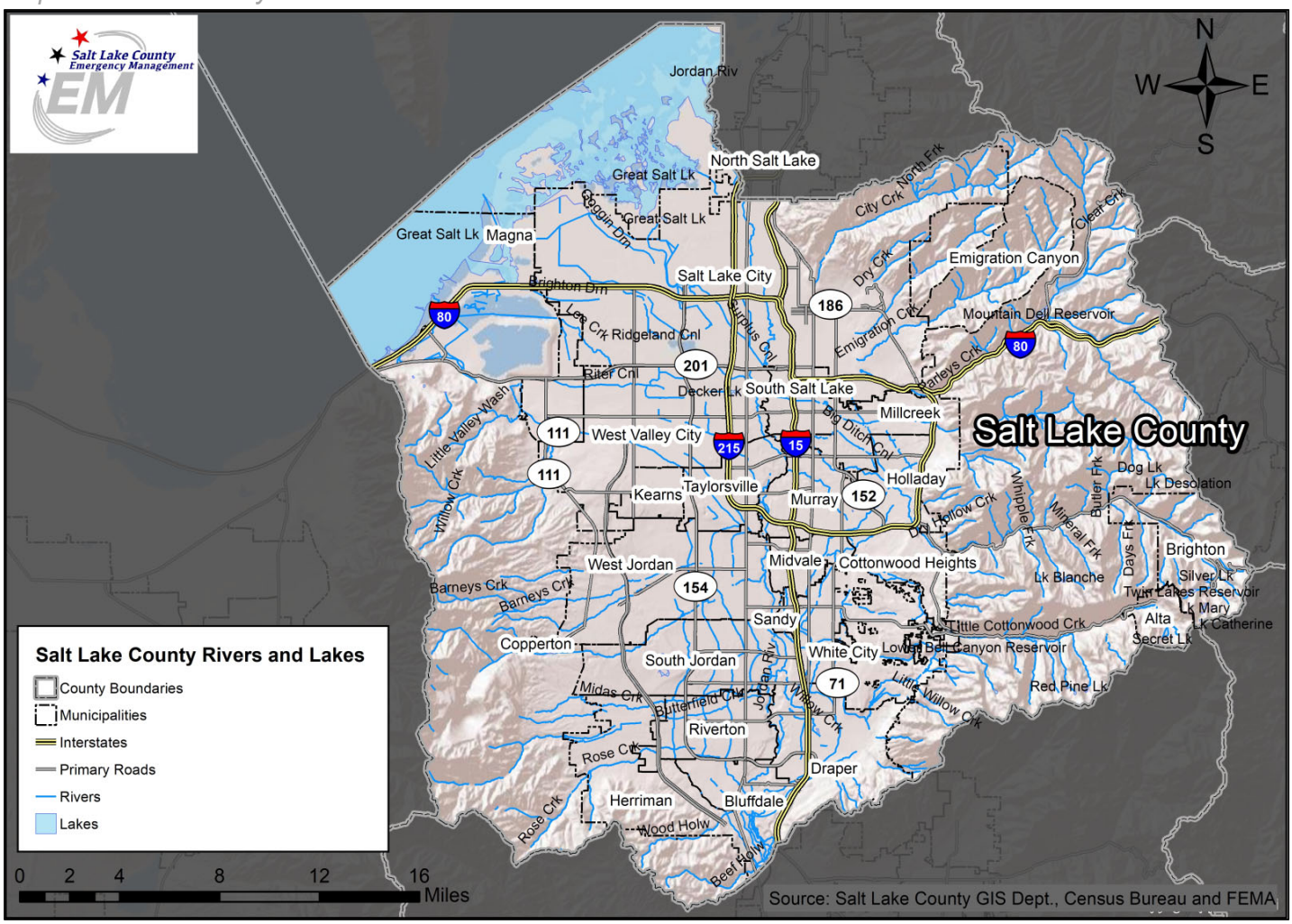


Source: Google Maps

Land Use and Development

Within Salt Lake County are 17 cities: Alta, Bluffdale, Cottonwood Heights, Draper, Herriman, Holladay, Midvale, Millcreek, Murray, Riverton, Sandy, Salt Lake City, South Jordan, South Salt Lake, Taylorsville, West Jordan, and West Valley City. There are also 5 Metro Townships: Copperton, Emigration, Kearns, Magna, and White City. Brighton was incorporated in 2020. There are also several distinct unincorporated areas with substantial populations including Big Cottonwood, Camp Williams, Canyon Rim, Granite West, Mount Olympus, Parley's Canyon, Sandy Hills, Southwest, and Willow Canyon. Salt Lake County's land ownership is approximately 72.8% private, 20.4% Federal, 2.3% State, and 4.6% water.

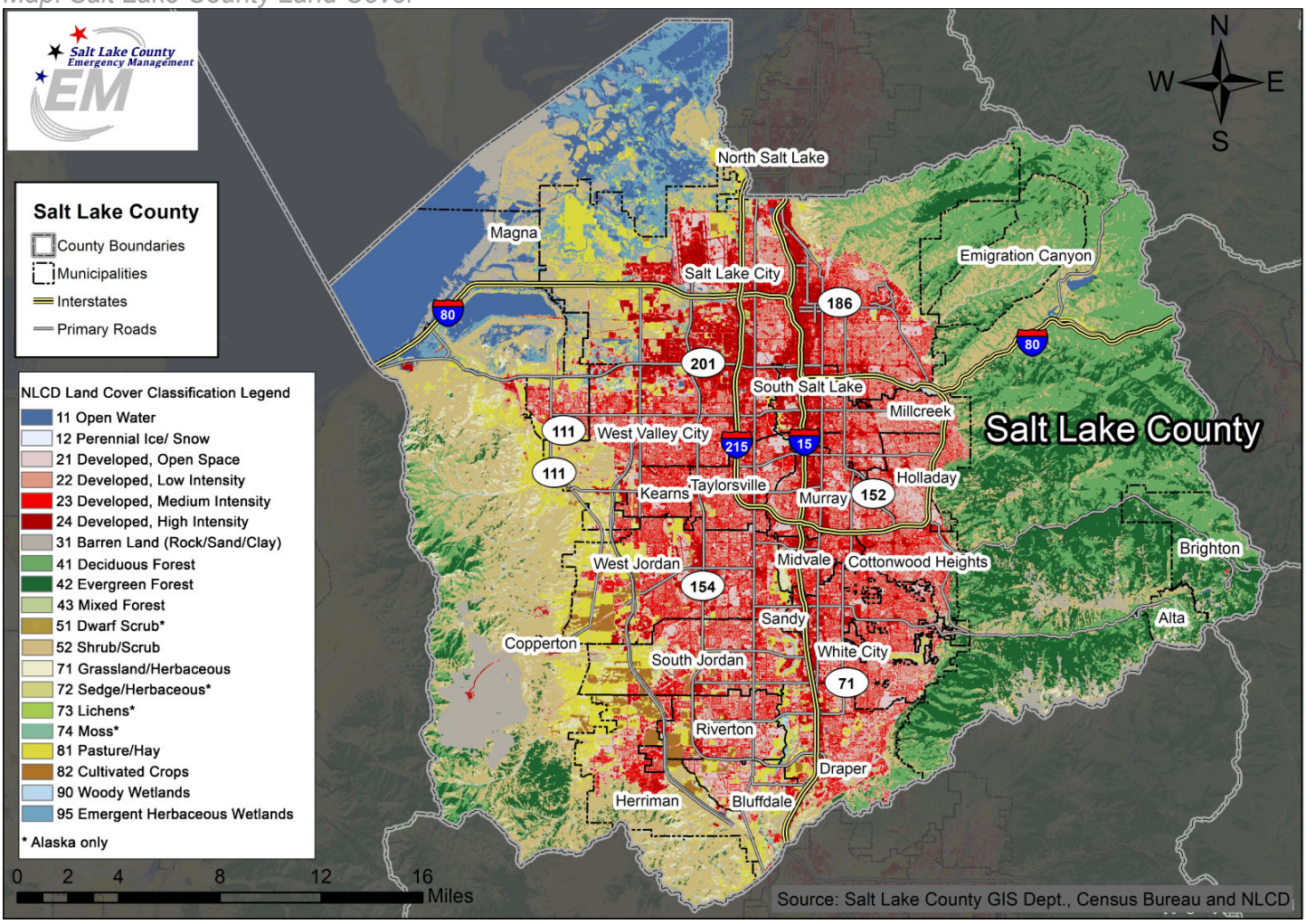
Map: Salt Lake County Rivers and Lakes



A significant portion of Salt Lake County is currently zoned for low-density residential development. Some higher densities are allowed in eastern Salt Lake City, while the Southeast and Southwest areas of Salt Lake County are zoned for lower housing densities. Industrial land uses are planned for West Salt Lake City, along the I-15 corridor, northern West Valley City, the western portion of North Salt Lake, and the West side of Salt Lake County. Areas primarily for commercial use include concentrations in Salt Lake City's central business district and along primary transportation corridors including I-15, I-215, State Street, 400 South, Highland Drive, 3500 South, 4500 South and 7200 South.

Additional commercial land use nodes are dispersed throughout Salt Lake County to serve adjoining residential communities. Many public and private lands still remain undeveloped because of specific environmental constraints, such as steep slopes or prime wetlands. Some areas currently being used for industrial or mining activity may be redeveloped for commercial and residential purposes. Kennecott Utah Copper Corporation currently holds much of this land.

Map: Salt Lake County Land Cover



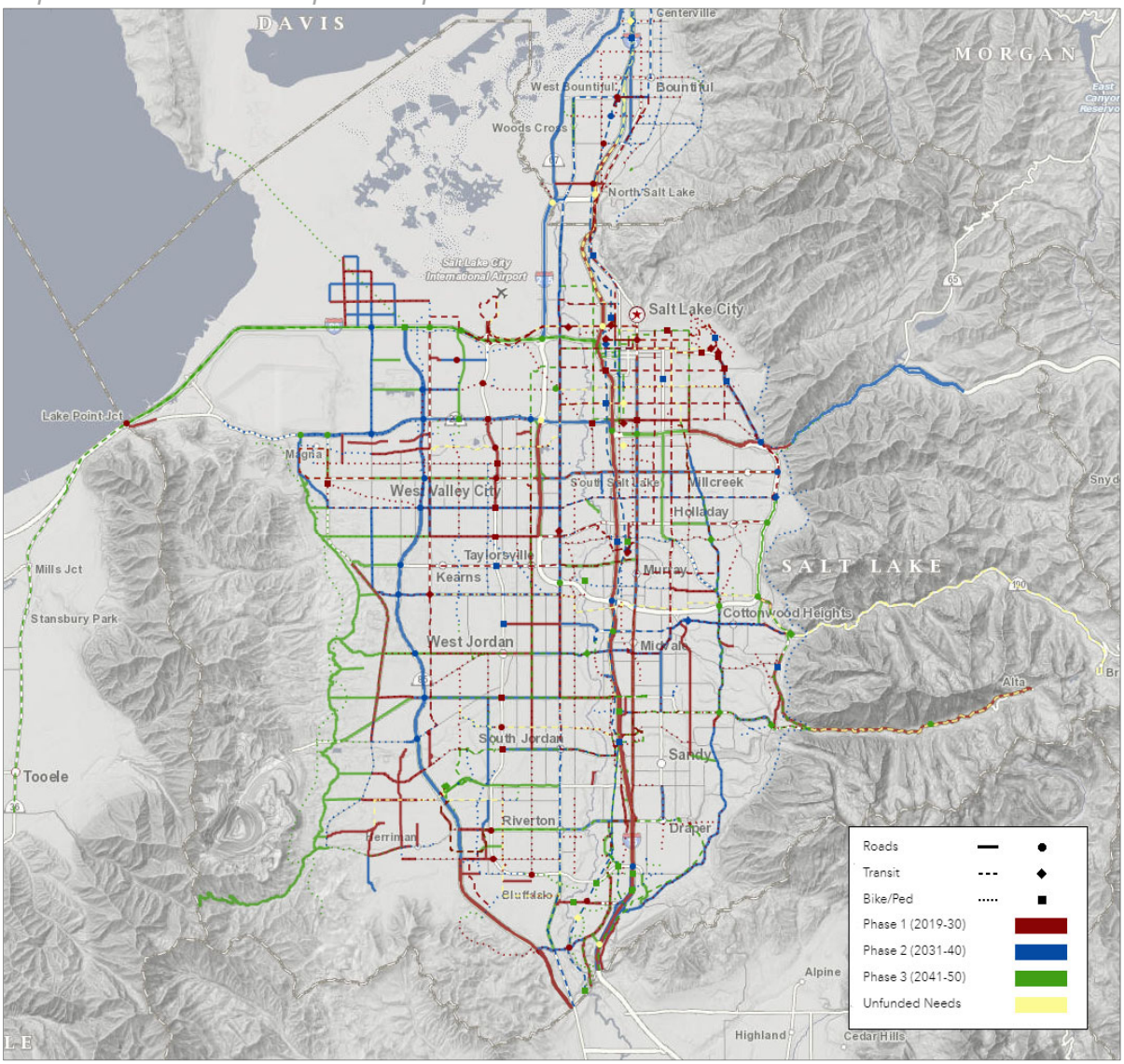
Salt Lake County anticipates continued population growth over the next 30 years, reaching almost 5 million by 2050. This growth necessitates development of key infrastructure guided by long range planning. To that end, the Wasatch Front Regional Council (WFRC) is responsible for coordinating the transportation planning process for the region. WFRC is an Association of Governments comprised of elected officials from Box Elder, Davis, Morgan, Salt Lake, Tooele, and Weber counties. The WFRC has facilitated the development of the Wasatch Choice 2050 Plan, which is the communities' shared vision for transportation investments, development patterns, and economic opportunities. Wasatch Choice envisions transportation investments and inter-related land and economic development decisions that achieve desired local and regional outcomes.

Four key strategies represent the overarching themes in the WC2050 Vision and help achieve the Regional Goals. The key strategies of Wasatch Choice are as follows.

- **Provide Transportation Choices:** Help us have real options in how we choose to get around and increase the number of easily reached destinations.
- **Support Housing Options:** Support housing types and locations that we can both afford and work best for our lives.
- **Preserve Open Space:** Preserve sufficient and easily accessible open lands that provide us with recreational opportunities.
- **Link Economic Development with Transportation and Housing Decisions:** Create a synergy between these three key building blocks. Enable shorter and less expensive travel to afford us more time and money. Efficiently utilize infrastructure to save taxpayer dollars. Provide housing options and increase housing affordability. Improve the air we breathe by reducing auto emissions.

Wasatch Choice is implemented through Comprehensive Economic Development Strategy, Local Planning, and Regional Transportation Plans (RTP). The maps below from the 2019 - 2050 RTP show the region's vision for future transportation and land use.

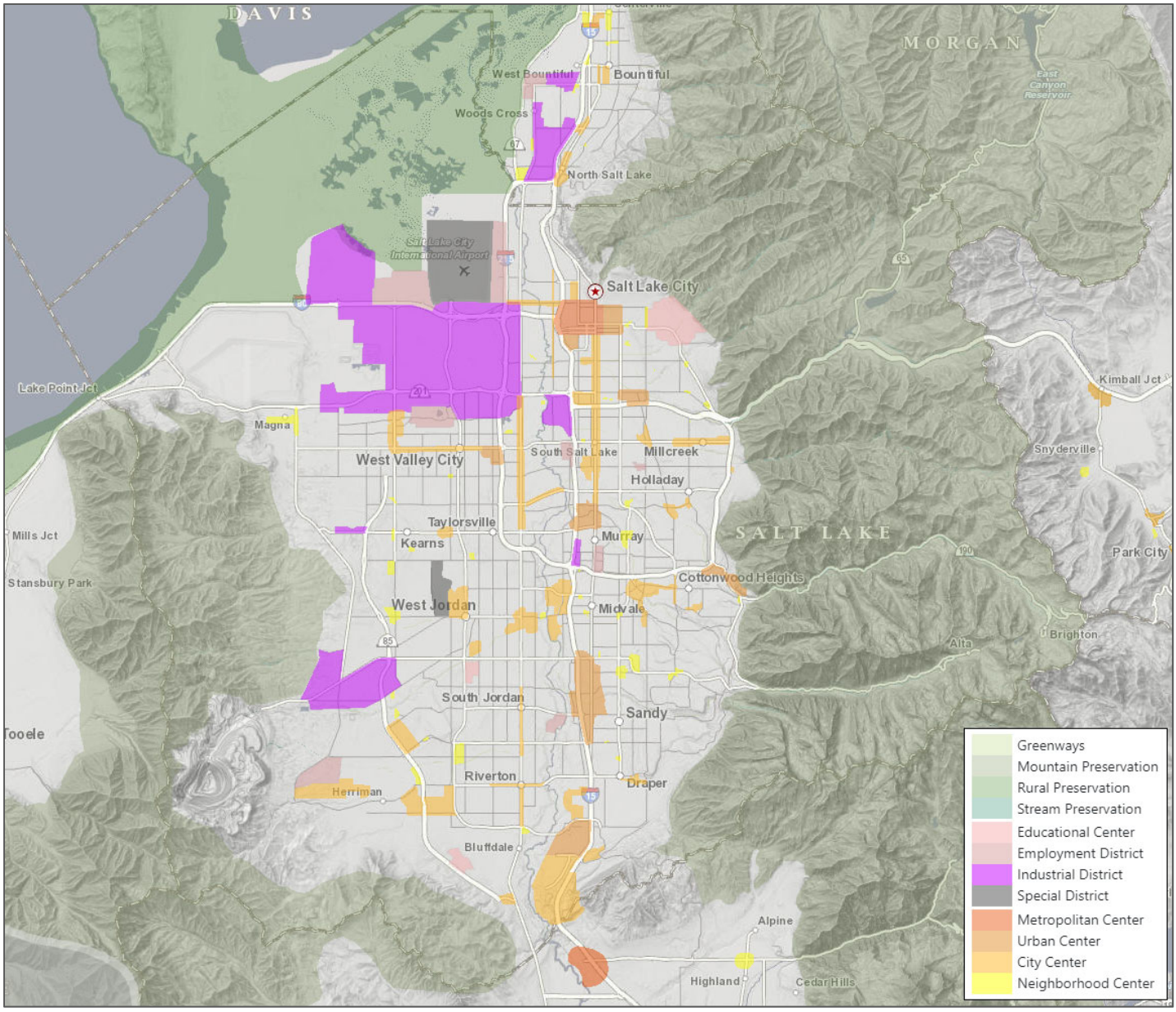
Map: Wasatch Choice Map - Transportation



Source: *www.wfrc.org*

As can be seen in the map below, the regionally significant land uses include a hierarchy of centers. Centers are the hearts of a community and are locations where communities anticipate welcoming more intense buildings, even as they may maintain lower levels of intensity elsewhere. They vary in scale but in all cases are more intense than their surrounding area, are walkable, and offer a mix of uses. Because of these traits, residents within or near centers drive shorter distances and are more apt to walk, bike, and ride transit. Overall, this means less traffic congestion and reduced air emissions. In addition, they are typically good candidate locations for providing a variety of housing options, including units that impact housing affordability.

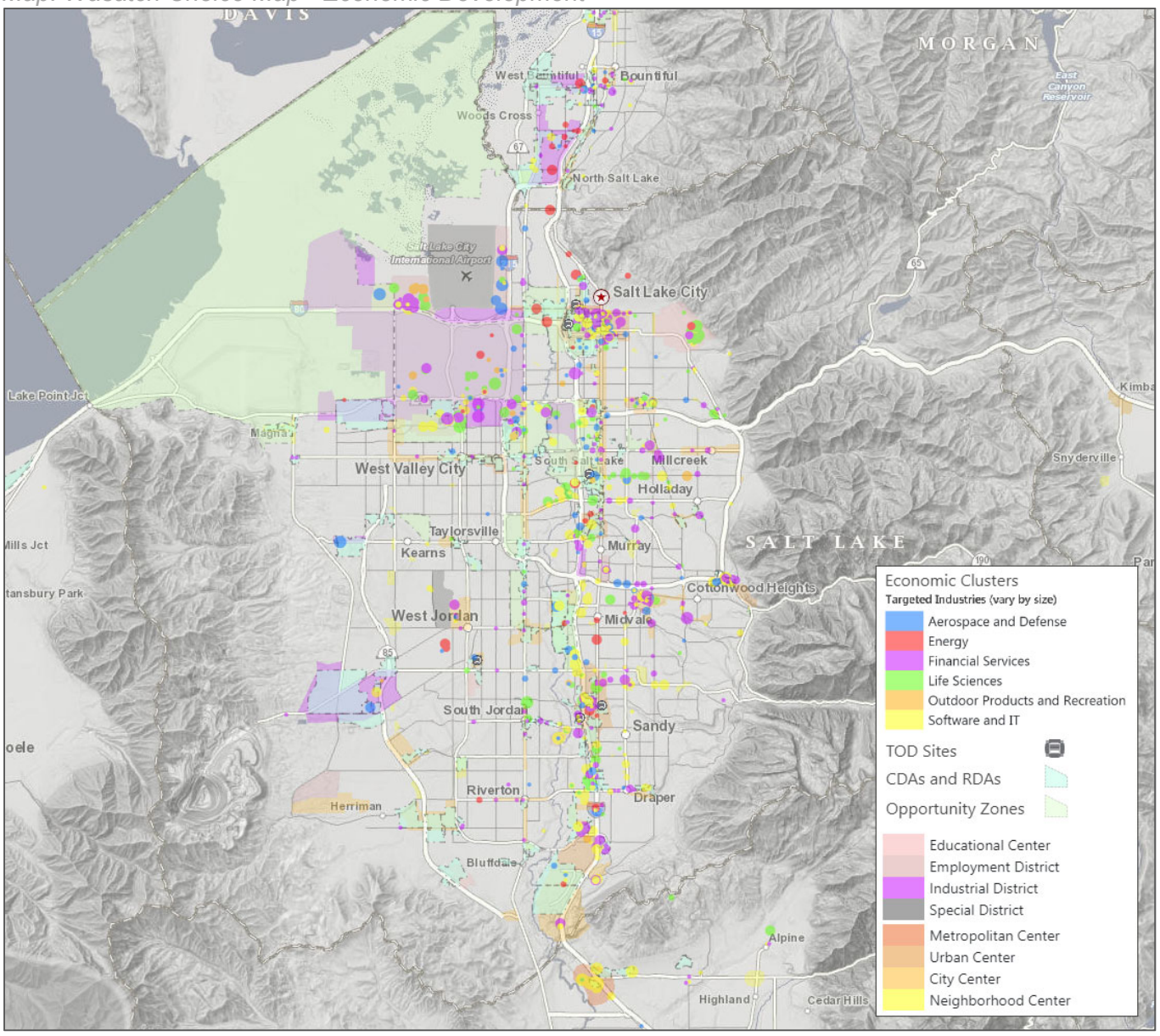
Map: Wasatch Choice Map - Land Use



Source: www.wfrc.org

The Economic Development information shown on the map shows several important regional policy and geographic considerations: Utah State Economic Clusters, Opportunity Zones, CDA and RDA areas, and Transit Oriented Developments. Utah's industry clusters are aerospace and defense, energy, financial services, life sciences, outdoor products and recreation, and software and IT. Nurturing industry clusters helps both the State and Salt Lake County sustain a competitive business advantage. Opportunity Zones are areas determined by the US census as "low-income communities." Designated Opportunity Zones incentivize private sector investments in housing and economic development in these areas by providing tax incentives for the developments. CDAs and CRAs are public financing tools. They temporarily utilize the increase in tax revenue spurred by land reinvestment in order to pay for things like infrastructure improvements. By doing so they further encourage land reinvestment. TOD refers to housing, jobs, and commercial developments focused around transit. Development that is well integrated with transit choices provides additional transportation choices, and positively impacts the economy through increased accessibility to jobs and housing. TOD helps reduce household transportation costs, congestion, and emissions of air pollution.

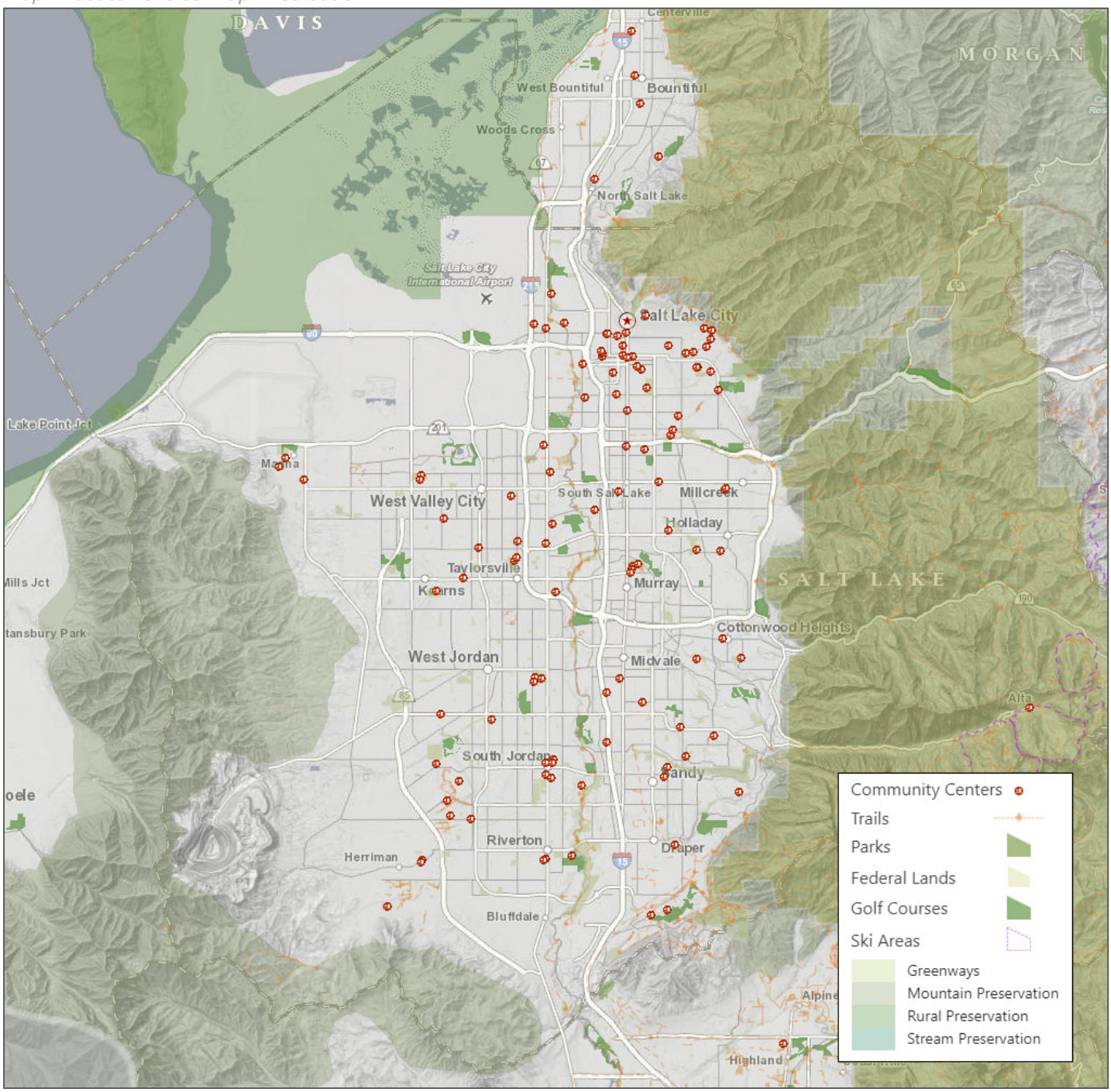
Map: Wasatch Choice Map - Economic Development



Source: www.wfrc.org

The Wasatch Front region is endowed with a stunning natural setting. One of the challenges as growth continues is to ensure residents have sufficient open space and recreational opportunities that are also easy to access. Open space can manifest itself in a number of different ways: natural, untouched landscapes; mountain trails; bird sanctuaries; rivers and lakes; places of solitude; playgrounds; paved urban trails; neighborhood pocket parks; regional urban parks; sports complexes; and places of community gathering, among many more. In addition to the health benefits, both mental and physical, for people using these spaces, open space is critical green infrastructure.

Map: Wasatch Choice Map - Recreation



Source: www.wfrc.org

As the region grows, a diversity of open space and recreation opportunities must be planned to maintain the quality of life that so many Utah and County residents currently enjoy. Setting local goals for park space per household, is one way to focus attention on providing recreational spaces in growth areas. Attention to parks is becoming even more important as the region densifies with high rates of multifamily residential development. Establishing goals and intentions is a great step, but energy and funding must also be put into making new parks become reality.

In addition, recreation planning should look to enhance access to these spaces via walking and biking. This can be accomplished by linking these spaces through a biking and walking network such as the 100 mile Golden Spoke network of off-street paved pathways consisting of the Provo River Parkway, Murdock Canal Trail, Jordan River Parkway, Legacy Parkway Trail, Denver & Rio Grande Western Trail, and Ogden River Trail.

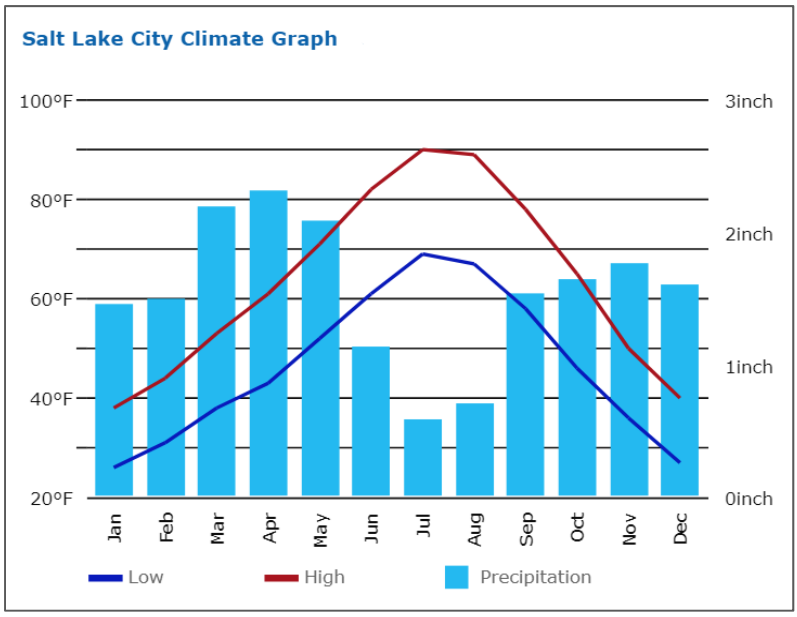
Climate and Weather

The climate averages and weather data for Salt Lake County can be seen in the tables below.

Table: Salt Lake County Climate Overview

	Salt Lake, Utah	United States
Rainfall	19.6 in.	38.1 in.
Snowfall	54.2 in.	27.8 in.
Precipitation	90.2 days	106.2 days
Sunny	226 days	205 days
Avg. July High	91.4º	85.8º
Avg. Jan Low	22.8º	21.7º
Comfort Index (higher=better)	7.1	7
UV Index	4.7	4.3
Elevation	5599 ft.	2443 ft.

Source: www.bestplaces.net



Source: www.climatedata.com

Table: Average Monthly High and Low (ºF)

	High	Low
January	38º	23º
February	44º	26º
March	54º	34º
April	62º	40º
May	72º	48º
June	83º	57º
July	91º	65º
August	89º	63º
September	79º	53º
October	65º	42º
November	50º	32º
December	39º	24º

Source: www.bestplaces.net

Table: Average Monthly High and Low (ºF)

	Hot Days	Freezing Days	Rainy Days	Snowy Days
January	0	26	9	6
February	0	21	9	5
March	0	12	9	3
April	0	5	10	2
May	1	1	9	0
June	7	0	5	0
July	20	0	4	0
August	15	0	5	0
September	2	0	6	0
October	0	3	7	1
November	0	16	9	3
December	0	26	9	6

Source: *www.bestplaces.net*

CAPABILITY ASSESSMENT

This section provides an assessment of county hazard mitigation capabilities, including any policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages within all of the communities listed in this Plan. At the County level, a summary of the jurisdiction's tools available for pre- and post-disaster hazard mitigation is provided as well as development management. For jurisdictions, a comprehensive overview of existing planning policies, programs, and capabilities which support hazard mitigation activities are included in Volume 2 as well.

The purpose of conducting a capability assessment is to determine the ability of the County to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing for enhancing specific mitigation policies, programs or projects. The assessment has two primary components: an inventory of the County's relevant plans, laws regulations and policies and/or programs already in place and an analysis of its capacity to carry them out. A careful examination of capabilities will detect any existing gaps, shortfalls or weaknesses associated with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate hazard vulnerability. The capability assessment also provides an opportunity to highlight the positive mitigation measures already in place or being implemented throughout the County, which should continue to be supported and enhanced if possible, through future mitigation efforts.

Countywide Capability Assessment

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Yes 1989 to Present	Yes to All
Capital Improvements Plan	Current	Yes to All
Economic Development Plan	Current	Yes to All
Local Emergency Operations Plan	Current	Yes to All
Continuity of Operations Plan	Current	Yes to All
Transportation Plan	Current	Yes to All
Stormwater Management Plan	Current	Yes to All
Community Wildfire Protection Plan	Current	Yes to All
Other special plans (i.e., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Yes – 2012 International Codes (ICC)
Fire department ISO rating	Yes	Yes
Site plan review requirements	Yes	Yes
Land Use Planning and Ordinances	**Yes/No**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	Yes	Yes to All
Subdivision ordinance	Yes	Yes to All
Floodplain ordinance	Yes	Yes to All
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Yes to All
Flood insurance rate maps	Yes	Yes to All
Acquisition of land for open space and public recreation uses	Yes	Yes to All
Other		
Administration	**Yes/No**	**Describe capability Is coordination effective?**
Planning Commission	Yes	Salt Lake County Council of Governments; Regional Development
Mitigation Planning Committee	Yes	Representatives from the agencies listed in this document are members of the Mitigation Planning Committee
Maintenance programs to reduce risk, e.g., tree trimming, clearing drainage systems	Yes	Ongoing – Regulated through ordinance and part of the County's responsibility as well
Mutual aid agreements	Yes	Public Works and other County Agencies have mutual aid agreements with the other jurisdictions and special service districts throughout the valley as well as neighboring counties.

Staff	Yes/No FT/PT[1]	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Yes	Yes to All
Floodplain Administrator	Yes	Yes to All
Emergency Manager	Yes	Yes to All
Community Planner	Yes	Yes to All
Civil Engineer	Yes	Yes to All
GIS Coordinator	Yes	Yes to All
Other		
Technical	**Yes/No**	**Describe capability Has capability been used to assess/mitigate risk in the past?**
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Yes – As shortfalls are identified, action is taken to correct deficiencies. A county-wide notification system is currently being considered.
Hazard data and information	Yes	Hazards data and information is available via SLCo EM.
Grant writing	Yes	Salt Lake County employs a number of personnel who seek and write grant proposals. Grant personnel are also found throughout the various departments and agencies of Salt Lake County.
Hazus analysis	Yes	The County performs HAZUS analysis and uses this data in conjunction with all planning efforts.
Other		

[1] Full-time (FT) or part-time (PT) position

Funding Resource	Access/ Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Yes	Yes – NRCS for Flood Control Facilities
Authority to levy taxes for specific purposes	Yes	Yes - Fire Area Tax – Levied with property taxes
Fees for water, sewer, gas, or electric services	Yes	Yes - These services are provided in part by the private sector
Impact fees for new development	Yes	Yes - All new development.
Storm water utility fee	Yes	Yes
Incur debt through general obligation bonds and/or special tax bonds	Yes	Yes – Used to upgrade water systems to meet fire-flow requirements
Incur debt through private activities	Yes	
Community Development Block Grant	Yes	
Other federal funding programs	Yes	
State funding programs	Yes	
Other		

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation? Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Yes – Open Space initiatives and Meals on Wheels programs and other social programs administered by the County Health Department; VOAD
Ongoing public education or information program, e.g., responsible water use, fire safety, household preparedness, environmental education.	Yes	Yes – County Agencies providing public outreach – Flood Control, Planning and Development Services – Building Department, County Health Department, Business and Economic Development.
Natural disaster or safety related school programs	Yes	Cooperation with schools with the “Safe Neighborhoods Program”
StormReady certification	Yes	
Firewise Communities certification	Yes	
Public-private partnership initiatives addressing disaster-related issues	Yes	Yes – Participation with the Private Sector Coordinating Council

An overview of other existing capabilities, resources, and programs are listed below.

Be Ready Utah

Be Ready Utah is the state's official emergency preparedness campaign managed by the Utah Department of Public Safety's Division of Emergency Management (DEM). The Be Ready Utah campaign was officially launched in April 2005 at the annual League of Cities and Towns conference in St. George, Utah following the devastating floods in January 2005.

Be Ready Utah provides valuable information for individuals and families, communities, public safety professionals, business and civic leaders, school administrators and volunteers. We believe that preparedness leads to prosperity. Every community has the opportunity to provide resources to prepare its citizens and Be Ready Utah can help prepare Utah.

Hazard Mitigation Grant Program Administrative Plans

In the event of a presidential disaster declaration, a Hazard Mitigation Grant Program Administrative Plan is edited and updated. Edits may be extensive and may require new sections to be developed depending on the regulatory changes between disaster declarations. Administrative Plans document the process for the administration of HMGP and the project management of the mitigation measures to be funded under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988. They set forth agency guidance for the eligibility, development, submission, review, and recommendation of HMGP applications relative to federal disaster declarations. Topics including responsibilities and staffing, identification and evaluation of mitigation projects, application procedures, and financial management are addressed. SLCo EM will also provide quarterly information sessions for municipal officials on the post-disaster grant funding application process.

Salt Lake County Emergency Coordination Center (ECC)

The County ECC is a technologically advanced facility staffed and operated 24-hours a day by highly trained personnel. Each of the Emergency Support Function (ESF) agencies is required to send a representative to the ECC during emergencies and exercises. During emergencies, personnel from other county agencies staff the ECC. At the county and local levels, ECCs are also the central coordination point for response and recovery efforts. These facilities range from large and highly sophisticated to small and simple.

Technical and Communication Tools

SLCo EM is capable of assisting all levels of government in post-disaster situations. The agency has both the technical expertise and the communication tools available to provide disaster-related coordination. For example, HAZUS, Geographic Information Systems (GIS), a 24-hour call center, WebEOC, and video telecommunication can all be used in post-disaster situations.

Public Safety Emergency Telephone Act

Act 78 (i.e. the Public Safety Emergency Telephone Act, 1990-78), as amended, is designed to provide a toll-free standard number (911) accessible from both land and cellular phones for any individual in the county to gain rapid, direct access to emergency services. The act places responsibility for developing a 911 system on county government. It provides for user contributions based on the number of lines of telephone service. These contributions are administered at the county level. Act 78 establishes technical, training and certification guidelines, and minimum standards to be met in developing the county 911 plan. It encourages the development of enhanced 911 systems and constant improvement of existing systems.

Post-Disaster Capability

Salt Lake County's post-disaster capability is built on staff and the training they receive to know and practice their post-disaster responsibilities. SLCo EM staff are cross-trained so that they can fulfill multiple roles in the post-disaster environment. Salt Lake County and SLCo EM staff have access to multiple technical and communication tools, including the Salt Lake County Emergency Operations Center, that supports their ability to respond effectively in post-disaster situations. The Public Safety Emergency Telephone Act supports identification of disaster needs to emergency responders and managers. The most prominent emerging policy or program impacting post-disaster capability is the program to regularly host training and exercises of post-disaster capability.

Repetitive Loss and Severe Repetitive Loss Capability

SLCo EM staff will have a continuous twelve-month approach to mitigating repetitive loss and severe repetitive loss properties. This continuous approach supports both pre- and post-disaster grant funding streams. Specifically in the post-disaster situation, mitigating both repetitive loss (RL) and severe repetitive loss (SRL) properties is a criterion used by the state committee that reviews the HMGP applications. For instance, if all items in an HMGP were equal, an application for an RL or SRL property would be prioritized over a non-RL or SRL property.

Development Management Capability

In Salt Lake County, local municipalities regulate development. They do this by adopting zoning ordinances, floodplain ordinances, and subdivision and land development ordinances—and grant building permits by verifying that development proposals are consistent with these documents. Local municipalities have several effective tools at their disposal to address development in hazard prone area. These tools are discussed below.

Zoning ordinances allow for local communities to regulate the use of land in order to protect the interest and safety of the general public. Zoning ordinances can be designed to address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development and/or require land development to consider specific hazard vulnerabilities.

Subdivision and land development ordinances are intended to regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events

To protect people and structures from flood hazards, FEMA administers the National Flood Insurance Program that has an objective to guide development away from high-flood risk areas. Local municipalities participate through ordinance adoption and floodplain regulation and as a condition of community participation in the NFIP structures built within the Special Flood Hazard Area must adhere to the floodplain management regulations.

Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether.

Municipalities can also participate in the NFIP's CRS program. Community participation in this program can provide premium reductions for properties located outside of Special Flood Hazard Areas of up to 10-percent and reductions for properties located in Special Flood Hazard Areas of up to 45-percent. These discounts can

be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities.

The County also has policies to regulate construction standards for new construction and substantially renovated buildings. Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community.

Local Capability Assessments

The capability assessments for each local, participating jurisdiction can be found within each jurisdiction's annex in Volume 2 of this Plan.

RISK ASSESSMENT

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, injury or disability, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on a sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people to all relevant hazards within the planning area.

Disaster Declarations

The following lists all of the major disaster or assistance declarations that have impacted Salt Lake County since 2010.

- Utah Severe Winter Storms and Flooding (DR-4311) Incident Period: February 07, 2017 to February 27, 2017. Major Disaster Declaration declared on April 21, 2017. Total Public Assistance Grants Dollars Obligated: $3,383,180.16
- Utah Severe Storm and Flooding (DR-4088) Incident Period: September 11, 2012. Major Disaster Declaration declared on November 03, 2012. Total Public Assistance Grants Dollars Obligated: $1,653,796.77
- Utah Rose Crest Fire (FM-2991) Incident Period: June 29, 2012 to June 30, 2012. Fire Management Assistance Declaration declared on June 29, 2012.
- Utah Severe Storm (DR-4053) Incident period: November 30, 2011 to December 1, 2011. Major Disaster Declaration declared on February 1, 2012. Total Public Assistance Grants Dollars Obligated: $2,564,683.72
- Utah Flooding (DR-4011) Incident period: April 18, 2011 to July 16, 2011. Major Disaster Declaration declared on August 8, 2011. Total Public Assistance Grants Dollars Obligated: $8,701,342.50
- Utah Machine Gun Fire (FM-2859) Incident period: September 19, 2010 to December 31, 1969. Fire Management Assistance Declaration declared on September 19, 2010.

The following represent incidents in which Salt Lake County supported but were not directly affected:

- Utah Bald Mountain Fire (FM-5277) Incident Period: September 21, 2018 to September 24, 2018. Fire Management Assistance Declaration declared on September 21, 2018.
- Utah Hilltop Fire (FM-5267) Incident Period: August 06, 2018 - August 11, 2018. Fire Management Assistance Declaration declared on August 06, 2018.

- Utah Dollar Ridge Fire (FM-5248) Incident Period: July 02, 2018 to July 22, 2018. Fire Management Assistance Declaration declared on July 02, 2018.
- Utah Uintah Fire (FM-5206) Incident Period: September 05, 2017 to September 08, 2017. Fire Management Assistance Declaration declared on September 05, 2017.
- Utah Brian Head Fire (FM-5185) Incident Period: June 17, 2017 to July 11, 2017. Fire Management Assistance Declaration declared on June 18, 2017.
- Utah Saddle Fire (FM-5130) Incident Period: June 21, 2016 to July 12, 2016. Fire Management Assistance Declaration declared on June 21, 2016.
- Utah Anaconda Fire (FM-5065) Incident Period: July 21, 2014 to July 22, 2014. Fire Management Assistance Declaration declared on July 21, 2014.
- Utah Rockport Five Fire (FM-5044) Incident Period: August 13, 2013 to August 19, 2013. Fire Management Assistance Declaration declared on August 13, 2013.
- Utah Shingle Fire (FM-2994) Incident Period: July 02, 2012 to July 09, 2012. Fire Management Assistance Declaration declared on July 02, 2012.
- Utah Clay Springs Fire (FM-2990) Incident Period: June 27, 2012 to July 07, 2012. Fire Management Assistance Declaration declared on June 27, 2012.
- Utah Wood Hollow Fire (FM-2986) Incident Period: June 24, 2012 to June 28, 2012. Fire Management Assistance Declaration declared on June 24, 2012.
- Utah Dump Fire (FM-2983) Incident Period: June 22, 2012 to June 24, 2012. Fire Management Assistance Declaration declared on June 22, 2012.

Hazard Profiles

Using existing natural hazards data and input gained through planning meetings, the Planning Team agreed upon a list of natural hazards that could affect Salt Lake County. Hazard data from the Utah State Department of Emergency Management and Mitigation, FEMA, the National Oceanic and Atmospheric Administration, and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries and property and economic damage. The natural hazards evaluated as part of this plan include those that occurred in the past or have the potential to cause significant human and/or monetary losses in the future.

The natural hazards identified and investigated as part of the Risk Assessment for the Salt Lake County Multi-Hazard Mitigation Plan include:

- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flooding (Urban/Flash and Riverine Flooding)
- Landslide and Slope Failure
- Public Health Epidemic/Pandemic
- Radon
- Severe Weather
- Severe Winter Weather
- Tornado
- Wildfire

Other Hazards of interest were identified as having some potential to impact the planning area, but at a much lower risk level. These hazards included:

- Civil Disturbance
- Cyber Attack
- Hazardous Materials Incident (Transportation and Fixed Facility)
- Terrorism (Including Active Shooter Events)

Avalanche



A snow avalanche is the rapid down slope movement of a mass of snow, ice and debris. Snow avalanches occur in the mountains of Utah during the winter and spring as a result of snow accumulation and unstable snowpack conditions. Avalanches can be extremely destructive due to the forceful energy of rapidly moving snow and debris, and the burial of areas in the run out zones. Avalanches can cause damage to property, interruption of communications, blockage of transportation routes and streams and often result in injury and death (UNHH 2008). Avalanches have caused more fatalities than any other natural hazards in Utah. Over the past 20 years on average four people have been killed in the state each year.

Even though most avalanches occur in wildland areas, recreational endeavors—hiking, hunting, mountain climbing, skiing, snowboarding, snowmobiling and other wintertime activities—bring the population into contact with avalanche-prone areas. Due to the immense popularity of these activities, avalanches are actively mitigated within well-traveled areas. Persons venturing into the backcountry are more at risk. Homes and businesses along the foothills and in mountain areas have been damaged from avalanches. Avalanches can occur naturally, or can be triggered artificially by explosives or by people such as snowmobilers, backcountry skiers, or other outdoor recreationists. Two main natural factors that affect avalanche activity are weather and terrain.

Weather events create a layered snowpack. When strong layers or slabs form on top of weak layers, the snowpack can become unstable. The amount of snow, rate of accumulation, wind speed and direction, moisture content and snow crystal type all contribute to snowpack stability conditions. Most natural avalanches occur during or within 24 hours after a storm. In Utah, the avalanche potential is greatest from December through April.

Terrain factors affecting avalanches include slope angle, elevation, aspect, shape and roughness. Slope angle is the primary factor of avalanche probability, with most occurring in the optimum angles between 30 and 45 degrees. Elevation and aspect dictate the depth, temperature and moisture characteristics of the snowpack. Slope shape and roughness contribute to stability. For example, bowl-shaped slopes are more prone to avalanches than ridges. Boulders, shrubs and trees contribute to the slope's roughness and provide some stability (UNHH 2008).

Types of avalanches include wet and dry slab. Wet-slab avalanches occur most often in warming conditions on southerly-facing slopes. Dry-slab avalanches occur mostly on northerly-facing slopes in mid-winter. Wind can accelerate snow deposition leading to larger and/or more frequent avalanches (UAC 2008).

Avalanche Hazard Profile

Potential Impact		High	**Probability**	X	High
		Medium			Medium
	X	Low			Low
		Minimal			Unlikely
Location	Occur in localized areas in canyons and foothills, primarily in the canyons of the Wasatch Mountains.				
Seasonal Conditions	Winter, spring				
Conditions	Vary based on weather conditions, slope, aspect, and landforms.				
Duration	Initial impact seconds, possibly days if avalanche impacts roads or structures				
Secondary Hazards	Traffic restrictions, limited access to and from canyon communities				
Analysis Used	National Weather Service, Utah Avalanche Center, UDEM, local input, and review of historic events and scientific records.				

Range of Magnitude

Internationally, there is no firm consensus on the standard way to evaluate avalanche size and magnitude. Different scales that have been proposed use various measures like volume of snow transported relative to the avalanche path, potential or kinetic energy, depth of deposit, or measures of other observable factors like mass of the avalanche or water content of the debris.

Although all avalanche classification systems developed thus far have drawbacks, the Canadian system attempts to provide a compromise among the alternatives and still provide a practical tool for communication among most parties regarding avalanche magnitude.

Table: Canadian Snow Avalanche Size Classification System and Typical Factors

Size	Description	Typical Mass	Typical Path Length	Typical Impact Pressures
5	Largest snow avalanches known; could destroy a village or a forest of 40 hectares	10^5 t	3000 m	1000 kPa
4	Could destroy a railway car, large truck, several bldgs. or a forest with an area up to 4 hectares (40000 m^2)	10^4 t	2000 m	500 kPa
3	Could bury a car, destroy a small bldg. or break a few trees	10^3 t	1000 m	100 kPa
2	Could bury, injure or kill a person	10^2 t	100 m	10 kPa
1	Relatively harmless to people	<10 t	10 m	1 kPa

The North American Public Avalanche Danger Scale is another tool used by forecasters to communicate the potential for avalanches to cause harm or injury to backcountry travelers.

Table: North American Public Avalanche Danger Scale

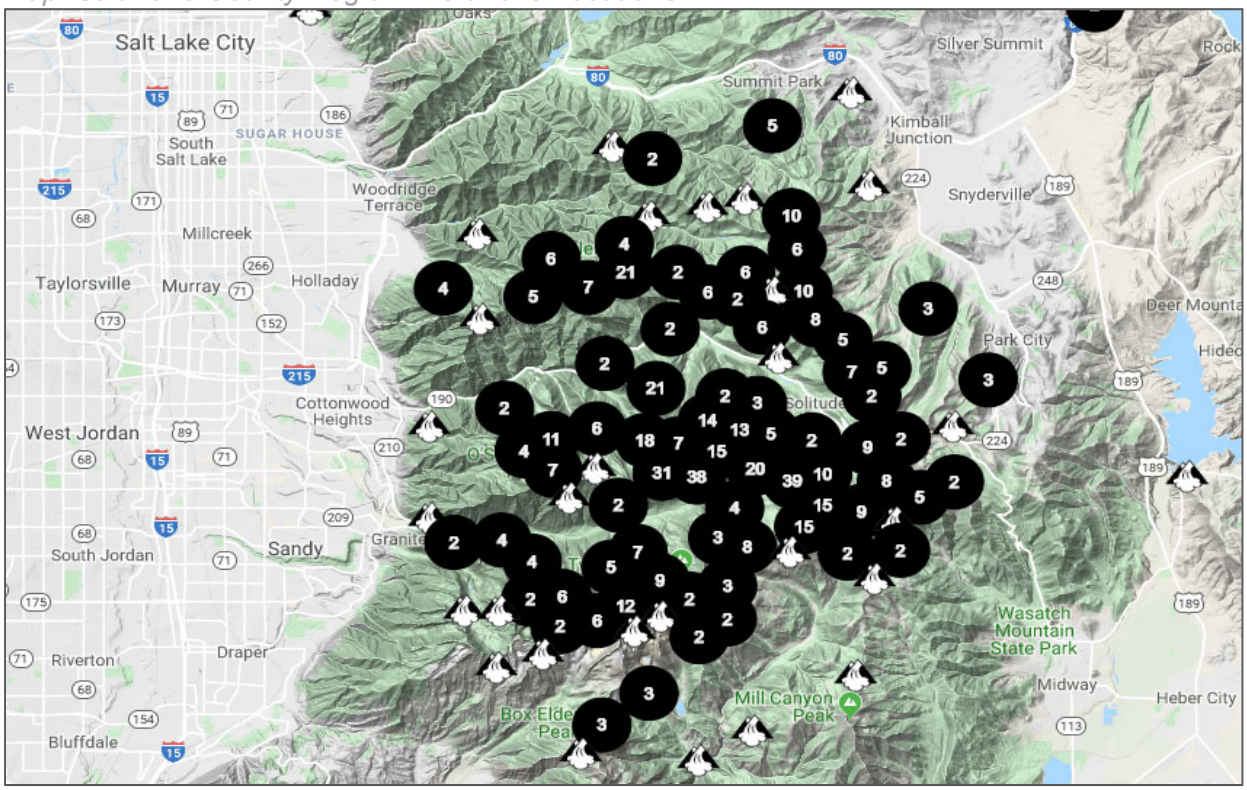
Danger Level	Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 - Extreme	Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Large to very large avalanches in many areas.
4 - High	Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
3 - Considerable	Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - Moderate	Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - Low	Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Location

The risk for avalanches in Salt Lake County exists primarily in the Wasatch Range and Uinta mountains—due to their high recreation use and increasing development—although they occur throughout Utah's mountainous areas. Avalanche paths may not have a serious avalanche for years or even decades, but the potential is there especially during above average snowfall years (UNHH 2008). In Utah, 100 avalanche deaths have occurred from 1958-2010, and by comparison 61 deaths from lightning since 1950. Avalanche risk in Salt Lake County is particularly centered around the Big and Little Cottonwood Canyons. The Town of Alta is especially at risk to the impacts of avalanches.

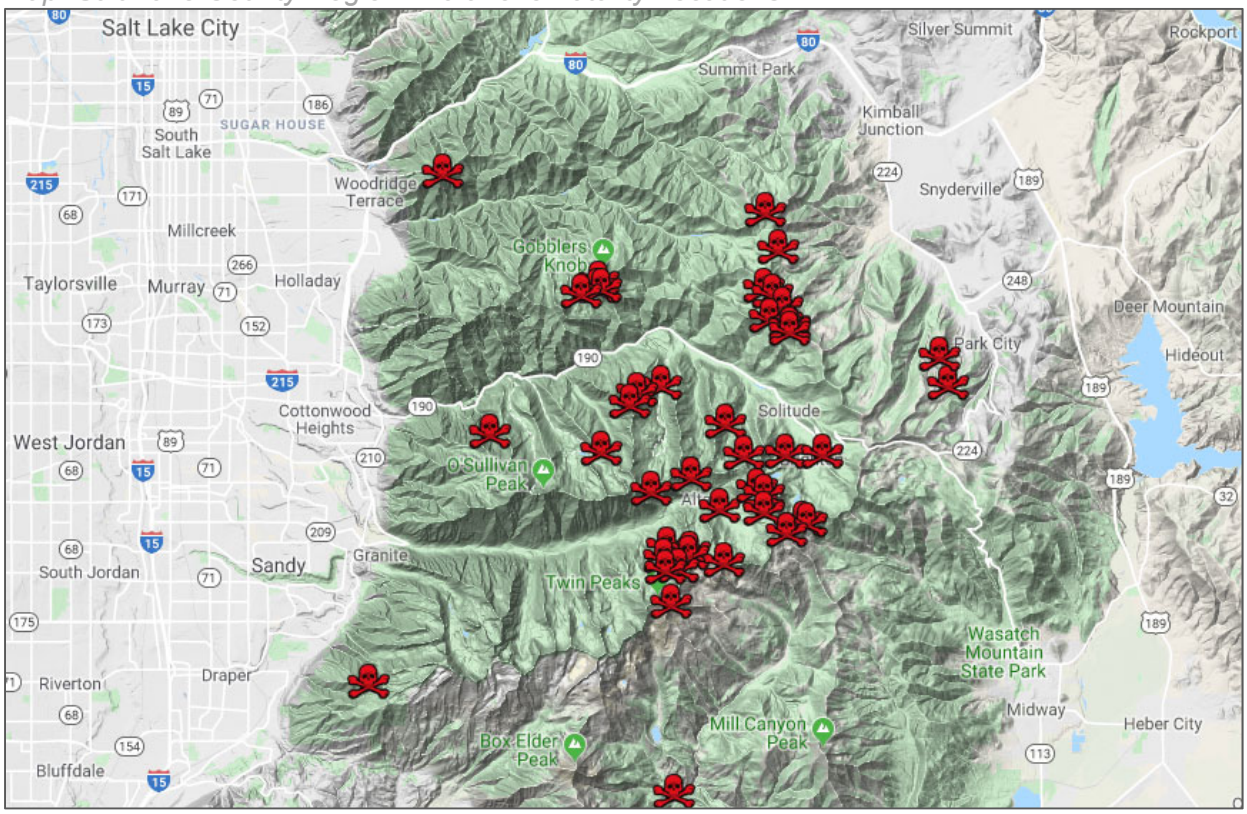
The following maps from the Utah Avalanche Center shows the locations of all reported avalanche events from 2015 to 2019, as well as the locations of all reported avalanche fatalities in the Salt Lake County Region.

Map: Salt Lake County Region Avalanche Locations



Source: https://utahavalanchecenter.org/avalanches

Map: Salt Lake County Region Avalanche Fatality Locations



Source: https://utahavalanchecenter.org/avalanches/fatalities/map

Highway 210 also has the highest avalanche hazard-rating index of any major roadway in the country. At times when UDOT and Alta agree that conditions are unsafe, the town goes into an Interlodge Alert, meaning all occupants of the town (including both visitors and residents) must remain indoors until conditions are deemed safe. During large storm cycles, an Interlodge can last days until the storm cycle is over and proper avalanche control work has been performed.

The Town's General Plan (dated November 2005, Updated 2013) covers Highway 210 access and possible mitigation activities to keep this critical road open. It also provides background on the Little Cottonwood Canyon Road Committee, a group consisting of representatives from Alta, Snowbird, Salt Lake County (including the Unified Fire Authority), UDOT, UTA, and USFS, that meet monthly to discuss access, usage, and safety and security issues related to the canyon road.

Historical Events and Probability of Future Occurrence

According to data from the Utah Avalanche Center (UAC) there have been 51 injuries and 57 deaths in the Salt Lake County region from all recorded avalanches since 1965. From 2009 to 2018 there were approximately 2,151 reported avalanches in the region as well, averaging approximately 215 reported events per year. According to NOAA data from 1996 to 2018, however, there have been only two events with significant recorded property damages, totaling $70,000.

On January 21, 2016, a group of skiers was skiing along Gobblers Knob, between Big Cottonwood and Millcreek Canyons. An avalanche, about 600 feet wide, was triggered, and two of the skiers were caught. One skier was partially buried and sustained minor injuries. The other skier, a 49-year-old male, was killed after being fully buried by the avalanche.

On December 23, 2007, an avalanche in-bounds at the Canyons Resort caught 4 skiers in it, leading to three injuries and one fatality. The avalanche was triggered by two men who were descending upper Red Pine Chute; one of the men was caught by the slide, but ended up on top of the snow. The other man was caught and died of head trauma after hitting a tree. A man and a child below were engulfed, with the man partially buried, and the child totally buried. The child was hospitalized for several days following the avalanche, but survived his injuries.

On March 14, 1998, the Little Cottonwood Canyon had 6 avalanches. Vehicles were swept from the road causing injuries to 5 people and $50,000 in property damages.

In 1983, a large avalanche completely covered Highway 210, buried a number of automobiles and wiped out the first floor of the Peruvian Lodge. A Salt Lake City motorist was seriously injured in a 1998 avalanche in Little Cottonwood Canyon.

The number and severity of avalanches each year is dependent upon a myriad of factors such as previous snow conditions, amount of new snowfall, wind speeds, wind direction, snow density, and avalanche control work success., with a majority occurring in the Wasatch Mountain range. It is reasonable to expect that frequencies of avalanche occurrence in the near future will continue to be in line with past events.

Secondary Hazards

Avalanches tend to be localized events causing immediate injury or death, but not having secondary impacts affecting the rest of the county. Nonetheless, it is possible avalanche events could damage roads and other transportation infrastructure, or cause traffic restrictions and limited access to and from canyon communities.

Vulnerability Assessment

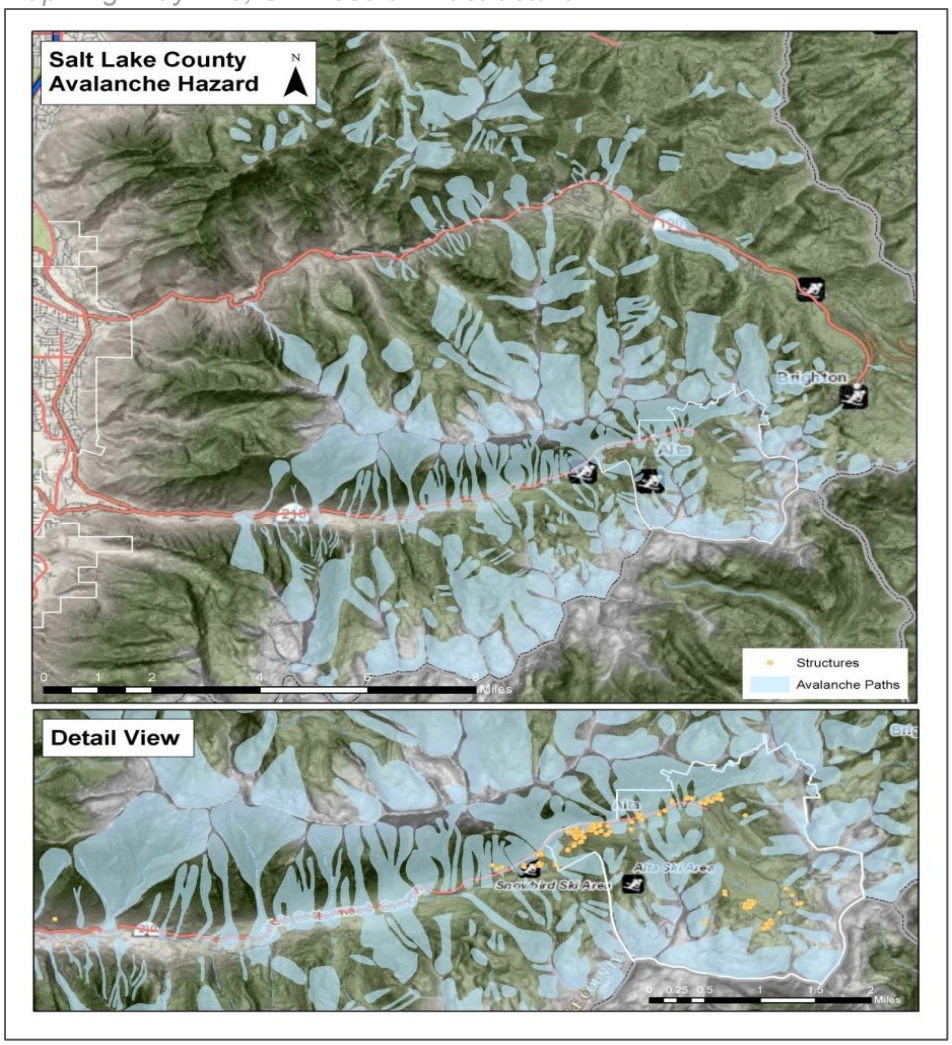
As previously mentioned, avalanche risk in Salt Lake County is primarily found in the Wasatch Mountains, particularly in Big and Little Cottonwood Canyons. The Town of Alta is particularly at risk to the impacts of avalanches. State Highway 210 follows Little Cottonwood Creek for the length of Little Cottonwood Canyon and serves as the primary access route to the town. Culvert blockages, bank erosion, landslides, and avalanches all have the potential to close down the town's only arterial connection with the rest of the county. Although the Town of Alta only has a population of 383 (per the town's website), it has a significant, fluctuating tourist population, which would be greatly impacted if Highway 210 is blocked by an avalanche.

According to the 2019 Utah State Hazard Mitigation Plan, the following structures are vulnerable to avalanche events, which can also be seen in the map below.

Community Assets:

95 Structures within Avalanche Paths
- 56 Commercial – $54,647,250
- 1 Government – $183,696
- 38 Residential – $2,869,264

Map: Highway 210, Ski Resort Infrastructure



Dam Failure

Dams are usually man-made, and therefore not inherently considered naturals hazards – however, dam failures can occur because of natural hazard loading events. The impacts of a dam failure can also be similar to natural flood events, although they are often more sudden and violent than normal stream floods (Living with Dams). Causes include breach from flooding, overtopping, ground shaking from earthquakes, settlement from liquefaction, slope failure and slumping, internal erosion from piping, failure of foundations and abutments, outlet leaks or failures, and internal weakening caused by vegetation and rodents. Possible effects include flooding, silting, loss of water resources, loss of property, and loss of life (UNHH 2008).

There are two types of dam failures – “rainy day” and “sunny day” failures. Rainy day failures occur because floodwaters overstress the dam, spillway, or outlet capacities. The floodwaters eventually flow over the top of the dam and erode the structure from the top down. The breach flows of the dam are added to the floodwaters from the rainstorm to produce a flood of large proportion and destructive power. Sunny day failure occurs from seepage and erosion inside the dam that removes fine material, creating a large void that can cause the dam to collapse or overtop and wash away. Sunny day failures can be the most dangerous because they can happen quickly with no warning to owners or downstream residents (UNHH 2008).

Dam Failure Hazard Profile

Potential Impact		High	**Probability**		High
	X	Medium			Medium
		Low		X	Low
		Minimal			Unlikely
Location	Dam locations are located throughout the county, with most of the high and moderate hazard dams in the eastern and southern portion of the County.				
Seasonal Conditions	Rainy Day Failure: Anytime Sunny Day Failure: Spring, late summer				
Conditions	Rainy Day Failure happens mainly during heavy precipitation events, can have some warning time. Sunny Day Failure can happen anytime without warning.				
Duration	Hours or days - depends on spillway type and area, maximum cubic feet per second (cfs) discharge, overflow or breach type and dam type.				
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.				
Analysis Used	Review of BOR inundation maps and plans, FIS, Utah Division of Water Rights.				

Range of Magnitude

The severity of a dam or levee failure depends on the area protected by the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the protected area. A dam or levee breach will result in flooding of normally protected areas, resulting in impacts similar to those seen in areas that are within the floodplain and not normally protected by a levee.

Table: CORPS of Engineers Hazard Potential Classification

Hazard Category (a)	**Direct Loss of Life** (b)	**Lifeline Losses** (c)	**Property Losses** (d)	**Environmental Losses** (e)
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers, 1995

Location

The 2019 Utah State Hazard Mitigation Plan gives an inventory of all dams in Utah:

Utah Dam Inventory

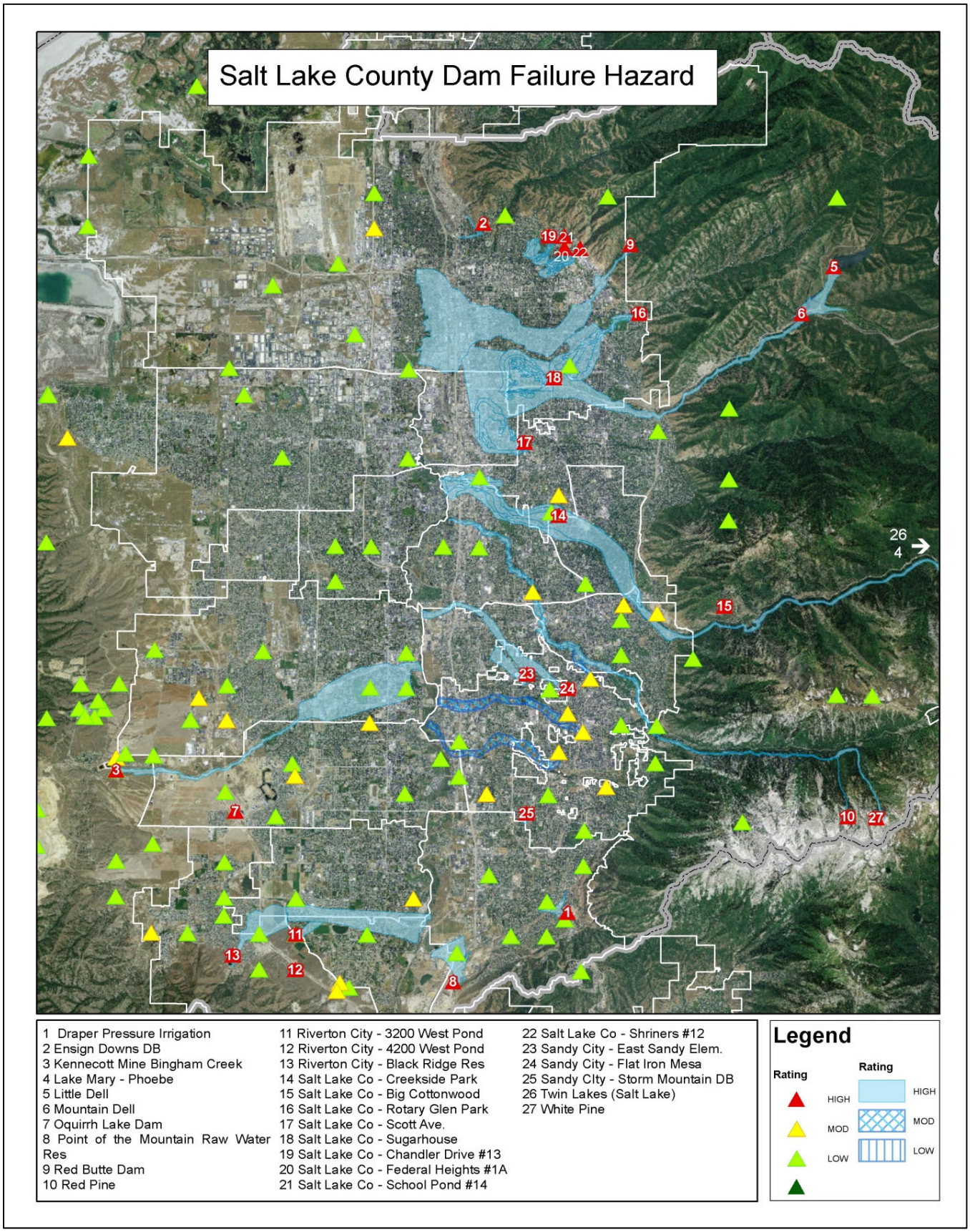
County	State Inspected (General)	State Inspected (Flood Control)	State Inspected (Industrial)	Federally Inspected	Inspected by Other Agencies	Uninspected	Inactive	Planned	Under Construction	Other	Total
Salt Lake	19	22	4	1	0	210	23	0	0	3	282

The National Inventory of Dams maps 66 of the total dams in Salt Lake County, listing an average age of 43 years since construction.

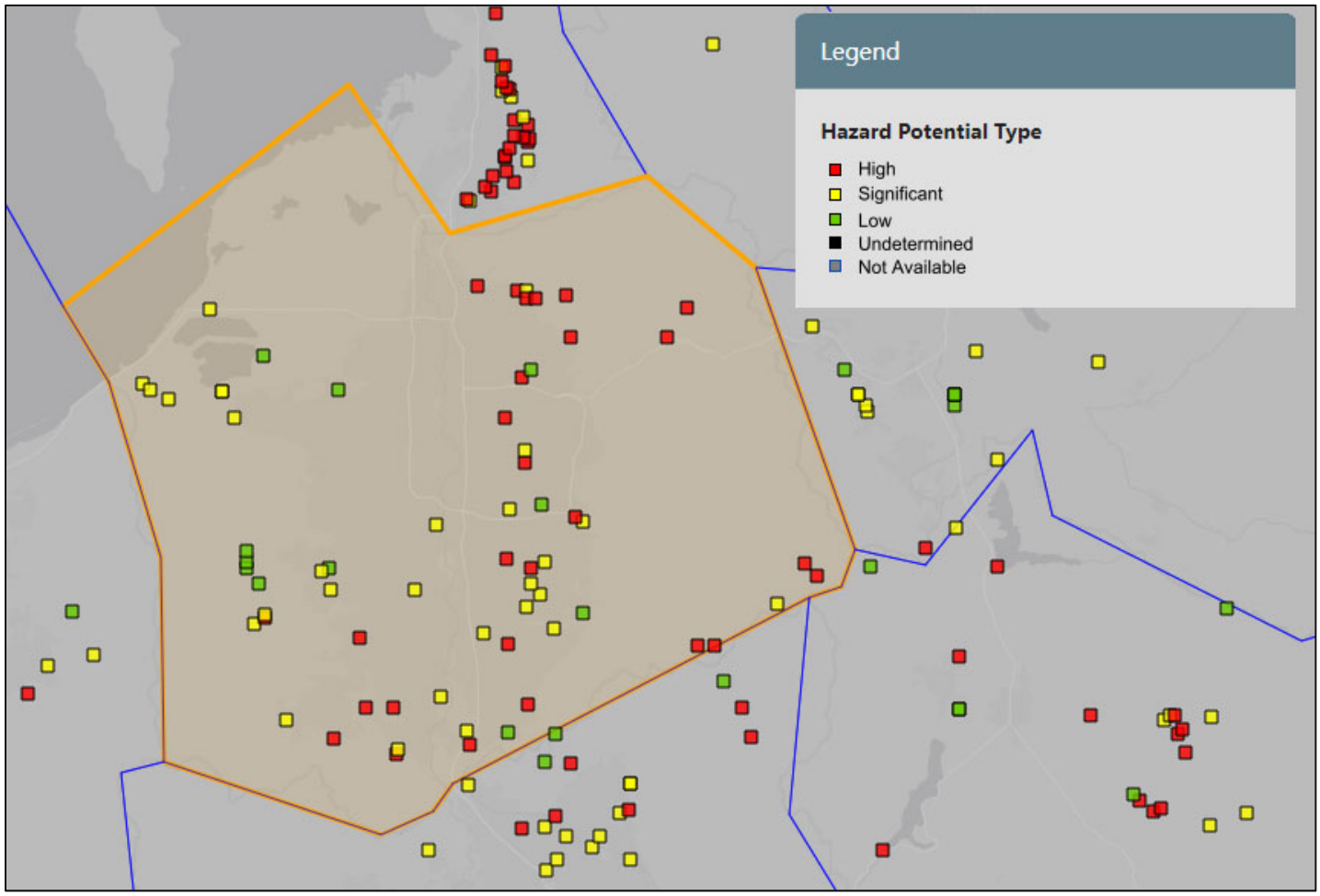
The NID consists of dams meeting at least one of the following criteria;

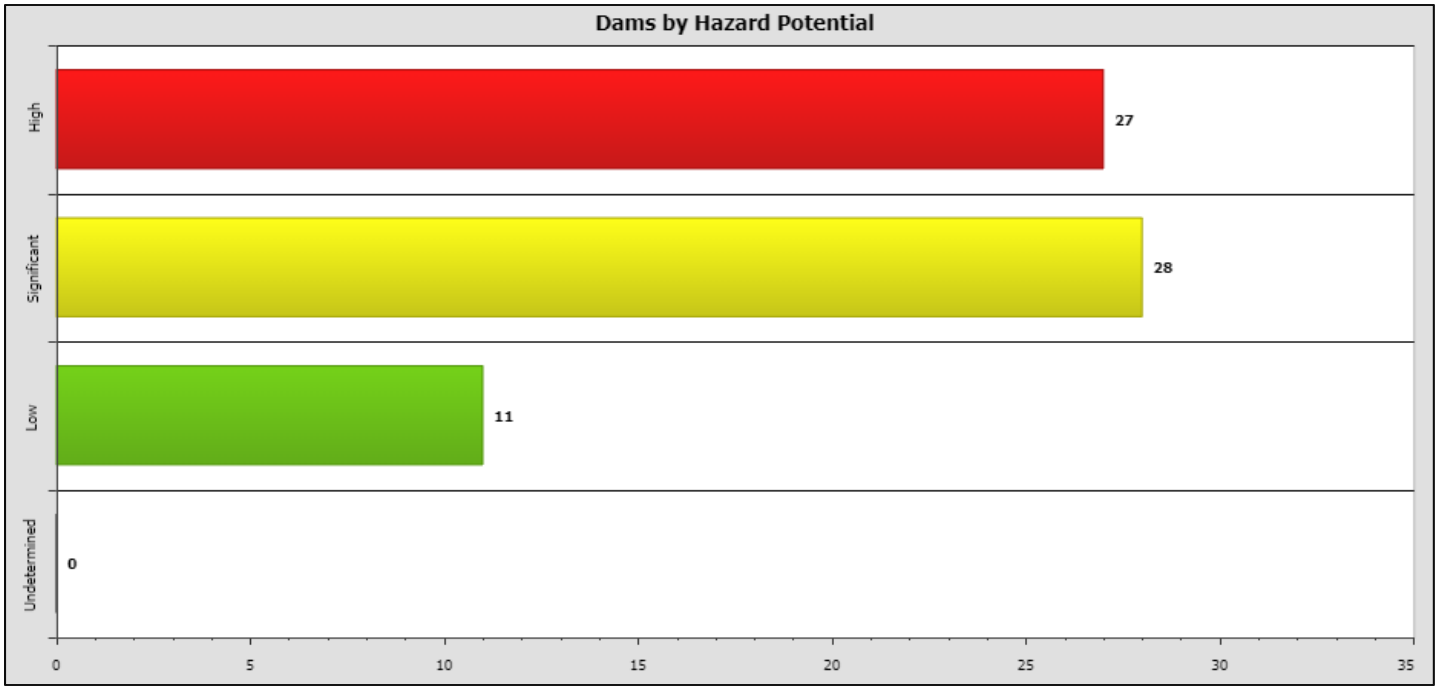
1. High hazard potential classification - loss of human life is likely if the dam fails,
2. Significant hazard potential classification - no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns,
3. Equal or exceed 25 feet in height and exceed 15 acre-feet in storage,
4. Equal or exceed 50 acre-feet storage and exceed 6 feet in height.

Map: Salt Lake County Dam Failure Hazard



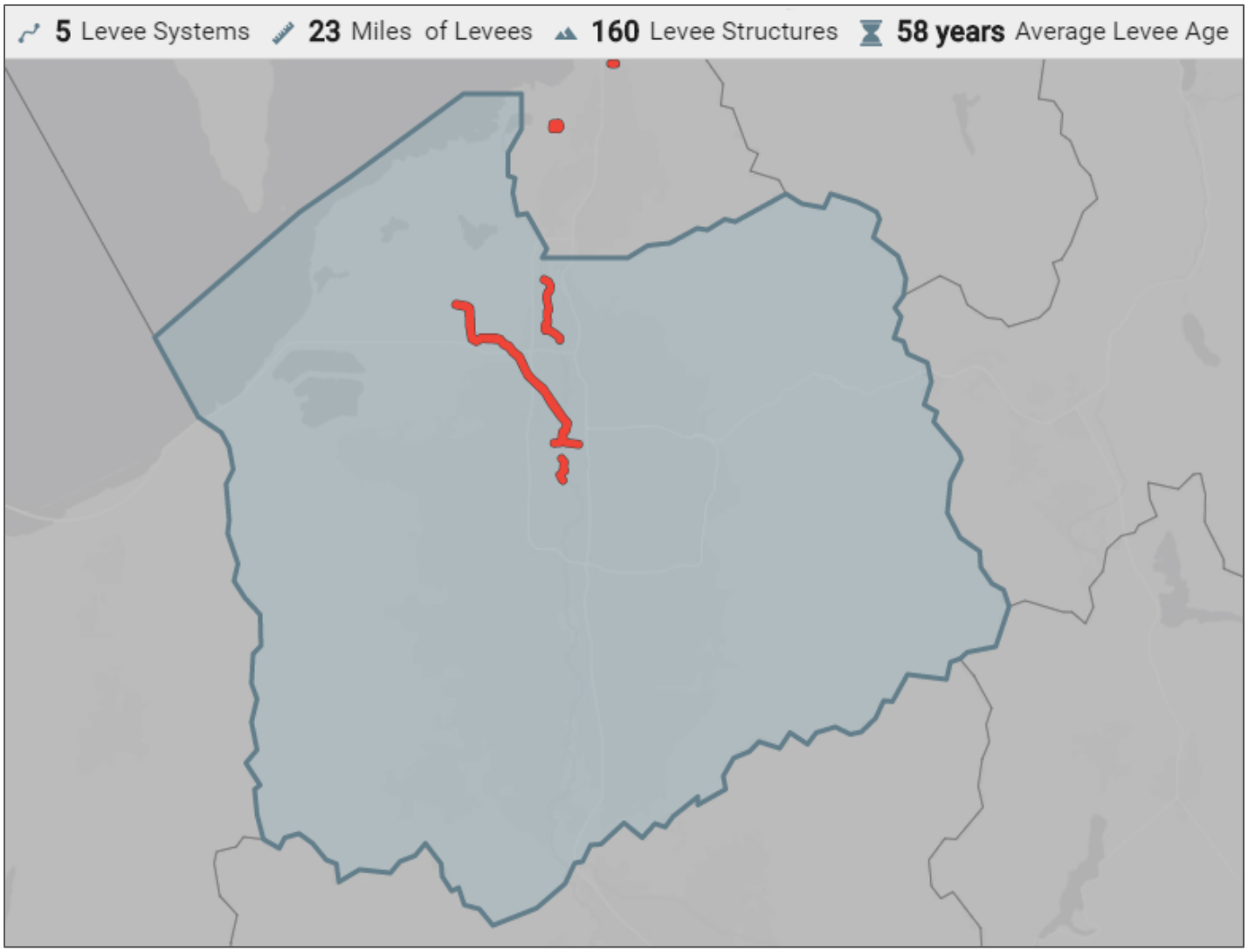
Map: National Inventory of Dams (NID) Locations in Salt Lake County





Source: https://nid.sec.usace.army.mil/

Map: Levees of Salt Lake County



Source: https://levees.sec.usace.army.mil/#/

Historical Events and Probability of Future Occurrence

Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, flooding, excessive rainfall, and snowmelt. There is a "residual risk" associated with dams and levee failures. Residual risk is the risk that remains after safeguards have been implemented. For dams and levees, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of any type of dam or levee failure in the planning area is low in today's regulatory environment. No record was found of any historical dam failure incidents within Salt Lake County either, however, incidents have occurred in other parts of Utah, according to the 2019 Utah State Hazard Mitigation Plan.

21 Mile Dam Failure

The 21 Mile Dam failed in Elko County, Nevada on February 8, 2017 due to heavy runoff and snowmelt. The water broke free from the earthen dam and flooded the community of Montello, Nevada, damaged Union Pacific property, and entered extreme northwestern Utah causing road damage.

Laub Detention Dam Failure

The Laub Detention Dam failed on September 11, 2012. A severe storm with heavy rainfall occurred prior to the failure. Numerous homes, businesses and roads were damaged. No lives were lost. A Presidential Disaster Declaration was declared for Washington County on November 3, 2012. The Dam was rebuilt in 2013 and was renamed “Tuacahn Wash Lower Detention Basin."

Quail Creek

Quail Creek dam failed on New Year’s Eve, 1988, due to extensive foundation seepage. Failure caused approximately $12 million in damage and cost approximately $8 million to rebuild. No lives were lost.

Secondary Hazards

In addition to the direct damages and loss of life possible from a dam or levee failure, there are many secondary hazards that could arise as well. Disruption of a public water supply or wastewater treatment facility, could lead to water shortages, exposure to sewage, or other health hazards. Damage or disruption to major roads, railroads, public utilities, or other critical facilities could cause the delay of vital services and exacerbate conditions on the ground. Extensive damage to the environment could impact local agriculture affecting the food and supply chain for the region.

Vulnerability Assessment

The 2019 Utah State Hazard Mitigation Plan includes loss estimates for Salt Lake County, as can be seen in the tables below.

Table: Salt Lake County Dams by Hazard Rating

County	Low Hazard	Moderate Hazard	High Hazard
Salt Lake County	181	29	29

Source: 2019 Utah State Hazard Mitigation Plan

Due to having the highest population in the state, Salt Lake County is ranked first in Utah for population per high hazard dam, as can be seen in the table below.

Table: Rankings by County of Population per High Hazard Dam

Ranking	County	Population per High Hazard Dam	High Hazard Dams
1	Salt Lake County	38,906	29
2	Weber	24,884	10
3	Utah	24,709	25
4	Tooele	22,378	3
5	Cache	21,082	6
6	Davis	12,456	28

Source: 2019 Utah State Hazard Mitigation Plan

Table: Salt Lake County Potential Dam Inundation Area

County	Total Area (sq. miles)	Total Potential Inundation Area (sq. miles)	Potential Percent Inundation Area
Salt Lake County	805.18	38.67	4.80%

Source: 2019 Utah State Hazard Mitigation Plan

Table: Salt Lake County HAZUS Building Stock Exposure to Dam Inundation

County	HAZUS Number of Buildings	HAZUS Total Building Value	Estimated Buildings in Inundation Area	Estimated Building Value Exposure	Percent Building Value Exposure	Per Capita Hazard Exposure
Salt Lake County	310,571	$98,684,444,000	41,384	$13,353,268,953	13.33%	$11,758

Source: 2019 Utah State Hazard Mitigation Plan

Table: Salt Lake County Estimated Daytime and Nighttime Population in Inundation Areas

County	Estimated Daytime Population in Inundation Areas	Percent Daytime Population in Inundation Areas	Estimated Nighttime Population in Inundation Areas	Percent Nighttime Population in Inundation Areas
Salt Lake County	170,786	15.04%	137,641	12.12%

Source: 2019 Utah State Hazard Mitigation Plan

As can be seen in the table below, there are 66 critical facilities within Salt Lake County, a breakdown of which can also be seen below.

Critical Facilities

4 Fire (SLC Fire Stations 3, 6, 8, South Salt Lake Fire Department)
2 Hospitals (Jordan Valley Medical Center)
4 Police (Sandy Police Substation, Salt Lake County Sheriff's Office, South Salt Lake Police Dept., Fort Douglas Public Safety)
8 UTA Transportation Stations
48 Schools

Table: Dam Failure Vulnerability and Loss

County	Residential Units	Residential Unit Value	Commercial Units	Commercial Unit Value	Critical Facilities
Salt Lake County	51,009	$9,665,508,700	6,052	$3,719,874,395	66

Source: 2019 Utah State Hazard Mitigation Plan

The following table estimates infrastructure vulnerable to dam failure in Salt Lake County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software.

Table: Infrastructure Vulnerable to Dam Failure, Salt Lake County

Item	Length (Miles) or Number of Units	Replacement Cost
Highways/Interstates	49.35 miles	$270,712,431
Highway Bridges	141 bridges	$194,240,663
Railway Segments	18.68 miles	$21,462,350
Railway Bridges	0 bridges	$0
Water Distribution Lines	N/A	N/A
Gas Lines	N/A	N/A
Sewer Lines	N/A	N/A
Total Estimated Infrastructure Replacement Cost		**$486,415,444**

Table: Vulnerability Assessment for Dam Failure, Incorporated Salt Lake County

Incorporated Areas	Acres Affected	Population Affected	Structures in Inundation Areas	
			Residential (Replacement Value)	Commercial (Annual Sales)
Alta	0	0	0	0
Bluffdale	577	1,066	281 $57,492,600	9 $2,792,296
Copperton	92	1	0	0
Cottonwood Heights	618	4,299	1,498 $306,490,800	170 $68,626,409
Draper	479	1,444	486 $99,435,600	52 $126,907,719
Emigration Canyon	0	0	0	0
Herriman	0	0	0	0
Holladay	1,159	7,369	3,080 $630,168,000	371 $232,693,583
Kearns	0	0	0	0
Magna	0	0	0	0
Midvale	323	3,714	1,546 $316,311,600	49 $33,150,823
Millcreek	640	6,428	3,153 $645,103,800	282 $180,987,936
Murray	1,066	7,423	3,324 $680,090,400	715 $550,016,335
Riverton	853	3,710	969 $198,257,400	28 $14,217,055
Salt Lake City	5,487	44,174	18,186 $3,720,855,600	2,259 $1,319,027,117
Sandy City	1,357	12,191	4,221 $863,616,600	442 $216,962,013
South Jordan	222	474	137 $28,030,300	1 $110,705
South Salt Lake	1,719	12,973	5,974 $1,222,280,400	1,344 $855,609,248
Taylorsville	1	60	32 $6,547,200	0
West Jordan	2,126	13,322	3,830 $783,618,000	313 $109,253,013
West Valley City	40	324	80 $16,368,000	16 $9,492,390

Note: At the time the plan was updated, Brighton, was not considered an incorporated community. Information related Brighton is captured under Big Cottonwood Canyon.

Table: Vulnerability Assessment for Dam Failure, Unincorporated Salt Lake County

Unincorporated Areas	Acres Affected	Population Affected	Structures in Inundation Areas	
			Residential (Replacement Value)	Commercial (Annual Sales)
Big Cottonwood Canyon	913	55	19 $3,887,400	0
Camp Williams	0	0	0	0
Canyon Rim	127	936	332 $67,927,200	0
Granite	328	269	80 $16,368,000	1 $27,753
Mount Olympus	27	45	13 $2,659,800	0
Parley's Canyon	708	146	44 $9,002,400	0
Sandy Hills	25	280	83 $16,981,800	1 $27,753
Southwest	0	0	0	0
Willow Canyon	0	0	0	0

Community Assets:

Additional significant community assets with potential impacts by dam failure hazards were identified by the Mitigation Planning Team. These include areas of particular concern, critical facilities, critical infrastructure, areas of future development, major employers or economic sectors, cultural or historic facilities, and significant populations or significant natural resources. More detailed information on jurisdictional assets is listed in their individual annex in Volume 2.

Murray:
Previous events: None, but similar to other flooding events. Many residential homes would be impacted near Little Cottonwood Creek, Murray Park, State St and Vine St. Some roads would also be impassable.
Growth: Birkhill Apartment complex
Structures: Fire Station #82
Population: Nighttime residential and apartment complexes near Little Cottonwood Creek
Economic: Some business impacts in north end of city
Natural: Jordan River Conservatory

South Salt Lake
Areas of concern: Scott Ave., Little Dell and Mountain Dell, Sugarhouse, Jordan River
Previous events: None, but similar areas to other flood events. Scott Ave Millcreek Damage, flooding in Jordan River area
Growth: 2100 S-2400 S, State St – 400 W
Structures: County EOC, Jails, Metro, Oxbow, Youth, Sewer Treatment Facility, Transportation corridors, I-15, I-80, railroad, Trax, Schools
Population: Larger daytime population, prisoner population, Non-English speakers

Taylorsville
Areas of concern: All tributaries coming into Jordan River
Previous events: Flooding near 3900 S and 4800 S along Jordan River in 2011.High-density housing affected, Calloway Apts. and Bridgesite Apts.

Growth Structures: High density housing along rivers, Sorenson Research Park, businesses
Population: Residential and business population along river/drainage area
Economic: Sorenson Research Park, Golf Course 3900-4300 S and river
Natural: Possibly along the river

Drought

According to the National Drought Mitigation Center, drought is a "deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector." Although variation in the amount of precipitation recorded each year is normal, a drought is beyond these norms in terms of low precipitation for an extended period or over a large area. While most natural hazards are sudden and result in immediate impacts, droughts "sneak up on us quietly disguised as lovely sunny weather" (McKee, Doesken, and Kleist 2005) and can last a long time resulting in significant socioeconomic impacts. Drought can be categorized according to unique characteristics and may be thought of as phases of the same drought (UNHH 2008).

- Meteorological drought: a measure of departure of precipitation from normal for a particular location.
- Agricultural drought: where the amount of moisture in the soil no longer meets the needs of a particular crop.
- Hydrological drought: when surface and subsurface water supplies are below normal.
- Socioeconomic drought: when dry conditions persist long enough and are severe enough to impact sectors beyond the agricultural community, such as community drinking supply and other social and economic enterprises.

Although the agricultural community is usually the most heavily impacted by drought, times of extended drought can have direct and indirect impacts into economic, social, or environmental sectors as well. When this occurs and drought begins to effect the general population, reservoirs, wells, and aquifers are often low and conservation measures are required. Some forms of water conservation are water-use restrictions, implementation of secondary water or water recycling and xeriscaping. Other conservation options include emergency water agreements with neighboring water districts or transporting water from elsewhere.

Drought Hazard Profile

Potential Impact		High	**Probability**		High
		Medium		X	Medium
	X	Low			Low
		Minimal			Unlikely
Location	Countywide				
Seasonal Conditions	Impacts typically noticeable in summer, conditions can be year round.				
Conditions	Meteorological Drought: Lack of precipitation Agricultural Drought: Lack of water for crop production Hydrologic Drought: Lack of water in the entire water supply Socioeconomic Drought: Lack of water sufficient to support population				
Duration	Months, Years				
Secondary Hazards	Wildfire, dust storms, air quality.				
Analysis Used	National Weather Service, Utah Climate Center, Utah Division of Water Resources, Newspapers, Local input.				

Range of Magnitude

The United States Drought Monitor has a map that identifies areas of drought and labels them by intensity. D1 is the least intense level and D4 the most intense. Drought is defined as a moisture deficit bad enough to have social, environmental or economic effects. D0 areas are not in a drought, but are experiencing abnormally dry conditions that could turn into drought or are recovering from drought but are not yet back to normal.

			Ranges				
Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx

The Palmer Drought Severity Index (PDSI) developed by Wayne Palmer in the 1965, measures drought severity using temperature, precipitation and soil moisture (Utah Division of Water Resources 2007a). The PDSI has become the "semi-official" drought index as it is standardized across various climates. The index uses zero as normal and assigns a number between 6 and -6, with dry periods having negative numbers and wet periods expressed using positive numbers (NDMC 2006)

Table: Palmer Drought Severity Index (NDMC 2006)

4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

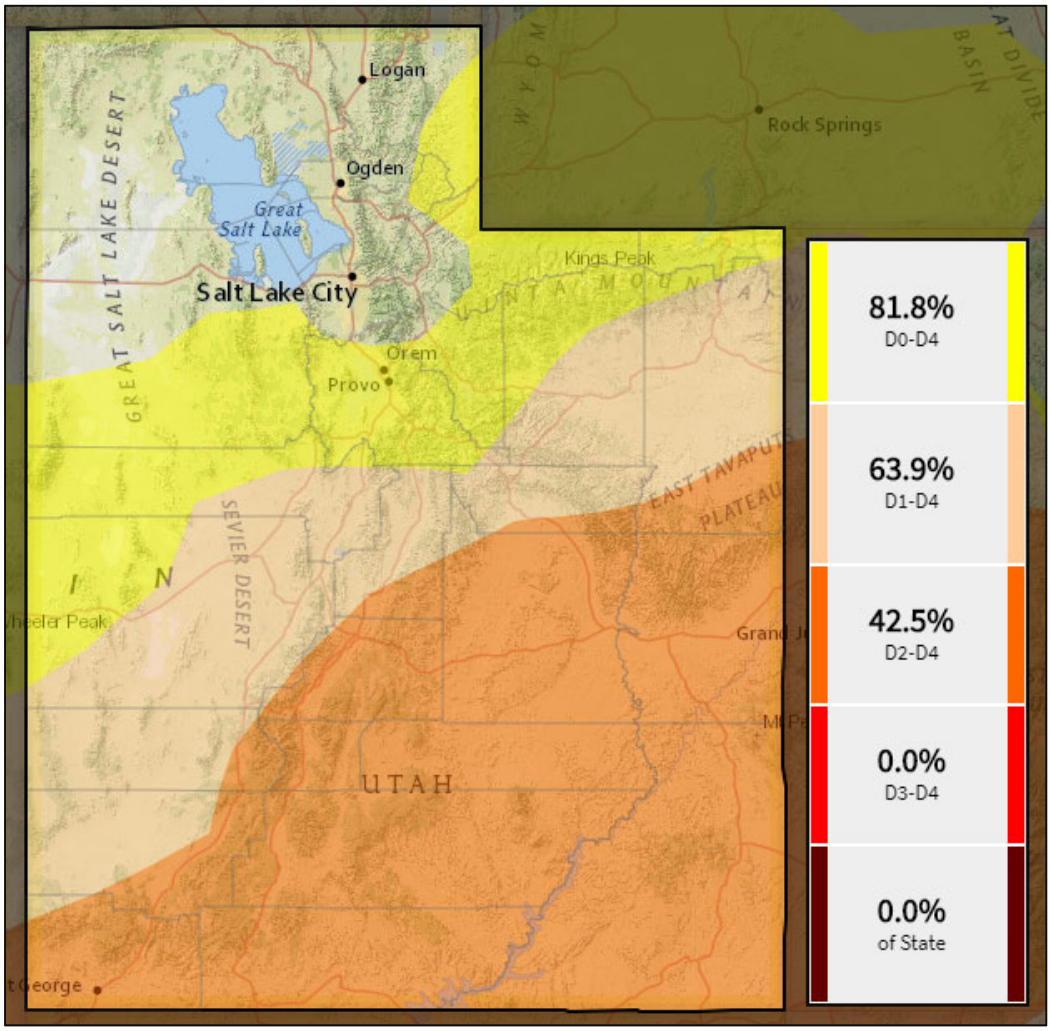
Location

Utah is the second driest state in the nation. Drought dramatically affects this area because of the lack of water for agriculture and industry, which limits economic activity, irrigation and culinary uses. The severity of the drought results in depletion of agriculture lands and deterioration of soils. In the Wasatch Front Region, the risk of drought is high.

Salt Lake County falls within two climatic regions: the North Central Region and the Northern Mountains Region. Each of these regions has differing characteristics, but often experience similar drought periods. The two regions experience mild drought (PDSI ≥ -1) every 2.6-3.3 years, moderate drought (PDSI ≥ -2) every 3.7-5.2 years, and severe drought (PDSI ≥ -3) every 6.9-8.5 years. The Northern Mountain Region typically experiences droughts less frequently (Utah Division of Water Resources 2007a). Conversely, the Northern Mountain Region averages more severe drought conditions at its peak than the Western Region. It may be Northern Mountains Region simply has more water to lose as the Wasatch and Uinta Mountains receive much more precipitation on average.

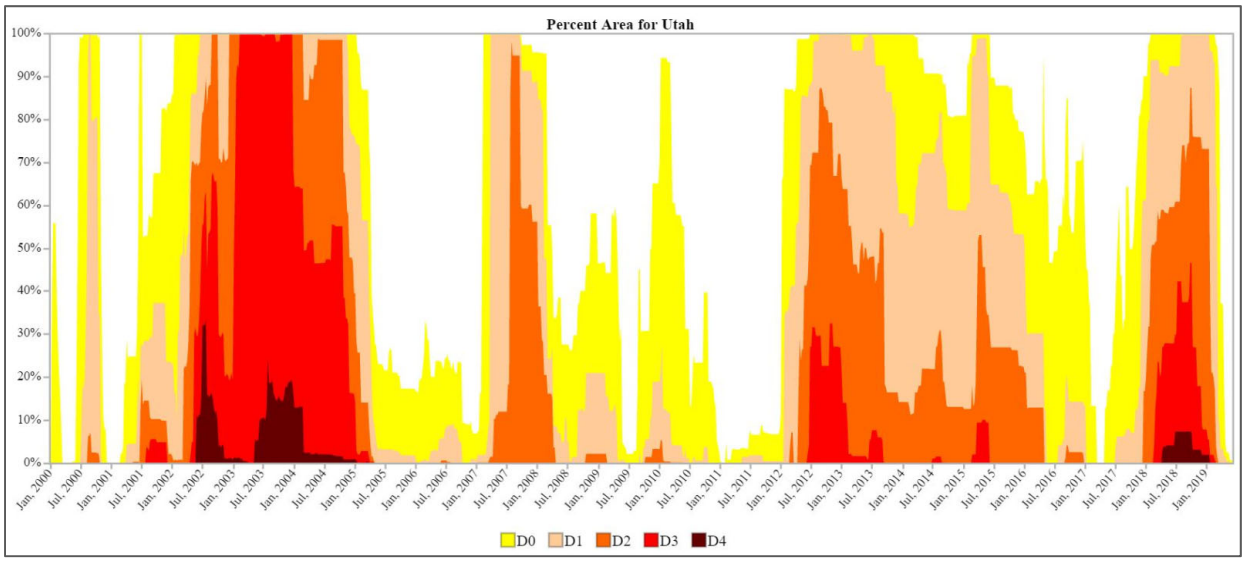
The map below is a snapshot of the drought extent as of November, 2019.

Map: Utah Drought Extent, November, 2019



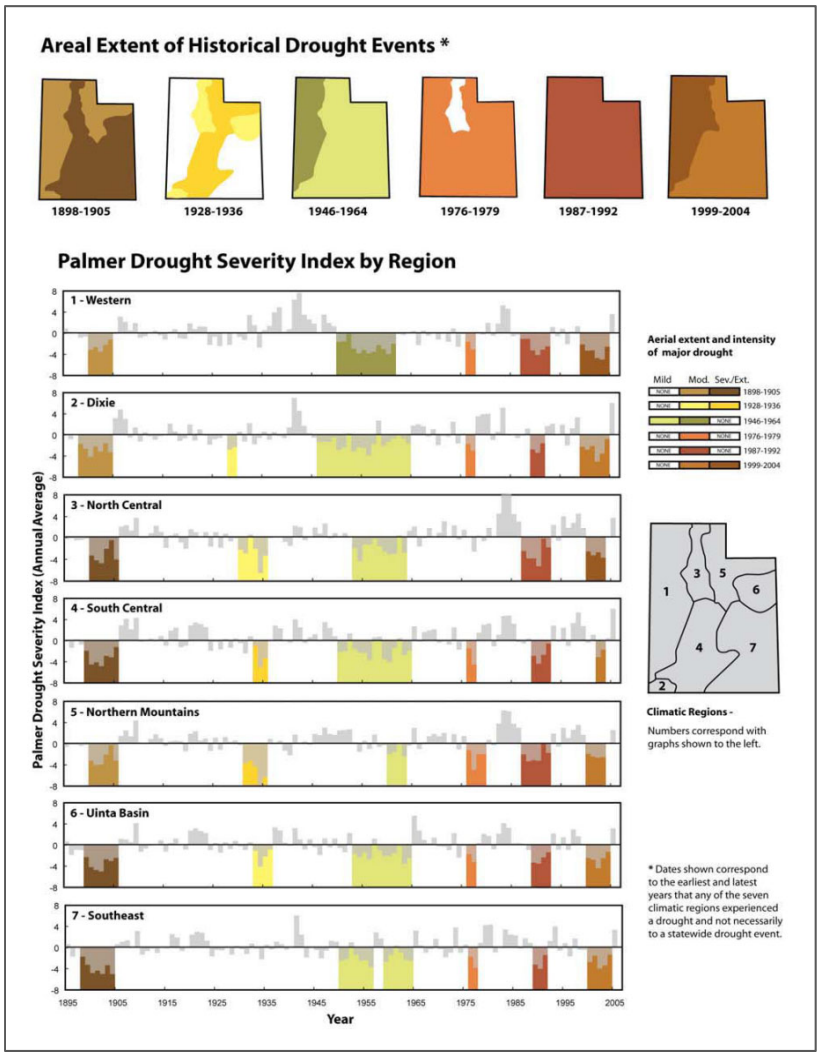
Source: https://www.drought.gov/drought/states/utah

The figures below show a recent snapshot in time for drought extent in the State of Utah.



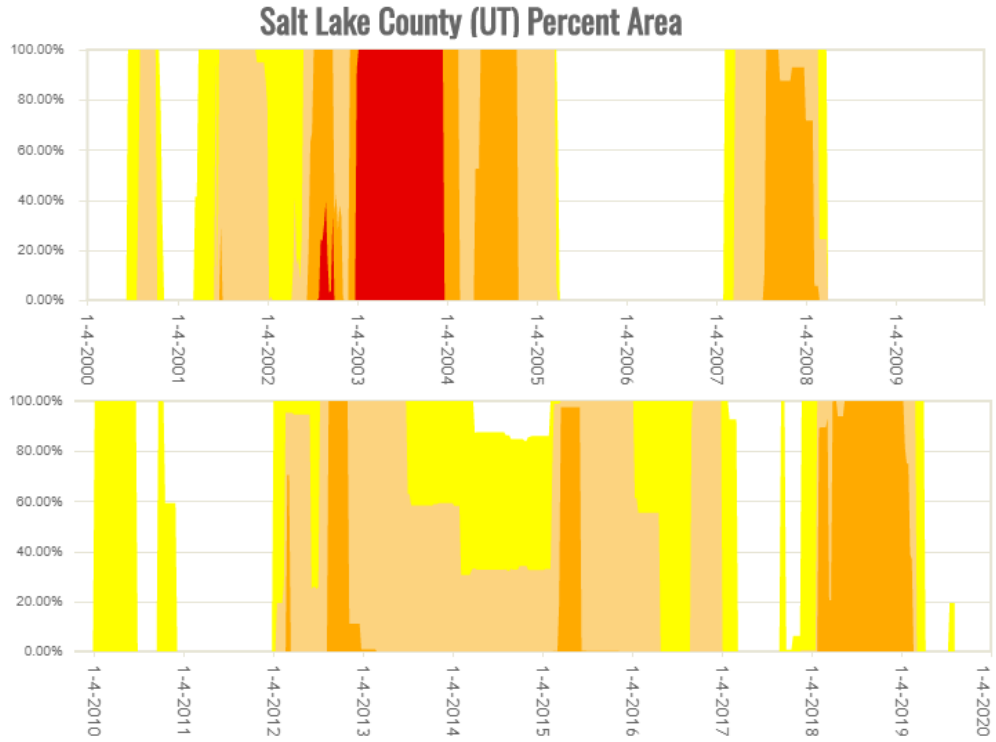
Source: https://www.drought.gov/drought/states/utah

Figure: Utah Historical Droughts

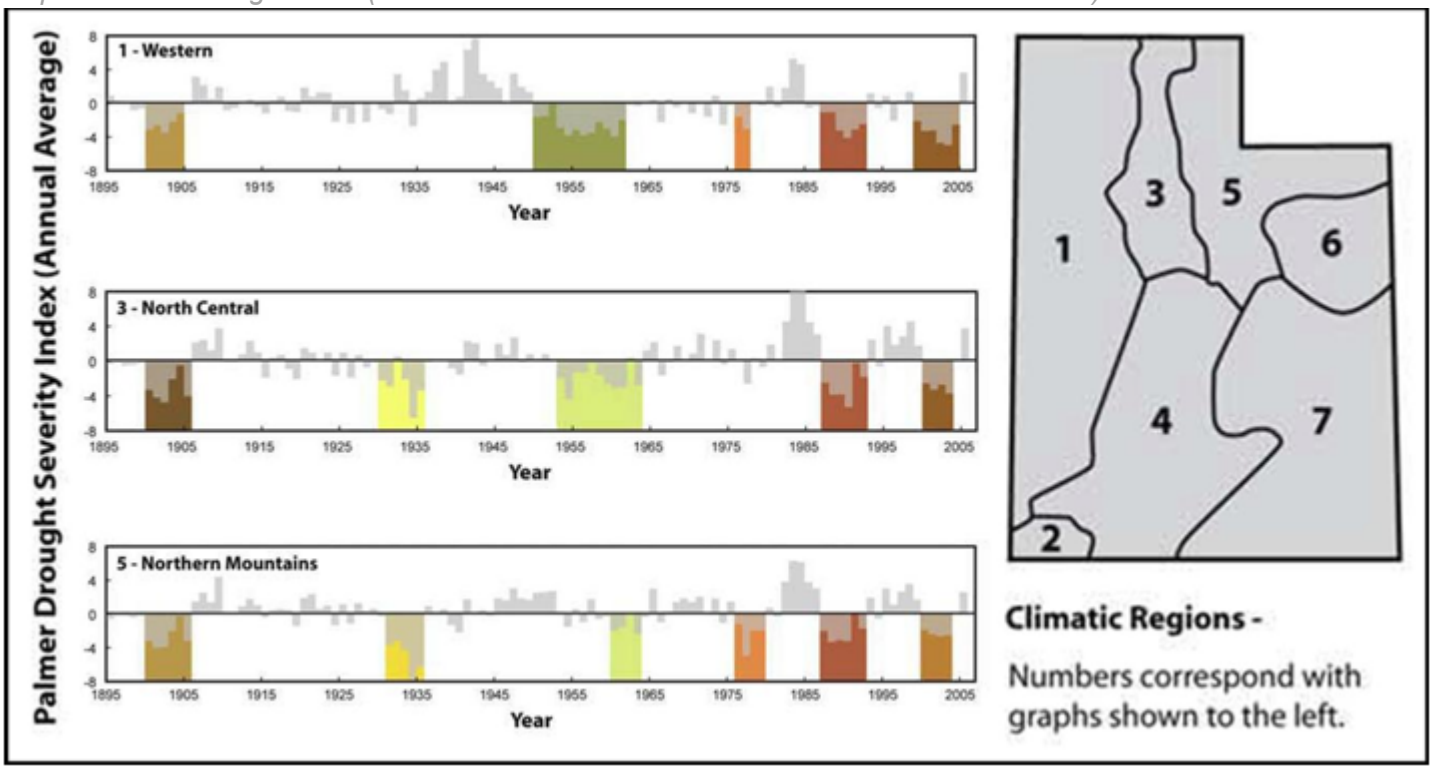


Historical Events and Probability of Future Occurrence

The following image from the United States Drought Monitor shows recent drought frequency and severity, as well as the total percentage of the land area in Salt Lake County impacted.



Map: Annual Average PDSI (Modified from Utah Division of Water Resources 2007a)



The most severe drought period in recorded history for the North Central and Northern Mountains Regions occurred in 1934 at the height of the Great Depression and during the same drought period (1930 to 1936) that caused the "Dust Bowl" on the Great Plains. The longest drought period varies from 11 years for the North Central region (1953-1963), and 6 years for the Northern Mountains (twice; 1900-1905 and 1987-1992) (Utah Division of Water Resources 2007a). In 2018 a severe drought caused virtually all of the state to be in a moderate drought with many areas in extreme drought. This drought peaked in September 2018 and reached -6.16 on the Palmer Drought Severity Index scale (NCDC, 2019).

There is no doubt that droughts or water shortages will continue to be a factor in Salt Lake County's future, particularly as public demands for water usage increase. The expectation of a population doubling in the next 20 years creates an absolute certainty for increasing water shortages. Future zoning ordinances, use of secondary water for irrigation, and mandatory no watering days are already an every year occurrence.

Figure: Annual water usages by category for Salt Lake County (based on USGS data).

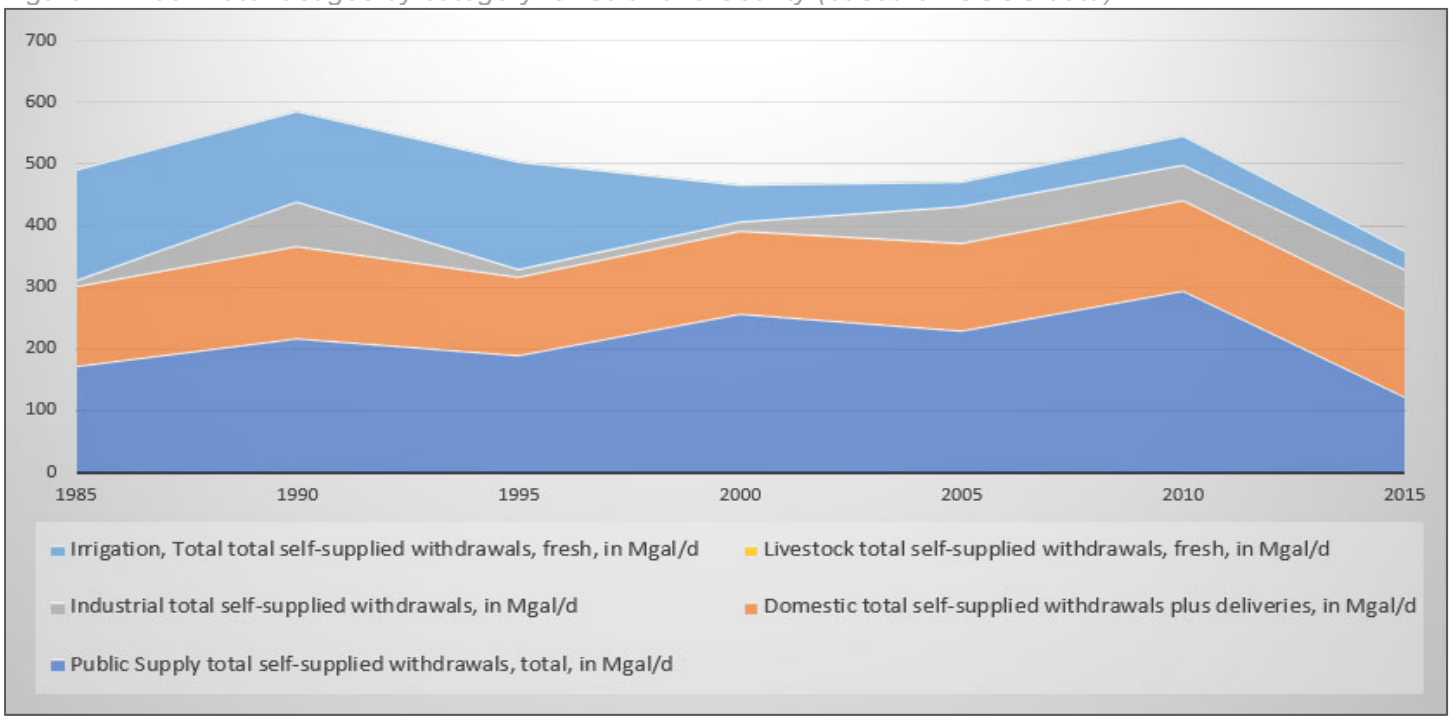


Table: Annual water usages by category for Salt Lake County (based on USGS data).

Year	Public Supply total self-supplied withdrawals, total, in Mgal/d	Domestic total self-supplied withdrawals plus deliveries, in Mgal/d	Industrial total self-supplied withdrawals, in Mgal/d	Livestock total self-supplied withdrawals, fresh, in Mgal/d	Irrigation, Total self-supplied withdrawals, fresh, in Mgal/d
1985	172.9	129.27	10.68	0.21	180.28
1990	218.54	149	72.19	0.15	146.41
1995	189.95	127.73	11.7	0.43	173.7
2000	258.39	134.125*	15.13	0.19	59.78
2005	231.12	140.52	61.77	0.15	37.83
2010	295.7	146.83	56.08	0.09	47.58
2015	123.69	141.33	65.82	0.09	28.77

**Data was not available for this entry, so the average between the 1995 and 2005 amounts was inserted as the best approximate value*

Source: https://waterdata.usgs.gov/ut/nwis/water_use/

Salt Lake Valley is a largely urban area with a growing population. Most of the development in Salt Lake Valley uses municipal water sources, principally wells completed in the basin-fill aquifer system. The population growth and concomitant increase in municipal ground-water pumping could significantly decrease the amount of ground water discharged from the principal aquifer system (where most wells are completed) to the shallow unconfined aquifer system.

The shallow unconfined aquifer overlies confining beds above the principal aquifer system in the central and northern parts of the valley, and provides water to springs and approximately 58,000 acres (23,500 hm2) of wetlands in ground-water discharge areas. Decreased recharge to the shallow unconfined aquifer from the principal aquifer due to increased ground-water pumping could reduce water supply to these springs and wetlands. Also, water supply to the springs and wetlands is affected by climatic conditions and Great Salt Lake level. Drought conditions during 1999–2004 reduced the amount of recharge to ground-water aquifers across the state, including the Great Salt Lake area, negatively impacting the Salt Lake Valley wetlands. In 2005 and 2008, the elevation of Great Salt Lake declined to near its historic low stand reached in 1963, allowing some parts of the Salt Lake Valley wetlands to de-water.

To evaluate the potential impacts of drought and increased development on the Salt Lake Valley wetlands, researchers used existing data to estimate a water budget and develop regional, three-dimensional, steady-state and transient MODFLOW models to evaluate water-budget changes for the wetland areas; these efforts focused on wetlands around the margins of Great Salt Lake, although the results may apply to all of the wetlands in Salt Lake Valley. The modeling suggests that subsurface inflow into the wetland areas would be most affected by decreased subsurface inflow due to long-term (20-year) drought conditions, which would also cause changes in Great Salt Lake levels, but subsurface inflow would also decrease due to increased municipal and industrial well withdrawals over the same time period. Therefore, the worst-case scenario for the wetlands would be a combination of both conditions. If the U.S. Environmental Protection Agency’s goal on no net loss of wetlands is to be met, the Salt Lake Valley wetland areas should be managed to maintain their current budget of water (estimated at about 52,420 acre-feet per year [65 hm3/yr] of recharge in 2010) (Yidana, Lowe, and Emerson).

Secondary Hazards

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. Crops can obviously be vulnerable, as well. Loss of forests and trees increases erosion, causing severe damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers. Droughts can also create the conditions for dust storms which decrease the air quality humans and animals breathe. Low stream flows can create high temperatures, oxygen depletion, disease, and lack of spawning areas for fish resources. Often, drought is accompanied by extreme heat. When temperatures reach 90ºF and above, people are vulnerable to sunstroke, heat cramps, and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries.

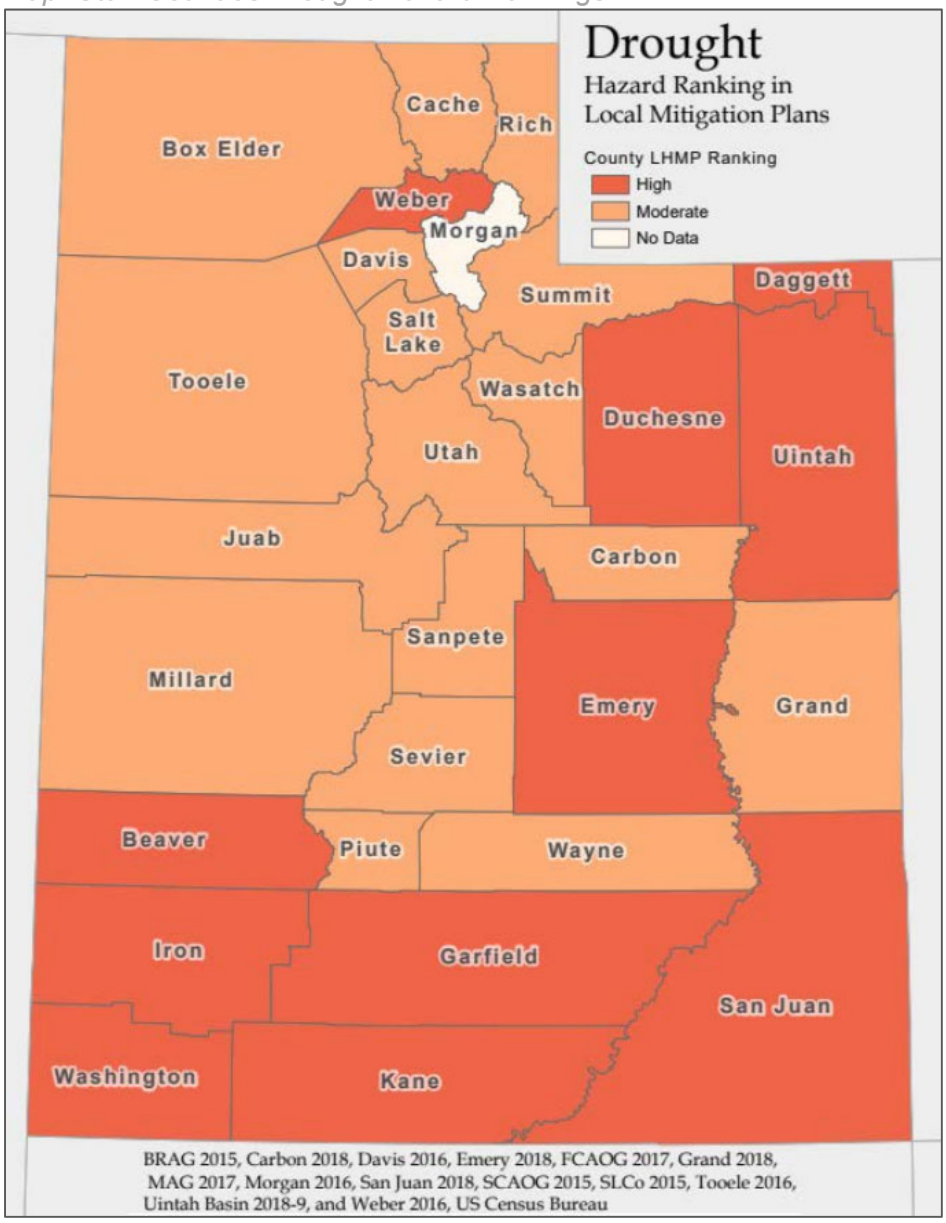
Vulnerability Assessment

Due to the unpredictability of drought, it is difficult to identify the areas most threatened and to provide loss estimate values. However, historical drought records demonstrate that agriculture is typically the economic sector most impacted by drought (UHMP). For example, the hardest hit sector during 2002 drought was agriculture, where 2,600 jobs and almost $40 million in income were lost. Livestock sales were estimated as down $100 million and hay sales down $50 million due to the drought. The 2003 Economic Report to the Governor suggests the drought also contributed to job change. “During 2002, job change was -1.0%. Without the drought, job change might have been -0.6%, 0.4% higher than what actually occurred." Drought related fires are also believed to contribute to a decline in tourism sales, which were down $50 million. The combined effects of the drought in these three sectors resulted in a loss of over 6,100 jobs and $120 million in lost income during

2002. Construction, manufacturing, and wholesale trade were also impacted by drought. The Utah Division of Water Resources mentions in their drought report that large and significant data gaps hinder the quantification of drought impacts in all sectors of the economy and society. They suggest that tax revenues and other potential economic indicators of drought impacts be monitored at all levels of government in order to improve evaluation methods and to better understand drought impacts (UHMP).

The 2019 Utah State Hazard Mitigation Plan conducted drought vulnerability rankings for each county in the state, based on local hazard mitigation plans (LHMPs). Each LHMP was reviewed to gather data on how each jurisdiction viewed their vulnerability to drought. The frequency of drought and severity of drought as reported in the LHMPs were gathered to determine a hazard ranking for drought. The hazard ranking is calculated from a combination of severity (categorized from 0-4) and probability/frequency (categorized from 0-4). The numbers were then combined to allow for a ranking from 0-8 to be scored. The map below was also created that shows the hazard ranking of drought for each county as reported in the LHMPs.

Map: Utah Counties Drought Hazard Rankings



Source: 2019 Utah State Hazard Mitigation Plan

The table below lists the agriculture statistics for Salt Lake County from the 2017 Agriculture Census, which is the most current agriculture census data available to date.

Table: Salt Lake County Agriculture Statistics

Farms	Total Acres	Market Value of Products Sold	Estimated Market Value of Land and Buildings (Avg. per farm)
592	61,965	19,901,000	1,013,467

Source: U.S. Department of Agriculture 2017 Census

The 2019 Utah State Hazard Mitigation Plan also lists 1,463 state-owned facilities within Salt Lake County that are vulnerable to the effects of drought, with a total insured value of $7,274,528,270.

Earthquake

The Utah Geologic Survey defines an earthquake as the “abrupt, rapid shaking of the Earth caused by sudden breakage of rocks that can no longer withstand the stresses that build up deep beneath the earth’s surface”. The rocks break along zones of weakness, called faults. Seismic waves are then transmitted outward and also produce ground shaking or vibrations in the earth (Utah Natural Hazards Handbook. 2008).

The Richter scale measures the magnitude of earthquakes on a seismograph. Generally an earthquake needs to be at least a magnitude 2.0 to be felt by humans, and about magnitude 5.5 before significant damage occurs. The amount of damage that occurs from an earthquake depends on soil type, rock type, ground-water depth and topography. Other factors include the type of construction in an area and the population density.

Ground Shaking:

Ground shaking is caused by the passage of seismic waves generated by an earthquake. Shaking can vary in intensity but is the greatest secondary hazard because it affects large areas and stimulates many of the other hazards associated with earthquakes. Moderate to large earthquake events generally produce trembling for about 10 to 30 seconds. Aftershocks can occur erratically for weeks or even months after the main earthquake event.

The waves move the earth’s surface laterally and vertically and vary in frequency and amplitude. High frequency, small amplitude waves cause more damage to short, stiff buildings. Low frequency, large amplitude waves have a greater effect on high-rise buildings. The intensity depends on geologic features such as bedrock and rock type, topography, and the location and magnitude of the earthquake. Other significant factors include ground water depth, basin shape, thickness of sediment, and the degree of sediment consolidation (UNHH 2008).

Surface Fault Rupture and Tectonic Subsidence:

Surface fault rupture is the result from relative movement between blocks in the Earth’s crust. In Utah, the result is the formation of scarps or steep breaks in the slope. The 1934 Hansel Valley earthquake resulted in a surface displacement of approximately 1.6 feet. Earthquakes having a magnitude of 6.5 or greater could result in surface faulting 16 to 20 feet high and 12 to 44 mile long break segments. Surface displacement generally occurs over a zone of hundreds of feet wide called the zone of deformation and can cause severe damage to building foundations or lifelines (roads, pipelines, communication lines) that cross the fault. Tectonic subsidence, or down dropping and tilting of the valley floor, generally depends on the amount of surface fault rupture, and can cause

flooding by tilting lakebeds or dropping ground surface below the water table. The greatest amount of subsidence will be in the fault zone and will gradually diminish out into the valley (UDCEM 1991).

Earthquake Hazard Profile

Potential Impact	X	High	**Probability**		High
		Medium		X	Medium
		Low			Low
		Minimal			Unlikely
Location	Ground shaking will be felt throughout the entire county. Surface fault rupture can be found in areas of known historic fault movements. Liquefaction can be expected in areas of high to moderate liquefaction potential.				
Seasonal Pattern	None.				
Conditions	Liquefaction potential within areas with shallow ground water. Soil that is comprised of old lakebed sediments. Historic movement along faults. Intermountain Seismic Zone, Wasatch Fault.				
Duration	Actual ground shaking will be under one minute, aftershocks can occur for weeks or even months.				
Secondary Hazards	Fire, landslide, rock falls, avalanche, flooding, hazardous material release, transportation and infrastructure disruptions, essential service disruptions (communications, utilities).				
Analysis Used	Review of hazard analysis plans and other information provided by the University of Utah Seismograph Station, UGS, USGS, FEMA, UDEM, AGRC.				

Range of Magnitude

Magnitude

Currently the most commonly used magnitude scale is the moment magnitude (Mw) scale, with the following classifications of magnitude:

- Great—Mw $\geq$ 8
- Major—Mw = 7.0 – 7.9
- Strong—Mw = 6.0 – 6.9
- Moderate—Mw = 5.0 – 5.9
- Light—Mw = 4.0 – 4.9
- Minor—Mw = 3.0 – 3.9
- Micro—Mw < 3

Estimates of moment magnitude roughly match the local magnitude scale (ML) commonly called the Richter scale. One advantage of the moment magnitude scale is that, unlike other magnitude scales, it does not saturate at the upper end. That is, there is no value beyond which all large earthquakes have about the same magnitude. For this reason, moment magnitude is now the most often used estimate of large earthquake magnitudes.

The ISB contains the Wasatch Fault—one of the longest and most active normal faults in the world—with a potential for earthquake with a magnitude up to 7.5. The largest earthquakes in Utah occur in the ISB, where at least 35 earthquakes of magnitude 5.0 or greater have occurred since 1850 (UNHH 2008).

The range of earthquake magnitude experienced in Salt Lake County since 1962, according to the USGS, is .01 to 5.7.

Intensity

Currently the most commonly used intensity scale is the modified Mercalli intensity scale, with ratings defined as follows (USGS, 1989):

- I. Not felt except by a very few under especially favorable conditions.
- II. Felt only by a few persons at rest, especially on upper floors of buildings.
- III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it is an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
- IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like a heavy truck striking building. Standing cars rocked noticeably.
- V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
- VI. Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
- VII. Damage negligible in buildings of good design and construction; slight in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.
- VIII. Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
- XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
- XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Location

Utah's earthquake hazard is greatest within the Intermountain Seismic Belt (ISB), which extends 800 miles from Montana to Nevada and Arizona, and trends from North to South through the center of Utah (The Wasatch Fault, UGS PIS 40).

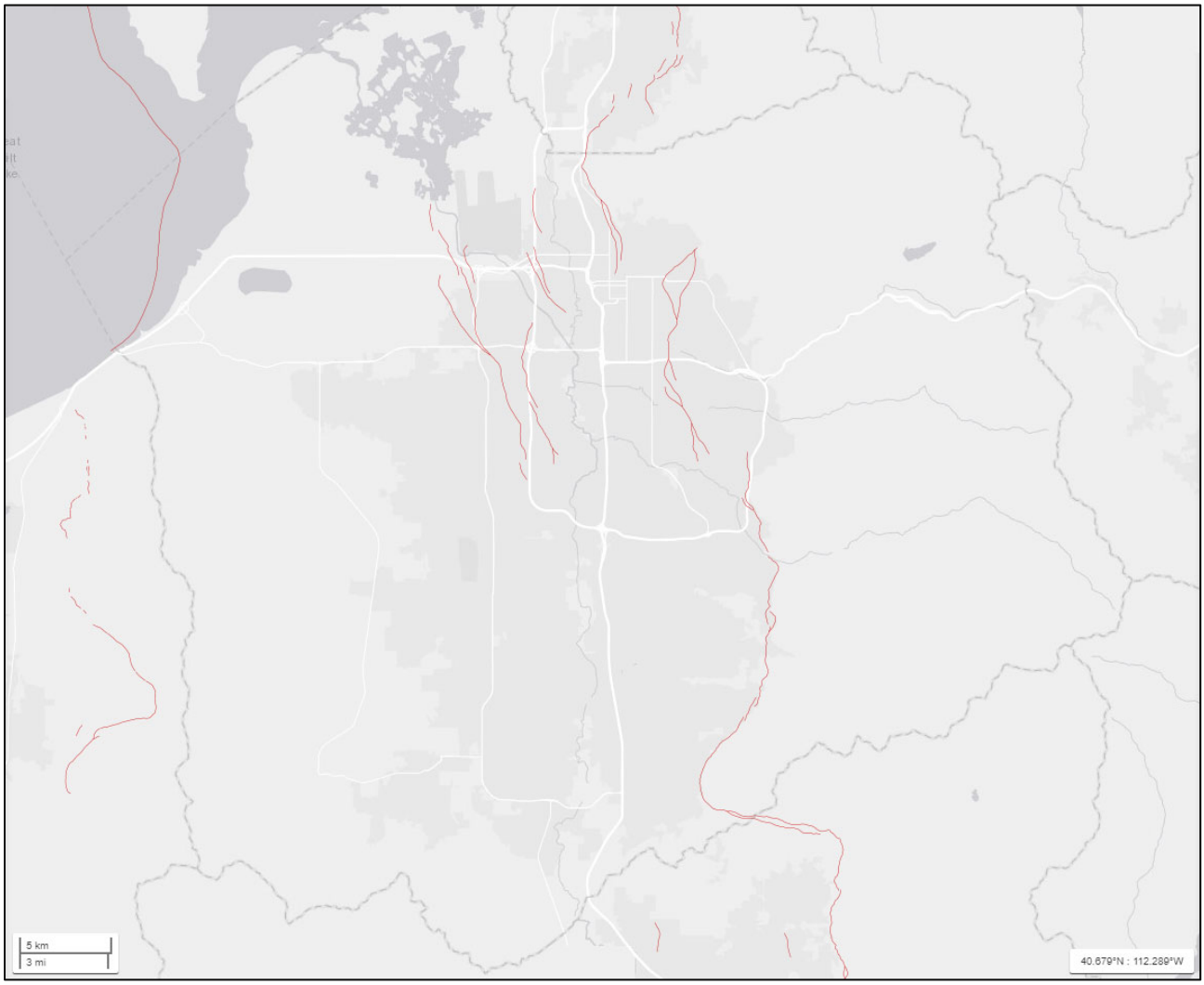
The Wasatch Fault traces along the base of the Wasatch Mountain Range. It is made up of 10 segments that act independently, meaning that a part of the fault ruptures separately as a unit during an earthquake. The Salt Lake City Segment traverses Salt Lake County from North to South, roughly along the Eastern foothills of the Wasatch Mountains. Within the Salt Lake City Segment of the Wasatch Fault are three smaller segments from North to South known as the Warm Springs Fault, the Virginia Street Fault and the East Bench Fault.

Other faults within Salt Lake County include the West Valley Fault Zone and the East Great Salt Lake Fault Zone. Each of these fault zones has much longer return interval (2,500 years or more) and is not expected to produce a major quake in the near future.

Table: Quaternary Faults, Salt Lake County (UGS 2002, UGS 2006)

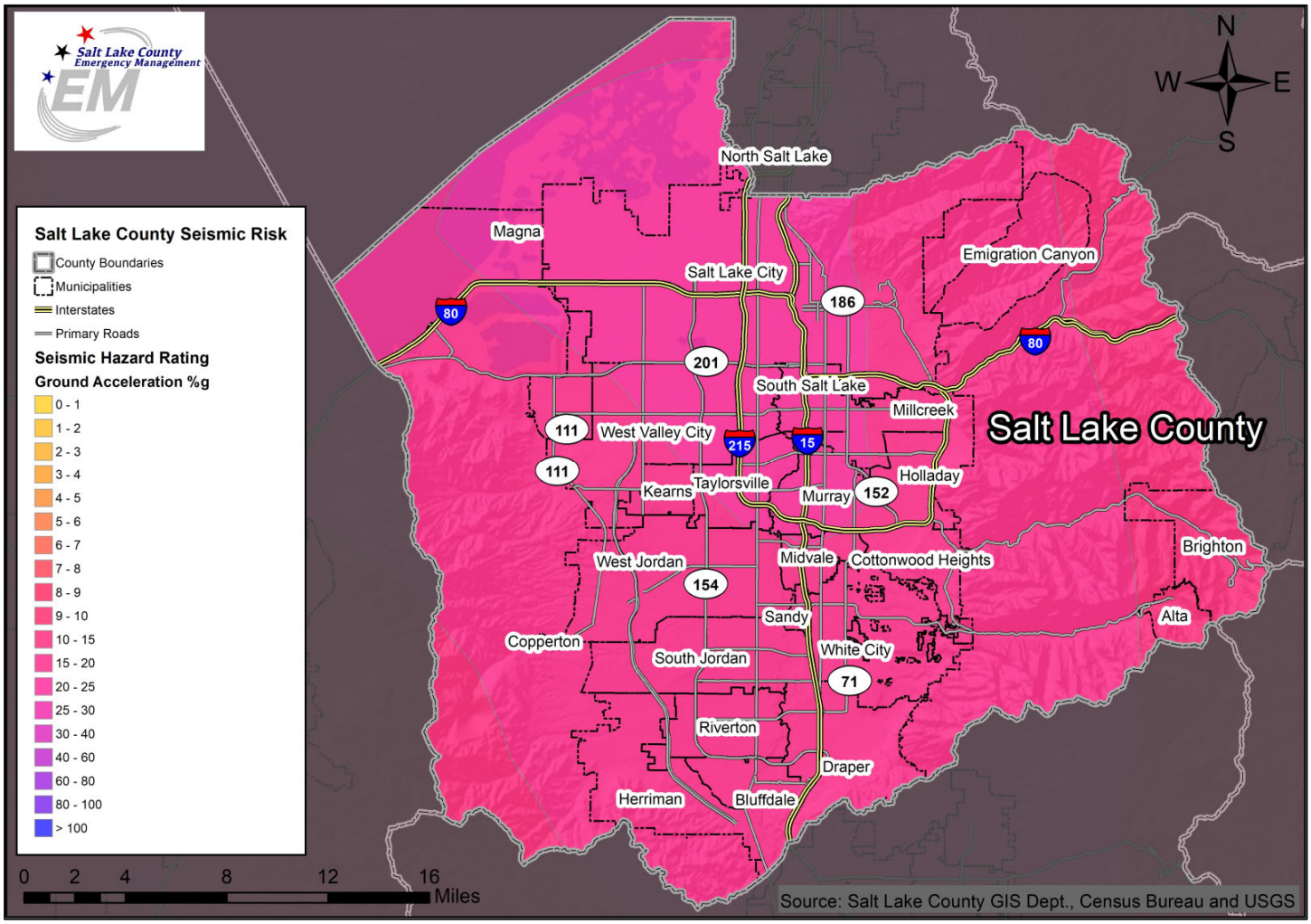
Name	Fault Type	Length (km)	Time of Most Recent Deformation	Recurrence Interval
East Great Salt Lake fault zone, Antelope Island section	Normal	35	586 201/-241 cal yr B.P.	4,200 years
Wasatch fault zone, Salt Lake segment	Normal	43	1,300 ± 650 cal yr B.P.	1,300 years
West Valley fault zone, Granger segment	Normal	16	1,500 ± 200 cal yr B.P.	2,600-6,500 years
West Valley fault zone, Taylorsville segment	Normal	15	2,200 ± 200 cal yr B.P.	6,000-12,000 years
Cal yr B.P.=calendar years before present				

Map: Salt Lake County Fault Line

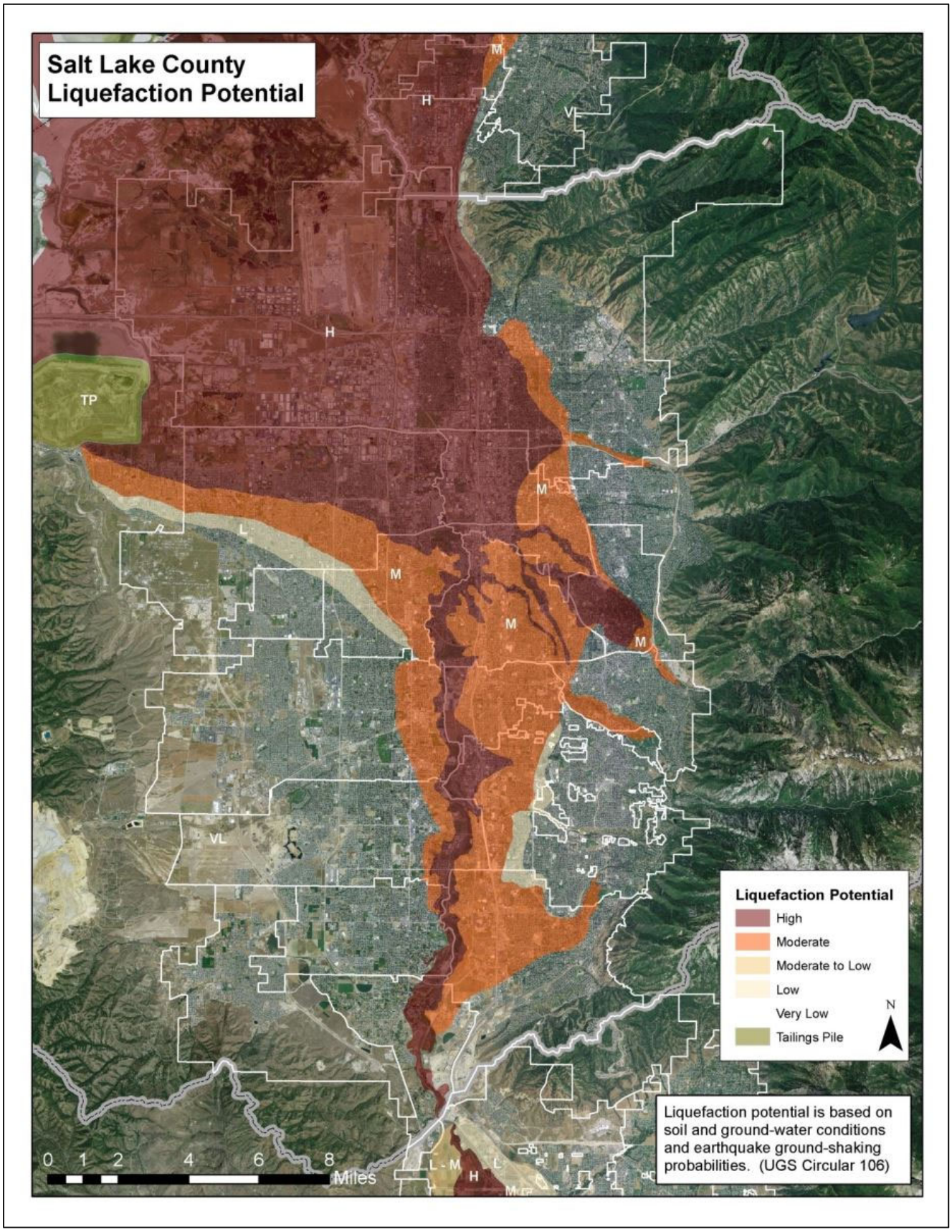


Source: USGS Earthquake Catalogue

Map: Salt Lake County Seismic Hazard Rating



Map: Salt Lake County Liquefaction Potential

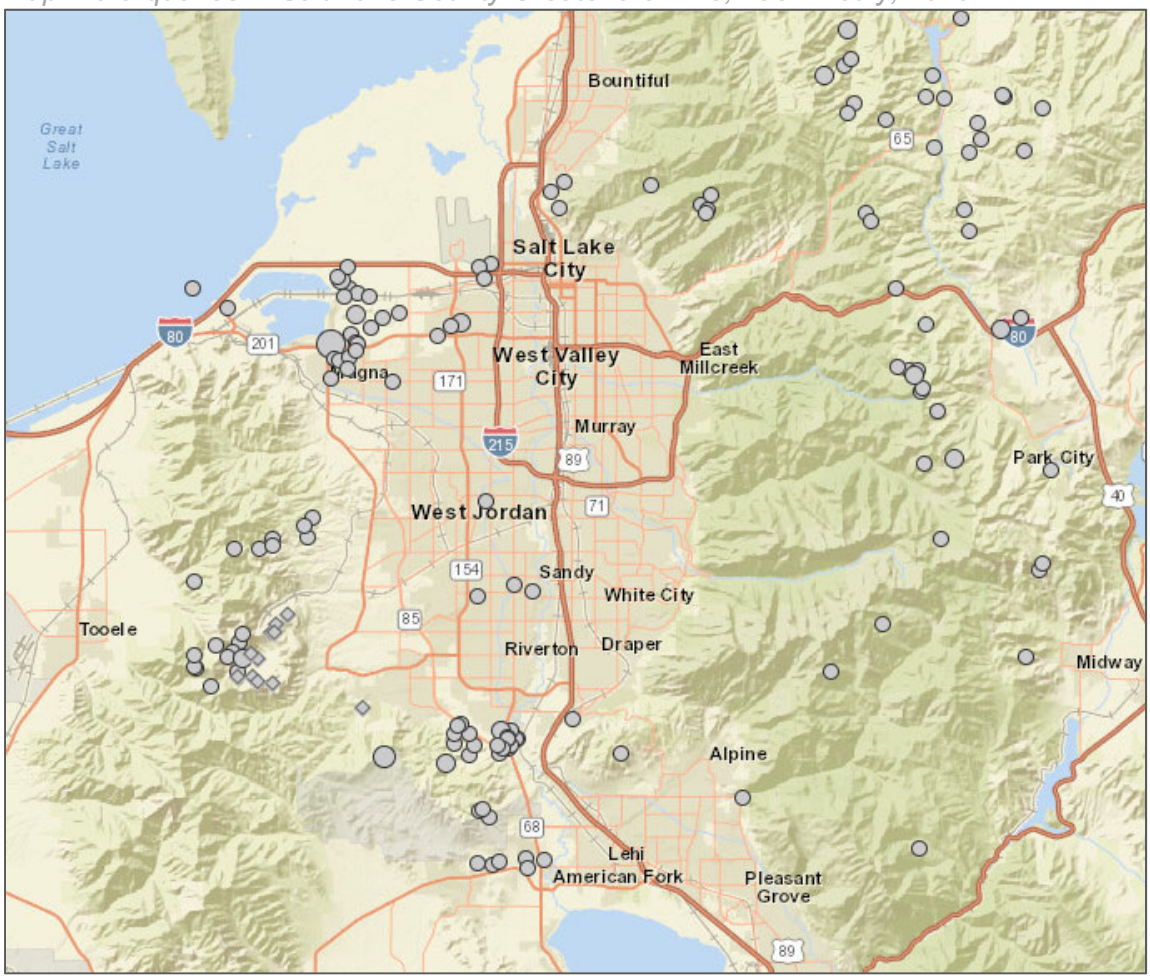


Historical Events and Probability of Future Occurrence

Although no surface-faulting earthquakes have occurred on the Wasatch fault in recent history, evidence of numerous prehistoric events exists in the geologic record (The Wasatch Fault, UGS PIS 40). The segments between Brigham City and Nephi have a composite recurrence interval (average time between earthquake events) for large surface-faulting earthquakes (magnitude 7.0-7.5) of 300-400 years. The average repeat time on an individual segment is 1,200-2,600 years. The most recent surface-faulting earthquakes occurred about 500 years ago in the Provo and Weber segments, and about 350 years ago in the Nephi segment (UNHH 2008).

According to USGS records, there have been 152 recorded earthquakes of 2.0 magnitude or greater that occurred in or immediately around Salt Lake County from 1962 through July 2019. These can be seen on the map below.

Map: Earthquakes in Salt Lake County Greater than 2.0, 1962 – July, 2019



Source: www.earthquake.usgs.gov

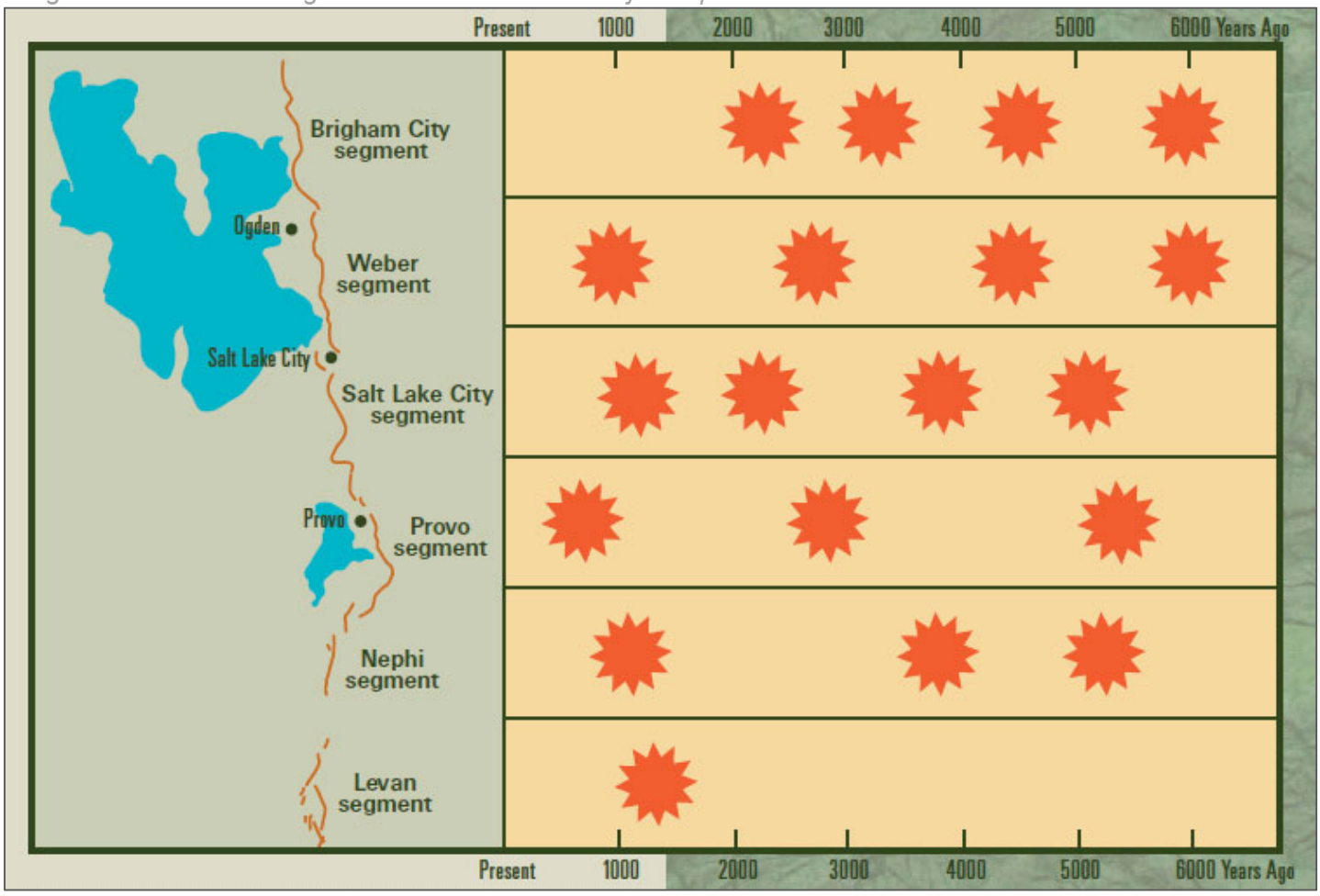
The two largest measured earthquakes to occur in Utah were the Richfield earthquake of 1901, with a magnitude of 6.5 and the Hansel Valley earthquake of 1934 with a magnitude of 6.6. The Hansel Valley earthquake produced MM intensities of VIII in Salt Lake City, with numerous reports of broken windows, toppled chimneys, and structures twisted on their foundations. A clock mechanism weighing more than 2 tons fell from the main tower of the Salt Lake City County Building and crashed through the building. The only death that occurred during the event was caused when the walls of an excavation collapsed on a public-works employee south of downtown Salt Lake City (Lund 2005).

Utah's most damaging earthquake was of a smaller magnitude (5.7), which occurred near Richmond in Cache Valley in 1962. This earthquake damaged over 75 percent of the houses in Richmond, as well as roads and various other structures. The total damage was about $1 million (in 1962), or with inflation accounted for, $7,768,300 today (UNHH 2008).

Significant earthquakes have occurred in Salt Lake County within the last 50 years. In 1962, a 5.2 Richter magnitude quake jolted the Magna area. In 1992, a magnitude 4.2 quake shook the southern portion of the County.

Utah experiences approximately 700 earthquakes each year, and approximately six of those have a magnitude 3.0 or greater. On average, a moderate, potentially damaging earthquake (magnitude 5.5 to 6.5) occurs within the State every 10 years. Large earthquakes (magnitude 6.5-7.5) occur on average every 50 years (UNHH 2008). The history of seismic activity in Utah and along the Wasatch Front suggests that it is not a matter of "if" but when an earthquake will occur. The probability of a large earthquake occurring along the central segments of the Wasatch Front is 13 percent in 50 years, or 25 percent in 100 years (The Wasatch Fault, UGS PIS 40).

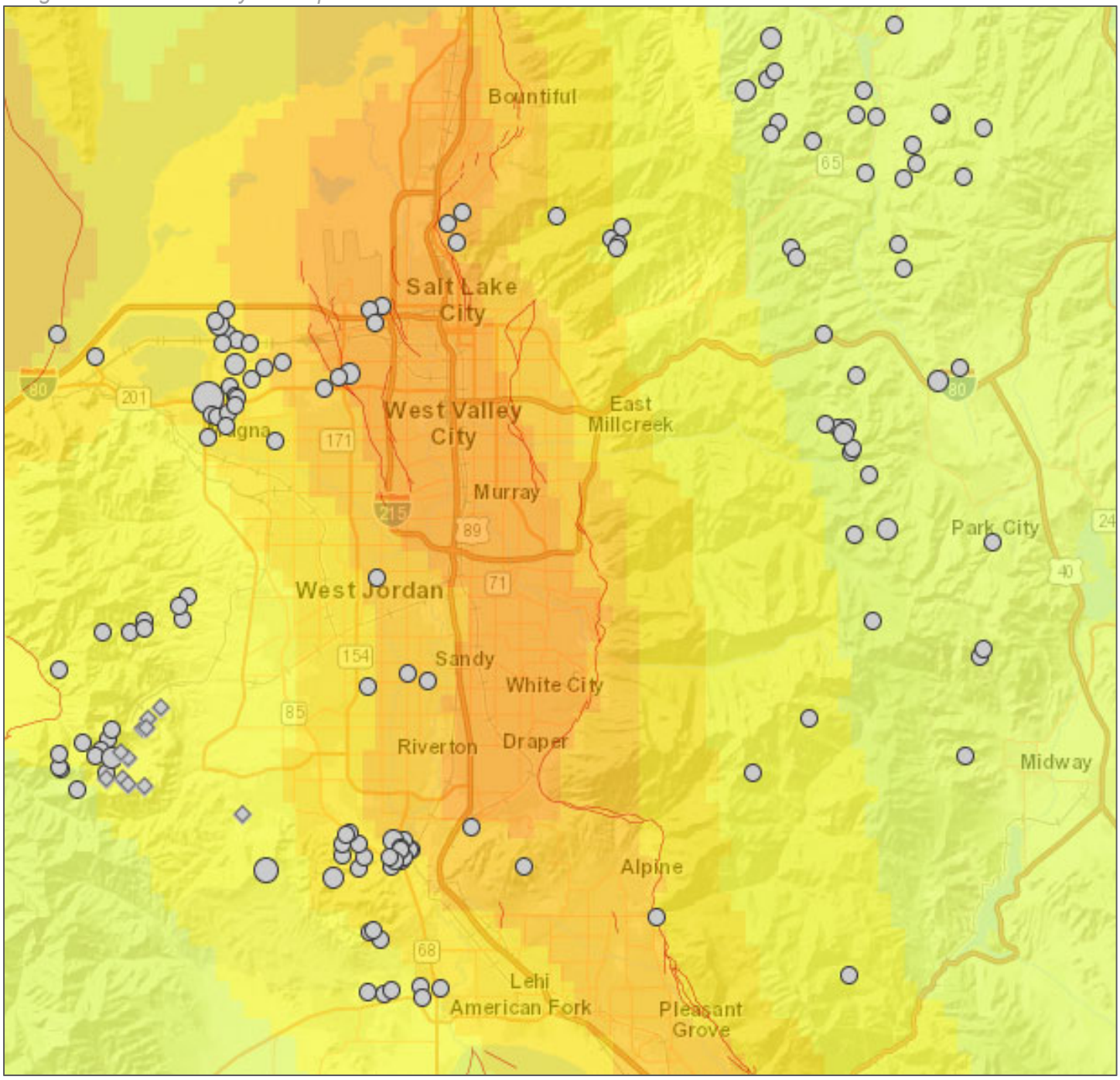
Image: Wasatch Fault Segments and Timeline of Major Ruptures



Source: "The Wasatch Fault", Utah Geological Survey Public Information Series 40

The image below shows the areas in and around Salt Lake County where the earthquake hazard is highest. Fault lines and previous earthquake locations are also shown.

Image: Salt Lake County Earthquake Faults and Hazard Areas



Source: www.earthquake.usgs.gov

Secondary Hazards

Secondary hazards of earthquake events can include liquefaction, slope failure, flooding, avalanches, sensitive clays, subsidence, and valley fever. The County is located atop the ancient Lake Bonneville Lakebed, which is made up of unconsolidated sandy soils. Much of the valley is also subject to shallow ground water.

Soil Liquefaction:

Liquefaction can occur when water-saturated, cohesionless, sandy soils are subjected to ground shaking. The soils “liquefy” or become like quicksand, lose bearing capacity and shear strength, and readily flow on the gentlest of slopes. Liquefaction is common in areas of shallow ground water and sandy or silty sediments. Liquefaction can produce lateral spreading and flows, where surface soil layers break up and move independently. Displacement of up to 3 feet may occur, accompanied by ground cracking and differential vertical displacement. Soil may move downhill, pulling apart roads, buildings, pipelines and buried utilities. Bearing capacity will lessen and can cause buildings to settle or tip, while lightweight buoyant structures such as empty storage tanks may “float” upward. Liquefaction can also cause foundation materials beneath earthfill dams to liquefy and fail, flooding by ground water in low-lying areas, back up of gravity fed systems, and/or cause sand boils. Sand boils are deposits of sandy sediment ejected to the surface during an earthquake along fissures. Liquefaction can occur during earthquakes of magnitude 5.0 or greater (UNHH 2008).

Slope Failure:

Ground shaking can cause rock falls and landslides in mountainous or canyon areas. Rock falls are the most common slope failure and can occur up to 50 miles away from a 6.0 magnitude earthquake. Landslides occur along steep slopes and benches in wet, unconsolidated materials. During a 6.0 magnitude earthquake, landslides typically occur within 25 miles of the source (UNHH 2008).

Flooding:

“Flooding can happen due to tectonic subsidence and tilting, dam failure, seiches (waves generated in standing bodies of water) in lakes and reservoirs, surface-water diversion or disruption, and increased ground-water discharge.” (UNHH 2008).

Avalanches:

Avalanches could be triggered because of the associated ground movement. The most vulnerable areas include those that have steep terrain, high precipitation, high earthquake potential, and high population density, and heavy backcountry use (UNHH 2008).

Sensitive Clays:

Sensitive clays are a soil type that loose strength and are subject to collapse when shaken. The resulting type of ground failure is similar to liquefaction (UNHH 2008).

Subsidence:

A settling or sinking of loose granular materials such as sand and gravel that do not contain clay. Western Utah is subject to this type of ground settlement (UNHH 2008).

Valley Fever:

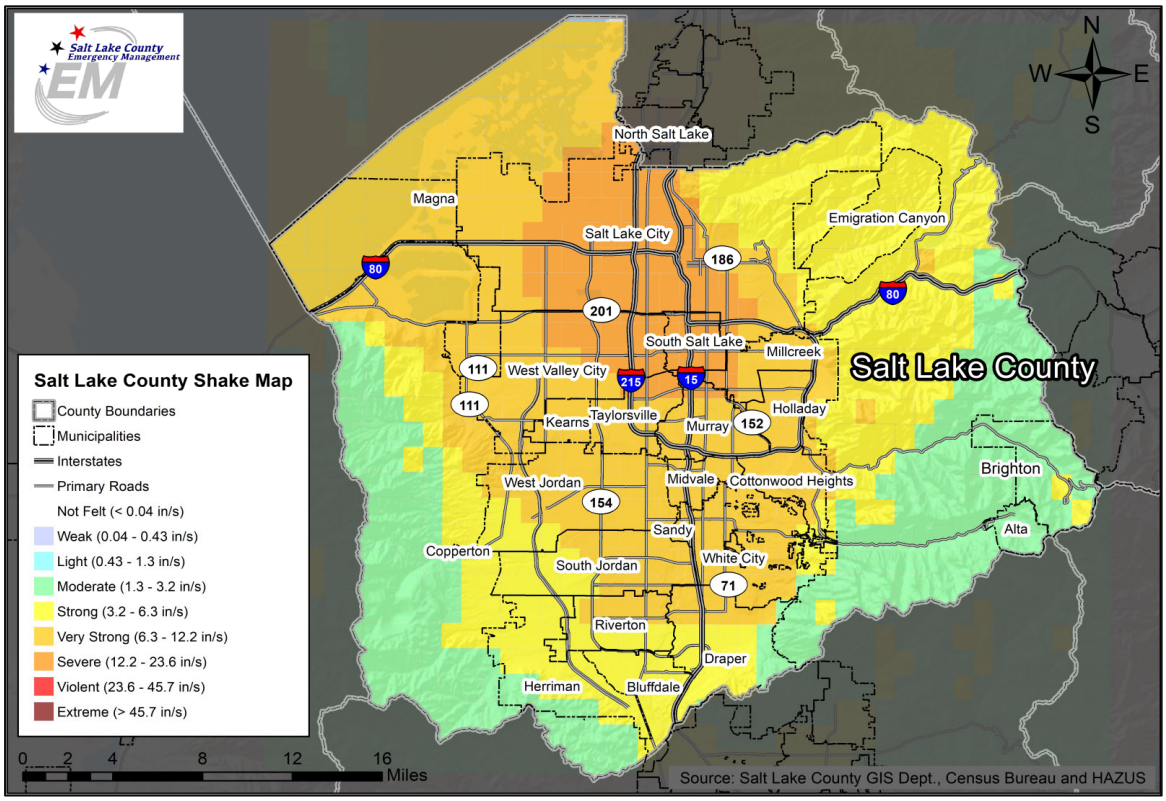
Valley Fever is an illness caused by the fungus Coccidioides, which grows in soils in areas, such as the project site, that have low rainfall, high summer temperatures, and moderate winter temperatures. It is found most often in the southwestern United States (especially Arizona, Utah, Texas and California). Valley Fever infection rates are the highest from June to November, when soils are typically very dry.

Valley Fever is not known to spread from person to person or between people and animals. Exposure typically occurs in connection with ground disturbing activities that release fungal spores which are then inhaled. Earthquakes disturb soil enabling spores to spread into the air. Most people who are exposed to the fungus do not develop symptoms, or have relatively mild flu-like symptoms. Others, however, can experience more severe symptoms, particularly individuals with a weakened immune system, who are of African-American or Filipino descent, or who are pregnant. The elderly may also be prone to more severe cases. Common symptoms include fever, cough, headache, rash, muscle aches, and joint pain. Symptoms of advanced coccidioidomycosis may include skin lesions, chronic pneumonia, meningitis, bone or joint infection. Symptoms may appear between one (1) and three (3) weeks after exposure. Some patients have reported having symptoms for six months or longer, especially if the infection is not diagnosed early.

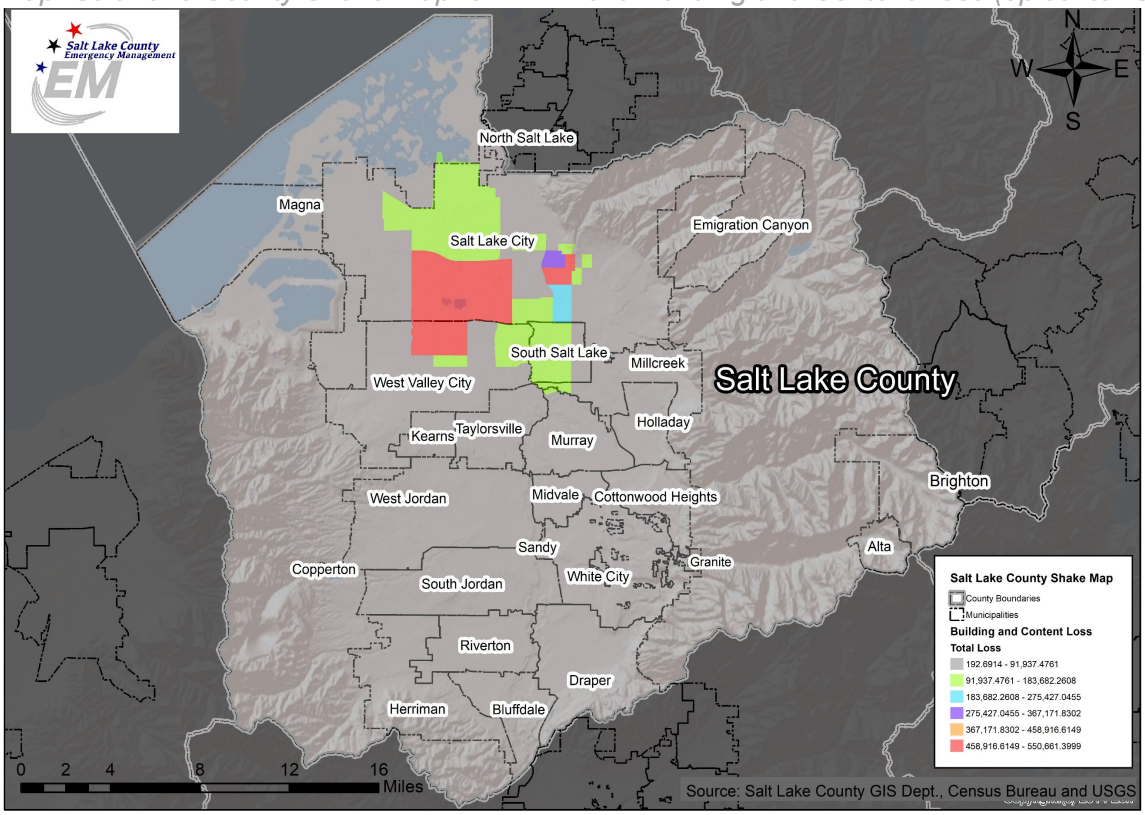
Vulnerability Assessment

Vulnerability of people and infrastructure to earthquake hazards in Salt Lake County was obtained from the modeling program HAZUS-MH using 2010 Census Data. The Hazus earthquake scenario entails a magnitude 7.0 earthquake occurring within Salt Lake County (epicenter Salt Lake City), which is the basis for the vulnerability and loss estimates provided in this section. An additional scenario based on the Great Shakeout was also developed, and the building and content loss map is provided below for comparison.

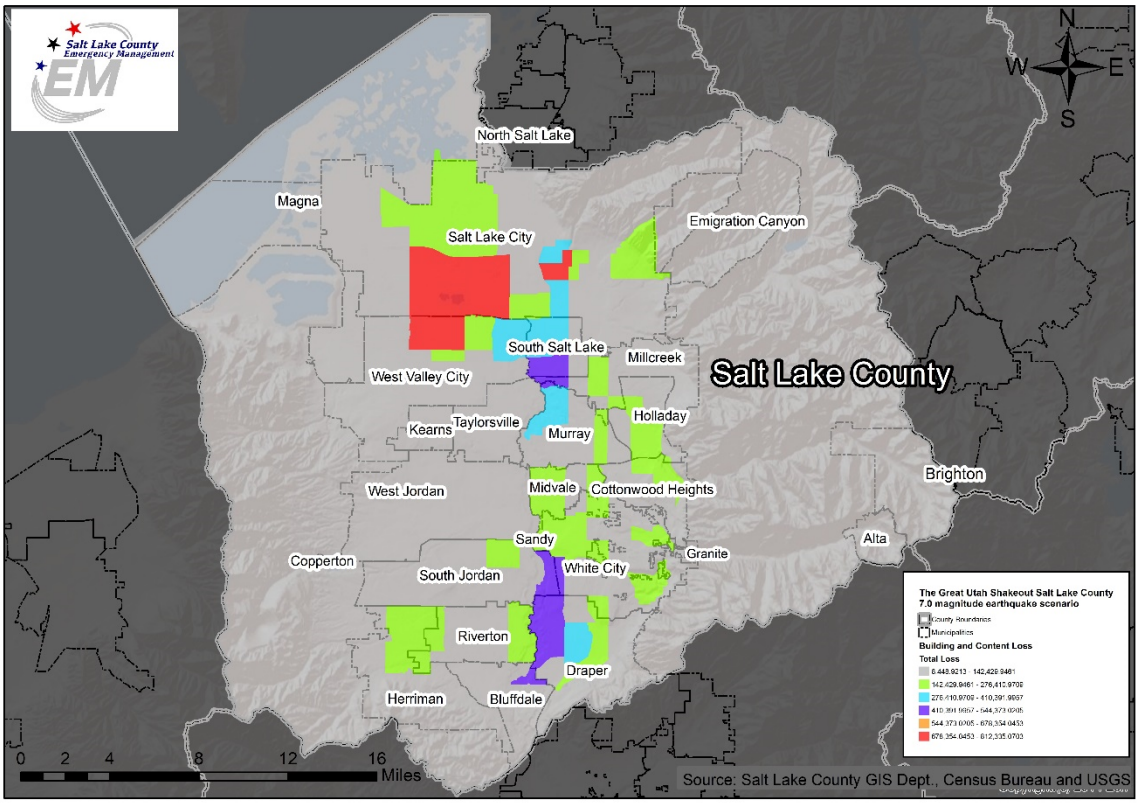
Map: Salt Lake County Shake Map for M7 Event (epicenter Salt Lake City)



Map: Salt Lake County Shake Map for M7 Event: Building and Content Loss (epicenter Salt Lake City)



Map: Salt Lake County Shake Map for M7 Event: Building and Content Loss (Great Shakeout)



Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can be life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The table below provides a summary of the casualties estimated for this earthquake. The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table: Salt Lake County Earthquake Casualty Estimates

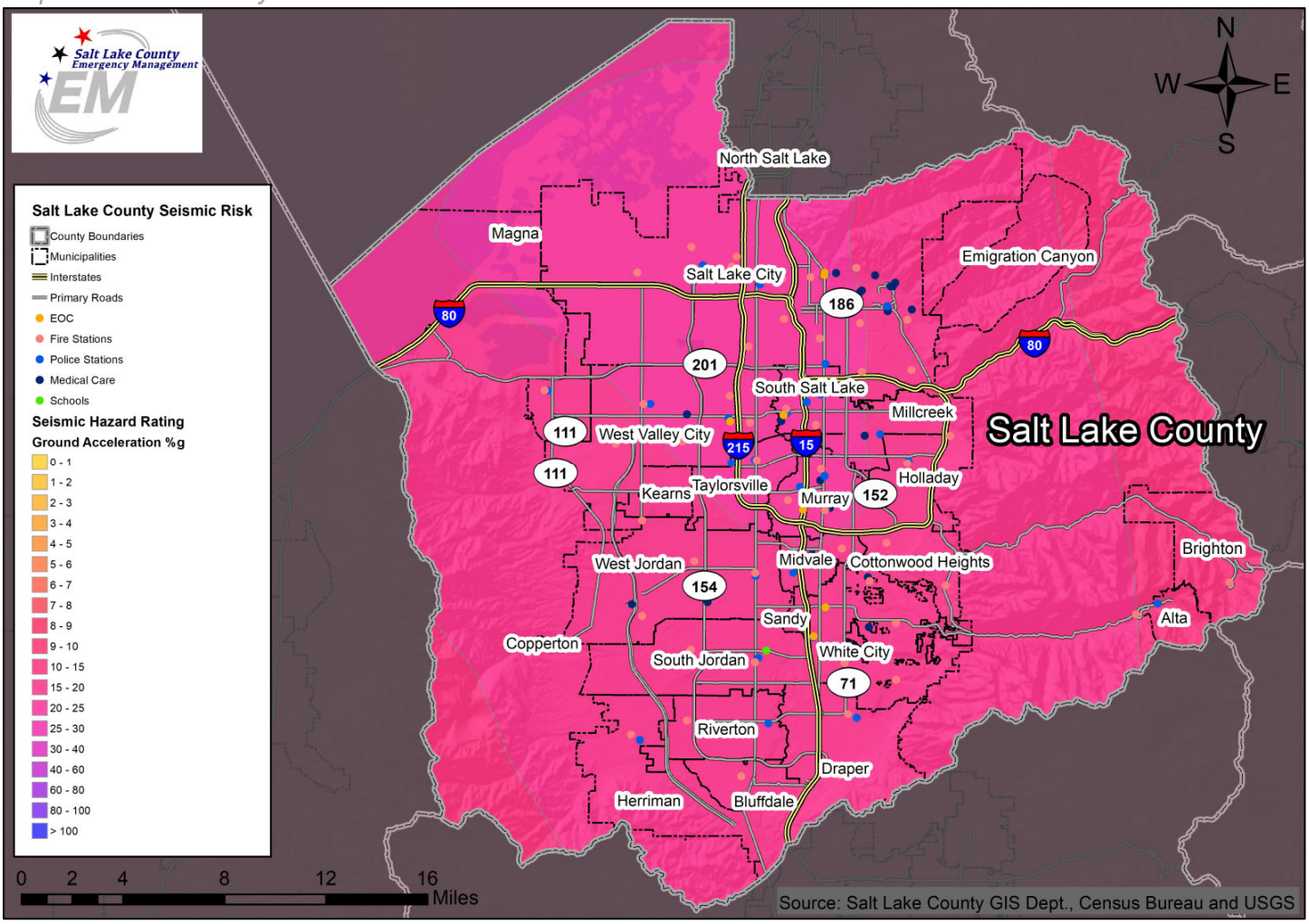
		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	29.43	7.78	1.21	2.39
	Commuting	0.21	0.25	0.46	0.09
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	33.23	8.52	1.28	2.52
	Other-Residential	523.31	119.75	14.29	27.44
	Single Family	635.36	134.14	18.05	35.42
	Total	**1,222**	**270**	**35**	**68**
2 PM	Commercial	1657.91	438.77	68.36	134.36
	Commuting	1.88	2.24	4.11	0.78
	Educational	395.12	101.81	15.79	30.80
	Hotels	0.00	0.00	0.00	0.00
	Industrial	244.90	62.77	9.46	18.44
	Other-Residential	96.85	22.48	2.78	5.17
	Single Family	115.46	24.93	3.47	6.50
	Total	**2,512**	**653**	**104**	**196**
5 PM	Commercial	1168.71	309.43	48.46	93.98
	Commuting	34.16	40.71	74.59	14.15
	Educational	49.56	12.95	2.02	3.95
	Hotels	0.00	0.00	0.00	0.00
	Industrial	153.06	39.23	5.91	11.53
	Other-Residential	197.75	45.85	5.67	10.56
	Single Family	247.88	53.27	7.38	13.85
	Total	**1,851**	**501**	**144**	**148**

Essential Facility Damage

Table: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	25	4	0	14
Schools	389	36	0	284
EOCs	8	2	0	3
Police Stations	30	0	0	19
Fire Stations	60	0	0	40

Map: Salt Lake County Seismic Risk and Critical Facilities



Economic Loss

The total economic loss estimated for the earthquake is 7,093.67 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following sections provide more detailed information about these losses, which can be broadly grouped into three categories: direct building, business interruption, and transportation and utility lifeline losses.

Building-Related Losses

The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

Hazus estimates that about 36,629 buildings will be at least moderately damaged. This is over 12.00% of the buildings in the region. There are an estimated 2,531 buildings that will be damaged beyond repair. The tables below summarize the expected damage and loss. The total building-related losses were 6,782.33 (millions of dollars); 23% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancy category which made up over 40% of the total loss.

Table: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	523.15	0.24	143.90	0.24	101.70	0.38	38.98	0.53	15.27	0.60
Commercial	10,648.63	4.96	3,402.34	5.72	3,241.15	12.13	1,433.28	19.42	588.60	23.25
Education	323.19	0.15	92.26	0.16	76.45	0.29	33.96	0.46	13.14	0.52
Government	296.01	0.14	110.26	0.19	131.27	0.49	78.41	1.06	39.05	1.54
Industrial	3,054.62	1.42	931.88	1.57	952.74	3.57	438.31	5.94	175.43	6.93
Other Residential	10,495.66	4.89	5,490.63	9.24	4,415.02	16.53	2,058.56	27.89	674.12	26.62
Religion	723.44	0.34	238.28	0.40	201.20	0.75	91.78	1.24	36.30	1.43
Single Family	188,431.06	87.85	49,035.75	82.49	17,596.85	65.87	3,208.26	43.46	990.07	39.10
Total	**214,496**		**59,445**		**26,716**		**7,382**		**2,532**	

Table: Building-Related Economic Loss Estimates

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	20.1901	289.2409	13.1964	20.1692	342.7966
	Capital-Related	0.0000	8.6027	261.4721	8.1902	3.1692	281.4342
	Rental	48.7253	78.1877	169.3044	5.4315	13.8295	315.4784
	Relocation	170.8302	56.6410	264.0967	28.4588	67.1917	587.2184
	Subtotal	**219.5555**	**163.6215**	**984.1141**	**55.2769**	**104.3596**	**1526.9276**
Capital Stock Losses							
	Structural	249.6381	133.7350	413.6649	91.2331	64.6952	952.9663
	Non Structural	891.8710	673.3223	1071.6538	286.3120	195.0177	3,118.1768
	Content	248.4333	144.3726	479.9086	181.2167	83.3172	1,137.2484
	Inventory	0.0000	0.0000	15.5317	31.0296	0.4486	47.0099
	Subtotal	**1389.9424**	**951.4299**	**1980.7590**	**589.7914**	**343.4787**	**5255.4014**
Total		**1609.50**	**1115.05**	**2964.87**	**645.07**	**447.84**	**6782.33**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. The losses for the transportation and utility systems are displayed separately below.

Transportation System Damage and Losses

Table: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	370	0	0	370	370
	Bridges	698	165	6	537	583
	Tunnels	0	0	0	0	0
Railways	Segments	182	0	0	182	182
	Bridges	17	0	0	17	17
	Tunnels	0	0	0	0	0
	Facilities	6	0	0	6	6
Light Rail	Segments	24	0	0	24	24
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	24	0	0	24	24
Bus	Facilities	2	0	0	2	2
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	2	0	0	2	2
	Runways	5	0	0	5	5

Table: Transportation System Economic Losses (Millions of Dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	4634.8229	0.0000	0.00
	Bridges	1383.4012	153.3494	11.08
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**6018.2241**	**153.3494**	
Railways	Segments	253.5243	0.0000	0.00
	Bridges	2.2755	0.0043	0.19
	Tunnels	0.0000	0.0000	0.00
	Facilities	15.9780	4.5613	28.55
	Subtotal	**271.7778**	**4.5656**	
Light Rail	Segments	37.1528	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	63.9120	14.4103	22.55
	Subtotal	**101.0648**	**14.4103**	
Bus	Facilities	2.1364	0.2143	10.03
	Subtotal	2.1364	0.2143	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	21.3020	3.8683	18.16
	Runways	189.8200	0.0000	0.00
	Subtotal	**211.1220**	**3.8683**	
Total (Millions of Dollars)		**6,604.33**		**176.41**

Utility System Damage and Losses

Table: Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	With Functionality > 50%	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Wastewater	5	1	0	1	5
Natural Gas	1	0	0	1	1
Oil Systems	2	1	0	1	2
Electrical Power	7	4	0	3	7
Communication	42	3	0	42	42

Table: Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	10,482	1204	301
Wastewater	6,289	605	151
Natural Gas	4,193	207	52
Oil	0	0	0

Table: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	342,622	5,720	3,124	424	0	0
Electric Power		1,065	569	188	29	2

Table: Utility System Economic Losses (Millions of Dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	337.3820	5.4179	1.61
	Subtotal	**337.3820**	**5.4179**	
Wastewater	Pipelines	0.0000	0.0000	0.00
	Facilities	326.3400	34.2154	10.48
	Distribution Lines	202.4292	2.7215	1.34
	Subtotal	**528.7692**	**36.9369**	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	1.0682	0.0891	8.34
	Distribution Lines	134.9528	0.9324	0.69
	Subtotal	**136.0210**	**1.0215**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.1960	0.0279	14.23
	Subtotal	**0.1960**	**0.0279**	
Electrical Power	Facilities	754.6000	91.3465	12.11
	Subtotal	**754.6000**	**91.3465**	
Communication	Facilities	4.1160	0.1818	4.42
	Subtotal	**4.1160**	**0.1818**	
Total (Millions of Dollars)		**1,761.08**	**134.93**	

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 5 ignitions that will burn about 0.02 sq. miles of the region's total area. The model also estimates that the fires will displace about 157 people and burn about 8 million of dollars of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris. The model estimates that a total of 2,258,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 30.00% of the total, with the remaining 70.00% being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 90,320 truckloads (25 tons/truck) to remove the debris generated by the earthquake.

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 6,735 households to be displaced due to the earthquake. Of these, 4,458 people will seek temporary shelter in public shelters.

Flooding (Urban/Flash Flooding and Riverine Flooding)

Floods are related to fast snowmelt, heavy rainfall, or failure of natural or engineered impoundments onto riverbanks and adjacent floodplains. Floodplains are lowland areas near rivers, lakes, reservoirs, oceans and low terrain urban areas that are subject to recurring floods. Stream flooding occurs when the peak discharge, or rate of flow in cubic feet per second (cfs), is larger than the channel of the river or storm sewer capacity. In Salt Lake County, floods are typically localized events running out of mountain canyons. Urban areas are also prone to flooding because urban development such as buildings, streets, and parking lots prevent water infiltration into the soil and greatly increase runoff. Undersized piping, manmade drainage channels, or debris that obstructs passageways may further contribute to flooding. Flood damage includes saturation of land and property, erosion, deposition of mud and debris, and fast flowing water. Most injuries and deaths occur from fast moving floodwaters, while most property damage results from inundation by sediment-filled water.

Snowmelt Floods

These are caused by rapid spring snowmelt of mountain snowpack. Most times, intense spring rainfall assists the flood scenario, causing additional rapid river rises. These events can last for weeks during the spring (generally April-June) and may result in loss of life and extensive damage affecting property owners and municipalities. More damage is occurring over the years as a result of increased development near the riverbanks of mountain streams (UNHH 2008). Snowmelt risk is greatest when snowpack is at or above normal and/or accompanied by an abrupt warming trend.

Flash-Flooding

These are caused by intense thunderstorms and resultant intense rainfall. Intense rainfall may fall on areas of sparse vegetation, steep slopes, and impervious surfaces, and is then channeled into smaller waterways or conduits. Once the large volume of runoff begins to accumulate across the basin, it typically increases in volume and speed in a short time. Events are often short-lived, but very dangerous for those caught in a confined area, such as a canyon, during the time of the flood (UNHH 2008). Flash flooding has caused 34 fatalities in Utah since 1950 (NOAA). In 2015 there were 20 fatalities including 7 at Zion National Park.

Areas of localized flooding may occur in urban areas not associated with existing waterways. Rain from high intensity thunderstorms may accumulate in low-lying areas with no outlet or where storm drains have become

overwhelmed. These types of flood and the resulting impacts are difficult to anticipate due to the uncertainty of when and where such storms will occur.

Long-term Rainfall Events

These rain events occur mostly in the fall or winter months and are produced by large synoptic weather systems originating out of the South, Southwest or West that produce rainfall for an extended period. Some melting of snow may occur as a result of the rainfall. This occurs mainly in the southern half of the state (UNHH 2008).

Post-fire Debris Flow Flooding

Enhanced runoff conditions from a fire-damaged watershed can result in debris flow flooding. As fires burn, they destroy vegetation and leave soils in a hydrophobic state, resulting in greater peak flows (UNHH 2008). This issue will be discussed further in the landslide section.

Flooding Hazard Profile

Potential Magnitude		High	**Probability**	X	High
	X	Medium			Medium
		Low			Low
		Minimal			Unlikely
Location	Largely in and along floodplains; debris flows could cause natural damming of water if nearby streams were to become blocked.				
Seasonal Conditions	Spring, heavy rainfall, and spring snowmelt runoff.				
Conditions	Thunderstorms w/heavy rainfall, extended wet periods.				
Duration	Flooding can last anywhere from hours to days and even months.				
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.				
Analysis Used	Review of FIS, FIRM, Army Corp of Engineers Flood Study.				

Range of Magnitude

Floods can range in magnitude from minor to catastrophic. The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability.

1% Special Flood Hazard Area (100-year flood):

Applies to an area that has a 1 percent chance, on average, of flooding in any given year. However, a 100-year flood could occur two years in a row, or once every 10 years. The 100-year-flood is also referred to as the base flood. Some agencies use the term called the 1% Annual Exceedance Probability.

0.2% Special Flood Hazard Area (500-year flood):

A 0.2 percent (500-year) floodplain is an area at risk for flooding from a bayou, creek or other waterway overflowing during a 0.2 percent (500-year) flood. Structures located in a 0.2 percent (500-year) floodplain have a minimum of a 0.2 percent chance of flooding in any given year

Location

Flooding in Salt Lake County is typically the result of excessive snowmelt runoff and/or heavy rainfall. Snowmelt flooding is usually the result of rapid melting of snowpack and occurs between April through June, and occurs along the major existing streams and waterways. Thunderstorms can produce high intensity, short duration heavy rainfall that occurs over a relatively small area in the summer months. However, flooding can also occur from non-thunderstorm rainfall events.

The major waterways in the County include the Jordan River, Big and Little Cottonwood Creeks, Parley's Creek, Emigration Creek, Red Butte Creek, City Creek, and Millcreek. Smaller waterways include Bingham Creek, Midas Creek, Rose Creek, Corner Canyon Creek, Dry Creek, Wood Hollow, Willow Creek, and Barney's Creek. All have the potential to flood. However, significant flood mitigation measures were implemented following the major floods of 1983-84 that greatly reduced the flood threat.

The flows of the Jordan River from Utah Lake into Salt Lake County are controlled and the flood potential from is somewhat reduced upstream of the major Jordan River tributaries. Parley's Creek has flood storage capacity at Mountain Dell and Little Dell Reservoirs and is routed through a retention basin in Sugarhouse Park. Big and Little Cottonwood Creeks and have a number of smaller flood storage lakes and ponds providing some flood protection, such as Wheeler Historic Farm. In Salt Lake City, Emigration Creek and Red Butte Creek come together at 700 East and 1300 South and can be discharged in or bypass Liberty Park pond. Parley's Creek discharges to the 1300 South drain at State Street.

Areas to monitor include 1300 South between 700 East and State Street, 700 West and North Temple Streets. Retention ponds are also used to store runoff from commercial and residential development areas.

Maps visually showing the probable boundaries of a 100 and 500-year flood event can be found in the Vulnerability Assessment portion of this hazard profile.

Historical Events and Probability of Future Occurrence

According to NOAA data, there have been 32 Flood/Flash Flood events in Salt Lake County since 1996. Total property damages were approximately 13.235 million with an additional $1,000 in crop damages.

The following flood events are of notable significance:

- **2017** - Thunderstorms producing heavy rainfall moved into the Salt Lake Valley in the early morning hours of July 26 and generally persisted for 3-4 hours, producing widespread flash flooding.
- **2015** - Heavy rain brought road, parking lot, and basement flooding to the Sugarhouse and Foothill areas of Salt Lake City.
- **2014** - Heavy rain during the early morning hours of August 20 led to flooding in West Jordan and Murray
- **2011** - Large snowpack meant larger resulting spring runoff flows
- **2010** - Spring snowmelt combined with heavy rains caused several streams to overtop their banks
- **1987** - Great Salt Lake reached its all-time maximum water level (4211.6 feet)
- **1983** - Large snowpack was coupled with a rain-on-snow event, (City Creek diverted down State Street)
- **1983/1984** - Large snowpack overwhelmed Utah Lake and affected Jordan River downstream
- **1952** - Rapid melt of a large snowpack

Utah has received seven Presidential disaster declarations related to flooding: in 1983, 1984, two in 2005 in (Southern Utah), two in 2012 and one in 2017. Following the events of 1983-84, an enormous amount of mitigation was completed along the urban areas of the Wasatch Front. The State of Utah constructed a county flood control project in which pumps were installed on the Great Salt Lake to pump excess water into the west desert. An advanced water-monitoring network of stream gauges, SNOTEL sites, and automated stream flow gates give warning of elevated flows (UHNN 2008).

During the past 149 years, the Great Salt Lake has three times peaked over 4,211 feet above sea level: to 4,211.60 feet in June 1873, to 4,211.50 feet in June 1986 and to 4,211.60 feet in June 1987.

Image: Salt Lake County, June 2010 Flooding



Source: Salt Lake County Engineering

This picture of the Salt Air Resort on the southeast shore of the Great Salt Lake was taken during the flood years of the 1980s. Large pumps were installed on the West side of the Great Salt Lake (at a cost of $60 million) and began pumping water into the West Desert in 1987. These pumps are currently not in operation, but could be reactivated if necessary (Utah Department of Water Resources 2007b).

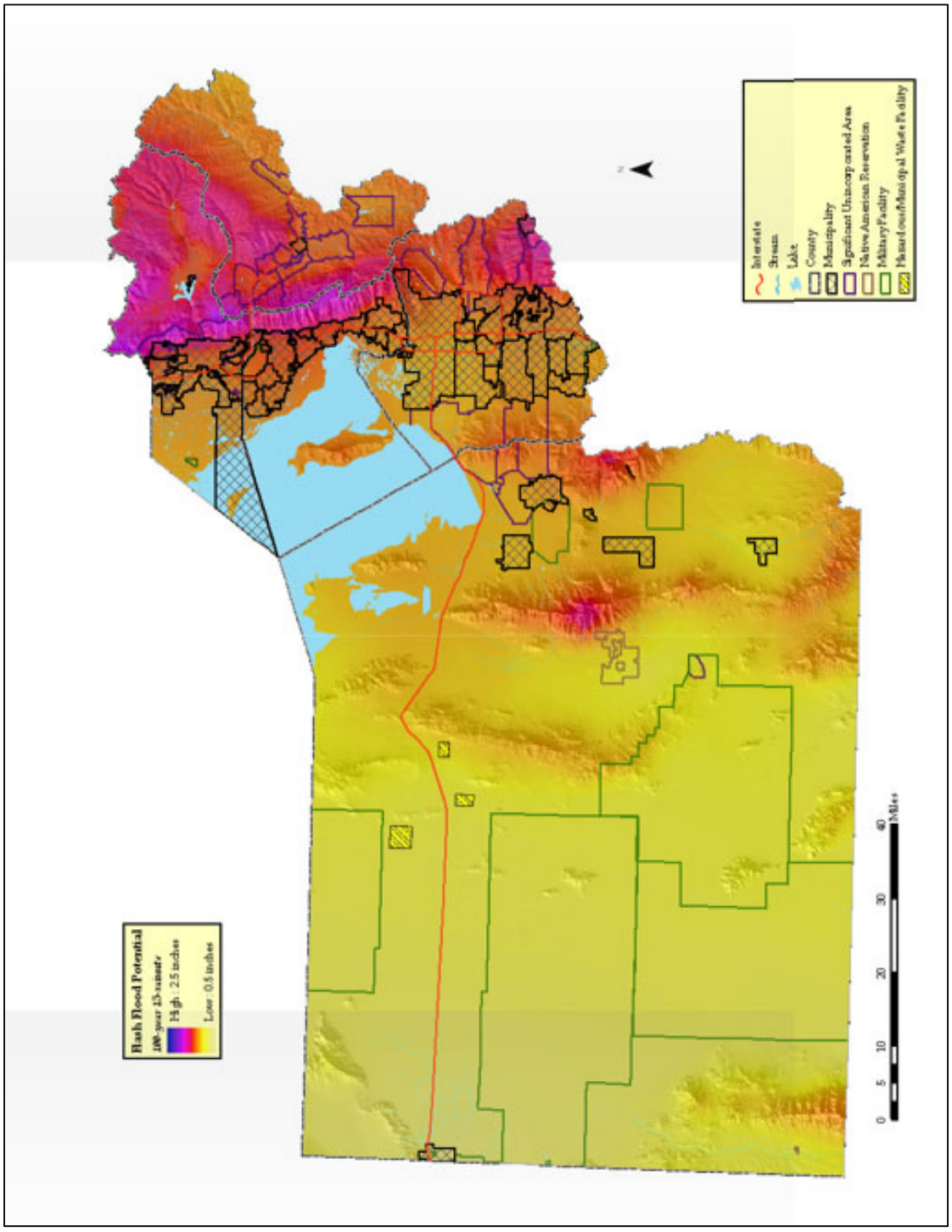
Image: Great Salt Lake Flooding, Salt Air Resort
(Photo courtesy of the National Weather Service)



Source: http://www.utahweather.org/

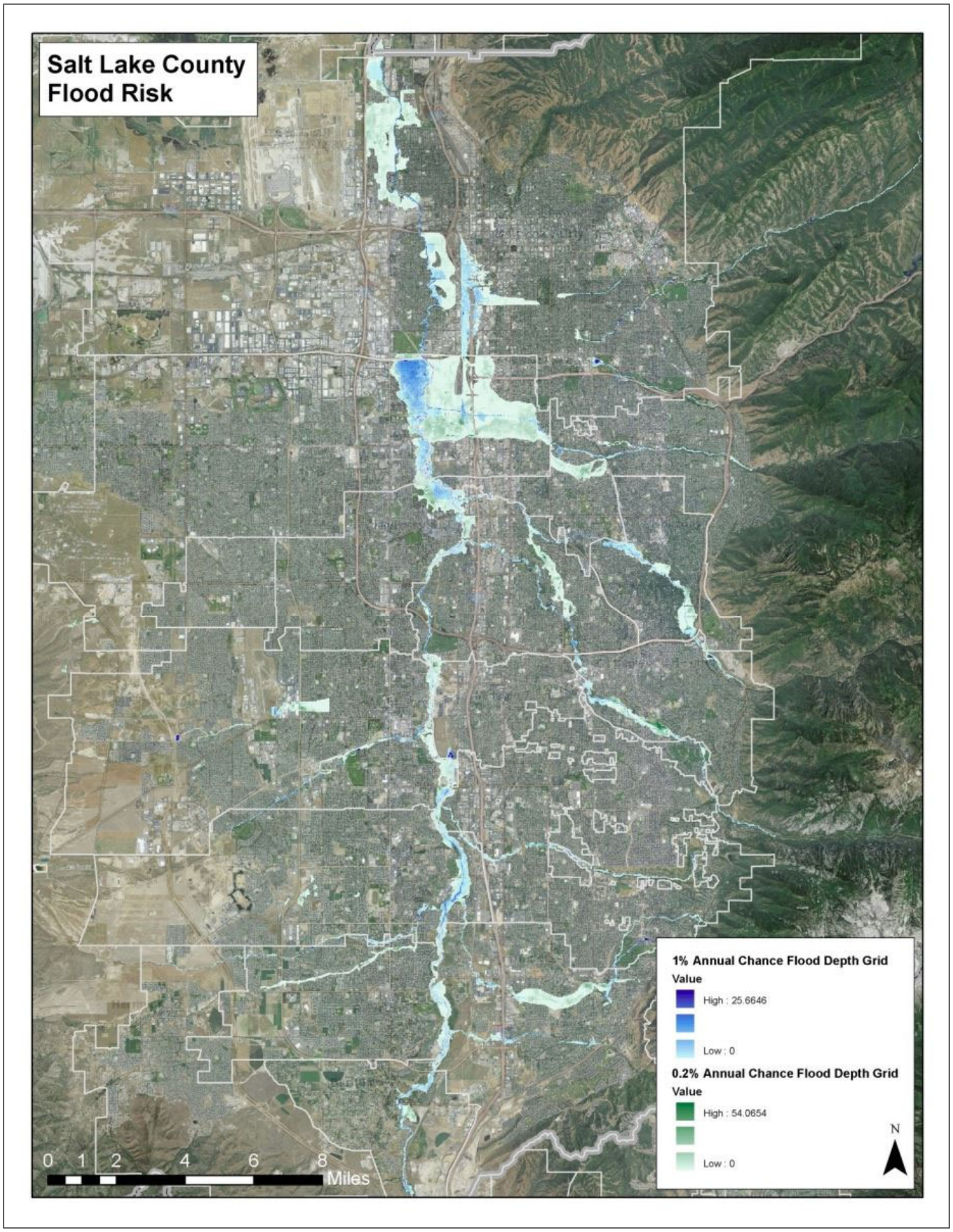
Depending upon the amount of snowfall in the winter and the speed with which it melts, flows can vary dramatically from year to year. Nevertheless, flood mitigation is on every jurisdiction's mind each spring and a myriad of mitigation plans are in place to prevent damage. There is no question that flooding will continue to occur in the future. As previously stated, NOAA data records 32 flooding events from 1996 to 2018. This results in an average of approximately 1.4 flooding events per year. Salt Lake County will likely experience at least this average amount of flooding, going forward.

Map: 7-FF Regional Flash Flood Hazard



Source: NWS Hydrometeorological Design Studies Center

Map: Salt Lake County Flood Risk



Secondary Hazards

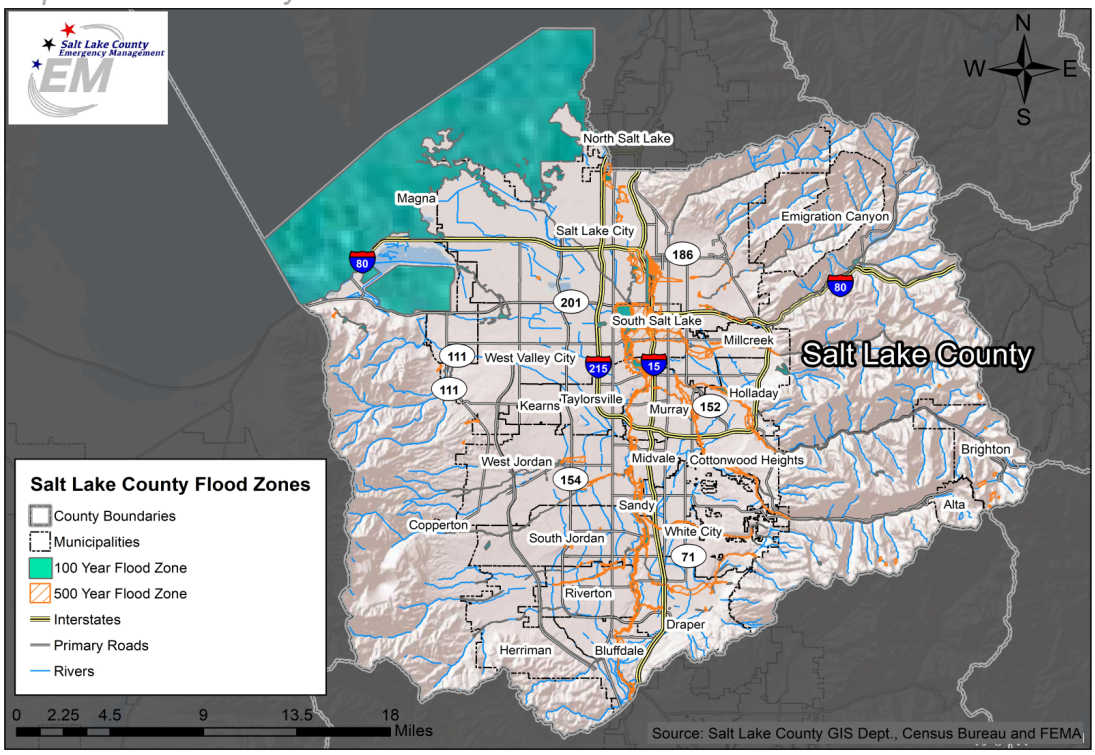
One of the most problematic secondary hazards for flooding is bank erosion, which in some cases can be more harmful than the actual flooding itself. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. This may also happen in areas with soft soils that are prone to erosion. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers, or storm sewers. If flooding is severe enough, infrastructure failure can occur, delaying the delivery of vital services. If enough residential structures are impacted, there may also be extreme stress on the emergency housing and shelter capabilities, not to mention the social fabric of the community.

Vulnerability Assessment

Vulnerability of people and infrastructure to flooding hazards in Salt Lake County was obtained from the modeling program HAZUS-MH. The Hazus flooding scenarios, which are the basis for the vulnerability and loss estimates provided in this section, entails both a 100 and 500-year flood occurring within Salt Lake County (1% and 0.2% annual risk, respectively).

Portions of the following vulnerability assessment data are also sourced from the 2019 Utah State Hazard Mitigation plan. The State Plan also assessed vulnerability for both 100-year (NFIP Zone A) and 500-year flood events in Salt Lake County. Analysis in the State Plan was completed using Digital Flood Insurance Rate Maps (DFIRM). Only streams that contained detailed flood cross-section data could be used and flooding from the Great Salt Lake was not included. Consequently, the portion of analysis below incorporated from the State Plan should be considered conservative. Overall, the 2019 Utah State Hazard Mitigation Plan reflects that vulnerability to flooding is ranked as "Moderate" for Salt Lake County, based on frequency and severity of past events and future probabilities.

Map: Salt Lake County Flood Zones



Map: Salt Lake County Population Density in Flood Zones

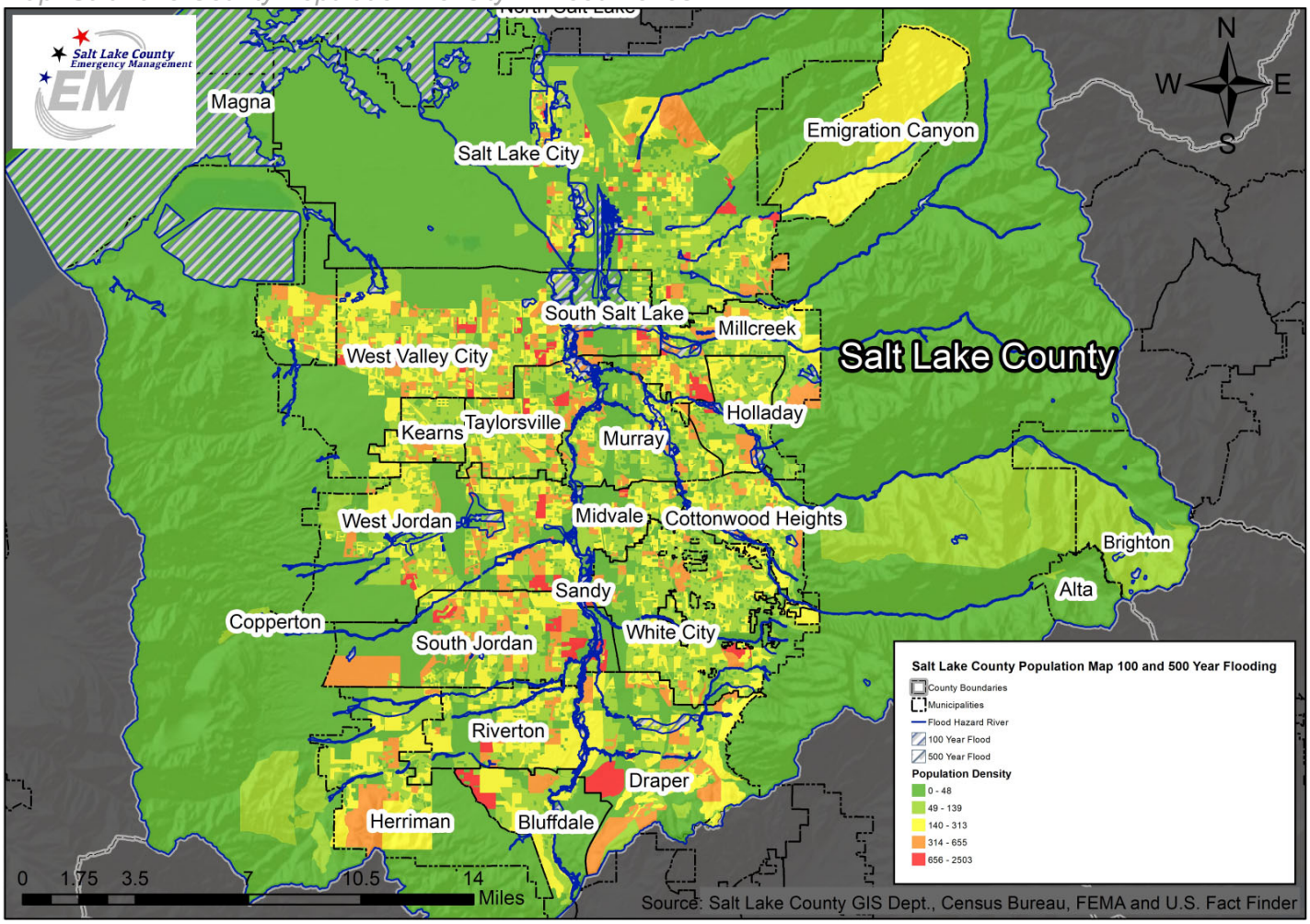


Table: Salt Lake County Flood Vulnerabilities and Loss Estimates

County	Acres Flooded	People
100-year Flood	2,588.7	13,777
500-year Flood	8,346.4	14,613

Source: 2019 Utah State Hazard Mitigation Plan

Economic Loss

For a 100-year event, the total economic loss estimated for the flood is 181.26 million dollars, which represents 7.20% of the total replacement value of the scenario buildings. For a 500-year event, the total estimated economic loss is 561.23 million dollars, which represents 6.44% of the total replacement value of the scenario buildings. Economic loss is measured by building losses, which can be broken up into two categories: direct building loss and business interruption loss.

The table below shows the exposure for each category of building use in Salt Lake County to each flood scenario.

Table: Building Exposure by Occupancy Type for Flood Scenario

	100-Year Flood		500-Year Flood	
Occupancy	**Exposure ($1,000)**	**Percent of Total**	**Exposure ($1,000)**	**Percent of Total**
Residential	1,786,736	71.0%	5,830,834	66.9%
Commercial	472,720	18.8%	1,898,747	21.8%
Industrial	210,144	8.3%	541,625	6.2%
Agricultural	5,172	0.2%	19,869	0.2%
Religion	29,147	1.2%	268,081	3.1%
Government	8,951	0.4%	120,419	1.4%
Education	4,082	0.2%	37,328	0.4%
Total	**2,516,952**	**100%**	**8,716,903**	**100%**

Direct Building Damage and Loss

For a 100-year flood scenario, Hazus estimates that about 236 buildings will be at least moderately damaged. This is over 61% of the total number of buildings in the scenario. It is estimated that only 1 building will be completely destroyed. For a 500-year flood scenario, Hazus estimates that about 452 buildings will be at least moderately damaged, which is over 57% of the total number of buildings in the scenario. It is also estimated that about 6 buildings will be completely destroyed.

Table: Expected Building Damage by Occupancy for 100-Year Flood Event

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	173	42	178	44	38	9	13	3	6	1	1	0
Total	**173**		**178**		**38**		**13**		**6**		**1**	

Table: Expected Building Damage by Occupancy for a 500-Year Flood Event

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	9	53	7	41	1	6	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	504	53	341	36	68	7	21	2	8	1	6	1
Total	**513**		**348**		**69**		**21**		**8**		**6**	

As can be seen in the tables below, the total building-related losses for a 100-year flood event were 81.22 million dollars. About 55% of the total estimated losses were related to the business interruption of the region. The residential occupancies made up 39.74% of the total loss. For a 500-year event, the total building-related losses were 227.77 million dollars. About 59% of the total estimated losses were related to the business interruption of the region and residential occupancies made up 36.39% of the total loss.

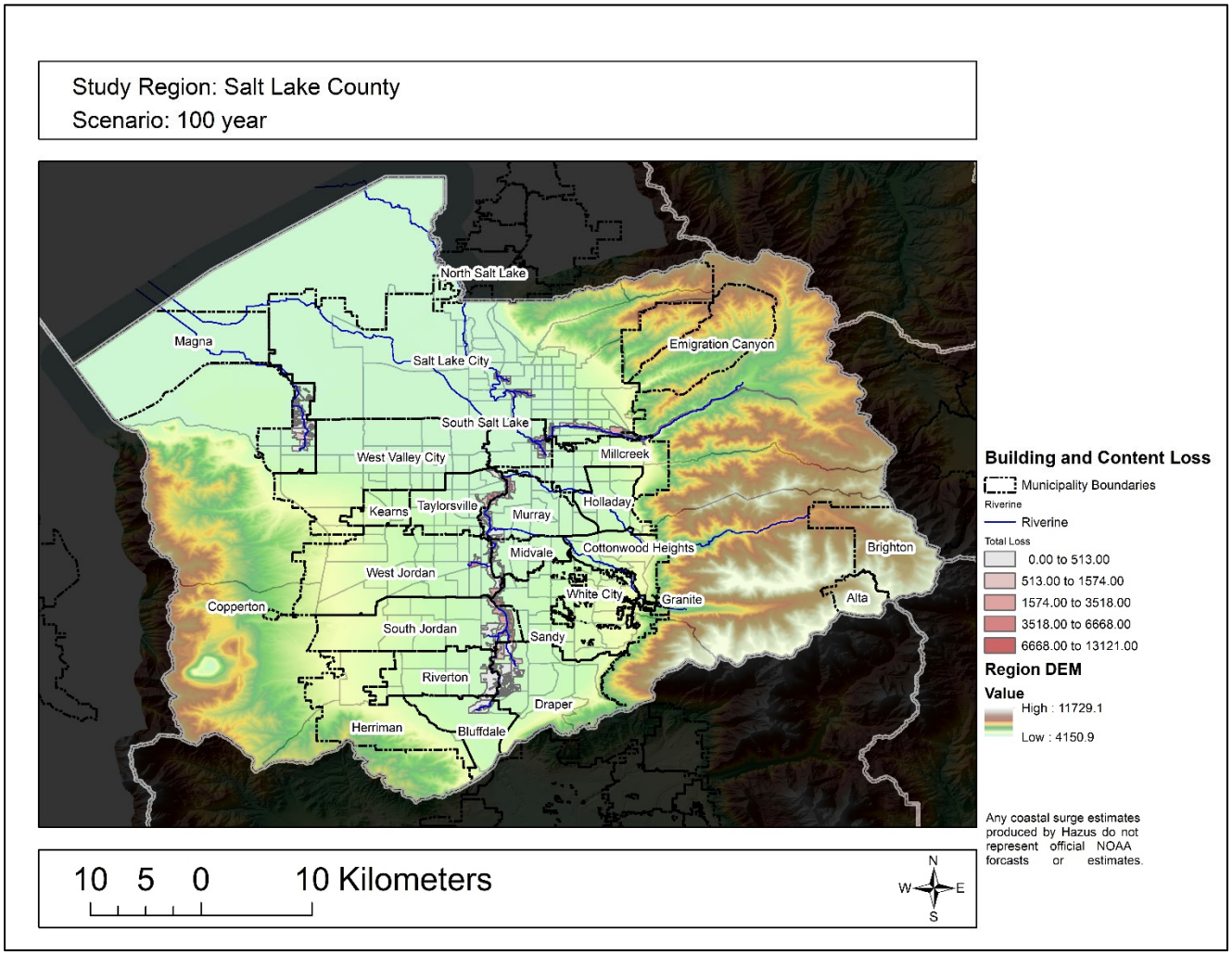
Table: Building-Related Economic Loss Estimates for 100-Year Flood Event (In Millions of Dollars)

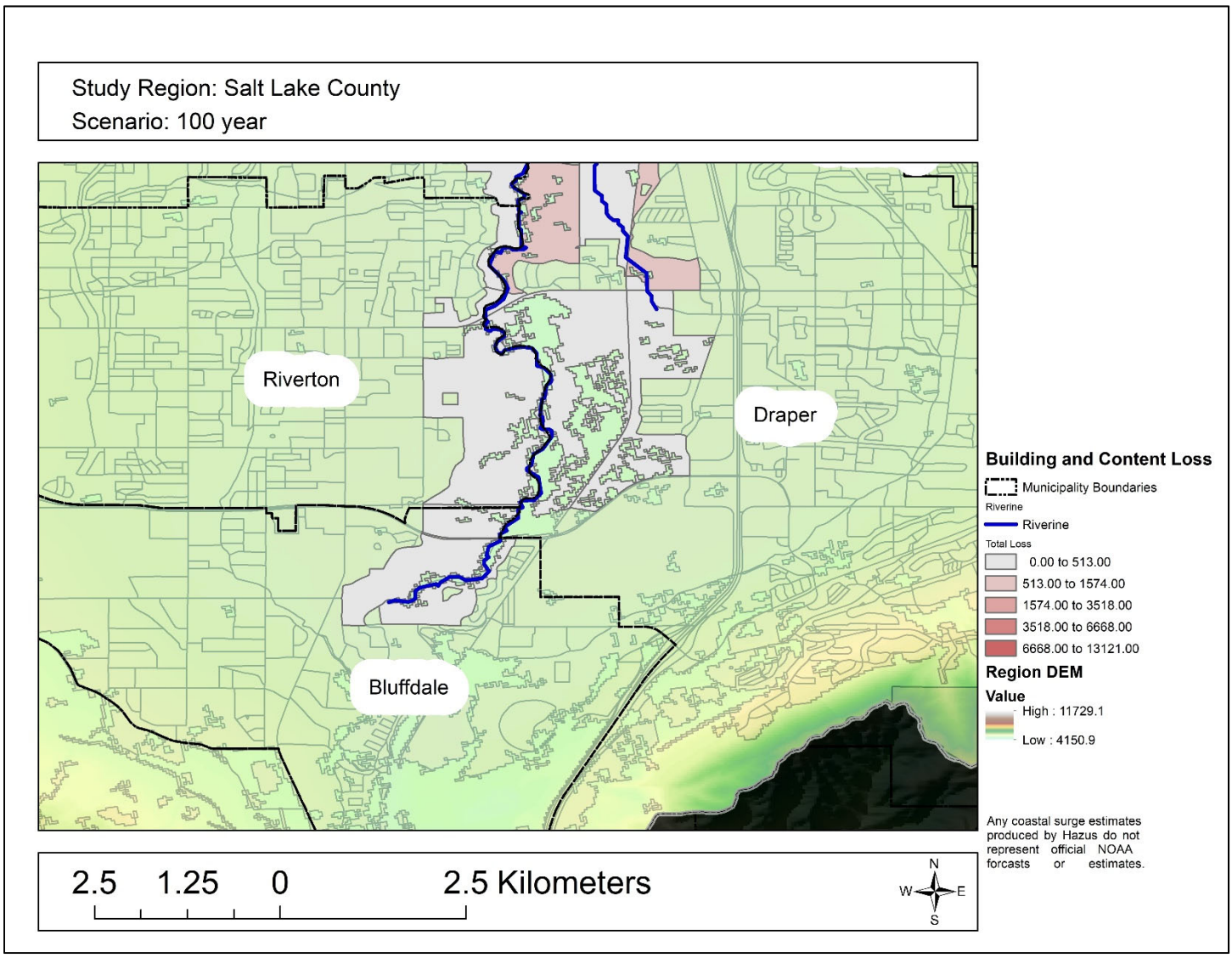
Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Building	30.43	6.27	2.08	0.40	39.18
	Content	16.87	17.30	4.22	2.57	40.96
	Inventory	0.00	0.47	0.60	0.00	1.07
	Subtotal	**47.30**	**24.04**	**6.90**	**2.97**	**81.22**
Business Interruption	Income	0.37	25.95	0.18	1.25	27.75
	Relocation	15.48	7.83	0.26	0.64	24.21
	Rental Income	8.02	5.75	0.03	0.11	13.91
	Wage	0.87	26.34	0.35	6.62	34.18
	Subtotal	**24.74**	**65.88**	**0.81**	**8.62**	**100.05**
All	**Total**	**72.03**	**89.92**	**7.72**	**11.60**	**181.26**

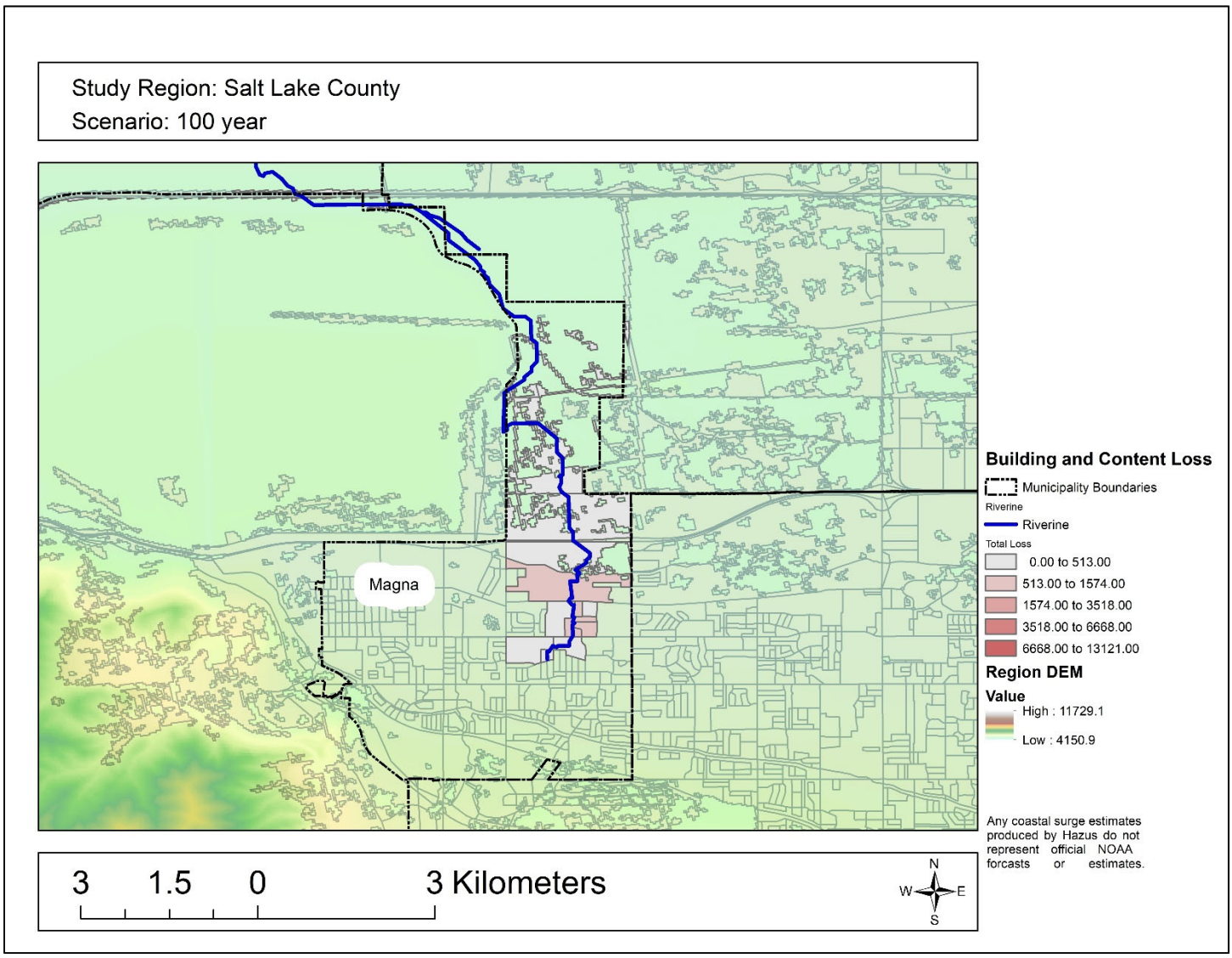
Table: Building-Related Economic Loss Estimates for 500-Year Flood Event (In Millions of Dollars)

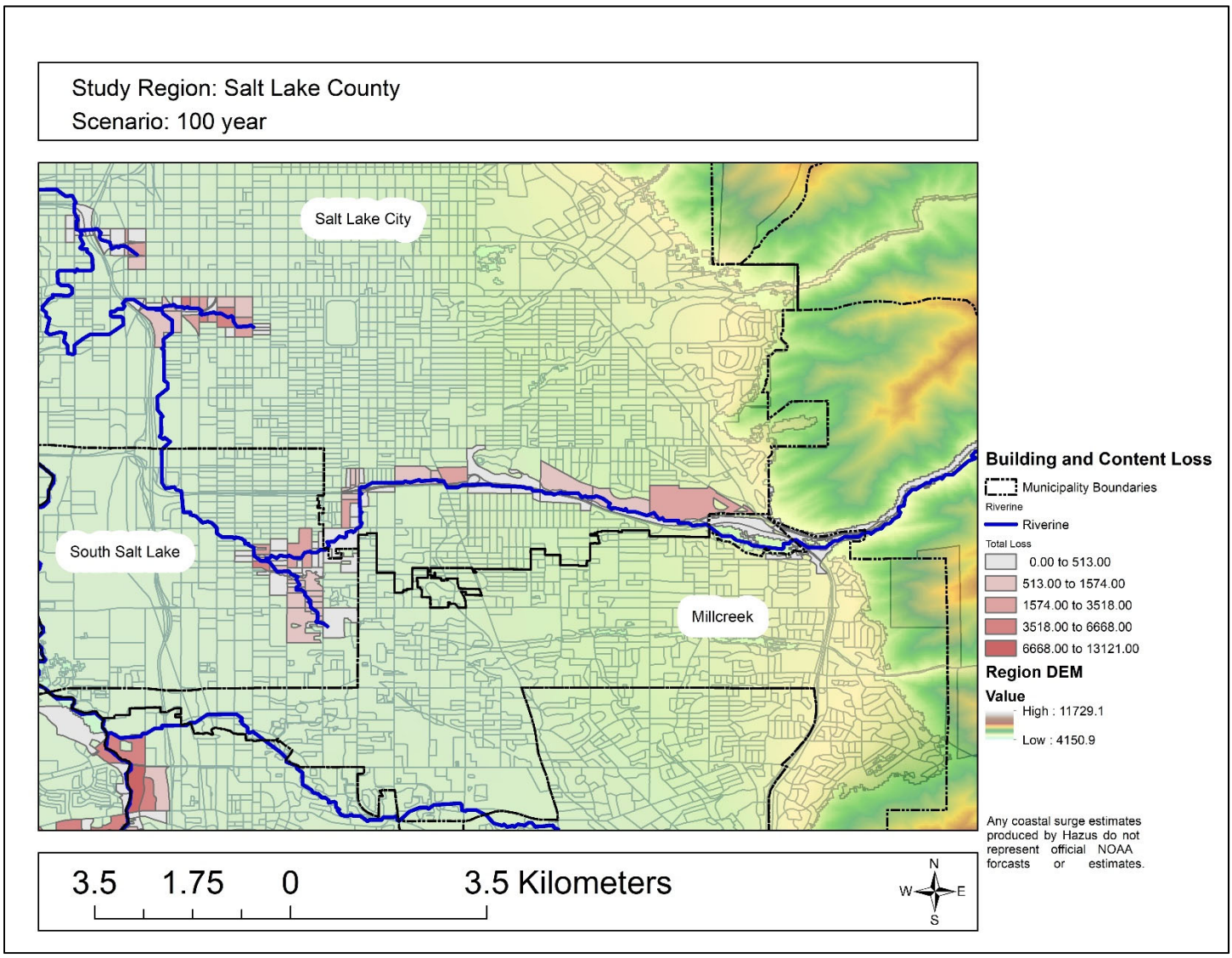
Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Building	81.61	19.31	4.78	1.03	106.73
	Content	46.16	55.23	10.09	6.69	118.16
	Inventory	0.00	1.34	1.51	0.02	2.88
	Subtotal	**127.76**	**75.88**	**16.38**	**7.74**	**227.77**
Business Interruption	Income	2.27	81.04	0.50	4.77	88.59
	Relocation	43.81	24.40	0.64	2.74	71.59
	Rental Income	25.05	17.23	0.08	0.53	42.89
	Wage	5.37	84.86	0.89	39.29	130.41
	Subtotal	76.50	207.54	2.12	47.32	333.47
All	**Total**	**204.26**	**283.42**	**18.50**	**55.06**	**561.23**

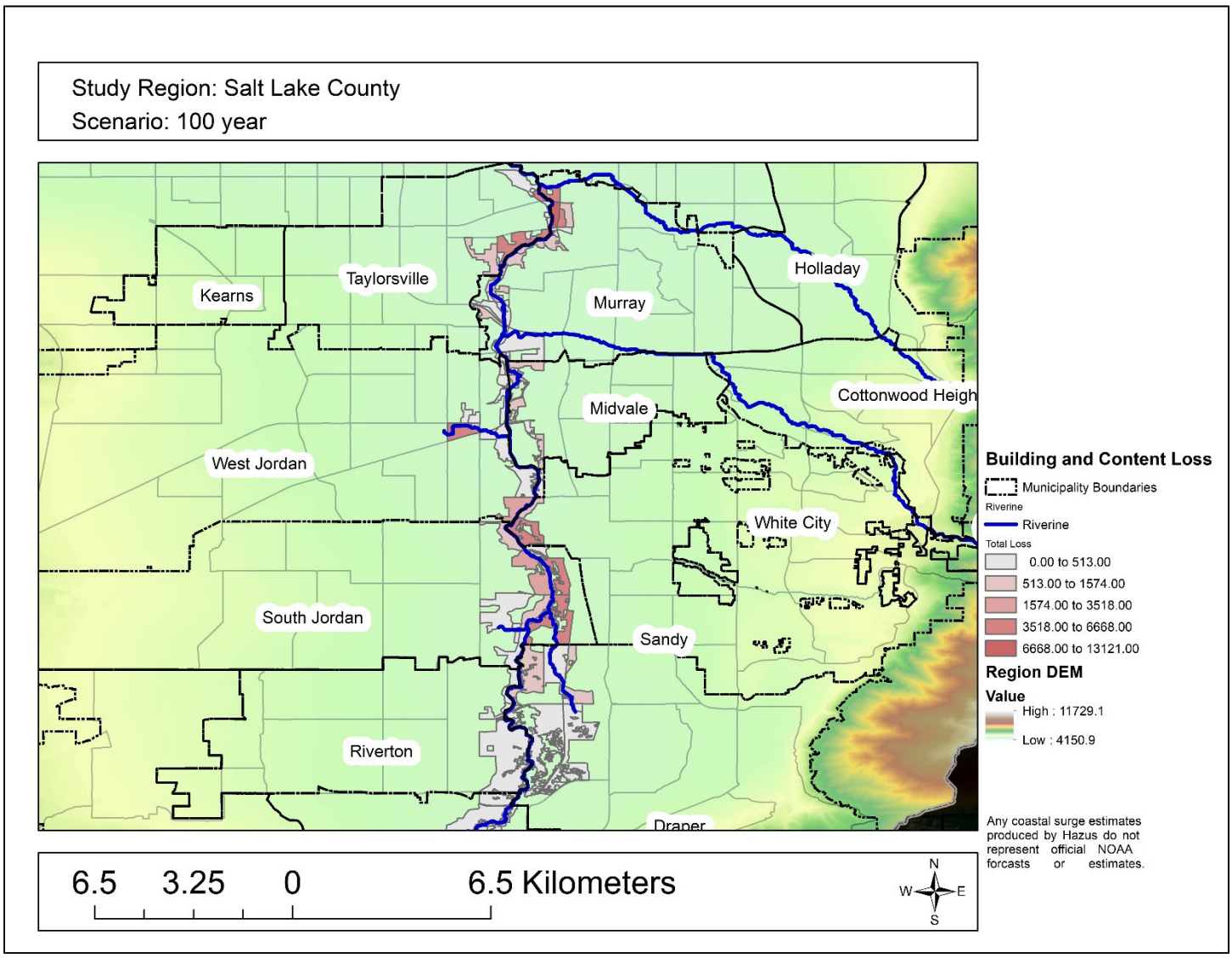
Map: Salt Lake County Area 1% Annual Chance Flood Risk (100-year)



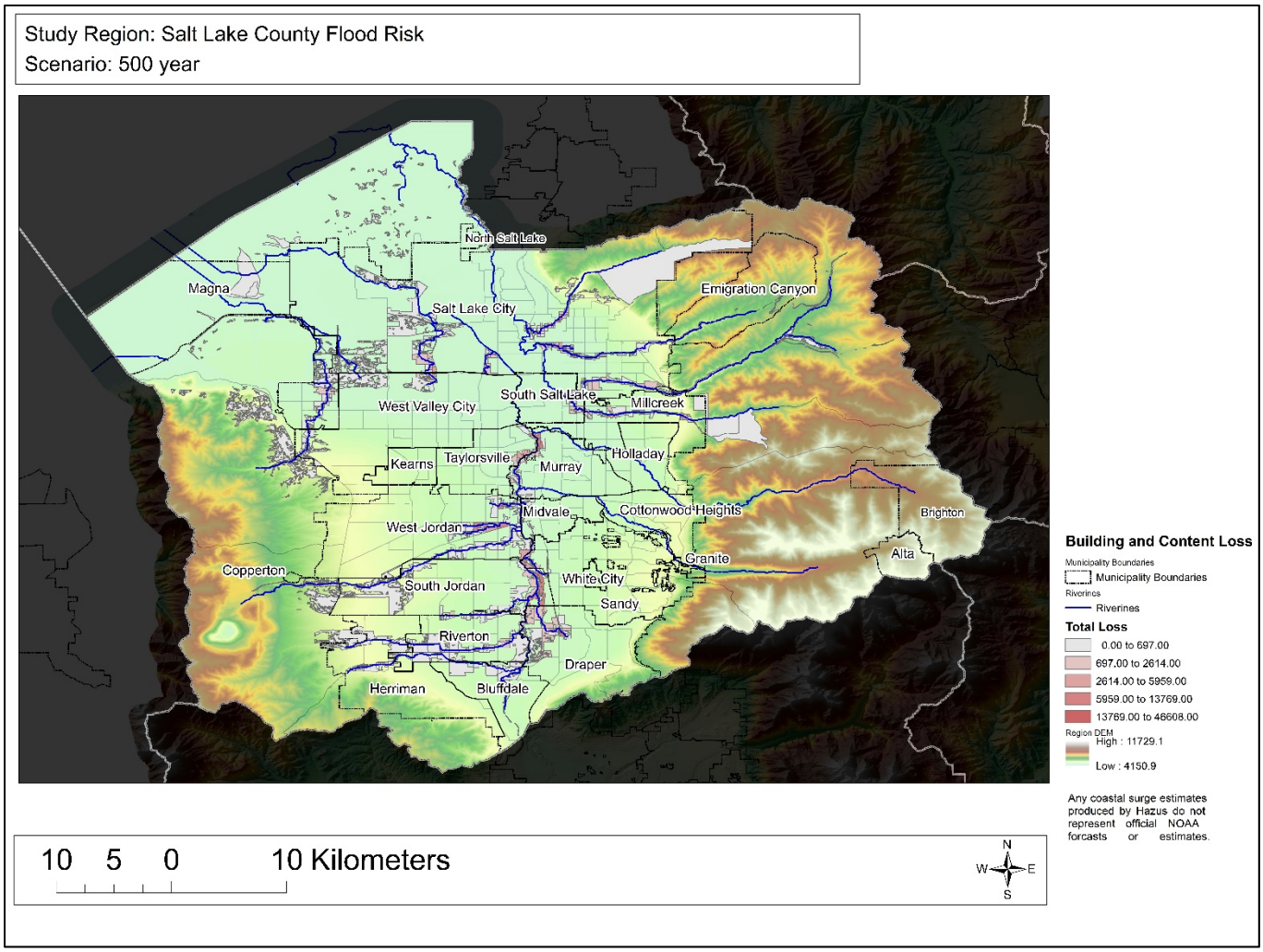

Study Region: Salt Lake County
Scenario: 100 year
Riverton
Draper
Bluffdale
Building and Content Loss
Municipality Boundaries
Riverine
Riverine
Total Loss
0.00 to 513.00
513.00 to 1574.00
1574.00 to 3518.00
3518.00 to 6668.00
6668.00 to 13121.00
Region DEM
Value
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.
2.5 1.25 0 2.5 Kilometers
N
W
E
S

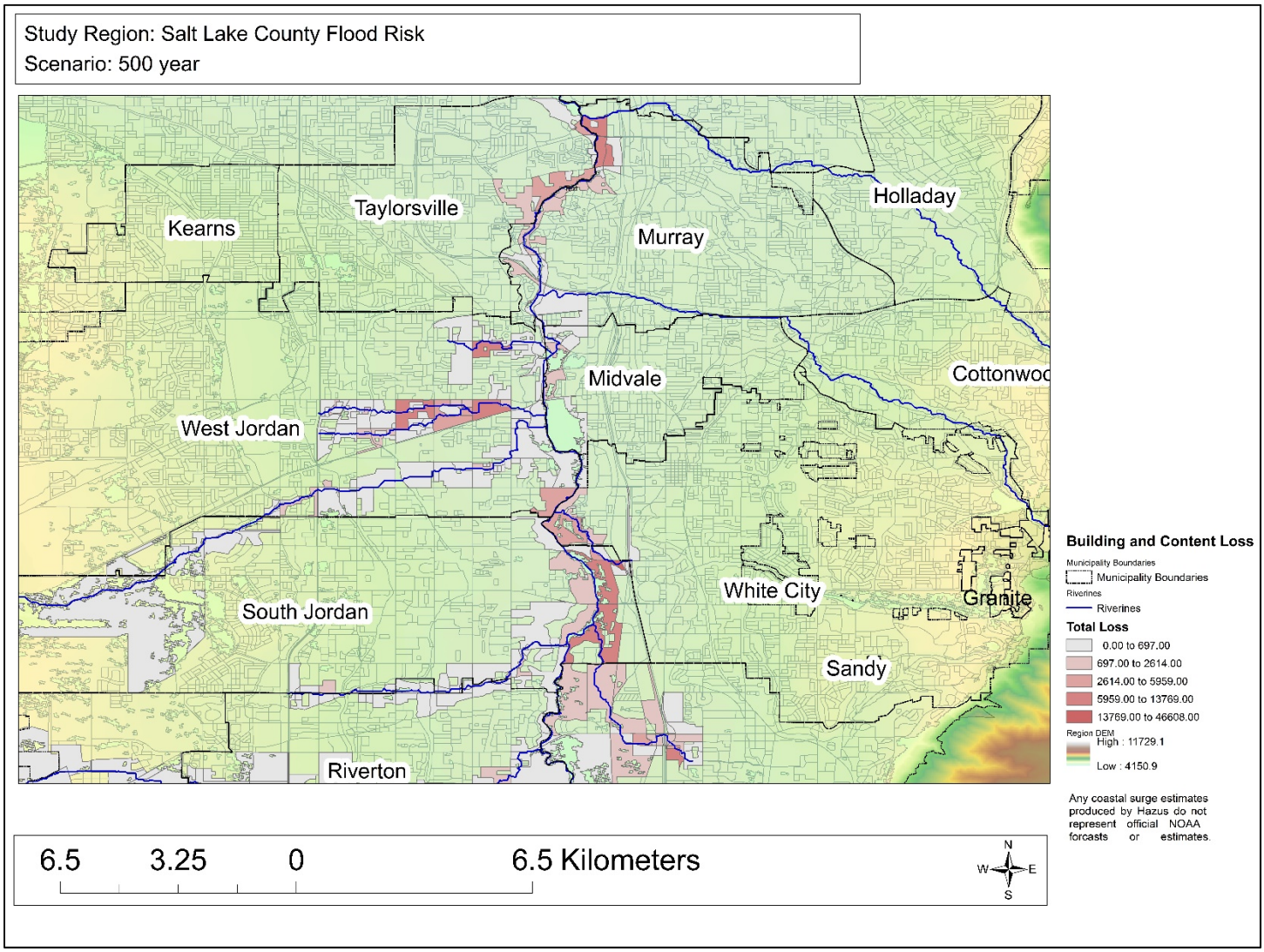

Study Region: Salt Lake County
Scenario: 100 year
Magna
Building and Content Loss
Municipality Boundaries
Riverine
Riverine
Total Loss
0.00 to 513.00
513.00 to 1574.00
1574.00 to 3518.00
3518.00 to 6668.00
6668.00 to 13121.00
Region DEM
Value
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.
3 1.5 0 3 Kilometers
N
W
E
S

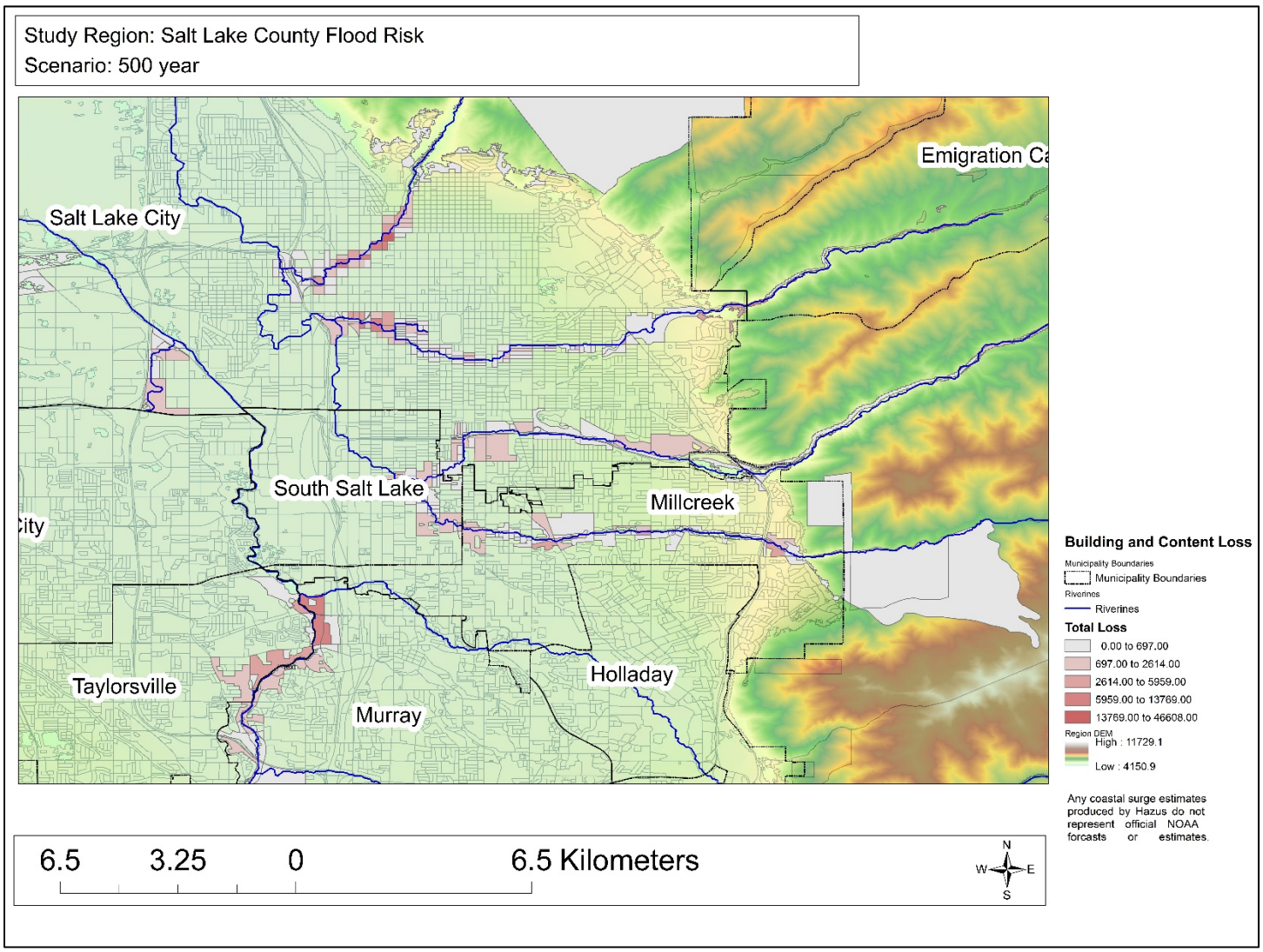

Study Region: Salt Lake County
Scenario: 100 year
Salt Lake City
South Salt Lake
Millcreek
Building and Content Loss
Municipality Boundaries
Riverine
Riverine
Total Loss
0.00 to 513.00
513.00 to 1574.00
1574.00 to 3518.00
3518.00 to 6668.00
6668.00 to 13121.00
Region DEM
Value
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.
3.5 1.75 0 3.5 Kilometers
N
W
E
S

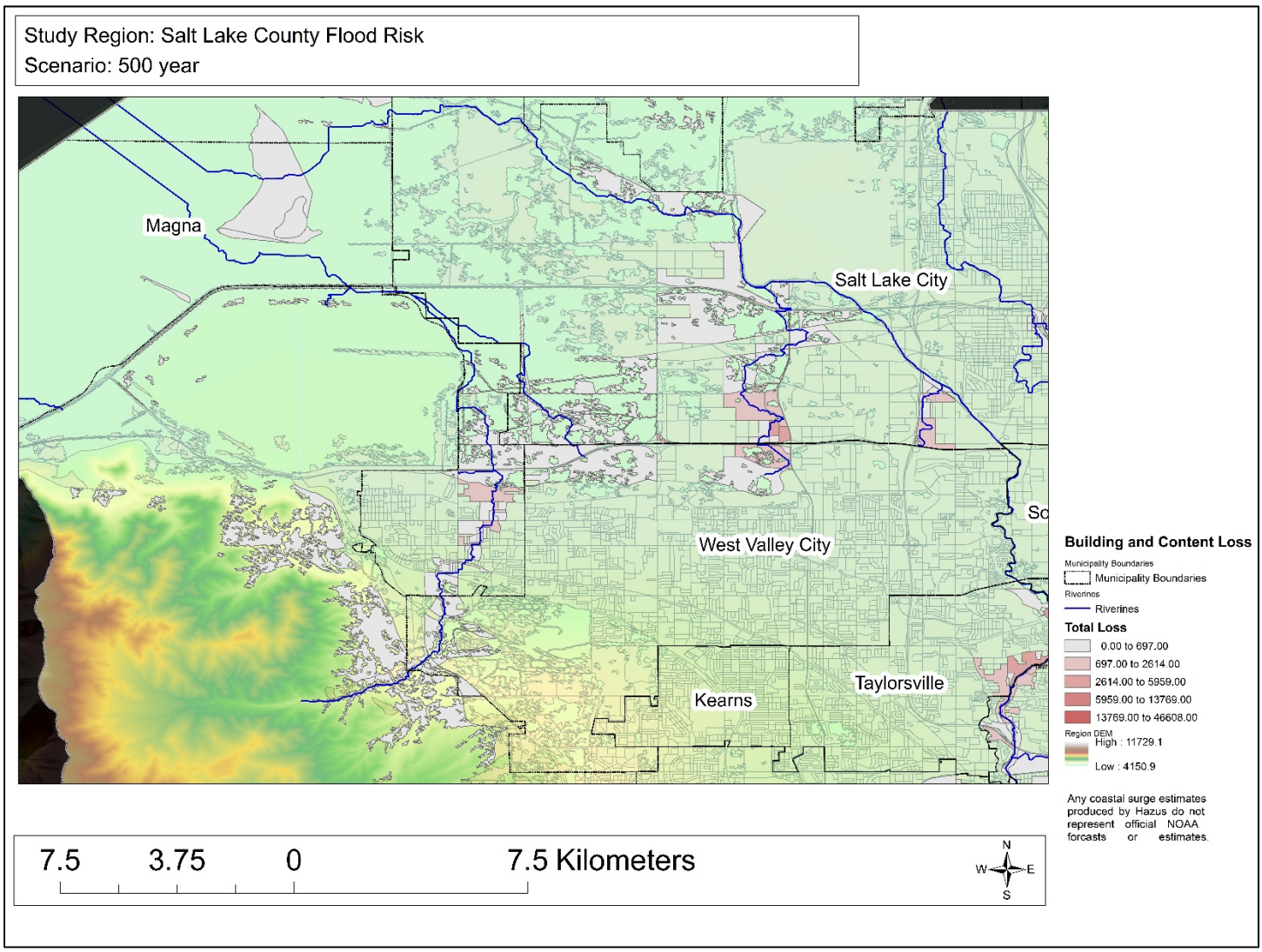

Study Region: Salt Lake County
Scenario: 100 year
Kearns
Taylorsville
Murray
Holladay
Midvale
Cottonwood Heigh
West Jordan
White City
South Jordan
Sandy
Riverton
Draper
Building and Content Loss
Municipality Boundaries
Riverine
Riverine
Total Loss
0.00 to 513.00
513.00 to 1574.00
1574.00 to 3518.00
3518.00 to 6668.00
6668.00 to 13121.00
Region DEM
Value
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.
6.5 3.25 0 6.5 Kilometers
N
W
E
S

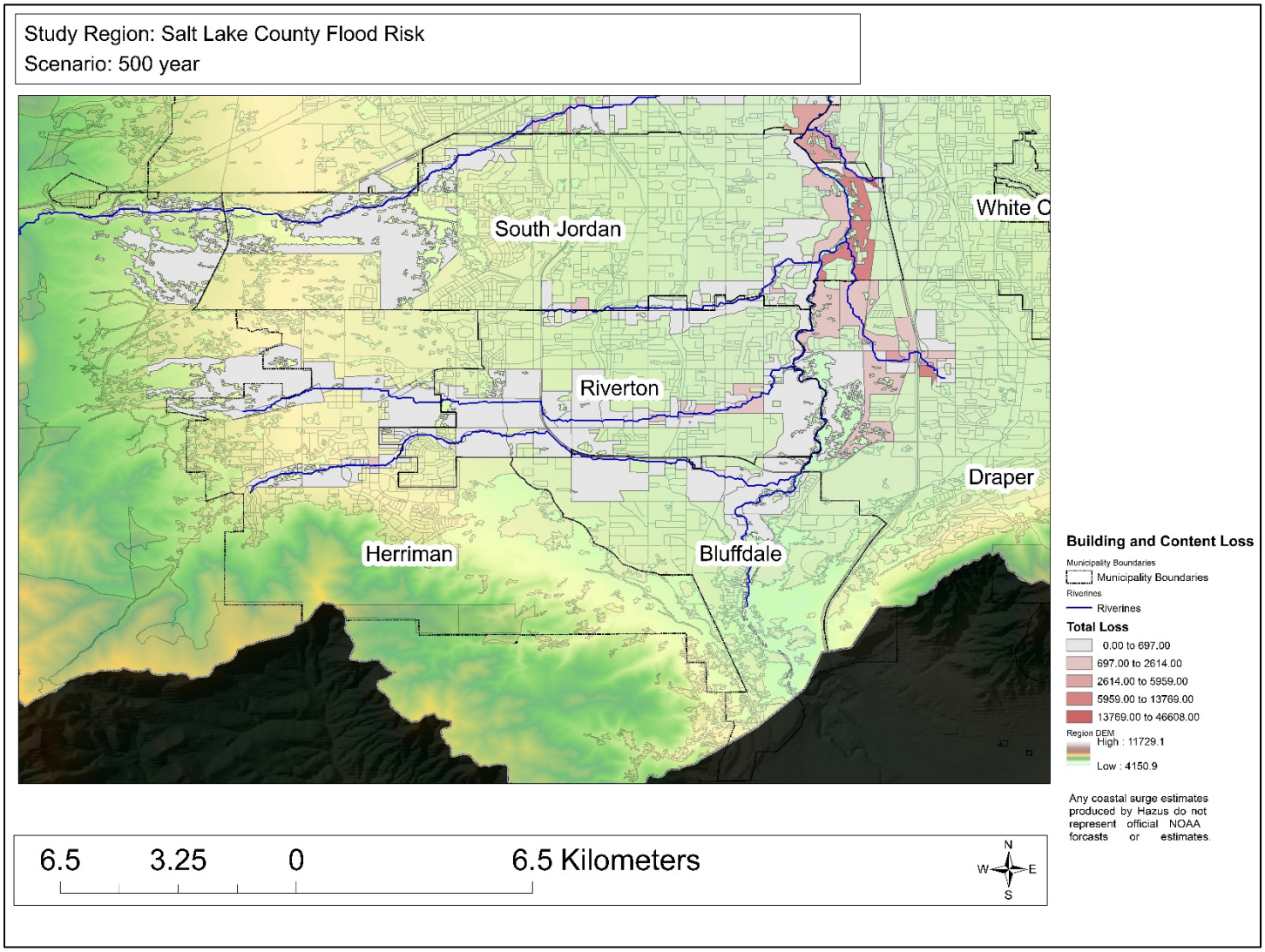
Map: Salt Lake County Area 0.2% Annual Chance Flood Risk (500-year)




Study Region: Salt Lake County Flood Risk
Scenario: 500 year
Kearns
Taylorsville
Murray
Holladay
Midvale
Cottonwoo
West Jordan
South Jordan
White City
Granite
Sandy
Riverton
6.5
3.25
0
6.5 Kilometers
N
W
E
S
Building and Content Loss
Municipality Boundaries
Municipality Boundaries
Riverines
Riverines
Total Loss
0.00 to 697.00
697.00 to 2614.00
2614.00 to 5959.00
5959.00 to 13769.00
13769.00 to 46608.00
Region DEM
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.


Study Region: Salt Lake County Flood Risk
Scenario: 500 year
Salt Lake City
Emigration Ca
South Salt Lake
Millcreek
Holladay
Taylorsville
Murray
6.5
3.25
0
6.5 Kilometers
N
W
E
S
Building and Content Loss
Municipality Boundaries
Municipality Boundaries
Riverines
Riverines
Total Loss
0.00 to 697.00
697.00 to 2614.00
2614.00 to 5959.00
5959.00 to 13769.00
13769.00 to 46608.00
Region DEM
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.


Study Region: Salt Lake County Flood Risk
Scenario: 500 year
Magna
Salt Lake City
West Valley City
Kearns
Taylorsville
Building and Content Loss
Municipality Boundaries
Municipality Boundaries
Riverines
Riverines
Total Loss
0.00 to 697.00
697.00 to 2614.00
2614.00 to 5959.00
5959.00 to 13769.00
13769.00 to 46608.00
Region DEM
High : 11729.1
Low : 4150.9
Any coastal surge estimates produced by Hazus do not represent official NOAA forcasts or estimates.
7.5 3.75 0 7.5 Kilometers
N
W
E
S



Agriculture Loss

Agricultural losses are listed in the table below. Losses are computed according to the number of days in which the crops are inundated with water. All numbers are estimated for a flood occurring near April 15th.

Table: Agricultural Losses, April 15th Scenario

Crop	100-year Losses Day 3	100-year Losses Day 7	500-year Losses Day 3	500-year Losses Day 7
Barley	$45,134	$60,179	$49,078	$65,438
Corn Silage	$565,932	$754,577	$566,310	$820,518

Vehicle Loss

The table below contains losses for vehicles in floods during both daytime and nighttime scenarios. The scenarios assume ninety percent (90%) of vehicles being removed from hazard areas due to warning.

Table: Vehicle Losses

Category	100-year	500-year
Daytime Scenario	$8,934,176	$12,019,101
Nighttime Scenario	$16,956,505	$21,976,899

Debris Removal

The table below shows how much debris would be generated by flooding and how many loads it would take to remove the debris, based on a capacity of 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

Table: Debris Generation and Removal

Category	100-year	500-year
Finishes	37,402 tons/1,497 loads	44,481 tons/1,780 loads
Structures	64,725 tons/2,589 loads	69,936 tons/ 2,798 loads
Foundations	61,660 tons/2,467 loads	66,747 tons/2,670 loads
Totals	163,786 tons/6,553 loads	181,164 tons/7,248 loads

Essential Facility Damage

Hazus estimates that there are 8 emergency operations centers, 60 fire stations, 25 hospitals, 30 police stations, and 389 schools within the area of the flood scenarios for Salt Lake County. No essential facility is estimated to receive substantial or moderate damage from a 100-year event. For a 500-year event, 3 schools are estimated to receive at least moderate damage during the scenario, which will result in loss of use of the facility.

Social Impact

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. Displacement includes households evacuated from within or very near to the inundated area. For a 100-year flood event, the model estimates 1,437 households (4,310 people) will be displaced due to the flood. Of these, 325 people (out of a total population of 1,029,655) will seek temporary shelter in public shelters. For a 500-year flood event, the model estimates 3,643 households (10,930 people) will be displaced due to the flood. Of these, 498 people will seek temporary shelter.

NFIP Participation

Salt Lake County and all cities, except for newly incorporated city, Brighton, and the metro townships, participates in the National Flood Insurance Program (NFIP). NFIP Zone A in the table below refers to a 100-year flood event, as previously mentioned.

Six residential properties have experienced repetitive loss in the County. Average amount of loss was $36,455.00.Total amount paid was $546,819.00. Residential repetitive loss properties reside in Unincorporated Salt Lake County.

Table: Salt Lake County 2018 NFIP Statistics by County

Total Premium	A-Zone	No. Policies	Total Coverage	Total Claims Since 1978	Total Paid Since 1978
$747,827	500	1,022	$244,166,300	354	$1,265,725

Source: 2019 Utah State Hazard Mitigation Plan

Landslide and Slope Failure

Slope failure is any type of ground disturbance on a surface with any slope and not on flat ground. Landslides, also referred to as slope failures, are classified according to the type of movement and material involved. Movement types include falls, topples, slides, lateral spreads and flows. Materials include rocks, debris (coarse-grained soil), and earth (fine-grained soil). The most common landslides in Utah include rock falls, rock topples, debris slides, debris flows, earth slides, and earth flows (UNHH 2008).

Similarly, a landslide is a mass of earth or rock which moves downslope by flowing, spreading, sliding, toppling or falling. Landslides are one of the most commonly occurring natural hazards in Utah. They are most common in areas having moderate to steep slopes, weak slope materials, and relatively wet climates. In these areas, most landslides are associated with precipitation events sustained above-average precipitation, individual intense rainstorms, or snowmelt events. Erosion, removal of vegetation by wildfires, and earthquake induced ground shaking increase the likelihood of landslides. Human activities such as grading of slopes or increasing soil moisture through landscape irrigation can also trigger landslides (UNHH 2008).

Rock falls and topples are downslope movements of loosened blocks or boulders from a bedrock area. These generally occur along steep canyons with cliffs, deeply incised stream channels in bedrock, and steep bedrock road cuts. The greatest damage from rock falls has been to roads, railroads, and aboveground pipelines (UNHH 2008).

Debris slides and flows occur in steep mountainous areas and involve the relatively rapid, viscous flow of coarse-grained soil, rock, vegetation and other surface materials. Debris flows contain more water than slides and are potentially more dangerous because they can form quickly, move at high speeds, and travel long distances. Debris flows generally remain in stream channels but can flow out from canyon mouths for a considerable distance. They can damage buildings, bridges, roads, railroads, and pipelines (UNHH 2008).

Earth slides and flows are composed of fine-grained material, but earth flows contain more water than earth slides. Earth slides and flows vary in size, including some of the largest past earth slides in Utah. Like other landslides, they can damage anything in their path (UNHH 2008).

Slumps are common along road embankments and river terraces. They slip or slide along a curved plane away from the upper part of a slope, leaving a scarp. They generally do not move far from the source area.

Landslide distribution is dependent on geology, topography, and climate. They are most numerous in the Middle Rocky Mountain's physiographic province and in the High Plateaus section of the Colorado Plateau province. As previously mentioned, weak rock types, steep slope gradients and relatively abundant precipitation are primary contributors to land sliding. Vegetative cover, slope aspect, and ground shaking from earthquakes can also influence slope stability (UNHH 2008). Nearly all landslides in Utah are reactivations of pre-existing landslides. Risk can be reduced by avoiding and/or stabilizing landslides (UNHH 2008).

Landslide and Slope Failure

Potential Impact		High	**Probability**		High
		Medium		X	Medium
	X	Low			Low
		Minimal			Unlikely
Location	Generally in canyon mouths and foothills and areas of recent wildfire activity.				
Seasonal Pattern	Spring and summer months.				
Conditions	Usually caused by the stress release of over-weighted soils or loosening of rock and debris by wind, water or ground shaking.				
Duration	Landslides/Rock falls: Hours to Months. Debris flows: Instantaneous.				
Secondary Hazards	Flooding (natural dams), traffic accidents.				
Analysis Used	Information and maps provided by UGS, UDEM, AGRC.				

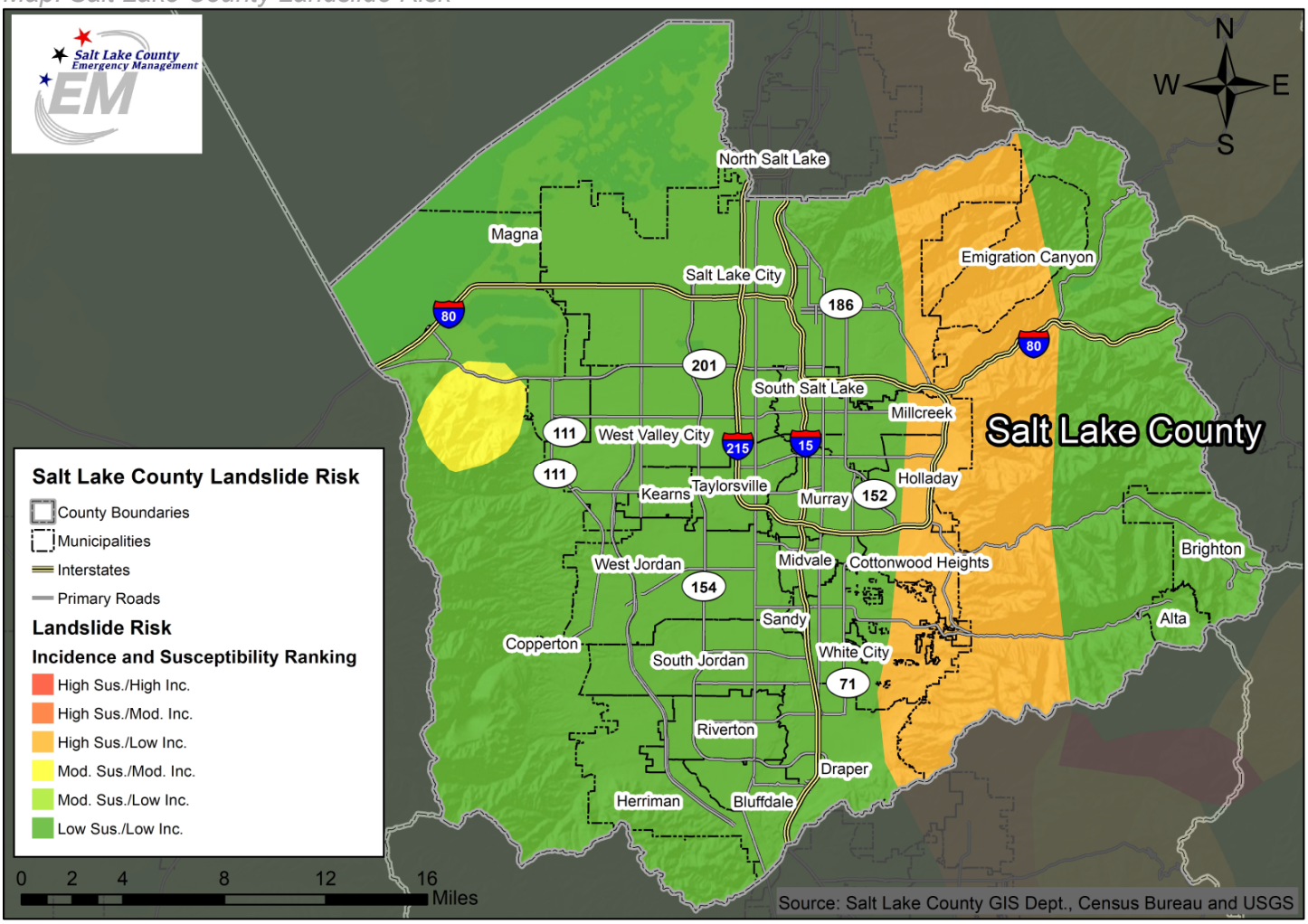
Range of Magnitude

The Rio Tinto Landslide was the single largest natural disaster in Salt Lake County's history. The recent landslide in North Salt Lake City falls into the "major" category. Due to the nature of Salt Lake County's topography and development moving into the steeper areas, the magnitude of damage is likely to continue to increase. Many landslide or slope failure events may be minor and cause little to no damage, but it is also possible that future landslides can range in costs from hundreds of thousands of dollars to hundreds of millions of dollars.

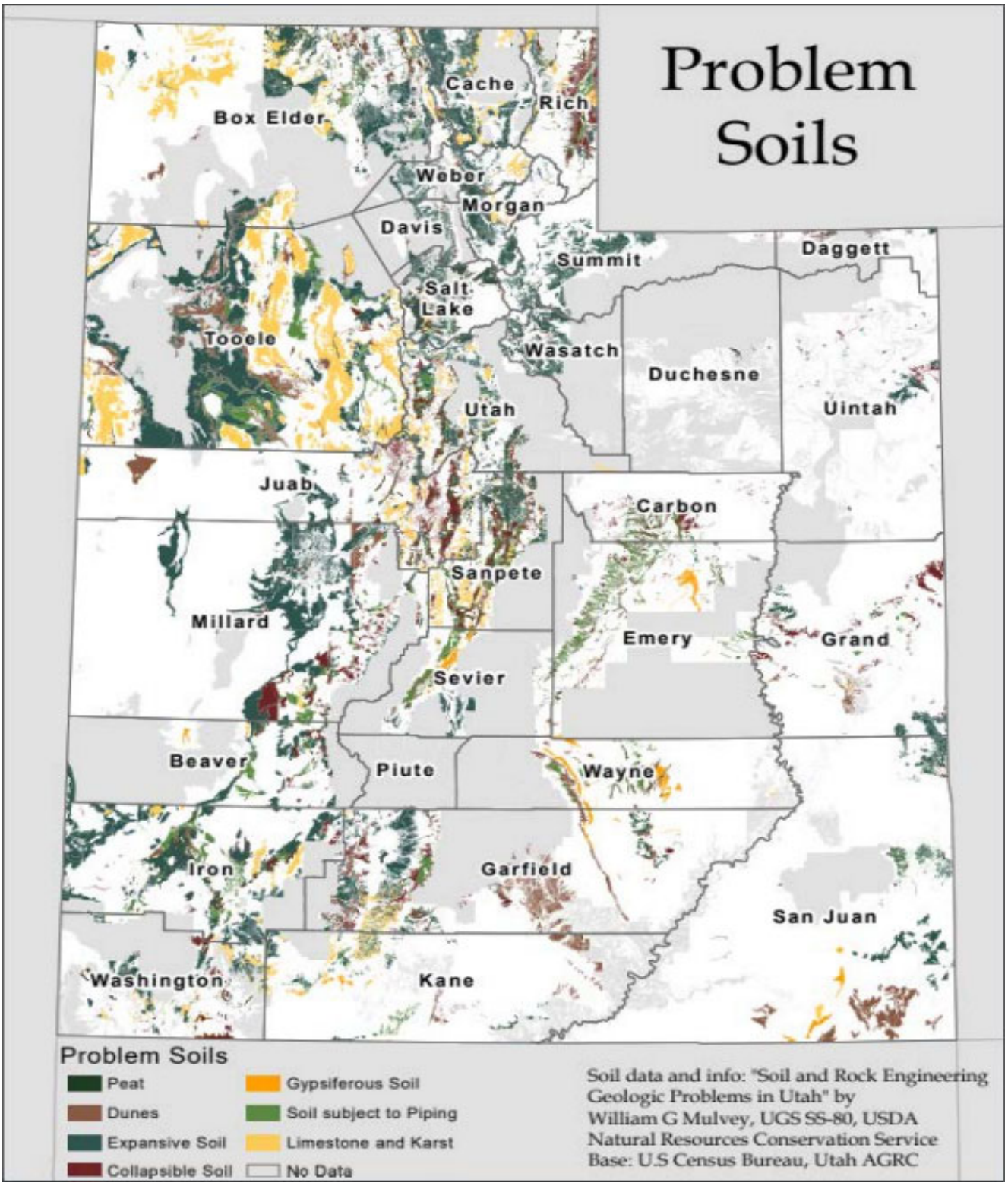
Location

Landslides and debris flows are most common in the foothills along the base of the Wasatch Mountain Range from wet climatic conditions. Some major landslide areas include the Grand View Peak rockslide in upper City Creek Canyon, the Little Valley Red Rock landslide in Draper and the shallow disrupted landslides in and near Steep Mountain in Draper. As urbanization spreads into geologically unstable areas of the county, the risk to life and property increases.

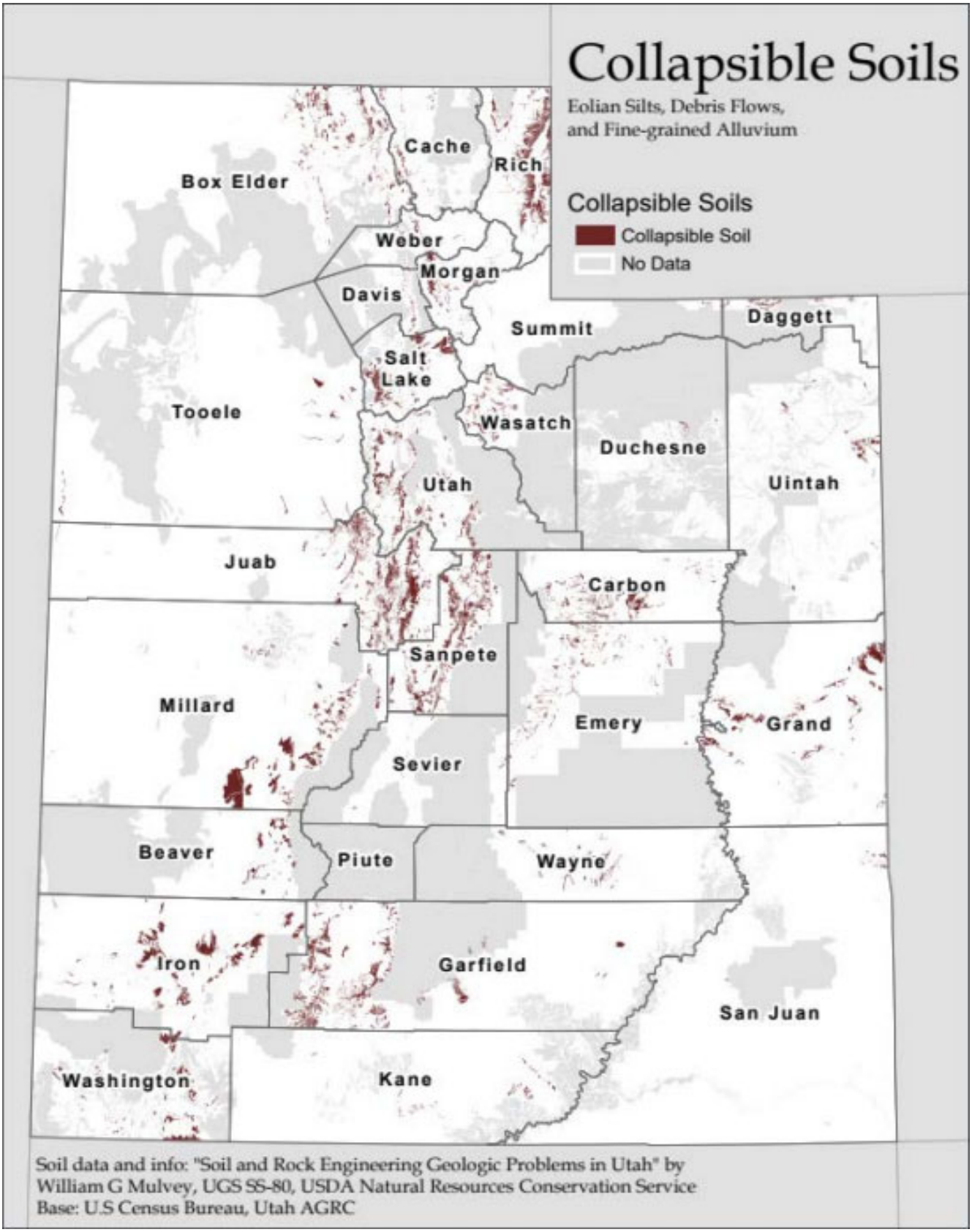
Map: Salt Lake County Landslide Risk



According to the 2019 Utah State Hazard Mitigation Plan, 56% of all slope failures in Salt Lake County occurred on hillsides where slopes range between 31 and 60%. In addition, there are approximately 1.63 square miles of the County ranked as being "High Hazard," in terms of landslide susceptibility; 320 sq miles are categorized as "Moderate," 25 sq miles as "Low," and 373.9 sq miles as "Extremely Low."



Source: 2019 Utah State Hazard Mitigation Plan



Source: 2019 Utah State Hazard Mitigation Plan

Historical Events and Probability of Future Occurrence

City Creek Canyon Landslides

A cluster of historical landslides is visible from the hairpin turn in Bonneville Boulevard in lower City Creek Canyon in Salt Lake City. The UGS and the Salt Lake City surveyor have monitored movement of the largest and most damaging of these landslides since June 1998. Since June 1998, the toe of the landslide has moved about 24 feet, and the main scarp has offset the ground surface about the same amount. Like most recurrently active landslides in northern Utah, movement typically occurs between March and June as ground-water levels rise following the snowmelt. Four houses at the top of the slide are threatened, and efforts to protect one house have cost in excess of $300,000. In 2006 the landslide reactivated again, moving about 2 feet, despite drier-than-normal conditions in Salt Lake City (2019 Utah State Hazard Mitigation Plan).



Courtesy UGS

Springhill Landslide

UGS has been monitoring conditions at the Springhill landslide in North Salt Lake, Davis County since 1998. In the late 1990s residents began noticing cracking and other distress related to relatively minor movement of the landslide. By 1998 a house at address 160 Springhill Drive that straddled the northern boundary of the landslide was severely damaged and condemned and several houses along Valley View Drive (formerly 350 East) and Springhill Circle also sustained damage. The City of North Salt Lake worked with DEM and FEMA to obtain PDM and HMGP grants to purchase the properties affected by this landslide. By 2013 the houses in the affected area of the landslide were demolished and North Salt Lake had turned the area into open space (2019 Utah State Hazard Mitigation Plan).



Courtesy UGS

Bingham Canyon Landslides

Two landslides occurred in 2013 at Rio Tinto's Bingham Canyon Mine. The first occurred on April 10, 2013 at 9:30 PM and moved around 65-70 million cubic meters of dirt and rock down the side of the mining pit. Officials at the mine anticipated the slide and took precautions. It is historically the largest landslide in the United States not connected to volcanism. On September 11, 2013 100 workers were evacuated when a second, smaller landslide occurred. No injuries occurred during either landslide (2019 Utah State Hazard Mitigation Plan).

It is highly likely that landslides and slope failures will continue to occur periodically within Salt Lake County. Subsidence is possible in City Creek, Emigration, Parley's, and Big Cottonwood Canyons due to the prevalence of dissolvable limestone. Subsidence can also occur in the Avenues area of Salt Lake City and in the Taylorsville-Kearns area due to collapsible soils that are compactable upon wetting (Mulvey 1992).

Secondary Hazards

Landslides can often enter water courses, increasing turbidity and polluting water supplies. Landslides can also alter river courses, disrupt large amounts of soil, contaminate the air, and cause deforestation. All of these environmental changes can lead to an increased risk of vector borne diseases or bacteria, potentially impacting human health long after the disaster has occurred. Other potential impacts to infrastructure include broken and failed railways, roadways, bridges, and even utility lines, which could lead to loss of power or the delay of delivery of vital services to certain parts of the county.

Vulnerability Assessment

The tables below estimates infrastructure vulnerable to landslides in Salt Lake County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. The tables also estimates the total area, population, and buildings vulnerable to landslides for individual cities, although not every identifiable area is specifically listed. This data is carried over from previous plans due to time constraints and minimal concern about change in hazard risk.

Table: Infrastructure Vulnerable to Landslides, Salt Lake County

Item	Length (Miles) or Number of Units	Replacement Cost
Highways/Interstates	46.86 miles	$259,322,175
Highway Bridges	38 bridges	$33,527,413
Railway Segments	4.98 miles	$5,716,617
Railway Bridges	1 bridges	$23,520
Water Distribution Lines	609.38 miles	$19,621,849
Gas Lines	243.64 miles	$7,848,732
Sewer Lines	365.61 miles	$11,773,110
Total Estimated Infrastructure Replacement Cost		$337,833,416

Daytime population in the County within high or moderate landslide susceptibility areas is approximately 23,573 people. The total night-time population within high or moderate landslide susceptibility areas is approximately 24,443 people.

Table: Vulnerability Assessment for Landslides, Incorporated Salt Lake County

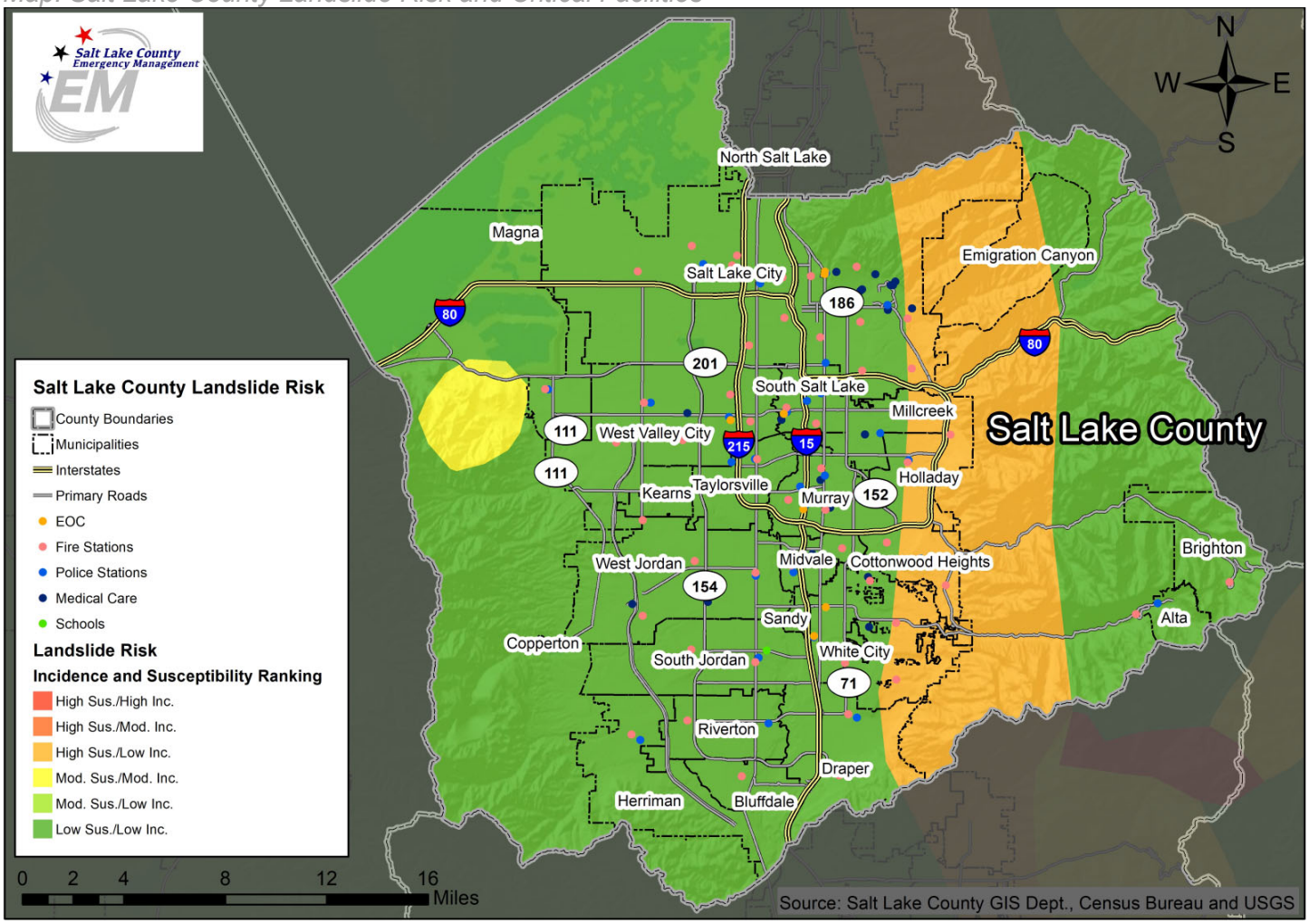
Incorporated Areas	Acres Affected	Population Affected	Structures in Areas of Moderate or Greater Hazard	
			Residential (Replacement Value)	Commercial (Annual Sales)
Alta	2,477	986	322 $65,881,200	0
Bluffdale	1,457	3,626	1,061 $217,080,600	1 $110,705
Copperton	14,390	510	215 $43,989,000	1 $9,785
Cottonwood Heights	1,296	5,982	2,014 $412,064,400	93 $38,368,162
Draper	2,816	8,318	2,380 $486,948,000	26 $7,143,464
Emigration Canyon	11,281	3,562	1,378 $281,938,800	25 $12,583,730
Kearns	10	109	31 $6,342,600	1 $85,797
Herriman	2,508	4,139	1,242 $254,113,200	0
Holladay	397	1,721	506 $103,527,600	23 $3,371,052
Magna	40	254	157 $32,122,200	0
Midvale	11	53	18 $3,682,800	0
Millcreek	4	54	20 $4,092,000	0
Murray	35	258	88 $18,004,800	4 $2,407,223
Riverton	75	362	88 $18,004,800	2 $120,490
Salt Lake City	15,701	15,762	6,327 $1,294,504,200	176 $47,480,280
Sandy City	1,567	8,199	2,301 $470,784,600	77 $15,535,108
South Jordan	72	213	60 $12,276,000	0
South Salt Lake	0	0	0	0
Taylorsville	19	179	55 $11,253,000	2 $346,531
West Jordan	368	439	171 $34,986,600	0
West Valley City	65	59	17 $3,478,200	0

Note: At the time the plan was updated, Brighton, was not considered an incorporated community. Information related Brighton is captured under Big Cottonwood Canyon.

Table: Vulnerability Assessment for Landslides, Unincorporated Salt Lake County

Unincorporated Areas	Acres Affected	Population Affected	Structures in Areas of Moderate or Greater Hazard	
			Residential (Replacement Value)	Commercial (Annual Sales)
Big Cottonwood Canyon	32,822	4,635	1,543 $315,697,800	0
Camp Williams	9,746	5,475.0	1,571 $321,426,600	2 $724,308
Canyon Rim	168	2,865	928 $189,868,800	0
East Millcreek	18	162	57 $11,662,200	1 $27,753
Granite	17,372	8,817	2,724 $557,330,400	6 $2,300,292
Mount Olympus	18,263	5,226	1,706 $349,047,600	39 $9,634,013
Parley's Canyon	31,744	6,188	2,245 $459,327,000	1 $530,390
Sandy Hills	1	7	2 $409,200	0
Southwest	15,295	2,383	656 $134,217,600	7 $5,411,633
Willow Canyon	5	45	11 $2,250,600	1 $387,562

Map: Salt Lake County Landslide Risk and Critical Facilities



Public Health Epidemic/Pandemic

An epidemic is a localized outbreak that spreads rapidly and affects a large number of people or animals in a community. A pandemic is an epidemic that occurs worldwide or over a very large area and affects a large number of people or animals.

For example, an influenza pandemic occurs when a new, virulent strain of the Influenza A virus emerges and there is little or no immunity in human populations, allowing the virus to circulate globally. The virus would be easily transmitted and has the ability to make many people very sick in a relatively short period of time. Its effects on humans could be mild, moderate, or very severe, even leading to death (SLVHD Family Emergency Preparedness Guide). Influenza is caused by a virus that is spread from person-to-person primarily through respiratory droplets generated from coughing or sneezing. Transmission is most efficient among crowded populations in enclosed spaces. The virus may persist for several hours, particularly in cold, indoor, and low humidity environments. It spreads rapidly because it has a short incubation period (period between infection and onset of symptoms) of 1-3 days and because persons are infectious (able to transmit the virus to others) during early illness or even before the onset of symptoms (SLVHD 2010).

Based on their characteristics and capacity to spread, the following human diseases could also contribute to a serious epidemic and should be noted:

- Methicillin-resistant staphylococcus
- West Nile virus
- H1N1 influenza
- Severe acute respiratory syndrome
- Measles
- Hepatitis
- Tuberculosis
- E. coli
- Lye disease
- Hantavirus
- Leptospirosis

Public Health Epidemic/Pandemic Profile

Potential Impact		High	**Probability**		High
	X	Medium		X	Medium
		Low			Low
		Minimal			Unlikely
Location	May occur throughout the county. It is difficult to identify exactly when and where the next event will take place.				
Seasonal Conditions	Primarily fall and winter, with potential impacts year round.				
Conditions	Variable time frame and variable severity. Once novel virus is introduced to the area, person-to-person transmission may spread virus rapidly.				
Duration	Four to six weeks to several months, possibly up to a year				
Secondary Hazards	Social and economic consequences, possible surge on healthcare resources.				
Analysis Used	Salt Lake Valley Health Department, Center for Disease Control, UDEM, local input, and review of historic events and scientific records.				

Range of Magnitude

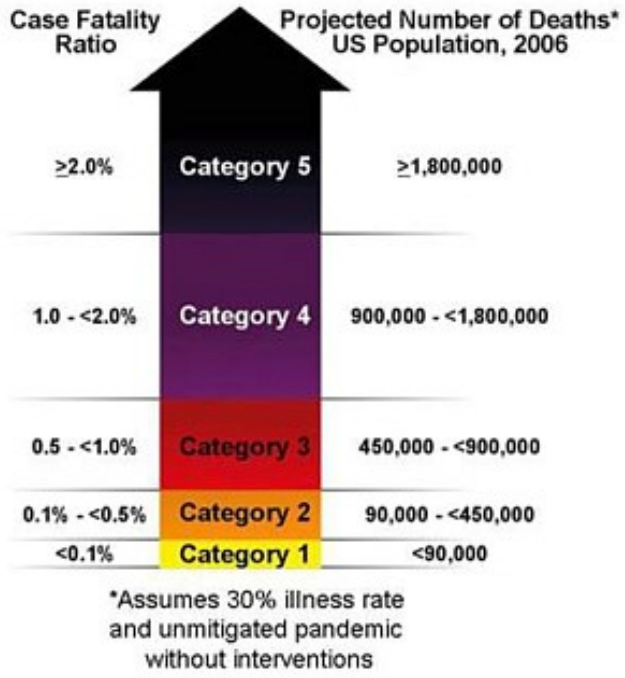
The Pandemic Severity Index is a tool to assess the severity of pandemic illness and appropriate mitigation measures to implement.

	Pandemic Severity Index		
Interventions by Setting	**1**	**2 and 3**	**4 and 5**
Home			
Voluntary isolation of ill at home (adults and children); combine with use of antiviral treatment as available and indicated	Recommend	Recommend	Recommend
Voluntary quarantine of household members in homes with ill persons (adults and children); consider combining with antiviral prophylaxis if effective, feasible, and quantities sufficient	Generally not recommended	Consider	Recommend
School			
Child social distancing –dismissal of students from schools and school-based activities, and closure of child care programs	Generally not recommended	Consider: ≤ 4 weeks	Recommend: ≤ 12 weeks
–reduce out-of-school contacts and community mixing	Generally not recommended	Consider: ≤ 4 weeks	Recommend: ≤ 12 weeks
Workplace/Community Adult social distancing			
–decrease number of social contacts (e.g., encourage teleconferences, alternatives to face-to-face meetings)	Generally not recommended	Consider	Recommend
–increase distance between persons (e.g., reduce density in public transit, workplace)	Generally not recommended	Consider	Recommend
–modify, postpone, or cancel selected public gatherings to promote social distance (e.g., stadium events, theater performances)	Generally not recommended	Consider	Recommend
–modify workplace schedules and practices (e.g., telework, staggered shifts)	Generally not recommended	Consider	Recommend

Location

There is often no defined geographic boundary for public health epidemics. Pandemics can spread throughout the county, region, state, and beyond.

Pandemics are different from other types of hazards. They may have a much wider geographic impact, last several months, the evidence tends to be less visible, casualties are predominantly human rather than material or structural, state and federal aid resources may be limited, and the economic impacts may be more widespread.



A widespread outbreak of influenza could require temporary changes in many areas of society, such as schools, work, transportation, and other public services. Although the most effective tool for mitigating a pandemic is a well-matched vaccine, it is likely no perfectly matched vaccine will be available for a new virus for several months. There may also be insufficient quantities of antiviral medications (CDC Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation). Therefore, mitigation measures can be designed to limit the impact on the community by slowing transmission, limiting opportunities for exposure, and delaying the outbreak peak to lessen the impact on the health care system (SLVHD 2010). Social distancing measures could also be implemented where public gatherings such as sporting events, church meetings, schools, and others would be closed to prevent further spread of the disease (SLVHD FEPG).

Historical Events and Probability of Future Occurrence

In 2018, at least 295 cases of hepatitis A were recorded in Utah (and two deaths), with the majority being reported primarily among the homeless of Salt Lake County. A small percentage of the outbreak occurred in nearby Utah County as well. Health officials set up hotlines and vaccinations were encouraged.

The Great Pandemic of 1918-1919 was the first reported pandemic in the Salt Lake County. The first cases in Utah undoubtedly appeared in the military camp at Fort Douglas. Like many states with a large rural population, Utah did not provide a report to the Public Health Service in the early weeks of the pandemic. This may have been because they were overwhelmed by the spread of the disease or it may have been because the state did not have enough public health officials available to make the weekly reports the Public Health Service demanded.

Although the odds of an eventual pandemic are high, the exact timing and frequency of occurrences are difficult to predict, making the risk low for any given year. In the 20th century, there were three influenza pandemics; in the 21st century, there has been one to date.

Secondary Hazards

Although public health emergencies usually will not directly impact physical infrastructure, the most likely secondary hazards would be social and economic in nature. If there was a surge on healthcare resources, shortages could cause civil disturbance events or mass evacuations, which would have additional far-reaching impacts.

Vulnerability Assessment

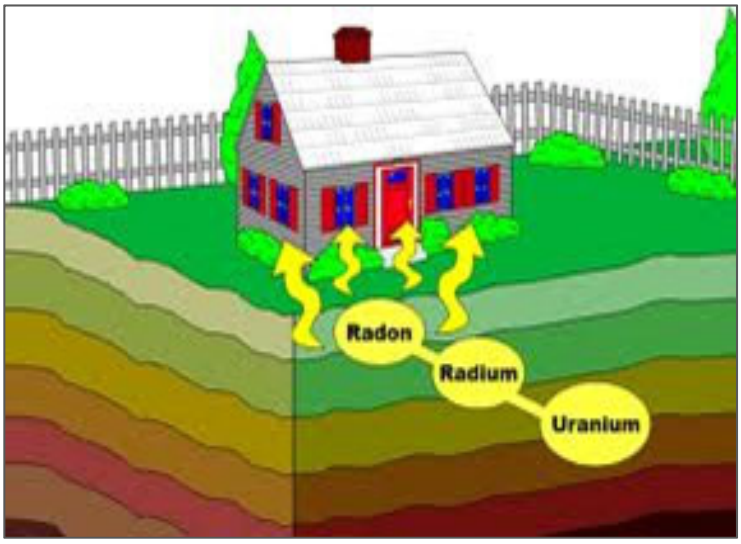
Individuals, families, employers, and communities will all experience difficulties dealing with community mitigation measures. Many problems will come from having children dismissed from schools and childcare programs. There are 546,000 children less than 18 years old currently in school in Utah, accounting for 21.8% of the population. An additional 205,000 residents (8.2%) are enrolled in college. Dismissing students from school would directly disrupt the schedule of 30% of the population. Secondary disruptions would occur for parents who would need to balance working with tending their children. Tertiary disruptions would occur for employers with absent employees that must stay home to care for children and could potentially result in workplaces closing or reducing operations and limiting the availability of essential services. Additionally 156,000 (17.9%) of Utah residents live alone; 30.1% are 65 years of age and older. Persons who live alone may be unable to follow isolation requirements if they need to acquire medications or shop for other essentials (SLVHD 2010).

Table: Community Mitigation Plan, Appendix H to the Salt Lake Valley Health Department Pandemic Influenza Preparedness and Response Plan

Characteristics	Pandemic Severity Index				
	Category 1	Category 2	Category 3	Category 4	Category 5
Case Fatality Ratio (Percentage)	<0.1	0.1-<0.5	0.5-<1.0	1.0-<2.0	>=2.0
Excess Death Rate (per 100,000)	<30	30-<150	150-<300	300-<600	>=600
Illness Rate (percentage of the population)	20-40	20-40	20-40	20-40	20-40
Potential Number of Deaths (based on 2008 population estimate of 1,041,578)	<312	312-<1,562	1,562-<3,125	3,125-<6,249	>=6,249
20th Century UT experience	Seasonal Influenza (illness rate 5-20%)	1957, 1968 Pandemic	None	None	1918 Pandemic

Radon

Radon is a radioactive gas released from the nuclear decay process of uranium and radium, which are trace elements of many soils. The radiation emitted is alpha, beta and gamma. It is odorless, colorless, and tasteless. As radon moves up through the ground it can enter a home through cracks and gaps in walls and floors, cavities inside walls, gaps around service pipes and water supply connections. Though relatively harmless at low levels, radon is classified by the EPA as a known human carcinogen and is considered the leading cause of non-smoking lung cancer in the United States. Small radioactive particles are inhaled and become lodged in the lungs damaging DNA. Because radon is tasteless, odorless, and invisible, it presents unique challenges in minimizing our daily exposure to this naturally occurring radiation (UNHH 2008).



Radon can be detected through an inexpensive test and can be mitigated through proper ventilation of excessive radon and installation of systems to prevent radon from entering the home.

The danger of high exposure to radon in mines was known back in the 1500s, yet the presence of radon in indoor air was not documented until 1950. Finally in 1970, research was initiated to address sources of indoor radon, determinants of concentration, health effects and approaches to mitigation. In 1984, a widely publicized incident in Salt Lake County escalated the problem of indoor radon and investigation intensified, with the EPA taking a strong lead to educate states via its State Indoor Radon Grant (SIRG).

EPA's grant has been partially funding the Utah Division of Radiation Control's (DRC) Indoor Radon Program that enables the Division to respond to a continuous stream of public telephone and email inquiries, provide education to homeowners and professionals, conduct "target area" indoor radon assistance and surveys and offer individualized assistance to homeowners and public agencies concerning all aspects of the indoor radon hazard problem.

"The Division's primary goal is to assure that radiation exposure to individuals is kept to the lowest practical level," said Lundberg. "A vital mechanism in reducing radiation exposure and potentially saving lives is our Indoor Radon Program."

Radiation risk to the American public from radon gas is undisputed. According to William Field (2011), radon is the leading environmental cause of cancer mortality in the United States and the seventh leading cause of cancer mortality overall. The Harvard School of Public Health in the Center for Risk Analysis has ranked radon as the highest of ten risks of death in homes in the United States, ahead of falls and home fires.

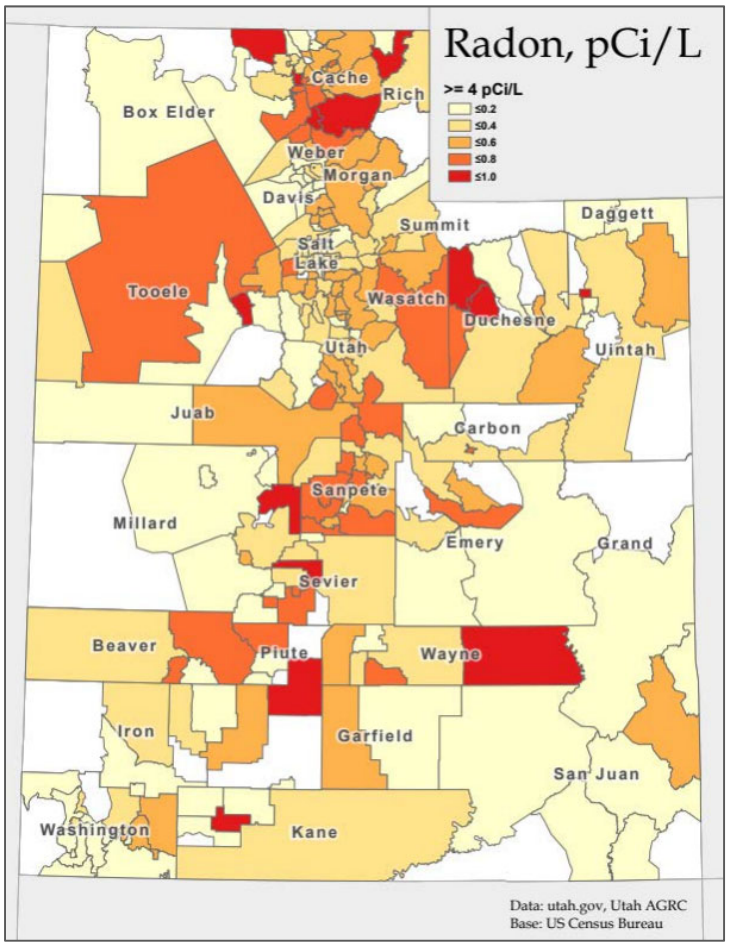
"Radon awareness in Utah has grown steadily the past decade," said Keyser. "Already this year, we have seen the number of radon tests conducted in Utah triple from the previous year."

Radon Hazard Profile

Potential Impact		High	**Probability**	X	High
		Medium			Medium
	X	Low			Low
		Minimal			Unlikely
Location	Region wide				
Seasonal Conditions	Year-round, continuous				
Conditions	Buildings over top of soils containing high amounts of decaying uranium, which is commonly found in Utah.				
Duration	Years				
Secondary Hazards	Unknown				
Analysis Used	Information and maps provided by the Utah Geological Survey and the Utah Division of Radiation Control.				

Range of Magnitude

Radiation is measured in curies. A curie is a rate of disintegration of 1 gram of radium. Radon is measured in picocuries per liter, shown as pCi/L. The 2019 Utah State Hazard Mitigation Plan maps the counties within the state according to Radon, pCi/L, which shows the range of magnitude that can be found throughout the County.



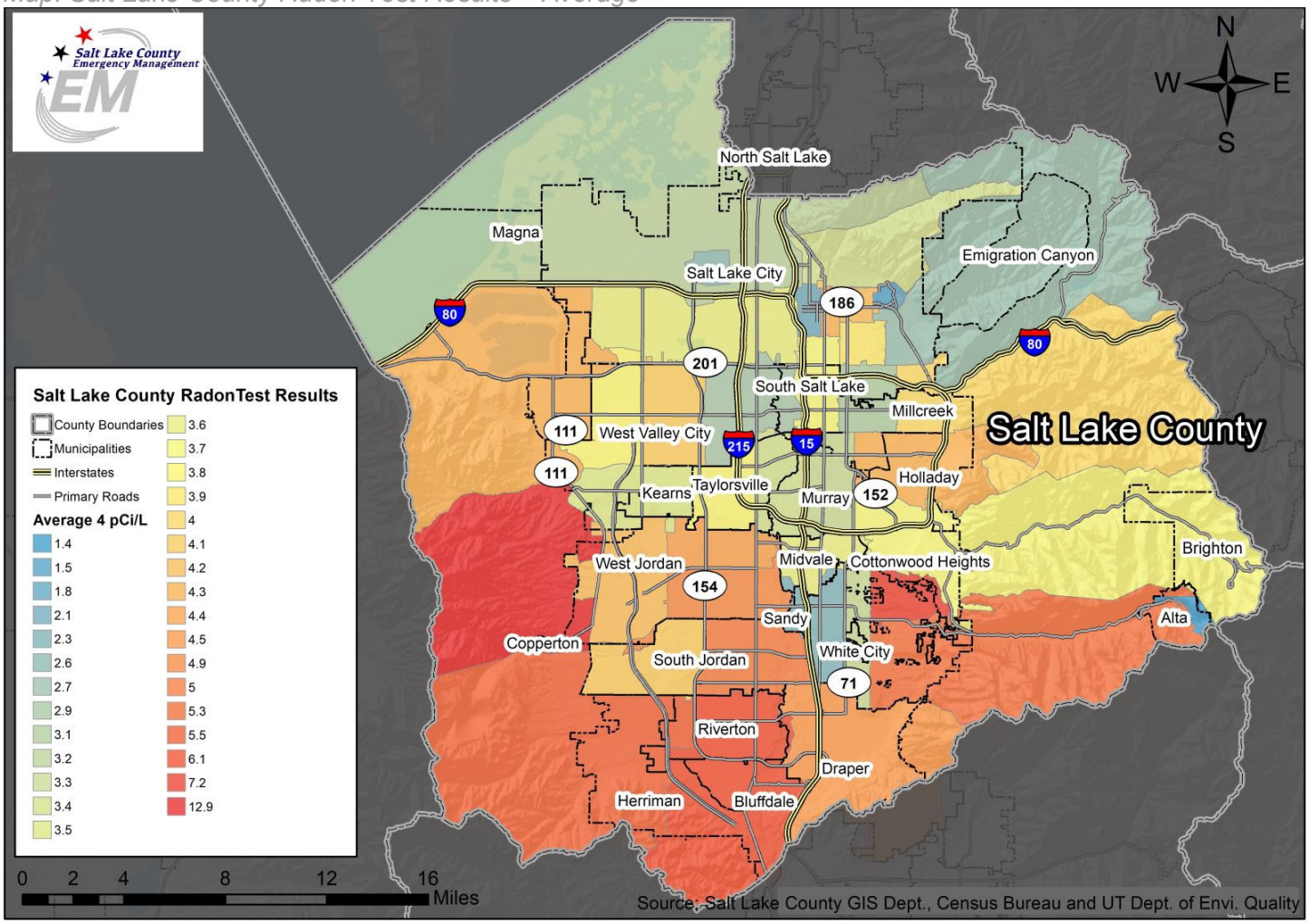
Source: 2019 Utah State Hazard Mitigation Plan

Location

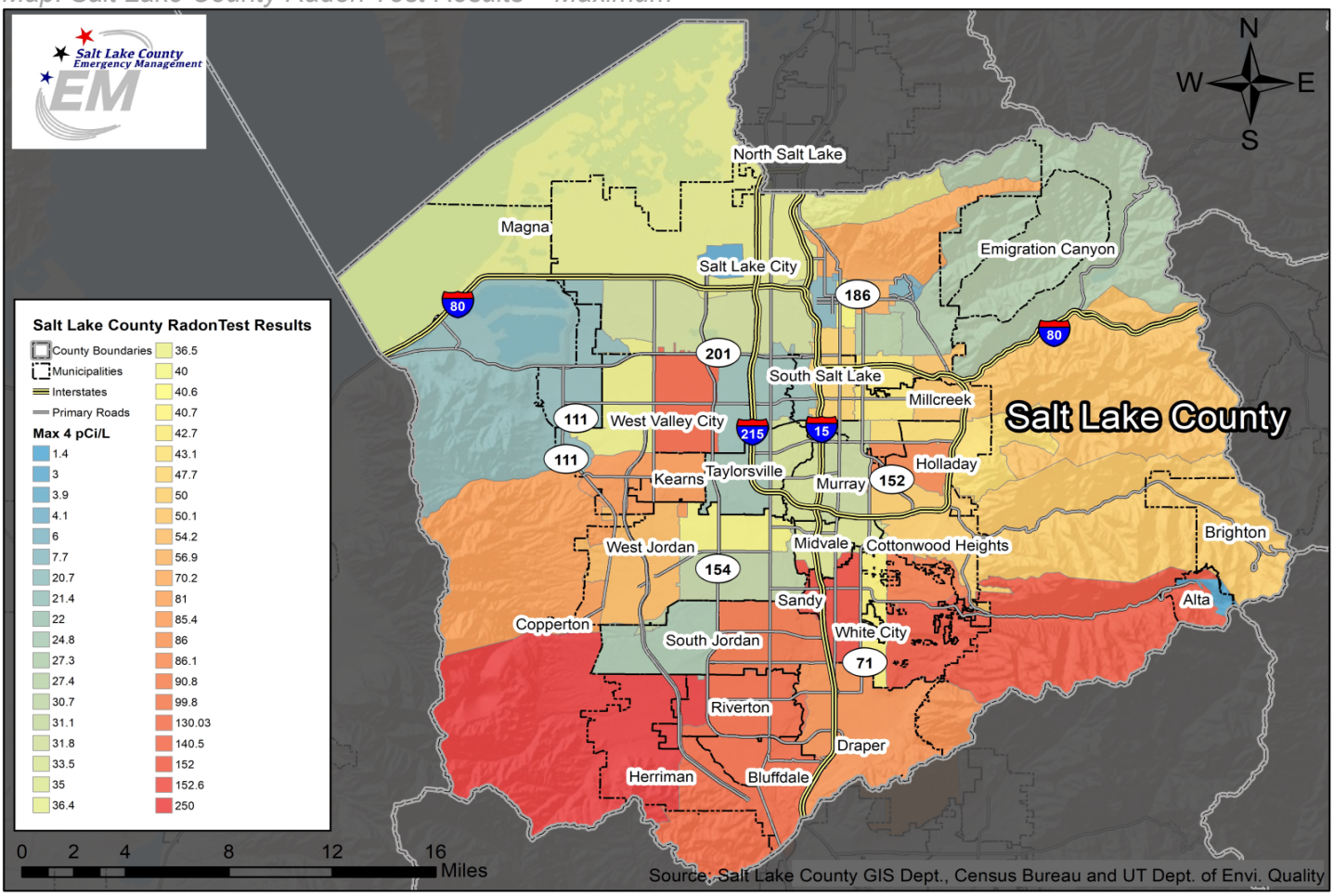
Radon gas can be found in most Utah homes. The gas comes from the small particles of uranium in rocks and soil, which decays into radium. In turn, the radium breaks down further into radon. As the radon moves up through the ground, it can enter a home through cracks and gaps in walls and floors if not properly vented.

Due to the types of geologic formations found in Salt Lake County, radon gas is likely present in higher concentrations in homes in the Wasatch and Oquirrh Mountains and their foothills. Sites further from the mountains and foothills generally have lower concentrations of radon. Radon does not pose a threat to infrastructure. Through collections of tests performed by various households in the county, households containing higher levels of radon were indeed found to roughly follow the patterns predicted by geologic formation. One exception is the area just South of Interstate 80 in Western Salt Lake City.

Map: Salt Lake County Radon Test Results – Average



Map: Salt Lake County Radon Test Results – Maximum



Historical Events and Probability of Future Occurrence

According to the US EPA, nearly 1 in 3 homes checked in seven states and on three Indian lands had screening levels over 4 pCi/L, the EPA's recommended action level for radon exposure.

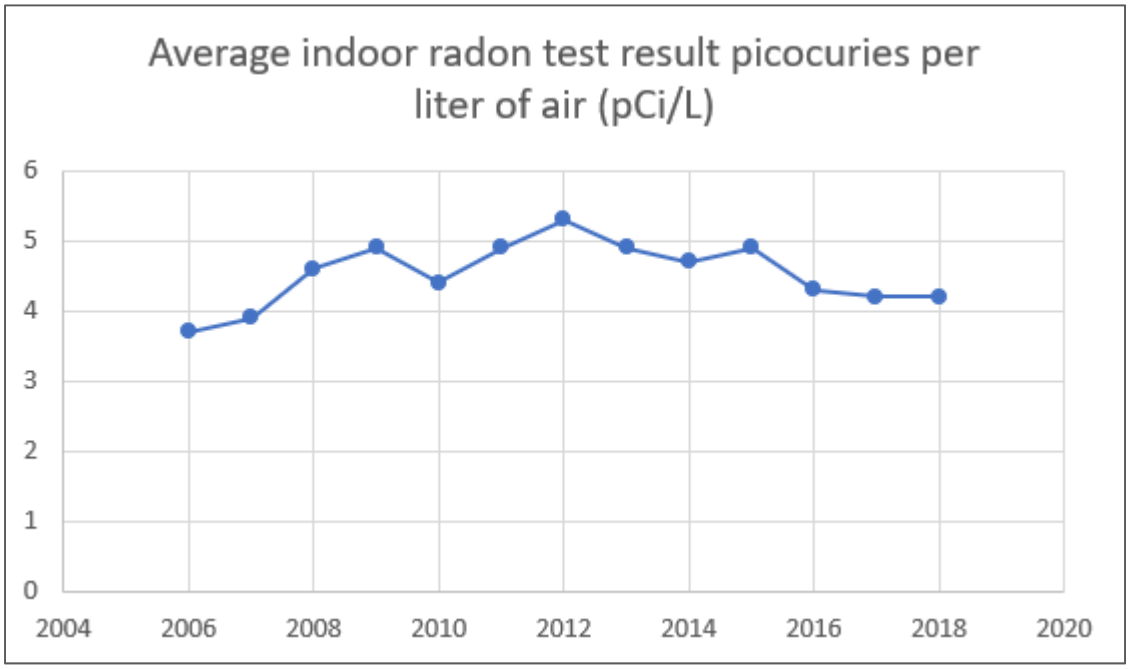
A family whose home has radon levels of 4 pCi/L is exposed to approximately 35 times as much radiation as the Nuclear Regulatory Commission would allow if that family was standing next to the fence of a radioactive waste site. (25 mrem limit, 800 mrem exposure)

An elementary school student that spends 8 hours per day and 180 days per year in a classroom with 4 pCi/L of radon will receive nearly 10 times as much radiation as the Nuclear Regulatory Commission allows at the edge of a nuclear power plant. (25 mrem limit, 200 mrem exposure)

The Utah Department of Public Health tracks the results for indoor radon levels within each county every year – the results of which can be seen below.

Table: Salt Lake County Results for Indoor Radon Levels

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
pCi/L	3.7	3.9	4.6	4.9	4.4	4.9	5.3	4.9	4.7	4.9	4.3	4.2	4.2



Source: https://epht.health.utah.gov/epht-view/query/result/radon/Radon/Average.html

The Salt Lake County Board of Realtors is currently maintaining a database of Radon readings in residential homes. County Ordinances require homes with unacceptable radon levels to undergo mitigation procedures prior to sale. This should eventually make all homes safe, however the County will continue to experience radon exposure for the foreseeable future.

Secondary Hazards

The secondary hazards from radon are unknown.

Vulnerability Assessment

Radon does not impact infrastructure, but all humans and households who are exposed within the County would be at risk. These figures can be seen in the Salt Lake County Demographics portion of this Plan. As previously stated, radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer. Most U.S. EPA lifetime safety standards for carcinogens are established based on a 1 in 100,000 risk of death. Most scientists agree that the risk of death for radon at 4 pCi/L is approximately 1 in 100. At the 4 pCi/L EPA action guideline level, radon carries approximately 1000 times the risk of death as any other EPA carcinogen. It is important to note that the action level is not a safe level, as there are no “safe” levels of radon gas. Radon is the second leading cause of lung cancer in the United States. Only smoking causes more lung-cancer deaths, and smoking combined with radon is a particularly serious health risk. Chances of getting lung cancer are higher from the combination of smoking and radon than from either source alone. Not everyone who is exposed to radon develops the disease, but the chances increase with increasing levels of radon and length of exposure. The amount of time between exposure and onset of the disease is usually many years.

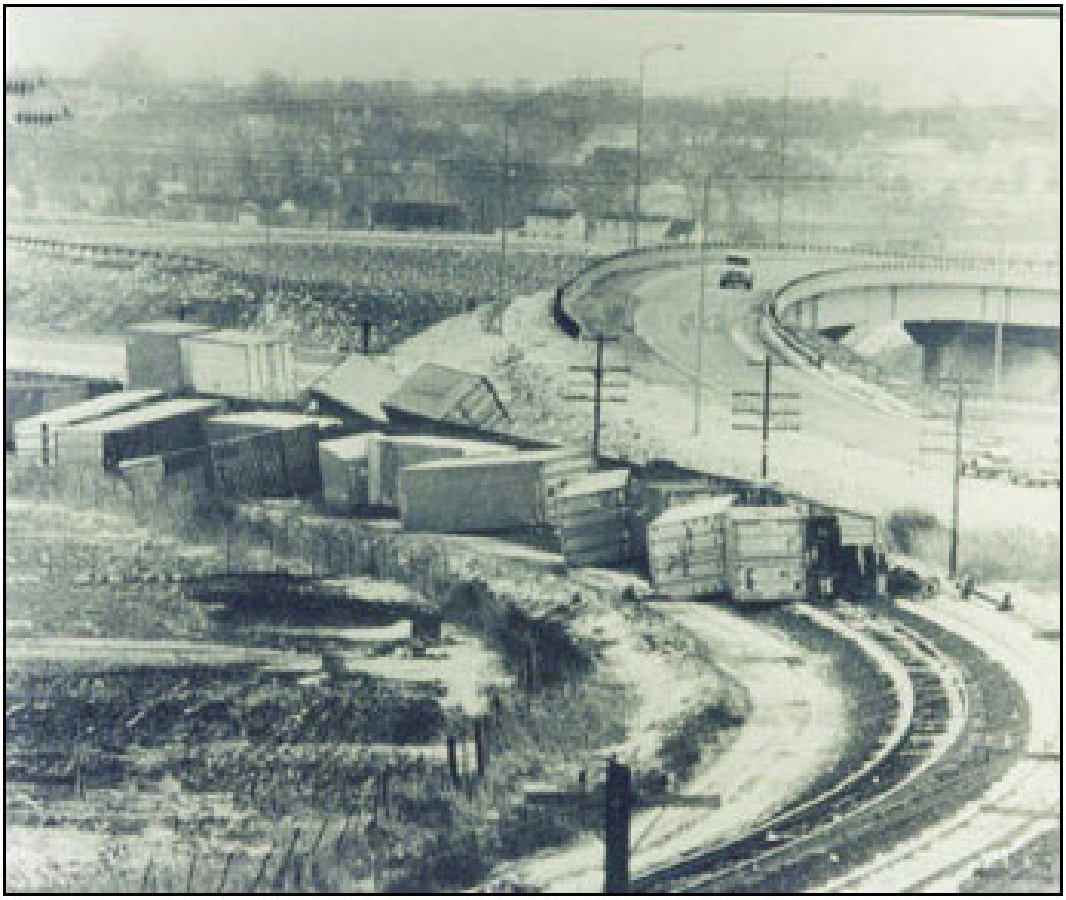
Severe Weather

High/Strong/Thunderstorm Winds:

High winds can occur with or without the presence of a storm and are unpredictable in regards to time and place. Salt Lake County has experienced high winds in the past and can expect future events.

Straight-line winds produced by thunderstorms are any winds not associated with the rotation of a tornado. Straight-line winds are responsible for most thunderstorm wind damage, and speeds can exceed 125 mph. Other damaging winds originating from thunderstorms include downbursts and microbursts. Utah has also experienced down slope wind events, which occur when wind generated as a deep layer of air is forced over a barrier. Winds accelerate down mountain slopes and generate high winds in a wave region formed at the base of the terrain. A down slope windstorm in December 2011 generated numerous reports of 60-80 mph winds, and maximum gusts of 80-100 mph in the Bountiful/Centerville area, resulting in loss of power and significant damage in the region (NWS 2012, Definitions for Severe Weather).

Canyon winds can bring wind gusts greater than 100 mph through the canyon mouths into the populated areas of the Wasatch Front. Winds are usually strongest near the mouths of canyons and have resulted in the loss of power and the inability to heat homes and businesses. Winds have also damaged roofs, destroyed and knocked down large trees and fences, overturned tractor-trailers, railroad cars and downed small airplanes.



Wasatch Front, April 4-6, 1983 – 70 mph
"East Winds" derailed this train in the Lagoon area. Peak gusts were recorded at 104 mph.
Source: Utah's Weather and Climate, Photo: Ogden Standard Examiner

Heavy Rain:

Heavy amounts of precipitation from rain or snow can result in flash flood events. The Wasatch Front has been susceptible to these types of storms because of close proximity to the mountain ranges. Major winter storms can produce five to ten times the amount of snow in the mountains than in the valley locations. Heavy snow can cause a secondary hazard in avalanches. Much of the valley's development has occurred on old alluvial fans from the canyon mouths. During heavy rain events, water and debris collect on these same alluvial fans, damaging residential, commercial property and infrastructure. In 2017, near Salt Lake City International Airport 1.97 inches of rainfall was recorded; this was the wettest day on record for the month of March, and the 6th wettest day since records began in 1874.

Lightning:

Lightning is a discharge of atmospheric electricity from a thunderstorm. It can travel at speed up to 140,000 mph and reach temperatures approaching 54,000 degrees. Lightning is often perceived as a minor hazard; in reality, lightning causes damage to many structures and kills, or severely injures, numerous people in the United States. It is estimated that there are 16 million lightning storms worldwide every year.

Hailstorms:

Hailstorms occur when freezing water (in thunderstorm clouds) accumulates in layers around an icy core generally during the warmer months of May through September. Hail causes damage by battering crops, structures and automobiles. When hailstorms are large, damage can be extensive, especially when combined with high winds. At times hail in Salt Lake County exceeds 1 inch in diameter.

Figure: Salt Lake Valley, September 3rd, 1983 - Thunderstorms produce 0.5" – 1.5" hail



Source: Utah's Weather and Climate, Photo: National Weather Service

Fog:

Temperature inversions often occur during the winter months as a result of high pressure trapping cold air in the valley. These inversions keep cold, moist air trapped on the Wasatch Front valley floor forming super-cooled fog. This fog can cause visibility restrictions and icy surfaces. Wind is needed to clear the inversion and fog. The Great Salt Lake has been shown to affect the prevalence of fog, especially when lake levels are high (Hill 1987).

Extreme Heat:

Temperatures in Utah can reach the extreme ends of the thermometer. Winter months often experience temperatures below zero degrees Fahrenheit. Summer temperatures regularly reach into the nineties with many days above 100 degrees Fahrenheit. Drastic temperature changes also occur, even in matter of hours. Temperature swings in such a short period of time can cause severe emotional stress in people.

Extreme heat is “summertime weather that is substantially hotter and/or more human than average for a location at that time of year” (EPA 2006). Extreme heat not only causes discomfort, but personal health can be affected through heat cramps, heat exhaustion or heat stroke. This can particularly affect vulnerable populations such as the very young, elderly, poor and homeless. Extreme heat places a substantial burden on power grids through widespread use of evaporative coolers and air conditioning. This strain can lead to brownouts or blackouts leaving many without power.

Severe Weather Hazard Profile

<table>
<tr><td rowspan="4">Potential Impact</td><td></td><td>High</td><td rowspan="4">Probability</td><td>X</td><td>High</td></tr>
<tr><td>X</td><td>Medium</td><td></td><td>Medium</td></tr>
<tr><td></td><td>Low</td><td></td><td>Low</td></tr>
<tr><td></td><td>Minimal</td><td></td><td>Unlikely</td></tr>
<tr><td>Location</td><td colspan="5">Can occur in areas throughout the entire county.</td></tr>
<tr><td>Seasonal Pattern</td><td colspan="5">Year round.</td></tr>
<tr><td>Conditions</td><td colspan="5">Vary based on latitude, elevation, aspect and landforms.</td></tr>
<tr><td>Duration</td><td colspan="5">Severe weather hazards generally last hours; some conditions can persist for days.</td></tr>
<tr><td>Secondary Hazards</td><td colspan="5">Wildfire, flooding.</td></tr>
<tr><td>Analysis Used</td><td colspan="5">National Climate Data Center, National Weather Service, Utah Avalanche Center, UDEM, local input, and review of historic events and scientific records.</td></tr>
</table>

Range of Magnitude

High/Strong/Thunderstorm Wind:

According to NOAA data, the highest Strong Wind event recorded in the County occurred on January 8, 2005, with gusts up to 99 kts.

Heavy Rain:

On August 8, 2006, about 1.3 inches of rain fell within one hour from Murray to East Millcreek. On several occasions, around 2 inches of rain have fallen at multiple locations within the County. On January 8, 2005, in

one of the costliest natural disasters in Utah history to that also impacted Salt Lake County occurred. A stalled storm system just off the southern California coast was able to tap abundant tropical moisture from the central Equatorial Pacific Ocean and dump copious amounts of rain and wet snow on many portions of Utah. Rain and snow fell on an already deep snowpack, producing a water equivalent total of over 10 inches and unleashing a chain of natural hazards that destroyed 30 homes, took multiple lives, and inflicted property damages estimated around $300 million throughout the State.

Lightning:

Lightning routinely occurs and causes no significant damage, but has inflicted up to $300,000 in property damage in Salt Lake County in the past. Damage of this magnitude should be considered rare and unlikely, however.

Hail:

Hail up to 1.75 inches in diameter has been observed multiple times within Salt Lake County, although most severe storms are unlikely to produce hail of this magnitude, if any at all.

Fog:

Fog is a natural phenomenon that routinely occurs to some degree within the County, with no damages or extremely hazardous conditions occurring. If fog becomes dense enough, however, visibility around travel routes can become extremely limited and result in massive damages from transportation related accidents. Although rare, up to $500,000 in damages have been recorded from accidents directly attributable to dense fog.

Extreme Heat:

The highest temperature ever recorded in Salt Lake City was 107ºF on July 13, 2002, although the average July high for the County is around 91ºF.

Location

The entire region of Salt Lake County can be affected by most severe weather event, however, mountains and valleys are prone to the highest and lowest temperatures and their effects. Communities with dense development and with limited park space or forest preserve areas are at greater risk during extreme heat events. Wind events are most damaging to areas that are heavily wooded and areas with exposed property, major infrastructure, and above-ground utility lines.

Historical Events and Probability of Future Occurrence

High/Strong/Thunderstorm Wind:

According to NOAA data, there have been 205 High, 5 Strong, and 67 Thunderstorm Wind event days from 1996 to 2018 (23 years). These have resulted in approximately 15 deaths, 274 injuries, and $9,752,300 in property damage. This averages to approximately 1 death, 12 injuries, and $424,013 in property damage per year, which is highly likely to continue to into the near future. The median property damage amount for all high, strong, and thunderstorm wind events is $0, indicating that the data is skewed upwards by a smaller number of higher costing events. For example, three events that took place on August 1, 2006, May 2, 2001, and March 20, 2000, totaled approximately $4,500,000 by themselves. If these outliers are removed from the data, an average of $228,361 in property damages emerges, on average for each year, although the fact remains that the majority of events cause little to no property damage.

Very strong winds developed across much of Utah on April 16, 2018, ahead of a cold front, with wind damage reported in parts of the Wasatch Front. Maximum recorded wind gusts included 73 mph at SR-201 at I-80, 65 mph at Baccus, 63 mph at Flight Park South, and numerous other reported gusts in the 50-62 mph range. The gusts blew down multiple trees and one fell on a house in Murray. Trampolines became airborne and landed in yards, over fences, and on the roof of a home in one case. Total damages were recorded as $50,000 and more than 7,500 power outages were reported.

On August 1, 2006, severe thunderstorm winds up to 75 mph impacted the southern part of Salt Lake County in conjunction with Utah County Storms. Trees up to 12 inches in diameter snapped in East Millcreek, and large trees were uprooted in Sugarhouse area. Numerous power poles were also downed in the southern portion of County. According to a regional insurance claim estimate, the total reported damage was approximately $2,000,000.

On May 2, 2001, strong canyon winds developed along the Wasatch Front, lasting until the early morning of the 4th. The storm caused an estimated 3 million dollars in property damage between Davis and Salt Lake Counties, and several hundred thousand dollars damage to trees. The worst damage was reported in East Sandy and Cottonwood Heights. A semi-truck was overturned on I-15 in Centerville on the 3rd, and a large tree smashed into a house in Farmington. Thankfully, no injuries were reported.

Heavy Rain:

Although rain obviously occurs frequently as part of natural weather processes, rains heavy enough to be classified specifically as "heavy rain" events within the NOAA records have occurred 8 times from 1996 to 2018 – approximately 1 event every 3 year, a rate likely to continue. Total property damage from these 8 events are $1,567,000, although half (4) caused no reported damage at all.

On March 23, 2017, heavy rain fell across the Salt Lake Valley. At the Sunnyvale Apartments on 3940 South 764 West, two families had to evacuate their apartments due to flooding. Relatively close by at the Salt Lake City International Airport, 1.97 inches of rainfall was recorded; this was the wettest day on record for the month of March, and the 6th wettest day since records began in 1874.

As previously stated, on August 8, 2006, about 1.3 inches of rain fell within one hour from Murray to East Millcreek. On several occasions, around 2 inches of rain have fallen at multiple locations within the County. On January 8, 2005, in one of the costliest natural disasters in Utah history to that also impacted Salt Lake County occurred. A stalled storm system just off the southern California coast was able to tap abundant tropical moisture from the central Equatorial Pacific Ocean and dump copious amounts of rain and wet snow on many portions of Utah. Rain and snow fell on an already deep snowpack, producing a water equivalent total of over 10 inches and unleashing a chain of natural hazards that destroyed 30 homes, took multiple lives, and inflicted property damages estimated around $300 million throughout the State.

Lightning:

Lightning routinely occurs and causes no significant damage, but 11 events have been recorded from 1996 to 2018 that caused significant damage, injury, or death. During this time span, 4 deaths, 10 injuries, and $351,200 in property damage recorded. It is certain that lightning events will continue to occur routinely throughout the year within the County.

On May 24, 2000, an 11-year-old girl was killed and six other children were injured when lightning struck them as they were getting out of Midvalley Elementary School in Midvale. The children were walking across the playground, heading for their bus when the lightning struck. The victim was still alive as she was transferred to the hospital, but died later from her injuries. One other child was hospitalized, but recovered. The other five

children suffered minor injuries. Shortly afterwards, also in Midvale, a 36-year-old man was injured by lightning as he ran out to his car to roll up his windows.

On August 13, 1997, lightning struck a chimney and sparked a fire in the Aix La Chapelle Condominiums in Holladay. Several units received heavy fire damage, totaling $300,000 in damage.

Hail:

From 1996 to 2018, 39 hail events are recorded in the NOAA data, an average of approximately 2 significant events per year. Although minor hail events will certainly continue regularly as part of natural weather processes, the 48 events recorded by the NOAA are comprised of hail that is a minimum of .75 inches in diameter; .95 inches is the average diameter of the hail reported in these events. Only three of these events have significant damage recorded, totaling $27,000; all other events caused little to no significant damage.

Fog:

As previously mentioned, fog is a natural phenomenon that will routinely occur to some degree within the County, with no damages or extremely hazardous conditions occurring. If fog becomes dense enough, however, visibility around travel routes can become extremely limited and result in massive damages from transportation related accidents. There have been 4 dense fog incidents recorded by NOAA from 1996 to 2018, totaling $1,200,000 in resulting damages.

On January 8, 2003, dense fog formed along the Great Salt Lake during the morning commute, causing a 59 car pileup between the Salt Lake International Airport and Saltair. Amazingly, there were no fatalities, but 14 people were injured and taken to local hospitals. Approximately $500,000 in damages were recorded.

On February 3, 2002, dense fog caused an 11-vehicle pileup on Interstate 80 between Tooele and Grantsville. There were 3 fatalities and several injuries in an accident that involved 8 semi-tractor trailers, 2 passenger cars and a pickup truck. A semi slammed into the rear of another semi that had pulled off the freeway in the dense fog. That initial collision was followed by a chain of vehicles and the remaining semis slamming into each other. The pileup caused 4 of the semis to catch fire. The accident closed I-80 in both directions. Approximately $500,000 in damages were recorded.

Extreme Heat:

As previously stated, the highest temperature ever recorded in Salt Lake City was 107ºF on July 13, 2002, although the average July high for the County is around 91ºF. No extreme heat events or any corresponding death or injury have been recorded by NOAA within Salt Lake County, specifically, although it is certain that at least mild events have occurred with moderate regularity, and will continue into the future.

Secondary Hazards

The most significant secondary hazards associated with severe local storms are floods, falling and downed trees, and downed power lines and associated power outages. Rapidly melting snow combined with heavy rain can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Excessive heat events can cause failure of motorized systems such as ventilation systems used to control temperatures inside buildings. Fires can occur as a result of lightning strikes.

Power Outages

According to the Commonwealth Edison (ComEd), "Weather-related events cause 70 percent of all power outages." Power outages usually last anywhere from a few minutes to a few hours. In some extreme cases, power outages have lasted a few days or even a few weeks. Severe weather induced power failures can come from the following sources:

- Storms: Thunderstorms increase the chance of lightning striking a vital part of the power grid. In addition, simple things like rain or freezing rain may damage insulators and other components vital for maintaining a functioning circuit. Snowstorms with wet snow have the same effect. Insulators keep the flow of electricity moving and not shorting out on buildings and other structures so large amounts of moisture entering the insulators cause a fuse to blow.
- Wind: High and moderate winds lead to power outages by blowing objects into power lines and other components, causing them to break. Momentary outages may occur if an object, such as a tree limb, is blown on to a power line and then falls off. Areas near oceans and other large bodies of saltwater may also experience power outages if the wind creates enough salt spray to reach nearby system components vulnerable to damage from sea water. Both high winds (more than 55 mph) and moderate winds (35 to 55 mph) may be sufficient to cause power outages.

Vulnerability Assessment

The following populations are most vulnerable to a severe weather event, face isolation and exposure during severe storms, or could suffer more secondary effects of the hazard.

The majority of injuries and deaths associated with lighting strikes occur when people are outdoors; however, almost one-third of lightning related injuries occur indoors. Males are five times more likely than females to be struck by lightning, and people between the ages of 15 and 34 account for 41 percent of all lightning strike victims (CDC, 2013).

Young children, the elderly, those who are sick, overweight or have alcohol problems, and men in general (because they sweat more and become more quickly dehydrated) are more susceptible to extreme heat. The chronically ill and elderly are often taking prescription medications that interfere with the body's ability to dissipate heat. However, even young and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Some behaviors also put people at greater risk: drinking alcohol; taking part in strenuous outdoor physical activities in hot weather; and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration. In past studies, extreme heat most strongly affected adults age 50 or older. Additionally, many more males than females were killed by heat than females, due to the higher rate of dehydration men experience.

The following table provides a breakdown of vulnerable populations for which data was available.

Table: Salt Lake County Vulnerable Populations to Severe Weather

Population Under 5	Population Under 18	Population Over 65	Male Population	Foreign Born	Speak English less than "Very Well"	Population with Disability	No Health Insurance	Population in Poverty
87,892	310,473	110,372	517,881	137,383	72,335	102,204	132,936	114,135

Source: 2017 American Community Survey

Severe Winter Weather

Extreme Cold:

Temperatures in Utah can reach the extreme ends of the thermometer. Winter months often experience temperatures below zero degrees Fahrenheit, however, prolonged periods of extremely cold weather are infrequent. An exception was January 2013, the coldest month on record for Salt Lake City since 1949. Historically, extreme cold in the region has disrupted agriculture, farming and crops. Especially vulnerable to extreme cold are the young, elderly, homeless and animals. Wind chill can also enhance the effects of extreme cold.

Winter Storms/ Ice Storms/ Winter Weather/ Blizzards:

Ice or sleet, even in the smallest quantities, can result in hazardous driving conditions and can be a significant cause of property damage. Sleet can be easily identified as frozen raindrops. Sleet does not stick to trees and wires. The most damaging winter storms are often ice storms. Ice storms are the result of cold rain that freezes on contact with objects having a temperature below freezing. Ice storms occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and heavy precipitation. This precipitation takes the form of freezing rain coating power lines, communication lines, and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication. Falling trees and limbs can also cause building damage during an ice storm. A blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and/or visibility of less than one-quarter mile for three or more hours. The strong winds during a blizzard blow about falling and already existing snow, creating poor visibility and impassable roadways. Blizzards have the potential to result in property damage. Blizzard conditions not only cause power outages and loss of communication, but also make transportation difficult. The blowing of snow can reduce visibility to less than one-quarter mile, and the resulting disorientation makes even travel by foot dangerous if not deadly.

Heavy Snow/ Lake Effect Snow:

Significant snowstorms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility.

East Bench, Salt Lake Valley, October 18, 1984;
22 inches of snow falls in 24 hours.



Source: Utah's Weather and Climate

Severe Winter Weather Profile

Potential Impact		High	**Probability**	X	High
	X	Medium			Medium
		Low			Low
		Minimal			Unlikely
Location	Can occur in areas throughout the entire county.				
Seasonal Pattern	Winter months				
Conditions	Vary based on latitude, elevation, aspect and landforms.				
Duration	Severe weather hazards generally last hours; some conditions can persist for days.				
Secondary Hazards	Secondary hazards can include potential for flooding, transportation failure, infrastructure damage and failure, including power outages.				
Analysis Used	National Climate Data Center, National Weather Service, Utah Avalanche Center, UDEM, local input, and review of historic events and scientific records.				

Range of Magnitude

Extreme Cold:

The coldest temperature recorded in Salt Lake was -22ºF on January 25, 1949; the average January low for the County is 23ºF.

Winter Storms/ Ice Storms/ Winter Weather/ Blizzards:

Although many of these events occur and cause little to no significant impact, there have been several occasions in the State's history that demonstrate the magnitude that is possible with these hazard events. There have been numerous other occasions where significant ice buildup has occurred, or 2 to 3 feet of snow has fallen along with gusts over 70 mph. In the Blizzard of 1997, up to four feet of snow fell in some places, numerous avalanches were triggered, and gusts of up to 77 mph were experienced, resulting in 50 injuries, several deaths, and approximately $40 million in damages throughout the State.

Heavy Snow/ Lake Effect Snow:

As previously described, heavy snow events routinely occur within the County, but cause no death, injury, or significant damage the majority of the time. There have been several occasions, however, where over 3 feet of snow has fallen, hundreds of thousands in damages have been incurred, or numerous deaths/injuries have been reported.

Location

The entire region of Salt Lake County can be affected by most severe weather event, however, mountains and valleys are prone to the highest and lowest temperatures and their effects. Communities with dense development and with limited park space or forest preserve areas are at greater risk during extreme heat events. Wind events are most damaging to areas that are heavily wooded and areas with exposed property, major infrastructure, and above-ground utility lines.

Historical Events and Probability of Future Occurrence

Extreme Cold:

The coldest temperature recorded in Salt Lake was -22ºF on January 25, 1949; the average January low for the County is 23ºF. Three cold/wind chill events have been recorded by NOAA within Salt Lake County from 1996 to 2018. No death, injury, or property damage has been recorded by NOAA as a result of any cold/wind chill event.

Winter Storms/ Ice Storms/ Winter Weather/ Blizzards:

According to NOAA data from 1996 to 2018, there have been 200 days with a blizzard, ice storm, winter weather, or winter storm event, totaling 13 deaths, 267 injuries, and $47,096,000 in damages. However, 3 of the deaths, 50 of the injuries, and $40,000,000 of the damages all occurred in one event on January 11, 1997. If this outlier is removed from the data, there is an average of approximately .43 deaths, 9.43 injuries, and $308,522 in property damages per year, although these averages are likely still skewed upwards by a smaller number of higher impact events.

On March 7, 2002, a ferocious cold front moved across Northern Utah with lightning, small hail and heavy snow. Very heavy snow along with strong winds made driving treacherous several hours after frontal passage. Around 200 accidents occurred in the Salt Lake Valley on the 8th, with 2 weather-related traffic fatalities and about 50 injuries. Approximately $140,000 in damages were recorded. Some of the snow totals in the mountains included 31 inches at Alta, 26 inches at Snowbird, 25 inches at Solitude, 15 inches at Trial Lake, and 12 inches at Sundance. Snowfall in the valleys and benches included 8 inches in Holladay and Olympus Cove, 7 inches in Sandy and Laketown, 6 inches in Centerville and Brigham City, and 5 inches at the Salt Lake City International Airport.

As previously mentioned, in the Blizzard of 1997, up to four feet of snow fell in some places, numerous avalanches were triggered, and gusts of up to 77 mph were experienced, resulting in 50 injuries, several deaths, and approximately $40 million in damages throughout the State. There have been numerous other occasions where significant ice buildup has occurred, or 2 to 3 feet of snow has fallen along with gusts over 70 mph.

Heavy/ Lake Effect Snow:

According to NOAA data from 1996 to 2018, there have been 222 days with a reported heavy or lake effect snow event. There were 6 deaths, 161 injuries, and $3,272,950 in property damage from these hazards during this time. This averages to approximately 1 death every four years, as well as 7 injuries and $142,302 in property damage per year. Most events cause no death, injury, or significant property damage, however, and these averages are influenced by a smaller number of high impact events.

On February 18, 2018, the Salt Lake and Tooele Valleys saw widespread heavy snowfall. Storm total snowfall reports included 25 inches in Sandy, 23 inches in Cottonwood Heights, 17.5 inches in Tooele, 15 inches in Olympus Cove, and 14 inches in Taylorsville. For the calendar day of February 19, Tooele recorded 13 inches of snow, which broke the calendar day record of 8 inches, set in 1945.

On December 5, 1996, a storm system combined with a moist westerly flow to spread heavy snow to much of the state. The valleys received from 6-11 inches while the mountains from 1-2 feet. The highest total for the mountains was at the Park City ski resort where 23 inches accumulated. The wet snow helped to trigger 6 avalanches during and shortly after the storm. A 37-year old man snowmobiling near Bountiful Peak was killed when he was overcome by one of these slides. There were also about 100 traffic accidents with 20 known injuries during this storm.

Secondary Hazards

The most significant secondary hazards associated with severe winter weather are structural damage from snow loads, wind damage, impacts on life safety, disruption of traffic, economic impact, loss of ability to evacuate, taxing first responder capabilities, service disruption (power, water, etc.), and communication disruption. Freezing temperatures and extreme cold may cause insulators to fail and conductors to break. Extreme cold has the added effect of making people turn up their heaters, which causes circuit overload and the resulting power outage. People turning on their lights and heaters in anticipation of the power being restored may extend an outage. It creates a high power demand on fusing that may not be able to handle the stress of the load.

Vulnerability Assessment

Similarly to severe weather vulnerability, all residents in the planning area are vulnerable to severe winter weather, but the elderly, low income, homeless, or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads or without adequate shelter may be especially vulnerable. Power outages can be life threatening to those dependent on electricity for life support. Power outages can also cause life-threatening situations if residents use alternative means to heat their homes without the use of proper ventilation. populations face isolation and exposure during severe winter weather events and could suffer more secondary effects of the hazard. The following chart provides a breakdown of vulnerable populations for which data was available.

Table: Salt Lake County Vulnerable Populations to Severe Winter Weather

Population Under 5	Population Under 18	Population Over 65	Foreign Born	Speak English less than "Very Well"	Population with Disability	No Health Insurance	Population in Poverty
87,892	310,473	110,372	137,383	72,335	102,204	132,936	114,135

Source: 2017 American Community Survey

Tornado

A tornado is a narrow, violently rotating column of air that extends from the base of a cumulonimbus cloud to the ground. The visible sign of a tornado is the dust and debris that is caught in the rotating column made up of water droplets. Tornadoes are the most violent of all atmospheric storms. The following are common ingredients for tornado formation:

- Very strong winds in the mid and upper levels of the atmosphere
- Clockwise turning of the wind with height (i.e., from southeast at the surface to west aloft)
- Increasing wind speed in the lowest 10,000 feet of the atmosphere (i.e., 20 mph at the surface and 50 mph at 7,000 feet.)
- Very warm, moist air near the ground with unusually cooler air aloft
- A forcing mechanism such as a cold front or leftover weather boundary from previous shower or thunderstorm activity.

Tornadoes can form from individual cells within severe thunderstorm squall lines or from an isolated super-cell thunderstorm. Weak tornadoes can sometimes occur from air that is converging and spinning upward, with little more than a rain shower occurring in the vicinity. The most extreme tornadoes can attain wind speeds of more than 300 miles per hour, stretch more than two miles across, and stay on the ground for dozens of miles.

Types of tornadoes include landspouts, multiple vortex tornadoes, and waterspouts. Other tornado-like phenomena that exist in nature include dust devils, fire whirls, and steam devils; downbursts are frequently confused with tornadoes, though their action is dissimilar.

Tornado Hazard Profile

Potential Impact		High	**Probability**		Highly Likely
		Medium		X	Likely
	X	Low			Possible
		Negligible (<10%)			Unlikely
Location	A tornado event is possible anywhere within the county.				
Seasonal Pattern	The majority of tornado and funnel cloud activity within the county has occurred during the late spring to early fall period of the year.				
Conditions	Tornadoes can often form from individual cells within severe thunderstorm squall lines.				
Duration	Tornadoes can last from a few seconds to an hour, although most last less than 10 minutes.				
Secondary Hazards	Potential secondary hazards include hazardous material releases, structural fires, and infrastructure failure if key facilities are damaged.				
Analysis Used	National Climate Data Center, local input, and review of historic events and scientific records.				

Range of Magnitude

Tornadoes were originally categorized using the Fujita Scale (F-Scale) or Pearson Fujita Scale, introduced in 1971, based on a relationship between the Beaufort Wind Scales (B-Scales) (measure of wind intensity) and the Mach number scale (measure of relative speed). The Fujita Scale is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure. The F-Scale categorizes each tornado by intensity and area. The scale is divided into six categories, F0 (Gale) to F5 (Incredible). The table below explains each of the F-Scale categories.

Table: Fujita Damage Scale

Scale	Wind Speed (mph)	Typical Damage
F0	<73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena occur.

The primary limitations of the F-Scale rating system are a lack of damage indicators, no account of construction quality and variability, and no definitive correlation between damage and wind speed. These limitations have led to the inconsistent rating of tornadoes and, in some cases, an overestimate of tornado wind speeds. These limitations led to the development of the Enhanced Fujita Scale (EF-Scale) by the Texas Tech University Wind Science and Engineering Center and a national forum of meteorologists and wind engineers (NOAA 2008). The EF-Scale takes into account more variables than the original F-Scale did when assigning a wind speed rating to a tornado. The EF-Scale became operational on February 1, 2007.

Because the EF-Scale was revised from the original F-Scale to better reflect examinations of tornado damage, it considers how most structures are designed (NOAA 2008). Tornado ratings are assigned based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DI) and Degree of Damage (DOD), which help better estimate the range of wind speeds produced by the tornado. From that, a rating is assigned, with six categories from EF0 to EF5, representing increasing degrees of damage. *Table: Enhanced Fujita Damage Scale* lists six categories of the EF-Scale.

The EF-Scale offers a set of wind estimates (not measurements) based on damage. Its uses three-second gusts estimated at the point of damage based on a judgment of eight levels of damage to the 28 indicators listed in *Table: Enhanced Fujita Scale Damage Indicators*. These estimates vary with height and exposure. Standard measurements are taken by weather stations in open exposures. *Table: The EF-Scale Ratings* describes the EF-scale ratings.

Table: Enhanced Fujita Scale Ratings

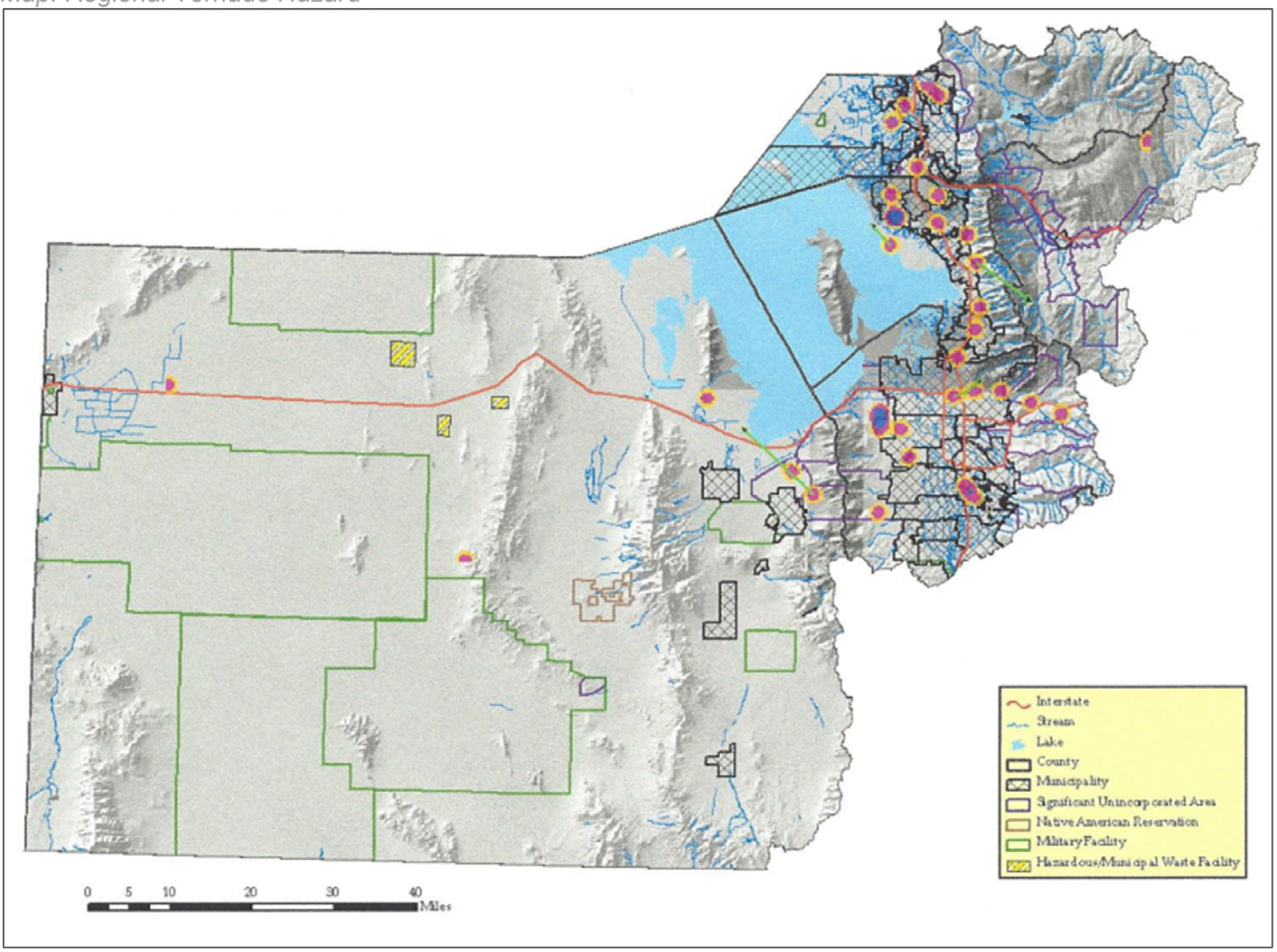
EF-Scale Number	Intensity Phrase	Wind Speed (mph)	Type of Damage Done
EF0	Light tornado	65–85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	Moderate tornado	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	Significant tornado	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	Severe tornado	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	Incredible tornado	>200	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); high-rise buildings have significant structural deformation; incredible phenomena occur.

Location

Some tornadoes can have wind speeds greater than 250 mph with a damage zone 50 miles long and greater than a mile wide. Currently, the most intense tornado in Utah's history has been an F3 on August 11, 1993, in the Uinta Mountains. No recorded tornado has been greater than an F2 within Salt Lake County specifically, however. Although they are less common in the Intermountain Region, an average of 3 tornadoes per year occurs in Utah. Examples are the Salt Lake City tornado August 11, 1999 and the Manti tornado in 2002. Most tornadoes in Utah typically have winds less than 110 mph (F2 or smaller), and no wider than 60 feet and are on the ground no longer than a few minutes.

Tornado distribution for the region suggests many tornadoes are funnel clouds aloft coming into contact with the increasing elevation of the region's foothills and mountains, as can be seen in the map below. Several of the tornadoes to impact Salt Lake County have specifically struck the Magna Metro Township. A tornado event is possible anywhere within or immediately around the entire planning region, however.

Map: Regional Tornado Hazard

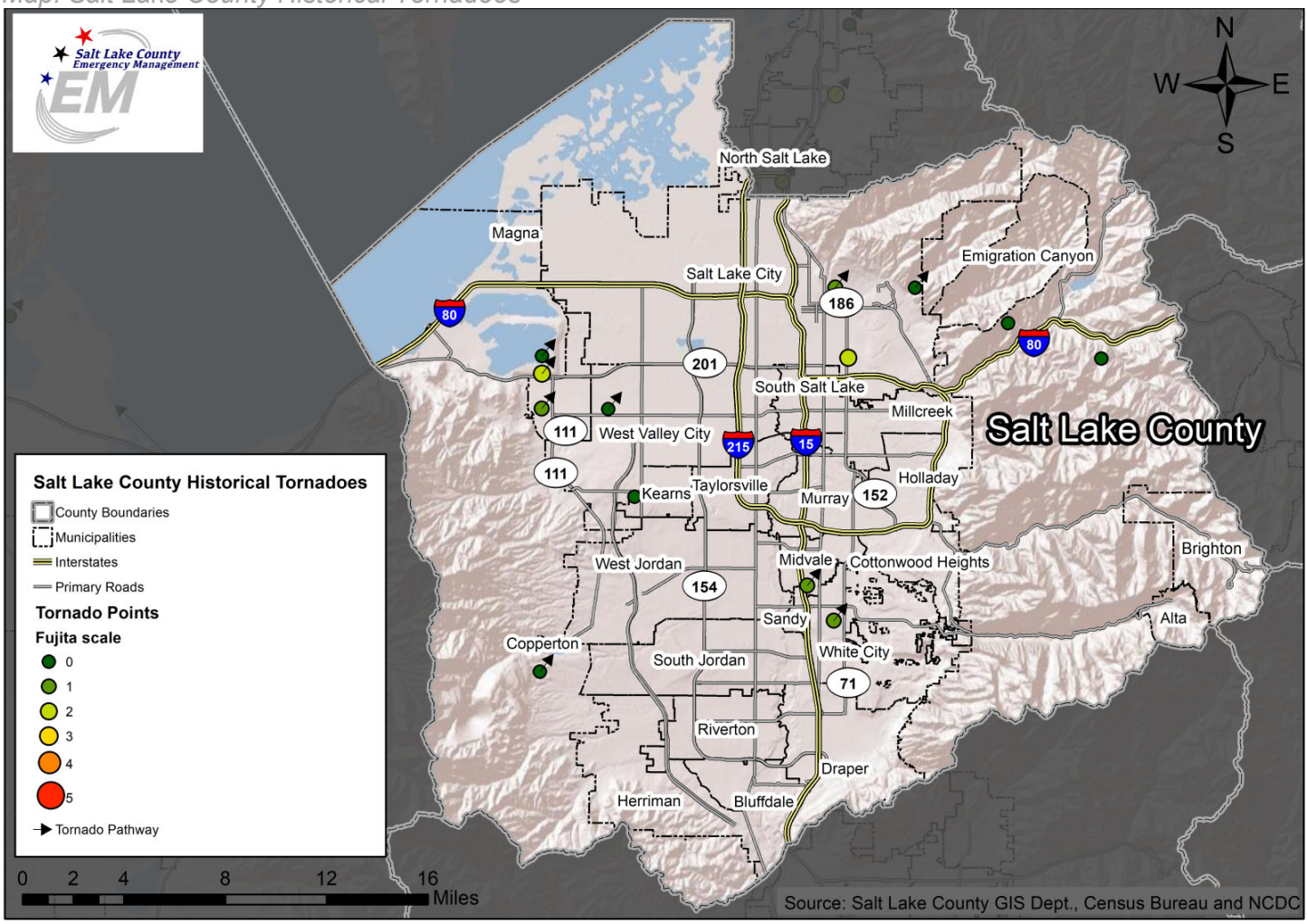


Source: NWS Storm Prediction Center

Historical Events and Probability of Future Occurrence

According to NOAA data from 1965 to 2018 (54 years), there have been 1 death, 80 injuries, and $170,165,000 in property damage within Salt Lake County from 18 tornado or funnel cloud events – an average of one event every three years. However, the most recent recorded event occurred in 2001. This would indicate that, although a tornado remains possible in any given year, the expected frequency of this hazard for the near future is likely to be less than one event every three years.

Map: Salt Lake County Historical Tornadoes



Historically, atmospheric conditions have not been favorable for tornado development in Utah due to a dry climate and mountainous terrain. Despite this fact, interactions of the relatively cool air of the Great Salt Lake and relatively warm air of urban areas could potentially create situations more favorable for tornado development. This phenomenon possibly contributed to the formation of the August 11, 1999, Salt Lake City tornado (Dunn and Vasiloff 2001). Around lunch time, a tornado touched down in the southwest portions of Salt Lake City. The tornado intensified to an F2 on the Fujita scale, and moved northeast through the metropolitan area of Salt Lake City. It caused widespread damage at the Delta Center, then ripped across an outdoor retailers convention tent, where the lone fatality occurred along with many of the injuries. After blowing out many windows in the Wyndam Hotel, the tornado continued its northeast track, knocking down scaffolding and shearing off a crane at the LDS Assembly Hall construction site. Next it skirted the Capitol Building, ripping out several large trees there and in historic Memory Grove. It then moved into the residential area known as The Avenues, damaging hundreds of

trees and ripping the roofs off of several homes, before finally lifting back into the clouds. All told, there was 1 fatality, 80 injured, and 300 buildings and homes sustained damage, with 34 homes deemed uninhabitable. At least 500 trees were totally destroyed, with 300 more damaged. Many vehicles were damaged or totaled as well. The $170 million in damages caused by this tornado make it the costliest disaster in Salt Lake County history. This event caused the only human losses to tornado events ever recorded in Salt Lake County.

Image: Salt Lake City Tornado,
August 11, 1999 - Orange fireball is a power sub-station exploding



Source: KTVX News 4

Secondary Hazards

Tornadoes have the potential to lead to widespread utility failure, thus exposing vulnerable populations to extreme temperatures. Tornado events may also be accompanied by strong thunderstorms, straight line winds, and hail, which can cause significant property damage on their own right.

Vulnerability Assessment

The following populations are most vulnerable to a severe weather event, face isolation and exposure during severe storms, or could suffer more secondary effects of the hazard. The elderly and functional needs populations are considered most vulnerable because they require extra time or outside assistance to seek shelter and are more likely to seek or need medical attention, which may not be available due to isolation during or after an event. The County population with a language barrier that possibly would be unable to follow warning messages would be vulnerable as well. Those living in mobile homes would be especially vulnerable to heavy winds and tornado activity. The following table provides a breakdown of vulnerable populations.

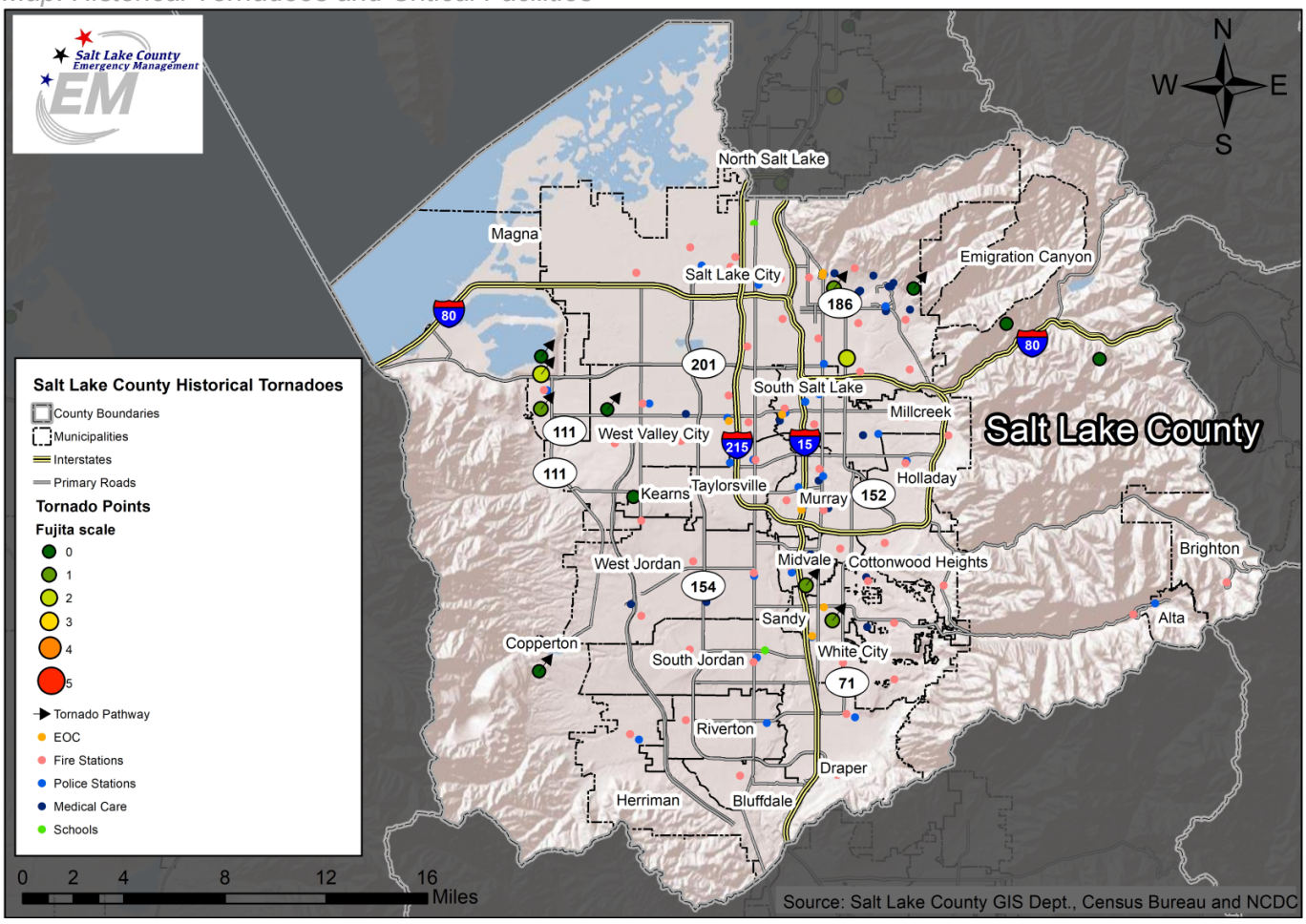
Table: Salt Lake County Vulnerable Populations to Tornado

Population Under 5	Population Over 65	Foreign Born	Speak English less than "Very Well"	Population with Disability	No Health Insurance	Population in Poverty	Population in Mobile Homes
87,892	110,372	137,383	72,335	102,204	132,936	114,135	7,199

Source: 2017 American Community Survey

The population in a car at the time of a tornado would also be vulnerable. According to the 2017 American Community Survey, the population in Salt Lake County transported to work by car, truck, or van is 482,321 people.

Map: Historical Tornadoes and Critical Facilities



Wildfire

Fire is a natural process in wildland areas. Wildfires are particularly concerning in the wildland-urban interface, however. The wildland-urban interface (WUI) is the line, area, or zone where structures or other human development meet or intermingle with undeveloped wildland or vegetative fuel. Examples include homes, storage sheds, recreational facilities, transmission lines, or other buildings. Significant human development has taken place in the WUI in Salt Lake County that has placed many people in fire-prone areas (UNHH 2008). Approximately 65% of Utah's wildfires are started by lightning, although 35% of fires are initiated by human activity.

The three conditions that affect fire behavior are topography, vegetation and weather.

Topography: Topography includes factors such as slope, aspect and elevation. Fires spread faster upslope because fuels are closer to flames. Aspect influences fuel moisture content. Fuels tend to be drier on south and west-facing slopes. Higher elevation is related to cooler temperatures and higher relative humidity, as well as changes in vegetative fuel types (UNHH 2008).

Vegetation: The type of vegetation around has a major effect on how quickly a fire will spread. For example, light grasses burn rapidly, whereas heavy, dense fuels like Douglas Fir burn slowly but with greater intensity. Different fuels burn at different rates of spread, intensity, and will resist control to different degrees (UNHH 2008).

Size, continuity and compactness also affect the fuel's rate of spread. Large fuels do not burn as readily as small fuels, and take more heat to ignite. Small fuels ignite easier and fire will spread more rapidly through them. Continuity describes how a fuel is arranged horizontally. Fuels that are broken up in patches burn unevenly and slower than uniform fuels. Compactness is how fuel is arranged vertically. Compact fuels burn slower than tall, deep fuels that have more oxygen available (UNHH 2008).

Weather: Weather (temperature, humidity, precipitation, and wind) affects the ease with which a fuel ignites, the intensity at which it burns, and how easy control may be. High temperatures heat fuels and reduce water content, which increases flammability. A decrease in relative humidity causes a proportionate decrease in fuel moisture, promoting easier ignition and more intense burning. Wind carries the heat from a fire into unburned fuels, drying them out and causing them to ignite easier. The wind may also blow burning embers into unburned areas ahead of the main fire that may start spot fires (UNHH 2008).

Wildfire removes vegetation that protects soil from excessive rainfall and resulting runoff. It also damages soil by making the soil hydrophobic, or water repellent. These conditions contribute to depletion of wildlife resources, soil erosion, water runoff, and in some cases severe slope failures and debris flows (UNHH 2008).

Providing adequate fire protection in the WUI can be difficult. Local suppression methods and resources may not be suited to wildfire suppression, and personnel can become easily overwhelmed when multiple structures are threatened simultaneously. Energy output from a wildfire may make protection of homes almost impossible and involves tremendous danger to firefighters and homeowners (UNHH 2008).

Wildfire Hazard Profile

Potential Impact		High	**Probability**	X	High
		Medium			Medium
	X	Low			Low
		Minimal			Unlikely
Location	Wildland-Urban Interface (WUI) zones near the foothills and in forested areas. Canyons, along Jordan River, undeveloped islands within urban areas (Dimple Dell)				
Seasonal Pattern	June-October.				
Conditions	Areas affected by drought; heavily overgrown and dry brush and debris; lightning and human triggers.				
Duration	Days to months; depends on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.				
Secondary Hazards	Landslides, debris flows/flash floods, erosion, traffic accidents, air pollution.				
Analysis Used	Review of plans and data provided by US Forest Service, FFSL, FEMA, AGRC, County Hazard Analysis Plans, WWA, and UDEM.				

Range of Magnitude

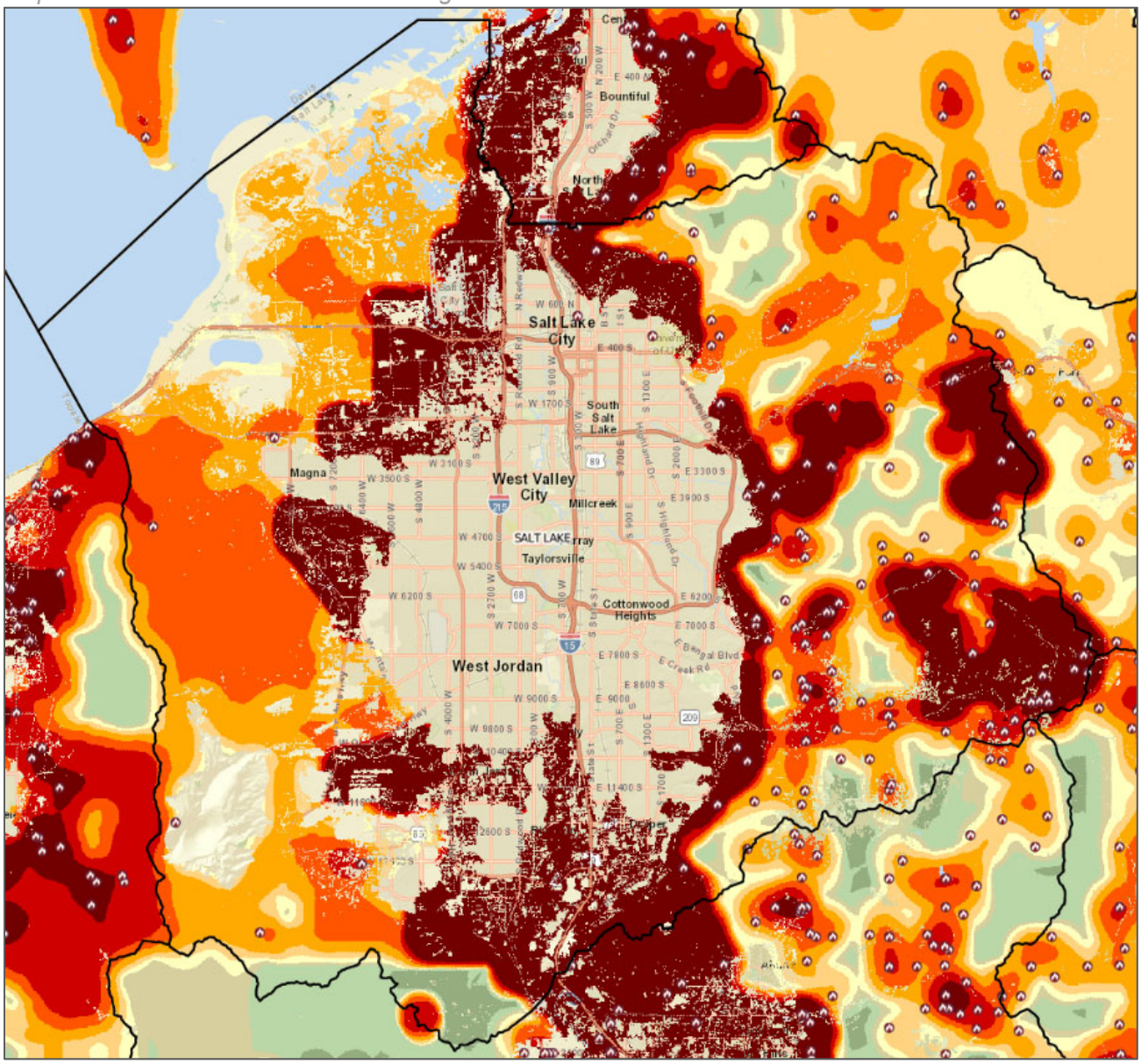
For information on the range of magnitude for wildfire in Salt Lake County, please see the Fire Threat Index information in the Vulnerability Assessment section of this hazard profile.

Location

The portions of Salt Lake County that could experience the most significant amount of destruction due to a wildland fire include the foothills and the bench areas on or near the Wasatch Range, Traverse Mountain and the Oquirrhs. These WUI areas are threatened most because of the amount of forested lands and the increasing population growth spreading into the foothills. Another concern is vegetation type in these areas such as sagebrush, mountain scrub oak, cheat grass, pinion and juniper trees, and rural and riparian vegetation. Sagebrush and mountain shrub burn hot and fast, spreads easily and is found throughout the county. During prime burning conditions (hot, dry and windy) the pinion juniper class will burn.

As can be seen in the map below, historical wildfire ignition points have been marked, and areas most likely to be the source of ignition based on historical patterns are darkly shaded.

Map: Historical and Probable Wildfire Ignition Points



Source: West Wide Wildfire Risk Assessment

As population growth continues, pressure to develop in WUI areas is likely to increase the threats associated with fire. Mitigation measures will need to be recognized and enforced to reduce these threats.

Past wildfires in Salt Lake County have also had a significant impact on watersheds, resulting in slope failure, debris flows and other forms of erosion. State and local agencies have worked together to enhance ordinances and other measures to protect County watersheds.

Historical Events and Probability of Future Occurrence

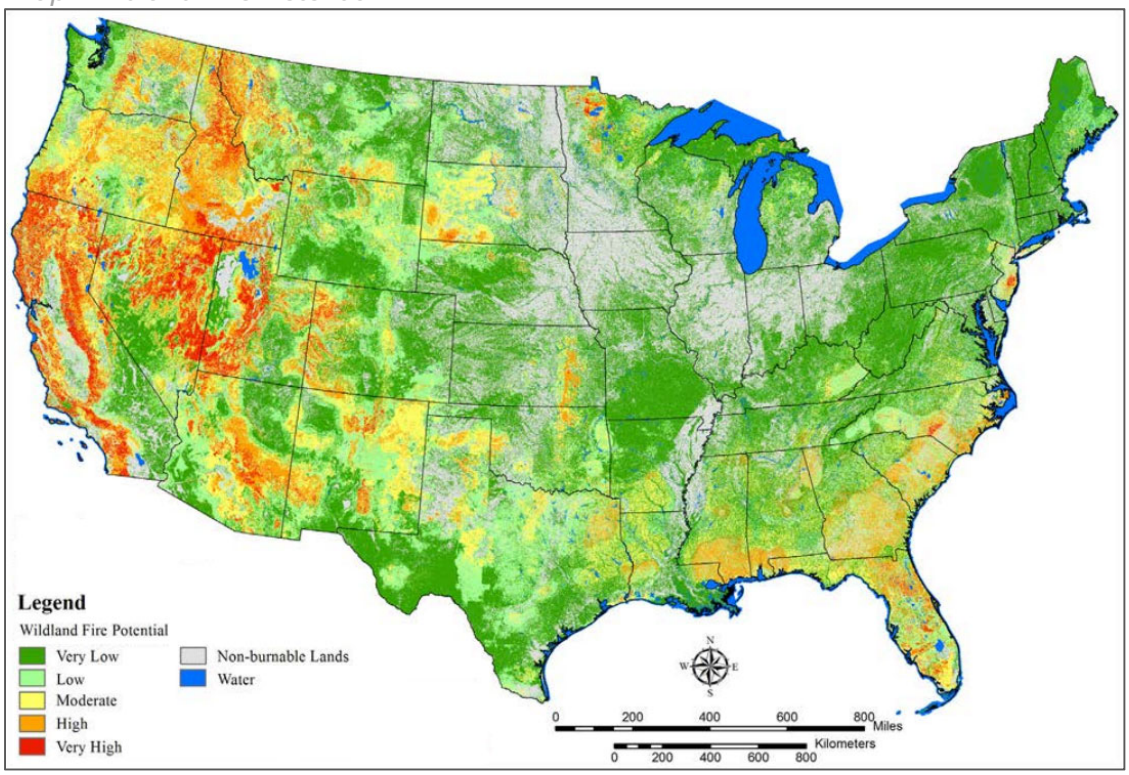
Several notable wildfires have occurred in Salt Lake County recently. These include a brush fire in the Avenues area of Salt Lake City on April 2015. Another fire occurred in Herriman City in 2016 destroying two homes and causing evacuations. In neighboring Tooele County the Dollar Ridge Fire burned destroyed 90 homes. These fires prompted major fire response, required evacuations of large numbers of citizens, and created the threat of debris flows in following years. The Dollar Ridge Fire received a Fire Management Assistance Declaration.

According to NOAA data, there have been 14 days with a wildfire event in Salt Lake County from 2010 to 2018.

There is near 100 percent chance of occurrence in next year, according to historical averages. As previously stated, there have been 14 recorded days from 2010 to 2018 with a wildfire event in Salt Lake County, according to NOAA data. This averages out to approximately 1.6 wildfire events every year. The USDA Forest Service portrays the majority of Salt Lake County as being a "Very High" or "High" rank for wildfire potential.

The map below shows the wildland fire potential for the broader region. The probable ignition points within the County are shown in the previous map, *Historical and Probable Wildfire Ignition Points.*

Map: Wildland Fire Potential



Source: Dillon, Menakis, and Fay, Wildland Fire Potential: A Tool for Assessing Wildfire Risk and Fuel Management Needs, 2015.

Secondary Hazards

The most obvious impacts of a wildfire would be property damage or complete loss, injury, or even death, but secondary impacts could include poor air quality due to smoke in nearby areas. Impacts to agricultural land could have impacts on the local and regional economy. As one might expect, the effect of wildfires on the environment is typically devastating. Many trees and other vegetation will be killed off, although many species of vegetation can flourish in the aftermath of a wildfire due to increased sunlight exposure to the ground. The initial impact to the environment from wildfires is severe, however, and stripping the land of vegetation can also lead to increased erosion or risk of slope failure, which could further threaten structures or impact water supplies and quality.

Vulnerability Assessment

Utah Summary

- 33% of burnable acres in the state are Moderate-to-High wildfire risk (classes 4 to 9).
- 45 million burnable acres across the state (82% of all lands)
- 457,090 are living at risk to wildfire within Wildland Development Areas
- 15.1 million acres of forest assets at risk to wildfire

An analysis based on the Utah Wildfire Risk Assessment Portal was performed to show the percentage of each county's threat to wildfire risk. The results show the threat based on a percentage of land that falls under certain threat categories ranging from VVL (Very Low) to VVH (Very High). There are 7 counties within Utah that have 25% or greater of its land being a high threat to wildfire, of which Salt Lake County has the highest percentage with 59.8%.

Table: Salt Lake County Wildfire Threat 2018

VVL%	VL%	L%	LM%	M%	HM%	H%	VH%	VVH%	High Totals
1.2%	8.9%	6.2%	9.5%	14.3%	18.0%	15.3%	11.2%	15.4%	59.8%

Source: 2019 Utah State Hazard Mitigation Plan

Table: Exposed Values in Salt Lake County for Wildfire

Residential Value	Non-Residential Value	Schools	Hospitals	Emergency Response Facilities	Total Building Value
$74,079,664,000	$24,604,780,000	335	16	110	$98,684,444,000

Source: 2019 Utah State Hazard Mitigation Plan

Table: Wildfire Vulnerability and Loss from LHMPs

People	Residential Units		Commercial Units	
	Units	Value	Units	Value
70,795	5424	$1,785,312,688	419	$1,809,855,542

Source: 2019 Utah State Hazard Mitigation Plan

It is recommended that growing counties follow FEMA's Firewise construction recommendations for all new development areas to minimize wildfire risk. The Firewise program encourages and assists neighborhoods to mitigate wildfire hazards. There are currently 28 Firewise communities in Utah.

Table: Firewise Communities in Salt Lake County

Community Name	Number of Residents	First Year
Emigration Canyon	850	2002
Hi-Country Estates Phase 1	88	2016
Mt. Air	100	2017

Source: 2019 Utah State Hazard Mitigation Plan

Wildfire is a natural part of Utah's ecosystems, but the development within and around wild lands over the last decade or two has posed challenges for wildfire and safety officials. In 2005, Utah initially identified almost 600 communities and their surrounding natural resources as "at risk" from wildland fire. The annually updated list consists of communities throughout Utah that have been determined by wildland fire officials to be at risk from wildland fire. The "Overall Score" represents the sum of multiple risk factors analyzed for each community. Examples of some risk factors are fire history, local vegetation, and firefighting capabilities. The Overall Score can range from 0 (No risk) to 12 (Extreme risk). This score allows Utah's fire prevention program officials to assess relative risk and create opportunities for communications with those communities on the list.

Table: Communities at Risk, FFSL 2019

Communities At Risk	Fire Occurrence	Fuels Hazards	Values Protected	Fire Protection Capability	Overall Score
Alta	1	1	2	2	6
Big Cottonwood	1	1	3	2	7
Bluffdale	2	3	2	1	8
Brighton	1	1	3	2	7
Copperton	2	2	2	1	7
Cottonwood Heights	1	2	3	1	7
Dimple Dell	2	3	3	1	9
Draper	2	2	3	1	8
Emigration Canyon	2	3	3	2	10
Herriman	2	3	2	1	8
High Country Estates	2	3	3	1	9
Holladay	1	2	1	1	5
Lambs Canyon	2	2	2	3	9
Little Cottonwood	1	1	2	2	6
Mount Aire	2	2	2	3	9
Olympus Cove	2	3	2	1	8
Salt Lake City	2	3	2	1	8
Sandy	2	3	2	1	8
Suncrest	1	2	2	1	6

Further wildfire vulnerability information was considered from the West Wide Wildfire Risk Assessment, or "WWA" produced by Sanborn on behalf of the Oregon Department of Forestry for 17 western states, including Utah. This assessment included partner states and agencies to quantify the magnitude of wildland fire risk to provide a baseline for quantifying mitigation activities and to monitor change over time. For a full description of the analysis methodology used, as well as more detailed versions of all the images and maps below, please see the full WWA Risk Assessment.

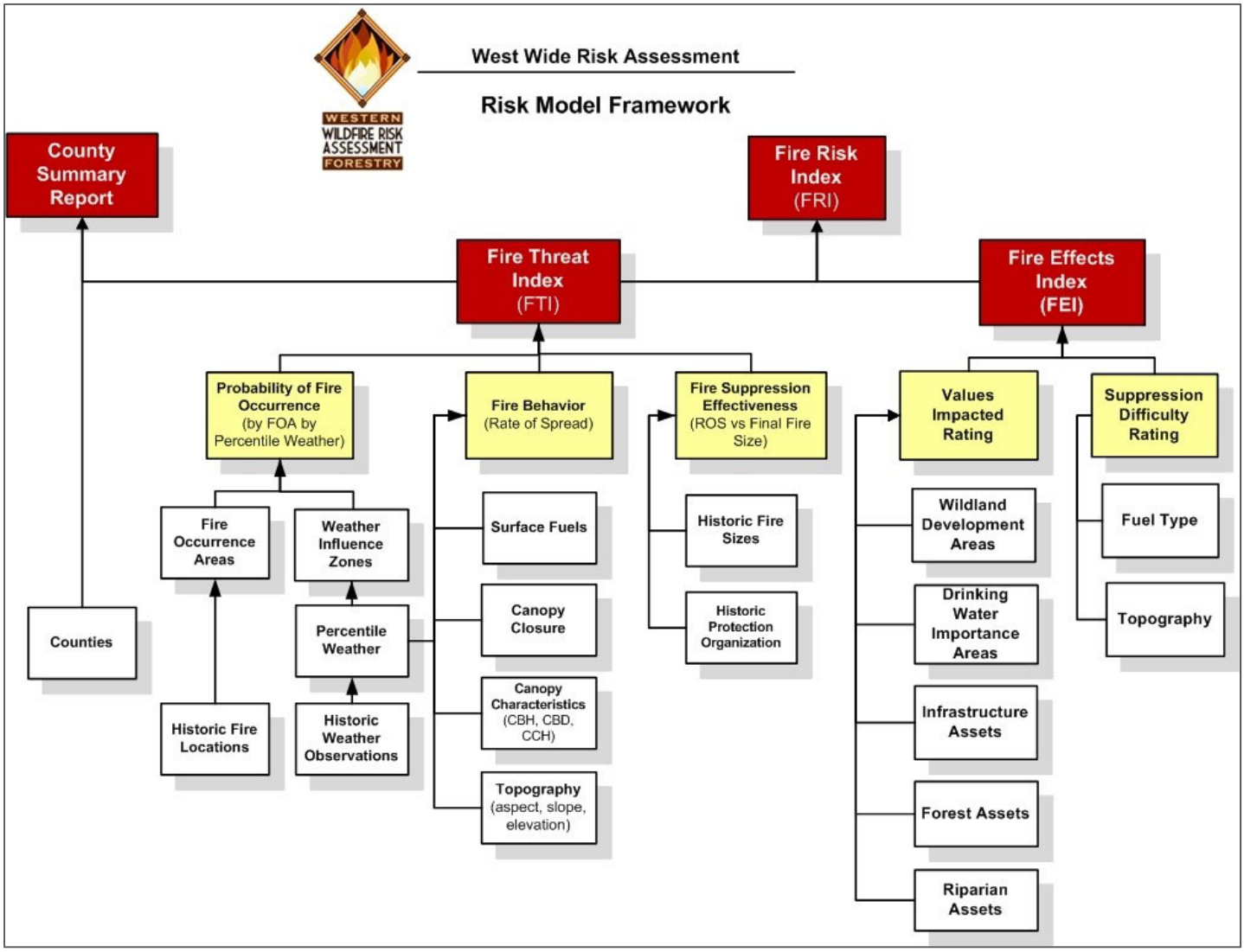
The WWA produced three primary outputs: The Fire Effects Index, the Fire Threat Index, and the Fire Risk Index.

The Fire Effects Index is based on a rating of suppression difficulty and values impacted, which identifies areas that have important values at risk to wildland fire and/or are costly to suppress.

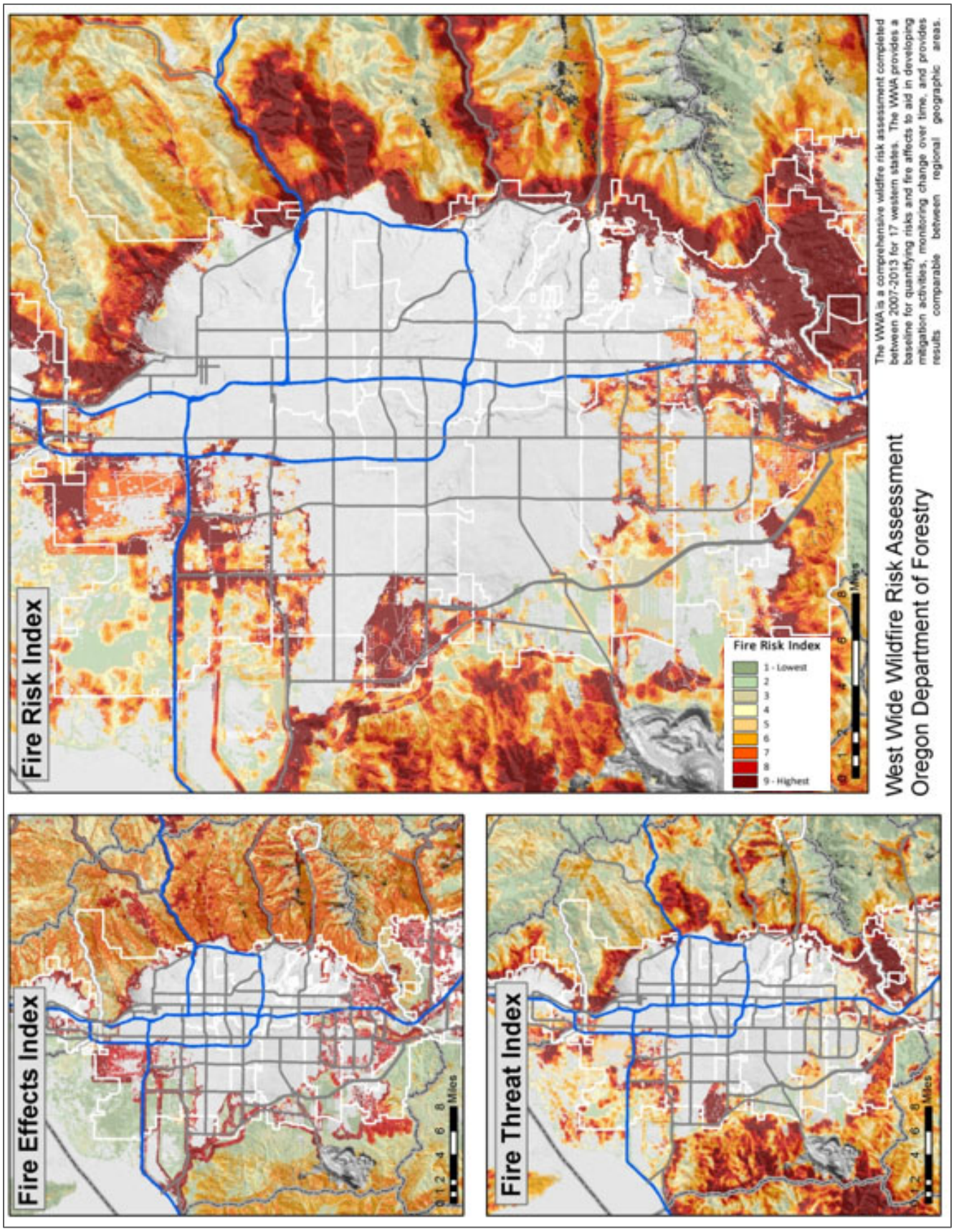
The Fire Threat Index (FTI) is a mathematical calculation to estimate the probability of an acre igniting and the expected final fire size.

The Fire Risk Index (FRI) is determined by the Fire Effects Index multiplied by the Fire Threat Index. This combines the probability of an acre burning with the expected effects if a fire occurs to reflects the possibility of suffering loss. This yields a measure of overall wildfire risk. The FRI can be used to identify areas where mitigation options may be of value, allow agencies to work together and better define priorities, develop a refined analysis of a complex landscape and fire situations using GIS, and increase communication with local residents to address community priorities and needs.

Table: WWA Wildfire Risk Assessment Process



Map: Salt Lake County, Fire Effects, Threat, and Risk Indices



Wildland Development Areas (WDA) indicates where people live in wildland areas that are threatened by fire from wildland fuels. WDA also reflects housing density depicting where people live in the wildland. The analysis process derives the number of house per square kilometer but is presented as “houses per acre” to aid in interpretation of the data.

Output values are grouped into nine classes based on their distribution across burnable acres. The breakpoints between classes use a consistent target cumulative percentile value. By design the categories were developed to display the highest rated 14.5% of the cells in categories 6-9 so the user will truly locate the differences within these highly rated cells. The class values represent a West Wide distribution of acres.

Table: Salt Lake County Acres Per Wildfire Risk Class

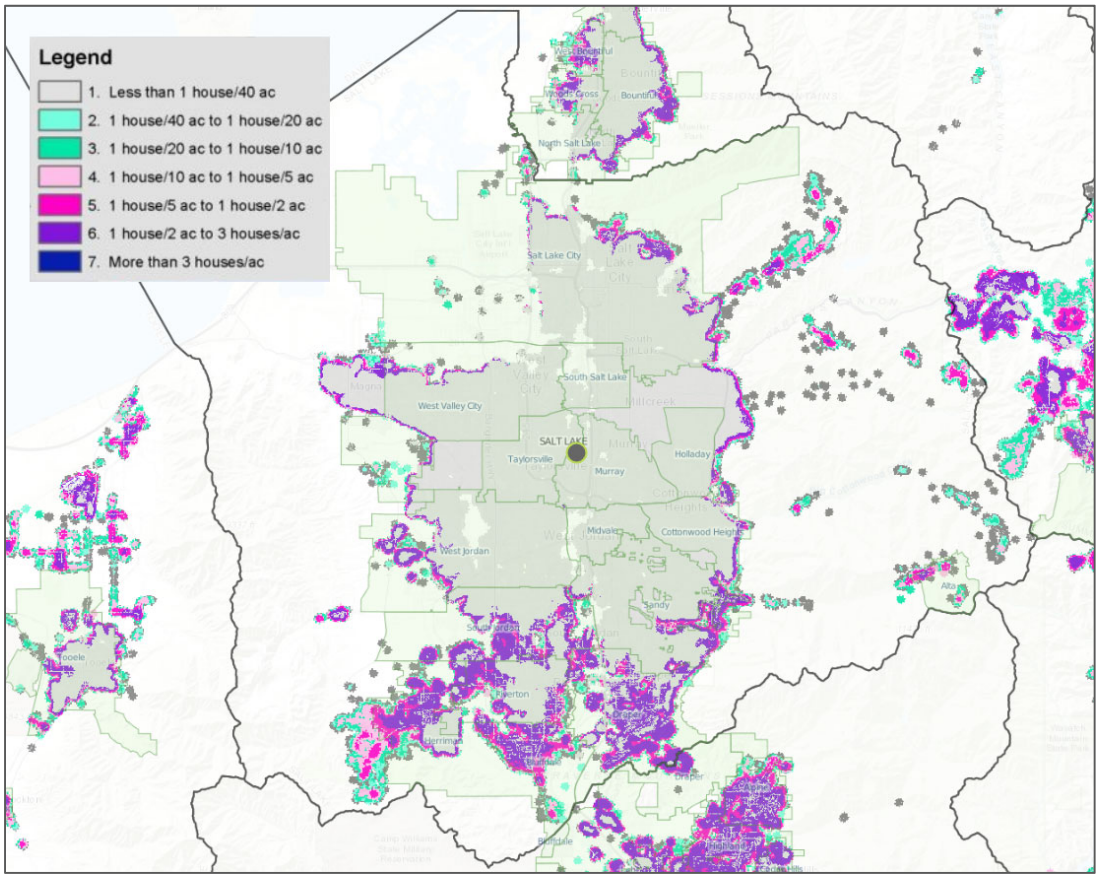
	1	2	3	4	5	6	7	8	9	Total	Ave.
FRI	11,796	32,623	14,453	26,843	37,571	43,154	41,988	35,263	63,719	307,385	6
FTI	22,208	40,671	13,257	23,243	38,992	49,997	36,924	30,857	51,235	307,385	6
FEI	33,172	58,237	11,032	10,588	38,838	30,976	51,829	42,984	29,730	307,385	5

Table: Salt Lake County, acres per risk class in each Wildland Development Area class

WDA Class	WDA 1	WDA 2	WDA 3	WDA 4	WDA 5	WDA 6	WDA 7	Total WDA	Avg. WDA
Acres	14,401	5,013	5,318	6,518	9,364	18,910	36	59,622	4

(307,385 total acres wildland, 209,120 non-wildland acres)

Map: Salt Lake County Wildland Development Areas

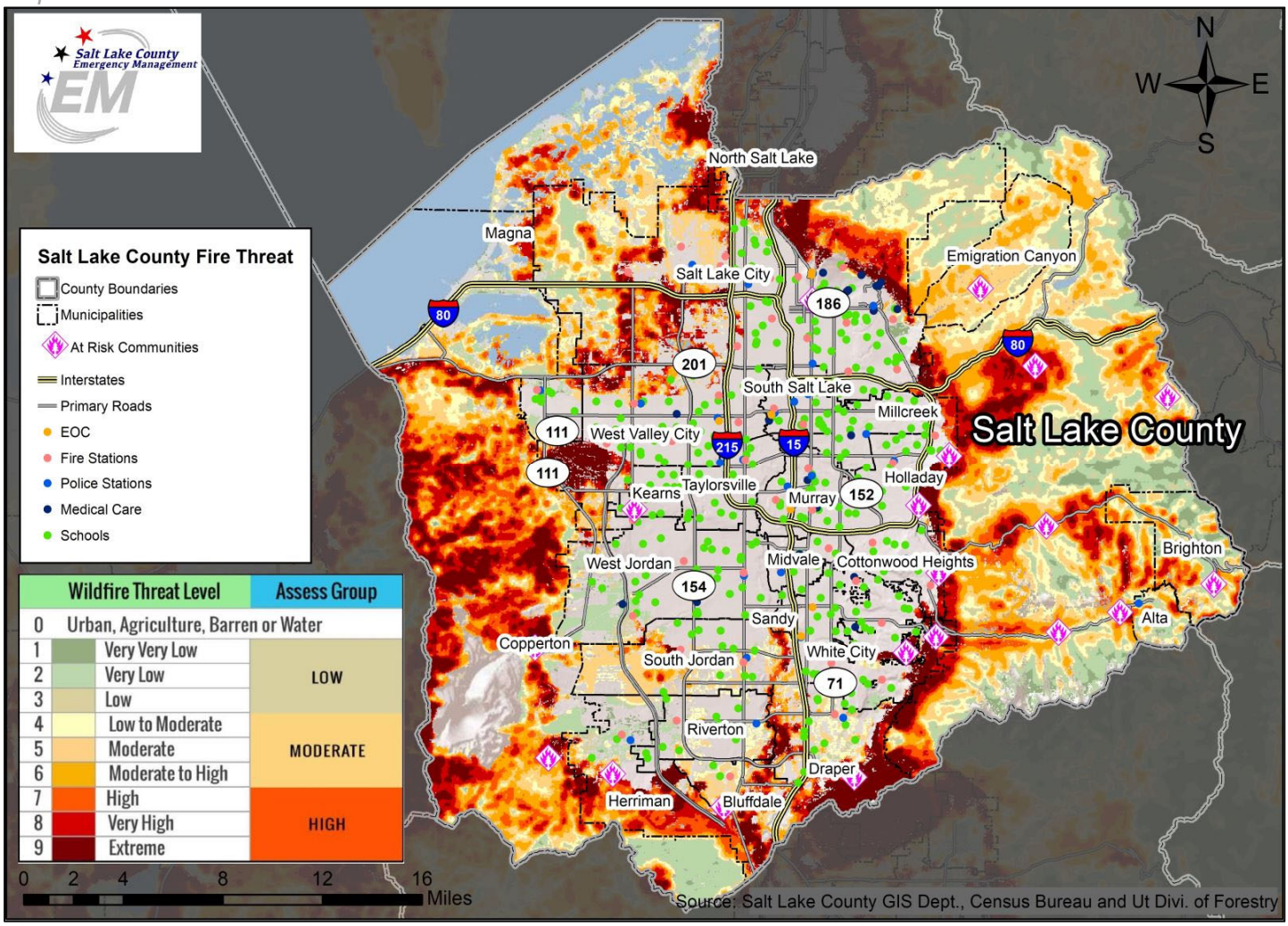


The table below estimates infrastructure vulnerable to wildland fire in Salt Lake County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software.

Table: Infrastructure Vulnerable to Wildland Fire, Salt Lake County

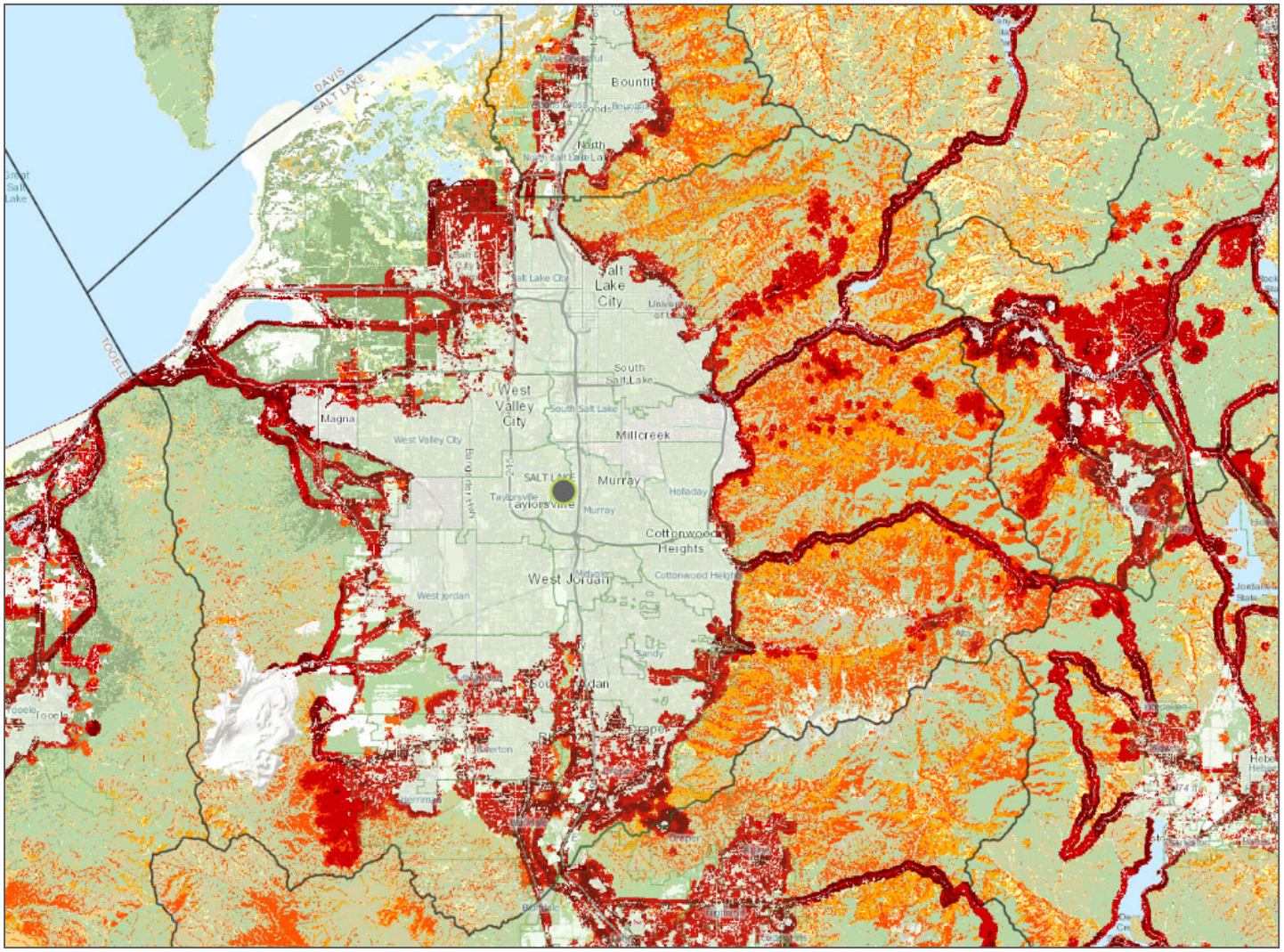
Item	Length (Miles) or Number of Units	Replacement Cost
Highways/Interstates	366.71 miles	$1,991,590,683
Highway Bridges	608 bridges	$1,298,659,176
Railway Segments	179.70 miles	$206,434,364
Railway Bridges	17 bridges	$2,275,560
Water Distribution Lines	N/A	N/A
Gas Lines	N/A	N/A
Sewer Lines	N/A	N/A
Total Estimated Infrastructure Replacement Cost		$3,498,959,783

Map: Wildfire Threat and Critical Facilities



The Aggregate Value Impacts shown in the image below are defined by the Value Impacts Rating (VIR) from the WWA. The VIR is a collective value that represents adverse impacts by a wildfire based on the impacts to all of the five defined Values Impacted: Wildland Development Areas (WUI), Forest Assets, Riparian Assets, Drinking Water Importance Areas, and Infrastructure. The darker the color, the more negatively impacted the area is projected to be.

Map: Salt Lake County Wildfire Aggregate Value Impacts



Other Hazards of Interest

As previously mentioned, other hazards of interest were identified as having some potential to impact the planning area, but at a much lower risk level. These hazards included:

- Civil Disturbance
- Cyber Attack
- Hazardous Materials Incident (Transportation and Fixed Facility)
- Terrorism (Including Active Shooter Events)

Civil Disturbance

Definition

Civil disturbance or disorder is a wide-ranging phenomenon that encompasses any incident involving large groupings of individuals participating in activities that disrupt public order and put the safety of the public, businesses, or critical infrastructure at risk. This can include rioting, looting, and violent demonstrations.

Civil disorder can be a spontaneous impact of a triggering event such as the looting seen following disasters (Hurricane Katrina) or can be a specific hazard unrelated to any other hazard (WTO riots). It can arise from peaceful events, gatherings, or demonstrations or can be pre-planned and intentional. Ultimately, civil disturbances are rooted in highly complex social, economic, and political interactions.

The right of public assembly is protected by the First Amendment of the United States Constitution; accordingly, emergency managers must be careful to protect the rights of their citizenry. Disregard or perceived disregard for this right will be used by individuals participating in civil disorder to gain sympathy for their cause. Taking this into consideration, the most effective method to diminish politically motivated civil disorder is to stop it before it occurs. This involves significant planning by emergency managers and robust intelligence from law enforcement entities. Once a civil disorder has occurred, an assortment of riot quelling non-lethal weapons are available to responders. Finally, to protect the safety of the public, first responders, and other protesters, various options for lethal force can be used as a last resort.

Civil Disturbance During Disasters

Civil disorder during disasters often occurs in the time during or immediately after a disaster. This type of civil disorder primarily manifests itself in the form of looting. Other forms of types of civil disorder such as rioting are extremely rare following a disaster.

It is argued that the cause of civil disorder during disasters results from many types of motivating factors. One factor is the chaos resulting from a disaster alters the environment and the resulting social norms allowing for the rationalization of acts previously considered contemptible. This change in behavior coupled with a displaced or overtaxed police force allows civil disorder to grow during or after disasters. Another factor that may result in civil disorder during disasters is the lack of or the fear of the lack of basic human supplies. Disasters often disrupt a community ability to provide food, clothing, and potable water for its citizenry. Fearing for survival, a populace may begin to loot for these basic necessities. Lastly, it has been argued that the genesis of civil disorder during disasters stems from social inequalities. There is a strong correlation between lower socio-economic status and crime. There is evidence to suggest that during and immediately following disasters these conditions are exacerbated resulting in higher crime rates, specifically looting.

All this considered, differing opinions exists of the frequency of looting during disasters. Some argue that the occurrence of widespread looting is a misconception and that perceptions are influenced by misinterpreting behavior, misunderstandings over the ownership of property, exaggerating claims of looting, and sensational media coverage. In addition, it is widely observed that pro-social behaviors such as citizens volunteering to help and feed one another far outweigh anti-social behavior such as looting. Nonetheless, looting does exist in many disasters to some degree. Its origins are rooted in social issues but are probably influenced by a combination of the above factors.

Due to the resulting impacts of a disaster, the affected populace is already under duress; therefore, responders and emergency managers must take appropriate caution when responding to these events. Shifting search and rescue activities to trained strike teams may free up enough police to quell looting. Setting up disaster recovery operations as quickly and efficiently as possible will provide residents assistance in maintaining basic life needs. Finally, strong public information campaigns will help to inform citizenry and quell fears.

Politically Motivation Civil Disorder

Politically motivated civil disorder results when a large group of individuals disturb public order to affect political or social change. This can occur in a pre-planned fashion, in response to a significant social event, or spontaneously at large crowd gatherings. This type of civil disorder can manifest itself in rioting, looting, or unauthorized gatherings and the disrupting of the public order.

Politically motivated civil disorder can happen for a number of reasons. Some of these reasons are to affect change in socio-economic inequalities, to change existing laws, to take advantage of a lawless situation, or can be anarchist in nature. This type of civil disorder can occur but is not limited to the following scenarios: peaceful marches and parades, pre-planned summit and major political events, and large gatherings at concerts and sport arenas.

Often in politically motivated civil disorder, initial targets are symbolic acts of defiance against what the participants see as institutions upholding the societal norms they wish to change. This includes destructive behaviors towards police forces and their equipment, firefighters and their equipment, and other symbols of law and order. This destructive behavior often morphs to crimes of opportunity such as looting and theft. Finally, aggression toward the public and peacekeepers can take place.

In recent years, politically motivated civil disorder and those that participate in it have become increasingly organized. These individuals often attach their cause to otherwise innocuous or peaceful demonstrations to take advantage of a police force strained with other responsibilities. Anarchist groups such as the Black Bloc have incorporated guerilla tactics into their operations such as hiding their identity and using misdirection on police forces to have the greatest opportunity to inflict damage. Another tactic of these groups is to incite violence in the larger crowd. Exploiting already existing tensions on a variety of issues, such as hunger, poor employment opportunities, inadequate community services, poor housing, and labor issues can elevate tensions within a large group. When tensions are high, a seemingly minor incident, rumor, or act of injustice can ignite a crowd to riot and act violently.

Civil Disturbance Potential in Salt Lake County

According to the Southern Poverty Law Center, as of 2018, there were 9 hate groups being tracked in Utah, including 2 with significant presences in Salt Lake City. These two groups are the Kingston Group and Identity Evropa. Although civil disturbances could theoretically arise from any contentious situation or gathering of predisposed people, it is important for the County to remain aware of groups with the potential to spark these events.

Historical Events and Future Probability

Although not extremely likely in any particular year, it is certainly possible that civil disturbances and riots of significant magnitude could occur within the County. In one example that took place in February 2016, there was a civil disturbance that arose as a result of an altercation between police and a teenage male, which resulted in the shooting of the teen. A crowd soon gathered and began to throw rocks and yell obscenities at police forces, requiring the further arrest of four people who failed to obey commands to evacuate. In another example that took place in Salt Lake City in 2002, unruly Olympic celebrations saw a crowd attempt to force its way into a beer tent and evade security. The situation escalated and required 75 to 100 police in full riot gear to regain control of the area. At least 30 people were arrested.

Vulnerability Analysis for Civil Disorder/Riot Hazard

Although civil disorder poses a threat to the public on its own, the many hazard impacts associated with civil disorder also pose a threat to the safety of the public.

Impact to Salt Lake County Residents

There are many ways that civil disorder events can impact County residents. Individuals engaging in civil disruption will often attach themselves to unrelated protests as a means of getting their message out and as a diversion for police. Unfortunately, residents of the county who are peaceful protesters could potentially be trapped in the chaos that ensues. With these types of events, injuries and fatalities are a possibility.

Impact to Essential Facilities and Other Property

Essential facilities may be impacted if they are near or the target of the civil disorder/riot. Businesses are often the focus of civil disruption as individuals will target these establishments for looting and vandalism. Also, in scenarios where supplies are limited, these businesses are often looted for their goods. Any building/edifice where the riot or disorder is taking place may be vulnerable to damages.

Impact to Critical Infrastructure

This hazard typically does not damage infrastructure, but large groups can block traffic (either because there are so many people at the gathering or as a protesting tactic).

Impact to Operations

First responders are at particular risk of civil disruption. First responders are most likely the first group of individuals on the scene as civil disruption occurs. This puts them at direct risk of injury during a disruption. Additionally, responders are viewed as part of the authority the disruption is protesting against and therefore, they could become targets. The nature of civil disturbances is such that local emergency response services are often overwhelmed.

Impact to Environment

This hazard typically does not typically directly impact the environment, except in the unlikely event that hazardous materials were to be intentionally released.

Cyber Attack

A cyberattack is an effort by hackers to gain access to an electronic network or system. Cyberattacks happen all day, every day, around the world. Major targets typically include governments, banks, and businesses, but any online network can be attacked.

Advancements in technology have increased the productivity of our nation and made daily operations and markets reliant on cyber systems. As a result, the United States has become, and will increasingly continue to be, vulnerable to non-traditional attacks including cyberattacks on information and operations. Cyberspace is the nervous system for all critical infrastructures and is composed of hundreds of thousands of interconnected computers, servers, routers, switches, and fiber optic cables that allow our critical infrastructures to work. Studies performed by the Government Accounting Office and the Computer Security Institute found that the number of cyber security threats to both public and private sectors are on the rise. The aggressors range from nation-states to unorganized groups or individuals. According to the Salt Lake Tribune, around 2010, Utah government computer systems faced 25,000 to 30,000 attempted cyberattacks every day. At the time, Utah Public Safety Commissioner Keith Squires thought that was massive. "But [by only 2014] we have had spikes of over 300 million attacks [each day] against the state databases": a 10,000-fold increase.

The attacks on computer systems can come in the form of viruses, Trojans, worms, spoofs, or hoaxes from virtually anywhere in the world. Computer viruses, ranging from devastating to simply annoying, are sent out daily by organizations and individual hackers, and intermittently by people who fail to protect their computer software.

Previous Occurrences for Cyberattack Hazard

Cyberattacks occur regularly in Utah (and Salt Lake County) but are not typically reported in a central database. A cursory list of cyberattacks on the U.S. over the last few decades can be found at risidata.com. Examples include:

- In May, 2019, A denial of service attack, which involves overwhelming computer systems with information in a bid to take them down, successfully interrupted electrical systems in Salt Lake County, according to the Department of Energy.
- In November, 2015, a distributed denial of services attack targeted the Salt Lake City School District, disrupting websites and grading systems.

Future Probability for Cyberattack Hazard

This hazard will likely continue to occur with moderate frequency because significant occurrences of this hazard have rarely occurred (even though isolated or low impact events may occur with regularity). As society becomes increasingly dependent on technology, the threat and likelihood of cyber-attacks will only increase.

Location for Cyberattack Hazard

Cyberattacks occur virtually. They can originate from anywhere in the world and can target anywhere in the world.

Hazard Extent for Cyberattack

At minimum, cyberattacks can target a single individual's information or cause the physical manipulation of items connected to the network. In major cyberattacks, information can be stolen from millions of people.

Vulnerability to Cyberattack Hazard

All existing and future assets/infrastructure, are unlikely to receive direct damages. However, the systems and technologies that are integrated within these assets will undoubtedly be affected, especially as technology becomes more advanced and automated. Any resident of Salt Lake County that is connected to the internet is vulnerable to cyberattacks and identify theft. These incidents have long been a growing trend along with the increasing adoption of technology. Victims of this hazard are likely to experience substantial monetary loss or harassment. Any disruption to Internet service or critical infrastructure information systems could potentially threaten lives, property, the economy, and national security. Any essential facility connected to a network is at risk for a cyberattack. For example, individuals and businesses are reliant on information systems and the Internet for daily tasks; without access to these systems, there could be major financial losses. Furthermore, delivery systems including water, electricity, even things such as groceries rely on information systems to coordinate and complete the delivery. While sabotage to computer systems normally would not lead to harm to health and safety, it is possible. As technology becomes more integrated into society, the more access hackers will have to sensitive systems. Integration of systems (such as electrical grids, air traffic control centers, traffic lights, etc) can leave these systems vulnerable to attack. If these systems are compromised, it is possible that people may be injured or killed. Cyberattacks carried out on public infrastructure can directly impact the County's ability to operate essential facilities and provide services. Forms of sabotage to computer systems include the introduction of viruses, malware or spyware that can cripple a computer network or steal private and public information. Emergency services, such as 911 dispatch would have difficulties because most phone lines work via the Internet. Medical response and care is reliant on electricity, water and information systems and the Internet to access medical records. If the Internet was not available, many information systems would be useless and operations for many of the critical infrastructure sectors may stop altogether, causing major problems for both the public and private sector.

Hazardous Materials Incident (Transportation and Fixed Facility)

Definition

Hazardous Material (Hazmat) Incident – Fixed Site is defined as an uncontrolled release of a hazardous material originating from a building, structure or fixed equipment which is capable of posing a risk to life, health, safety, property or the environment.

Hazardous Material (Hazmat) Incident – Transportation is defined as an uncontrolled release of a hazardous material during transport which is capable of posing a risk to life, health, safety, property or the environment.

Historical Events and Future Occurrences

As can be seen in the table below, the United States Coast Guard National Response Center reported receiving an average of about 10 calls per year about fixed facility hazmat releases in Salt Lake County in recent years. Although many hazmat incidents occur at industrial facilities, this is not always the case. Many transportation related hazmat incidents also occur, with a majority occurring during the loading or unloading phases of the transportation. According to data from the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Office of Hazardous Material Safety (PHMSA), there have been 332 recorded instances of transportation related hazardous materials releases in Utah from 2009 to 2019. This averages to about 33 transportation hazmat incidents per year. Both of these averages can be reasonably expected to continue, going forward.

Table: Reported Fixed Site Hazmat Releases in Salt Lake County

Year	Number of Reports Received
2014	12
2015	16
2016	8
2017	5
2018	11
Source: U.S. Coast Guard, National Response Center website, www.nrc.uscg.mil, Standard Query Report for Salt Lake County, Fixed Incident Commons, 2014 - 2018	

From 2014-2018 approximately 1,555 reported hazardous materials incidents in the State of Utah occurred, according to the U.S. DOT's Pipeline and Hazardous Materials Safety Administration. The following table shows the year (2014-2018), number of incidents, and the State's total damages.

Table: Reports of Hazardous Materials Incidents in the State of Utah

Year	Number of Incidents	Damage
2014	261	$532,102
2015	279	$1,153,997
2016	312	$407,253
2017	347	$434,613
2018	356	$1,221,687
Total	**1,555**	**$3,749,652**

Source: http://www.phmsa.dot.gov

Vulnerability & Potential Impact/Consequences

Area Impacted

Besides fixed facility locations, rail lines, major roadways, and shipping centers also are the sites of potential hazmat incident risk to the County. Although large-scale, off-site impacts are not common with hazmat transportation incidents, they are certainly possible within the County. Off-site impacts can include evacuation, closure of roadways and environmental contamination. In Salt Lake County, hazmat incidents have rarely, if ever, required an evacuation.

Economic Impact

The economic impact due to this hazard can be highly variable, especially when including the costs of environmental remediation. According to the U.S. EPA Hazmat Response Team, costs for responding to a hazmat incident can range from $1,000-$100,000. Costs to the public can include response efforts, commuter delays and damage to transportation infrastructure. Some property damage from this type of event may be expected, especially if the release results in a fire or explosion. Additional impact in the form of lost business revenue, can result if the incident causes a business to close.

Terrorism

Definition

For the purposes of this Plan, terrorism can be thought of an intentional, unlawful use of force, violence or subversion against persons or property to eliminate, harm, intimidate, or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives. For this Plan, this hazard definition will include active shooter situations, which may be either randomly or intentionally directed and could impact significant numbers of people.

Geographic Location for Terrorism Hazard

Terrorism typically targets a specific location – in many active shooter situations, the setting is often a commercial, governmental, educational, or religious institution. Other terrorist events may target major infrastructure, in accordance with the perpetrator's specific end goal However, terrorists can also target certain population groups, such as minorities. Residential areas are less likely to be directly targeted.

Hazard Extent for Terrorism

Terrorist events typically, but not always, aim to impact large numbers of people. Depending on a number of factors including terrorist intent, setting, victim response, and response time from law enforcement, the amount of damage incurred or casualties actually inflicted can vary widely. Additionally, those who are not directly impacted by the event may still be psychologically impacted through fear, concern for safety, and reduced activity. Therefore, the impact of a terrorist event in Salt Lake County could potentially have relatively minimal impact, or indirectly effect every resident of the County.

Historical Events

The most recognized forms of terrorism include assassination, bombings and extortion. These acts are often identified with particular groups or organizations. The Middle East and portions of Europe, South America and Asia have been greatly impacted for many years by acts of terrorism and sabotage. In more recent years, the United States has been victim to acts of terrorism.

According to the Global Terrorism Database, there have been 7 recorded cases of terrorism in Salt Lake City, resulting in 2 fatalities and 1 injury. These events can be seen in the image below.

DATE	COUNTRY	CITY	PERPETRATOR GROUP	FATALITIES	INJURED	TARGET TYPE
2010-06-05	United States	Salt Lake City	Animal Liberation Front (ALF)	0	0	Business
1995-06-10	United States	Salt Lake City	Animal Liberation Front (ALF) (suspected)	0	0	Business
1987-02-20	United States	Salt Lake City	Anti-Technology extremists	0	1	Business
1981-10-08	United States	Salt Lake City	Anti-Technology extremists	0	0	Educational Institution
1980-08-20	United States	Salt Lake City	White supremacists/nationalists	2	1	Private Citizens & Property
1975-09-05	United States	Salt Lake City	Weather Underground, Weathermen	0	0	Business
1970-05-13	United States	Salt Lake City	Left-Wing Militants	0	0	Military

Source: Global Terrorism Database

Probability for Terrorism Hazard

While this hazard has not happened frequently and is not highly probable in any particular year, the possibility of significant future terrorism incidents cannot be discounted. As a low probability, high consequence hazard, terrorism prevention and mitigation should remain a priority for all participating jurisdictions. Historically, these incidents have been isolated or low impact events and the hazard's overall impact to both the County and participating jurisdictions has been minor (relatively).

Vulnerability & Potential Impact/Consequences

Impact to Salt Lake County Residents

Due the tragic events of September 11, 2001, and the rise of active shooter events in recent years, no citizen of the United States is unaware of the enormous potential impacts of terrorist acts to life and property. The emotional impacts: fear, dread, anger, outrage, etc., serve to compound the enormous physical, economic, and social damage. The continuing terrorist threat itself has a profound impact on many aspects of everyday life.

Impact to Essential Facilities, Critical Infrastructure, and Other Property

As previously stated, terrorists may target essential facilities to disrupt normal life for Salt Lake County residents. Airports, places of worship, communication and transit facilities, waterways, and commercial, industrial, and governmental buildings are all at a higher risk of being targeted. Beyond firearms, past incidents in the nation have demonstrated that fires and bombs have also often been utilized to incite terror. These incidents created damage to the intended facility/location. As stated previously, high profile locations are likely to be targeted as opposed to residential areas. Terrorist acts carried out on public infrastructure can directly impact the County's ability to operate essential facilities and provide services.

Impact to Operations

Law enforcement officials would likely be required to respond swiftly and with a large deployment to deal with a terrorist incident. If such an attack targets a major building or infrastructure, many other first responders may be needed to fight fires or search for survivors trapped in debris. Many law enforcement officials may put themselves in harm's way and potentially suffer injury or death. In addition, medical personnel would be needed to respond to the potentially large number of victims in need of assistance. The full impact to operations would likely be significant but depend upon the specific location and intention of the terrorist attack.

Impact to Environment

This hazard does not typically impact the environment. Exceptions include setting of wildfires, intentional hazardous materials releases, or destroying a dam. All of these scenarios would likely result in significant damage to the environment as well as loss of property and human life.

In a broad based analysis, the following state assets have been identified as potentially vulnerable to terrorism:

- Water: such as lakes and reservoirs
- Dams (federal, state and privately owned)
- Canals, pipelines, and levees
- Highways, airports, public roads, and bridges
- Agriculture: farms
- Finance: commercial banks; credit unions
- Oil and Natural Gas; hazardous liquid pipelines, refineries and terminal facilities
- Electrical Power: private and local power plans; and
- Chemical “high risk” facilities

Table: Assessing Terrorism Vulnerability

Hazard	Application Mode	Hazard Duration	Extent of Effects: Static/Dynamic	Mitigating and Exacerbating Conditions
Conventional Bomb	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile	Instantaneous; additional secondary devices may be used lengthening the time duration of the hazard until the attack site is determined to be clear	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc can provide protection by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding poor construction; and ease of concealment of device.
Chemical Agent	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperatures can affect evaporation of aerosols. Ground temperatures affect evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents, but disperse vapors can also enlarge target area. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.

Biological Agent	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers.	Biological agents may pose viable threats for hours to years depending on the agent and the conditions in which it exists.	Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can also be spread via human or animal vectors.	Altitude of release agent used and the effectiveness with which it is deployed, contamination can above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents. Enclosed structures elongate the lifespan of biological agents due to the lack of ultraviolet radiation.
Radiological Agent	Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.	Contaminants may remain hazardous for seconds to years depending on isotope used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior or radioactive contaminants may be dynamic.	Duration of exposure, distance from source or radiation, and the amount of shielding between source and target determine exposure to radiation.
Nuclear Bomb	Detonation of nuclear device underground, at the surface, in the air or at high altitude.	Light/heat flash and blast/shock wave lasts for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat, and blast effects of a subsurface, ground or air burst are static and are determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.

Hazards and Future Development

Table: Salt Lake County Population Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	1,094,650	1,249,961	1,361,099	1,470,574	1,594,804	1,693,513	598,863	55%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

Table: Salt Lake County Household Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	379,320	454,929	521,352	579,472	635,143	689,490	310,170	82%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

Table: Salt Lake County Employment Projections

County	2015	2025	2035	2045	2055	2065	Absolute Change 2015 - 2065	Percent Change 2015 - 2065
Salt Lake County	844,316	1,053,362	1,182,092	1,293,225	1,385,240	1,454,567	610,251	72%

Source: Kem C. Gardner Policy Institute 2015-2065 State and County Projections

Those portions of the county near the Great Salt Lake and the Jordan River are subject to high liquefaction in the event of an earthquake and therefore pose a risk to incoming residents and new structures. Jurisdictions may mitigate the earthquake threat and its secondary risks through the use of zoning ordinances and building codes that will recognize the threat and reduce its impact. Examples of more appropriate forms of land use along fault lines include “farms, golf courses, parks, and undeveloped open space” (UGS 1996).

Flooding is also possible along the Jordan River. Many new homes have been built along the river’s banks in areas that flooded in 1983-84. Zoning restrictions on building location and building codes preventing basements would be well suited in these areas.

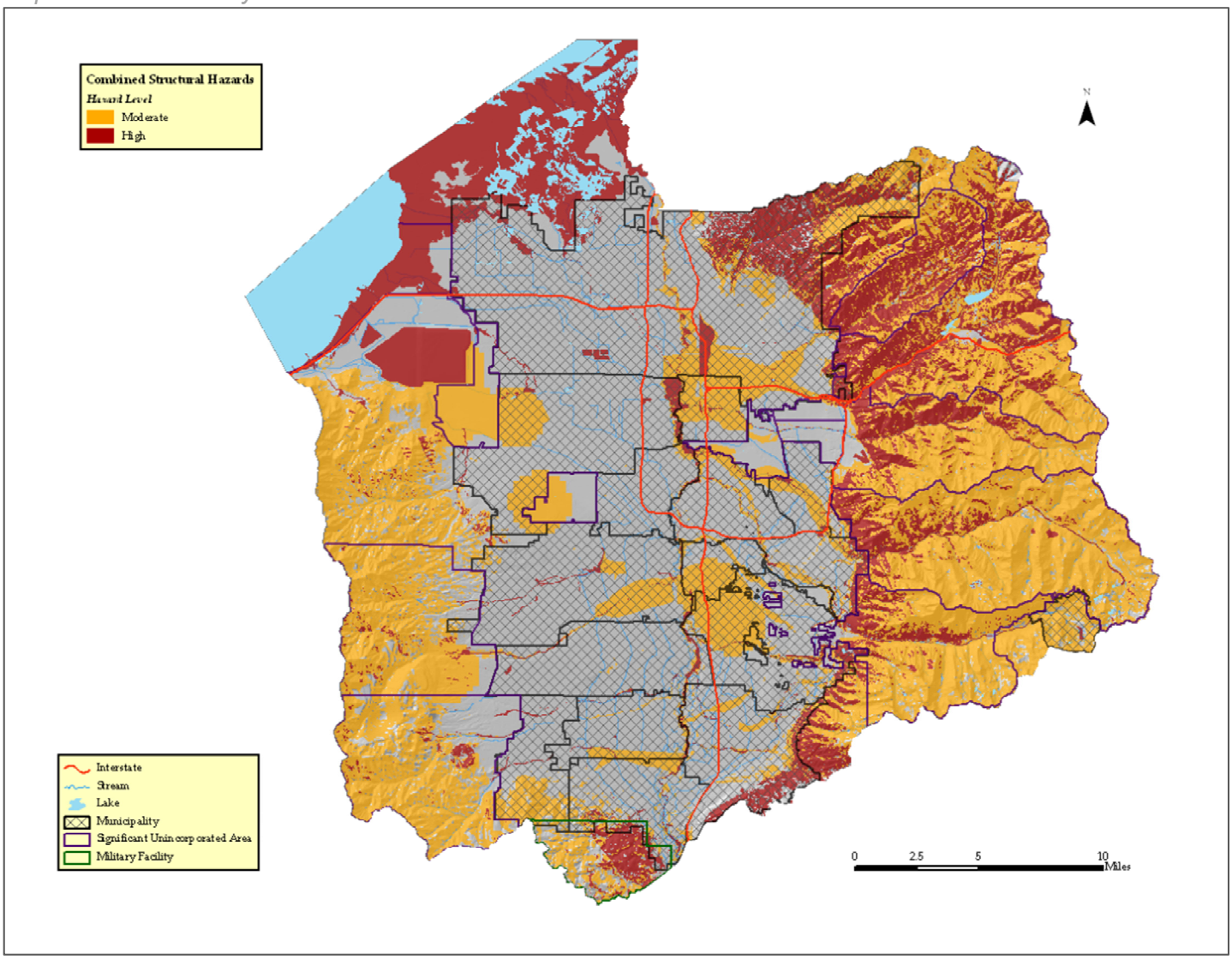
Wildfire risk is most severe in the foothills of the Wasatch Mountain Range. These areas, known as Wildland-Urban Interface (WUI) zones, are most vulnerable due to the amount and types of vegetation and new structures that act as fuel to a burning fire. This threat may be mitigated by encouraging communities to become “Fire Wise Communities”, continued use of building and zoning codes and increase the public’s awareness.

Landslide/slope failure is another threat near the foothills of the Wasatch Mountains. Many new developments can be found near areas of current landslides. More detailed landslide studies and zoning appropriate for high hazard areas will decrease the likelihood of landslides injuring persons or damaging property.

The map below shows the combined risk of nine structural-threatening hazards (dam failure, earthquake, flood, landslide, lightning, problem soils, tornado, wildland fire and wind) in Salt Lake County. The areas of high hazard (red) are areas of high landslide and flood risk as well as the “extreme” risk wildland fire areas. These areas are

best preserved as open space to protect citizens from almost certain disasters. The moderate areas of the map (orange) are those areas having moderate or greater risk from five (5) or more structural-threatening hazards. These areas should be preserved as open space if not already developed or hazard-appropriate development encouraged. If already developed, these areas should be the initial focus of education campaigns and for regulatory requirements of hazard mitigation techniques by residents.

Map: Salt Lake County Combined Structural Hazard Risk



Hazard Risk Ranking

A risk ranking for all the hazards was performed that assessed the probability of each hazard's occurrence, as well as its likely impact on people, property, and the economy. This process was a critical component in selecting mitigation actions for this plan update. The ranking is not intended to focus all actions on the single hazard with the highest rank, but to ensure that attention is given to all hazards that have a significant impact. At the same time, the ranking allows communities to identify hazards with little or no impact so that those hazards can be eliminated from consideration for actions. The results of the countywide ranking, presented in the sub-section, Ranking Results, are used in establishing mitigation action and priorities presented in the Mitigation Strategies and Alternatives section of this Plan.

Probability of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- High—Significant hazard event is likely to occur annually (Probability Factor = 3)
- Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. The table below summarizes the probability assessment for each hazard of concern for this plan.

Table: Probability of Hazards

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)
Avalanche	High	3
Dam Failure	Low	1
Drought	Medium	2
Civil Disturbance	Medium	2
Cyber Attack	Medium	2
Earthquake	Medium	2
Flooding	High	3
Hazardous Materials Incident	High	3
Landslide and Slope Failure	Medium	2
Public Health Epidemic/ Pandemic	Medium	2
Radon	High	3
Severe Weather	High	3
Severe Winter Weather	High	3
Terrorism	Low	1
Tornado	Medium	2
Wildfire	High	3

Impact

Hazard impacts were assessed in five categories: impacts on people, impacts on property, impacts on the local economy, and the catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

- **Population Exposed**—Values were assigned based on the percentage of the total **population exposed** to the hazard event. The degree of actual impact on individuals from any hazard event can vary widely, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs.
    - High—30% or more of the population is exposed to a hazard (Impact Factor = 3)
    - Medium—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
    - Low—14% or less of the population is exposed to the hazard (Impact Factor = 1)
    - No impact—None of the population is exposed to a hazard (Impact Factor = 0)
- **Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic.
    - High—High potential that this hazard event could be catastrophic (Impact Factor = 3)
    - Medium—Medium potential that this hazard event could be catastrophic (Impact Factor = 2)
    - Low—Low potential that this hazard event could be catastrophic (Impact Factor = 1)
    - Unlikely—Virtually no potential that this hazard event could be catastrophic (Impact Factor = 0)
- **Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies.
    - High—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
    - Medium—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
    - Low—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
    - No impact—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)
- **Property Exposed**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:
    - High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
    - Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)
    - Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
    - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

- **Economic Factor**—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP).
    - High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
    - Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
    - Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
    - No Impact—Virtually no significant economic impact (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 for both population exposed to the hazard and its potential for catastrophe; a weighting factor of 2 for property damages probable due to a major hazard event; and a weighting factor of 1 for both property exposed to the hazard and its impact on the economy. The following tables summarize the impacts ratings for each hazard.

Table: Population Exposed to Hazard Event

Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1	3
Dam Failure	Low	1	3
Drought	High	3	9
Civil Disturbance	Low	1	3
Cyber Attack	High	3	9
Earthquake	High	3	9
Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3	9
Severe Weather	High	3	9
Severe Winter Weather	High	3	9
Terrorism	Medium	2	6
Tornado	Low	1	3
Wildfire	Low	1	3

Table: Potential for Hazard Event to be Catastrophic

Hazard Event	Potential for Catastrophe (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Table: Property Damages from Major Hazard Event

Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Medium	2	4
Dam Failure	High	3	6
Drought	No Impact	0	0
Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0
Earthquake	High	3	6
Flooding	High	3	6
Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0
Severe Weather	Medium	2	4
Severe Winter Weather	Medium	2	4
Terrorism	High	3	6
Tornado	High	3	6
Wildfire	High	3	6

Table: Property Exposed to Hazard Event

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Low	1	1
Dam Failure	Low	1	1
Drought	No Impact	0	0
Civil Disturbance	Low	1	1
Cyber Attack	No Impact	0	0
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Low	1	1
Landslide and Slope Failure	Low	1	1
Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0
Severe Weather	High	3	3
Severe Winter Weather	High	3	3
Terrorism	Low	1	1
Tornado	Low	1	1
Wildfire	Low	1	1

Table: Impact on Economy from Hazard Event

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Medium	2	2
Dam Failure	Low	1	1
Drought	Low	1	1
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Low	1	1
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	Medium	2	2

Ranking Results

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors as shown in the table below.

Table: Hazard Risk Ranking Analysis

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Flooding	3	19	57
Severe Winter Weather	3	18	54
Severe Weather	3	17	51
Wildfire	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Hazardous Materials Incident	3	13	39
Cyber Attack	2	17	34
Avalanche	3	10	30
Radon	3	9	27
Drought	2	13	26
Terrorism	1	25	25
Tornado	2	12	24
Landslide and Slope Failure	2	10	20
Civil Disturbance	2	10	20
Dam Failure	1	17	17

Mitigation Strategies

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation goals and objectives were reevaluated and updated; and mitigation actions/projects were updated/amended, identified, evaluated, and prioritized.

Mitigation Goals

The Mitigation Planning Team has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The team held a series of meetings designed to develop mitigation strategies as described further throughout this section. Goals for this mitigation plan are statements that:

- Represent the desires of the entire community
- Include all members of the community both public and private
- Can be accomplished in the future whether near-term or long-term

Goals form the basis for objectives and actions that will be taken and are not dependent on feasibility of implementation. Objectives—which are different than goals—define strategies that will accomplish the goals and are specific and measurable. The following are the goals in a prioritized fashion:

Goal 1
Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.

Goal 2
Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.

Goal 3
Enhance and protect the communication and warning/notification systems in the County.

Goal 4
Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.

Goal 5
Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.

Goal 6
Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.

Goal 7
Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.

Mitigation Action Plan

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next 5 years. Countywide mitigation actions will be listed using this table in Volume 1: Mitigation Strategies and Alternatives, while actions for each participating jurisdiction will be listed in their respective annexes in Volume 2. Each mitigation project identified during the 2019 plan update for both the County or jurisdiction has been organized based on the following table below, which is meant to guide the updates and progress for each mitigation initiative by helping to implement a programmatic approach.

Table: Mitigation Action Form

Mitigation Action	[Mitigation Action Title]	
Year Initiated		
Applicable Jurisdiction		
Lead Agency/ Organization		
Supporting Agencies/ Organizations		
Applicable Goal(s)		
Potential Funding Source(s)		
Estimated Cost		
Cost Analysis (Low, Medium, High)		
Benefits (loss avoided)		
Benefit Analysis (Low, Medium, High)		
Projected Completion Date (Also list as Short, Long-term, or Ongoing)		
Priority and Level of Importance (Low, Medium, High)		
Hazards Mitigated		
Recommended Mitigation Action/Implementation Plan and Project Description		
Action/ Implementation Plan and Project Description:	[Additional narrative about the project and its implementation]	
Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019		
2020		
2021		
2022		
2023		

Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (**Projected Completion Date**) are as follows:

- **Short Term**—To be completed in 1 to 5 years
- **Long Term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs, but without a definite completion date.

Mitigation Strategy/Action Benefit Parameters

Benefit ratings were defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term

Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this Plan were identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High Priority**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or PDM grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium Priority**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, PDM, or other grant programs. The project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low Priority**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or PDM grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

Mitigation Strategies and Alternatives

Plan participants assessed and included a comprehensive range of hazard mitigation strategies/actions, including strategies from FEMA documents, strategies from the 2015 Salt Lake County Hazard Mitigation Plan, and suggestions from participating communities and their respective stakeholders during a series of workshops that took place throughout the County throughout the Fall of 2019.

Each of the participating communities, including Salt Lake County, were invited to participate in a series of workshops in which goals, objectives, and strategies were discussed, identified, updated and prioritized. Each participant in this session was provided with a number of resources to help them identify relevant mitigation strategies. A final draft of the Plan was also presented to all stakeholders to allow them to provide final edits and approval of the strategies and their priority.

One of the benefits of using an online planning system was to ensure neighboring communities had full visibility of each other's mitigation initiatives. This was done to ensure synergies were identified, when applicable, and that mitigation actions in one community would not adversely impact another nearby community.

County-Wide Actions

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Existing Mitigation Actions - Actions that are still in progress. During the 2019 update, these mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects.

New Mitigation Actions

The following are new mitigation actions created during the 2019 update.

- Develop an Enhanced Emergency Notification Communication System for the County
- Coordinate with Community Development and Community Planning to Integrate Programs
- Enhance Security at Critical Infrastructure Sites
- Enhance Interoperable Radio Communications Systems throughout the County
- Elevate and/or Mitigate Roadways in Low-Lying Areas Prone to Flooding
- Conduct Flood-Specific Impact Studies
- Work with Communities (Newly Incorporated and Metro Townships) not Currently in the NFIP to Adopt the Program
- Develop a County-Wide Program to Purchase Repetitive Loss Properties
- Develop and Implement a Water Conservation Plan
- Provide Information to Flood-Prone Areas about the Need for NFIP Coverage
- Develop and Implement Public Education Programs on Disaster Awareness
- Procure Generators and Transfer Switches for Schools, Public Facilities, and Critical Facilities
- Assess and Prioritize the Burying of Utilities
- Commodity Flow Allocation Study for Rail and Road Transportation
- Move Electrical Panels, Mechanical, Generators above BFE in Facilities in Flood-Prone Areas
- Enhancement and Expansion of Green Space
- EOC Enhancements
- Integrate WebEOC and Other Technological Enhancements
- CERT and Other Related Programs
- Establish Functional and Access Needs Registry Program
- Mutual Aid Agreement Development and/or Updates
- Countywide Green Infrastructure Plan
- Evaluate Capacity for all Local Governments to Provide Emergency Power to Critical Infrastructure
- Implement and/or Sustain Salt Lake County's Disaster Recovery Program
- Retrofit critical facilities and infrastructure to withstand avalanches
- Bring deficient High Hazard dams up to current industry standards
- Increase the size of culverts and bridges
- Remove debris and vegetation from floodway and drainage structures through a systematic maintenance program
- Improve flood resistance through enhancement of wing walls, flood barriers, foundations, etc. at likely flood impact points
- Construct debris basins, flood retention ponds, energy flow dissipaters in an effort to control the flow and release of flood waters

- Construct temporary debris traps and other flood mitigating structures in wildfire-burned areas
- Retrofit critical facilities and infrastructure to withstand earthquakes and other geologic hazards
- To retrofit businesses, residential structures, infrastructure, and public buildings (especially in historic districts) to withstand moderate earthquakes and other geologic hazards
- Using flexible piping when extending water, sewer, or natural gas service
- Installing shutoff valves and emergency connector hoses where water mains cross fault lines
- Encourage all new construction to meet enhanced standards for windloading, snow-loading and other weather-related hazards
- Plan for and maintain adequate road and debris clearing capabilities
- Install pump stations in strategic locations to mitigate flooding
- Collaborate with private canal companies to mitigate drainage, leakage, and capacity issues
- Conduct levee upgrades and certification
- Assess high-pressure pipelines to ensure they meet seismic standards

Mitigation Action	Develop an enhanced emergency notification communication system for the County
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM
Supporting Agencies/ Organizations	Local Emergency Management
Applicable Goal(s)	Goals: 1, 3
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All Hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Coordinate Conservation, Preservation, and Mitigation Actions with Community Development and Community Planning Divisions to Ensure Integration of Programs across all Communities
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD
Supporting Agencies/ Organizations	All participating jurisdictions
Applicable Goal(s)	Goals: 1, 4, 5, 6
Potential Funding Source(s)	General Funds
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Dam/Levee Failure, Drought, Earthquake, Flood, Hazardous Materials Incident (Transportation and Fixed Facility), Wildfire
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Enhance security at critical public safety and technology infrastructure sites. Develop and implement a CIKR Security/Hardening Program
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 3
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Examples of strategic locations that may benefit from security upgrades and hardening include, but are not limited to: Salt Lake County Government Center and Salt Lake County Public Works Yard; key local law enforcement centers and public gathering places; local municipal buildings and courts.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Enhance interoperable radio communications systems throughout the County
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	All jurisdictions within the County
Applicable Goal(s)	Goals: 2, 3, 5
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	High
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Additional efforts are needed to continue improving interoperable communications throughout the County; and to create redundant systems should the primary communication infrastructure fail. Additional efforts include, but are not limited to ensuring enhanced interoperability with key partners, such as public works and across the many participating jurisdictions, agencies, and partners. This is especially important for communities in remote/isolated locations.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Elevating and/or mitigate roadways in low-lying areas prone to overland flooding
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 2, 5
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Conduct Flood-Specific Impact Studies [Eastside Canal and Creek Study]
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 4, 6
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine), Severe Thunderstorm
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Although a number of studies have been completed in the past, a comprehensive Eastside Canal and Creek Study is needed to better understand risks, vulnerabilities, and opportunities for mitigation. The estimated cost is $500,000.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Work with communities (newly incorporated and metro townships) not currently in the NFIP to adopt the program
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD
Supporting Agencies/ Organizations	SLCo EM, Local Emergency Management
Applicable Goal(s)	Goals: 2, 4
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	All cities in the County, with the exception of newly incorporated Brighton and metro townships, currently participate in the NFIP.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Develop a county-wide program to purchase repetitive loss properties and to develop a program to monitor locations of buy-outs. Encourage local jurisdictions to institute a buy-out plan for flood-prone structures or those susceptible to landslide and other geological concerns.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD
Supporting Agencies/ Organizations	SLCo EM, Local Emergency Management
Applicable Goal(s)	Goals: 1, 2, 4, 6
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Riverine), Earthquake, Landslide
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Develop and implement a water conservation plan
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD
Supporting Agencies/ Organizations	SLCo EM, Local Emergency Management, Salt Lake County Emergency Services
Applicable Goal(s)	Goals: 2, 4, 5
Potential Funding Source(s)	General Funds
Estimated Cost	TBD
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	
Benefit Analysis (Low, Medium, High)	Low
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Drought, Extreme Heat Incident
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Provide information to property owners in flood-prone areas and the need for NFIP coverage
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Salt Lake County Public Works & Municipal Services, Local Emergency Management
Supporting Agencies/ Organizations	Salt Lake County Emergency Services: A division of Public Works & Municipal Services
Applicable Goal(s)	Goals: 4
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	
Benefit Analysis (Low, Medium, High)	Low
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Develop and Implement Public Education Programs on Disaster Awareness
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goal 4
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Low
Hazards Mitigated	All Hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Procure generators and transfer switches for schools, public facilities, and critical facilities. This includes generators/redundant backup power at traffic signals in key locations.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 2, 5
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	TBD
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Assess and prioritize the burying of utilities (i.e. especially in areas where new development is occurring)
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	Utility Companies
Applicable Goal(s)	Goals: 1, 2, 3, 5
Potential Funding Source(s)	Private Sector Funds, HMA Grants
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Dam Failure, Flood (Flash and Riverine), High Wind and Tornado, Landslide, Severe Thunderstorm, Severe Winter Storm, Wildfire
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Commodity flow allocation study for rail and road transportation
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	Dept. Regional Transportation, Housing & Economic Development
Applicable Goal(s)	Goals: 2, 5
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Low
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	Low
Hazards Mitigated	Hazardous Materials Incident
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Move electrical panels, mechanical, generators above base flood elevation (BFE) in facilities located in flood-prone areas
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	Salt Lake County Emergency Services
Applicable Goal(s)	Goals: 2, 5
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Enhancement and expansion of green space
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	
Mitigation Action and Project Maintenance	

Year	Status	Comments
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	EOC Enhancements
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County
Lead Agency/ Organization	SLCo EM
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Short Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	The Salt Lake County EOC requires significant enhancements to ensure situational awareness and improved coordination across the valley.
Mitigation Action and Project Maintenance	

Year	Status	Comments
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Integrate WebEOC and other technological enhancements and integration throughout the County
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	All jurisdictions throughout the County
Applicable Goal(s)	Goals: 1, 2, 3, 4, 5, 6
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Construct Snow Sheds for Avalanche Mitigation in Little Cottonwood Canyon
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Salt Lake Emergency Management
Supporting Agencies/ Organizations	Utah Department of Transportation
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	HMA, General Funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Avalanche
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Enhance and continue to promote the implementation of the CERT and other related programs
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	Local emergency management
Applicable Goal(s)	Goals: 1, 4, 5
Potential Funding Source(s)	General Funds
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Establish functional and access needs registry or similar program
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	Salt Lake County Dept. of Human Services
Applicable Goal(s)	Goals: 1, 4
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Mutual aid agreement development and/or updates
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	All participating jurisdictions within the County
Applicable Goal(s)	Goals: 5, 6, 7
Potential Funding Source(s)	General Funds
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Specifically, address the need to develop and maintain mutual aid agreements with public works departments within the county.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Develop and implement countywide green infrastructure plan
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD
Supporting Agencies/ Organizations	All participating jurisdictions within the County
Applicable Goal(s)	Goal: 2
Potential Funding Source(s)	General Funds, HMA
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Evaluate capability and capacity for all local governments to provide and sustain emergency power to critical infrastructure resources under their control
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM, Local Emergency Management
Supporting Agencies/ Organizations	All participating jurisdictions within the County
Applicable Goal(s)	Goals: 2, 3, 5, 6
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Continue implementing and improving Salt Lake County's Disaster Recovery Program by developing and updating key plans, strategies, and recovery protocols.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLCo EM
Supporting Agencies/ Organizations	All participating jurisdictions within the County, Salt Lake County Emergency Services (A Division of Public Works & Municipal Services)
Applicable Goal(s)	Goals: 1, 5
Potential Funding Source(s)	General Funds, HSGP Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	All hazards
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Examples include, but are not limited to the following: Many local jurisdictions indicated they do not have an updated Local Disaster Recovery Plan. An additional recognized gap is the need for local Debris Management Plans in the County that meet current regulations and position the County and local jurisdictions to successfully manage recovery efforts following a major disaster.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Retrofit critical facilities and infrastructure to withstand avalanches
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County PW & Municipal Services, MSD, Local Governments, Ski Resorts, Private Owners
Supporting Agencies/ Organizations	SLCo EM, Local Emergency Management
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, General Funds, Resort Revenue, Private Funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Avalanche
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Bring deficient High Hazard dams up to current industry standards
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County, Local Governments
Supporting Agencies/ Organizations	Utah Dam Safety
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	General Funds, National dam safety funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine), Dam Failure
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Examples include, but are not limited to: Mountain Dell Dam (Mountain Dell Dam is 5 miles east of Salt Lake City next to Interstate 80) -- efforts are currently underway by Salt Lake City to mitigate existing leaks. Seismic activity are a threat to all of the dams in the County, and necessary retrofitting may be necessary to decrease the risk of failure due to an earthquake.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Increase the size of culverts and bridges
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Remove debris and vegetation from floodway and drainage structures through a systematic maintenance program
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Specific examples identified with key partners include, but are not limited to: Dredging of the Jordan River and other waterways, as required.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Improve flood resistance through enhancement of wing walls, flood barriers, foundations, etc. at likely flood impact points.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Construct debris basins, flood retention ponds, energy flow dissipaters in an effort to control the flow and release of flood waters.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Specific examples include, but are not limited to: constructing a diversion at Millcreek to a drainage area.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Construct temporary debris traps and other flood mitigating structures in wildfire-burned areas.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	Utah DNR, NRCS, UDOT
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, capital improvement budgets, bonds, state and local funds, Utah DNR, NRCS
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine), Wildfire
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Retrofit critical facilities and infrastructure to withstand earthquakes and other geologic hazards.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Owners of Facilities
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	PDM, HMGP, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	To retrofit businesses, residential structures, infrastructure, and public buildings (especially in historic districts) to withstand moderate earthquakes and other geologic hazards
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Owners of Facilities, Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	PDM, HMGP, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Using flexible piping when extending water, sewer, or natural gas service
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Utility Companies, Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	PDM, HMGP, capital improvement budgets, bonds, state and local funds, utility companies
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Installing shutoff valves and emergency connector hoses where water mains cross fault lines.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Utility Companies, Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	PDM, HMGP, capital improvement budgets, bonds, state and local funds, Utility Companies
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Encourage all new construction to meet enhanced standards for windloading, snow-loading and other weather-related hazards.
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Facility Owners, Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	General Funds, HMA Grants
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Severe Weather
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Plan for and maintain adequate road and debris clearing capabilities
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 5
Potential Funding Source(s)	General Funds, HMA Grants, State Funds, UDOT
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Severe Weather
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Specific examples include, but are not limited to: expanding the capabilities of the County's snow removal fleet.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Install pump stations in strategic locations to mitigate flooding
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	Medium
Cost Analysis (Low, Medium, High)	Medium
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Collaborate with private canal companies to mitigate drainage, leakage, and capacity issues
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD, Canal Districts
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	For certain problem areas in the County, appropriate mitigation solutions may include but are not limited to: installing liner or piping, and/or installing culverts.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Conduct levee upgrades and certification
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	SLC Public Works & Municipal Services, Local Public Works/Engineering Depts., MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2
Potential Funding Source(s)	PDM, HMGP, FMA, NRCS, capital improvement budgets, bonds, state and local funds
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Med, High)	High
Hazards Mitigated	Flood (Flash and Riverine)
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	The levees along the Surplus Canal do not currently meet FEMA levee certification criteria defined in the Code of Federal Regulations (CFR) 65.10 using the current effective FEMA base flood magnitude of 4,500 cfs. Levee upgrades and improvements include, but are not limited to: • Storm drainpipes that penetrate the levees should be provided with closure devices per FEMA standards to prevent river water from flooding land behind levee enclosures. This action should be given a high priority to increase levee performance during a flood event and to facilitate certifying the levees. • In certain locations, channel dredging activities have destabilized the toe of the canal banks, which has also made the reaches of the canal banks unstable. To stabilize the canal banks, it is recommended that the canal banks be modified and that future channel dredging be performed in a manner that will not destabilize the banks. • In certain locations, raising the levees may be necessary • Certain bridges that cross canals may not be high enough to serve as a continuation of the canal levees with freeboard.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Mitigation Action	Assess high-pressure pipelines to ensure they meet seismic standards; Conduct upgrades, as needed
Year Initiated	2019
Applicable Jurisdiction	Salt Lake County and all participating jurisdictions
Lead Agency/ Organization	Utility Companies, Salt Lake County Public Works & Municipal Services, Local Public Works/Engineering Departments, MSD
Supporting Agencies/ Organizations	
Applicable Goal(s)	Goals: 1, 2, 3, 5
Potential Funding Source(s)	Private Sector Funds, HMA Grants
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	High
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Initiated/New Action	
2020		
2021		
2022		
2023		

Existing Mitigation Actions

The following are existing mitigation actions that are still in progress. During the 2019 update, these actions and projects were modified and/or amended, as needed.

- Promote Firewise Initiative and Develop CWPPs within At-Risk Communities
- Promote the Fix the Brick Program
- Help County Jurisdictions Procure FMA Grants
- Assist Emergency Managers in the Design of Pandemic Mitigation Programs
- Assist Emergency Managers in Public Education about Radon Kits

Mitigation Action	Promote Firewise Initiative and Develop Community Wildfire Protection Plans (CWPP) within At-Risk Communities
Year Initiated	2015
Applicable Jurisdiction	Salt Lake County and All Participating Jurisdictions
Lead Agency/ Organization	Salt Lake County UFA
Supporting Agencies/ Organizations	All participating communities within the County
Applicable Goal(s)	Goals: 1, 2, 4, 6
Potential Funding Source(s)	Grants
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Hundreds of thousands to millions of dollars
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Wildfire
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	One thing unique to Utah, is the CWPP ties in with communities becoming Firewise. Salt Lake County has 19 high risk wildland fire communities, and most are within UFA's response area. Salt Lake County is currently working with each community to develop CWPP and work towards Firewise recognition where applicable. Once the CWPP is complete, grants are applied for on their behalf by the SMEs involved and most communities will typically receive a monetary reward to complete the projects identified in the CWPP.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Ongoing	
2020		
2021		
2022		
2023		

Mitigation Action	Promote the Fix the Brick Program throughout the County
Year Initiated	2016
Applicable Jurisdiction	Salt Lake County and All Participating Jurisdictions
Lead Agency/ Organization	Salt Lake County and All Participating Jurisdictions
Supporting Agencies/ Organizations	State of Utah
Applicable Goal(s)	Goal: 1, 2
Potential Funding Source(s)	HMA Grant
Estimated Cost	High
Cost Analysis (Low, Medium, High)	High
Benefits (loss avoided)	Hundreds of thousands to millions of dollars
Benefit Analysis (Low, Medium, High)	High
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Earthquake
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Salt Lake County's large number of non-reinforced brick residences poses a large problem in the event of a major earthquake. SLCo EM will help county jurisdictions present the "Fix the Bricks" program. This program is part of the Salt Lake City and State of Utah effort to mitigate the effects of a large-scale earthquake by minimizing post- earthquake personal injury and requirement for outside assistance.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	Ongoing	Annual applications for pre-disaster mitigation funding to continue this project are likely.
2020		
2021		
2022		
2023		

Mitigation Action	Help County Jurisdictions Procure FMA Grants
Year Initiated	2015
Applicable Jurisdiction	Salt Lake County and All Participating Jurisdictions
Lead Agency/ Organization	SLCo EM
Supporting Agencies/ Organizations	All participating jurisdictions within the County
Applicable Goal(s)	Goals: 1, 2, 4, 6
Potential Funding Source(s)	General Fund
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Hundreds of thousands to millions of dollars
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Medium
Hazards Mitigated	Flood
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	SLCo EM will help County jurisdictions procure grants for flood mitigation assistance through presentation at a special emergency managers' meetings. Sub-committees will be formed as needed to accomplish needed tasks or explore different topics.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	In progress	
2020		
2021		
2022		
2023		

Mitigation Action	Assist Emergency Managers in the Design of Pandemic Mitigation Programs
Year Initiated	2015
Applicable Jurisdiction	Salt Lake County and All Participating Jurisdictions
Lead Agency/ Organization	SLCo EM, Salt Lake County Health Department
Supporting Agencies/ Organizations	All participating jurisdictions within the County
Applicable Goal(s)	Goals: 1, 4, 6
Potential Funding Source(s)	Local Funds
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Long Term
Priority and Level of Importance (Low, Medium, High)	High
Hazards Mitigated	Public Health Epidemic/Pandemic
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	Salt Lake County is the home of both the University of Utah's Medical Facilities and the Intermountain Healthcare's facilities possessing state of the art infectious disease physicians and treatment facilities. SLCo EM will host presentations from these facilities and the County Health Department to the County's emergency managers to assist them in designing their mitigation programs for dealing with pandemics.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	In progress	
2020		
2021		
2022		
2023		

Mitigation Action	Conduct Seminar to Assist Emergency Managers in Public Education about Radon Kits
Year Initiated	2015
Applicable Jurisdiction	Salt Lake County and All Participating Jurisdictions
Lead Agency/ Organization	SLCo EM
Supporting Agencies/ Organizations	Salt Lake County Health Department
Applicable Goal(s)	Goals: 1, 4
Potential Funding Source(s)	General Funds
Estimated Cost	Low
Cost Analysis (Low, Medium, High)	Low
Benefits (loss avoided)	Medium
Benefit Analysis (Low, Medium, High)	Medium
Projected Completion Date (Also list as Short, Long-term, or Ongoing)	Ongoing
Priority and Level of Importance (Low, Medium, High)	Low
Hazards Mitigated	Radon
Recommended Mitigation Action/Implementation Plan and Project Description	
Action/ Implementation Plan and Project Description:	SLCo EM will conduct a half day seminar to help emergency managers educate their citizens in procuring radon testing kits. A presentation from the Salt Lake County Health department will be made.

Mitigation Action and Project Maintenance		
Year	**Status**	**Comments**
2019	In progress	
2020		
2021		
2022		
2023		

NFIP-Specific Mitigation Actions and Implementation

The following mitigation strategies demonstrate Salt Lake County and its participating jurisdictions' continued support and compliance with NFIP requirements, as appropriate.

- Countywide Action—Help County Jurisdictions Procure FMA Grants
- Countywide Action—Elevate and/or Mitigate Roadways in Low-Lying Areas Prone to Flooding
- Countywide Action—Conduct Flood-Specific Impact Studies
- Countywide Action—Work with Communities not Currently in the NFIP to Adopt the Program
- Countywide Action—Develop a County-Wide Program to Purchase Repetitive Loss Properties
- Countywide Action—Provide Information to Flood-Prone Areas about the Need for NFIP Coverage

Other priorities within Salt Lake County related to NFIP participation include: 1) Increased CRS participation throughout the county; 2) Increase in the number of flood insurance policies; 3) Increased number of CFMs throughout the county; 4) Post-flood damage estimate training for county and municipal staff; 5) Acquisition of severe repetitive loss and repetitive loss properties; 6) Higher regulatory standards including higher freeboard, cumulative substantial damage and substantial improvement threshold, and enforcing floodplain regulations in areas of known urban, typically shallow depth, flooding.

NFIP participation, compliance, and status information for each participating jurisdiction can be found in Volume 2 in each of the respective capability assessments.

Completed Mitigation Actions

Because the implementation of this Plan is critical to creating greater community resilience, completion of mitigation actions is an important indicator of implementation and activity in the County. As of the 2019 update of this plan, all mitigation actions at the county level are in new or ongoing phases. Many of the previous actions at the county level were to conduct seminars and trainings for emergency managers. Because those actions did not reflect the new priorities and needs of the county, they were removed.

The 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan is a living document, however, and will continue to be updated on a 5-year cycle, as Salt Lake County officials recognize the significance of these strategies and how such actions can protect the County. The actions that have been completed at the jurisdictional level, can all be viewed in the annexes found in Volume II.

Participating Jurisdiction Mitigation Actions

The mitigation strategies for each participating jurisdiction can be found in each respective annex in Volume 2 of this plan.

Plan Integration Strategy

Plan integration is the process by which communities look critically at their existing planning framework and align efforts with the goal of building a safer, smarter community. Plan integration involves a two-way exchange of information and incorporation of ideas and concepts between the Salt Lake County Multi-Jurisdictional Multi-Hazard Mitigation Plan and other community plans. Specifically, plan integration involves the incorporation of hazard mitigation principles and actions into community plans and community planning mechanisms.

The following demonstrates Salt Lake County and its participating jurisdictions' continued effort to integrate mitigation into other community plans and efforts:

- Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.

Although existing county and local plans acknowledge hazards and risks, clear attempts to specifically integrate and reference the 2015 mitigation plan were not well documented. Goal 6 was added to make sure subsequent updates accomplish this important task.

Comprehensive Plan	Yes	No
Land Use	Yes	No
1. Does the future land-use map clearly identify natural hazard areas?	X	
2. Do the land-use policies discourage development or redevelopment within natural hazard areas?	X	
3. Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?	X	
Transportation	Yes	No
1. Does the transportation plan limit access to hazard areas?	X	
2. Is transportation policy used to guide growth to safe locations?	X	
3. Are movement systems designed to function under disaster conditions (e.g., evacuation)?	X	
Environmental Management	Yes	No
1. Are environmental systems that protect development from hazards identified and mapped?	X	
2. Do environmental policies maintain and restore protective ecosystems?	X	
3. Do environmental policies provide incentives to development that is located outside protective ecosystems?	X	
Public Safety	Yes	No
1. Are the goals and policies of the comprehensive plan related to those of the FEMA Local Hazard Mitigation Plan?	X	
2. Is safety explicitly included in the plan's growth and development policies?	X	
3. Does the monitoring and implementation section of the plan cover safe growth objectives?	X	
Zoning Ordinance	Yes	No
1. Does the zoning ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?	X	
2. Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?	X	

Comprehensive Plan	Yes	No
3. Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?	X	
4. Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains?	X	
Subdivision Regulations	Yes	No
1. Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?	X	
2. Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?	X	
3. Do the regulations allow density transfers where hazard areas exist?	X	
Capital Improvement Program and Infrastructure Policies	Yes	No
1. Does the capital improvement program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?	X	
2. Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?	X	
3. Does the capital improvement program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan?	X	
Other	Yes	No
1. Do small area or corridor plans recognize the need to avoid or mitigation natural hazards?	X	
2. Does the building code contain provisions to strengthen or elevate construction to withstand hazard forces?	X	
3. Do economic development or redevelopment strategies include provisions for mitigation natural hazards?	X	
4. Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards?	X	

Plan Implementation and Maintenance

Evaluating, updating, and monitoring this plan are critical to maintaining its value and success in the County's hazard mitigation efforts. A hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a five-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

This section details the formal process that will ensure that the Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

Plan Implementation

The effectiveness of the hazard mitigation plan depends on its implementation and incorporation of its action items into partner jurisdictions' existing plans, policies, and programs. SLCo EM will assume lead responsibility for **implementation** and **monitoring** of this plan maintenance strategy. Although the County will have primary responsibility, plan implementation and **evaluation** will be a shared responsibility among all planning partners and agencies identified as lead agencies in the mitigation action plans. Completion of this strategy is the responsibility of each planning partner. This was conveyed to each planning partner as an expectation at the beginning of the planning process. Many of the mitigation actions developed by the participating jurisdictions include elements of mitigation implementation including the National Flood Insurance Program (NFIP), the Utah Wildland-Urban Interface Code, the Building Code Effectiveness Grading System (BCEGS), and Community Rating System (CRS), all of which have been implemented.

Incorporation Into Other Planning Mechanism

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this plan was prepared. The comprehensive plans of participating jurisdictions are considered to be integral parts of this plan. The County and partner municipalities have also planned for the impact of natural hazards through adoption of zoning ordinances. The plan development process provided the County and the municipalities with the opportunity to review and expand on policies contained within these planning mechanisms. The planning partners used their comprehensive plans (when applicable) and the hazard mitigation plan as complementary documents that work together to achieve the goal of reducing risk exposure to the citizens of the planning area. An update to a comprehensive plan may trigger an update to the hazard mitigation plan.

Once the Mitigation Plan is promulgated, participating jurisdictions will be able to include this plan's information in existing programs and plans. These could include the General or Master Plan, Emergency Response or Operations Plans, Municipal Codes, Capital Improvements Plan, or Community Design Guidelines, among others. All municipal planning partners are committed to creating a linkage between this hazard mitigation plan and their jurisdiction-specific plans by identifying a mitigation action as such and giving that action a high priority.

Some action items do not need to be implemented through regulation. Instead, they be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

Maintenance Schedule and Evaluation Process

Periodic monitoring and updates of this Plan are required to ensure that the plan's goals are kept current and that local mitigation strategies are being carried out. This portion of the Plan outlines the procedures for completing revisions and updates. The Plan will also be revised to reflect lessons learned or to address specific hazard incidents arising out of a disaster.

Annual Review Procedures

County jurisdictions will be responsible to annually review their mitigation strategies described in this Plan, as required by the Utah Division of Emergency Management (UDEM), or as situations dictate, such as following a disaster declaration. SLCo EM will regularly monitor the Plan and is responsible to make revisions and updates. This process may include the County organizing a Mitigation Planning committee comprised of individuals from the jurisdictions and organizations responsible to implement the described mitigation strategies.

Progress toward the completion of the strategies will be assessed and adjustments may be made, as needed. If SLCo EM, the participating jurisdictions, or UDEM determines that a modification of the Plan is warranted, an amendment to the Plan may be initiated as described below.

Plan Amendments

The SLCo EM Hazard Mitigation Officer, Local Mitigation Committee, or Mayor/City Manager of an affected community will initiate amendments and updates to the Plan.

Upon initiation of an amendment to the plan, SLCo EM will forward information on the proposed amendment to all interested parties including, but not limited to: all affected city or county departments, residents and businesses. Depending on the magnitude of the amendment, the full planning committee may be reconstituted.

At a minimum, the information will be made available through public notice in a newspaper of general circulation or on the Salt Lake County website www.slcoem.org. The review and comment period for the proposed Plan amendment will last for not less than thirty (30) days.

At the end of the comment period, the proposed amendment and all review comments will be forwarded to participating jurisdictions for consideration. If no comments are received from the reviewing parties within the specified review period, such will be noted accordingly. SLCo EM will review the proposed amendment along with comments received from other parties and submit a recommendation to the SHMO and FEMA within sixty (60) days of the end of the comment period.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered:

- There are errors or omissions made in the identification of issues or needs during the preparation of the Plan; and/or
- New issues or needs have been identified which were not adequately addressed in the Plan; and/or
- There has been a change in information, data or assumptions from those on which the Plan was based.
- The nature or magnitude of risks has changed.
- There are implementation problems, such as technical, political, legal or coordination issues with other agencies.

Upon receiving the recommendation of SLCo EM, a public hearing will be held. SLCo EM will review the recommendation (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, SLCO EM will take one of the following actions:

1. Adopt the proposed amendment as presented.
2. Adopt the proposed amendment with modifications.
3. Defer the amendment request for further consideration and/or hearing.
4. Reject the amendment request.

Five-Year Plan Review

Local hazard mitigation plans must be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6(d)(3)). The planning partnership intends to update the hazard mitigation plan on a five-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than five years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area
- A hazard event that causes loss of life
- A comprehensive update of the County or participating municipality's comprehensive plan

Typically, the same process that was used to create the original plan will be used to prepare the update. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plans will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new partnership policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The partnership governing bodies will adopt their respective portions.

Continued Public Involvement

Throughout the planning process, public involvement has been and will be critical to the development of the Plan and its updates. The Plan will be available on the Unified Fire Authority and Salt Lake County Emergency Management websites to provide opportunities for public participation and comment. The Plan will also be available for review at the offices of SLCo EM.

SLCo EM has been designated as the lead agency in preparing and submitting the Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan, which includes coverage for all incorporated jurisdictions within Salt Lake County in addition to unincorporated areas. With limited resources, however, it becomes difficult to both identify and to individually contact the entirety of the broad range of potential people and agencies that may stand to benefit from the Plan. This being the case, the following course of action has been established.

STEP 1

SLCo EM will publicly advertise all hearings, requests for input, and meetings directly related to the mitigation planning process. Meetings of the Mitigation Planning Team where plan items are discussed and where actions are taken will not receive special notifications as they are already advertised according to set standards. All interested parties are welcome and invited to attend such meetings and hearings, as they are public and open to all.

STEP 2

The County has established a mailing list of many local agencies and individuals that may have an interest in the Plan. Each identified agency or person will be mailed a notice of the hearings and open houses.

STEP 3

Comments, both oral and written, will be solicited and accepted from any interested party. Comments, as far as possible, will be included in the final draft of the Plan, however, SLCo EM reserves the right to limit comments that are excessively long, due to the size of the plan.

STEP 4

Specific to risk assessment and hazard mitigation, needs analysis, and capital investment strategies, SLCo EM will also make initial contact and solicitation for input from each incorporated jurisdiction within the region. All input is voluntary. Staff time and resources may not allow personal contact with other agencies or groups; however, comments and strategies are welcomed as input to the planning process from any party via regular mail, FAX, e-mail, phone call, etc. In addition, every public jurisdiction advertises and conducts public hearings on their planning, budget, etc. where most of these mitigation projects are initiated. Input can be received from these prime sources by the region as well.

Overarching Policies

The following policies will guide SLCo EM staff in making access and input to the Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan as open and convenient as possible:

Participation

All citizens of the region are encouraged to participate in the planning process, especially those who may reside within identified hazard areas. SLCO EM will take whatever actions possible to accommodate special needs of individuals including the impaired, non-English speaking, persons of limited mobility, etc.

Access to Meetings

Adequate and timely notification to all area residents will be given as outlined above to all hearings, forums, and meetings.

Access to Information

Citizens, public jurisdictions, agencies and other interested parties will have the opportunity to receive information and submit comments on any aspect of the Plan, and/or any other documents prepared for distribution by SLCo EM that may be adopted as part of the Plan by reference. SLCo EM may charge a nominal fee for printing of documents that are longer than three pages.

Technical Assistance

Residents as well as local jurisdictions may request assistance in accessing the program and interpretation of mitigation projects. SLCo EM staff will assist to the extent practical, however, limited staff time and resources may prohibit staff from giving all the assistance requested. SLCo EM will be the sole determiner of the amount of assistance given all requests.

Public Hearings

The County will plan and conduct public hearings according to the following priorities:

- Hearings will be conveniently timed for people who might benefit most from mitigation programs
- Hearings will be accessible to people with disabilities (accommodations must be requested in advance according to previously established policy)
- Hearings will be adequately publicized. Hearings may be held for a number of purposes or functions including: Identification and profile of hazards; developing mitigation strategies; and reviewing Mitigation Plan goals, performance and future Plans.

Future Revisions

Future revisions of the Plan shall include:

- Continuation of the search for more specific mitigation actions
- An analysis of progress of the plan as it is revised.

Plan Adoption

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6(c)(5)). For multi-jurisdictional plans, each jurisdiction requesting approval must document that is has been formally adopted. This plan will be submitted for a pre-adoption review to the State and FEMA prior to adoption. Once pre-adoption approval has been provided, all planning partners will formally adopt the plan. All partners understand that DMA compliance and its benefits cannot be achieved until the plan is adopted.

After a thorough review, the Salt Lake County Council adopted the plan on <date adopted>. Copies of the resolutions adopting this plan for all planning partners can be found in Appendix D of this volume.

Appendices

Appendix A: Acronyms and Definitions

Abutment (dam) – the valley side against which a dam is constructed.

Acre-Foot – An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Acre-Foot of Water – approximately 326,000 gallons of water, or approximately a football field covered by one foot of water.

Active Faults – An active fault is defined as a fault displaying evidence of displacement along one or more of its traces during Holocene time (about the last 11,000 years).

Aftershocks – earthquakes during the seconds, hours, days to months following a larger earthquake (main shock) in the same general region.

Alluvial Fan – a cone-shaped deposit of stream sediments, generally deposited at the base of a mountain where a stream encounters flatter terrain.

Amplitude (seismic waves) – the maximum height of a wave crest or depth of a trough. Amount the ground moves as a seismic wave passes, as measured from a seismogram.

ATV – All Terrain Vehicle

AQI – Air Quality Index

Asset – An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Avalanche path – the area in which a snow avalanche runs; generally divided into starting zone, track, and runout zone.

Basin and Range Physiographic Province – consists of north-south-trending mountain ranges separated by valleys, bounded by the Rocky Mountains and the Colorado Plateau to the east and the Sierra-Cascade Mountains to the west (includes western Utah).

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the “100-year” or “1-percent-annual-chance” flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

Basin – A basin is the area within which all surface water – whether from rainfall, snowmelt, springs, or other sources – flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Bearing Capacity – the load per unit area, which the ground can safely support without excessive yield.

Bedrock – solid in-place rock sometimes exposed and sometimes concealed beneath the soil.

Benefit – A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis – A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost-effectiveness.

Block Faulting – see normal fault

Building – A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment – A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components – an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

CIP – Capital Improvement Plan

Collapsible Soil (hydrocompaction) – loose, dry, low-density soil that decreases in volume or collapses when saturated for the first time following deposition.

Critical Areas – An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations. These could include: environmentally sensitive areas that include wetlands fish and wildlife habitat conservation areas; geologically hazardous areas; areas with a critical recharging effect on aquifers used for potable water; and frequently flooded areas. Critical areas have measurable characteristics which, when combined, create a value for or potential risk to public health, safety and welfare.

Critical/Essential Facilities – Structures meeting one or more of the following criteria:

- Fire stations, police stations, storage facilities for vehicles/equipment needed after a hazard event, and emergency operation centers.
- Hospitals, nursing homes, and housing which is likely to contain occupants who may not be sufficiently mobile to avoid injury or death as a result of a hazardous event
- Public and private utility facilities, which are vital to maintaining or restoring normal services to, damaged areas after a hazardous event.
- Structures or facilities that produce, store, or use highly flammable, explosive, volatile, toxic and/or water reactive materials

CFR – Code of Federal Regulations

CFS – Cubic feet per second

Community Rating System (CRS) – The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Dam – Any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure – Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Flow – involves the relatively rapid, viscous flow of surficial material that is predominantly coarse grained.

Debris Slide – Debris slides consist of unconsolidated rock, soil, or coarse-grained material that has moved rapidly down slope, mainly along a planar surface. They occur on slopes greater than 65 percent.

DFIRM – Digital Flood Insurance Rate Maps

Disaster Mitigation Act of 2000 (DMA) – The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin – A basin is the area within which all surface water- whether from rainfall, snowmelt, springs or other sources- flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Drought (Agricultural) – lack of water for crop production in a given area

Drought (Hydrologic) – lack of water in the entire water supply for a given area.

Drought (Meteorological) – lack of precipitation compared to an area's normal amount

Drought (Socioeconomic) – lack of water sufficient to support an area's population

Earth Flow – Involves fine-grained material that slumps away from the top or upper part of a slope, leaving a scarp, and flows down to form a bulging toe.

Earthquake – An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Earthquake Fault Zone – earthquake fault zones are regulatory zones around active faults. The zones are used to prohibit the location of critical facilities and structures designed for human occupancy from being built astride an active fault. Earthquake Fault Zones are plotted on topographic maps at a scale of 1-inch equals 2,000 feet. The zones vary in width, but average about one-quarter mile wide.

Earthquake-Induced Seiche – Earthquake generated water waves causing inundation around shores or lakes and reservoirs.

Enhanced Fujita Scale – The Enhanced Fujita Scale or EF Scale, which became operational on February 1, 2007, is used to assign a tornado a 'rating' based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators (DIs) and Degrees of Damage (DoD) which help estimate better the range of wind speeds the tornado likely produced. From that, a rating (from EF0 to EF5) is assigned. The EF Scale was revised from the original Fujita Scale to reflect better examinations of tornado damage surveys so as to align wind speeds more closely with associated storm damage. The new scale has to do with how most structures are designed.

EPA – U.S. Environmental Protection Agency

Epicenter – the point on the earth's surface directly above the focus of an earthquake.

Epoch – geologic time unit lasting more than an age but shorter than a period (Epoch 2008).

EPZ – Emergency planning zone

Erosion – the removal of earth or rock material by many types of processes, for example, water, wind, or ice action.

ESA – Endangered Species Act

Expansive Soil and Rock – soil and rock that contain clay minerals that expand and contract with changes in moisture content.

Exposure – Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent – The specific measurement of an hazard occurrence, often based on a scientific scale. Sometimes used interchangeably with the term “Magnitude.”

Fault – a break in the earth along which movement occurs.

Fault Segment – section of a fault that behaves independently from adjacent sections.

Fault Zone – an area containing numerous faults.

Federal Emergency Management Agency (FEMA) – authorized under Section 404 of the Stanford Act. Provides funding for hazard mitigation projects that are cost-effective and comply with existing post-disaster mitigation programs and activities. These projects cannot be funded through other programs to be eligible.

FERC – Federal Energy Regulatory Commission

Fill – material used to raise the surface of the land generally in a low area.

Firewise Communities Program – A program of the National Fire Protection Association that encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk. The program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

Fire-Resistant Vegetation – plants that do not readily ignite and burn when subjected to fire because of inherent physiological characteristics of the species such as moisture content, fuel loading, and fuel arrangement.

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study – A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Flash Flood – A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Floodplain – Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

Floodplain (100-year/500-year) – Floodplains that have the potential to flood once every 100 or 500 years or that has a 1% (100-year) or 0.2% (500-year) chance of flooding equal to or in excess of that in any given year.

Floodway – An area of land immediately adjacent to a stream or river channel that, in times of flooding, becomes an enlarged stream or river channel and carries the floodwater with the highest velocity.

Fluvial – concerning or pertaining to rivers or streams.

FMA – Flood Mitigation Assistance program

Focus – the point of origin of an earthquake within the earth, and the origin of the earthquake's seismic waves.

Fog – Fog refers to a cloud (or condensed water droplets) near the ground. Fog forms when air close to the ground can no longer hold all the moisture it contains. Fog occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is particularly hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents, cause airport delays, and impair the

effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States but are known to be substantial.

Formation (geologic) – a mappable rock unit consisting of distinctive features/rock types separate from units above and below.

Freeboard – Freeboard is the margin of safety added to the base flood elevation.

Frequency – For the purposes of this plan, frequency refers to how often a hazard of specific magnitude and/or duration is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Frequency (seismic waves) – the number of complete cycles of a seismic wave passing a point during one second.

Fuel (fire) – vegetation, building material, debris, and other substances that will support combustion.

Fuel Break – a change in fuel continuity, type of fuel, or degree of flammability of fuel in a strategically located strip of land to reduce or hinder the rate of fire spread.

Fuel Type – a category of vegetation used to indicate the predominate cover of an area.

Geographic Information System (GIS) – GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Glacial Moraine – debris (sand to boulders) transported and deposited by glacial ice along a glacier's sides or terminus.

Goal – A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Graben – a block of earth down dropped between two faults.

Gradient (slope) – a measure of the slope of the land surface.

Ground Failure – a general term referring to any type of ground cracking or subsidence, including landslides and liquefaction-induced cracks.

Ground Shaking – the shaking or vibration of the ground during an earthquake.

Ground Water – that portion of subsurface water that is in the zone of saturation.

Gypsiferous Deposits – soil or rock containing gypsum, which can be subject to dissolution.

Gypsum – a mineral composed of hydrated calcium sulfate. A common mineral of evaporates.

Hazard – A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation – Any action taken to reduce or permanently eliminate the long-term risk to human life and property and the environment posed by a hazard.

Hazard Mitigation Plan – The Plan resulting from a systematic evaluation of the nature and extent of vulnerabilities posed by a hazard present in society that includes the strategies needed to minimize future vulnerability to hazards.

Hazard Mitigation Grant Program (HMGP) – Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

HAZUS-MH – Hazards United States – Multi-hazards; Earthquake loss estimation software using GIS databases developed by FEMA.

Hazards U.S. Multi-Hazard (Hazus-MH) Loss Estimation Program – Hazus-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus-MH software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards. Hazus-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. Hazus-MH has also been used to assess vulnerability (exposure) for other hazards.

Head (landslide) – the upper parts of the slide material along the contact between the disturbed material and the main scarp.

Holocene – geologic epoch covering the last 10,000 years (after the last Ice Age).

HUD – U.S. Department of Housing and Urban Development

Hydraulics – Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology – Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

IBC – International Building Code

Intensity – For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Igneous Rocks – rocks formed by cooling and hardening of hot liquid material (magma), including rocks cooled within the earth (for example, granite) and those that cooled at the ground surface as lavas (such as basalt).

Impermeable – materials having a texture that does not permit water to move through.

Inventory – The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

IPCC – Intergovernmental Panel on Climate Change

Interfluve – land between two streams in the same drainage basin (Interfluve 2004)

Intermountain Seismic Belt (ISB) – zone of pronounced seismicity, up to 120 miles wide and 800 miles long, extending from Arizona through central Utah to northwestern Montana.

IRC – International Residential Code

Lacustrine – concerning or pertaining to lakes.

Lake Bonneville – a large, ancient lake that existed 30,000 to 12,000 years ago and covered nearly 20,000 square miles in Utah, Idaho, and Nevada. The lake covered many of Utah's valleys, and was almost 1,000 feet deep in the area of the present Great Salt Lake.

Lake Bonneville Sediments – sediments deposited by Lake Bonneville, found in the valleys, which range from gravels and sands to clays.

Landslide – a general term for a mass of earth or rock, which moves down slope by flowing, spreading, sliding, toppling, or falling (see slope failure).

Landspout – Tornado occurring with a parent cloud in its growth stage and with its vorticity originating in the boundary layer. The parent cloud does not contain a preexisting midlevel mesocyclone. The landspout was so named because it looks like a weak Florida Keys waterspout over land.

Lateral Spread – lateral down slope displacement of soil layers, generally several feet or more, above a liquefied layer.

Levee (flood) – a berm or dike used to contain or direct water, usually without an outlet or spillway.

Lightning – Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt,” usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Liquefaction – sudden large decrease in shear strength of a cohesionless soil (generally sand or silt) caused by collapse of soil structure and temporary increase in pore-water pressure during earthquake ground shaking.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude (earthquake) – a quantity characteristic of the amplitude of the ground motion of an earthquake. The most commonly used measurement is the Richter magnitude scale; a logarithmic scale based on the motion that would be measured by a standard type of seismograph 60 miles from the earthquake's epicenter.

Metamorphic Rocks – rocks formed by high temperatures and/or pressures (for example, quartzite formed from sandstone).

Mitigation – the act of reducing or preventing hazards that affect society or those things deemed important to society

Mitigation Actions – Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Modified Mercalli Intensity (MMI) – the most commonly used intensity scale in the U.S.; it is a measure of the severity of earthquake shaking at a particular site as determined from its effect on the earth's surface, man, and man's structures.

Montmorillonite – a clay mineral characterized by expansion upon wetting and shrinking upon drying.

NASA – National Aeronautics and Space Administration

Natural Vegetation – native plant life existing on a piece of land before any form of development.

NCDC – National Climatic Data Center

NEHRP – National Earthquake Hazards Reduction Program

NFIP – National Flood Insurance Program

NFPA – National Fire Protection Association

NOAA – National Oceanic and Atmospheric Administration

Normal Fault (block faulting) – fault caused by crustal extension in which relative movement on opposite sides is primarily vertical; for example, the Wasatch fault.

NRC – National Research Council

NWS – National Weather Service

Oolite – spherical grains of carbonate sand with a brine shrimp fecal pellet nucleus.

OTA – Congressional Office of Technology Assessment

Outlet (dam) - a conduit through which controlled releases can be made from the reservoir.

Palmer Drought Severity Index (PDSI) – developed by Wayne Palmer in the 1965; measures drought severity using temperature, precipitation and soil moisture (Utah Division of Water Resources 2007)

Peak Ground Acceleration – Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Peat – unconsolidated surficial deposit of partially decomposed plant remains.

Period (geologic) – a standard (world-wide) geologic time unit.

Permeability – the capacity of a porous rock or soil for transmitting a fluid.

Physiographic Province – a region whose pattern of relief features or landforms differs significantly from that of adjacent regions.

Piping (problem soil and rock) – a weak incoherent layer in unconsolidated deposits that acts as a channel directing the movement of water. As the layer becomes saturated it conducts water to a free face (cliff or stream bank for example) that intersects the layer, and material exits out a "pipe" formed in the free face. Piping can occur in a dam as the result of progressive development of internal erosion by seepage.

Pore Space – the open spaces in a rock or soil between solid grains. The spaces may be filled with gas (usually air) or liquid (usually water).

Porosity – the ratio of the volume of pore space in rock or soil to the volume of its mass, expressed as percentage.

PDM – Pre-Disaster Mitigation Grant Program

PDSI – Palmer Drought Severity Index

PGA – Peak Ground Acceleration

Preparedness – Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration – These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence – The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Probable Maximum Flood (PMF) – a flood that would result from the most severe combination of critical meteorological and hydrologic conditions possible in a region.

Probable Maximum Precipitation (PMP) – the maximum amount and duration of precipitation that can be expected to occur on a drainage basin.

Problem Soil and Rock – geologic materials that are susceptible to volumetric changes, collapse, subsidence, or other engineering geologic problems.

Project Impact – An initiative of the Federal Emergency Management Agency intended to modify the way in which the United States handles natural disasters. The Goal of Project Impact from a Federal Government perspective is to reduce the personal and economic costs of hazard events by bringing together the private and public sector to better enable the citizens of a community to protect themselves from natural hazards.

Quaternary – a geologic time period covering the last 1.6 million years.

Recurrence Interval – the length of time between occurrences of a particular event (an earthquake, for example).

Repetitive Loss Property – Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Return Period (or Mean Return Period) – This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

RHRC – Regional Hub Reception Center

Riverine – Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk – Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment – Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking – This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on people, property, and the economy. Risk estimates for the City are based on the methodology that the City used to prepare the risk assessment for this plan. The following equation shows the risk ranking calculation: Risk Ranking = Probability Impact (people property economy)

Robert T. Stafford Act – The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Rock Fall – abrupt free fall or down slope movement, such as rolling or sliding, of loosened blocks or boulders from an area of bedrock. The rock-fall runout zone is the area below a rock-fall source that is at risk from falling rocks.

Rock Topple – forward rotation movement of a rock unit(s) about some pivot point.

RSI – Regional Snowfall Index

Runout Zone (avalanche) – where a snow avalanche slows down and comes to rest (deposition zone). For large avalanches, the runout zone can include a powder- or wind-blast zone that extends far beyond the area of snow deposition.

Sand Blow (earthquake) – deposit of sandy sediment ejected as water and sand to the surface, formed when ground shaking has caused liquefaction at depth.

Scarp – a relatively steeper slope separating two more gentle slopes. Scarps can form as result of earthquake faulting.

Sediment – material that is in suspension, is being transported, or has been moved from its site of origin by water, ice, or wind, and has come to rest on the earth's surface either above or below the sea level.

Sedimentary Rocks – rocks formed from loose sediment such as sand, mud, or gravel deposited by water, ice, or wind, and then hardened into rock (for example, sandstone); or formed by dissolved minerals precipitating out of solution to form rock (for example, tufa).

Seiche – a standing wave generated in a closed body of water such as a lake or reservoir. Ground shaking, tectonic tilting, sub aqueous fault rupture, or landslides into water can all generate a seiche.

Seismic Waves – vibrations in the earth produced during earthquakes.

Seismicity – seismic or earthquake activity.

Sensitive Clay – clay soil that experiences a particularly large loss of strength when disturbed. Deposits of sensitive clay are subject to failure during earthquake ground shaking.

SFHA – Special Flood Hazard Area

Shear Strength – the internal resistance that tends to prevent adjacent parts of a solid from "shearing" or sliding past one another parallel to the plane of contact. It is measured by the maximum shear stress that can be sustained without failure.

Shear Stress – a stress causing adjacent parts of a solid to slide past one another parallel to the plane of contact.

SHELDUS – Spatial Hazard Events and Losses Database for the U.S.

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Slope Failure – a general term referring to any type of natural ground movement on a sloping surface (see landslide).

Slump – a slope failure that slides along a concave rupture surface. Generally slumps do not move very far from the source area.

Snow Avalanche – a rapid down slope movement of a mass of snow, ice, and debris.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems.

Spectral Acceleration – measurement for approximate horizontal force experienced in a model earthquake. Measurements are specific to the frequency of shaking found to affect buildings during and earthquake. A 0.2-second period affects primarily one- and two-story buildings while 1.0- second period of spectral acceleration affects buildings approximately 10 stories in height.

SPI – Standardized Precipitation Index

Stafford Act – Robert T. Stafford Disaster Relief and emergency Assistance Act, PL 100-707, signed into law November 23 1988: amended the Disaster Relief Act of 1974, PL 93-288.

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Starting Zone (avalanche) – where the unstable snow or ice breaks loose and starts to slide.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

StormReady Program: A program of the National Weather Service that helps arm America's communities with the communication and safety skills needed to save lives and property--before and during a storm event. StormReady helps community leaders and emergency managers strengthen local safety programs. StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness.

Stream Bank Erosion – Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Subsidence – a settling or sinking of the earth's crust.

Surface Fault Rupture (surface faulting) – propagation of an earthquake-generated fault rupture to the ground surface, displacing the surface and forming a scarp.

Sustainable Hazard Mitigation: This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

Tectonic Subsidence – subsidence (down dropping) and tilting of a basin on the down dropped side of a fault during an earthquake.

Thunderstorm – A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Toe (landslide) – the margin of disturbed material most distant from the main scarp.

Tornado – A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Track (avalanche) – the slope or channel down which a snow avalanche moves at a fairly uniform speed.

Unconsolidated Basin Fill – un-cemented and non-indurated sediment, chiefly clay, silt, sand, and gravel, deposited in basins.

Urban Area – a geographical area, usually of incorporated land, covered predominately by engineered structures including homes, schools, commercial buildings, service facilities, and recreational facilities.

USACE – United States Army Corps of Engineers

USGS – U.S. Geological Survey

Velocity (ground motion) – the rate of displacement of an earth particle caused by passage of a seismic wave.

Vulnerability – Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damage, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Wasatch Fault – a normal fault that extends over 200 miles from Malad City, Idaho to Fayette, Utah, and trends along the western front of the Wasatch Range.

Watershed – A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Weathering – a group of processes (such as the chemical action of air, rainwater, plants, and bacteria and the mechanical action of temperature changes) whereby rocks on exposure to the weather change in character, decay, and finally crumble into soil.

Wildfire – uncontrolled fire burning in vegetation.

Wildland Area – a geographical area of unincorporated land covered predominately by natural vegetation.

Wildland Urban Interface (WUI) – Wildland vegetation and forested areas adjacent to or intermingled with residential developments.

Windstorm – Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Zone of Deformation (earthquake) – the width of the area of surface faulting over which earth materials have been disturbed by fault rupture, tilting, or subsidence.

Zoning Ordinance – The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components – a zoning text and a zoning map.

44 CFR – Title 44 of the Code of Federal Regulations

100-Year Flood – The term “100-year flood” can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Appendix B: Plan Process and Development

Monthly Stakeholder Mitigation Meeting

A monthly stakeholder Hazard Mitigation meeting was held on the 2nd Monday of each month. Meetings started in May and went through December. All jurisdictional representatives and regional stakeholders were invited.

Salt Lake County Hazard Mitigation Workshop Attendees

Double-click link below to access the full registration and attendee list.

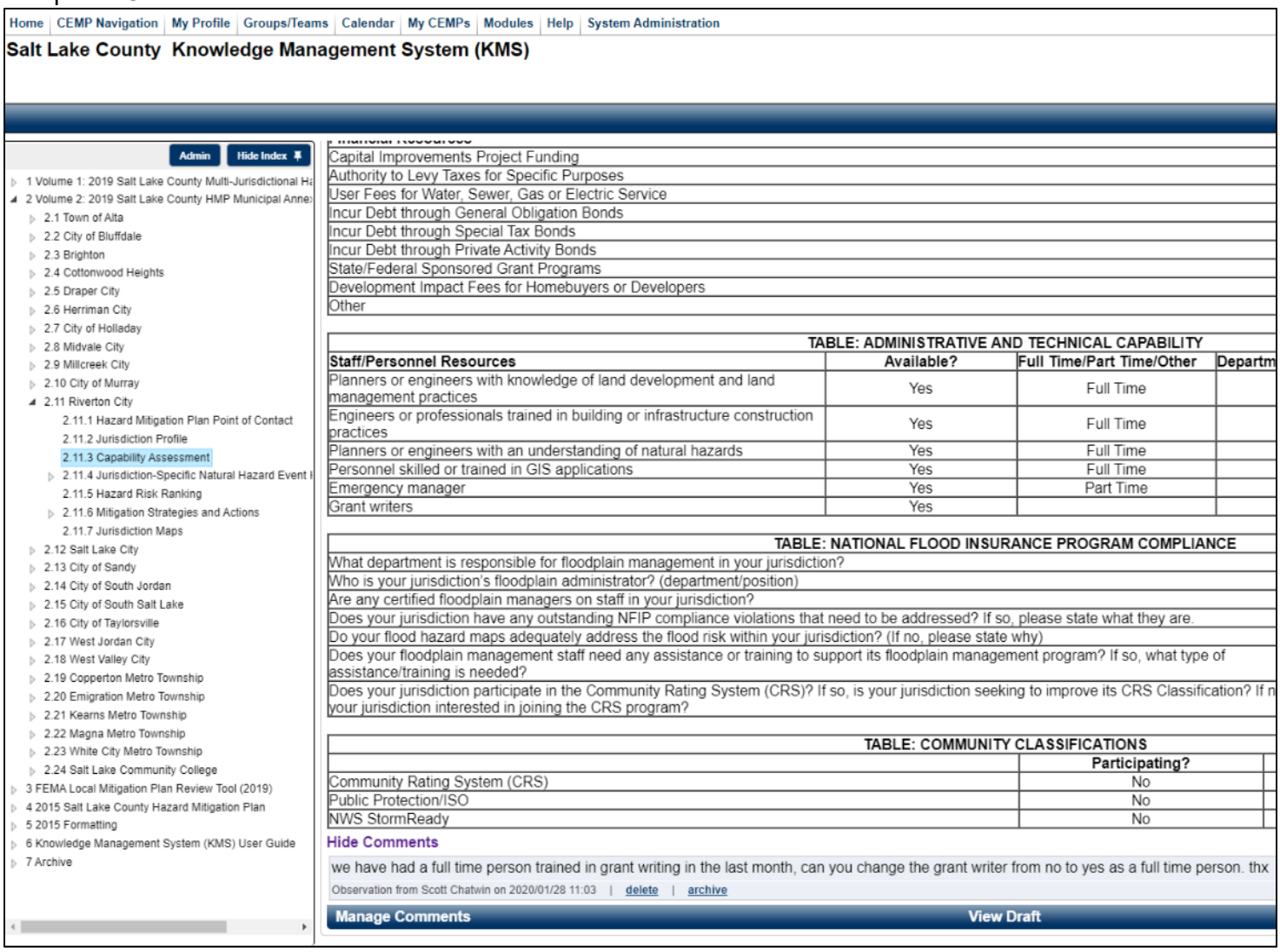
SLC-HMPWorkshop-Attendees.xlsx

WorkshopSign-inSheet.pdf

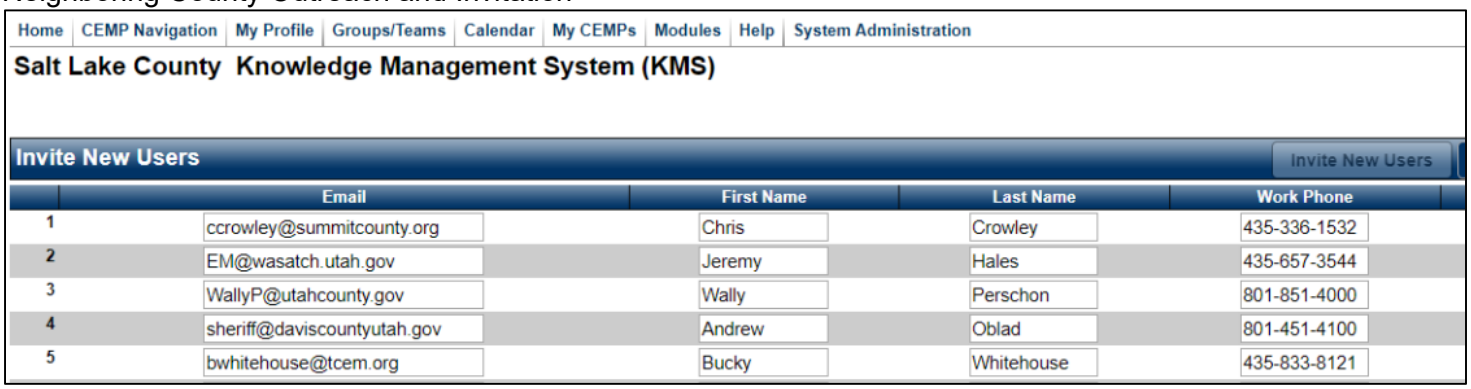


Online Planning System and Stakeholder Participation

Sample of Comments Received



Neighboring County Outreach and Invitation



Resources and Tools for Planning Partners

Double-click link below to access the full Handout. This handout provided sample mitigation projects and ideas for planning partners.



SaltLakeCounty Mitigation Actions (E

Jurisdiction-Specific Hazard Concerns

Salt Lake County Hazards

Name:_____; E-mail: _____;

Jurisdiction/Organization/Agency: _____

Natural Hazards	
Hazards	Please describe any specific and/or unique **concerns/risks** that this hazard poses to your jurisdiction and/or organization. For example, are there properties that are at risk of **repetitive damages** from this hazard? Are certain population groups in your jurisdictions more vulnerable to this hazard? Are there specific neighborhoods or areas in your community that are more at risk from one of these hazards?
Avalanche	
Dam Failure	
Drought	
Earthquake	

Handout: New Mitigation Actions (Salt Lake County)

Name:

Organization/Department:

E-mail:

Phone:

New Mitigation Action (Please Describe):

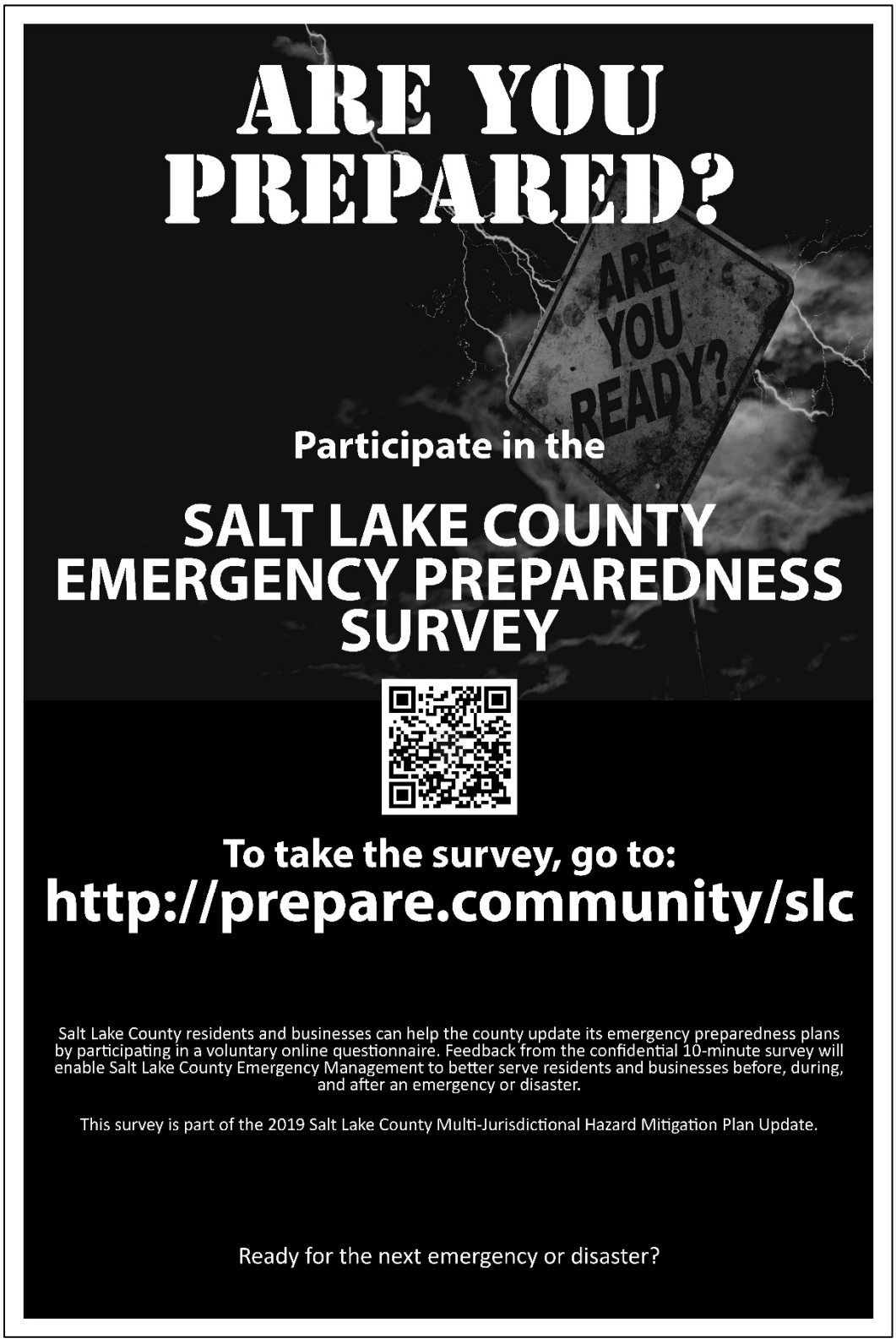
Year Initiated	**2019 (New Mitigation Action)**
Applicable Jurisdiction	
Lead Agency/Organization	
Supporting Agencies/Organizations	
Potential Funding Source	
Estimated Cost	
Benefits (loss avoided)	
Projected Completion Date	
PRIORITY (High, Medium, Low)	

Please indicate if the mitigation goals below are applicable to the new mitigation action/project). Check <u>All</u> That Apply.

Mitigation Goals			
X	Place an "X" by the applicable goal(s)		Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.
	Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.		Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.
	Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.		Enhance and protect the communication and warning/notification systems in the County.
	Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.		Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.

Appendix C: Public Participation Documentation

Survey Outreach Materials



Salt Lake County

KEITH BEVAN
PLANNING & INTELLIGENCE SECTION
SALT LAKE COUNTY EMERGENCY

SALT LAKE COUNTY EMERGENCY MANAGMENT

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FOR IMMEDIATE RELEASE

Contact:

Keith Bevan, Planning and Intelligence Section
Salt Lake County Emergency Management
Phone: (801) 743-7200; Email: KBevan@unifiedfire.org

SALT LAKE COUNTY RESIDENTS INVITED TO PARTICIPATE IN COMMUNITY PREPAREDNESS STUDY

SALT LAKE COUNTY, UTAH – Salt Lake County residents and businesses can help the county update its emergency preparedness plans by participating in a voluntary online questionnaire. Feedback from the confidential 10-minute survey will enable the Salt Lake County Emergency Management to better serve residents and businesses before, during, and after an emergency or disaster.

Some sample questions are:

- Please indicate where you go to obtain emergency and disaster preparedness related information?
- Do you believe that your household and/or place of business might ever be threatened by the following hazards?
- What might prevent you from leaving your place of residence if there was an evacuation order?
- In an evacuation, would you or anyone in your household require special assistance?

To fill out the questionnaire, go to: http://prepare.community/slc

The survey will remain open until September 30, 2019. For a hard copy version of the survey, please contact the Salt Lake County at KBevan@unifiedfire.org or call (801) 743-7200.

- ### -

SALT LAKE COUNTY EMERGENCY PREPAREDNESS SURVEY

Encuesta de preparación

Participate in the conversation!
¡Participe en la conversación!



Salt Lake County Emergency Management
EM
Unified Fire Authority

To take the survey, go to:
Para participar en la encuesta, visite:

http://prepare.community/slc

Are you prepared for the next emergency or disaster?
¿Está preparado/a para la próxima emergencia o desastre?

Please take our confidential survey at:
Tome nuestra encuesta confidencial en:

http://prepare.community/slc

Questions or Concerns? Please contact:
¿Preguntas o preocupaciones? Contáctenos:

Salt Lake County Emergency Management
P: (801) 743-7200

To request a Survey in an alternate format such as large print, please call (801) 743-7200.

https://www.slcoem.org/

Survey Results

Double-click link below to access the full Survey Report.

SLCOEm.MitigationSurveyResults2019.pdf

Sample Outreach Activities



Figure. Riverton Public Outreach Event to Understand Public Perception and Mitigation Priorities



Figure. Herriman Public Outreach Event to Understand Public Perception and Mitigation Priorities

Appendix D: Plan Adoption Resolutions from Planning Partners

[Insert Upon Plan Approval and Adoption]

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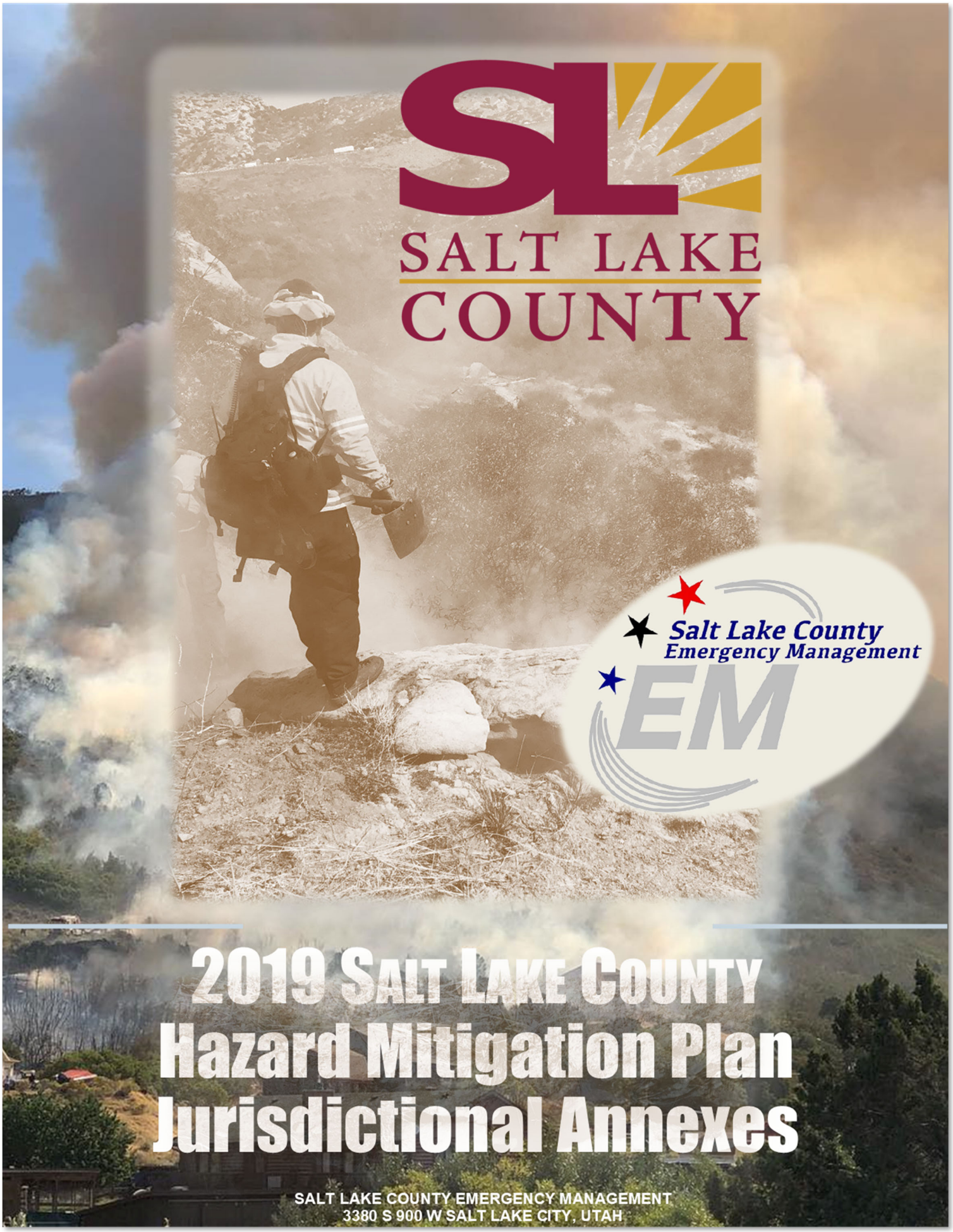

2019 Salt Lake County Hazard Mitigation Plan Jurisdictional Annexes

SALT LAKE COUNTY EMERGENCY MANAGEMENT
3380 S 900 W SALT LAKE CITY, UTAH

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2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Town of Alta

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Chris Cawley Title: Emergency Manager Department: Alta Emergency Management Address: 10220 Little Cottonwood Canyon Rd, Alta, UT 84092 Office Phone: 801-363-5105 Cell Phone: 603-731-8074 Email Address: chris@townofalta.com Website: https://townofalta.com/

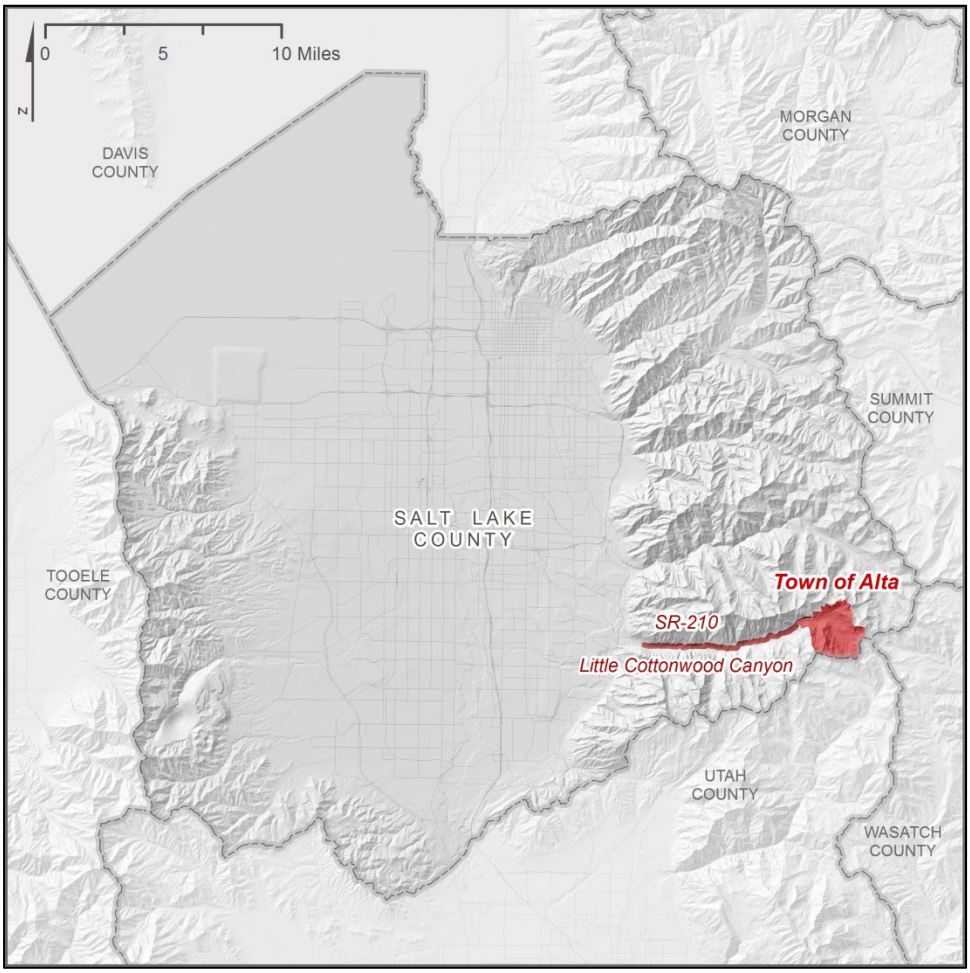
Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

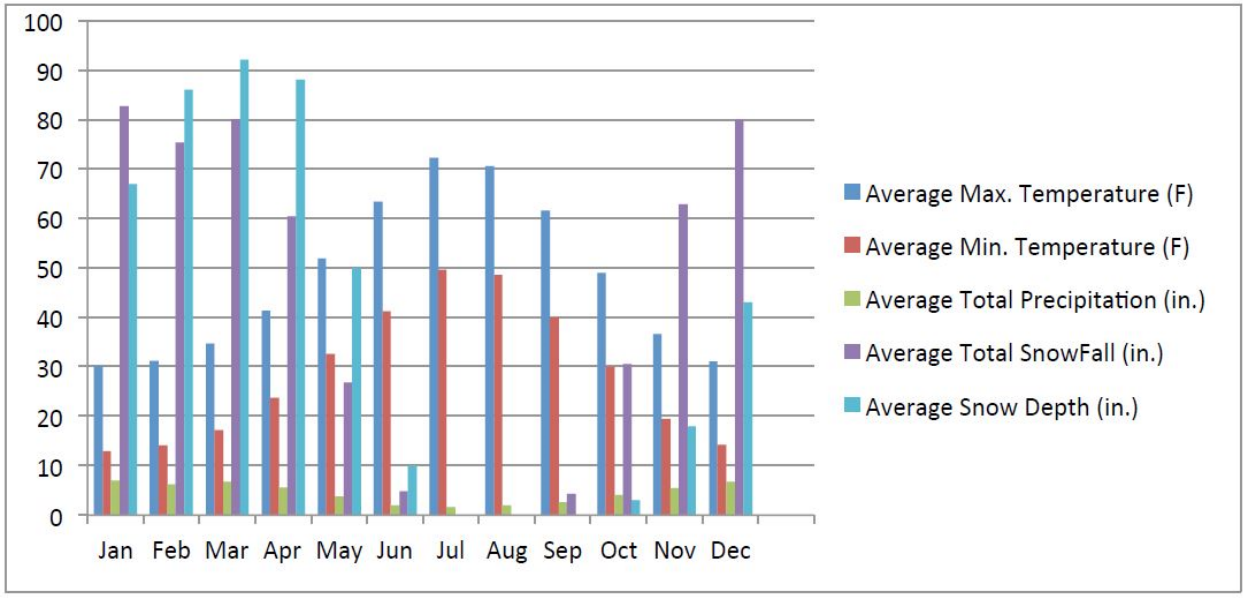
- **Date of Incorporatio**n: 1970
- **Current Population:** 383
- **Population Growth:** Alta's official census population has been quite stable over time and is not projected to increase substantially, as residential development is limited by US Forest Service (USFS) ownership of roughly 80% of land in Alta.
- **Location and Description:** The Town of Alta is located in the southeastern corner of Salt Lake County, at the top of Little Cottonwood Canyon in the central Wasatch Mountains. The boundaries of this tiny municipality generally traverse the alpine ridgelines at the head of a deep cleft in the Wasatch Front, encompassing 4.1 square miles of rugged mountainous terrain. Alta is most notably home to Alta Ski Area, and much of the land within the Town's jurisdiction is open space used by the ski area for commercial skiing. The western boundary of Alta is directly east of Snowbird Ski and Summer Resort, in unincorporated Salt Lake County. The highest elevation in the Town of Alta is 11,068' atop Mt. Baldy, and the center of town is roughly 8600' above sea level.
- **Brief History:** Alta was first inhabited in the 1860s after silver ore was discovered by early explorers. A period of economic growth followed in the 1870s when Alta was the site of one of the United States' most productive silver mines. Alta endured cycles of boom and bust consistent with its mining economy for decades, and suffered catastrophe from large fires and avalanches throughout its early history. In 1939, thanks in part to a tax-relief deal between one of the last miners in Alta and Salt Lake County for hundreds of acres to be donated to USFS, Alta Ski Area opened its first chairlift. Today Alta is world-famous for its high alpine scenery, its perfect ski terrain and natural snow, and its simple, rustic community vibe.
- **Climate:** Climate in Alta is characterized by a long snowy season between November and May, during which time an annual average of 500" of snowfall is measured at 9600' above sea level. Temperatures during this elongated "winter" season can reach well below 0° and severe storm cycles often persist for several days, featuring heavy snowfall and strong winds. Snow cover can linger on upper elevation slopes until August, although the months of June, July, August and September sometimes feature daytime high temperatures approaching 80°F. Summer weather in Alta is generally sunny and mild, although periods of monsoonal thunderstorm activity are not uncommon.
- **Governing Body Format:** The town is presided over by a 5 member town council. The mayor is the presiding member of the council and is the chief executive of the administration.

- **Development Trends:** Private property in Alta is largely "built out" under current zoning, although roughly 20 single family homes may be developed in the future. Alta Ski Area works with USFS to develop ski area facilities and may pursue additional commercial development in the future, although no substantial additional development is planned at this time.

Map: Town of Alta



Graph: Town of Alta Temperature, Precipitation, and Snow Depth



Capability Assessment

The town maintains a full-time staff of 12 and part-time staff of up to 7 individuals, depending on the season. The Assistant Town Administrator is the Town's designated Emergency Manager amongst numerous other responsibilities. Hazard Mitigation Planning efforts are led by the Assistant Town Administrator position and supported by the Town Marshal position.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**

Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	No	The town applies the UT building code like every other local jurisdiction
Zonings Ordinance(s)	Yes	Yes	-	The town has its own zoning ordinance
Subdivision Ordinance(s)	Yes	Yes	No	The town applies some county regulations by reference
Stormwater Management Program	Yes	Yes	No	
Floodplain Ordinance(s)	N/A	No	-	There is a very small amount of identified floodplain in Alta, but it is assumed to be a mapping error.
Post Disaster Recovery Program and Ordinance(s)	Unsure	No	Yes	
Real Estate Disclosure Ordinance(s)	No	No	-	
Growth Management	Yes	-	-	
Site Plan Review Requirements	Yes	Yes	Yes	Various other agencies are involved in reviewing development site plans
Planning Documents				
General or Comprehensive Plan	Yes	Yes	No	
Capital Improvement Plan	Yes	Yes	No	The town is required by the state to have a plan in order to place funds in a capital account
Economic Development Plan	Yes	No	Yes	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	No	The Town of Alta developed an EOP in 2011. It has not undergone a major update since that time.
Post-Disaster Recovery Plan	Yes	No	Yes	
Continuity of Operations Plan	Yes	No	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter	Yes	Yes	No	The town is a key component in the UDOT

Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section				SR 210 Highway Avalanche Safety Plan.

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Yes

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Town Administrator, Assistant Town Administrator, Building Official (contract), engineering contractor
Engineers or professionals trained in building or infrastructure construction practices	Yes	Contractor	contract water/sewer system operators, contract for services of city engineer
Planners or engineers with an understanding of natural hazards	Yes	Full time, contractor	Administration and contract engineer
Personnel skilled or trained in GIS applications	Yes	Part Time	
Emergency manager	Yes	Part Time	EM is a part-time component of the Assistant Town Administrator position
Grant writers	Yes	Part Time	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Administration
Who is your jurisdiction's floodplain administrator? (department/position)	The town has not formally designated a floodplain administrator
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	Yes	3X	July 2015
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

NOAA Natural Hazards 2014-2019

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction from 2014-2019. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- The Town of Alta does participate in the National Flood Insurance Program (FEMA, 2019). The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS

(NOAA Data with additions from the jurisdiction representatives. Winter storm event data was included if the storm event produced more than 10 inches of snow in 12 hours.)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Landslide	Debris flow on SR 210 down-canyon from Alta damaged roadway and utilities, resulting in restrictions on SR 210 for 2 days.		08/08/2019	No reported damages within Alta boundary
Landslide	Debris flow in the Culps/Emma Ridges area damaged USFS road providing access to "West Grizzly" homes, clogged culverts, debris on SR 210 within Alta.		08/03/2019	
Heavy Snow	19 inches of snow at Alta Ski Lifts		4/15/2019	
Heavy Snow	26 inches of snow at Alta Ski Lifts		4/6/2019	
Heavy Snow	24 inches of snow at Alta Ski Lifts		3/28/2019	
Heavy Snow	15 inches of snow at Alta Ski Lifts		3/23/2019	
Heavy Snow	32 inches of snow at Alta Ski Lifts		3/13/2019	
Winter Storm	35 inches of snow at Alta Ski Lifts		3/6/2019	
Heavy Snow	15 inches of snow at Alta Ski Lifts		3/1/2019	
Heavy Snow	16 inches of snow at Alta Ski Lifts		2/13/2019	
Heavy Snow	61 inches of snow at Alta Ski Lifts		2/3/2019	
Winter Storm	23 inches of snow at Alta Ski Lifts		1/21/2019	
Winter Storm	42 inches of snow at Alta Ski Lifts		1/16/2019	
Winter Storm	26 inches of snow at Alta Ski Lifts		1/5/2019	
Heavy Snow	24 inches of snow at Alta Ski Lifts		11/23/2018	
Winter Storm	26 inches of snow at Alta Ski Lifts		3/17/2018	
Winter Storm	30 inches of snow at Alta Ski Lifts		3/2/2018	
Heavy Snow	24 inches of snow at Alta Ski Lifts		2/18/2018	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	18 inches of snow at Alta Ski Lifts		1/19/2018	
Winter Storm	20 inches of snow at Alta Ski Lifts		4/24/2017	
Winter Storm	26 inches of snow at Alta Ski Lifts		4/7/2017	
Winter Storm	15 inches of snow at Alta Ski Lifts		3/5/2017	
Winter Storm	22 inches of snow at Alta Ski Lifts		2/27/2017	
Winter Storm	45 inches of snow at Alta Ski Lifts		2/21/2017	
Winter Storm	Winds were strong through the storm, with peak recorded gusts of 76 mph at Alta Ski Area Alta - MT Baldy sensor.		2/6/2017	
Winter Storm	33 inches of snow at Alta Ski Lifts		1/22/2017	
Winter Storm	28 inches of snow at Alta Ski Lifts		1/20/2017	
Winter Storm	15 inches of snow at Alta Ski Lifts		1/3/2017	
Winter Storm	25 inches of snow at Alta Ski Lifts		1/1/2017	
Winter Storm	20 inches of snow at Alta Ski Lifts		12/23/2016	
Winter Storm	25 inches of snow at Alta Ski Lifts		12/15/2016	
Winter Storm	40 inches of snow at Alta Ski Lifts		11/27/2016	
Winter Storm	20 inches of snow at Alta Ski Lifts		3/13/2016	
Winter Storm	14 inches of snow at Alta Ski Lifts		1/29/2016	
Winter Storm	12 inches of snow at Alta Ski Lifts		12/24/2015	
Winter Storm	42 inches of snow at Alta Ski Lifts		12/21/2015	
Winter Storm	34 inches of snow at Alta Ski Lifts		12/13/2015	
Winter Storm	34 inches of snow at Alta Ski Lifts		4/14/2015	
Winter Storm	20 inches of snow at Alta Ski Lifts		3/2/2015	
Winter Storm	26 inches of snow at Alta Ski Lifts		1/12/2015	
Winter Storm	23 inches of snow at Alta Ski Lifts		12/28/2014	
Winter Storm	21 inches of snow at Alta Ski Lifts		12/25/2014	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	28 inches of snow at Alta Ski Lifts		12/20/2014	
Winter Storm	30 inches in new snow		11/22/2014	Avalanche mitigation work resulted in an avalanche hitting a condominium and damaging an exterior deck.
High Wind	58 mph wind gusts were recorded at the base of Alta Ski Lifts. Near Alta Ski Lifts and Snowbird Ski and Summer Resort, multiple large trees were knocked down by these winds.		5/11/2014	$10,000 in property damage.
Winter Storm	28 inches of snow at Alta Ski Lifts		2/5/2014	
Winter Storm	12 inches of snow at Alta Ski Lifts		1/9/2014	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	25
Members of the community under 18 years old	13
Members of the community that identify as having disability status	12
Members of the community that speak English less than "very well"	0
Members of the community living below the poverty line	73
The number of mobile homes in the community	0
Members of the community without health insurance	3
Occupied housing units with tenants without a vehicle	5
Housing units without heating fuel	0

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

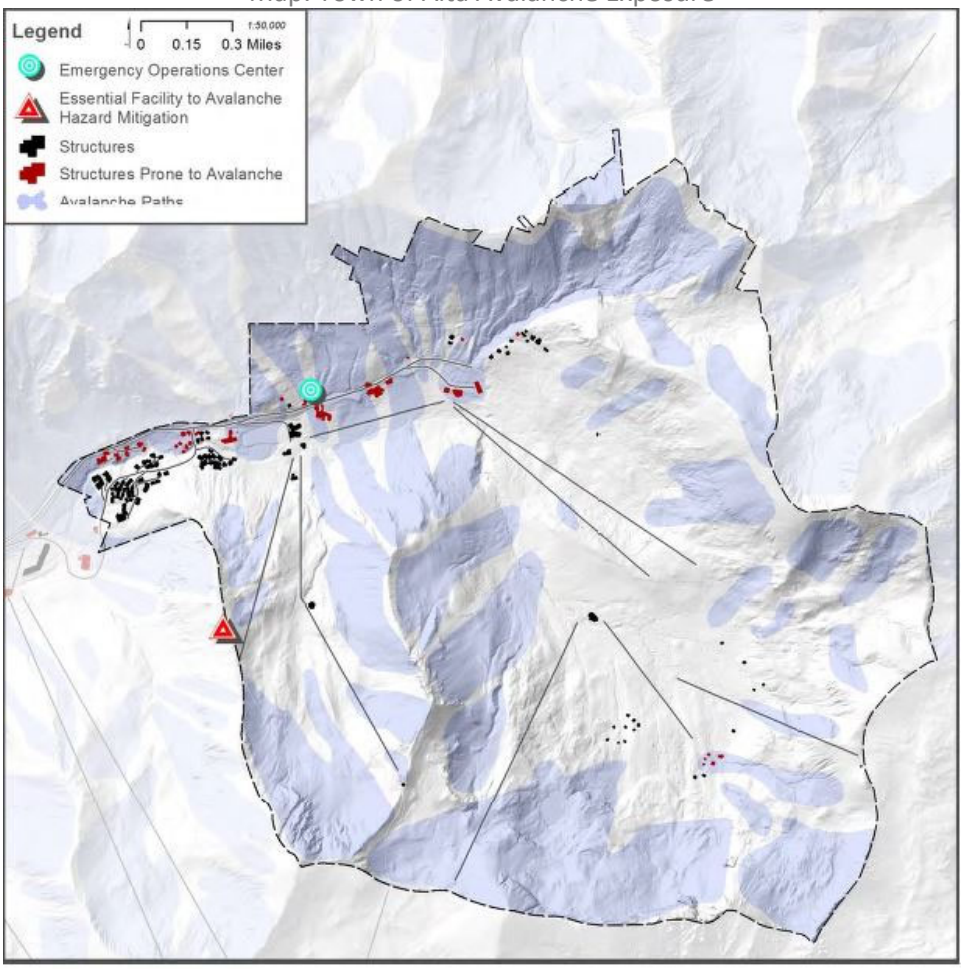
Avalanche: Exposure to snow avalanches is the Town of Alta's defining natural hazard. Significant portions of downtown Alta exist in the run-out zone of historic avalanche paths, and

most of Alta Ski Area is in avalanche terrain. Furthermore, Alta's only transportation corridor, Utah State Highway 210, carries the highest avalanche hazard-rating index of any major roadway in the country, and it is not uncommon for avalanches to bury the roadway, closing all vehicular access to Alta.

The history of human settlement in upper Little Cottonwood Canyon is rife with stories of destruction by large avalanches. Several times during the period of mining that occurred in Alta during the 19th and early 20th centuries, avalanches wiped out entire villages and mining infrastructure. In the 1940's, Alta was the birthplace of American avalanche science, and it was in Alta that the practice of using explosives to intentionally trigger avalanches—instead of allowing them to release unexpectedly—was first used in the United States.

Today, the Town of Alta relies on a partnership between the Utah Department of Transportation Avalanche Safety Program (UDOT), USFS, the Alta Ski Lifts Company, Snowbird Ski Area, and the Salt Lake County Unified Police Department (UPD) to conduct avalanche hazard mitigation with military artillery. UDOT and the two ski areas are responsible for avalanche hazard forecasting, and when those entities agree that hazard is sufficient for mitigation to take place, the Alta Marshal's Office and UPD enact a closure of highway 210, along with the restriction of "interlodge" travel, meaning that all persons must remain inside a building while hazard mitigation is conducted. Personnel from the ski areas and from UDOT are responsible for firing military artillery at avalanche starting zones, and when a firing mission is completed, public safety officials often conclude that it is safe for highway traffic and interlodge travel to resume. In some circumstances, such as a hazard mitigation mission conducted during a prolonged storm cycle, interlodge travel restrictions may remain in place even after a mission, until hazard abates, or until another mission is advisable. In some circumstances, UDOT contracts with a local business, Wasatch Powderbird Guides, to provide helicopter-assisted avalanche hazard mitigation services, but this option is only viable when weather conditions allow for the operation of helicopters.

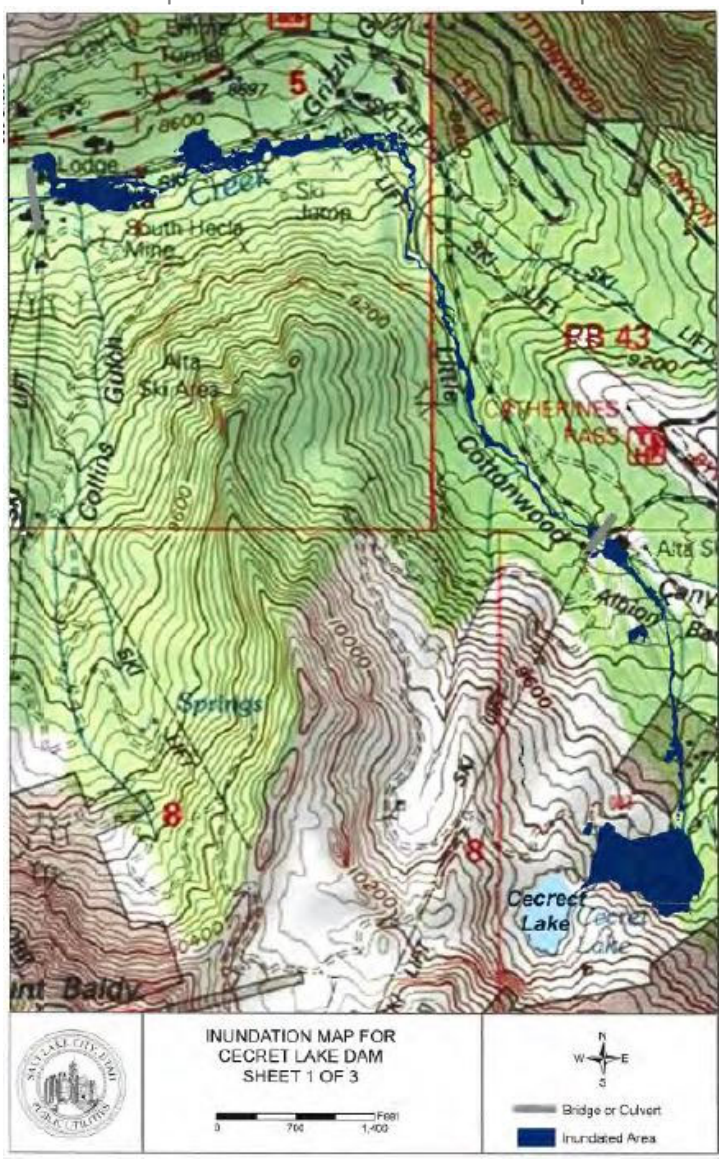
Map: Town of Alta Avalanche Exposure



The last major event in which a structure in the Town of Alta was damaged by an avalanche was in March of 2002, when an avalanche hit the Alta Peruvian Lodge, a hotel on the west end of Town, burying 14 vehicles, removing a fire escape, and inundating lower level hotel rooms with avalanche debris. More recently, smaller avalanches have impacted residential properties along the Alta-Snowbird Bypass Road, with minor damages in some cases, and avalanches have damaged parked vehicles along SR 210.

Dam Failure: Salt Lake City Public Utilities owns and maintains a dam at Cecret Lake, which was rebuilt in 2018, in the southeastern portion of the Town of Alta. The Town is seeking an updated inundation map and emergency action plan for the Cecret Lake Dam; however, the inundation map for the old dam shows that ski area base facilities could be inundated in a catastrophic failure of Cecret Lake Dam.

Map: Cecret Lake Dam Inundation Map

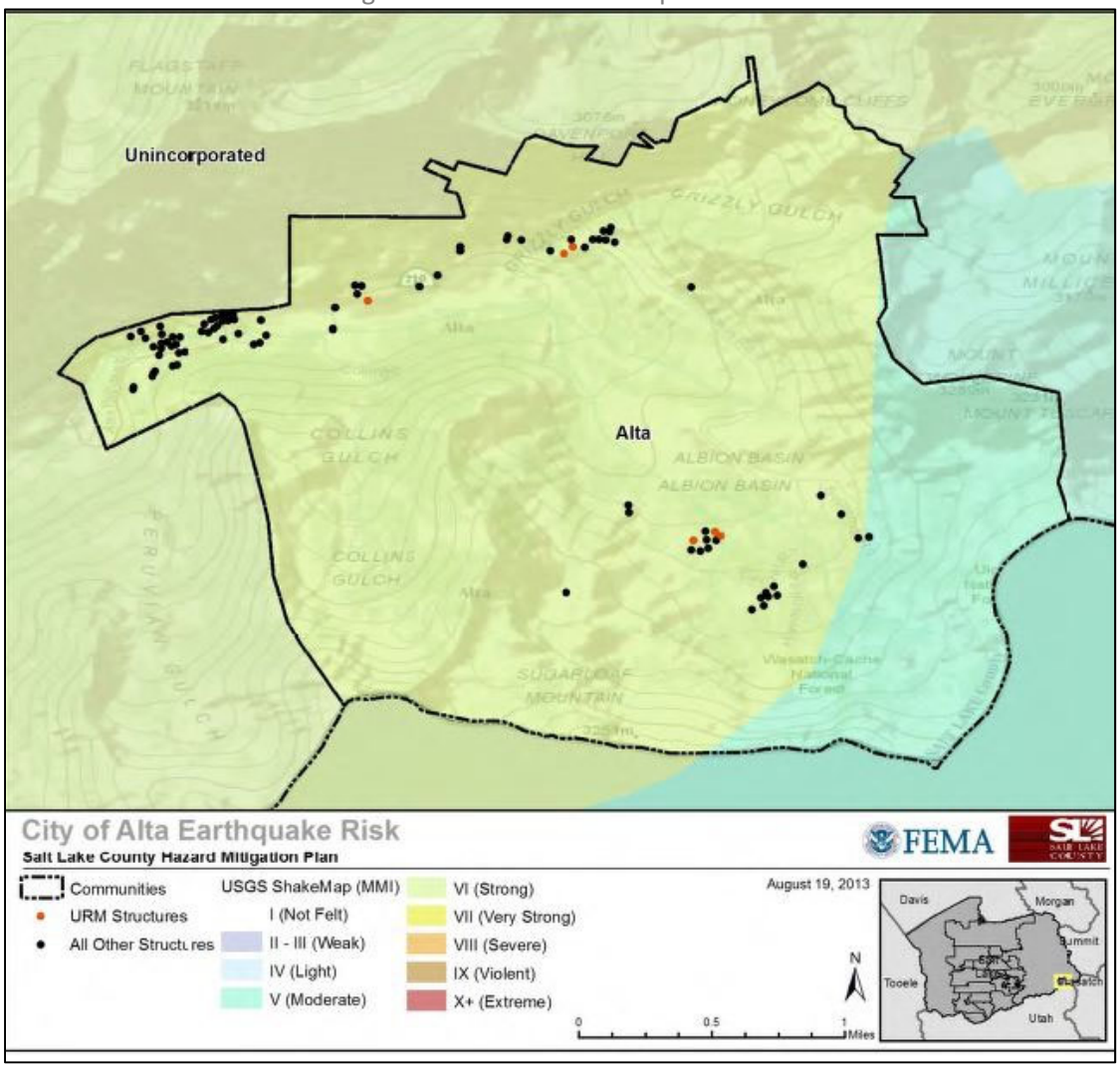


Drought: Alta is a tiny municipality with limited residential or commercial water usage, and thanks to its location at high elevation, near the source of an abundant watershed, Alta's direct susceptibility to drought is fairly low. However, prolonged, year-round drought sufficient to limit the volume of natural snowfall in Alta could have a serious effect on Alta's economy, which depends on cold temperatures and regular snowstorms to attract local and destination skiers. Furthermore, as all of Alta lies within municipal watershed controlled by Salt Lake City, the Town purchases water as part of a surplus water agreement with SLC, which stipulates that the contract may be cancelled for various reasons, including the need for SLC to supply water to its own local customers.

Earthquake: The Wasatch Front urban corridor is at risk of a major earthquake. Although a major earthquake originating in the Wasatch Fault would cause significant ground shaking in Alta, information provided by Salt Lake County and the United States Geologic Survey indicates that major earthquakes along the Wasatch Fault or other active regional faults would not be felt as

strongly in Alta as in other areas of Salt Lake County. Soil liquefaction potential has not been mapped rigorously in the Town of Alta.

Figure. Town of Alta Earthquake Risk

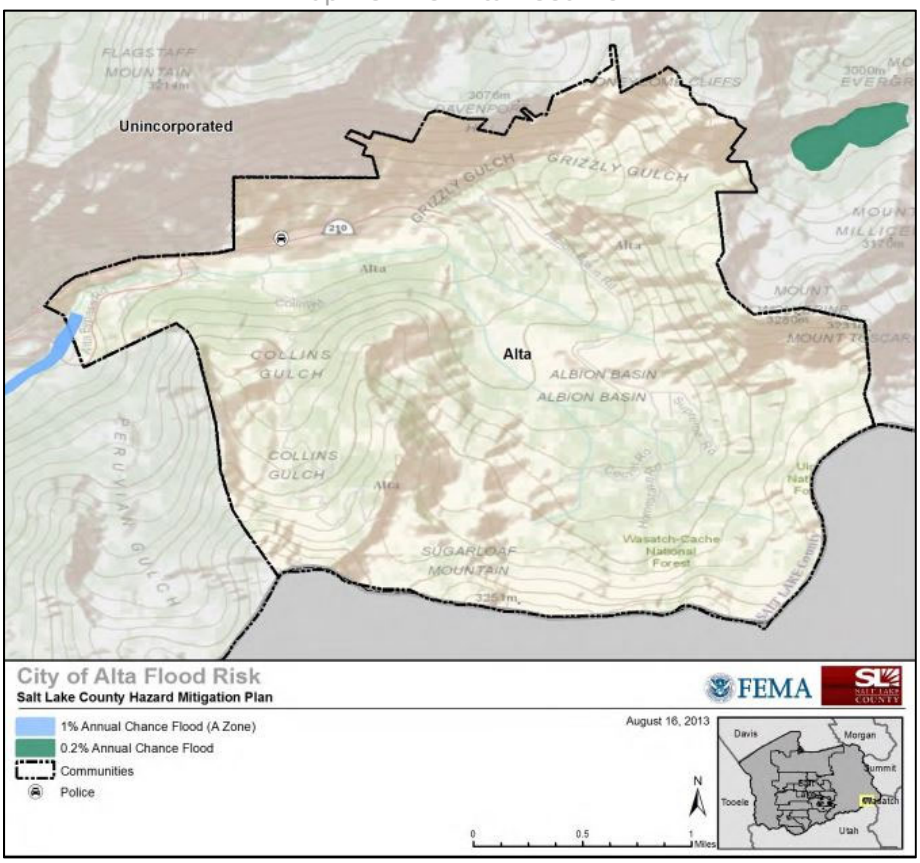


Secondary hazards possibly associated with a major earthquake in Alta are numerous. A major earthquake occurring during a period of high avalanche hazard could trigger numerous destructive avalanches at once. If this were to take place when interlodge travel was not restricted, as it is when avalanche hazard mitigation is being conducted, property damage and loss of life could be severe. A large earthquake could easily trigger landslides that would affect the highway 210 corridor, which is Alta's only point of access for outside emergency response agencies.

There are nine unreinforced masonry buildings in the Town of Alta. All but one of these buildings are single family homes or seasonal cabins. Assessed values of these properties vary from less than $100,000 to $1.2 million.

Flood: The Town of Alta has a very small area of identified floodplain, and there is no development permissible in that area due to it being directly adjacent to Little Cottonwood Creek. Nevertheless, minor property damage has occurred during periods of rapid snowmelt, or when small landslides have obstructed drainage culverts along minor tributaries to Little Cottonwood Creek. The unlikely event of a failure of Cecret Lake dam could cause inundation of high traffic areas as well as a small quantity of structures.

Map: Town of Alta Flood Risk



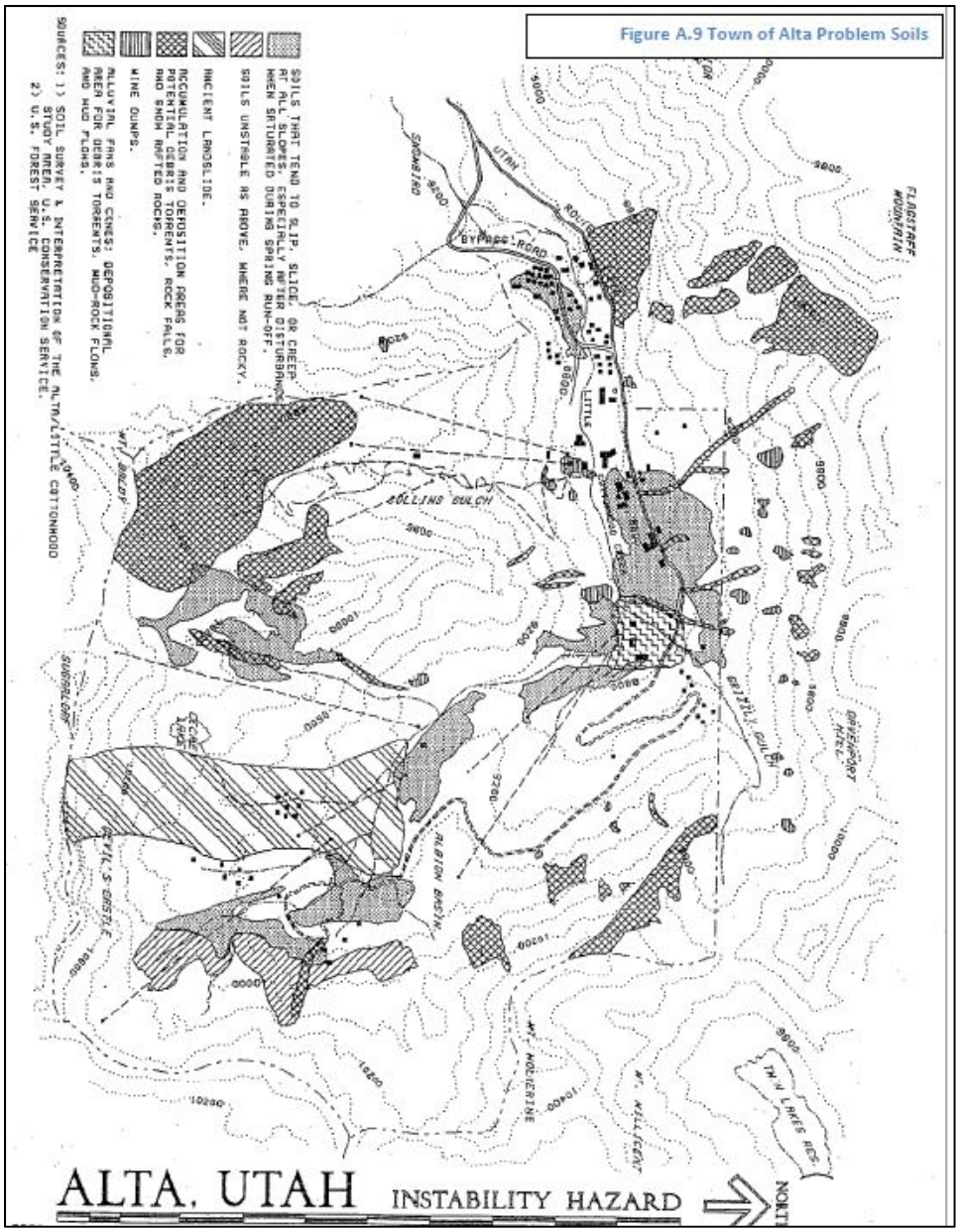
Infestation: Spruce Bark Beetle and Mountain Pine Beetle are both present in Alta trees and tree stands. Balsam Wooly Adelgid is an infestation currently affecting Sub-Alpine Fir in the Central Wasatch Mountains, and could have a severe impact on forest health in Alta and thus lead to increased wildfire hazard and other environmental impacts.

Landslide/Problem Soils: Steep mountain slopes surround the Town of Alta, and this topography lends itself to the phenomenon of downslope movement of earthen material. Rock falls and topples are downslope movements of loosened blocks or boulders from a bedrock area. These generally occur along steep canyons with cliffs, deeply incised stream channels in bedrock, and steep bedrock road cuts.

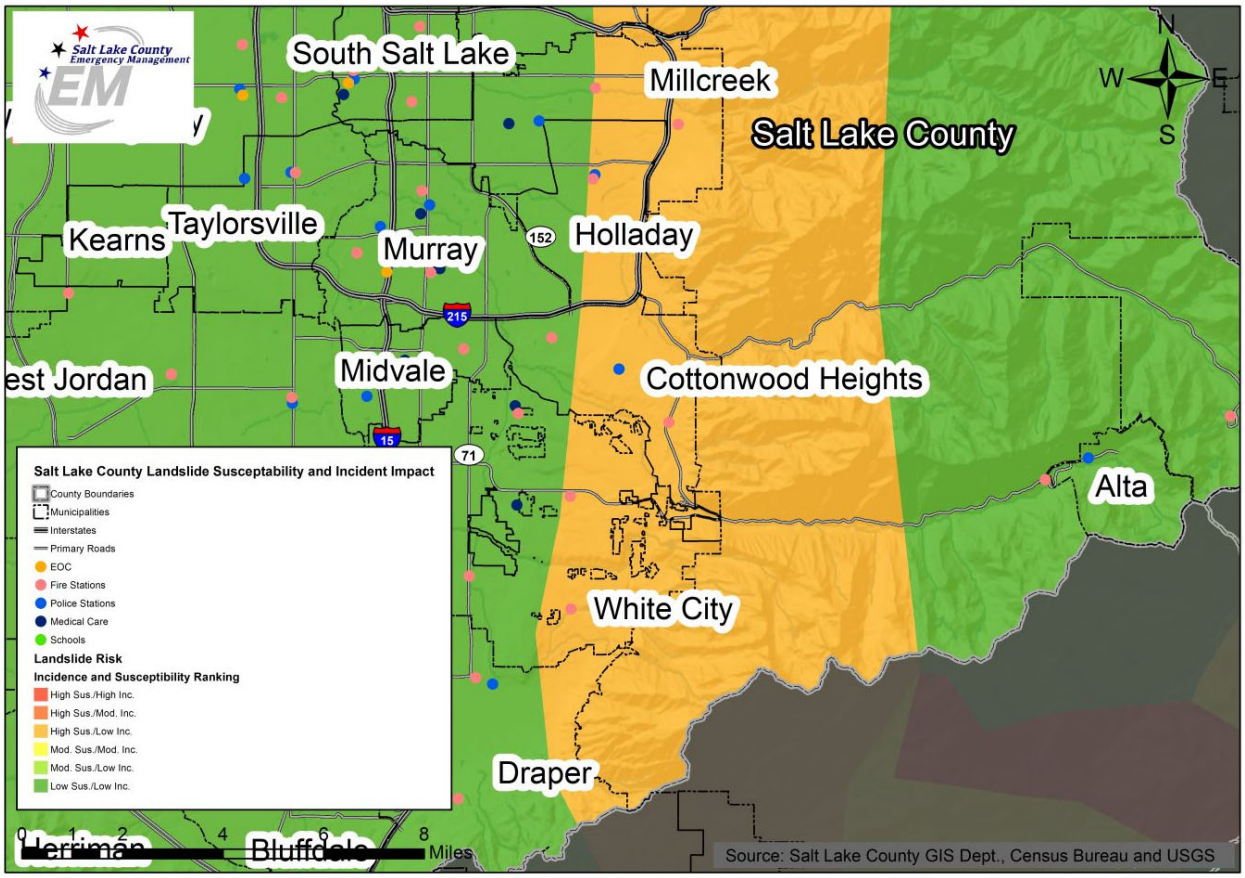
Occasionally, severe summer rainstorms lead to landslides and debris flows that damage SR 210 in Alta and down-canyon. In August of 2019, several sequential storms damage culverts, trapped vehicles in debris, and lead to a 2-day closure of SR 210 to the general public. When these events affect drainages containing elements of Alta's mining history—open tunnels, overburden piles,

etc.—they can release higher levels of heavy metals into the watershed, which could have impacts on local and regional water quality.

Map: Town of Alta Problem Soils



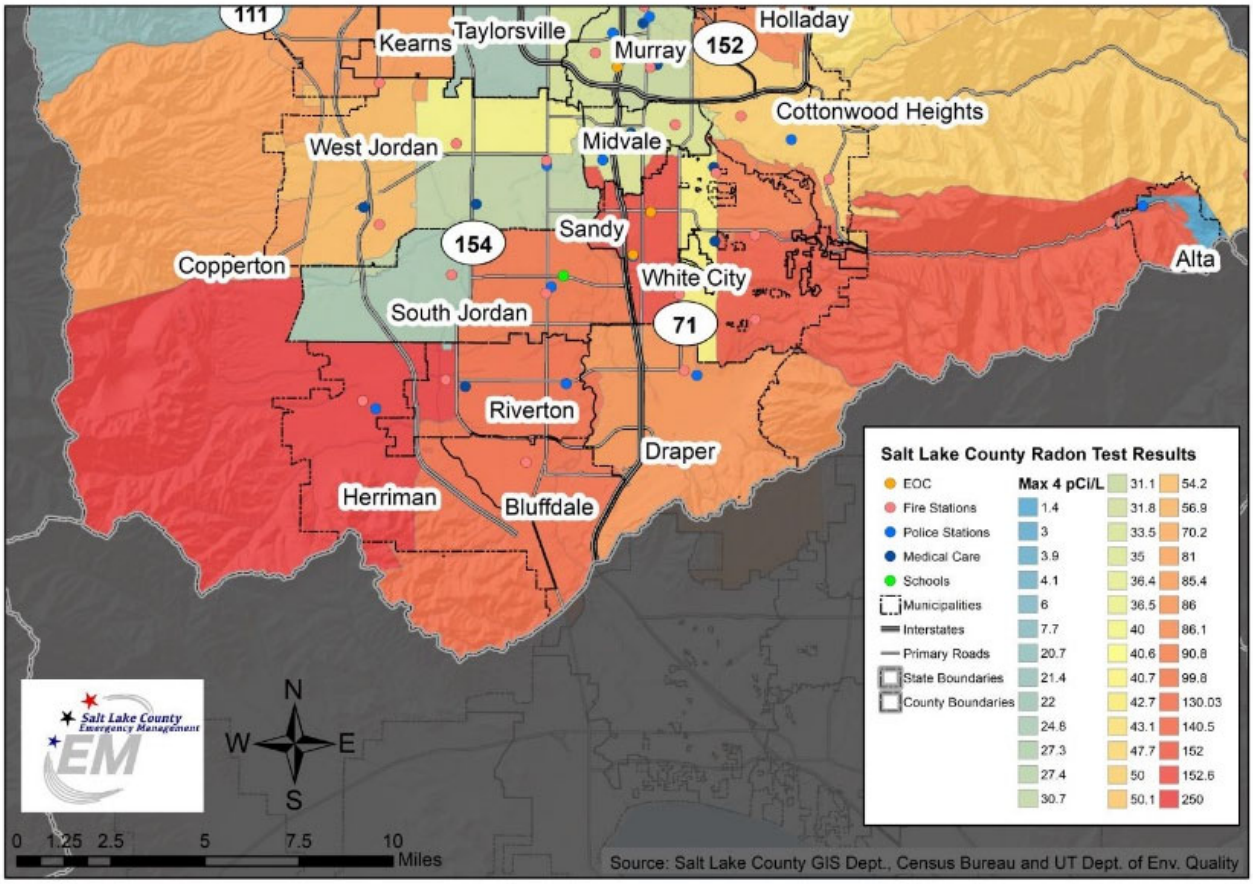
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Pandemic: On a regular basis, potentially catastrophic public health issues are raised in the mainstream media and there is a possibility of a regional or national pandemic arriving in Alta, where visiting guests arrive from around the world and may have been exposed to contagious conditions elsewhere. The Town of Alta has not made formal plans for response to an outbreak of infectious disease, but if an outbreak were to occur, the Town will work with outside agencies to communicate essential information and acquire assistance. The Town of Alta has limited medical capabilities, with a small, seasonal, private clinic and a regional fire authority outpost providing the only local response capabilities, so as in many other cases, resources for quarantine or evacuation will have to come from elsewhere.

Radon: The Town of Alta has not identified areas in which exposure to radon gas is likely, and current information from outside agencies indicating regional radon prevalence do not provide specific information regarding Alta's likely radon gas exposure. However, regional geologic conditions are consistent with the likely presence of radon gas, and many households in Salt Lake County have tested positive for high levels of radon gas.

Map: Radon with Critical Facilities



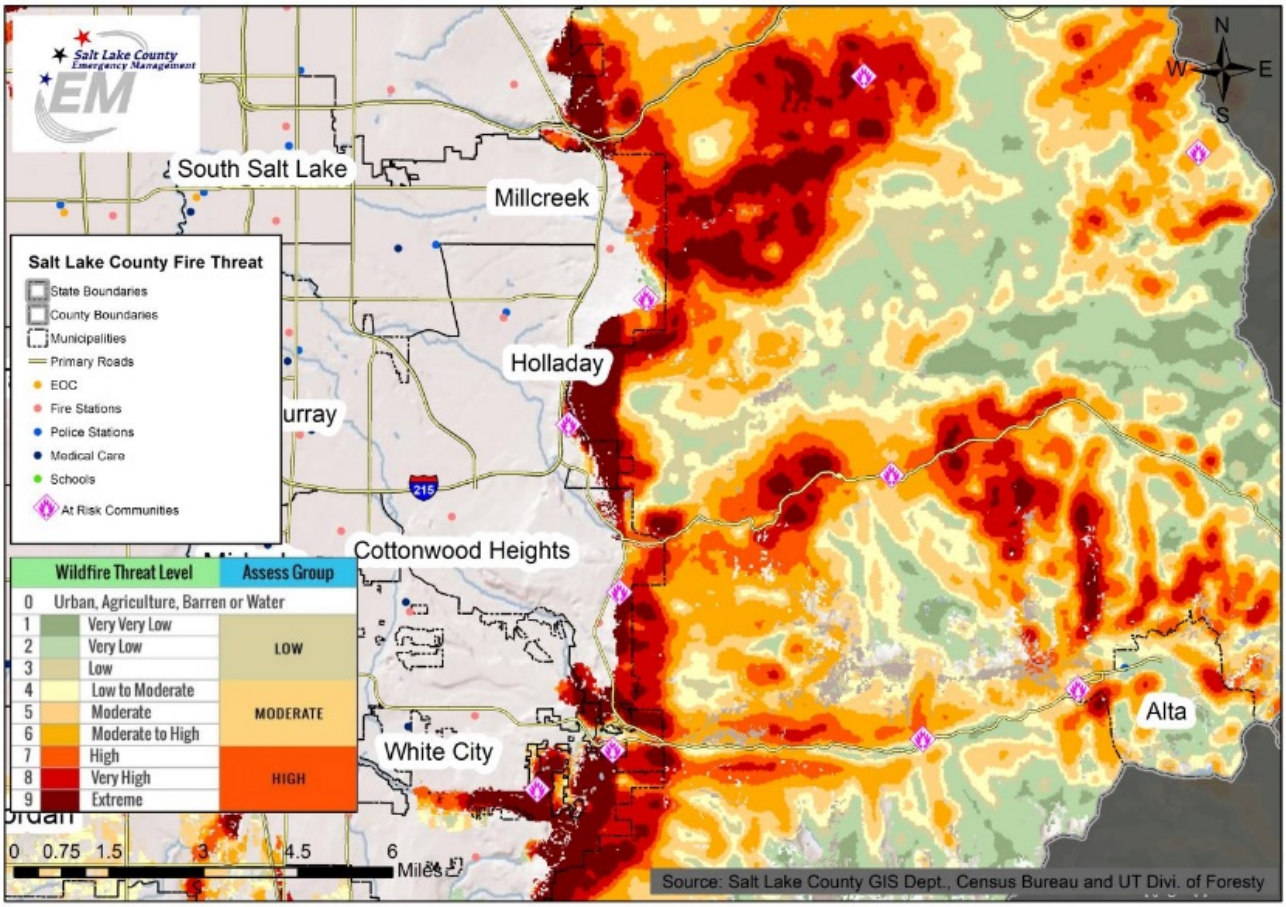
Severe Weather: The most common severe weather events in Alta are significant winter storms, which often result in periods of elevated avalanche hazard. Alta is world-renowned as a place where winter storms deposit enormous snow totals, and those storms are often accompanied by sustained winds near hurricane-force, with gusts over 100 mph. Although many Alta skiers prefer to be skiing during a major snow storm, sometimes weather is so severe that ski lifts cannot run, and when avalanche hazard becomes too high as a result of heavy snow and high wind, the ski area closes operations and the public is required by the Town of Alta Marshal to remain indoors until avalanche hazard is mitigated. The Alta landscape is often transformed by massive winter storms, with rows of parked cars and even unattended structures occasionally completely entombed in snow. During ski season, Alta Ski Area can host as many as 7,000 skiers on a very busy day, and peak ski area days that coincide with winter storms can exacerbate the impacts from winter storms to roadway operations and other public safety considerations. Winter storms that produce 10 or more inches in a 12-hour period are considered a significant event.

Severe winter storms often result in hazardous roadway conditions on the steep, winding, narrow highway 210, and when road surface conditions deteriorate at the end of a busy day at Alta and Snowbird, traffic accidents can cause epic backups. When such backups take place during times of escalating avalanche hazard, the possibility that natural avalanches will affect the roadway and potentially bury vehicles and their occupants can be a critical situation. The Town of Alta supports past, currently ongoing, and future studies of alternative transportation solutions and roadway improvement strategies, in the interest of reducing possible roadway avalanche incidents, and in reducing the need to close highway 210 to perform avalanche hazard mitigation.

Alta is also susceptible to non-winter weather events, such as rain, hail, and lightning storms. Significant rain events can cause landslides in ravines and stream channels which can damage highway 210, and which have occasionally caused property damage in the Town of Alta. Because of Alta's high elevation, extreme heat is not considered a likely hazard.

Wildfire: The Town of Alta has not experienced significant wildfire in its modern history. Typically, Alta's cool summer temperatures and very short warm season prevent critical fire conditions from developing. However, all Alta development is within the wildland-urban interface, and in a prolonged, severe drought, wildfire could impact Alta. Additionally, the loss of forested acreage within Alta Ski Area could constitute a significant economic loss to the Town of Alta, as ski area operations could be compromised.

Map: Wildfire Threat Level with Critical Facilities



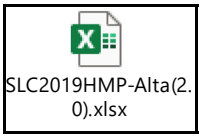
HAZMAT: Hazardous materials accidents can occur in Alta in more common ways—as part of a traffic or industrial accident—or in somewhat unique ways, such as when a landslide altered the flow of water from one of Alta's many open mine tunnels and increased heavy metal loading into Little Cottonwood Creek.

Terrorism and Civil Disturbance: Alta Ski Area hosts thousands of skiers per day on busy days which could make it susceptible as a mass-gathering area.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	18	54
Severe Weather	3	17	51
Wildfire	2	24	48
Avalanche	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Cyber Attack	2	17	34
Drought	2	13	26
Terrorism	1	25	25
Landslide and Slope Failure	2	12	24
Hazardous Materials Incident	1	14	14
Flooding	1	13	13
Dam Failure	1	13	13
Civil Disturbance	1	10	10
Tornado	1	7	7
Radon	2	3	6

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	High	3		Avalanche	Medium	2	6
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Low	1		Flooding	Low	1	3
Hazardous Materials Incident	Low	1		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	Medium	2		Radon	Low	1	3
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	High	3	9

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Medium	2	2		Avalanche	Medium	2	4
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Low	1	1		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Medium	2	4
Severe Winter Weather	High	3	3		Severe Winter Weather	Medium	2	4
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	Low	1	2
Wildfire	High	3	3		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	High	3	3
Dam Failure	Low	1	1
Drought	Low	1	1
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Low	1	1
Wildfire	High	3	3

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Update TOA Ordinance to promote fuel mitigation and structural defensibility	2019	Goal 7: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Wildfire	Town	UFA	High	Low	TOA Budget	medium	3 years	Reduce structure ignitability
Support UFA fuels mitigation on residential/commercial properties	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	Wildfire	UFA	Town	High	Low	UFA Budget	high	ongoing	Reduce structure ignitability
Maintain/improve water storage and distribution system	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County	Wildfire, drought, earthquake, etc.	Town	SLCO SA#3	High	High	BRIC Grant/PDM TOA Water fund	medium	5 years	Improve WUI response capability

		before, during, and after a disaster.									
Improve culverts along SR 210, Michigan City Road, additional storm water management features	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Landslide/Severe Weather	Town/UDOT	USFS	Medium	Medium	BRIC Grant PDM, UDOT	medium	5 years	Reduce impacts to roadway, protect access to TOA water storage facility
Seek best available data regarding the severity shaking during major earthquake	2019	Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	Earthquake	Town	UGS/FEMA	High	Low	--	high	1 year	Refine earthquake impact scenario
Support UDOT Remote Avalanche Control System (RACS) implementation	2019	Goal 3: Enhance and protect the communication and warning/notification systems in the County.	Avalanche	UDOT	Town, ski areas	Medium	High	UDOT	high	5 years	Eliminate overhead fire w/ artillery, improve avalanche mitigation program efficiency
Support UDOT avalanche detection system improvements	2019	Goal 3: Enhance and protect the communication and warning/notification systems in the County.	Avalanche	UDOT	Town, ski areas	Medium	High	UDOT	medium	5-10 years	Improve avalanche hazard forecasting

Seek new inundation map for improved Cecret Lake Dam	2019	Goal 3: Enhance and protect the communication and warning/notification systems in the County. Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	Dam Failure	SLC/DNR		Medium	Low	--	low	2 years	Refine dam failure impact awareness

Mitigation Table - Ongoing Actions

Action	Year Initiated	2019 Status	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	2009	Ongoing and will continue to be ongoing in the future	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards	Town	Utah Communications Authority	Medium	Medium	Local	Medium	Ongoing	The Town of Alta makes necessary communications upgrades as needs arise and budget/other funding sources allow
Identify and implement additional hazard monitoring capabilities.	2009	Ongoing and updated in 2019 to include	2 – Improve awareness and analysis of hazards 2.2 – Improve	All Hazards	Town	State of Utah	High	High	Federal and state (PDM, HMA)	High	Ongoing	This is especially important for Avalanche

Install remote avalanche explosive capability in the Canyon.		avalanche mitigation	and expand hazard monitoring capabilities									detection and monitoring.
Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009	Ongoing	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All Hazards	Town		Medium	Low	Local	Medium	Ongoing	The Town works closely with SLCo UPD and UFA to maintain current mutual aid agreements 2019: Develop MOUs with agencies called out in the EOP/ESFs. Help partnering entities establish agreements that will enable them to get reimbursed during a declaration
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	Ongoing	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All hazards	Town		Medium	Low	Local	Medium	Ongoing	Town staff is planning a “shake-out” activity for 2015, pursing neighborhood “Firewise” programs, and works constantly with other agencies responsible for avalanche hazard

												mitigation to forecast avalanche hazard and execute communication regarding avalanche hazard mitigation activities and related public safety issues.
Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	2009	Ongoing	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Town		High	Low	Local	High	Ongoing	Water conservation will always be prioritized as planning and ordinance review continues in Alta.
Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc	2009	Ongoing	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Town	County	High	Medium-High	BRIC/ PDM	High	Ongoing	The Town contracts with Salt Lake County Service Area #3 for operation, maintenance, and capital improvement planning of its water system.
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	Ongoing	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control	Flooding	Town	Contractors	High	High	PDM	High	Ongoing	The Town of Alta works with other local service providers to identify drainage culverts in need

			measures, particularly in new developments									of maintenance and repair.
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	Ongoing	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	Flooding	Town	Contractors	High	High	PDM	High	Ongoing	See above
Identify and assess structures for deficiencies	2009	Ongoing	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding	Town	Contractors	High	High	PDM	High	Ongoing	See above
Modify structures as needed to address deficiencies	2009	Ongoing	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding	Town	Contractors	High	High	PDM	High	Ongoing	See above
Assist Forest Service Utah Avalanche	2009	Ongoing	1 – Reduce threat of loss of	Severe Weather	Town		Medium	Low	Local	HMedium	Ongoing	Next to severe weather, avalanche

Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users			life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas									hazard is our most prevalent natural hazard in the Town of Alta. Promoting public safety and reducing exposure to avalanche hazard is one of our foremost challenges.. Alta does not publicize UAC forecasts, but much of our winter-season public safety program hinges on UDOT Avalanche Safety forecasts and necessary access closures relating to the UDOT program.
Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	2009	Ongoing	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	Slope Failure	Town	USGS	High	Low	Local	High	Ongoing	Building official consults with UGS as needed
Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	2009	Ongoing	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	Slope Failure	Town	USGS	High	Low	Local	High	Ongoing	See above

Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	2009	Ongoing	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	Wildland Fire	Town	Contractor	Medium	High	Grants would be needed	Low	Ongoing	Insufficient staff time and financial resources
Work with experts and communities to develop or update evacuation plans	2009	Ongoing	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	Wildland Fire	Town	County and State Transportation	High	Low	Local	High	Ongoing	Local evacuation plans hinge on whether or not SR210 is operable; plans for major transportation improvements will dictate future changes in our evac plans.
Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	2009	Ongoing	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation	Wildland Fire	Town	County and State Transportation	High	Low	Local	High	Ongoing	See above

			capabilities for WUI areas									
Support Current Avalanche Hazard Mitigation Interagency Partnerships	2014	Ongoing	Establishment of lift-served skiing on open slopes on the north side of Little Cottonwood Canyon in the Town of Alta. Installation of Gaz-ex remote detonation devices, 9 of which are currently in place on Mt. Superior above the Snowbird Village, outside of the Town of Alta boundaries. Gaz-ex devices cost roughly $200,000 each for materials and installation, and a large number of individual devices would be required to provide the same level of hazard mitigation currently provided by artillery. Installation of snow fences in avalanche path starting zones above the Town	Avalanche	Town		High	Low	Town of Alta General Fund	High	Ongoing	Staff time for communications and enforcement of interlodge travel restrictions.

			of Alta. Many of the paths that affect the Town of Alta originate uphill and outside of the Town of Alta boundaries.									

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal/Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	2 – Conduct Training and awareness activities on communication equipment, tools, and systems	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	4 – Establish notification capabilities and procedures for emergency personnel	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	2 – Establish redundancy for dispatch centers and other critical communications	Complete	

All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Complete	
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	1 – Utilize GIS to identify facilities and infrastructure at risk	Complete	
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	Complete	
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	1 – Establish and enforce appropriate planning, zoning, and building code ordinances	Complete	
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Complete	
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Complete	
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	Complete	
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	4 – Implement water-saving devices and practices in public facilities	Complete	

Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	6 – Coordinate public safety water use, such as hydrant testing	Complete	
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Complete	
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	2 – Encourage Communities to actively participate in NFIP	Complete	
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	1 – Determine potential flood impacts and identify areas in need of additional flood control structures	Complete	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	2 – Maintain Contact with NWS prior to re-application in 2010	Complete	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	1 – Meet with NWS representative on an annual basis to receive information on new services and alerts available	Complete	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	2 – Assist NWS in making other agencies and departments aware of available resources	Complete	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Complete	
All Hazard	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Complete	State did this

2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Bluffdale

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Natalie Hall Title: Emergency Manager Address: 2222 West 14400 South Bluffdale, UT 84065 Office Phone 801-254-2200 Cell Phone: 801-633-6833 Email Address: nhall@bluffdale.com Website: http://www.bluffdale.com/186/Emergency-Management

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** October 1978
- **Current Population:** 14,699 (2018 estimates). The population density is the smallest in the County.
- **Population Growth:** The population has almost doubled from 2010 (7,619) to 2018 estimates with a population percent change from April 1, 2010, to July 1, 2018, of 93.2% (Census).
- **Location and Description:** The City of Bluffdale is located at the south end of Salt Lake County and is home to wide-open spaces, dramatic mountain views of the Wasatch Range, and a significant stretch of the Jordan River. Bluffdale is only 20 miles south of Salt Lake City and 25 miles north of Provo, giving it a unique location between Utah's two largest counties. Bluffdale encompasses 10.22 sq mi (26.47 km2), which is all land (no water). The average elevation is 4,436 ft (1,352 m). Bluffdale is bounded by Lehi to the south, Herriman to the west, Riverton to the north, and Draper to the east. The Jordan River is the city's most prominent natural feature, cutting approximately through the center of the community. The west side of the city sits on a high bluff above the Jordan River. The Jordan River provides a physical division and a geographic challenge to the city's provision of services.
- **Brief History:** Bluffdale, named for its geography of bluffs and dales, was first settled in 1848–1849 when the area was originally part of West Jordan. On July 29, 1858, Orrin Porter Rockwell paid five- hundred dollars to Evan M. Green for sixteen acres of land near to the Crystal Hot Lakes (adjacent to the present Utah State Prison). This land included a hotel with dining facilities, stable, brewery, and pony express station. It was not until the canals were constructed that more settlers arrived. The canal system grew to include seven canals in Bluffdale. As the community expanded, the Bluffdale area became part of South Jordan, then Riverton. In 1883 the Bluffdale School Precinct was formed from parts of Herriman, South Jordan, and Draper. On August 1, 1886, the Bluffdale Ward of The Church of Jesus Christ of Latter-day Saints was organized with Lewis H.Mousley as Bishop. For a short time, the town was called Mousley. Some of the early buildings included an adobe church, built-in 1887–1888, a tithing house, and a three-room schoolhouse constructed in 1893 (Bluffdale).
- **Climate:** The summer high temperature is around 93, and the low winter temperature is 21. On average, Bluffdale receives 15 inches of rain and 34 inches of snow each year (Best Place).

- **Public Services:** Many County utilities pass through the City of Bluffdale.. Because Bluffdale lies at the narrowest point between the Wasatch and Oquirrh mountain ranges, many utilities are located here. These utilities and other infrastructure (CIKR) significantly influence the City's land uses. These include a heavily used Union Pacific Railroad and UTA rail line running north-south; Camp Williams Road (also running north-south); Interstate-15 and Bangerter Highways; and a major canal that is the effective western boundary of the community. In addition, six other canals, several aqueducts, two major power corridors, regional arterials and highways, and a major gas line corridor create obstacles and shape land use opportunities.
- **Governing Body Format:** In the state of Utah, Bluffdale is currently classified as a fifth-class city. Bluffdale City's form of government is Council / Manager. Bluffdale has a part-time Mayor and five part-time City Council members. The City Manager is full-time and works under the direction of the Mayor and Council.
- **Development Trends:** The entire Wasatch Front is under tremendous growth pressure, with the Wasatch Front Regional Council projecting a 67% increase in population by 2040. Bluffdale's 2014 Capital Facilities Plan (CFP) uses a detailed methodology to project population in connection with projected future land use in the City. Based on the CFP, Bluffdale's population will grow to nearly 40,000 by the year 2035. At this point, the City will be at full build-out (given its current future land use planning and the associated dwelling densities). More detailed information about population projections is included in the CFP document. Population growth is expected to increase dramatically with the new housing developments presently under construction. The major population growth center in Bluffdale will be the east side of the City, between I-15 and the railroad tracks, where the heaviest growth is expected to occur between approximately 2015 and 2025, and then tapering off as Bluffdale nears build-out.

Capability Assessment

The city maintains a full-time staff of zero and part-time staff of one individual. Natalie Hall is the City's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position and supported by the Engineering Department and Planning Department positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to	**A Jurisdiction-Specific**	**Rely on the County's Codes,**	**Comments**

	Develop and Implement/ Enforce?	Code, Ordinance and/or Requirement Currently Exists?	Ordinances & Requirements	
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	No	Yes	
Zonings Ordinance(s)	Yes	Yes	No	
Subdivision Ordinance(s)	Yes	Yes	No	
Stormwater Management Program	Yes	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	No	
Post Disaster Recovery Program and Ordinance(s)	Yes	No	No	
Real Estate Disclosure Ordinance(s)	No	No	No	
Growth Management	Yes	Yes	No	
Site Plan Review Requirements	Yes	Yes	No	
Planning Documents				
General or Comprehensive Plan	Yes	Yes	Yes	
Capital Improvement Plan	Yes	Yes	No	
Economic Development Plan	Yes	Yes	No	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	Yes	
Post-Disaster Recovery Plan	Yes	No	No	
Continuity of Operations Plan	Yes	Yes	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter	Yes	Yes	Yes	

Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section				

TABLE: FISCAL CAPABILITY	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planners and Engineers
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	
Planners or engineers with an understanding of natural hazards	Yes	Full Time	
Personnel skilled or trained in GIS applications	Yes	Full Time	
Emergency manager	Yes	Part Time	

Grant writers	Yes	Part Time	Each department is responsible for writing their own grants

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	Michael Fazio
Are any certified floodplain managers on staff in your jurisdiction?	Trained CFM but not certified.
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	We participate and work toward a better CRS Classification.

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	Yes	-	-
Public Protection/ISO	-	-	-
NWS StormReady	-	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 8 policies were in force with total coverage of $2,625,000 and total written premium and FPF of $3,366 (FEMA, 2019).

- City of Bluffdale does participate in the National Flood Insurance Program (CID # 490247) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019). The new map is in the final stages of completion.
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	Over 150 accidents or stranded motorists were reported in the Salt Lake Valley, and at least 1,500 customers were without power at some point during the event, with many of those in Bluffdale and Draper.	-	12/13/2015	-
Flash Flood	Bluffdale was the end location for the event	-	9/14/2013	-
High Wind	63 mph at Bluffdale	-	3/26/2012	$20,000 property damage
Flash Flood	Rainfall of 1.1 inches in 30 minutes inundated storm drains and resulted in numerous reports of basement flooding.	-	8/3/2007	$45,000 property damage
High Wind	52 knot winds	-	6/5/2007	-
Flash Flood	A canal above Bluffdale overflowed, sending a wall of water and mud into a subdivision,	-	9/6/2002	$200,000 property damage

	flooding at least 10 homes.			

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	583*
Members of the community under 18 years old	4,272
Members of the community that identify as having disability status	477
Members of the community that speak English less than "very well"	58
Members of the community living below the poverty line	316
The number of mobile homes in the community	0
Members of the community without health insurance	762
Occupied housing units with tenants without a vehicle	29
Housing units without heating fuel	0

*The number of community members over 65 years is likely higher than the number provided by the ACS 2017.

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Flooding: Flooding events can have an impact on school openings and with a large population under 18 years old, coordination will be needed to ensure educational attainment is not impacted by flooding events. Floods are related to an excess of snowmelt, rainfall, or failure of natural or engineered impoundments onto riverbanks and adjacent floodplains. Floodplains are lowland areas near rivers, lakes, reservoirs, and low terrain urban areas that are subject to recurring floods. Flooding occurs when the peak discharge, or rate of flow in cubic feet per second (cfs) is larger than the channel of the river or storm sewer capacity. Flooding events may yield temporary evacuation and relocation needs, depending on the damage. In Bluffdale, as in many other communities, floods are typically localized events. Possible causes in Bluffdale include:

- Runoff from heavy rain on the hills west of Bluffdale such as Wood Hollow
- Breaching of one of the canals that run through Bluffdale
- Obstructed or clogged storm drains

- Jordan River overflowing its banks

Flood damage includes saturation of land and property, erosion, deposition of mud and debris, and property damage from fast flowing water. Most injuries and deaths occur from fast moving floodwaters, while most property damage results from inundation by sediment-filled water.

The main potential flood source in Bluffdale is the Jordan River. There are three residential structures in the 0.2% annual chance flood zone that are located near this river.

The City of Bluffdale has no repetitive loss properties identified in the National Flood Insurance Program (NFIP).

Bluffdale City participates in the National Flood Insurance Program (NFIP). In order to continue to comply with the program, the city adopts floodplain management requirements and enforces those requirements by issuing certificates for new construction. The certificates allow the city to regulate construction in Special Flood Hazard Areas (SFHAs). The GIS and the engineering division department in the city has updated floodplain identification and mapping in order to facilitate issuing certificates or responding to any public requests for information. The city coordinates with Salt County during flood events and monitors current snow pack to evaluate the possibility of flooding conditions.

Figure. City of Bluffdale FEMA Flood Risk Map

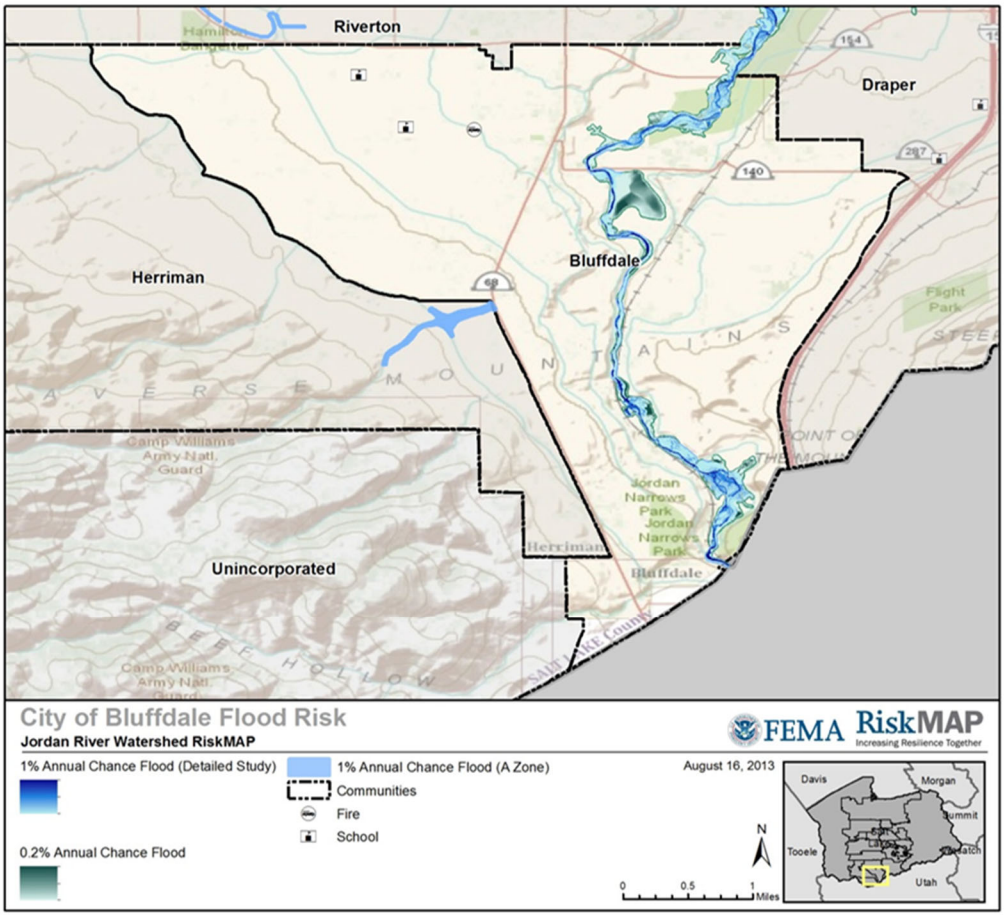


Table 1. Bluffdale Flood Loss Estimates

Structure Occupancy Type	11% Annual Chance Structure Exposure	1% Annual Chance Building and Contents Loss	0.2% Chance Structure Exposure	0.2% Chance Building and Contents Loss
Residential	0	0	3	$2,070,290.00
Total	0	0	3	$2,070,290.00

Table. Areas of Risk and Mitigation Interest

The Welby-Jacobs Canal was not designed for stormwater collection. Flood discharge from upstream drainages and recent developments enters the canal system.
The Welby-Jacobs Canal is elevated and could be impacted by ground shaking associated with earthquakes.
Wood Hollow is a drainage that currently has no SFHA depicted on the FIRM. However, the City recognizes the potential impacts of current and future development pressures and would like to have the drainage studied to ensure flood conveyance to the Jordan River.

Extreme Temperatures: Winter events are more frequent than high-temperature events. Of specific concern for this hazard is the elderly and people without insurance. Health side effects are common with extreme temperature events, particularly for those over 65 years.

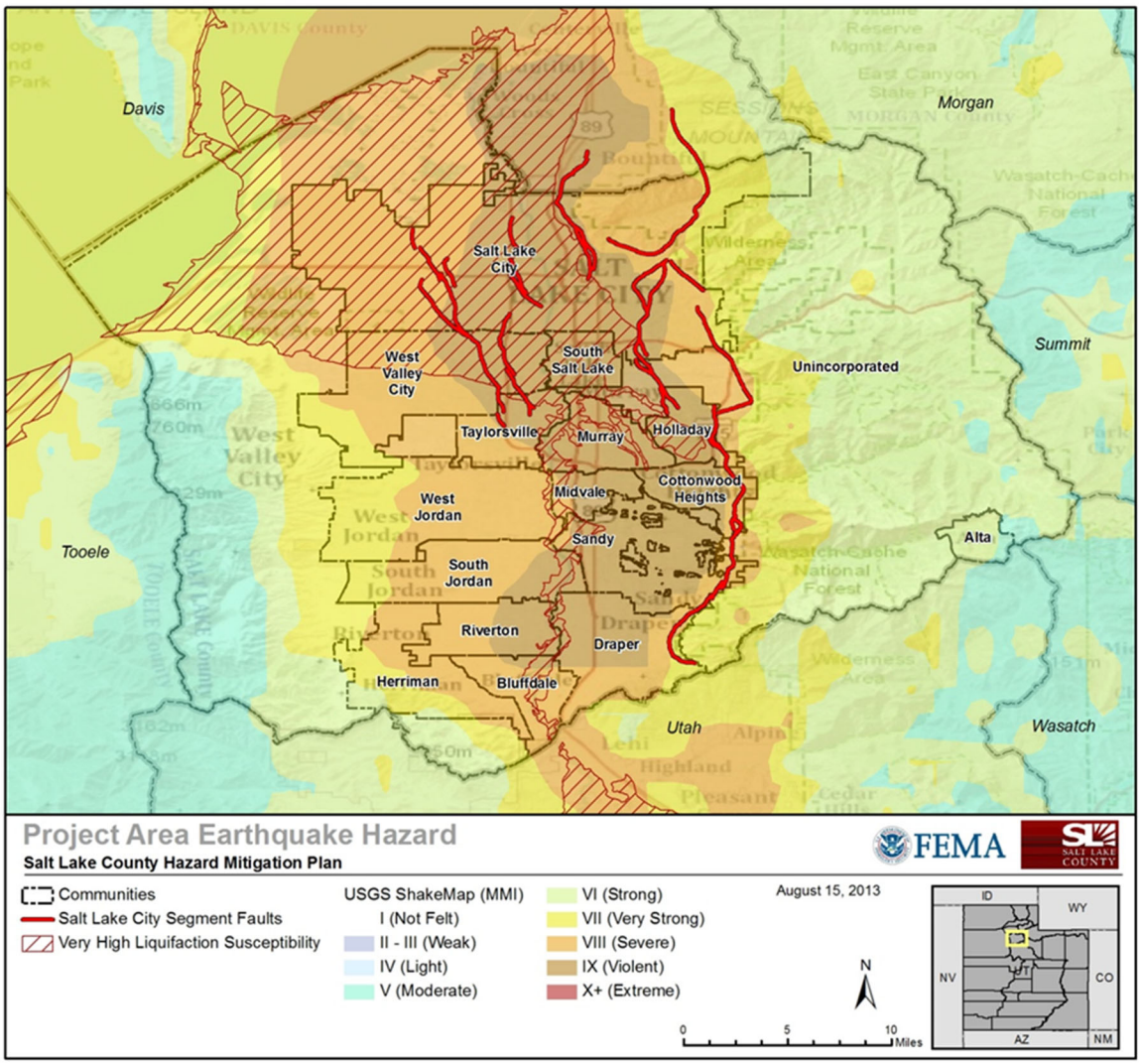
Dam Failure: The Jordan River flows through Bluffdale from south to north. In this area, several diversion structures (small dams) direct part of the river flow into irrigation canals that supply water for farming and irrigation in Salt Lake County. The risk of flooding from the failure of one of these dams is low because the dam is less than 20 feet high. Salt Lake County Flood Control District should have information on the flooding risk of these structures. A diversion dam failure will affect the delivery of irrigation water to farmers and homes increasing the risk of crop failure if the dam breaks in the summer months. The diversion dams and canals are owned and managed privately. Each canal company has a risk assessment for their canals.

Drought: Bluffdale City has large swings in temperature and in precipitation amounts during any year and is highly susceptible to drought. Drought can be especially problematic for farmers and sustaining farmland areas in Bluffdale. If drought conditions occur the City would restrict the use of water for outdoor landscaping. The cost benefit for reducing or restricting the use of water during a drought is the prolonged use of water for more beneficial use as farming to produce crops and sustain animal life.

Earthquake: Utah's earthquake hazard is greatest within the Intermountain Seismic Belt (ISB), which extends 800 miles from Montana to Nevada and Arizona, and trends from north to south through the center of Utah (The Wasatch Fault, UGS PIS 40). The ISB contains the Wasatch fault; one of the longest and most active normal faults in the world, with a potential for earthquake

with a magnitude up to 7.5. The largest earthquakes in Utah occur in the ISB, where at least 35 earthquakes of magnitude 5.0 or greater have occurred since 1850 (UNHH, 2008).

Figure. Bluffdale's Earthquake Hazard ranges from Very Strong to Violent



The segment of the Wasatch Fault that most clearly affects Bluffdale lies at the base of the foothills to the east, commonly referred to as the "Point of the Mountain." The faulting of this segment would be felt most strongly in the eastern section of Bluffdale, which lies just west of I-15 and south of 14600 South. The increase in new building at this location means more homes will be affected if this fault ruptures.

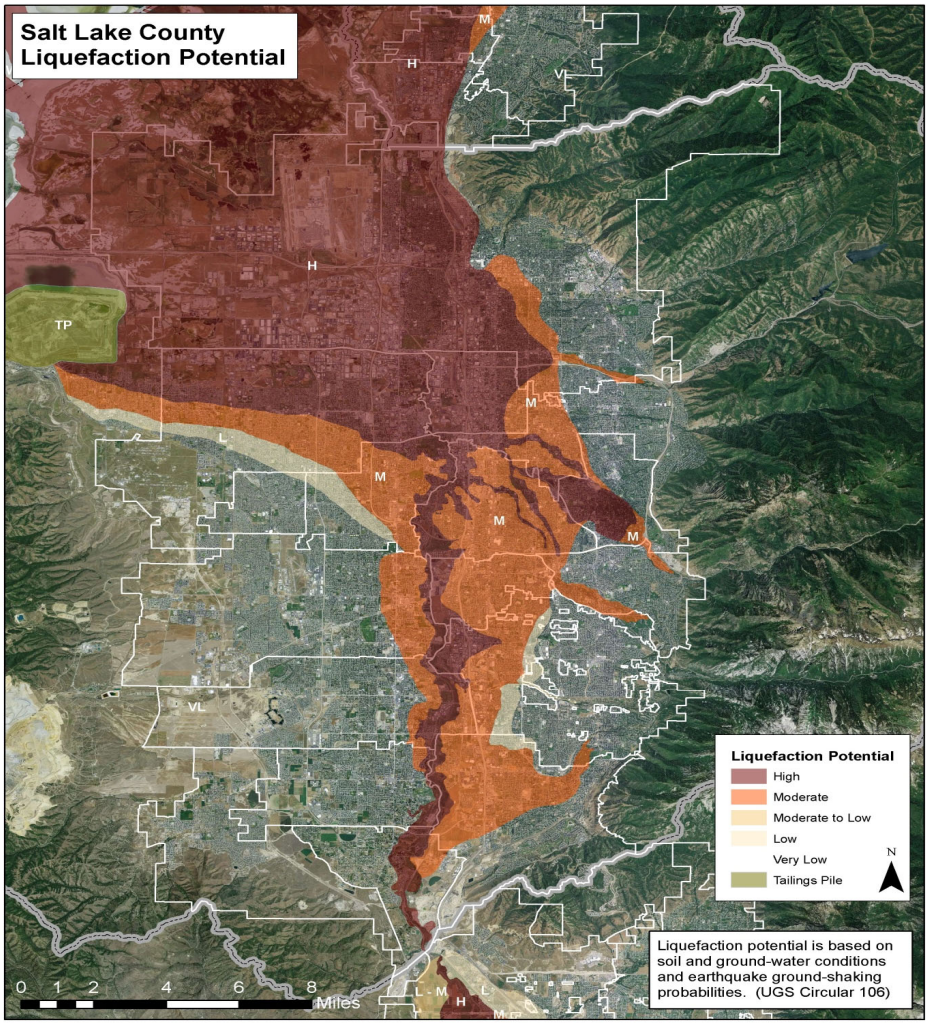
Of significant concern in Bluffdale are the many critical infrastructure facilities, which serve both Salt Lake and Utah Counties. Those facilities include very large water lines, large irrigation canals, utilities, power, railroads, major transportation routes, and a major natural gas line.

Large areas of ground surrounding the Jordan River are at risk for soil liquefaction during an earthquake. Liquefaction can occur when water-saturated, cohesionless, sandy soils are

subjected to ground shaking. The soils "liquefy" or become like quicksand, lose bearing capacity and shear strength, and readily flow on the gentlest of slopes. Liquefaction is common in areas of shallow ground water and sandy or silty sediments. Liquefaction can produce lateral spreading and flows, where surface soil layers break up and move independently. Displacement of up to 3 feet may occur, accompanied by ground cracking and differential vertical displacement. Soil may move downhill, pulling apart roads, buildings, pipelines and buried utilities. Bearing capacity will lessen and can cause buildings to settle or tip, while lightweight buoyant structures such as empty storage tanks may "float" upward. Liquefaction can also cause foundation materials beneath earth fill dams to liquefy and fail, flooding by ground water in low-lying areas, the backup of gravity fed systems, and possible sand boils. Sand boils are deposits of sandy sediment ejected to the surface during an earthquake along fissures. Liquefaction can occur during earthquakes of magnitude 5.0 or greater (UNHH, 2008).

Bluffdale City requires a geotechnical investigation for any structure or home built. The liquefaction potential is shown in this investigation.

Figure. Bluffdale's Liquefaction Potential



Tornado: Although infrequent, Bluffdale City is subject to severe damage resulting from tornadoes and extremely high winds often called microburst winds.

Severe Weather: The potential for severe weather is a reality in Bluffdale City and the surrounding region. These weather events are not isolated to any climatic season, but rather can occur at any time during the year. During the spring and summer months, heavy rains can fall upon soils in a desert climate that may not readily percolate creating surface runoff, mudslides, debris flow, flooding, and other water-related damage. During the winter months, heavy snowfall is possible. While Bluffdale City is typically self-reliant in weather-related events, severe weather may require assistance from outside agencies.

Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. Bluffdale City will continue to identify new methods to minimize the impact of winter storms, but it is not possible to prepare for all winter storm events.

Although infrequent, Bluffdale City is subject to severe damage resulting from tornadoes and extremely high winds often called microburst winds. As recent as August 11, 1999, a category F2 tornado touched down in the downtown Salt Lake City area, killing one person and injuring at least 100 people. The tornado caused widespread power outages as well as large-scale debris mainly from downed tree limbs. The community needs to be prepared and ready to respond to wind-related weather.

Wildfire: Given the proximity to the mountains, wildfires have the potential to cause limited damage and loss of life and property through fire events. While limited in probable location, fires can occur within the borders of the urban fabric of the community or as wildfires in the hillside areas south and west of the community. Each incident may require a unique response. Fires can occur within the urban fabric of the community or as wildfires in the hillside areas south and west of the community. Each incident may require a unique response.

The potential for structure and wildfires is increased by lightning events. When severe electrical storms are anticipated, the City Manager may request a heightened level of observation by city personnel.

Utah's fire season typically occurs during the warmer and drier months between May and October. Although traditionally most wildfires have been caused naturally, mostly by lightning, as development encroaches on the hillsides and lower slopes of the Wasatch and Oquirrh Mountains, wildfires caused by humans will likely increase. Education and careful preparation are necessary to protect life and personal property in vulnerable areas. Bluffdale works continually to incorporate a Wildland Interface Zone mitigation plan. Other programs such as the Firewise Communities program may be used to educate residents about the dangers of wildfire and help them prepare for these types of disasters.

Public Health: The city has a high concentration of wildlife which heightens the potential for an animal disease outbreak. On a regular basis, potentially catastrophic public health issues are raised in the mainstream media and the possibility of a national pandemic, local epidemic such as the Hantavirus, or a wide array of other health-related matters is real. Planning for these events is well beyond the ability of Bluffdale City, but if an outbreak were to occur, the City will be expected to provide accurate information in an immediate fashion. In the event of a public health emergency, the City Manager will determine the appropriate measure of municipal response. The

City Manager may choose to activate the EOC and use all means necessary to inform residents and business owners.

In partnership with local and state public health officials, other federal agencies, medical and public health professional associations, infectious disease experts from academia and clinical practice, and international and public service organizations, Bluffdale City will incorporate all reasonable strategies to educate its residents and prepare for a measured response in the instance of a public health emergency.

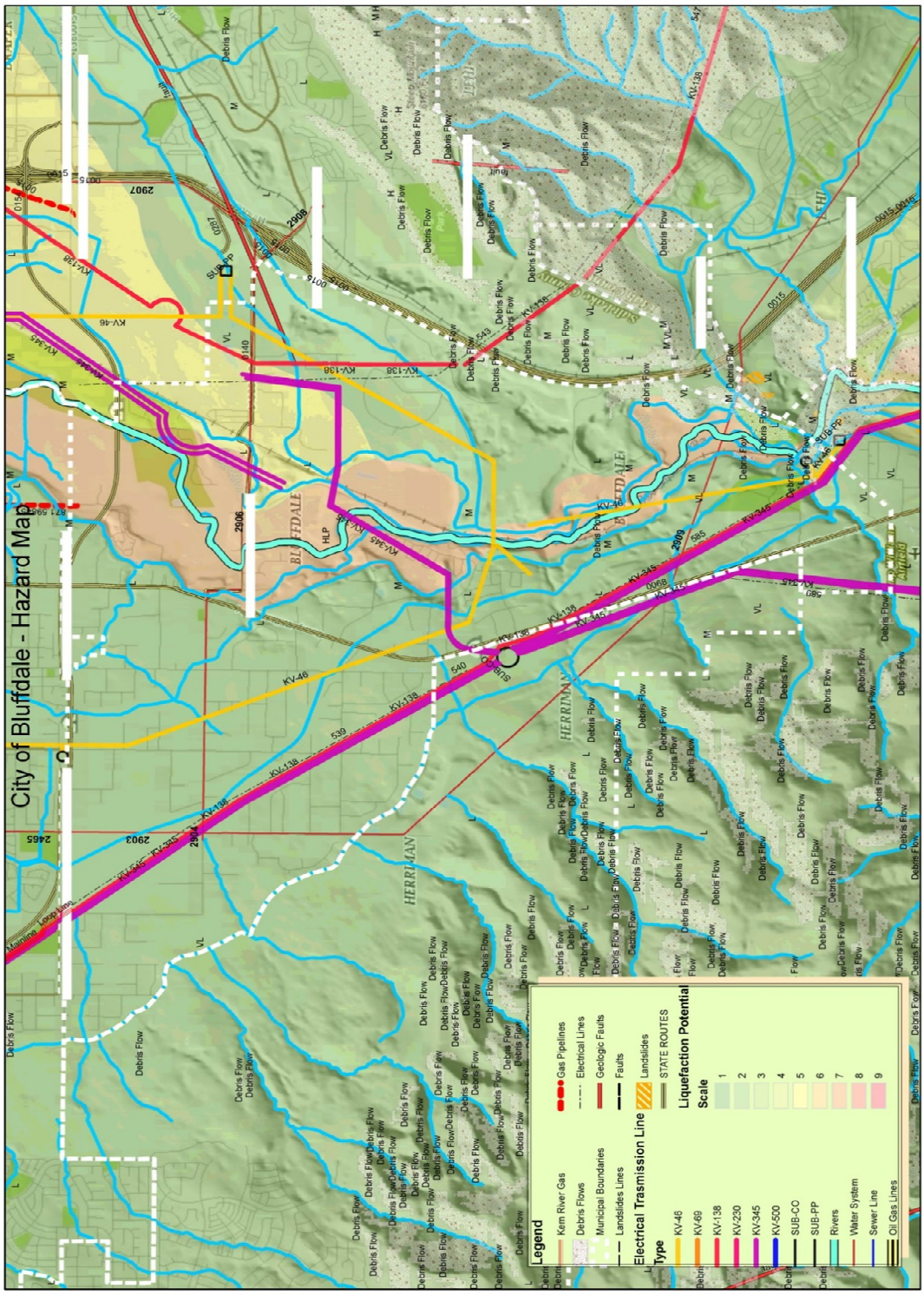
Radon: High levels of radon are found in the area. Radon is a radioactive gas that has no smell, taste, or color. It comes from the natural decay of uranium that is found in nearly all rock and soil. When geologic conditions are favorable, the potential increases for high indoor levels of radon. Outdoor radon levels never reach dangerous concentrations because air movement scatters radon into the atmosphere. Radon is a hazard in buildings because the gas collects in enclosed spaces. Radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer. Radon is the second leading cause of lung cancer in the United States.

HAZMAT: Hazardous materials move through the area through multiple avenues, including the train and Redwood Rd and I-15. A spill during transport is a concern.

Avalanche: The likelihood of avalanches impacting Bluffdale is extremely minimal. There are no adjacent mountains steep enough to be of concern and no historical avalanche activity in our community.

Landslide: Some areas are at risk of impact from a landslide including 14600th South and Highway 140 and parts of the community subdivision. Numerous geologic hazards exist in Bluffdale and throughout the Salt Lake Valley that could result in an emergency or disaster. Earthquake hazards are likely to include ground shaking, ground rupture, tectonic deformation, liquefaction, seismically induced slope failures and phenomena related to ground-water effects. Wildfires can remove necessary vegetation, which can result in unstable soils for extended periods of time. The most proactive approach to minimize geologic hazard is to avoid development in inappropriate areas. The potential for geologic events can be partially mitigated through proper placement of development. Each incident may require a unique response from Bluffdale City.

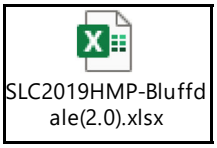
Figure. City of Bluffdale Hazards Map



Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Wildfire	2	19	38
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Landslide and Slope Failure	2	11	22
Dam Failure	1	17	17
Tornado	1	11	11
Civil Disturbance	1	8	8
Avalanche	1	3	3

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	High	3	3		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**		**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)		**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)		**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)		**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)		**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct a Slope Study	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Landslide/ Slope Failure	City of Bluffdale	Utah Department of Transportation	Medium	Medium $150,000	Grants and local funding	High	2026	The slope: https://www.google.com/maps/@40.4869924,-111.9216236,242m/data=!3m1!1e3 It is currently owned and managed by the Utah Department of Transportation. In 2020 it will be turned over to the City of Bluffdale. Currently, an inclinometer and a piezometer have been installed to measure water and earth movement. The slope is below a canal and train tracks owned by Union Pacific and the Utah Transit Authority. Below the slope are many homes. A study ($150,000) needs to be conducted to see how to best move the road and stabilize the slope. This road is one of the main thoroughfares for the City of Bluffdale and is essential for transportation, evacuation access East to West. The cost of mitigation is until the study is conducted.
Increase drinking water storage	2019	Goal 5: Ensure and promote ways to increase government and private sector continuity of	All-Hazards, Extreme Heat, Wildfire	City of Bluffdale	Jordan Valley Water Conservancy District	High	High ($15 million)	Grants and local funding	High	2026	Adding drinking water storage to the City of Bluffdale water system is a high priority. Bluffdale purchases water from the Jordan Valley Water Conservancy District. As the City of Bluffdale continues to grow, the need for water has increased. The City will be

		services during and after a disaster.									building 3 new drinking water storage tanks at three different locations in the City. This will include miles of transmission mains. This project will take several years and many phases to complete.
Conduct a HAZMAT Flow Study	2019	Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	Hazardous Materials Release	City of Bluffdale	N/A	Medium	Medium	Grants and local funding	High	TBD	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct Training and awareness activities on communication equipment, tools, and systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	Emergency Management	High	Low	Local	Medium	Completed / Ongoing	Bluffdale participates in training and exercises designed to practice using communication tools and equipment. Example: City

										uses its amateur radio volunteers
Establish agreements to share communications equipment between agencies involved in emergency operations	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	Emergency Management and Communications	Medium	Low	Local	Medium	Ongoing	Bluffdale continues to expand these agreements.
Establish redundancy for dispatch centers and other critical communications	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	All Hazards	Emergency Management and Communications	Medium	Medium	Local	Medium	Completed / Ongoing	Bluffdale relies on the Valley Emergency Communications Center (VECC) for dispatch services. They coordinate with other PSAPS to provide redundancy.
Establish a coordinating group to address long-term communication needs and implementation strategies	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards	Emergency Management and Communications	Medium	Low	Local	Medium	Ongoing	These meetings are on-going.
Acquire, upgrade, and/or integrate communications equipment and systems as	2009	1 – Improve and maintain communications capabilities for	All Hazards	Emergency Management and Communications	Medium	Low	Local	Medium	Ongoing	Bluffdale has upgraded existing equipment and purchased new equipment to

determined by coordinating group		emergency operations 1.3 – Conduct communications Strategic Planning								maintain operability
Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gauges, seismograph stations, road conditions, etc.	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	All Hazards	Emergency Management and Communications	High	Medium	Local	Medium	Completed / Ongoing	New technologies have been added to the EOC and exploring new options.
Implement improvements to address concerns identified in assessment	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All Hazards	Emergency Management	High	High	Federal grants such as HMA and local funding	High	In Process	
Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid	All Hazards	Emergency Management	High	Low	Local	High	Completed/ Ongoing	Bluffdale has formal agreements for Police, Fire, and Water

		agreements in accordance with National Incident Management System (NIMS) requirements								
Pursue and implement needed mutual-aid agreements	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All Hazards	Emergency Management	Medium	Low	Local	Medium	Completed/ Ongoing/In Process	
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All Hazards	Emergency Management	High	Low	Local	High	Completed/ Ongoing	Bluffdale Emergency Management provides several public education classes for groups to discuss the hazards in the community and what residents can do to be prepared
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive	All Hazards	Emergency Management	Medium	Low	Local	Medium	Completed/ Ongoing	Bluffdale's education programs are customizable for all kinds of groups and available to all members of the community

		public education program								
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All Hazards	Emergency Management and Communications	High	Low	Local	High	Completed/ Ongoing	Bluffdale has worked with Be Ready Utah, American Red Cross and other groups to present to the citizens of our community
Establish and enforce appropriate planning, zoning, and building code ordinances	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All Hazards	Emergency Management and Zoning	High	Low	Local	High	Completed/ Ongoing	Bluffdale enforces all current ordinances and building codes including ordinances like our Flood Damage Prevention and Land Disturbance ordinances.
Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Emergency Management	Medium	Low	Local	Medium	Completed/ Ongoing	

Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Emergency Management and Public Works	Medium	Medium	Local and County funding	Medium	Completed/ Ongoing	Bluffdale has a variety of incentive programs that it offers to its residents related to water conservation. We have a tiered pricing structure to promote conservation
Implement water-saving devices and practices in public facilities	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Emergency Management and Public Works	High	Medium	Local, state, and federal funding	Medium	Completed/ Ongoing	Bluffdale has implemented several projects including using secondary and reuse water to irrigate public parks instead of culinary water
Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Emergency Management and Public Works	High	Medium	Local, state, and federal funding	High	Completed/ Ongoing	The Bluffdale Water Division responds immediately to all reports of leaks and performs regular system maintenance, including actively monitoring for leaks, theft of services, etc.
Coordinate public safety water use, such as hydrant testing	2009	1 – Reduce and prevent hardships	Drought	Emergency Management and Public Works	High	Low	Local	Medium	Completed/ Ongoing	The Bluffdale Water Division coordinates all water use, including the

		associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County								testing of hydrants in partnership with the fire department
Coordinate with water districts to plan for, develop and/or expand secondary water	2009	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	Drought	Emergency Management and Public Works	High	High	Local, state, and federal funding	Medium	Completed/ Ongoing	Bluffdale continues to encourage the development of secondary water, where feasible. With every road project we add reuse lines.
Encourage Communities to actively participate in NFIP	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	Flooding	Emergency Management	High	Low	Local	High	Completed/ Ongoing	Bluffdale actively participates in the NFIP
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in	Flooding	Emergency Management, Engineering, and Public Works	High	Medium	Local, state, and federal funding	High	Completed/ Ongoing	The City Engineer and Public Works Director regularly review the impact of development and the need for flood control infrastructure and make

		new developments								recommendations as needed
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flooding	Emergency Management, Engineering, and Public Works	High	High	Local, state, and federal funding	High	Completed/ Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	Flooding	Emergency Management, Engineering, and Public Works	High	High	Local, state, and federal funding	High	Completed/ Ongoing	The Division of Public Works Department continues to maintain and repair all drainage systems in the City
Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for	Flooding	Emergency Management, Engineering, and Public Works	High	High	Local, state, and federal funding	Medium	Completed/ Ongoing	

		failure of flood control structures								
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding	Emergency Management and Public Works	High	High	Local, state, and federal funding	High	Completed/ Ongoing	The City Engineering Division in cooperation with the Public Works Department make repairs as needed to deficient structures
Assist NWS in making other agencies and departments aware of available resources	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	Severe Weather	Emergency Management	Medium	Low	Local	High	Completed/ Ongoing	Bluffdale supports the NWS efforts for education and outreach and makes internal departments aware of NWS resources
Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	2009	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	Slope Failure	Emergency Management, Public Works, Engineering, and GIS	Medium	Medium	Local	High	Completed/ Ongoing	Bluffdale Engineering and Planning reviews recommendations as provided pertaining to development within the City
Work with experts and communities to develop or update evacuation plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions and	Wildland Fire						Ongoing	

		improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas								
Determine potential flood impacts and identify areas in need of additional flood control infrastructure. Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures. Provide maintenance, repairs, and improvements to drainage structures, storm water systems, and flood control structures. Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Flood	Public Works, Planning, Engineering	High	High - $35,000.00	City budget	Medium-High	Now and ongoing	

systems. Reduce threat of unstable or inadequate flood control structures. Identify, assess, and modify as needed. Educate home and property owners regarding the risks of flooding. Identify potential flooding of Wood Hollow, Beef Hollow, and Rose Creek drainages. Continue to enforce floodplain regulations as they apply to new housing developments.										
Continue our work toward preparing our community to be storm ready, including: 1.Receive information from NWS annually of new services and alerts as available. 2.Include in our Neighborhood Emergency Plan the importance of caring	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Severe Weather	Emergency Management, Public Works, Fire Department	High	Low - $11,000	City budget	Medium-High	Now and ongoing	

for our older residents who will need help during severe weather. 3.Continue to educate all residents about how to prepare for severe weather.										
Continue to urge resident preparation through seasonal articles in the monthly newsletter Create evacuation plans for high risk areas Continue to assess existing water flow capabilities and address deficiencies. Continue to keep Wildland-Urban Interface as an important element to our development and insure that developers follow our city code for road accessibility and availability of water flow for fire response.	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Wildfire	Emergency Management, Public Works, Police, Fire	Medium	Low - $15,000	City budget	Medium	Now and ongoing	

Mitigation Table - Completed and Removed Action

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Completed	Bluffdale evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable Example: The development of a second / redundant radio system for the Police, Fire, and Public Works Departments
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	1 – Utilize GIS to identify facilities and infrastructure at risk	Completed	In 2012 Bluffdale GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk.
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	Completed	In 2012 Bluffdale GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness	2 – Incorporate information about cascading effects of hazards in education programs	Completed	Information is included in all presentations on the effects of cascading hazards

		5.1 – Establish a comprehensive public education program			
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Completed	Bluffdale GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Completed	All current Bluffdale ordinances are available online at: http://www.sterlingcodifiers.com/ codebook/index.php?book_id=974&keywords=bluffdale
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Completed	
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all	2 – Utilize inundation maps to identify potential evacuation areas and routes	Completed	

		identified high hazard dams in the County			
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	Not applicable	This is not applicable to Bluffdale
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	1 – Identify structures at risk to earthquake damage	Completed	In 2012 Bluffdale GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not Applicable	Bluffdale does not have funding to support this type of program.
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Completed	We are working to replace the Public Works Building

Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	There are very few URM homes and businesses located in Bluffdale that would make this activity cost effective for the City to engage in. Bluffdale supports county level efforts to share this type of information
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed / Not Applicable	Not applicable to Bluffdale as the referenced dam is located in another jurisdiction.
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Not Applicable	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed / Not Applicable	Bluffdale does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program

Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed / Not Applicable	Bluffdale does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	Bluffdale has not developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Completed / Not Applicable	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Completed / Not Applicable	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not Completed / Not Applicable	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Completed	Bluffdale has an adequate transportation network to support evacuation and emergency response

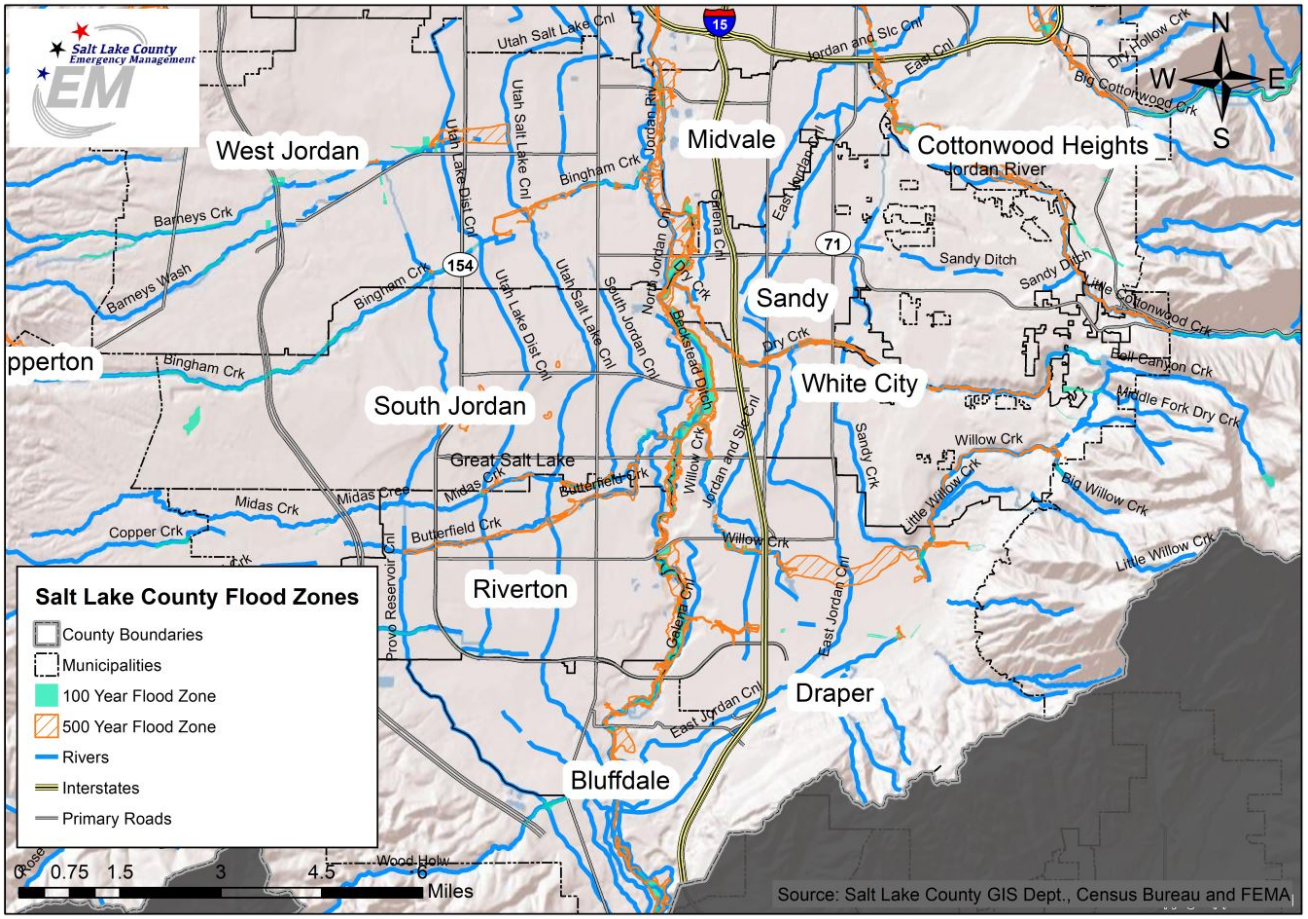
		capabilities for WUI areas			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Completed	Addressing of structures in Bluffdale is complete
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	Completed	Addressing of structures in Bluffdale is complete
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	1 – Reduce fuels around publicly owned structures	Not Applicable	

Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Not Applicable	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	The Bluffdale water system meets and/or exceeds requirements for providing water flow for firefighting purposes in the City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not Applicable	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities	1 – Adopt the Utah Wildland-Urban Interface Code	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

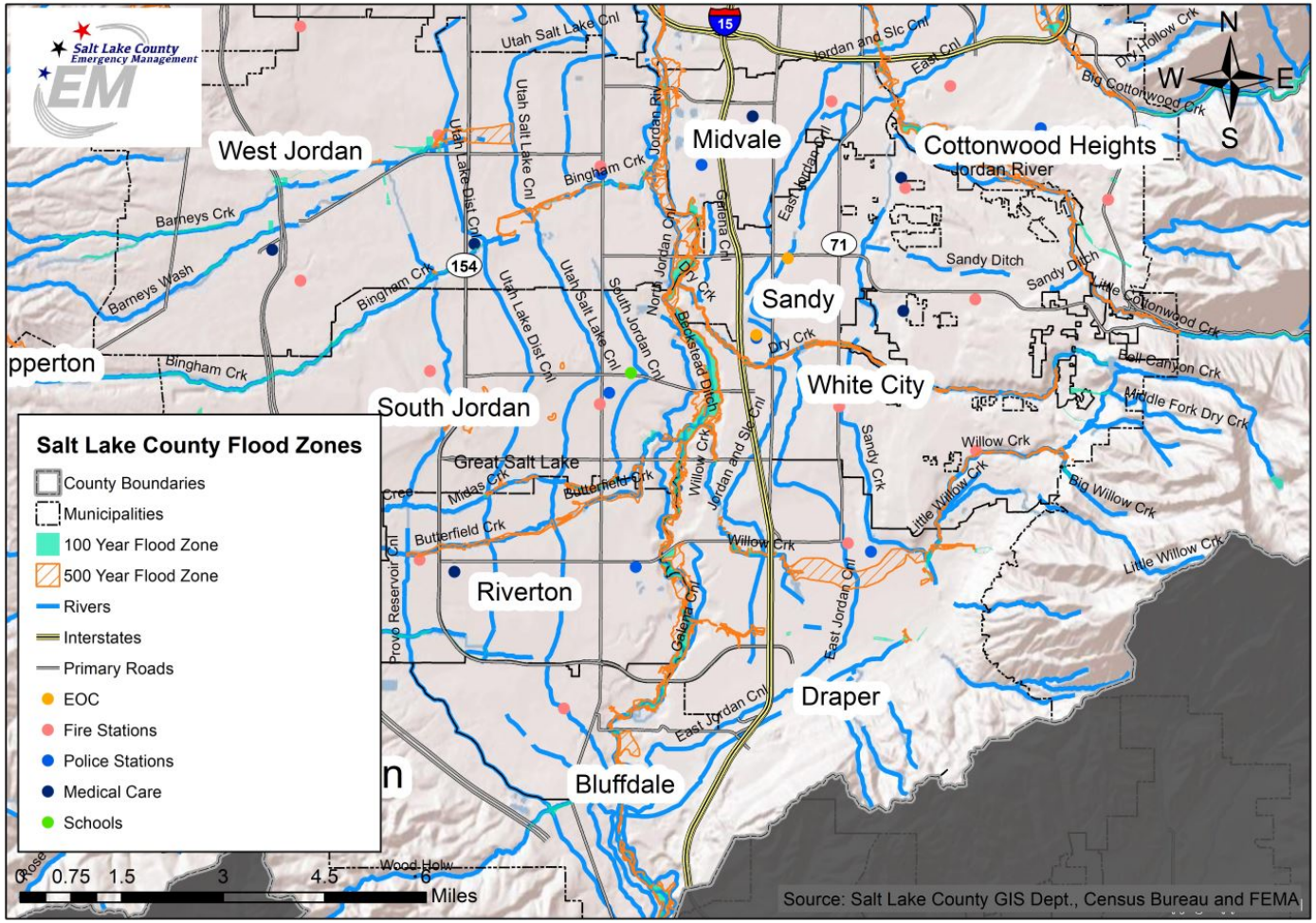
		2.5 – Encourage proper development practices in the WUI			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

Jurisdiction Maps

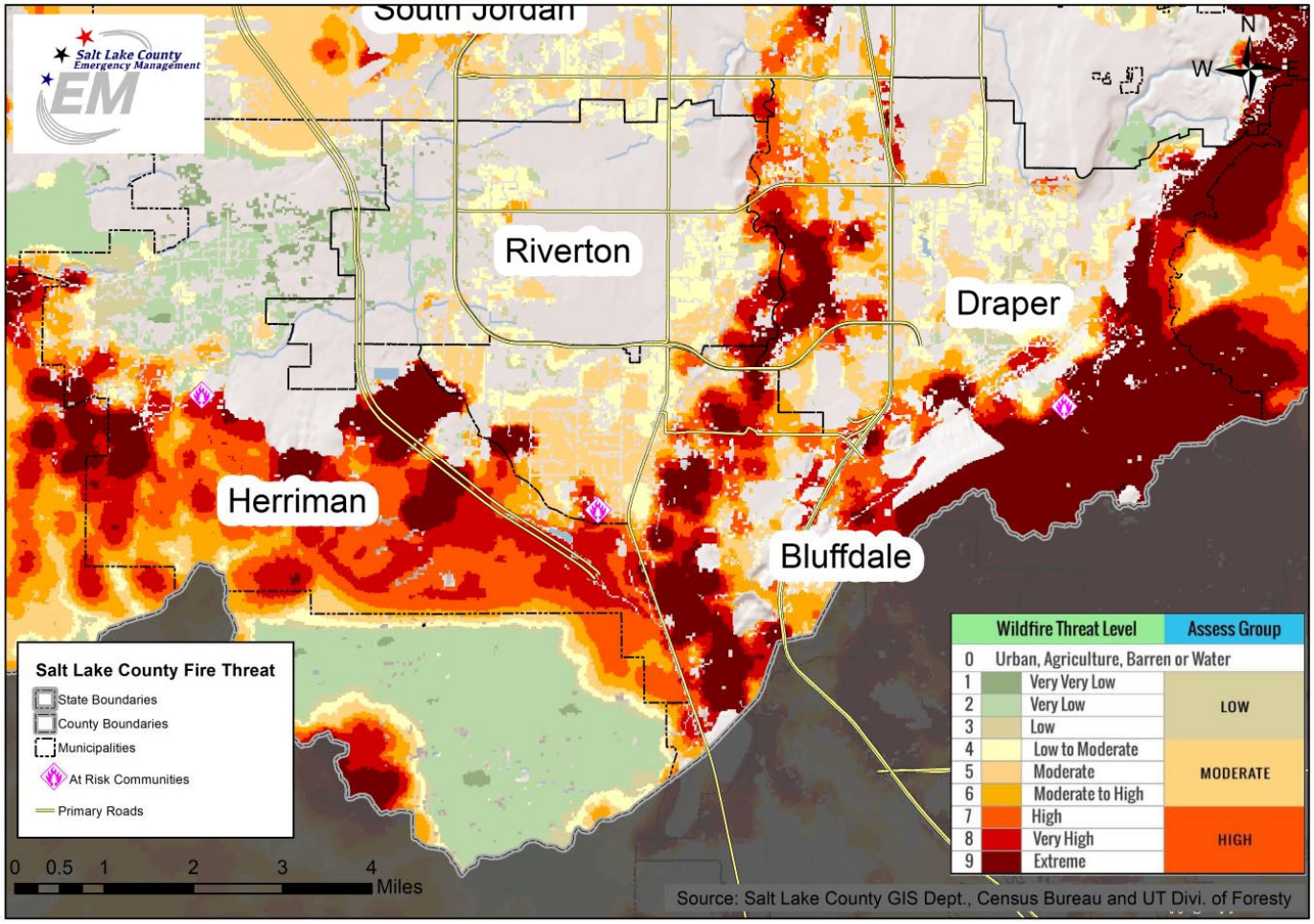
Map: 100 Year and 500 Year Flood Zone



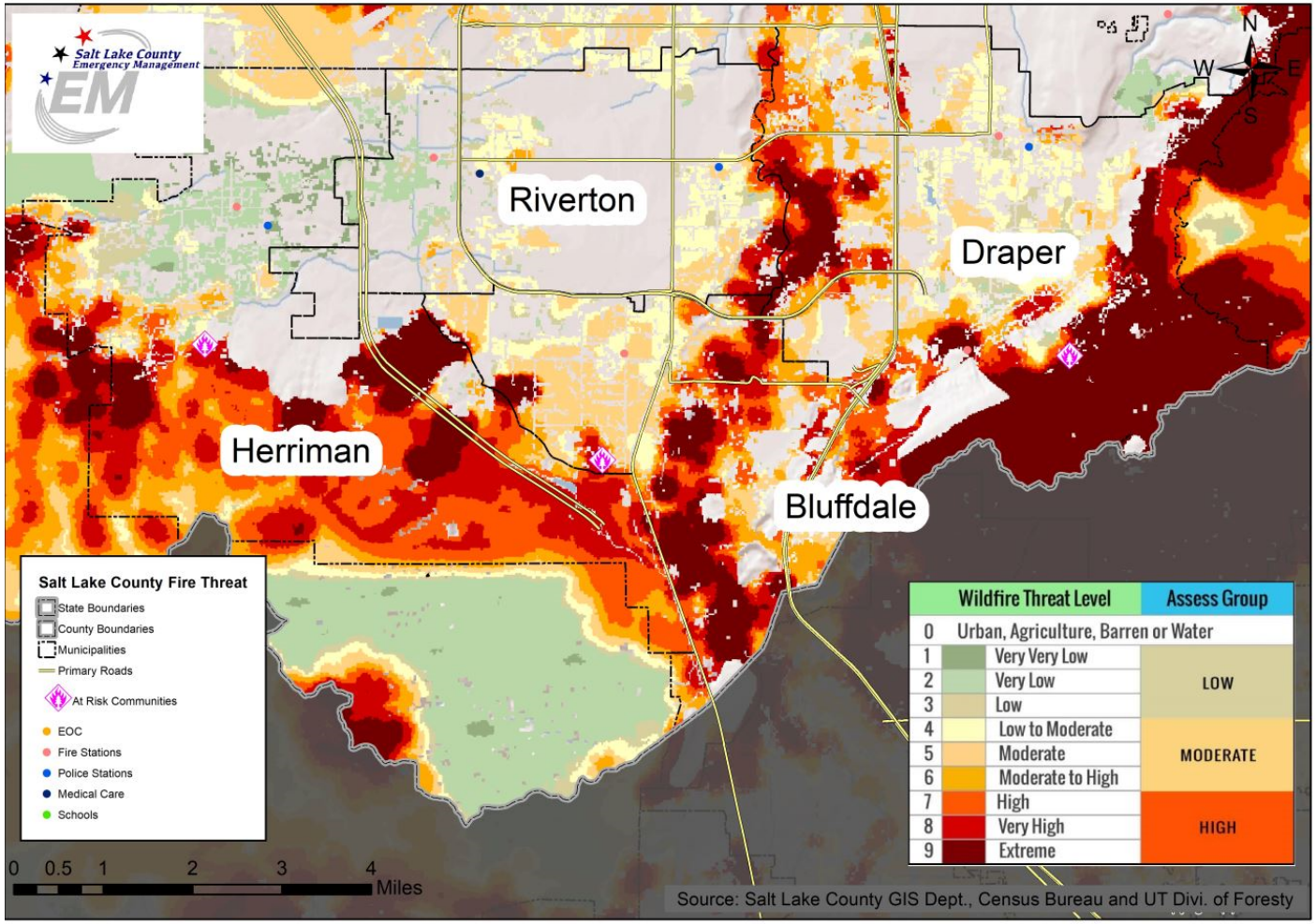
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



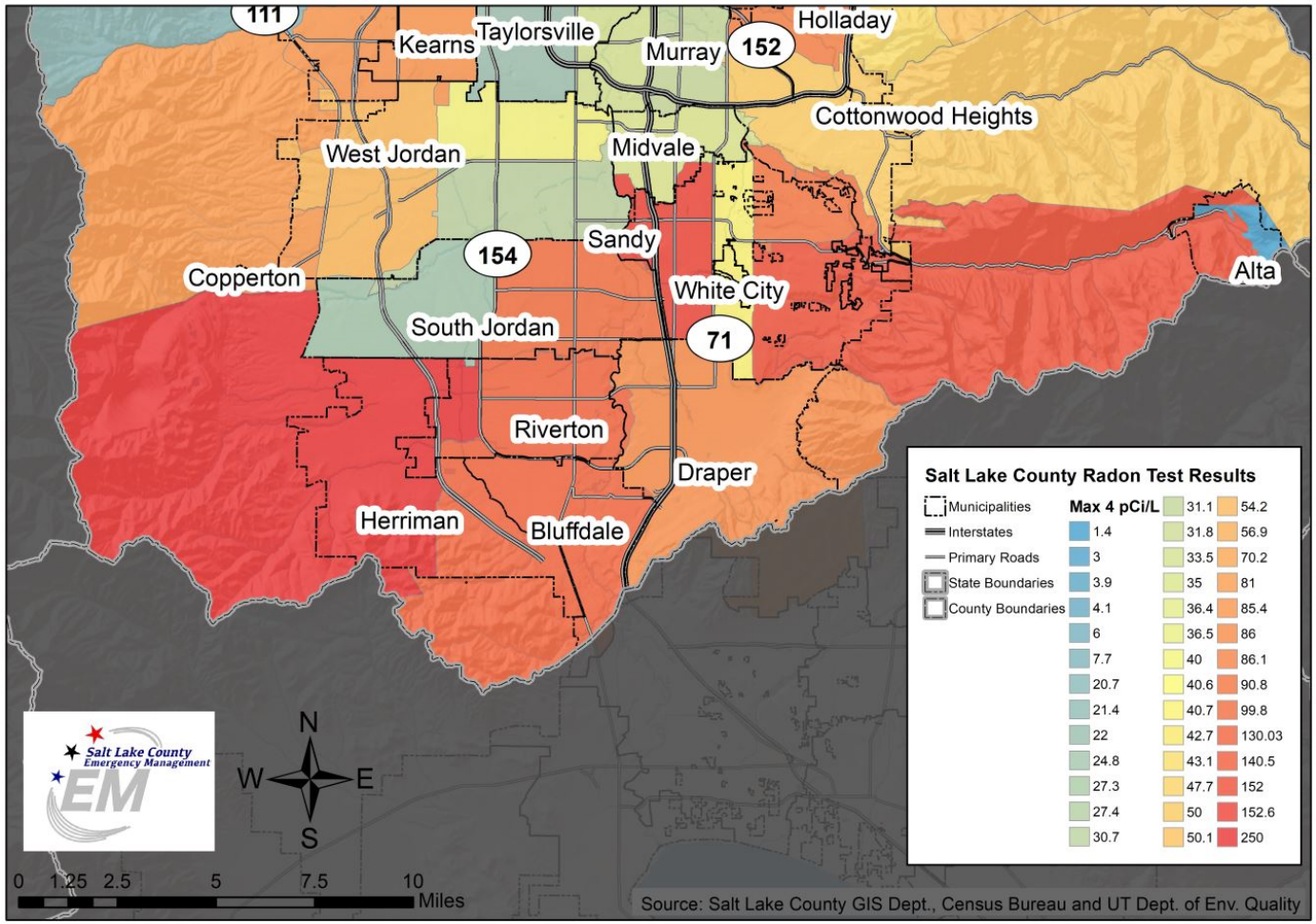
Map: Wildfire Threat Level



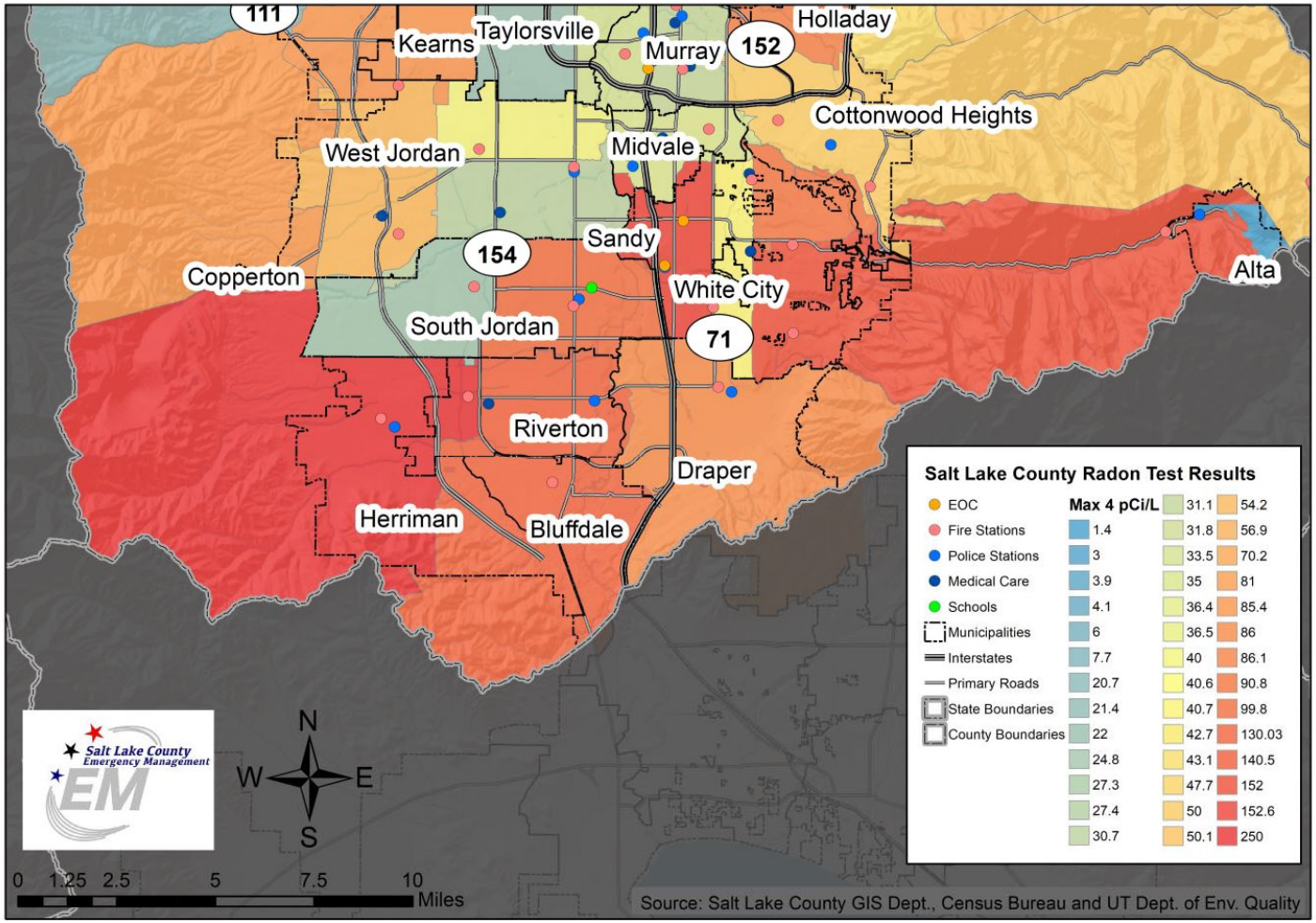
Map: Wildfire Threat Level with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Brighton

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Dan Knopp **Title:** Mayor **Office Phone:** 801-244-0366 **Email Address:** dan@silverforklodge.com	**Name:** Jeff Bossard **Title:** Council Member **Cell Phone:** 435-647-7941 **Email Address:** jeffboss1620@gmail.com

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation**: Brighton is working on incorporation for January 1, 2020, to officially be a town. On November 6, 2018, residents of the area voted for incorporation. The community was settled in 1871. Brighton is a part of the Municipal Services District (MSD). After incorporation, the town will have six months to decide if they will remain under the Municipal Services District or have services for the town provided through another avenue.
- **Current Population:** Approximately 260 residents. No Census data currently exists for Brighton; however, an estimation of the population is from 180-260. While the year-round population is low, Brighton is a resort area that hosts thousands of guests from around the world during peak ski-season.
- **Population Growth:** As mentioned above, the year-round population is likely below 300; however, when the area incorporates, Census data will be collected and provide population changes over time.
- **Location and Description:** Brighton is 35 miles from the Salt Lake City Airport and has a base elevation of 8,755 feet and a top elevation of 10,500 feet. Brighton is a resort community located at the top of Big Cottonwood Canyon and covers an area of 10,238.8 acres. The Brighton Ski Resort and the Solitude Mountain Resort are located in Brighton. Brighton is on public lands. All of the resort's land is part of the Wasatch-Cache National Forest, meaning the whole resort is open to the public year-round, though tickets must be purchased to use the lifts (Brighton Resort).
- **Brief History:** Brighton Ski Resort was the first ski resort in Utah, started in 1936, and one of the first in the United States. Brighton is not a typical resort town and focuses on top-notch trails over amenities. Most skiers are from Utah, and the majority of the visitors stay in the Salt Lake area instead of Brighton.
- **Climate:** Climate in Brighton is characterized by a long snowy season between November and May, during which time an annual average of 500" of snowfall is measured. Temperatures during this elongated "winter" season can reach near 0°F, and severe storm cycles often persist for several days, featuring heavy snowfall and strong winds. Snow cover can linger on upper elevation slopes until August, although the months of June, July, August, and September sometimes feature daytime high temperatures approaching 80°F. Summer weather in Brighton is generally sunny and mild, although periods of monsoonal thunderstorm activity are not uncommon (Brighton Resort).
- **Governing Body Format:** The incorporation of Brighton in 2020 will follow with a governing body establishment.
- **Development Trends:** Brighton is a local favorite for skiing due to its affordability, terrain, and top snow quality (Ski Utah). Medical services are available in the area in case of injury (Brighton Resort). Solitude Ski Resort currently has condos in the parking lot and is

potentially working on another development in the smaller parking lot. The town takes up 2/3 of the canyon. While water is bountiful, water rights limit developments. There are 17 water companies and any development requires a letter from the particular company that regulates that area. The water rights are tightly controlled by the County since the water from the area is a critical component of providing water to the rest of the County.

Capability Assessment

The city maintains a full-time staff of zero and part-time staff of 2 individuals. The Mayor is the jurisdiction's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Mayor and supported by the Town Council members.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	No	No	Yes	Utilize County Code/Ordinance/Plan
Zonings Ordinance(s)	No	No	Yes	Utilize County Code/Ordinance/Plan
Subdivision Ordinance(s)	No	No	Yes	Utilize County Code/Ordinance/Plan
Stormwater Management Program	No	No	Yes	Utilize County Code/Ordinance/Plan

Floodplain Ordinance(s)	No	No	Yes	Utilize County Code/Ordinance/Plan
Post Disaster Recovery Program and Ordinance(s)	No	No	Yes	Utilize County Code/Ordinance/Plan
Real Estate Disclosure Ordinance(s)	Yes	Yes	Yes	Town and County codes are utilized
Public Health and Safety Program Requirements	No	No	Yes	Utilize County Code/Ordinance/Plan
Site Plan Review Requirements	No	No	Yes	Utilize County Code/Ordinance/Plan
Planning Documents				
General or Comprehensive Plan	No	No	Yes	Utilize County Code/Ordinance/Plan
Habitat Conservation Plan	No	No	Yes	Utilize County Code/Ordinance/Plan, Salt Lake City Plan, and USFS (Forest Service) Plan
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	Yes	Town utilizes County Plan
Post-Disaster Recovery Plan	Yes	Yes	Yes	Town utilizes County Plan
Continuity of Operations Plan	Yes	Yes	Yes	Town utilizes County Plan
Public Health Plan	No	No	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	Yes	Town utilizes County Plan

TABLE: FISCAL CAPABILITY	
Financial Resources	Accessible or Eligible to Use?

Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes (from County)	Part Time	MSD
Engineers or professionals trained in building or infrastructure construction practices	Yes (from County)	Part Time	MSD
Planners or engineers with an understanding of natural hazards	Yes (from County)	Part Time	MSD
Surveyors	Yes (from County)	Part Time	County
Personnel skilled or trained in GIS applications	Yes (from County)	Part Time	County
Emergency manager	Yes (from County)	Part Time	County

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Public Works SLCO
Who is your jurisdiction's floodplain administrator? (department/position)	Public Works
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No – not complete
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No

Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

NOAA Natural Hazards 2014-2019

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction from 2014-2019. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- Brighton does not participate in the National Flood Insurance Program (FEMA, 2019).
- The city is newly incorporated and plans to participate in the NFIP through formalizing floodplain management and developing ordinances.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	22 inches of snow at Brighton Resort		4/15/2019	
Heavy Snow	18 inches of snow at Brighton Resort		4/6/2019	
Heavy Snow	18 inches of snow at Brighton Resort		3/28/2019	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	12 inches of snow at Brighton Resort		3/23/2019	
Heavy Snow	14 inches of snow at Brighton Resort		3/13/2019	
Winter Storm	69 mph winds		3/6/2019	
Heavy Snow	17 inches of snow at Brighton Resort		3/1/2019	
Heavy Snow & High Wind	13 inches of snow at Brighton Resort and 85 mph		2/13/2019	
Heavy Snow	71 inches of snow at Brighton Resort		2/3/2019	
Winter Storm	22 inches of snow at Brighton Resort		1/21/2019	
Winter Storm & High Wind	45 inches of snow at Brighton Resort and 68 mph		1/16/2019	
Winter Storm	37 inches of snow at Brighton Resort		1/5/2019	
Heavy Snow	31 inches of snow at Brighton Resort		11/23/2018	
Winter Storm	25 inches of snow at Brighton Resort		3/17/2018	
Winter Storm	30 inches of snow at Brighton Resort		3/2/2018	
Heavy Snow	23 inches of snow at Brighton Resort		2/18/2018	
Winter Storm	17 inches of snow at Brighton Resort		1/19/2018	
Winter Storm	17 inches of snow at Brighton Resort & 80 mph		4/7/2017	
Winter Storm	26 inches of snow at Brighton Resort (16 inches just in the daytime hours).		2/27/2017	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	17 inches of snow at Brighton Resort with strong winds		2/6/2017	
Winter Storm	43 inches of snow at Brighton Resort with strong winds at the start of the storm		1/22/2017	
Winter Storm	23 inches of snow at Brighton Resort		1/20/2017	
Winter Storm	38 inches of snow at Brighton Resort		1/10/2017	
Winter Storm	24 inches of snow at Brighton Resort		1/3/2017	
Winter Storm	31 inches of snow at Brighton Resort		1/1/2017	
Winter Storm	27 inches of snow at Brighton Resort with strong winds		12/23/2016	
Winter Storm	38 inches of snow at Brighton Resort with strong winds		12/15/2016	
Winter Storm	29 inches of snow at Brighton Resort with strong winds		12/8/2016	
Winter Storm	40 inches of snow at Brighton Resort		11/27/2016	
Winter Storm	20 inches of snow at Brighton Resort		3/13/2016	
High Wind	The winds impacted several mountain resorts, which either had to shut down some of their lifts or close early. Several downed trees were reported across the area, particularly at Brighton Resort.		2/17/2016	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	14 inches of snow at Brighton Resort		1/29/2016	
Winter Storm	Snowfall totals in the Wasatch Mountains were impressive, with many locations reporting 3-4 feet of new snow. The highest total was at Brighton Resort, which received 76 inches of snow at its 9500 foot crest.		12/21/2015	
Winter Storm	33 inches of snow at Brighton Resort		11/27/2015	
Winter Storm	22 inches of snow at Brighton Resort		4/14/2015	
Winter Storm	24 inches of snow at Brighton Resort		3/2/2015	
Winter Storm	25 inches of snow at Brighton Resort		1/12/2015	
Winter Storm	18 inches of snow at Brighton Resort		12/28/2014	
Winter Storm	14 inches of snow at Brighton Resort		12/25/2014	
Winter Storm	18 inches of snow at Brighton Resort		12/20/2014	
Winter Storm	30 inches in new snow	-	11/22/2014	-
High Wind	58 mph wind gusts were recorded at the base of Brighton Resort. Near Brighton Resort and Snowbird Ski and Summer Resort, multiple large trees were knocked down by these winds.		5/11/2014	$10,000 in property damage.
Winter Storm	47 inches of snow at Brighton Resort		2/5/2014	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	17 inches of snow at Brighton Resort		1/9/2014	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below. Brighton is working to become a town in 2020. Once demographic information is collected, the table below can be completed using the best available data, particularly Census and American Community Survey data.

Factors	Number in Community
Members of the community over 65 years old	N/A
Members of the community under 18 years old	N/A
Members of the community that identify as having disability status	N/A
Members of the community that speak English less than "very well"	N/A
Members of the community living below the poverty line	N/A
The number of mobile homes in the community	N/A
Members of the community without health insurance	N/A
Occupied housing units with tenants without a vehicle	N/A
Housing units without heating fuel	N/A

*While the population is less than 300 year-round, potentially up to 20,000 people may visit the area on the weekend. With only one way in and out of Brighton, this poses severe challenges and risk.

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Dam Failure: 3 dams are in the area and two are over 100 years old. The dams are made of concrete. Twin Lakes (holds 300 million gallons - built in 1914) would be the most damaging if it fails. Silver Lakes is visited in the summer by 300-400 people each day. Mary Dam (holds 240 million gallons - built in 1915) would also cause significant damage to the Girl Scout Camp if it failed, as well as other camps in the area. In the summer, 100-200 kids may be in the area. If the dams failed, warning time would be at most a couple of minutes for some area.

Winter Storms: These storms are extremely common in Brighton. Winter storm events that have the greatest impact are during times when the road is open and a number of visitors (ski visits) are in the area. Winter storms that drop ten or more inches in a 12-hour period would be a significant event. In the spring, spring runoff can be damaging to the canyon. The most damaging occurred in 1983.

Avalanche: Avalanches have the potential to close the roads (SR190). The biggest hazard and economic concern would be for SR190 to be closed off and isolate the town. Utah Department of Transportation provides mitigation for avalanches. The Ski Resorts have private insurance for an avalanche.

Landslide: Silver Fork and Honeycove Canyon are the most populated areas, and homes and roads could be susceptible to landslide flow. Steep mountain slopes surround the Town of Brighton, and this topography lends itself to the phenomenon of downslope movement of earthen material. Rockfalls and topples are downslope movements of loosened blocks or boulders from a bedrock area. These generally occur along steep canyons with cliffs, deeply incised stream channels in bedrock, and steep bedrock road cuts.

Earthquake: The Wasatch Fault is at the mouth of the canyon, and a significant earthquake could cut the canyon off from the rest of the County. Secondary hazards possibly associated with a major earthquake in Brighton are numerous. A major earthquake occurring during a period of high avalanche hazard could trigger numerous destructive avalanches at once. Landslides would also be a concern.

Flooding: Runoff, in addition to flooding from Big Cottonwood Creek, could cause significant flooding in the area. The event in 1983, where snow fell and then temperatures went up to the 90s and rain occurred, is the most catastrophic flooding event to hit the area.

Wildfire: This is probably the number one hazard of concern in the area. Brighton is an isolated community surrounded by a national forest. Even though the elevation is high, which leads to copious annual precipitation amounts, a large regional fire could impact the area. There are two campgrounds in the area

Severe Weather: The most common severe weather events in Brighton are significant winter storms, which often result in periods of elevated avalanche hazard. Brighton is world-renowned as a place where winter storms deposit enormous snow totals, and those storms are often accompanied by sustained winds near hurricane-force, with gusts over 100 mph. Although many Brighton skiers prefer to be skiing during a major snowstorm, sometimes weather is so severe that ski lifts cannot run, and when avalanche hazard becomes too high as a result of heavy snow and high wind, the ski area closes operations and the public is required by the Town of Brighton Marshal to remain indoors until avalanche hazard is mitigated. The Brighton landscape is often transformed by massive winter storms, with rows of parked cars and even unattended structures occasionally completely entombed in snow. Severe winter storms often result in hazardous roadway conditions. When road surface conditions deteriorate at the end of a busy day at Brighton, traffic accidents can cause epic backups. When such backups take place during times of escalating avalanche hazard, the possibility that natural avalanches will affect the roadway and potentially bury vehicles and their occupants can be a critical situation. Brighton is also susceptible to non-winter weather events, such as rain, hail, and lightning storms. Significant rain events can cause landslides in ravines and stream channels. Because of Brighton's high elevation, extreme heat is not considered a likely hazard.

High Winds: High winds can damage utilities and interrupt ski and road operations. Trees getting knocked down could interrupt debris flow in Big Cottonwood Creek.

Public Health: The town is an international skiing destination, and this could lead to infectious diseases being brought to the area from travelers.

Radon: Some areas may have an elevated risk for radon, but most areas are of low concern.

Hazardous Materials Release: The accidental release could have a regional impact on the watershed, water supply, and create transportation delays. Everyone in Brighton has to use propane, and the transport of propane to the area would be a concern if a spill occurred.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Wildfire	2	30	60
Severe Winter Weather	3	18	54
Avalanche	3	17	51
Severe Weather	3	17	51
Public Health Epidemic/ Pandemic	2	21	42
Cyber Attack	2	17	34
Dam Failure	1	30	30
Drought	2	13	26
Landslide and Slope Failure	2	13	26
Terrorism	1	25	25
Hazardous Materials Incident	1	14	14
Flooding	1	13	13
Civil Disturbance	1	10	10
Tornado	1	7	7
Radon	2	3	6

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.

SLC2019HMP-Brighton(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	High	3		Avalanche	Medium	2	6
Dam Failure	Low	1		Dam Failure	High	3	9
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Low	1		Flooding	Low	1	3
Hazardous Materials Incident	Low	1		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Medium	2	6
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	Medium	2		Radon	Low	1	3
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	High	3	9

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Medium	2	2		Avalanche	High	3	6
Dam Failure	High	3	3		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Low	1	1		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Medium	2	4
Severe Winter Weather	High	3	3		Severe Winter Weather	Medium	2	4
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	Low	1	2
Wildfire	High	3	3		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	High	3	3
Dam Failure	High	3	3
Drought	Low	1	1
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Low	1	1
Wildfire	High	3	3

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	High	3	9
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	High	3	9

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

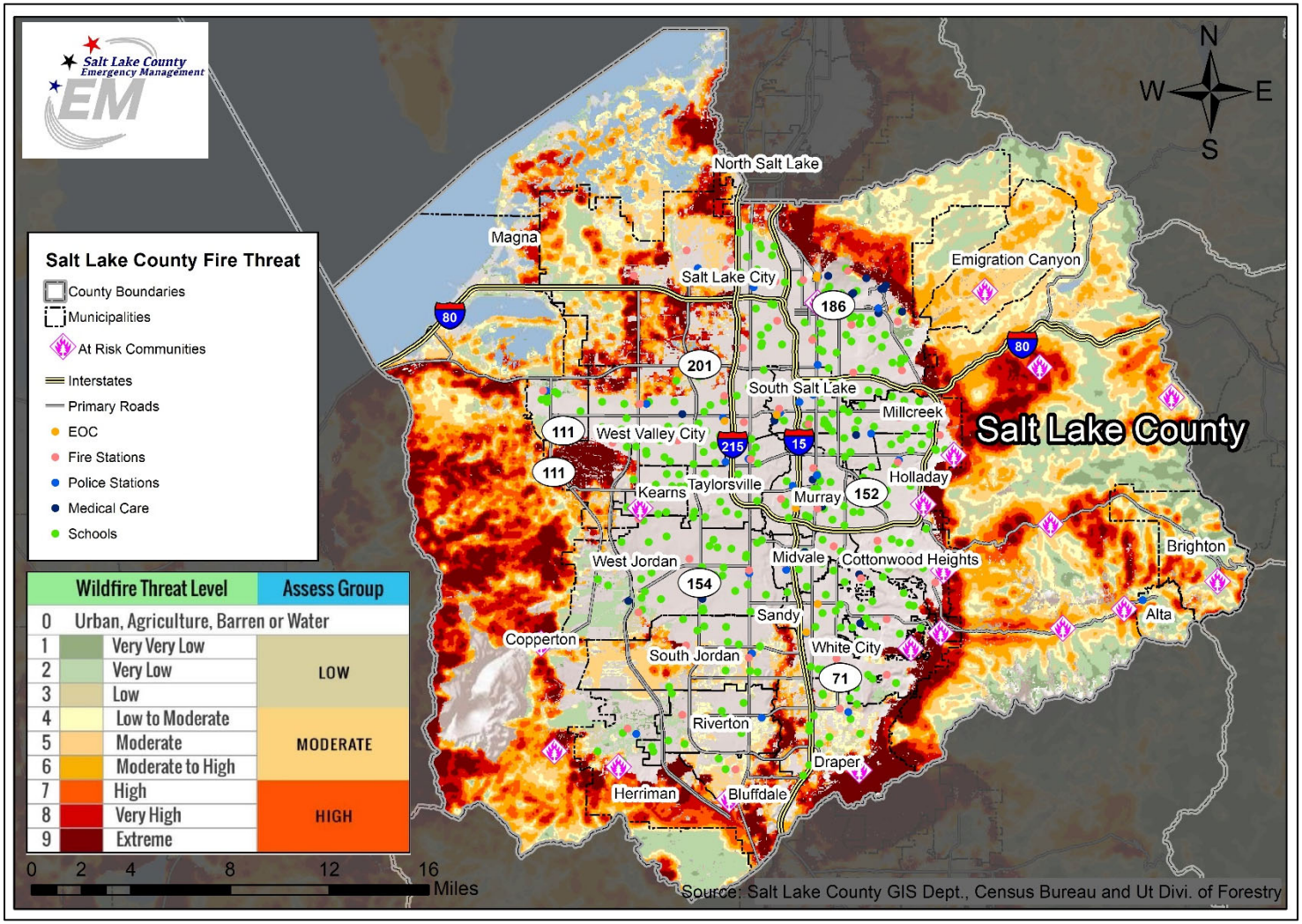
Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Remove debris from the 14 miles of Big Cottonwood Creek to enhance the natural flow	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood (Riverine), Flooding (Urban/Flash Flooding), Severe Thunderstorm, Severe Winter Storm	Brighton	Neighboring jurisdictions, Salt Lake County	High	High	HMA/PDM Grant or other federal funds	High	Ongoing	
Install three (3) horn notification/ warning systems	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 3: Enhance and protect the communication and warning/notification systems in the County.	All-Hazards	Brighton	N/A	High	Medium	Local Budget and County or State Grants	Medium	2025	
Bury powerline to decrease power outage potential and to mitigate the potential for wildfires	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Brighton	Utilities	High	High	HMA/PDM Grant or other federal funds	Medium	2030	
Continue to participate in Firewise, including strict fire codes and	2019	Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public	Wildfire	Brighton	UFA	Medium	Low	Local Budget	High	Ongoing	

programs with the fire department		entities to mitigate and become more resilient to disasters.									
Trim trees to reduce potential to spark fires and decrease power outage potential	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards, especially Wildfire	Brighton	UFA	Medium	Low	Local Budget and County or State Grants	Medium	Ongoing	

Mitigation Table - Ongoing Actions

Not applicable since Brighton did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Cottonwood Heights

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Paul Brenneman **Title:** Emergency Manager **Department:** Emergency Preparedness Coordination **Address:** 2277 Bengal Blvd, Cottonwood Heights, UT 84121 **Office Phone:** 801-944-7100 **Cell Phone:** **Email Address:** pbrenneman@ch.utah.gov **Website:** http://www.cottonwoodheights.utah.gov/your-government/administrative-services/emergency-preparedness-coordination	**Name:** Julie Sutch **Title:** Assistant Emergency Manager **Department:** Emergency Preparedness Coordination **Address:** 2277 Bengal Blvd, Cottonwood Heights, UT 84121 **Office Phone:** 801-944-7100 **Cell Phone:** **Email Address:** jsutch@ch.utah.gov Website: http://www.cottonwoodheights.utah.gov/your-government/administrative-services/emergency-preparedness-coordination

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** January 14, 2005
- **Current Population:** 34,117 (Census v2018)
- **Population Growth:** 1.6% (from April 1, 2010, to July 1, 2018)
- **Location and Description:** At an elevation of 4,900 feet above sea level, the city is located along the foothills of the Wasatch Mountains.
- **Brief History:** Big Cottonwood Canyon was the main source of logs and lumber for the homes of the pioneers in the Salt Lake Valley and this area became an overnight stopping point for the lumber wagons. The area also became an overnight stop for the wagons bringing granite out of Little Cottonwood Canyon for the building of the Salt Lake Temple and many other buildings. Soon there was a store, post office, brewery and tavern along Big Cottonwood Creek near the place where the Old Mill stands today. Among the earliest settlers of the area were six colorful brothers, the “Butler Brothers” who were lumbermen – complete with wagons, teams, and sawmills. There were also four McGhie brothers and their families. Legend has it that they called a town meeting to organize their community. There was one more Butler than McGhie at the meeting; therefore, the community was named “Butler” rather than “McGhie.” Natives differ on this name; some say it was named “Butlerville,” and others say the “Ville” was just a nickname. Officially the area is called “Cottonwood Heights” by Salt Lake County, but it is still called Butler or Butlerville by some.
- **Climate:** The climate is generally semiarid with a series of extremes occurring throughout the winter and summer seasons. Most precipitation occurs during the winter and spring months, with an average annual precipitation of 9 inches of rain and 48.4 inches of snow. In winter, temperatures can plunge to minus 10°F. Winter also brings snowstorms that regularly result in a foot or more of snow. In summer, temperatures can be in the upper 90s. These hot temperatures are moderated by low humidity that can drop into the single digits at times.
- **Public Services:** Cottonwood Heights was incorporated on January 14, 2005, out of the southeastern area of unincorporated Salt Lake County. The 2010 census reported a population of 33,433 residents. Current estimates place the population at 34,117. The City encompasses 9.24 square miles. It is known as the city between the canyons because it is located at the foot of the Wasatch Mountain Range between Big Cottonwood and Little

Cottonwood canyons. These two canyons are home to Salt Lake Valley's four major ski resorts: Alta, Brighton, Solitude and Snowbird. Each of these ski resorts has an international clientele and reputation.

The quality of life in Cottonwood Heights is very high with many cultural and recreational activities available within the city or in near proximity. Cottonwood Heights values highly its reputation as a well-maintained residential and business community. The preservation of quality of life is of utmost importance to residents and business owners. Cottonwood Heights views itself as a city where residents, businesses, and government come together to create an attractive, safe, well-groomed community and where people are proud to live, learn, work, recreate, and do business. The City presents with a stunning backdrop of the Wasatch Mountains and associated canyons and trails. Residents place a high value on the natural elements of hillsides, streams, natural open spaces and parks. The residents occupy a variety of residential dwellings in harmony with thriving commercial areas.

Cottonwood Heights is home to many corporate headquarters. At 2.5 million square feet of Class A and B office space, the City has one of the largest amounts of premium high rise office space in Salt Lake Valley. Office campuses include Union Park, Old Mill Corporate Center, and Cottonwood Corporate Center. These business parks provide important regional centers of employment providing jobs to many Cottonwood Heights residents. The City is home to the corporate offices of Extra Space Storage, JetBlue Airways, Instructure, MasterControl, and SanDisk.

As the gateway to the valley's largest ski resorts and with easy access to valley-wide transportation systems, Cottonwood Heights welcomes visitors. The City strives to attract businesses that will serve the needs of residents, promote the attractive image and appearance of the community, support and increase the general income and prosperity of the City, strengthen existing business centers, and complement the City's location as the gateway to the canyons.

- **Governing Body Format:** Cottonwood Heights has a Council/Manager form of government, which is an alternate form of government under state law. This form of government is different from state and federal governments, which have separate legislative and executive departments. The Council/Manager form of government has a legislative body consisting of four council members and a mayor, who acts as chairman of the council. The mayor also serves as the representative of the city in signing legal documents and at city events of various kinds. The council and mayor select and hire a city manager whose responsibilities are defined by state statute. The city manager is the chief administrative officer for the city and is responsible for enacting the council's policies and hiring additional personnel. State statute directs that the city has a city attorney, city treasurer, city recorder, and city finance officer. The duties for these positions are defined by statute and the appointees must be approved by the city council. When needed, the city council will act as the Community Development and Renewal Agency (CDRA). The Community Development and Renewal Agency was created to undertake or promote urban renewal, economic development, and community development within the geographic boundaries of the city. The CDRA will meet as necessary or at least once a year.
- **Development Trends:** The City serves as a sub-regional market to the Greater Salt Lake Metropolitan area, providing class A office, world-class outdoor, recreational amenities, and well-established residential neighborhoods. Currently, the City's six largest employers

are Jet Blue Airways Corporation (Leisure, Travel), INstructure Inc (Learning Technology), Canyons School District (Education), Extra Space Management (Retail Storage), Regence Blue Cross Blue Shield (Insurance), and Western Digital (Technology). The City has a high concentration of office parks with limited industry users. As with many other communities in Salt Lake County, the City has not been immune from the effects of the domestic and international economic slowdown. Economic development in the City has been very active in recent years but still struggles in the highly competitive recruitment of some major businesses.

Capability Assessment

The city maintains a full-time staff of 81 and 25 part-time employees. The city has a designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position and supported by the Assistant Emergency Manager.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance, and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	-	-	
Zonings Ordinance(s)	Yes	Yes	-	
Subdivision Ordinance(s)	Yes	Yes	-	
Floodplain Ordinance(s)	Yes	Yes	-	
Post Disaster Recovery Program and Ordinance(s)	No	-	-	

Real Estate Disclosure Ordinance(s)	-	No	-	
Growth Management	Yes	Yes	-	
Site Plan Review Requirements	Yes	Yes	-	
Planning Documents				
General or Comprehensive Plan	Yes	Yes	-	
Capital Improvement Plan	Yes	-	-	
Economic Development Plan	Yes	Yes	-	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	-	-	Currently under review and update
Post-Disaster Recovery Plan	No	-	-	
Continuity of Operations Plan	No	-	-	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	No	-	-	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes - Property Tax
User Fees for Water, Sewer, Gas or Electric Service	Yes - Stormwater and Telecom Fee
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes

Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	N/A

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full-time	4 Full-time Planners and 2 Full-time Engineering Staff
Engineers or professionals trained in building or infrastructure construction practices	Yes	Part-time	Building Official (contracted)
Planners or engineers with an understanding of natural hazards	Yes	Full-time	Engineering Staff and Consultant
Personnel skilled or trained in GIS applications	Yes	Full-time	GIS Specialist
Emergency manager	Yes	Part-time	
Grant writers	Yes	N/A	Function of other staff positions

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	City Engineer/Public Works
Who is your jurisdiction's floodplain administrator? (department/position)	Public Works Director/City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	No-City Engineer is in progress
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	None Known
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No/Undecided

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No		
Public Protection/ISO	Yes	3	2015
NWS StormReady	No		

Jurisdiction-Specific Hazards and Risks

The information provided below was solicited from the jurisdiction and supported by NOAA and other relevant data sources.

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 38 policies were in force with total coverage of $12,235,000 and total written premium and FPF of $19,779 (FEMA, 2019).
- Cottonwood Heights does participate in the National Flood Insurance Program (CID # 490028), and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	5 inches in snowfall in Cottonwood Height	-	3/28/2019	-
Heavy Snow	16 inches in Cottonwood Heights	-	3/13/2019	-
Heavy Snow	7 inches in Cottonwood Heights	-	3/1/2019	-

Heavy Snow	5 inches in Cottonwood height	-	2/13/2019	-
Heavy Snow	18 inches in Sandy and Cottonwood Heights	-	1/21/2019	-
Hail	Quarter- to half-dollar-sized hail	-	6/18/2018	-
Winter Storm	11 inches in Cottonwood Heights	-	3/3/2018	-
Heavy Snow	23 inches in Cottonwood Heights	-	2/18/2018	-
Winter Storm	16 inches in Cottonwood Heights	-	1/19/2018	-
Winter Storm	15 inches in Cottonwood Heights	-	2/21/2017	-
Winter Storm	16 inches in eastern Cottonwood Heights	-	1/20/2017	-
Winter Storm	14 inches in Cottonwood Heights	-	12/23/2016	-
Winter Storm	6 inches in Cottonwood Heights	-	11/28/2016	-
Winter Storm	10 inches in Cottonwood Heights	-	12/24/2015	-
Winter Storm	23 inches in Cottonwood Heights	-	12/13/2015	-
Winter Storm	6 inches in Cottonwood Heights	-	12/25/2014	-
Flooding	Significant flood event		June 2010	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	5,118
Members of the community under 18 years old	7,506
Members of the community that identify as having disability status	1,501
Members of the community that speak English less than "very well"	3,616
Members of the community living below the poverty line	1,774
The number of mobile homes in the community	81
Members of the community without health insurance	2,286
Occupied housing units with tenants without a vehicle	406
Housing units without heating fuel	26

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Dam Failure: Two main watercourses traverse the city, Little Cottonwood Creek and Big Cottonwood Creek. Both creeks have numerous dams upstream, which are out of the city boundaries but have the potential to impact the city if failures occur.

Winter Storms: The High East Bench suffers from winter storms.

Blizzards: Blizzards routinely impact the city, which is further exacerbated when snow removal resources are strained.

Extreme Cold: Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. The NWS will issue a Wind Chill Advisory for the Salt Lake County area when wind and temperature combine to produce wind chill values of 18°F below zero to 25°F below zero. Each winter and summer, it can be expected that Cottonwood Heights will experience several days of extreme heat or cold events.

Extreme Heat: Given the history in Salt Lake County and Cottonwood Heights, extreme temperature events will continue to occur annually. Heat disorders generally have to do with a reduction or collapse of the body‘s ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the

body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise, and heat-related illness may develop. Elderly persons, small children, chronic invalid, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails.

Earthquake: Because the occurrence of earthquakes is probable in Utah and the historical earthquake record identifies earthquake activity along the Wasatch Mountains, it is likely that Cottonwood Heights will experience an earthquake in the future. Additionally, numerous fault lines, including the Wasatch Fault, intersect along the Wasatch Blvd. corridor, which has multiple businesses and residences.

Drought: Given the geographic location of the planning area, it is probable the city will experience future drought conditions. According to historical data, Cottonwood Heights has experienced several periods of drought.

Flooding: Localized stormwater flooding at some location in Cottonwood Heights generally occurs on an annual basis. The extent of damage varies. Cottonwood Heights has experienced flooding along Cottonwood Creek as recently as 2010, which is also a historical flooding issue. However, the city does not have any repetitive loss properties. Cottonwood Heights has identified flood-prone areas and reviews any potential development in these areas. In addition, the city works with watershed officials to mitigate obstructions during spring runoff to minimize the chance of flooding.

Landslides/Slope Failure: The extreme eastern edge of the city has several areas that have issues related to slope failure. Minor landslides will likely continue in susceptible areas as a result of post-fire conditions or when heavy precipitation occurs.

Avalanche: There is no recorded history of avalanches occurring within city limits. Except within limited areas, the topography of the city is well below the slopes of 25-50 degrees on which data indicate that 98 percent of all avalanches occur.

Severe Weather: Each winter and summer, it can be expected that Cottonwood Heights will experience several days of extreme heat or cold events. The elderly population, which is over 5,000, is most susceptible to health effects from these events.

Wildfires: Given the geography, Cottonwood Heights is at risk of future fires due to the numerous wildland-urban interface (WUI) areas throughout the city. Generally, the fire season extends from spring to late fall. Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in air and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for a wildfire to occur. The wildfire risk is predominantly associated with the wildland-urban interface, areas where development is interspersed or adjacent to landscapes that support wildland fire. A fire along this wildland-urban interface can result in major losses of property and structures. Significant wildfires can also occur in heavily populated areas. Rangeland and grassland fires are a concern in the eastern portion of Cottonwood Heights County, including areas of the city, due to increased residential development in semi-urban and rural areas.

Public Health Epidemic/Pandemic: A pandemic is a global disease outbreak. Pandemic flu is a virulent human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic

occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control and Prevention has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with pandemic planning and preparation.

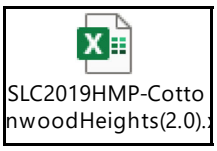
An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Since the hazard can affect 50-100% of the planning area, it was given an extensive geographic extent rating.

Although scientists cannot predict when the next influenza pandemic will occur or how severe it will be, wherever and whenever it starts, everyone around the world will be at risk. If an influenza pandemic does occur, many age groups would likely be seriously affected. The greatest risks of hospitalization and death—as seen during the last two pandemics in 1957 and 1968 as well as during annual outbreaks of influenza—will be to infants, the elderly, and those with underlying health conditions. However, in the 1918 pandemic, most deaths occurred in young adults. Few people, if any, would have immunity to the virus.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Wildfire	2	19	38
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Landslide and Slope Failure	2	9	18
Dam Failure	1	17	17
Tornado	1	11	11
Civil Disturbance	1	11	11
Avalanche	1	3	3

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	High	3	3		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**		**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)		**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)		**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)		**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)		**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Investigate potential buy-out of specific properties that reside in high-risk areas due to earthquake fault.	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	Cottonwood Heights	N/A	High	High	Grants (PDM)	Medium	Long-term	
Update and retrofit stormwater infrastructure to meet seismic standards and increased resiliency	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	Cottonwood Heights	N/A	High	High	Local Funds, Grants	High	Long-term	
Develop a Debris Management Plan	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All Hazards	Cottonwood Heights	N/A	High	Low	Local Funds	Medium	Long-term	
Procure generators and necessary hookups for key critical facilities, such as, but not limited to: the Public Works Yard, potential shelter locations and Long-	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before,	All Hazards	Cottonwood Heights	N/A	High	Medium	Local Funds, Grants	High	Long-term	

term Care facilities. Procure additional mobile generators.		during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct Training and awareness activities on communication equipment, tools, and systems	2009 [Ongoing in 2014]	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All-Hazards	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Monthly radio checks with key staff. Radio club implementation at all planned special events to improve communications
Provide centralized access to geographic data to emergency planners and responders	2009 [Ongoing in 2014]	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	All-Hazards	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	New server is being implemented

Utilize GIS to identify facilities and infrastructure at risk	2009 [Ongoing in 2014]	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	
Assess critical facilities [specifically schools and churches] for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	2009 [Ongoing in 2014]	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Cottonwood Heights	High	High	Local Funds, Grants	Medium	Ongoing	Grant funding dependent
Compile an inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009 [Ongoing in 2014]	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with the National Incident Management System (NIMS) requirements	All-Hazards	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Emergency Manager is identifying MOU's for renewal
Pursue and implement needed mutual-aid agreements	2009 [Ongoing in 2014]	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in	All-Hazards	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Develop emergency contracts

		accordance with the National Incident Management System (NIMS) requirements								Points of Distribution MOU with schools.
Provide education regarding all-natural hazards through live trainings, as well as web-based, print and broadcast media	2009 [Ongoing in 2014]	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Cottonwood Heights	High	Low	Local Funds, Grants	Medium	Ongoing	This is one of 5 strategic goals for the emergency operations program
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009 [Ongoing in 2014]	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Cottonwood Heights	High	Low	Local Funds, Grants	Medium	Ongoing	Community events incorporate EM into program
Enforce appropriate planning, zoning, and building code ordinances	2009 [Ongoing in 2014]	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All-Hazards	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	
Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	2009 [Ongoing in 2014]	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	City promotes green activities including water conservation

Implement water-saving devices and practices in public facilities	2009 [Ongoing in 2014]	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	
Provide information on landscaping alternatives for persons subject to green area requirements	2009 [Ongoing in 2014]	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	
Coordinate with water districts to plan for, develop and/or expand secondary water	2009 [Ongoing in 2014]	1 – Reduce and prevent hardships 1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	Drought	Cottonwood Heights	Medium	Medium	Local Funds, Grants	Medium	Ongoing	
Identify structures at risk to earthquake damage. Conduct an assessment	2009 [Ongoing in 2014]	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Cottonwood Heights	High	High	Local Funds, Grants	High	Ongoing	
Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	2009 [Ongoing in 2014]	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Cottonwood Heights	High	Low	Local Funds, Grants	High	Ongoing	

Complete seismic rehabilitation/ retrofitting projects of public buildings at risk	2009 [Ongoing in 2014]	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Cottonwood Heights	High	High	Local Funds, Grants	High	Ongoing	Assess school districts
Provide educational materials to unreinforced masonry home and business owners	2009 [Ongoing in 2014]	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	Earthquake	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of stormwater and flood control systems	2009 [Ongoing in 2014]	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs, and improvements to drainage structures, stormwater systems and flood control structures	Flood	Cottonwood Heights	High	High	Local Funds, Grants	High	Ongoing	
Identify and assess structures for deficiencies	2009 [Ongoing in 2014]	2 – Reduce the threat of unstable or inadequate flood control structures 2.1 – Reduce the potential for failure of flood control structures	Flood	Cottonwood Heights	High	High	Local Funds, Grants	High	Ongoing	
Maintain Hazardous Weather Operations Plan according to StormReady requirements	2009 [Ongoing in 2014]	1 – Reduce threat of loss of life or property due to extreme weather events	Severe Weather	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	

		1.1 – Maintain status as a StormReady Community								
Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris-flow hazard	2009 [Ongoing in 2014]	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	Slope Failure	Cottonwood Heights	Medium	Low	Local Funds, Grants	Medium	Ongoing	State Wildfire Pre – attack plan
Increase public awareness through "Firewise" program	2009 [Ongoing in 2014]	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire	Cottonwood Heights	High	Medium	Local Funds, Grants	High	Ongoing	Spring efforts will include information for residents and businesses
Educate homeowners on the need to create defensible space near structures in WUI	2009 [Ongoing in 2014]	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire	Cottonwood Heights	High	Low	Local Funds, Grants	High	Ongoing	
Assist communities in developing Community Wildfire Protection Plans or similar plans	2009 [Ongoing in 2014]	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire	Cottonwood Heights	High	Low	Local Funds, Grants	High	Ongoing	
Work with experts and communities to develop or update evacuation plans.	2014	Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities.	Wildland Fire	Cottonwood Heights	High	Medium	Local Funds, Grants	High	Ongoing	

		Improve evacuation capabilities for WUI areas.								
Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards.	2014	Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities. Improve addressing system in WUI areas to facilitate emergency response.	Wildland Fire	Cottonwood Heights	High	Medium	Local Funds, Grants	High	Ongoing	
Incorporate improved addresses in fire-dispatch and other databases.	2014	Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities. Improve addressing system in WUI areas to facilitate emergency response.	Wildland Fire	Cottonwood Heights	High	Medium	Local Funds, Grants	High	Ongoing	

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Action	Comments
All-Hazards	2009	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Cottonwood Heights continues to enhance communications by outfitting mobile command center
All-Hazards	2009	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	
All-Hazards	2009	4 – Establish notification capabilities and procedures for emergency personnel	Multiple avenues to reach staff are in place

Dam Failure	2009	1 – Include dam inundation maps in current County, City, and Special Service District Emergency Operations Plans	This is an unlikely event in Cottonwood Heights
Dam Failure	2009	2 – Utilize inundation maps to identify potential evacuation areas and routes	
Drought	2009	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	
Drought	2009	1 – Set up livestock water rotation in areas of agricultural use	
Earthquake	2009	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	
Flooding	2009	1 – Determine potential flood impacts and identify areas in need of additional flood control structures	
Flooding	2009	2 – Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	
Severe Weather	2009	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	
Slope Failure	2009	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	
Wildland Fire	2009	1 – Work with experts and communities to develop or update evacuation plans	Wildfire pre-attack plan has designated routes
Wildland Fire	2009	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	
Wildland Fire	2009	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	

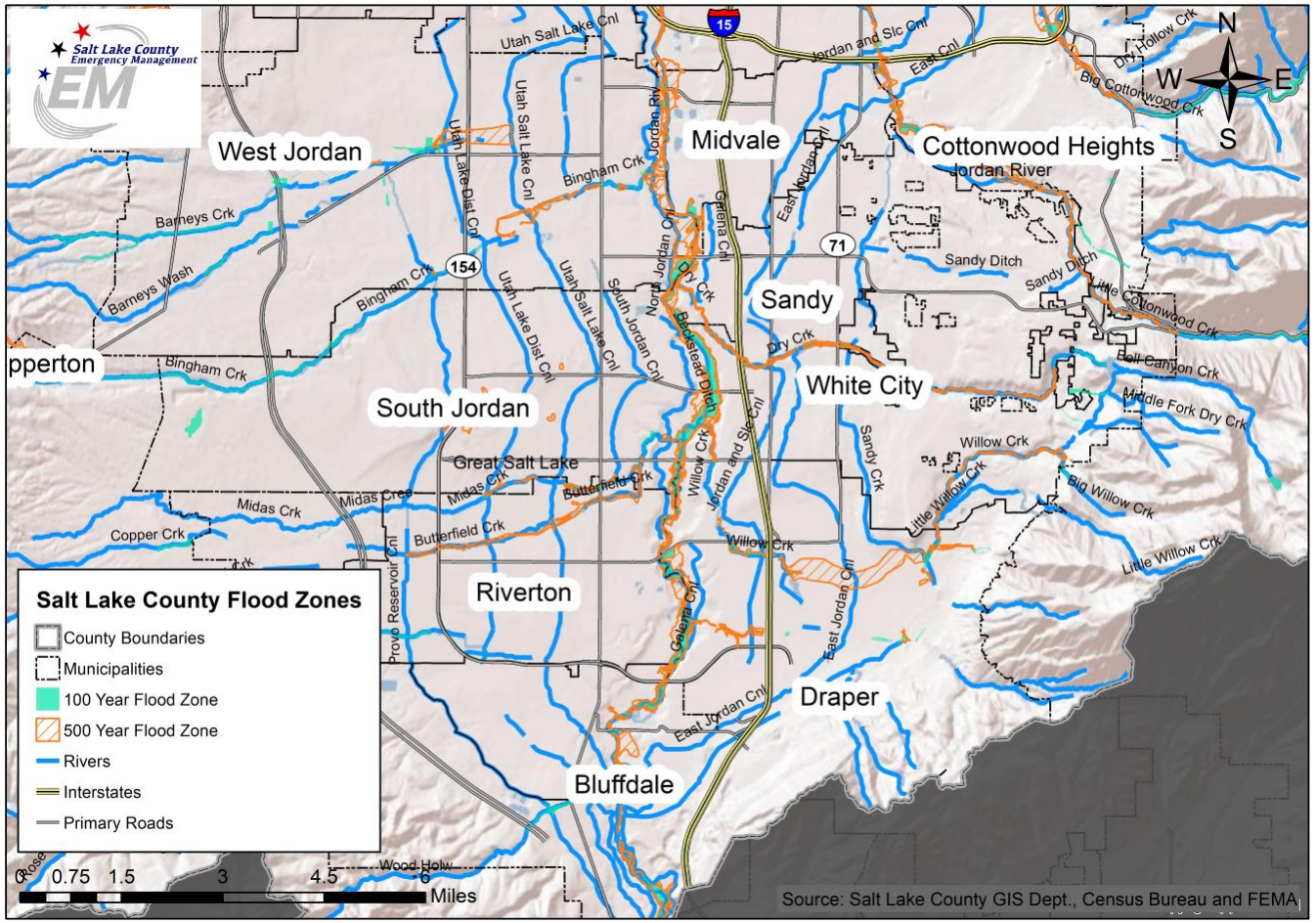
Wildland Fire	2009	2 – Incorporate improved addresses in fire-dispatch and other databases	
Wildland Fire	2009	1 – Reduce fuels around publicly owned structures	
Wildland Fire	2009	2 – Define wildland-urban interface and develop digital maps of the WUI	
All-Hazards	2014	Establish redundancy for dispatch centers and other critical communications systems.	
All-Hazards	2014	Establish a coordinating group to address long-term communication needs and implementation strategies.	
All-Hazards	2014	Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group.	
All-Hazards	2014	Establish a coordinating group to address geographic data issues.	
All-Hazards	2014	Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gauges, seismograph stations, road conditions, etc.	
All-Hazards	2014	Utilize GIS to identify facilities and infrastructure at risk.	
Dam Failure	2014	Include dam inundation maps in current County, City, and Special Service District Emergency Operations Plans.	
Dam Failure	2014	Utilize inundation maps to identify potential evacuation areas and routes.	
Drought	2014	Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses.	
Drought	2014	Implement water-saving devices and practices in public facilities.	
Drought	2014	Repair, maintain, and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	

Drought	2014	Coordinate public safety water use, such as hydrant testing.	
Drought	2014	Provide information on landscaping alternatives for persons subject to green area requirements.	
Drought	2014	Set up livestock water rotation in areas of agricultural use.	
Drought	2014	Coordinate with water districts to plan for, develop, and/or expand secondary water systems.	
Earthquake	2014	Procure an Engineering Consultant to perform the nonstructural design and geotechnical assessment and review. CUWCD staff will procure contractor and/or install nonstructural bracing per consultant's design.	
Severe Weather	2014	Maintain Hazardous Weather Operations Plan according to StormReady requirements.	
Severe Weather	2014	Maintain contact with NWS prior to re-application in 2010.	
Severe Weather	2014	Assist Forest Service Utah Avalanche Forecast Center (FSUAC) and other organizations in promoting avalanche hazard awareness for backcountry users.	
Severe Weather	2014	Work with the NWS to develop large event venue weather safety and evacuation procedures.	
Slope Failure	2014	Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris-flow hazard.	
Slope Failure	2014	Coordinate with Utah Geological Survey and other agencies to understand current slope failure threats/potential.	
Slope Failure	2014	Utilize recommendations provided by State Geologic Hazards Working Group to address land-use and planning for new developments.	
Wildland Fire	2014	Designate and promote countywide annual initiative for clearing fuels.	

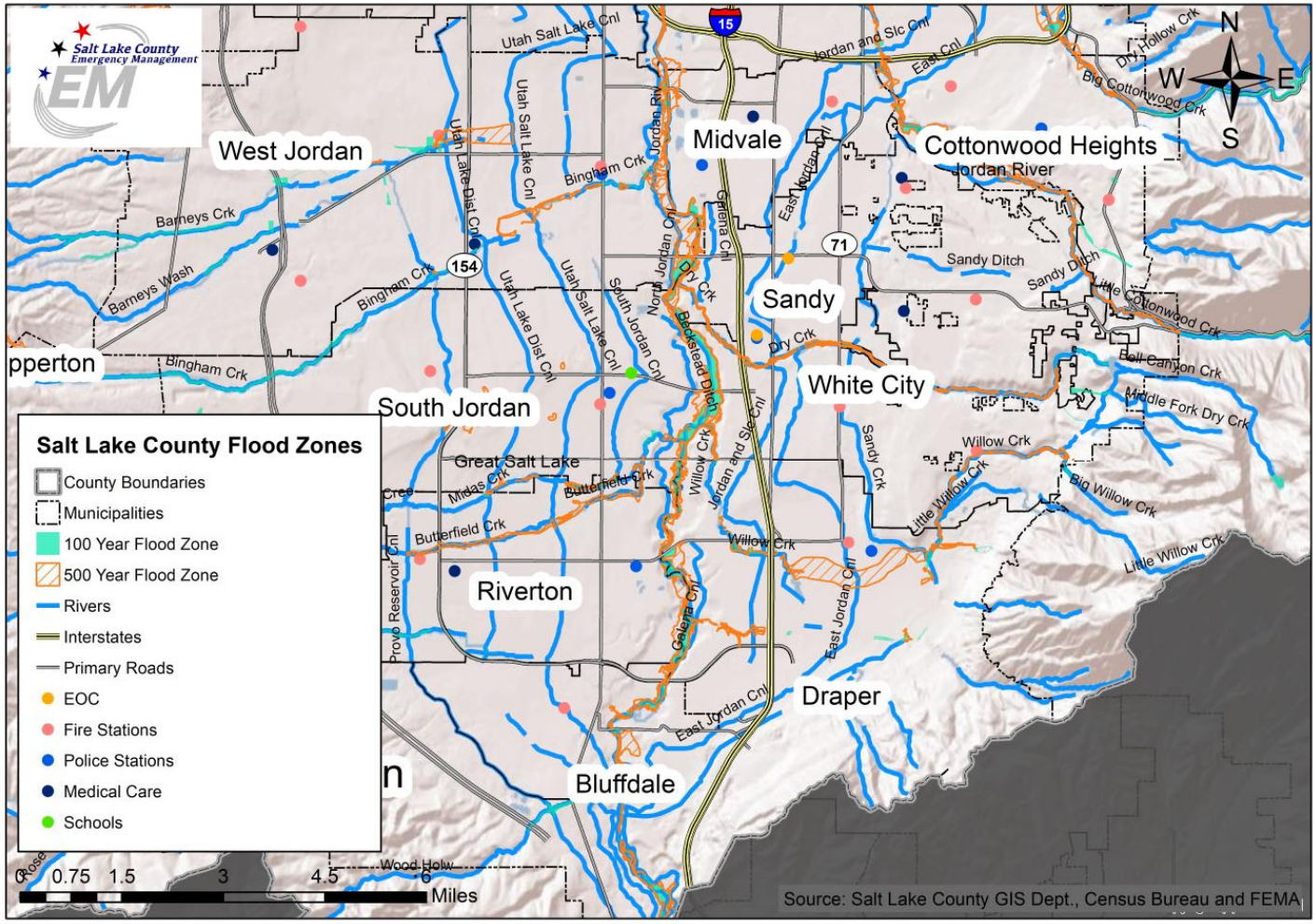
Wildland Fire	2014	Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response.	
Wildland Fire	2014	Reduce fuels around publicly owned structures.	
Wildland Fire	2014	Implement firebreaks and other protective measures.	
Wildland Fire	2014	Assess existing water flow capabilities, both public and private, and address deficiencies.	
Wildland Fire	2014	Adopt the Utah Wildland-Urban Interface Code (Code addresses proper road accessibility, availability of water flow for fire response, etc.)	

Jurisdiction Maps

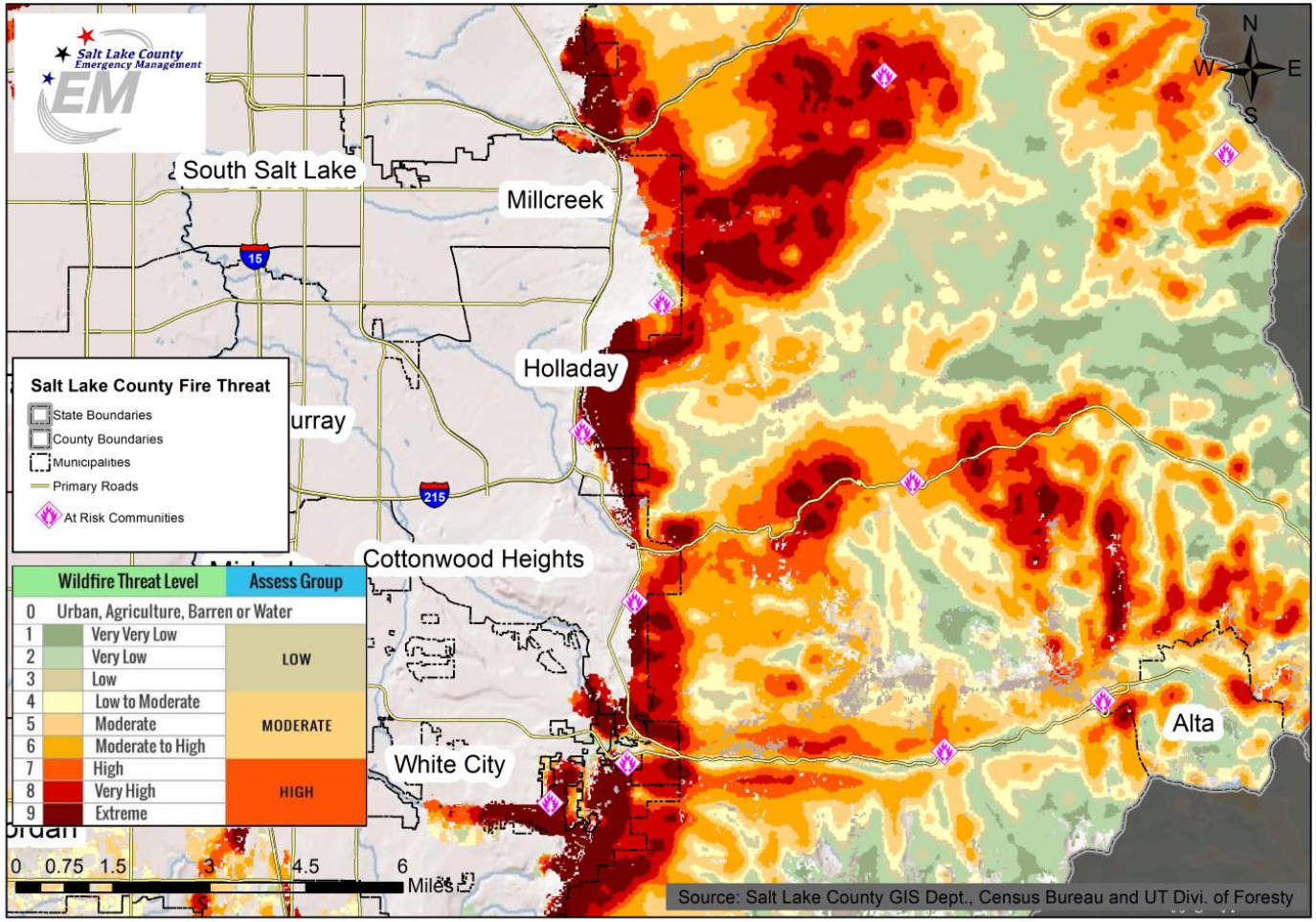
Map: 100 Year and 500 Year Flood Zone



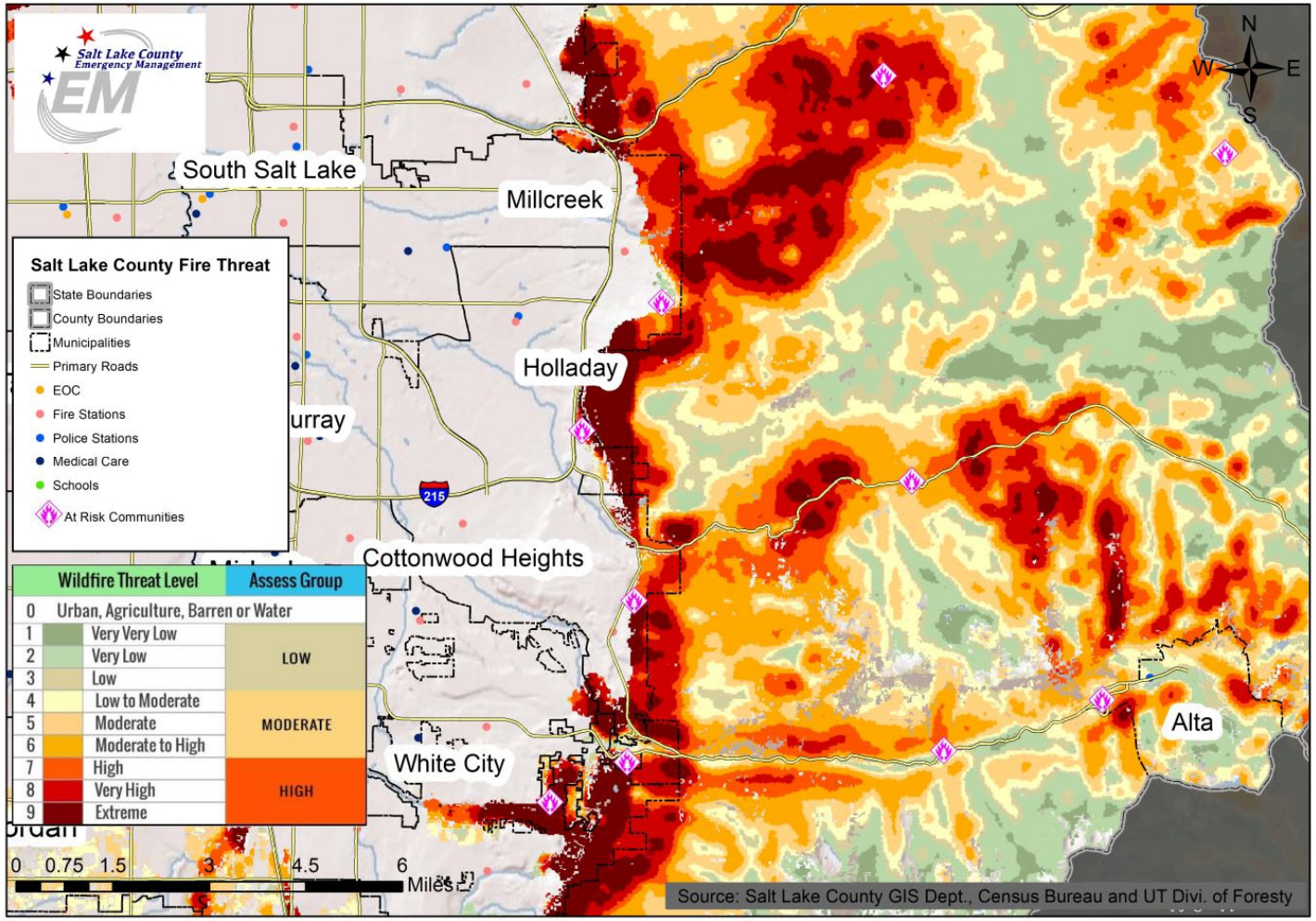
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



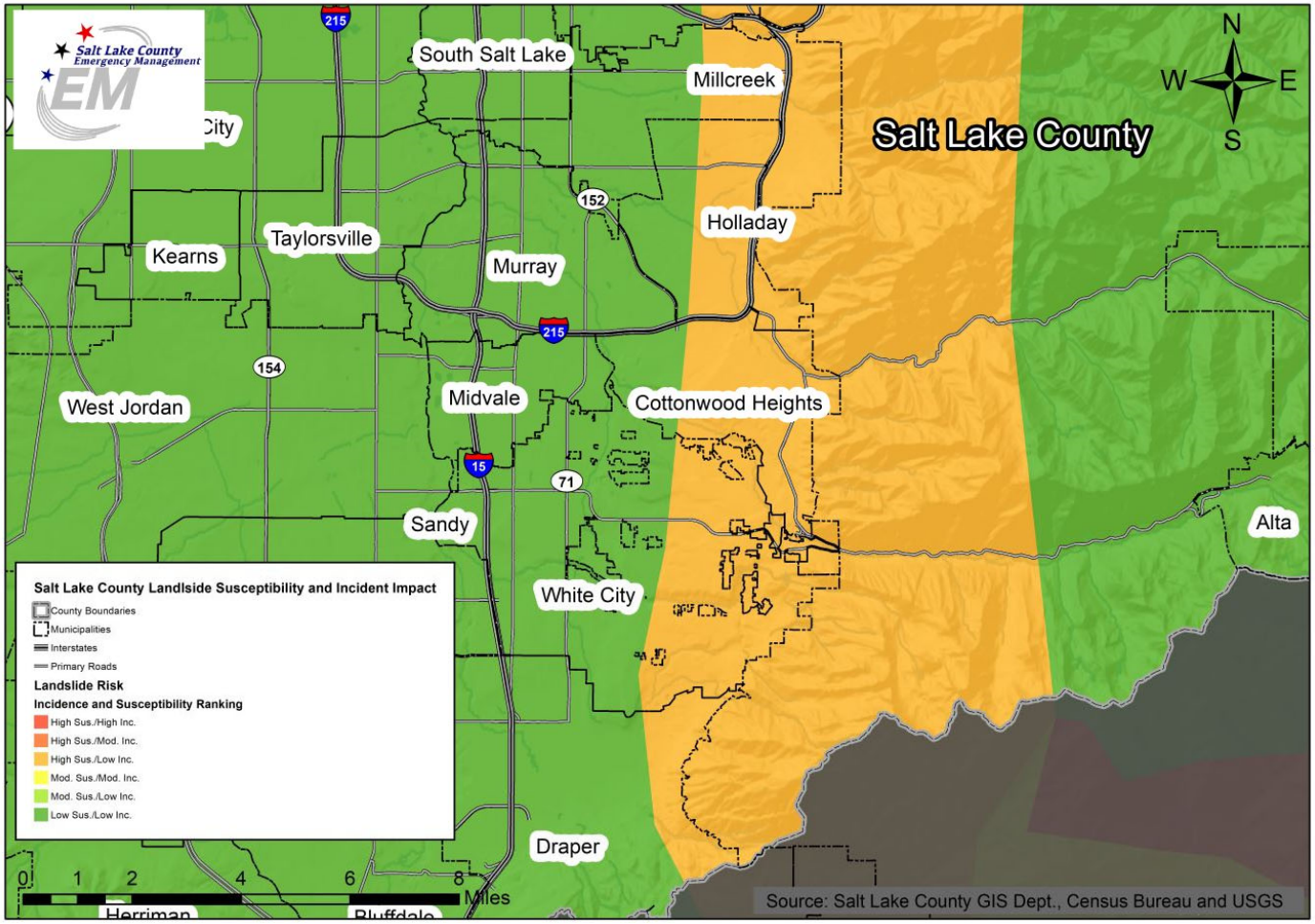
Map: Wildfire Threat Level



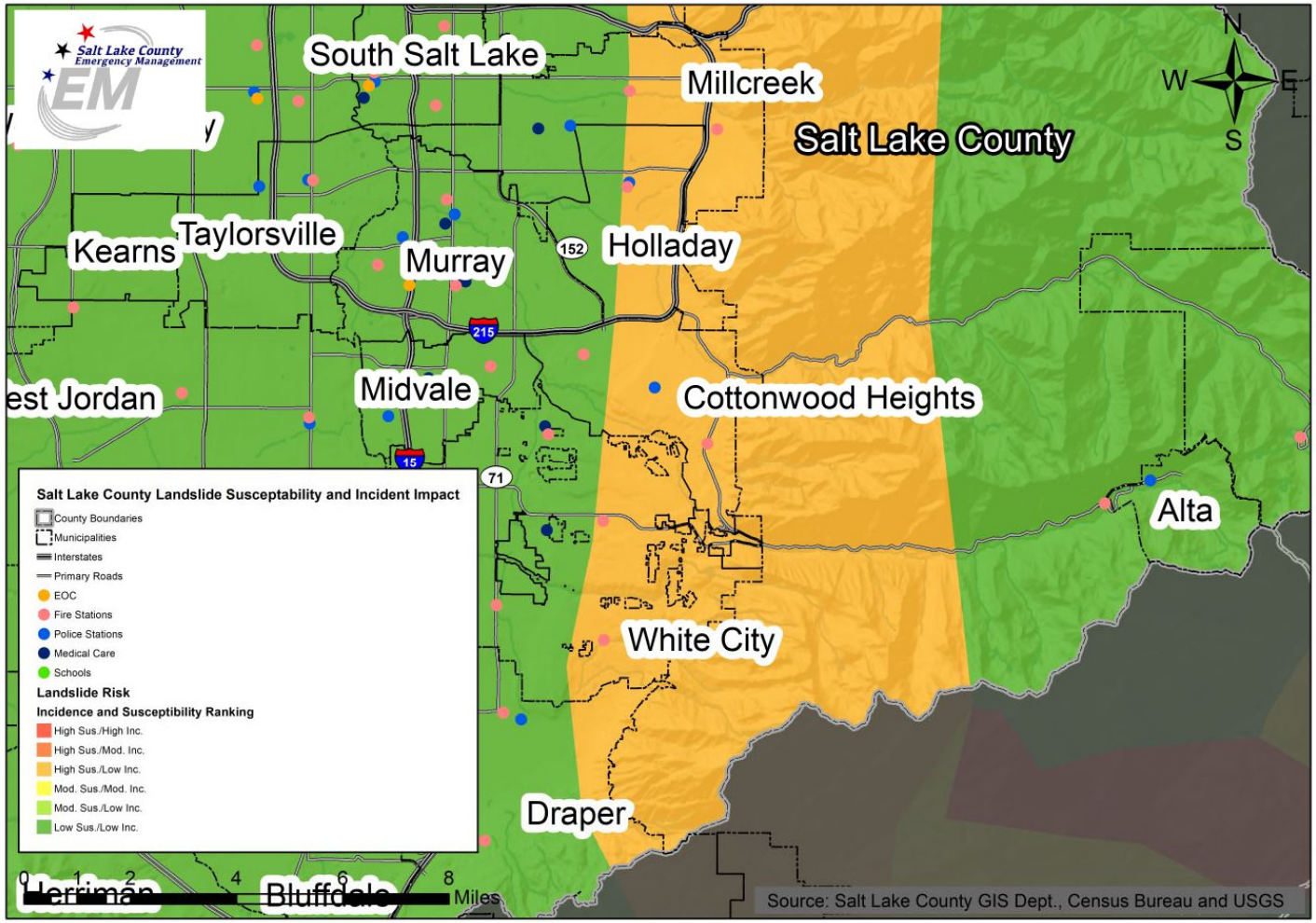
Map: Wildfire Threat Level with Critical Facilities



Map: Landslide Susceptibility and Incident Impact Potential

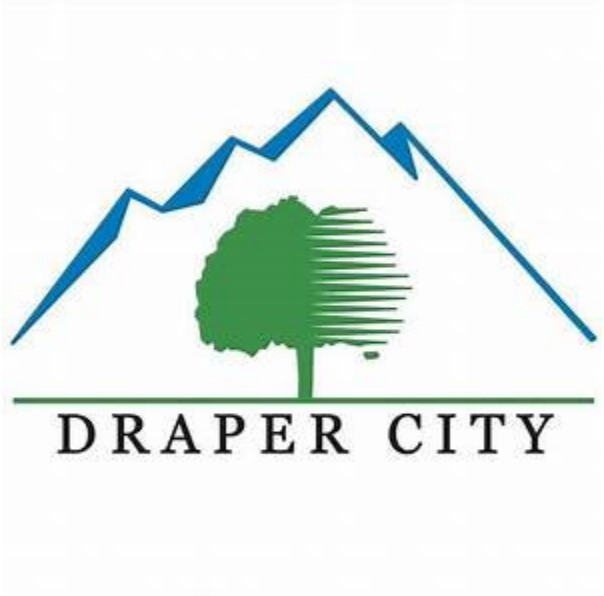


Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Draper City



Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Robert Lambert **Title:** Battalion Chief/Emergency Manager **Department:** Draper Fire Department/Emergency Preparedness **Address:** 14324 S Firehouse Road **Office Phone:** 385-695-7199 **Cell Phone:** (801) 831-7366 **Email Address:** robert.lambert@draper.ut.us **Website:** https://www.draper.ut.us/451/Emergency-Preparedness	**Name:** Bart Vawdrey **Title:** Deputy Fire Chief **Department:** Draper Fire Department **Address:** 14324 S Firehouse Road **Office Phone:** (385) 557-2802 **Email** **Address:** bart.vawdrey@draper.ut.us **Website:** https://www.draper.ut.us/451/Emergency-Preparedness

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1978
- **Current Population:** 48,319 (Census v2018)
- **Population Growth:** The population grew 14.3% from April 1, 2010 (42,274) to July 1, 2018 (Census).
- **Location and Description:** Draper is located in the southeast quadrant of Salt Lake County and in the northwest quadrant of Utah County. Draper covers 30.3 square miles. Draper City is strategically located in the southeast corner of the Salt Lake Valley, with the Wasatch Mountain Range on the east and the Traverse Mountain Range on the south. The city is 18 miles south of Salt Lake City and 28 miles north of Provo. The Salt Lake International Airport is 21 miles north of the city. Draper is located 20 minutes from world-class skiing at Alta, Snowbird, Brighton and Solitude and 30 minutes to Park City and Deer Valley ski areas. The city owns more than 3,200 acres of open space in Corner Canyon and SunCrest. This pristine mountain land is located in the foothills and canyons of Draper and on top of the Traverse Ridge Mountain Range. Draper City has more than 90 miles of cycling, hiking and equestrian trails, with easy access trails from residential neighborhoods.
- **Brief History:** When incorporated in1978 as a City, Draper was a small farming community of 4,500 residents situated on two square miles, but the area had been settled much earlier by Mormon pioneers under the direction of Brigham Young. In the fall of 1849, under the direction of Mormon Pioneer leader Brigham Young, Ebenezer Brown, the son of Scottish immigrants brought his cattle to graze the tall grass-fed by mountain streams in the unsettled area known as South Willow Creek. The following spring, Ebenezer brought his wife Phoebe and their large family. Together they raised and fattened cattle to sell to immigrants heading to the goldfields of California. That same year the Browns invited Phoebe's brother, William Draper III, his wife Elizabeth, a midwife/doctor, and their seven children to join in farming the area. The area grew rapidly and by the end of 1852, 20 families called South Willow Creek home. In 1854, the first post office was established. The town was named Draperville in honor of William Draper III, who was also the first presiding elder of the small Mormon congregation in town.
- **Climate:** Draper has an average annual temperature of 53.7°F and receives 15.69 inches of rain.

- **Public Services:** The City has organized a Draper City Emergency Preparedness Committee to look at long-range planning and preparedness.
- **Governing Body Format:** Draper City's form of government is Council / Manager. Draper has a part-time Mayor and five part-time City Council members. The City Manager is full-time and works under the direction of the Mayor and Council. In the state of Utah, Draper is currently classified as a third-class city.
- **Development Trends:** Draper is characterized by a mixture of land uses. Draper has commercial, industrial, residential, agricultural, vacant land and 4,500 acres of open space areas within its boundaries. The open space area is used for recreational purposes by residents of Draper and the surrounding communities and has many multi-use trails and areas within. Draper is home to the main customer service center and campus of eBay, the tech call center of PGP Corporation, the call center of Musician's Friend, and the headquarters of 1-800 Contacts. Draper is also home to Utah's first Ikea store located in the intermountain west, which opened in spring 2007. The Church of Jesus Christ of Latter-day Saints (Mormons) constructed a temple in Draper that was dedicated on March 20, 2009. The growth surge that Draper has experienced from 1990 to the present is the largest in volume and geographic extent the city has ever experienced. This growth period occurred when the city quickly changed from a rural, agricultural town into a full-fledged suburban city. During this time the city has experienced strong surges of relatively unrestrained growth. In terms of the geographic location of this growth, 75% of the new housing units have been built in the southeastern part of the city. Increasingly the new housing is being built in the fringe areas as properties near central city are nearing build-out. A very large portion of this growth has been focused on a series of medium to large master planned developments spread across the southern parts of the city. The growth in business facilities (office, warehousing, retail, and manufacturing) has been concentrated in areas both east and west of the I-15 freeway and along 123rd south corridor. This growth has included redevelopment, greater diversity in users and building types, more expensive construction and both the import of new businesses as well as the growth of existing businesses. The strongest future business growth areas are expected to be in the vicinity of the major north/south corridors (along the I-15 Freeway corridor from Sandy to the Point of the Mountain) and the major east/west corridors (114th South, 118th South State, and 123rd South and the Bangerter Highway), and the Town Center area. The mix of businesses will probably continue to diversify and the demand for more services to fulfill the needs of both the local population and business communities will increase.

Capability Assessment

The City maintains a full-time staff of 222 and part-time staff of 148 individuals. The Deputy Chief and Battalion Chief is the City's designated Emergency Manager. Hazard Mitigation Planning efforts are led by Battalion Chief position and supported by Deputy Fire Chief and City Manager positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	Yes	
Zonings Ordinance(s)	Yes	Yes	Yes	
Subdivision Ordinance(s)	Yes	Yes	Yes	
Stormwater Management Program	Yes	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	Yes	Adopted 2005, Updated 2009
Real Estate Disclosure Ordinance(s)	-	-	Yes	
Growth Management	Yes	Yes	Yes	
Site Plan Review Requirements	Yes	Yes	Yes	
Planning Documents				
General or Comprehensive Plan	Yes	Yes	-	
Capital Improvement Plan	Yes	Yes	-	
Economic Development Plan	Yes	Yes	-	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	Yes	
Post-Disaster Recovery Plan	Yes	Yes	Yes	

Continuity of Operations Plan	Yes	-	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	-	Yes	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
Other	N/A

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Draper Building-Zoning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Draper Building-Zoning
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Draper Building-Zoning
Personnel skilled or trained in GIS applications	Yes	Full Time	Draper GIS
Emergency manager	Yes	Full Time	Fire BC and Draper Fire
Grant writers	No	N/A	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE

What department is responsible for floodplain management in your jurisdiction?	Draper Building-Zoning
Who is your jurisdiction's floodplain administrator? (department/position)	Zoning
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No/Yes

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	-	-	-
Public Protection/ISO	Yes	2	June 2019
NWS StormReady	-	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 53 policies were in force with total coverage of $15,355,000 and total written premium and FPF of $23,543 (FEMA, 2019).
- Draper City does participate in the National Flood Insurance Program (CID # 490244) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment**

Winter Storm	8 inches in Draper	-	1/21/2019	-
Winter Storm	13.5 inches in Draper	-	1/19/2018	-
High Wind	68 mph at Draper	-	3/5/2017	100,000 property damage.
Hail	quarter-sized hail	-	7/19/2016	-
High Wind	59 mph in Draper	-	3/13/2016	-
Winter Storm	widespread power outages	-	12/13/2015	-
High Wind	72 mph in Draper	-	4/22/2014	500,000 property damage.
Orson Smith Trailhead Fire		-	6/12/2014	-
Winter Storm	7 inches in Draper	-	12/19/2013	-
Winter Storm	6 inches of snow in Draper	-	3/22/2013	-
Winter Storm	8 inches in Draper	-	1/27/2013	-
High Wind	These winds caused damage at a shopping center in Draper, blowing out two large windows.	-	3/26/2012	20,000 in property damage
Bell Canyon Fire	Not a huge fire	-	8/15/2011	-
Flooding		-	2011	-
Flood and Debris Flow		-	8/19/2010	-
Debris Flow		-	7/21/2009	-
High Wind	extensive roof damage to several homes in the Draper area was reported	-	3/29/2009	-
Corner Canyon Fire		-	8/8/2008	680 acres burned but no homes impacted.

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	3,181
Members of the community under 18 years old	15,470
Members of the community that identify as having disability status	2,141
Members of the community that speak English less than "very well"	902
Members of the community living below the poverty line	2,368
The number of mobile homes in the community	60*
Members of the community without health insurance	2,869
Occupied housing units with tenants without a vehicle	176
Housing units without heating fuel	29

*The number of residents in mobile homes is likely higher. The primary mobile home park in the area is the Mountain Shadows Mobile Home Park.

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Avalanche: The likelihood of avalanches impacting Draper City is limited. The area on the east side of the City is adjacent to the Wasatch Mountains and has slopes 25 degrees or greater, but there has been no historical avalanche activity in that area of the City. Small slides have occurred in unpopulated areas.

Dam Failure: The Draper Irrigation Company has a storage reservoir located at the mouth of Corner Canyon, which is classified as a dam by the State of Utah. The impacts of the failure of this storage reservoir could have an impact on residential areas within the City. Any dam failures in other areas of Utah would have little impact on Draper, except for the potential impact on water supplies.

Drought: Draper City has large swings in temperature and in precipitation amounts during any year and is susceptible to drought. The City encourages landscaping that is friendly to the desert climate of Utah and when drought conditions occur the City would restrict the use of water for outdoor landscaping. The table below shows average temperatures and precipitation amount for Draper City by month.

Table. Draper City Average Temperature Table

Month	Temp. (min)	Temp. (max)	Temp. (avg)	Precipitation

January	-2°F	58°F	29°F	1.3"
February	5°F	66°F	35°F	1.1"
March	15°F	74°F	43°F	1.9"
April	21°F	90°F	50°F	2.1"
May	30°F	93°F	61°F	1.3"
June	39°F	100°F	70°F	1.4"
July	54°F	105°F	82°F	0.2"
August	46°F	103°F	78°F	0.5"
September	35°F	96°F	66°F	1.2"
October	27°F	86°F	52°F	1.4"
November	4°F	75°F	42°F	0.9"
December	0°F	59°F	29°F	1.4"

Earthquake: Earthquake hazards are likely to include ground shaking, ground rupture, tectonic deformation, liquefaction, seismically induced slope failures and phenomena related to ground-water effects. Of significant concern, many high priority public and private buildings and many critical infrastructure facilities are located within or across the major fault zones in the region. These facilities include very large waterlines, large irrigation canals, utilities, railroads, and major transportation routes. However, the potential damage is not limited to fault zone areas. Fine-grained, lake-bottom sediments are common in western Draper and are susceptible to liquefaction-induced ground failure during a large earthquake. Each incident may require a unique response from Draper City and in the instance of a major earthquake outside assistance will be necessary. Utah's earthquake hazard is greatest within the Intermountain Seismic Belt (ISB), which extends 800 miles from Montana to Nevada and Arizona, and trends from north to south through the center of Utah (The Wasatch Fault, UGS PIS 40). The ISB contains the Wasatch fault; one of the longest and most active normal faults in the world, with a potential for an earthquake with a magnitude up to 7.5. The largest earthquakes in Utah occur in the ISB, where at least 35 earthquakes of magnitude 5.0 or greater have occurred since 1850 (UNHH 2008).

Severe Thunderstorms: Potential for severe weather is high and Draper and not specific to any one climatic season.

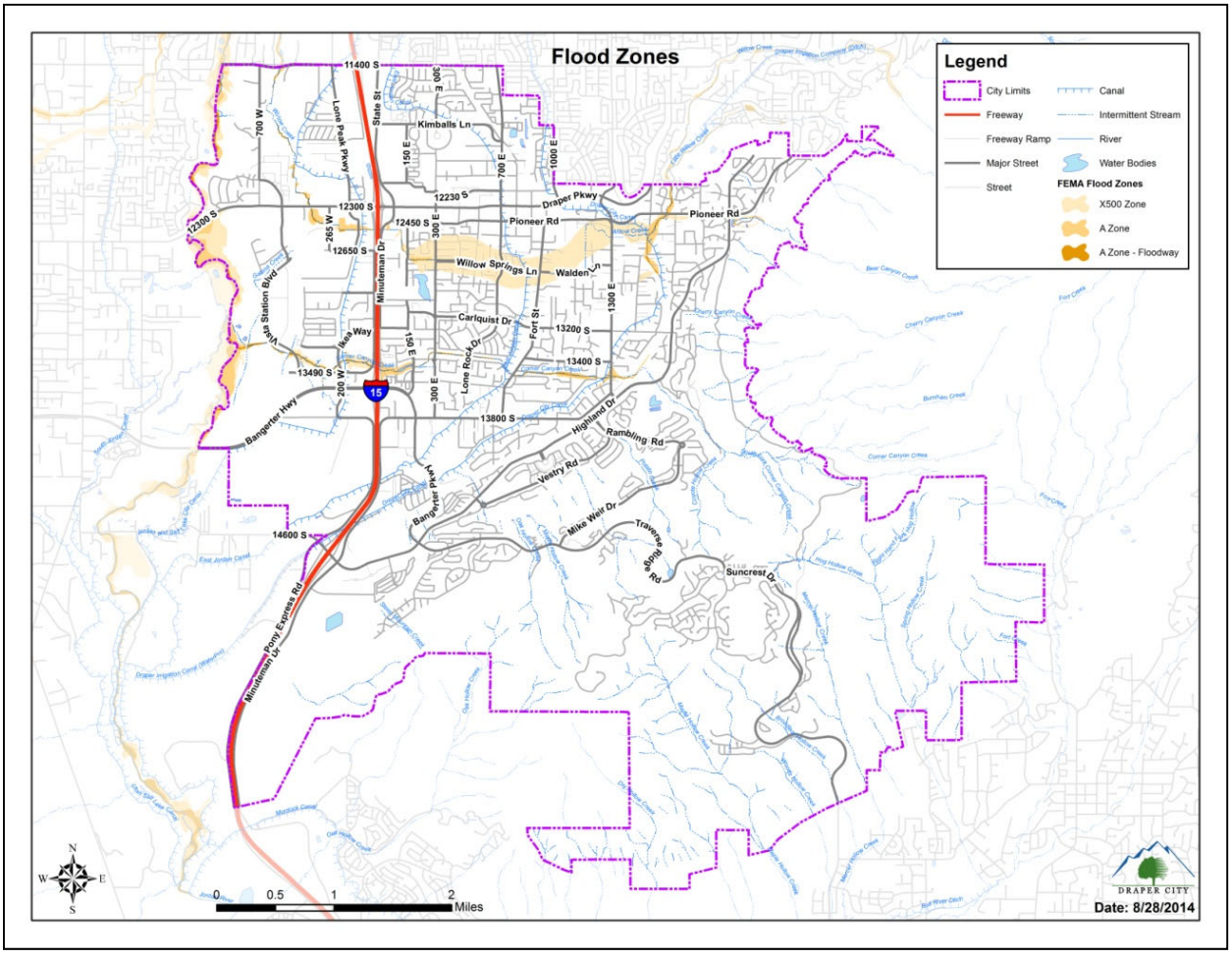
Tornado and High Winds: Wind speeds in Draper are annually higher than national averages and microburst winds are common. They are particularly high at the point of the mountain.

Flood: Although located in a semi-arid region, Draper City is subject to thunderstorms and snowmelt flooding. Areas that may be impacted by thunderstorm and snowmelt flooding include Bear Canyon Neighborhood, Springdale Way near the foothills, and Corner Canyon Creek. Additionally, while the potential is small, the Jordan River, which runs west of I-15 from North to South on the west side of Draper, could overtop due to thunderstorms, severe weather, and rapid snowmelt. Several streams run through the City of Draper and converge with the Jordan River that runs along the western border. Thirty-seven (37) structures are vulnerable to the 1% annual

chance event and there is additional development planned in the 1% annual chance floodplain. The following Areas of Mitigation Interest were identified by the City of Draper and through FEMA's GIS flood exposure analysis:

- The Bear Canyon neighborhood encroaches into the natural floodplain. During high flows, certain parts of the neighborhood experience flooding along historic flow paths.
- In 2011, houses along Springdale Way near the foothills experienced mudflows, flooding, and debris flow from small drainages coming off the foothills.
- Along Corner Canyon Creek, downstream of I-15, there is planned commercial development in the SFHA. The City is considering flood detention and an irrigation facility as well as a culvert or channelization for Corner Canyon Creek at 1100 East.
- The Draper Elementary School is vulnerable to the 0.2% annual chance flood.

Figure. The City of Draper's Flood Zones

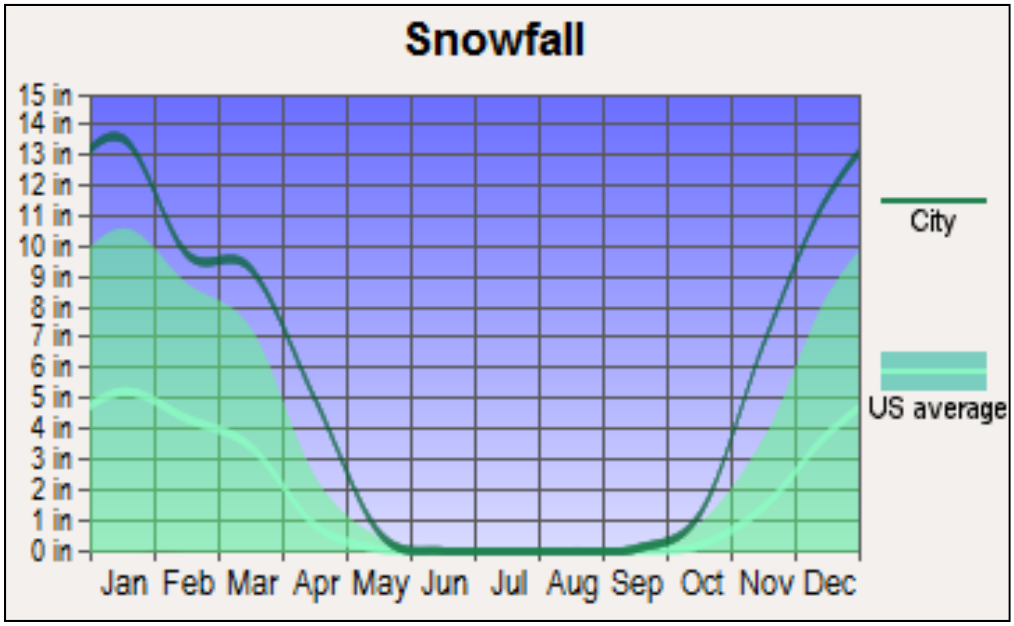


Landslide and Problem Soils: Numerous geologic hazards exist in Draper and throughout the Salt Lake Valley that could result in an emergency situation or disaster. Steep mountains adjacent to the city create a potential for landslides, debris flows, rock falls, and snow avalanches. Draper has experienced landslide-debris flow in the past. Steep slopes on the east and south side of Draper also lend to the high potential for landslides and slope failure. Buildings along the ridgetops of some areas increase the potential of slides due to added weight and hill disturbance.

Severe Weather: The potential for severe weather is a reality in Draper City and the surrounding region. These weather events are not isolated to any climatic season, but rather can occur at any time during the year. During the spring and summer months, heavy rains can fall upon soils in a desert climate that may not readily percolate creating surface runoff, mudslides, debris flow, flooding, and other water-related damage. During the winter months, heavy snowfall is possible, especially in higher elevations of the community. While Draper City is typically self-reliant in weather-related events, severe weather may require assistance from outside agencies.

Winter Storms: Corner Canyon and Suncrest Area receive large amounts of snow which can cause business interruption, including interrupting village services, such as Police, Fire, and Public Works tasks. Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. This challenge is heightened in Draper City because of the wide variety of local climatic features, such as significant elevation changes, atypical wind patterns, and mountainous slopes located immediately adjacent to city boundaries. These local features can impact the severity of winter storms. Winter Storms additionally bring colder temperatures which can adversely impact the elderly population. Additionally. Draper has a number of community members without health insurance which would impact medical care.

Figure. The City of Draper's Average Snowfall



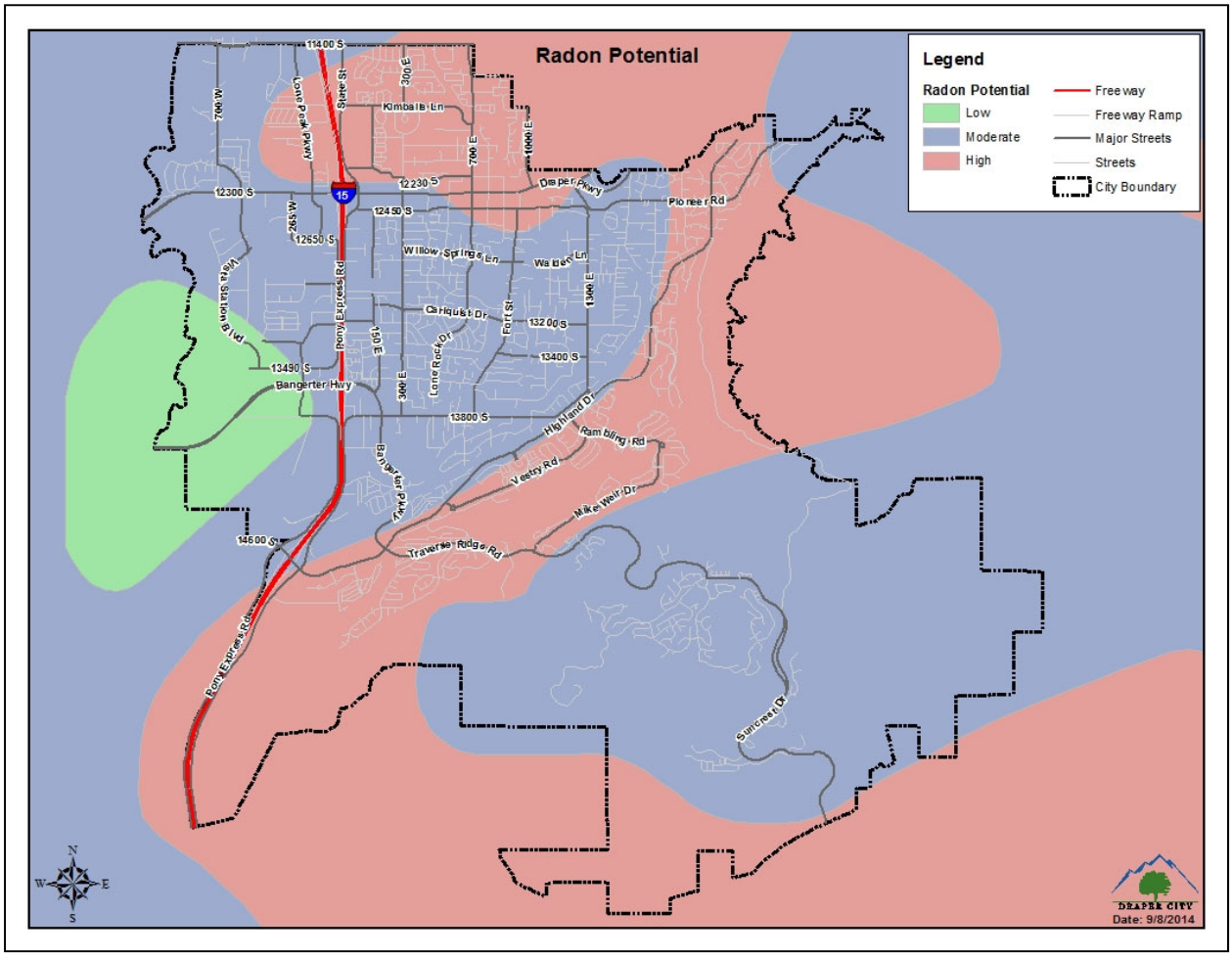
Wildfire: Perhaps the most likely and significant hazard in Draper City is the potential for damage and loss of life and property through fire events. The terrain of steep slopes adds to the dangers and difficulties of wildfire suppression. Many homes on the east and south sides of Draper have a high potential of being impacted by wildfires. Fires can occur within the urban fabric of the community or as wildfires in the hillside areas of the community and mountainous areas adjacent to the city. Each incident may require a unique response from Draper City. The potential for structure and wildfires is increased by lightning events. Wildfires can remove necessary vegetation, which can result in unstable soils for extended periods of time. Utah's fire season typically occurs during the warmer and drier months between May and October. Although

traditionally most wildfires have been caused naturally, mostly by lightning, as development encroaches on the hillsides and lower slopes of the Wasatch Mountains, wildfires caused by humans will likely increase.

Public Health: The number of community members that believe in not vaccinating their kids (anti-vaxxers) is a troubling public health concern.

Radon: Draper is at moderate to high risk for Radon exposure.

Figure. The City of Draper's Radon Potential



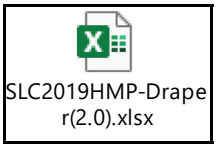
Cyber Attack: Cyberattacks could interrupt government work, public safety, and critical infrastructure operation.

Hazardous Materials: While Draper City has minimal hazardous materials stored in the city, I-15 is the main Interstate for some large hazardous materials transportation.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Wildfire	3	19	57
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Landslide and Slope Failure	2	11	22
Dam Failure	1	22	22
Tornado	1	11	11
Civil Disturbance	1	11	11
Avalanche	1	3	3

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	High	3		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Medium	2	2		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	High	3	3		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct Seismic Retrofitting	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	Draper Emergency Management	Public Works	High	High	Local Funds, Grants	High	2030	
Design Wildfire Evacuation Plan and Route designations	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	All Hazards	Draper Emergency Management		Medium	Medium	Local Funds, Grants	High	2025	
Install Notification System to Alert the Public	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 3: Enhance and protect the communication and warning/notification systems in the County.	All Hazards	Draper Emergency Management		High	Medium	Local Funds, Grants	High	2025	
Bury Powerlines	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All Hazards	Draper Emergency Management	Public Works	High	High	Local Funds, Grants	Medium	2030	
Increase Defensible Space and Wildfire Mitigation	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood (Riverine) and Flood (Urban/Flash Flooding)	Draper Emergency Management	Fire Department	Medium	High	Local Funds, Grants	Medium	2030	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All Hazards	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Check yearly
Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All Hazards	City of Draper	Medium	Low	Local Funds, Grants	Medium	Ongoing	Continually update
Pursue and implement needed mutual-aid agreements	2009	4 – Improve response capabilities	All Hazards	City of Draper	Medium	Low	Local Funds, Grants	Medium	Ongoing	Updated (as needed)

		through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements								
Provide education regarding all-natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All Hazards	City of Draper	Medium	Low	Local Funds, Grants	Medium	Ongoing	Offer different trainings each year
Repair, maintain, and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	City of Draper	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Continual (as needed)
Identify structures at risk to earthquake damage	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)

Complete seismic rehabilitation/ retrofitting projects of public buildings at risk	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Update (as needed)
Provide educational materials to unreinforced masonry home and business owners	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	Earthquake	City of Draper	High	Low	Local Funds, Grants	High	Ongoing	Continually provide
Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	Earthquake	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood	Flood	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)

		control measures, particularly in new developments								
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flood	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of stormwater and flood control systems	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, stormwater systems, and flood control structures	Flood	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)
Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flood	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or	Flood	City of Draper	High	High	Local Funds, Grants	High	Ongoing	Continual (as needed)

		inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures								
Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	Slope Failure	City of Draper	Medium	Low	Local Funds, Grants	Medium	Ongoing	Ongoing coordination
Increase public awareness through "Firewise" program	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire	City of Draper	High	Low	Local Funds, Grants	High	Ongoing	Ongoing community outreach
Educate homeowners on the need to create defensible space near structures in WUI	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire	City of Draper	High	Low	Local Funds, Grants	High	Ongoing	Ongoing community outreach
Work with experts and communities to develop or update evacuation plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities	Wildland Fire	City of Draper	High	Medium	Local Funds, Grants	High	Ongoing	Ongoing coordination

		2.2 – Improve evacuation capabilities for WUI areas								
Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	Wildland Fire	City of Draper	High	Medium	Local Funds, Grants	High	Ongoing	Continual (as needed)
Reduce fuels around publicly owned structures	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire	City of Draper	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Ongoing reduction
Assess existing water flow capabilities, both public and private, and address deficiencies	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire	City of Draper	Medium	Medium	Local Funds, Grants	Medium	Ongoing	Continual (as needed)

Assist communities in developing Community Wildfire Protection Plans or similar plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire	City of Draper	Medium	Low	Local Funds, Grants	Medium	Ongoing	Continual (as needed)
Establish Firewise Community Program for SunCrest and the entire East Bench.	2014 [Modified in 2019]	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Wildland Fire	Draper City Emergency Preparedness, Draper City Public Works, Unified Fire Authority and State of Utah	High This will prevent the loss of human life and economic and property losses.	Medium $200,000 to $250,000	$216,000 Grant from the State of Utah	High	Ongoing	The SunCrest residential community area located on Traverse Ridge, which divides Utah and Salt Lake County and is a Wildland Interface Zone, has a high potential for wildland fires. The City has worked with the community, Unified Fire Authority and the State of Utah in putting a program in place to educate residents and measures to reduce wildland fires in the area. Potential natural hazards covered by this mitigation action are wildfires and drought.
Continue to Enforce Master Drainage Plan Requirements	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County	Flood	Draper City Engineering Division and Draper City Public Works Department	High This will prevent the loss of human life and	Medium Developer-based funding under specific	Developer-based funding under specific plan requirements	Medium	Ongoing	The Draper City requires drainage plans as part of the approval process for all specific plans and large development projects, as determined by the

		before, during, and after a disaster.			economic and property losses.	plan requirements				City's Public Works Director and City Engineer. The master drainage plan should consider cumulative regional drainage and flooding mitigation. The intent of a master drainage plan is to ensure that the overall rate of runoff from a project does not exceed pre-development levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans. Potential natural hazard covered by this mitigation action is flooding.
Continue Utah Shakeout Activities to Promote Earthquake Awareness	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Earthquake	Emergency Manager, Police Department, and the City's Emergency Preparedness Committee	High This will help to prevent the loss of human life and property losses when a major	Low $5,000 to $10,000 annually	City budget	High	Ongoing	Draper City participates in the Utah Shakeout activities annually. This event promotes earthquake awareness of the residents, businesses, and City employees. This annual event allows the City to practice setting up its Emergency Operation Center

					earthquake event occurs.					and its process of communicating with neighborhoods and businesses throughout the City for other hazard events such as a dam failure, infestation, pandemic, floods, and severe weather conditions. Potential natural hazards covered by this mitigation action are earthquakes, a dam failure, infestation, pandemic, floods and severe weather conditions.
Purchase Hazard Public Notification Boards	2014	Goal 3 Enhance and protect the communication and warning/notification systems in the County.	All Hazards	Draper City Public Works Department and Police Department	Medium	Medium 1 signs @ $35,000 each = $35,000	Departmental operational budgets or grant funding	Low	Fiscal year 2015/ 2016	Consider purchase additional mobile, self-contained changeable message signs to pre-alert motorists to avoid “real-time” traffic, weather, fire or other hazard events. Potential natural hazards covered by this mitigation action are severe weather conditions, wildfires, flooding, avalanche and landslides. The City currently has one mobile sign that has been beneficial in notifying the public of potential hazards.

										These mobile signs provide the ability for City forces to aid emergency response crews by dispatching mobile sign units to be stationed at critical locations to alert motorists and citizens of potential hazard areas. Purchasing an additional sign will allow for better routing of nonessential vehicle traffic that may impede the delivery of critical health and safety services and ultimately result in quicker overall response delivery times. This will prevent the loss of human life and economic and property losses.
Educate Residents and Businesses through the Draper City Website and Twitter	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	All Hazards	Public Relation Officer, Emergency Manager, Draper City Building Inspection Division and Draper City Community Development Department		Low $5,000 annually	City budget	High	Ongoing	Draper City's website is an excellent tool to educate and notify residents, businesses, and the general public of potential natural hazards and how to mitigate them. The City's twitter account is also a tool that can be used to inform residents, businesses and the general public of

										hazard events in progress. The City will update its website as needed with documents, maps and information regarding potential natural hazards that could impact Draper City. Potential natural hazards covered by this mitigation action are avalanche, dam failure, drought, earthquake, flood, infestation, landslide, problem soils, pandemic, radon, severe weather conditions and wildfires.

Mitigation Table - Completed and Removed Actions

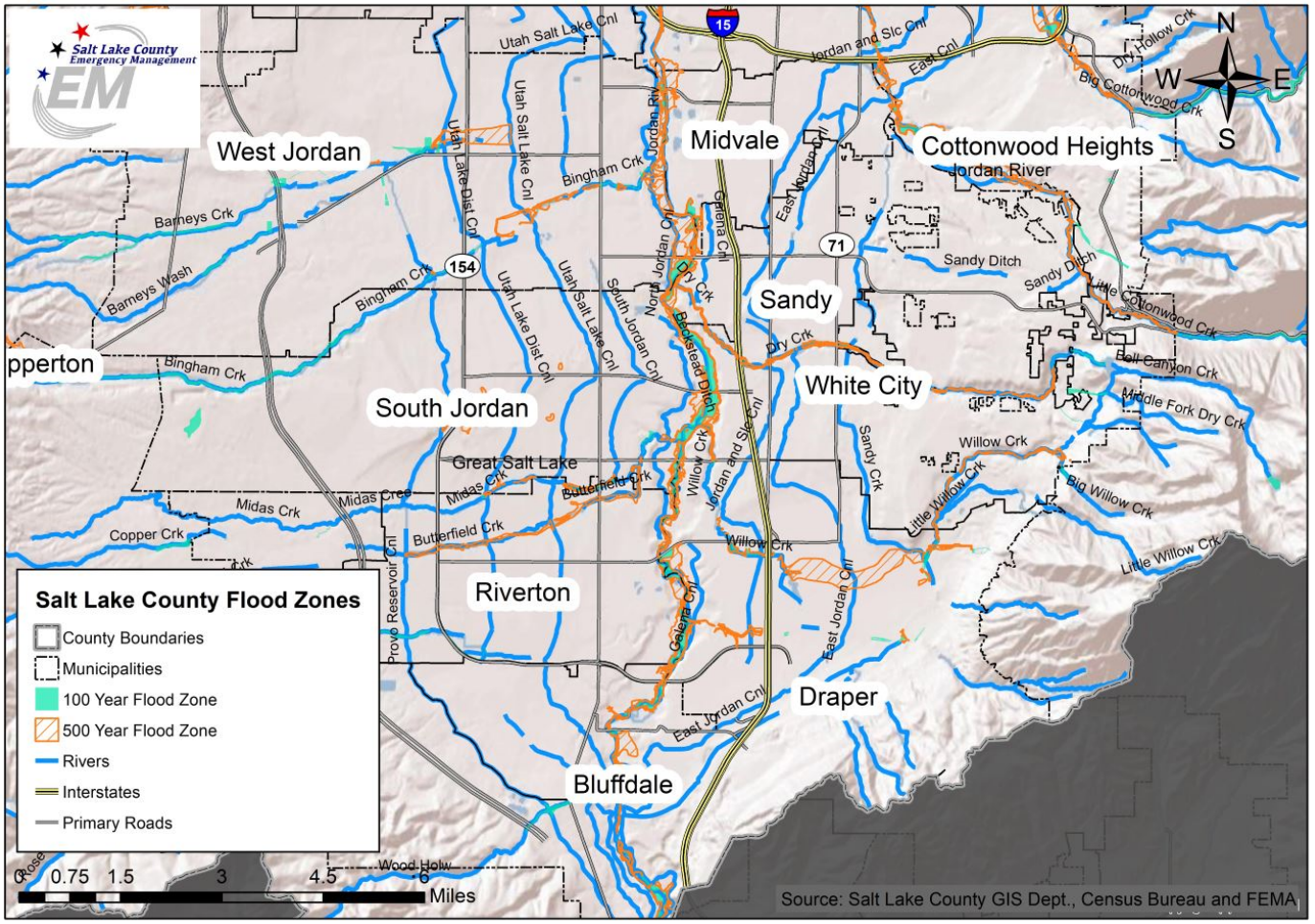
Category	Year Initiated	Action	Status	Comments
All Hazards	2009	2 – Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Not completed	Included in other mitigation action
All Hazards	2009	1 – Establish a coordinating group to address geographic data issues	Not applicable	Coordinate with county
All Hazards	2009	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gauges, seismograph stations, road conditions, etc.	Not completed	Included in other mitigation action
All Hazards	2009	2 – Identify and implement additional hazard monitoring capabilities.	Not completed	Included in other mitigation action
All Hazards	2009	2 – Incorporate information about cascading effects of hazards in education programs	Not completed	Included in other mitigation action

All Hazards	2009	3 – Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	Not completed	Included in other mitigation action
Dam Failure	2009	1 – Include dam inundation maps in current County, City, and Special Service District Emergency Operations Plans	Not completed	Coordinate with county
Dam Failure	2009	2 – Utilize inundation maps to identify potential evacuation areas and routes	Not completed	Included in other mitigation action
Drought	2009	2 – Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	Not completed	Included in other mitigation action
Drought	2009	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Completed	
Drought	2009	4 – Implement water-saving devices and practices in public facilities	Not completed	Funding constraints
Drought	2009	7 – Provide information on landscaping alternatives for persons subject to green area requirements	Completed / Ongoing	
Drought	2009	1 – Set up livestock water rotation in areas of agricultural use	Not applicable	No longer relevant
Drought	2009	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Not Completed	Included in other mitigation action
Earthquake	2009	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not completed	Funding constraints
Flooding	2009	1 – Assist Cities with NFIP application	Not applicable	Participate in NFIP
Flooding	2009	2 – Encourage Communities to actively participate in NFIP	Not applicable	Participate in NFIP
Severe Weather	2009	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not completed	Use different system
Severe Weather	2009	2 – Maintain Contact with NWS prior to re-application in 2010	Not applicable	Application passed
Severe Weather	2009	1 – Meet with NWS representative on an annual basis to receive information on new services and alerts available	Not completed	Coordinate with county
Severe Weather	2009	2 – Assist NWS in making other agencies and departments aware of available resources	Not Completed	Coordinate with county
Severe Weather	2009	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	Not Applicable	No longer relevant

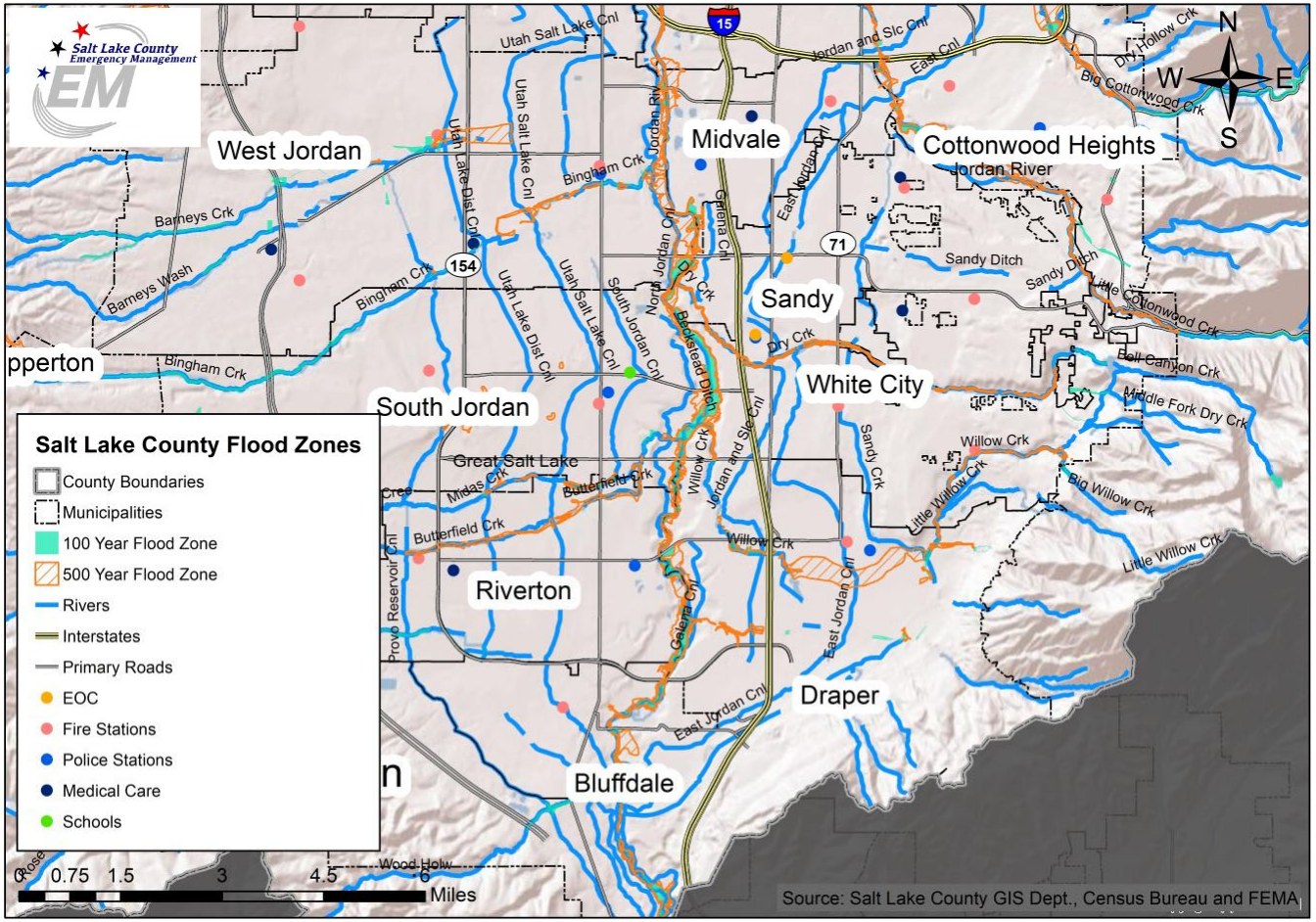
Severe Weather	2009	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	Coordinate with county
Wildland Fire	2009	1 – Designate and promote county-wide annual initiative for clearing fuels	Not applicable	Coordinate with county
Wildland Fire	2009	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not completed	Funding constraints
Wildland Fire	2009	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Not applicable	Included in other mitigation action
Wildland Fire	2009	2 – Incorporate improved addresses in fire-dispatch and other databases	Not applicable	Included in other mitigation action
Wildland Fire	2009	2 – Implement fire breaks and other protective measures	Not completed	Funding constraints
Wildland Fire	2009	1 – Adopt the Utah Wildland-Urban Interface Code	Not completed	Coordinate with county
Wildland Fire	2009	2 – Define wildland-urban interface and develop digital maps of the WUI	Not completed	Included in other mitigation action

Jurisdiction Maps

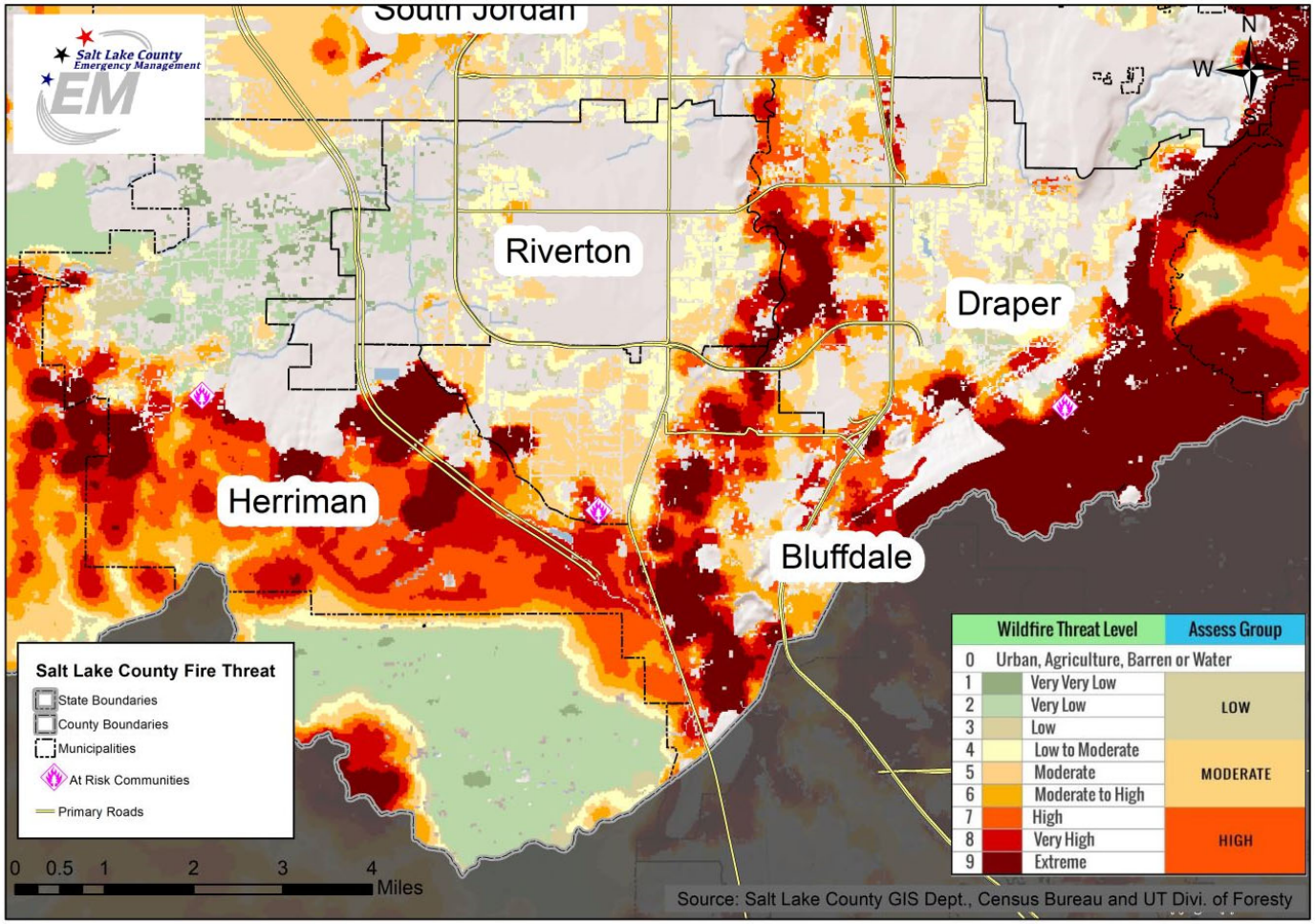
Map: 100 Year and 500 Year Flood Zone



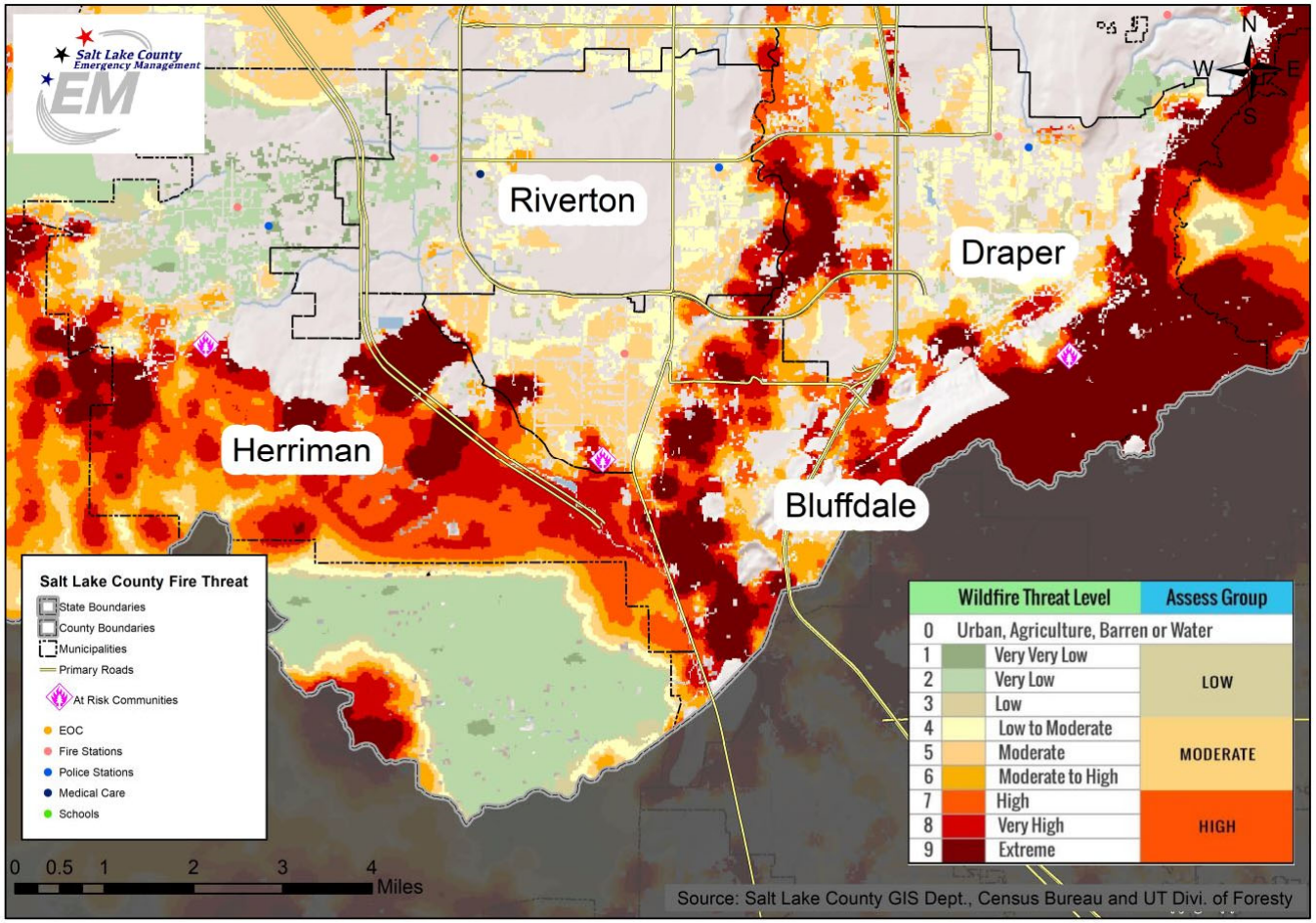
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



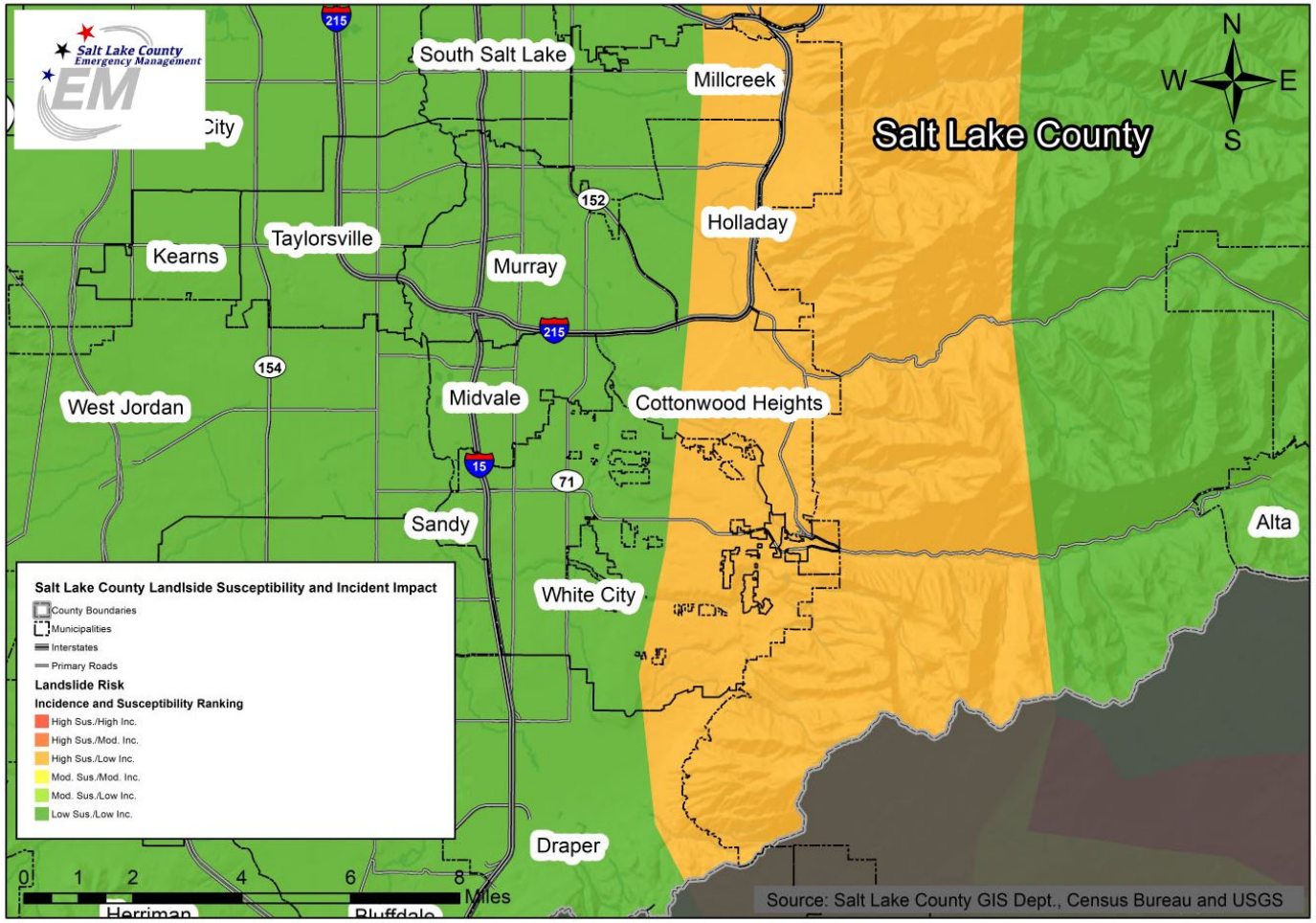
Map: Wildfire Threat Level



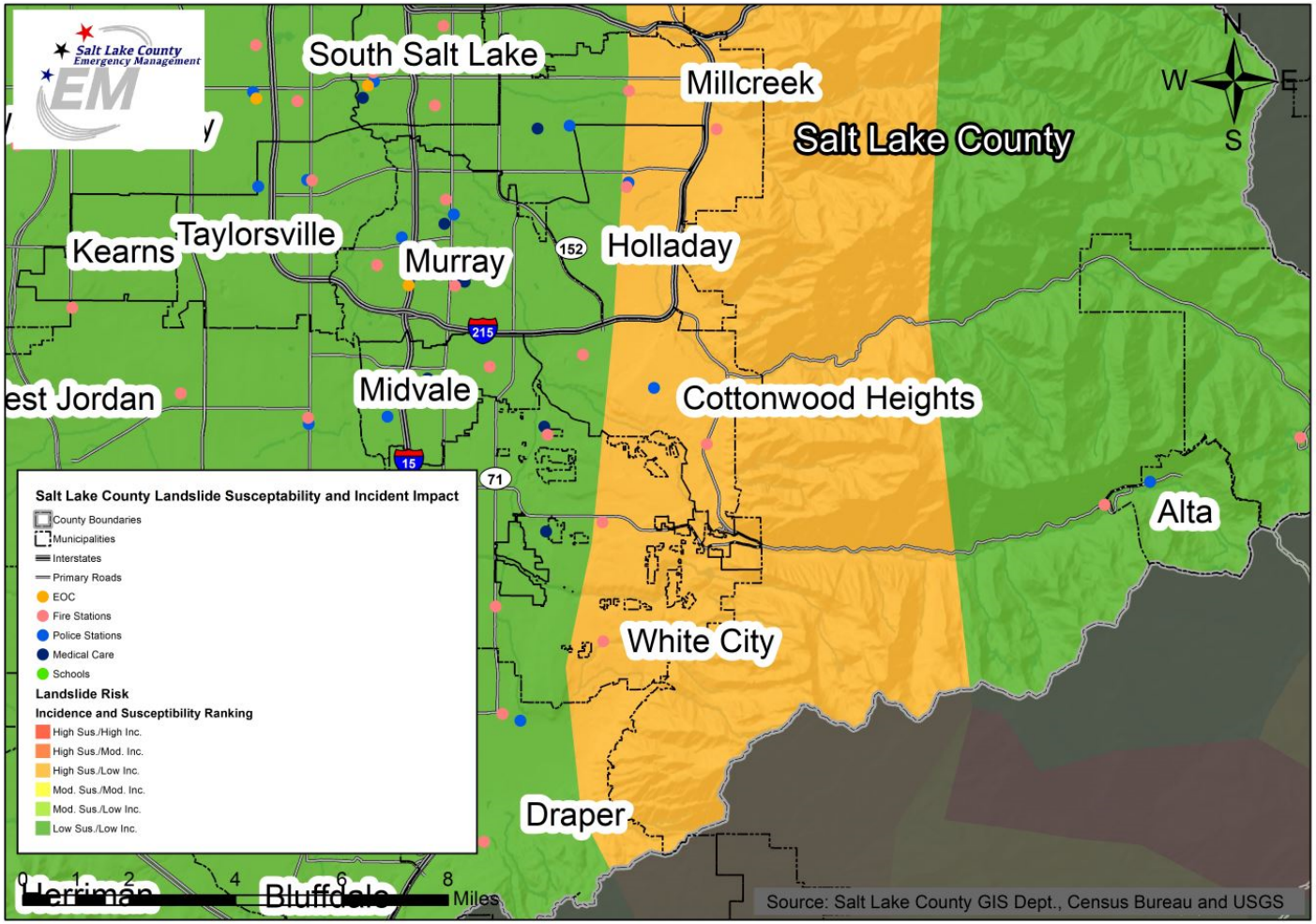
Map: Wildfire Threat Level with Critical Facilities



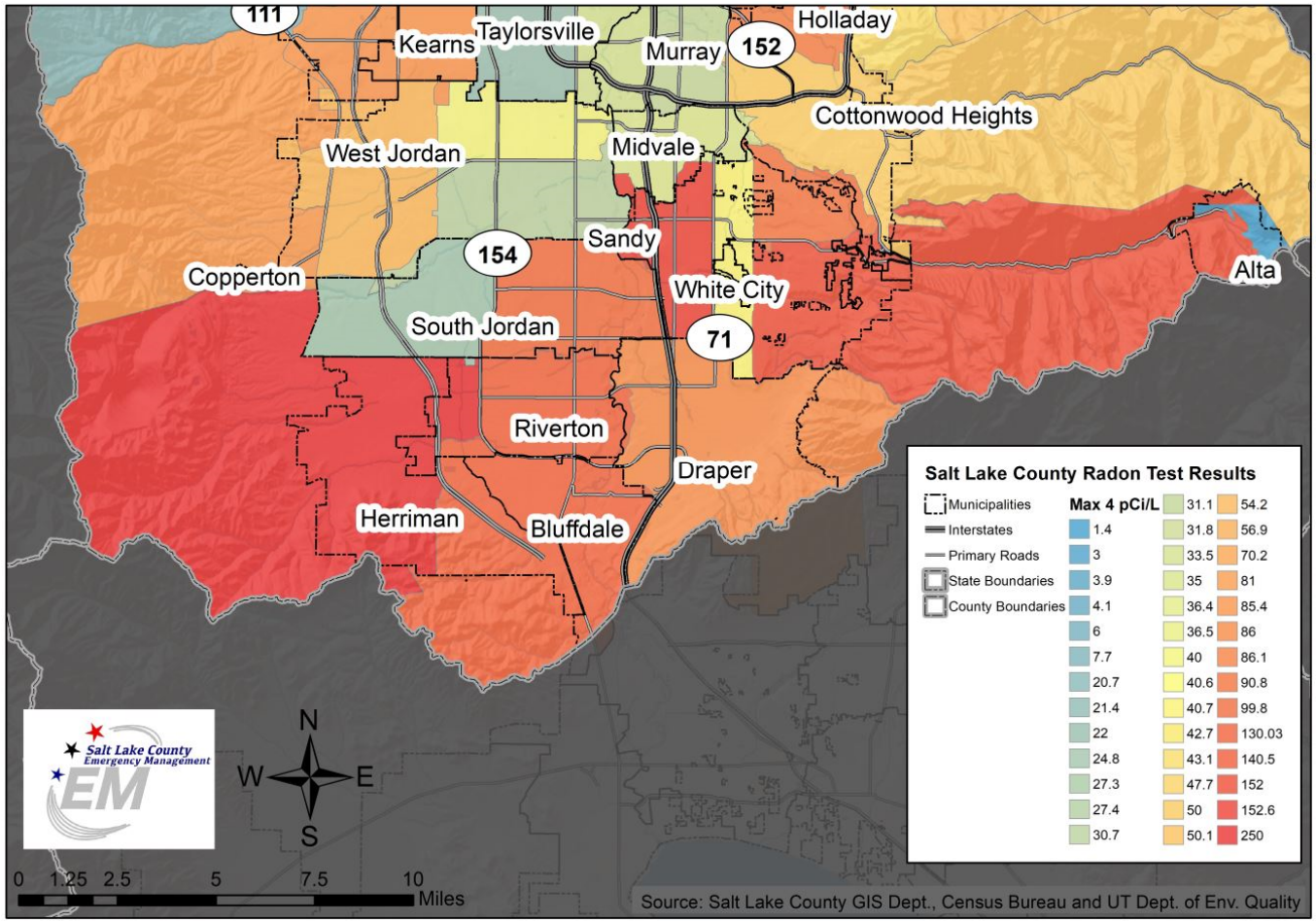
Map: Landslide Susceptibility and Incident Impact Potential



Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
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31.1
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54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
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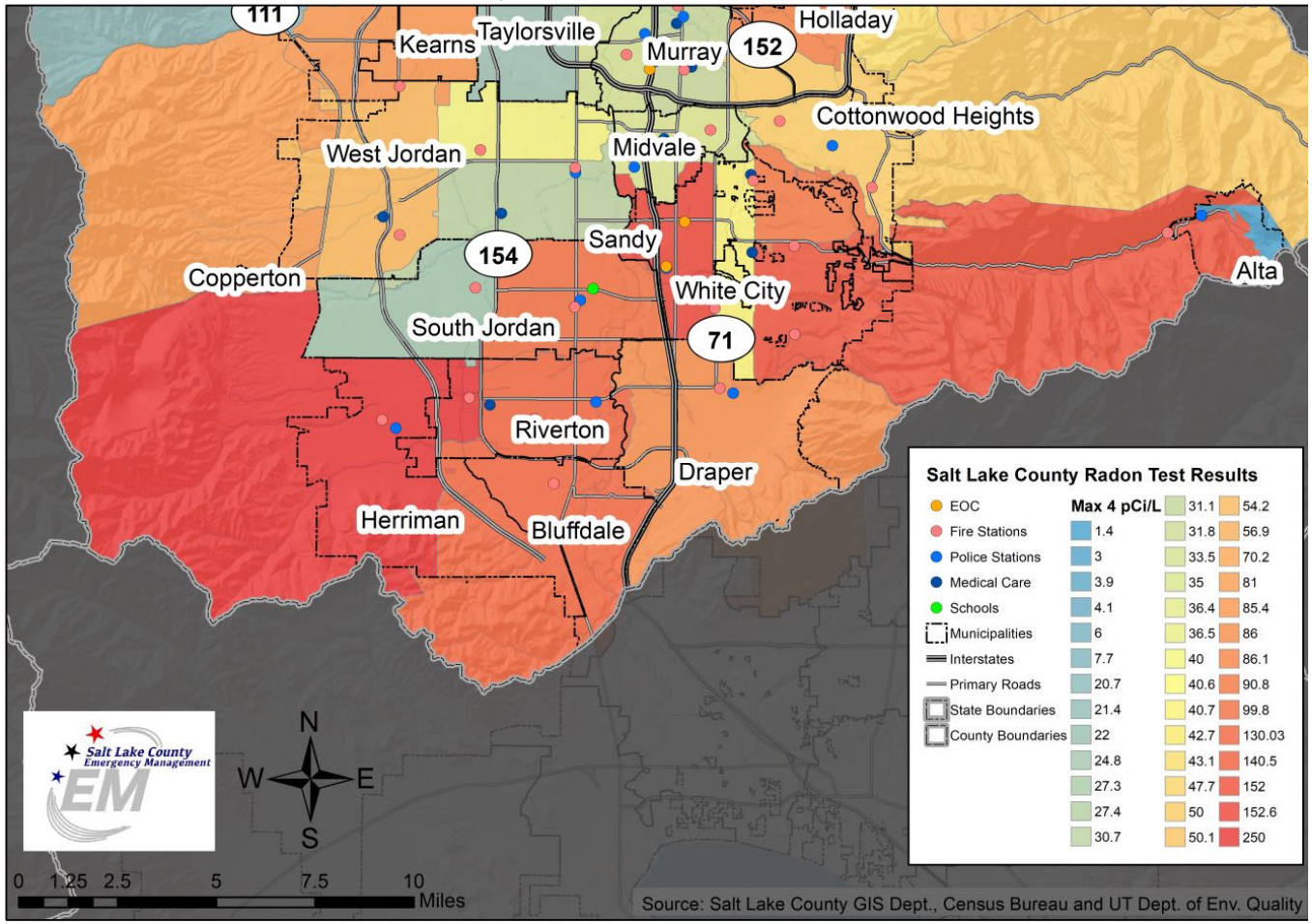
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Herriman City

Hazard Mitigation Plan Point of Contact

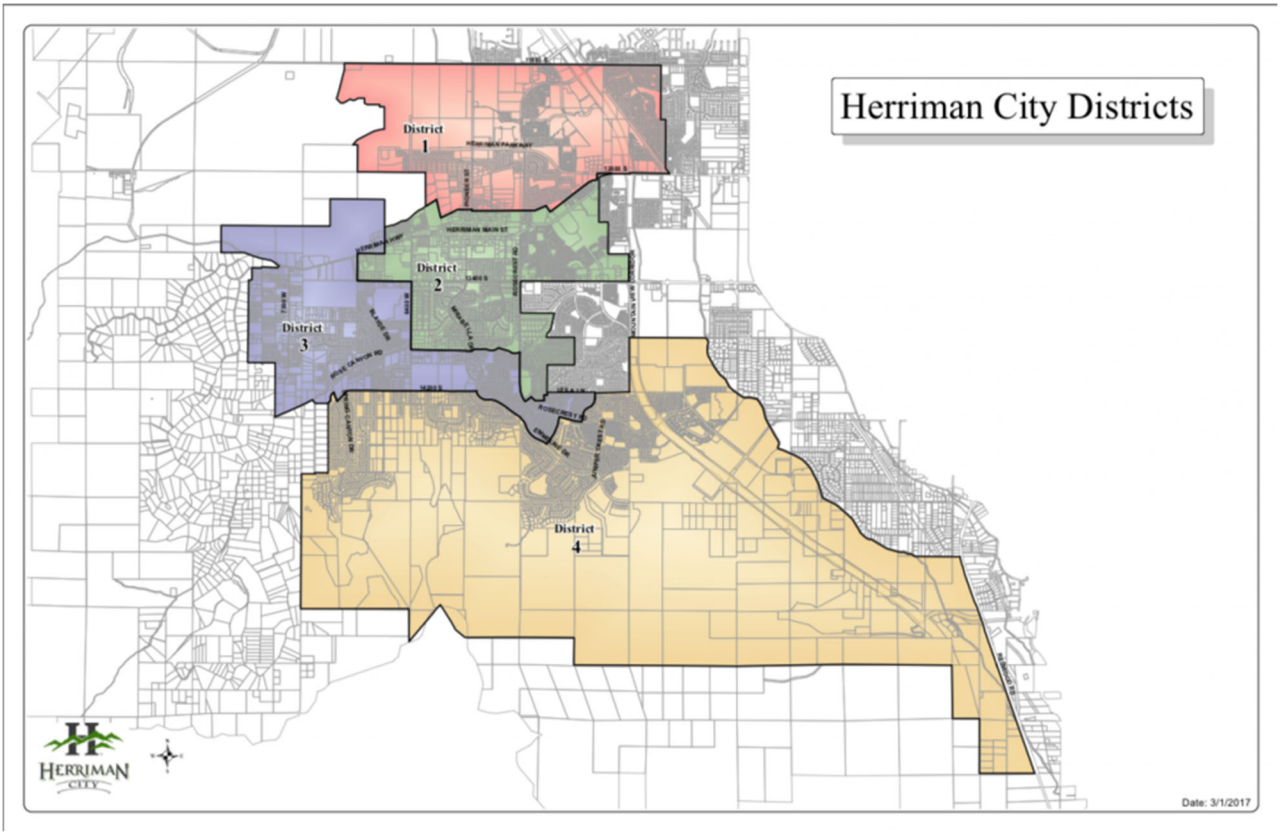
Primary Point of Contact	Alternate Point of Contact
Name: Monte Johnson **Title:** Emergency Manager **Department:** Emergency Management **Address:** 5355 West Herriman Main Street, Herriman, Ut 84096 **Office Phone:** (801) 727-0935 **Cell Phone:** (801) 703-6018 **Email Address:** mjohnson@herriman.org **Website:** https://www.herriman.org/be-ready-herriman/	**Name:** Tina Giles **Title:** Emergency Management Coordinator **Department:** Emergency Management Address: 5355 West Herriman Main Street, Herriman, Ut 84096 **Office Phone:** (801) 727-0939 **Cell Phone:** (801) 889-6563 **Email Address:** tgiles@herriman.org **Website:** https://www.herriman.org/be-ready-herriman/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1999 and became a city on April 19, 2001.
- **Current Population:** 44,877 (Census v2018) and the Herriman City Planning Department estimate as of July 1, 2019, was 58,287.
- **Population Growth:** The City's fast growth in recent years makes the projecting population particularly challenging. With a total population of only 1,523 in 2000, the population increased to 21,785 by the 2010 Census, which is a 245% annual growth rate and a thirteen-fold increase in population during the period. Recent estimates put the City's 2018 population at just over 44,500. Conservative estimates by the Governor's Office of Planning and Budget (GOPB) project continued growth at the highest rate of any city in Salt Lake County. The City has quickly changed from a rural, agricultural town into a full-fledged suburban city with the dominant residential market of large-lot homes giving way to a more diversified housing type and retail and business centers beginning to take shape. The City still has hundreds of contiguous acres available for future development (Census and Herriman City Community Development)
- **Location and Description:** Adjacent to Herriman City on the west are the Oquirrh Mountains and the Bingham Canyon/Rio Tinto Copper Mine. To the south is Camp Williams nestled in the South Hills, which separates Herriman from Utah County. Adjacent to Herriman on the east is Riverton; to the north is South Jordan. Herriman has developed commercial and residential areas as well as significant agricultural holdings and 2,412 acres of open space and an additional 214 acres of park space within its boundaries. This open space is reserved for recreational purposes and currently has many multi-use trails.
- **Brief History:** Originally called Butterfield, the town was established in 1849 by Thomas Jefferson Butterfield, John Jay Stocking, Robert Cowan Petty, and Henry Harriman. In 1854, an adobe Fort was constructed in the area, in order to protect settlers from hostile native tribes. Fort Herriman, as it was called, was soon disbanded, yet the small settlement remained for more than 130 years. Local residents earned a living through dryland farming, sheep and cattle ranching, and as employees at the nearby mines and smelters. Many people who did not live in Herriman grazed their livestock here. For a period of time, Herriman became home to some of the largest sheep operations west of the Mississippi River.
- **Climate:** Herriman has an average annual temperature of 53.7°F and receives 20 inches of rain and 68 inches of snow.

- **Public Services:** The city is currently updating its General Plan. The city provides the majority of public services within the city. Important to hazard mitigation, the city does have stormwater, health, secondary water, GIS, public safety, and "Be Ready Herriman" services.The city is currently updating its General Plan. Important to hazard mitigation, the city does have stormwater, health, secondary water, GIS, public safety, and "Be Ready Herriman" services.
- **Governing Body Format:** The city has an elected mayor and four districts, with each having an elected official. The city has a strong manger-council form of government.



- **Development Trends:** Once considered an isolated and far-flung locale, Herriman has emerged as one of the most desirable and fastest-growing communities in the region. In the 1980s and 1990s development pressure suddenly increased, resulting in the town's incorporation in 1999. Between 2000 and 2010 the pace of change and development was particularly furious, as Herriman went from being the 111th-largest incorporated place in Utah to the 32nd-largest (Herriman City Community Development)

Capability Assessment

The city maintains a full-time staff of 160 and part-time staff of 80 individuals. The Operations Director is the City's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Operations Director position and supported by Public Works Director positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is

presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	No	
Zonings Ordinance(s)	Yes	Yes	No	
Subdivision Ordinance(s)	Yes	Yes	No	
Stormwater Management Program	Yes	Yes	No	
Floodplain Ordinance(s)	Yes	Yes	No	
Post Disaster Recovery Program and Ordinance(s)	No	No	-	
Real Estate Disclosure Ordinance(s)	No	N0	No	
Growth Management	Yes	Yes	Yes	
Site Plan Review Requirements	Yes	Yes	No	
Public Health and Safety Program and Requirements	No	No	Yes	
Environmental Protection Program and Requirements	Yes	Yes	Yes	
Planning Documents				

General or Comprehensive Plan	Yes	Yes	No	
Capital Improvement Plan	Yes	Yes	No	
Economic Development Plan	Yes	No	No	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	-	
Post-Disaster Recovery Plan	No	No	-	
Continuity of Operations Plan	No	No	-	
Public Health Plans	No	No	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	N/A	-	-	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes

Development Impact Fees for Homebuyers or Developers	Yes
Other	

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Director of Planning/City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Officer
Planners or engineers with an understanding of natural hazards	Yes	Full Time	City Engineer
Surveyors	No		
Personnel skilled or trained in GIS applications	Yes	Full Time	Engineering Department
Emergency manager	Yes	Part Time	Operations Director
Grant writers	Yes	Part Time	Communications Department

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	Engineering/City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS

	Participating?	Classification	Date Classified
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 12 policies were in force with total coverage of $3,502,000 and total written premium and FPF of $4,671 (FEMA, 2019).
- Herriman City does participate in the National Flood Insurance Program (CID # 490252), and the last FIRM map for the area was issued on 9/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	9 inches of snow	-	3/13/2019	-
Winter Storm	9 inches of snow	-	12/1/2018	-
High Country Estates Fire	Wildland Urban Interface Fire		2018	
Rose crest Fire	Also, had the 611 acres Rosecrest Fire in June 2012, lost multiple homes in the unincorporated county but all these fires were a direct threat to Herriman residents and infrastructure.	-	2018	-

Hail	1-inch diameter hail	-	8/23/2017	-
Thunderstorms and Flooding	Damage to the basement of a private residence	-	9/29/2014	
Thunderstorms and Flooding	Damage to Herriman High School from flooding	-	9/13/2014	
Winter Storm	10 inches of snow	-	12/19/2013	$40,000 in property damage
Thunderstorms and Flooding	In Herriman, floodwaters entered an apartment complex, impacting about 18 apartment units	-	9/14/2013	$100,000
Pinyon Fire	Wildland Urban Interface Fire	-	2012	-
Machine Gun Fire	Wildland Urban Interface Fire	-	9/19/2010	-
Hail	0.75-inch diameter hail	-	6/6/2010	-

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	1,101
Members of the community under 18 years old	13,012
Members of the community that identify as having disability status	1,308
Members of the community that speak English less than "very well"	481
Members of the community living below the poverty line	898
The number of mobile homes in the community	10
Members of the community without health insurance	2,100

Occupied housing units with tenants without a vehicle	78
Housing units without heating fuel	0

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Dam Failure: Herriman has a 20 million gallon open irrigation reservoir located at 14940 south 5390 west Herriman, which is classified as a dam by the State of Utah. The unlikely catastrophic failure of this storage reservoir would impact a residential area with the loss of property and the potential loss of life. Juniper Canyon Dams, Blackridge Reservoir Dam, and Kennecott Stormwater Dams all have potential flooding impacts on the area if a failure occurs. Any dam failures in other areas of Utah would have little impact on Herriman, except for the potential impact on water supplies.

Drought: Herriman City's semi-arid climate has large swings in temperature and precipitation amounts during any year and is susceptible to drought. The table below shows average temperatures and precipitation amount for Herriman City by month.

Table. Herriman City Average Temperature Table

Month	Temp. (min)	Temp. (max)	Temp. (avg)	Precipitation
January	-2°F	58°F	29°F	1.3"
February	5°F	66°F	35°F	1.1"
March	15°F	74°F	43°F	1.9"
April	21°F	90°F	50°F	2.1"
May	30°F	93°F	61°F	1.3"
June	39°F	100°F	70°F	1.4"
July	54°F	105°F	82°F	0.2"
August	46°F	103°F	78°F	0.5"

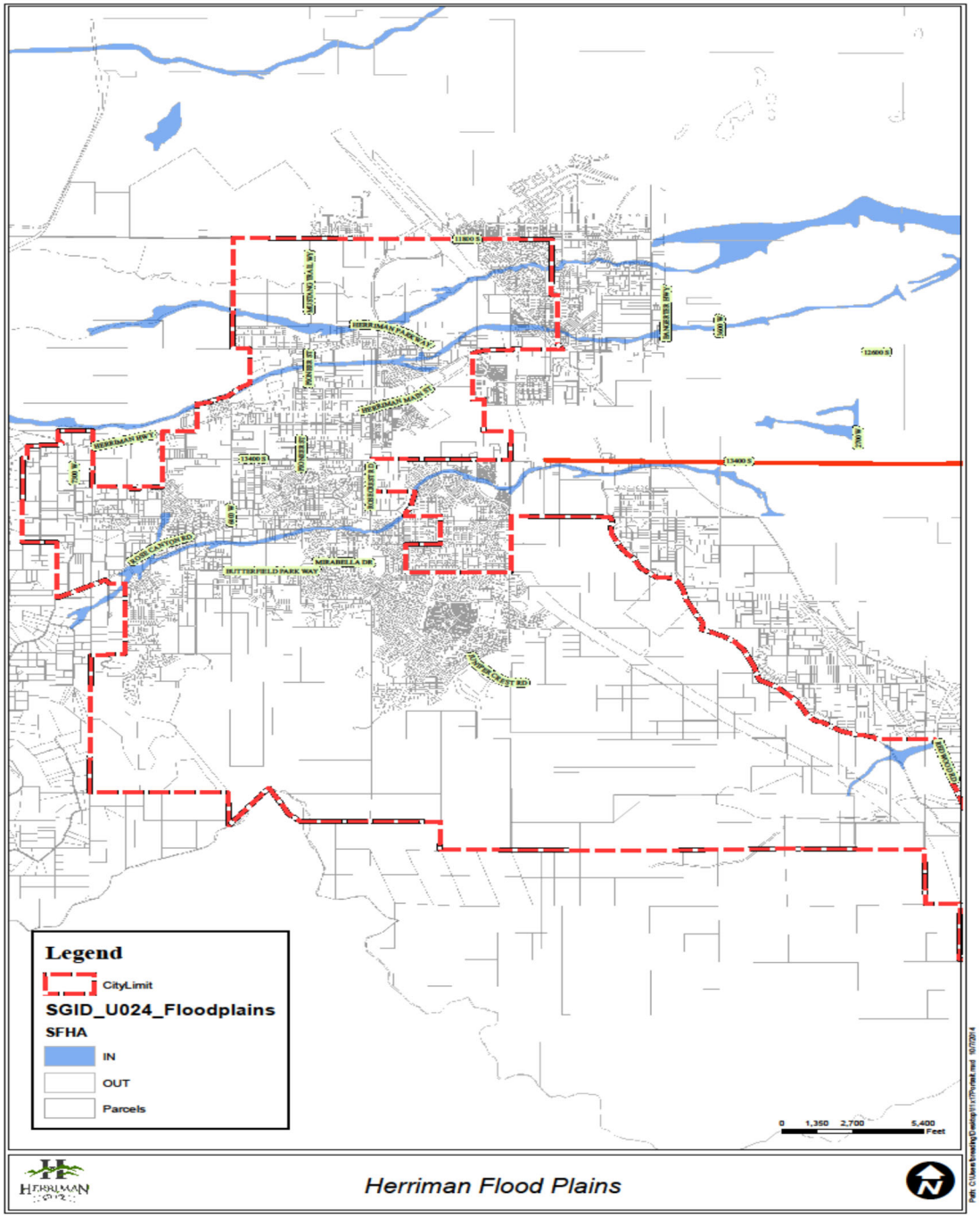
September	35°F	96°F	66°F	1.2"
October	27°F	86°F	52°F	1.4"
November	4°F	75°F	42°F	0.9"
December	0°F	59°F	29°F	1.4"

Earthquake: Of significant concern, many high priority public and private buildings and many critical infrastructure facilities are located within or across the major fault zones in the region. These facilities include very large waterlines, large irrigation canals, utilities, railroads, and major transportation routes. Additionally, high-pressure gas, four or more story housing complexes, underground utilities, road connectivity, bridges, Kennecott issues, and water tanks could all be affected. However, the potential damage is not limited to fault zone areas. Fine-grained, lake-bottom, and sediments are common throughout the Salt Lake Valley and are susceptible to liquefaction-induced ground failure during a large earthquake. Each incident may require a unique response from Herriman City, and in the instance of a major earthquake, outside assistance will be necessary. Perhaps the natural hazard with the potential for the most deadly outcome in Herriman is a high magnitude earthquake.

Flooding: Flooding in the area is considered urban or flash flooding, as riverine flooding is not a concern. Sheet flows across fields and sediment/debris basins at the canyons are prone to flooding. Although located in a semi-arid region, Herriman City is subject to thunderstorms and snowmelt flooding. Herriman has a history of small scale flooding almost annually. However, these flood sites are not typically in the Federal Emergency Management Agency (FEMA) defined flood hazard area, but rather, as sheet flow from significant storm events. These flood events generally follow areas of transition from open farm field or hillside to new development. New regulations have required new developments to adhere to standards and specifications to limit flooding concerns. Herriman has a significant area of foothills that also have a history of wildfires. These sloped burn scars are vulnerable to debris loaded high-intensity storm runoff

Herriman City does not have any repetitive loss properties due to flooding identified under the National Flood Insurance Program (NFIP). The city's Community Development Director oversees enforcement of floodplain management requirements adopted by the City, including regulating new construction in Special Flood Hazard Areas (SFHAs), floodplain identification, and mapping, including any local requests for map updates; and description of community assistance and monitoring activities.

Figure. The City of Herriman's Flood Zones

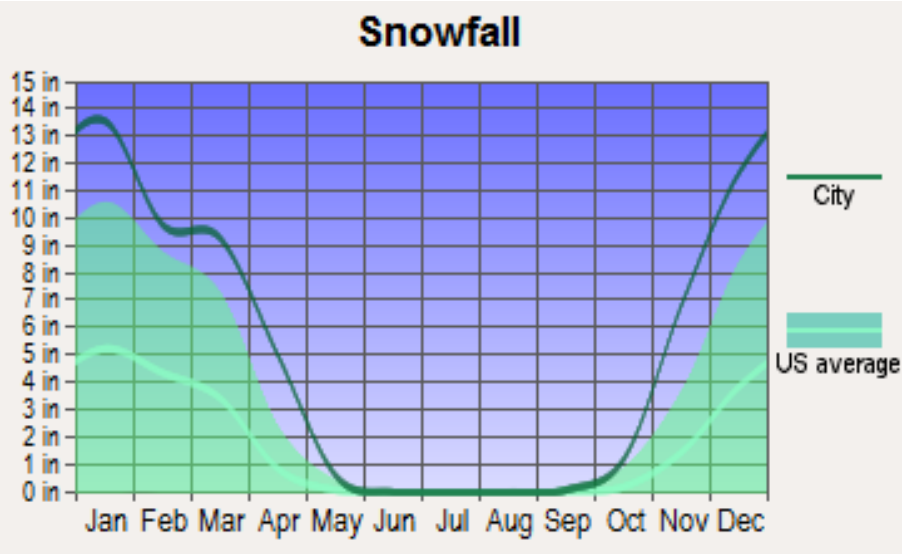


Landslide: Although Herriman has steep-sloped hills within its boundaries and within close proximity to its residents, the physical configuration internal to these features is largely soil impacted binding rock on top of solid rock. Therefore, the probability of a Landslide in Herriman only exists in Kennecott.

Winter Storms: Intense, snowstorms can have a dramatic effect on regional commerce, transportation, and daily activity and negatively impact all emergency response. Intense,

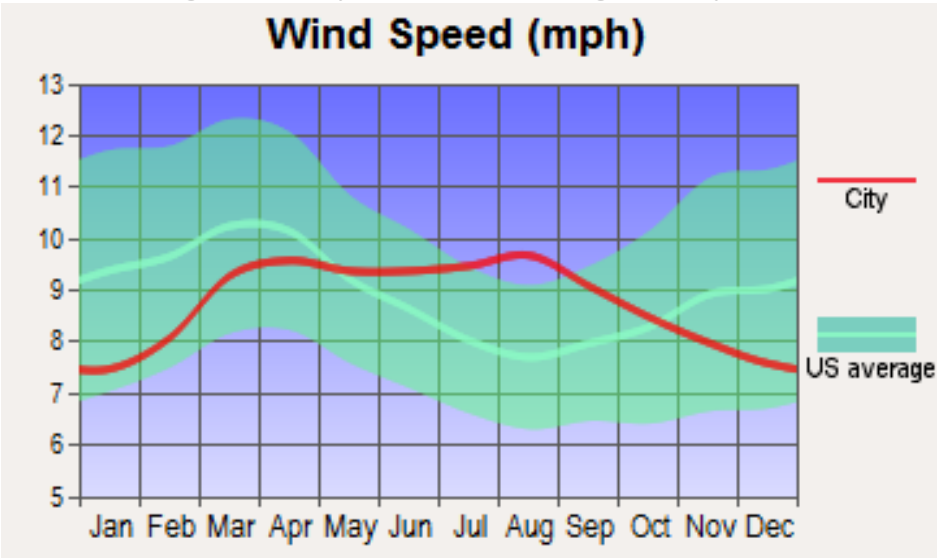
snowstorms can have a dramatic effect on regional commerce, transportation, and daily activity and negatively impact all emergency response.

Figure. The City of Herriman's Average Snowfall



Severe Weather and High Wind: The potential for severe weather is a reality in Herriman City and the surrounding region. The city incurs damage from extremely high winds, often called microburst winds, and the residents in mobile homes are particularly vulnerable to these events. Flash floods and lightning strikes (that could cause fires) can occur.

Figure. The City of Herriman's Average Wind Speed



Avalanche: Potential only exists along trails in the backcountry.

Radon: Radon is found throughout the city.

Public Health: Primary health concerns include algae in the Blackridge, the potential for a contaminated water supply, anti-vaccination supporters, as well as concerns regarding mental health issues within the community.

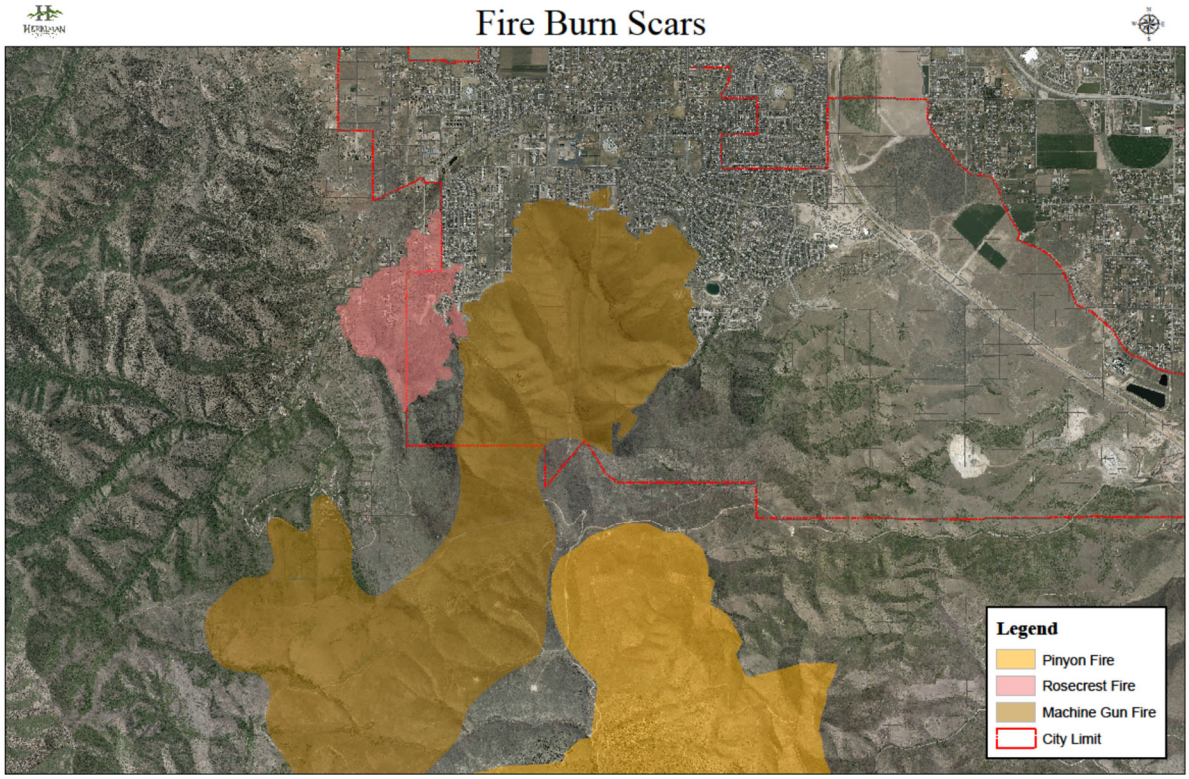
Cyber Attack: *The city continually manages and mitigates cyberattacks. Around 2014, a data breach in the school system occurred and the release of financial and juvenile information was a concern. Additionally, cyberattacks would most likely impact the city data server and access to water tank controls.*

Hazardous Materials Release: Multiple HAZMAT travel through or are housed in the city, including fluoride and chloride at the water storage sites, such as the Jordan Valley Water Conservancy District Plant. Kennecott, Camp Williams, and Mountain View Corridor haul materials through the City.

Terrorism: Active shooters are a concern for Herriman schools and government facilities. Additionally, the city is located close to an Army Base, NSA, and Kennecott, which could all be targets.

Wildfire: One of the most likely and significant hazards in Herriman City is the potential for damage and loss of life and property through fire events. Fires can occur within the urban fabric of the community or as wildfires in the hillside areas of the community and mountainous areas adjacent to the city. Each incident type will require a unique response. Obviously the most feared and damaging is a large scale wildfire. Unfortunately, Herriman has a history of wildfires occurring every few years.

Figure. The City of Herriman's Wildfire map



Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Wildfire	3	17	51
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	15	30
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Dam Failure	1	16	16
Tornado	1	11	11
Landslide and Slope Failure	1	9	9
Civil Disturbance	1	8	8
Avalanche	1	3	3

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	High	3		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Medium	2	2		Wildfire	Medium	2	4

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Medium	2	2		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Fire protection: Fuel mitigation in foothills to protect existing development. Install fire breaks, clear fuels in drainage, grazing, property acquisition to protect from new developments.	2019	Goal 1: Protect the lives, health, safety, and property of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildfire	Herriman City	TBD	High	High	State and Federal Grants	High	TBD	Fuel mitigation in foothills to protect existing development. Install fire breaks, clear fuels in drainage, grazing, property acquisition to protect from new developments.
Flash Flooding Protection	2019	Goal 1: Protect the lives, health, and safety of the citizens of	Dam Failure, Flood (Urban/Flash Flooding), Landslide/Slope Failure,	Herriman City	Dam Safety	Medium (Structure protection and life	High ($5,000,000)	State and Federal Grants	High	TBD	Construct debris basins in foothills above new developments.

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
		Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Hazardous Materials Release			safety protection)					

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
1 – Conduct an inventory and assessment of	2009	1 – Improve and maintain communications	All Hazards						Completed /Ongoing	Herriman continues to improve and maintain its

communications equipment and systems and identify needs		capabilities for emergency operations 1.1 – Improve communication capabilities								communications capabilities. Example: Upgrade and purchase 30 new radios and 12 HAM radios during the planning period
2 – Conduct Training and awareness activities on communication equipment, tools, and systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards						Completed /Ongoing	Herriman participates in training and exercises designed to practice using communication tools and equipment. Example: Monthly meetings at ST123 to conduct exercises.
3 – Establish agreements to share communications equipment between agencies involved in emergency operations	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards						Ongoing	No formal agreements exist to share communications equipment, but communications equipment can be shared as part of other mutual aid agreements that are in place
4 – Establish multi-agency notification capabilities and procedures for emergency personnel	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards						Ongoing	Herriman continues to work on notification tools and procedures to be in harmony with changing technology and equipment

2 – Establish redundancy for dispatch centers and other critical communications	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	All Hazards						Completed / Ongoing	Herriman relies on the Valley Emergency Communications Center (VECC) for dispatch services. They coordinate with other PSAPS to provide redundancy.
1 – Establish a coordinating group to address long-term communication needs and implementation strategies	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards						Ongoing	No formal coordinating group exists yet, but Herriman engages in discussions with other jurisdictions and the county regarding this issue
2 – Pursue and implement needed mutual-aid agreements	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All Hazards						Complete/ Ongoing/In Process	Herriman has a MAA for Police, Fire, and Public Works.
1 – Provide education regarding all natural hazards through live trainings, as	2009	5 – Increase citizen safety through improved hazard awareness	All Hazards						Completed / Ongoing	Herriman Emergency Management provides several public education classes for groups to

well as web-based, print and broadcast media		5.1 – establish a comprehensive public education program								discuss the hazards in the community and what residents can do to be prepared
2 – Incorporate information about cascading effects of hazards in education programs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All Hazards						Ongoing	Information is included in all presentations on the effects of cascading hazards
3 – Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All Hazards						Completed / Ongoing	Herriman education programs are customizable for all kinds of groups and available to all members of the community
4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All Hazards						Ongoing	Herriman GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city
5 – Coordinate with existing public education programs such as the American Red Cross,	2009	5 – Increase citizen safety through improved hazard awareness	All Hazards						Completed / Ongoing	Herriman has worked with Be Ready Utah and other programs to make presentations in Herriman and will

Ready, Set, Go!, Fire Adapted Communities or Firewise, Be Ready Utah, the National Weather Service, etc.		5.1 – Establish a comprehensive public education program								continue to invite them to events and other activities in the community
1 – Establish and enforce appropriate planning, zoning, and building code ordinances	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All Hazards						Completed / Ongoing	Herriman enforces all current ordinances and building codes, including ordinances like our Flood Damage Prevention and Land Disturbance ordinances.
2 – Ensure current hazard ordinances are available for viewing online	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All Hazards						Ongoing	Herriman is working on having the current hazard ordinances for viewing online
1 – Include dam inundation maps in current County, City, and Special Service District Emergency	2009	1 – Include dam failure inundation in future County and City planning efforts	Dam Failure						Ongoing	The inundation map for the dam at Black Ridge Reservoir is included in the City's Emergency Management Plans

Operations Plans		1.1 – Review current State dam safety information on all identified high hazard dams in the County								
1 – Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought						Completed / Ongoing	Herriman is working with Jordan Valley Water Conservancy District to provide materials on this topic
1 – Identify structures at risk to earthquake damage	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake						Ongoing	Herriman GIS, Fire and Emergency and Risk Management personnel are working on hazard and risk assessment on all structures in the city to evaluate their level of risk
2 – Encourage Communities to actively participate in NFIP	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	Flooding						Completed / Ongoing	Herriman actively participates in the NFIP

		1.2 Apply and become eligible to participate in the Community Rating System.								
1 – Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flooding						Completed / Ongoing	The City Engineer and Public Works Director regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed
2 – Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flooding						Completed / Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures Example: Significant construction efforts to ensure all the debris basins, flood retention ponds, energy dissipaters or other flood control structures are functioning
1 – Establish maintenance and repair programs to remove debris,	2009	1 – Protection of life and property before, during	Flooding						Completed / Ongoing	The Stormwater Division of the Public Works Department continues to maintain and repair

improve resistance and otherwise maintain effectiveness of stormwater and flood control systems		and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, stormwater systems, and flood control structures								all drainage systems in the City
1 – Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding						Completed / Ongoing	The City Engineering Division in cooperation with the Public Works Department regularly review and inspect City-owned infrastructure and make recommendations as needed
2 – Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding						Completed / Ongoing	The City Engineering Division in cooperation with the Public Works Department make repairs as needed to deficient structures
1 – Develop a protocol for working with State and Federal agencies in reducing the impact of post-	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope	Slope Failure						Ongoing	Herriman is working with State and Federal agencies in reducing the impact of post-fire debris-flow hazard

fire debris-flow hazard		failures following wildfires								
1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	Slope Failure						Ongoing	Herriman Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential
1 – Increase public awareness through "Firewise" program	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire						Ongoing	Herriman is working with the "Firewise" programs to ensure the public's safety in this matter and the Community Wildfire Protection Plan (CWPP) is under review.
2 – Educate homeowners on the need to create defensible space near structures in WUI	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	Wildland Fire						Ongoing	Herriman is – Educating homeowners on the need to create defensible space near structures in WUI
1 – Designate and promote county-wide annual initiative for clearing fuels	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.1 – Assist homeowners with creating	Wildland Fire						Ongoing	Herriman promotes county-wide annual initiative for clearing fuels

		defensible space near structures in WUI areas								
2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	Wildland Fire						Ongoing	Herriman Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week
1 – Work with experts and communities to develop or update evacuation plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	Wildland Fire						Ongoing	Herriman works with experts and communities to develop or update evacuation plans
2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire	Wildland Fire						Ongoing	Herriman is working on an adequate transportation network to support evacuation and emergency response

		response capabilities 2.2 – Improve evacuation capabilities for WUI areas								
1 – Identify all facilities, businesses, and residences, particularly in the areas, and assigned addresses according to current county addressing standards	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	Wildland Fire						Ongoing	Addressing of structures in Herriman has not been completed yet
2 – Incorporate improved addresses in fire-dispatch and other databases	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	Wildland Fire						Ongoing	Addressing of structures in Herriman has not been completed yet
1 – Reduce fuels around publically	2009	2 – Improve safety from wildfire hazards	Wildland Fire						Ongoing	Herriman is working on completing this

owned structures		through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects								
2 – Implement fire breaks and other protective measures	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire						Ongoing	Herriman Implements fire breaks and other protective measures
4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire						Ongoing	The Community Wildfire Protection Plan is currently under review (as of 11/2019)
2 – Define wildland-urban interface and	2009	2 – Improve safety from wildfire hazards	Wildland Fire						Ongoing	Herriman is working to define wildland-urban interface and

develop digital maps of the WUI		through planning, protective actions, and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI								develop digital maps of the WUI. These actions are being linked to the CWPP.
Drinking Water Trailer	2015	Consider purchasing a mobile, self-contained drinking water trailer. The trailer will be used to accommodate the residents' emergency needs for water.	Emergency Response	Herriman City Public Works Department and Police Department	The city will be providing the residents with the necessary water they will need for a time while other resources can help.	20,000	Water Department	Low	Ongoing	
Continue to Enforce Building Codes, Development Codes and Zoning Ordinance	2014	The Herriman City requires that construction complies with the adopted building codes and the zoning and development ordinances adopted by the City. The City has experienced tremendous growth since incorporation in 1999 and will	Earthquake	Herriman City Building Inspection Division, Herriman City Community Development Department, and Herriman City Engineering Division.	This will prevent the loss of human life and economic and property losses.	Developer-based funding under specific plan requirements	Developer-based funding under specific plan requirements	Medium	Ongoing	

		continue to grow in future years.								
Continue Utah Shakeout Activities to Promote Earthquake Awareness	2014	Herriman City participates in the Utah Shakeout activities annually. This event promotes earthquake awareness of the residents, businesses, and City employees. This annual event allows the City to practice setting up its Emergency Operation Center and its process of communicating with neighborhoods throughout the City.	Earthquake	Emergency Manager, Police Department, and the City's Emergency Preparedness Committee	This will prevent the loss of human life and economic and property losses.	$3,000 to $8,000 annually	City budget	High	Ongoing	
Continue to Enforce Storm Drain Master Plan Requirements	2014	The Herriman City requires drainage plans as part of the approval process for all specific plans and large development projects as determined by the City's Public Works Director and City Engineer. The master drainage	Flood	Herriman City Engineering Division and Herriman City Public Works Department	This will prevent the loss of human life and economic and property losses.	Developer-based funding under specific plan requirements	Developer-based funding under specific plan requirements	Medium	Ongoing	

		plan should consider cumulative regional drainage and flooding mitigation. The intent of a master drainage plan is to ensure that the overall rate of runoff from a project does not exceed pre-development levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans.								
Establish Firewise Community Program for Herriman	2014	The Herriman residential area, located next to Camp Williams is a Wildland Interface Zone and has a high potential for wildland fires. The City has worked with the community, Unified Fire	Wildfire	Herriman City Emergency Preparedness, Herriman City Public Works, Unified Fire Authority and State of Utah	This will prevent the loss of human life and economic and property losses.	$100,000 to $150,000	$216,000 Grant from the State of Utah	High	Ongoing	

		Authority and the State of Utah to put a program in place to educate residents and measures to reduce wildland fires in the area.								

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Completed	Herriman evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable Example: The development of a second/redundant radio system for the Police, Fire, and Public Works Departments
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	Completed	The inundation map for the dam at Black Ridge Reservoir is included in the City's Emergency Management Plans
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not Completed	Herriman does not have funding to support this type of program
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Completed	Due to the age of the City's public buildings (most having been built in the last 15 years) there are no major retrofit or rehabilitation projects needed at this time in Herriman

		1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure			
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	There are very few URM homes and businesses located in Herriman that would make this activity cost-effective for the City to engage in. Herriman supports county level efforts to share this type of information
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed/Not Applicable	Not applicable to Herriman as the referenced dam is located in another jurisdiction.
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Not Completed/Not Applicable	Herriman has been a participating community in the NFIP since 2008
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed/Not Applicable	Herriman does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed/Not Applicable	Herriman does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	Herriman has not developed a large event venue weather safety plan

		1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events			and/or evacuation procedures with the NWS
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions, and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	Herriman's water system meets and/or exceeds requirements for providing water flow for firefighting purposes in the City

2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of Holladay

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Julie Harvey Title: Municipal Emergency Management Planner Department: City Manager Address: 4580 S. 2300 E. Holladay, UT 84117 Office Phone: (801) 2728-9450 Cell Phone: (385) 377-7772 Email Address: jharvey@unifiedfire.org Website: http://cityofholladay.com/services/emergency-preparedness/	Name: Gina Chamness Title: City Manager Department: City Manager Address: 4580 S. 2300 E. Holladay, UT 84117 Office Phone: (801) 2728-9450 Cell Phone: (801) 699-0286 Email Address: gchamness@cityofholladay.com Website: http://cityofholladay.com/government/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation**: November 30, 1999. Subsequently, an area north and east of the original boundaries of Holladay were annexed into the City in October of 2002.
- **Current Population**: 30,697 (Census v2018)
- **Population Growth**: The population grew 1.9% from April 1, 2010 (30,127) to July 1, 2018 (Census).
- **Location and Description**: The City of Holladay is bounded South by I-215, on the west by Highland Drive to Van Winkle Expressway, Van Winkle Expressway to 1300 East, 1300 East to Murray-Holladay Road, Murray-Holladay Road, east to Highland Drive, Highland Drive north to 3900 South, 3900 Southeast to 2700 east, 2700 East south to 4430 South, east to Wasatch Blvd, south on Wasatch Blvd. to about 6710 South, west to Big Cottonwood Canyon Road and about 3000 East, west to I-215. The boundary east of Wasatch Blvd. at approximately 66th South to take in the Heughs Canyon area, which otherwise would have been isolated and landlocked.
- **Brief History**: On July 29, 1847, a group of pioneers known as the Mississippi Company, led by John Holladay, entered the Salt Lake Valley. Within weeks after their arrival, they discovered a free-flowing, spring-fed stream, which they called Spring Creek (near Kentucky Avenue). While most of the group returned to the Fort in the Great Salt Lake for the winter, two or three men-built dugouts along this stream and wintered over. Thus, this became the first village established away from Great Salt Lake City itself. In the spring, a number of families hurried out to build homes and tame the land. There were numerous springs and ponds here and grasses and wildflowers were abundant, making this a most desirable area for settlement. When John Holladay was named as a branch president for the Church of Jesus Christ of Latter-day Saints, the village took upon itself the name of Holladay's Settlement or Holladay's Burgh. As homes were built, commercial ventures developed, first at the intersection of Highland Drive and Murray-Holladay Road, with David Brinton's Mercantile Co-op and Brinton-Gunderson's Blacksmith Shop. As the community grew, businesses tended to move east of the intersection of Holladay Boulevard and Murray-Holladay Road, where more of the residents lived. Neilson's Store and Harper-Bowthorpe Blacksmith Shop were popular and well-frequented businesses for

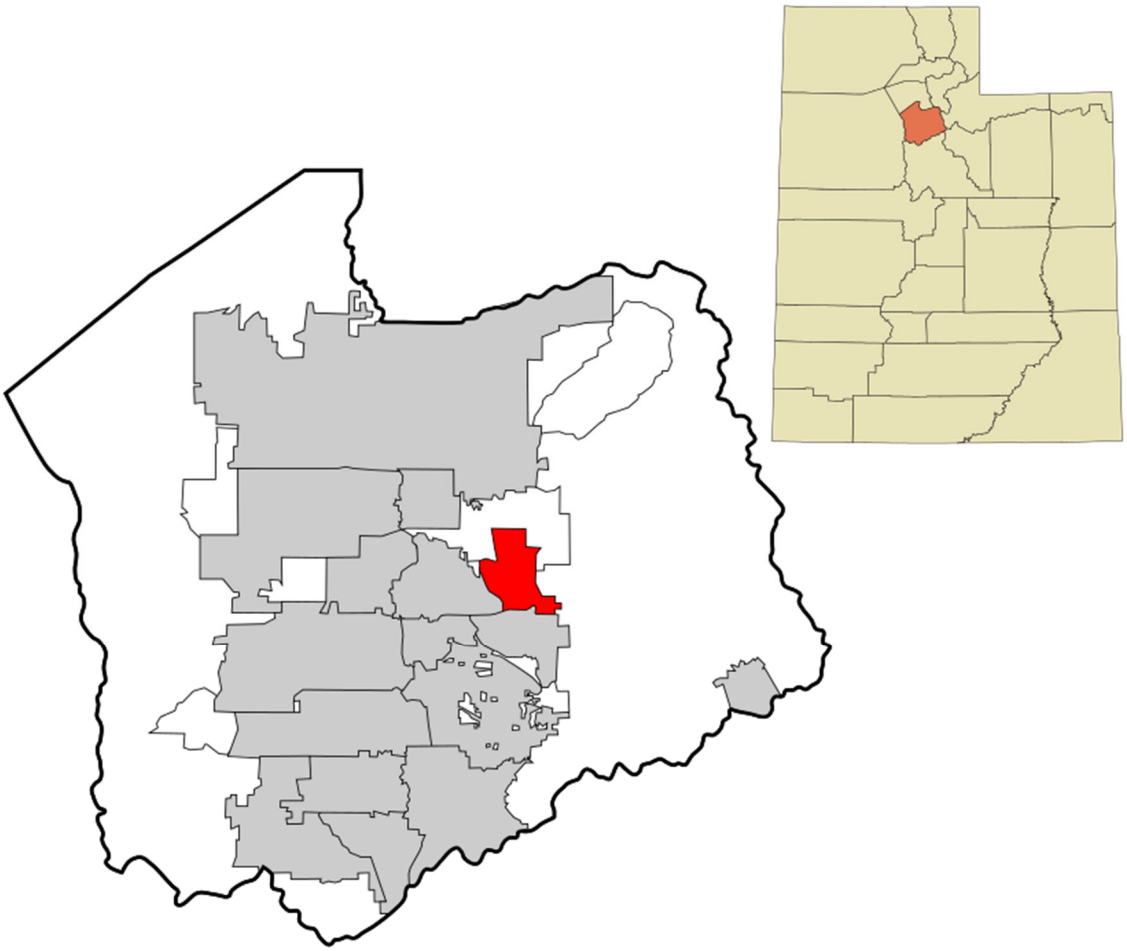
many years. Favorable conditions for agriculture, orchards and businesses allowed for continued growth over the years. The Holladay and Cottonwood communities were unincorporated areas of Salt Lake County and about 24 years ago efforts were made by a dedicated group of citizens to incorporate as a separate entity, but area citizens voted against incorporation by a narrow margin. Salt Lake County, the Utah Supreme Court and/or the Utah State Legislature frustrated subsequent efforts and citizens weren't allowed another incorporation vote until May 4, 1999. On that day, a better-informed and smaller citizenry voted by over 83% to approve incorporation and the City of Holladay was officially incorporated on November 30, 1999.

- **Climate**: The average high temperature is 92 and the average low is 24. Also, on average, the city receives 20 inches of rain and 52 inches of snow every year (Best Places).
- **Public Services**: One of the main reasons the city was incorporated was to control Planning and Zoning (City of Holladay). In addition to that department, the Emergency Preparedness program offers an emergency notification system and has multiple plans including a flood plain, preparing seniors, and a wildfire plan (City of Holladay).
- **Governing Body Format:** COUNCIL-MANAGER FORM OF GOVERNMENT
  In this form of government, a city manager is the chief executive officer of the city or town and has the following powers and duties prescribed by the state law, including the power to appoint individuals to municipal offices and positions. The city manager runs the day to day operations of the city and all employees report to this individual. The mayor in this form of government is a ceremonial mayor only. The mayor chairs the council and votes on all issues as a full voting member of the council. The council is the legislative policy making body of the city. The manager is hired and can be fired by the council. Council members may not have any administrative or executive functions in the city or town.
- **Development Trends**:
  - **Millrock Economic Development Area (EDA) Bond**.
    The City has a $8.474 million bond which helped reimburse the Developer to improve the retaining walls and water and sewer lines along with the Lion Lane connection to Millrock and to help for the purchase of the Knudsen Park property. The Lion Lane extension allowed Phases III and IV of Millrock Technology Park to be completed prior to the real estate crash in 2008. The bond has a 15-year term, which will be paid off in December 2020. The annual debt payment is $639,000. The entire amount of this debt is paid from the property tax increment generated from the Millrock EDA. (In other words, the EDA Project pays for itself. Without this bond, only Phases I and II would exist today.)

  - **City Hall and Fire Station Bond**
    The City has a $9.2 million bond debt from the purchase and remodeling of City Hall (the old Holladay Elementary School) and the construction of a new fire station. It is a 20-year bond, which will be paid off in 2031. The annual debt payment is $627,000. That debt is paid from the City's General Fund.

  - **Impact of the Cottonwood Mall Redevelopment**
    The redevelopment project has had little impact upon the City's property tax receipts, because of the multi-million-dollar investment in infrastructure has increased the assessed value of the land. The old mall was over 40 years old and fully depreciated. Thus, the City is still receiving about the same amount of property tax from the Cottonwood Mall as it did in 2007. As to sales tax, the City has clearly seen a decrease in the amount of sales tax, but it is difficult to determine how much of that decrease was due to the redevelopment of the Cottonwood Mall, and how much was due to the

global economic downturn that occurred at the very same time. City sales tax receipts are still down about 15% from what they were in at the peak in 2007, but the City has always had a balanced budget, and we are seeing a steady increase in sales tax receipts (Holladay City Community Development).



Capability Assessment

The city maintains a full-time staff of 16 and part-time staff of 6 individuals. The Emergency Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position and supported by the Planning and City Manager positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications

under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**The Codes, Ordinances & Requirements Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	
Zonings Ordinance(s)	Yes	Yes	
Subdivision Ordinance(s)	Yes	Yes	
Stormwater Management Program	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	
Post Disaster Recovery Program and Ordinance(s)	Yes	No	
Real Estate Disclosure Ordinance(s)	No	No	
Growth Management	Yes	Yes	Growth management is handled by zoning
Site Plan Review Requirements	Yes	Yes	
Public Health and Safety Program Requirements	Yes	Yes	Chapter 9.98; Adoption of Salt Lake County Health
Environmental Protection Program and Requirements	Yes	Yes	Various ordinances address different aspects of environmental protection.
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	In process	
Habitat Conservation Plan	Yes	No	
Economic Development Plan	Yes	Yes	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	Recently hired an EM who is working on it
Post-Disaster Recovery Plan	Yes	No	Recently hired an EM who is working on it
Continuity of Operations Plan	Yes	No	Recently hired an EM who is working on it

Public Health Plans	Yes	No	Recently hired an EM who is working on it
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	Recently hired an EM who is working on it

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Not eligible for block grants according to planning

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	3 full time (FT) planners 1 part time (PT) engineer	Planning
Engineers or professionals trained in building or infrastructure construction practices	Yes	1 PT engineer	
Planners or engineers with an understanding of natural hazards	Yes	3 FT planners 1 PT engineer	
Surveyors	Yes	Contract if needed	
Personnel skilled or trained in GIS applications	Yes	FT	Planning
Emergency manager	Yes	PT	City Manager Started December 2019
Grant writers	Yes	FT	City Manager

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Community Development Director
Who is your jurisdiction's floodplain administrator? (department/position)	Community Development Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No

Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes, but might be out of date due to improvements made post-2011 floods
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Unknown
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	Not currently

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

NOAA Natural Hazards 2014-2019

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction from 2014-2019. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 35 policies were in force with total coverage of $12,753,000 and total written premium and FPF of $34,855 (FEMA, 2019).
- The City of Holladay does participate in the National Flood Insurance Program (CID # 490253) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019). The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	Major winter storm event that closed schools in the area		2/2019	
Heavy Snow	4 inches in Holladay	-	3/1/2019	-
Winter Storm	11 inches in Holladay		3/3/2018	-
High Wind	Tree limbs were damaged across the Salt Lake	-	6/12/2017	$40,000 property damage.

	Valley, including a large branch that fell onto and damaged a home in Holladay.			
Hail	Hail the size of pennies	-	6/13/2016	-
Hail	Hail the size of pennies	-	5/19/2016	-
High Wind		-	4/13/2014	-
Winter Storm	Schools closed		2/2014	
Winter Storm	19 inches in Holladay	-	1/10/2013	-
Winter Storm	8 inches in Holladay	-	3/2/2012	-
Flooding	Heavy Rain - Big Cottonwood Creek	-	2011	-

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	5,544
Members of the community under 18 years old	7,812
Members of the community that identify as having disability status	2,667
Members of the community that speak English less than "very well"	670
Members of the community living below the poverty line	1,424
The number of mobile homes in the community	26*
Members of the community without health insurance	2,013
Occupied housing units with tenants without a vehicle	328
Housing units without heating fuel	21

**Census data may be incorrect regarding the number of mobile homes in the city.*

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are relevant and unique to the municipality.

Cyber Attack: A cyber-attack against government offices is always a potential threat. Adopting adequate safety processes and procedures, maintaining system security, having system and data redundancy, and developing policies and procedures are the first line of defense.

Dam Failure: The City of Holladay does not have any dams or debris ponds in the City. There are three small dams in Big Cottonwood Canyon that deliver water to the Big Cottonwood Creek, which flows through the City. Big Cottonwood Creek as has a debris basin on the creek just outside of Holladay in Cottonwood Heights Reservoir. These three dams and one debris pond are the responsibility of Salt Lake County Flood Control. The City of Holladay does not have any dams

or debris ponds in the City. There are three small dams in Big Cottonwood Canyon that deliver water to the Big Cottonwood Creek that flows through the City and a debris basin on the creek just outside of the City in Cottonwood Heights. These three dams and one debris pond are the responsibility of Salt Lake County Flood Control and the City does not have any responsibility for them.

Earthquake: Holladay sits on the Wasatch Front Fault Line. Of primary concern is the significant amount of unreinforced masonry (URMs) buildings in Holladay, including City Hall. The stability of City Hall could be enhanced through retrofitting. Additionally, educating residents on mitigation actions that can reduce damage during an earthquake is an urgent need. Seismic activity can potentially cause irrigation canal failures by either liquefaction of the bottom, collapse of the sides, or both. Several bridges are in need reinforcement or of retrofitting to culverts to preserve the transportation network. The City's use of irrigation canals as a storm water system may exacerbate damage during seismic activity. Fault zones pose the threat of earthquakes, while steep mountains adjacent to the City create a potential for landslides, debris flows, rock falls, and snow avalanches. Limited communication or lack of communication capabilities due to damaged infrastructure may occur during and after an earthquake. The City lacks public works equipment, which would be needed in the event of an earthquake. Some geologic hazards exist in the City of Holladay and the surrounding area, which can constrain land use. Of primary concern is the significant amount of unreinforced masonry (URMs) in the residential area and City Hall. The stability of City Hall could be enhanced through retrofitting and residents need more education on the potentially significant impact on URM homes. A canal failure is also a possibility for the area during seismic activity. Another concern is the lack of public works equipment in town, which would be needed in the event of an earthquake. Additionally, several bridges are in need of retrofitting to culverts to preserve the transportation network. The lack of a stormwater system is also a concern for drainage following any seismic activity. Active fault zones pose the threat of earthquakes, while steep mountains adjacent to the City create a potential for landslides, debris flows, rock falls, and snow avalanches. Limited communication or lack of communication capabilities is always a shortfall during an emergency.

Extreme Cold and Heat: The city has a large senior population, especially in the Cottonwoods area. The senior population is more at risk for adverse health impacts from extreme temperatures, especially when outdoors or during an extended power outage.

Flood: Although located in a semi-arid region, the City of Holladay is subject to cloudbursts and snowmelt floods. As mentioned in the earthquake section, several bridges need reinforcement or t to be rebuilt to culverts. Some of the bridges are: 6200 S, west of Holladay Blvd; and, Highland Rd at Big Cottonwood Creek. The Heughs Canyon -Cottonwood Canyon Cove area is prone to flooding. The City uses irrigation canals as also lacks a stormwater system and current facilities are limited mainly to historical laterals. Other hazards can increase flooding potential, including an earthquake or landslide that compromises infrastructure, such as a canal failure. Additionally, the bridges over the Old Canal System are potential flood hazards and needs to be repaired or retrofitted to reduce infrastructure damage. Some of those canals are: Salt Lake Canal at 5600 S, west of Highland Rd and the Upper Canal.

Hazardous Materials Release: I-215 runs north to south on the east side of Holladay thousands of vehicles pass through the city daily. It is difficult to know what types of hazards may be released from a transportation vehicle so the city will focus on having a reliable and redundant communication system and an evacuation plan to safely move citizens away from a hazard as quickly as possible.

Landslide: The areas most susceptible to landslides are the Heughs Canyon-Canyon Cove area and Wasatch Boulevard.

Public Health Epidemic/Pandemic: According to the Healthy Salt Lake website, less than 43% of the adult population in the City of Holladay receive an influenza vaccination. The lack of vaccinations could lead to a population decimating outbreak.

Radon: High level of radon in the community. The community needs more education on radon

Severe Weather: Microbursts have caused tree damage on properties. Additionally, Holladay Blvd. and Wasatch Blvd. are prone to impact from these events due to the significant number of trees. Power lines are also not buried and prone to wind damage.

Terrorism: While an isolated incident of terrorism could impact any of the schools, businesses, or government offices in the city, the likelihood of mass terrorism is unlikely due to there being no large-scale athletic venues, government buildings or similar locations where an act of terrorism typically occurs.

Tornado and High Winds: The city has a large number of old trees, which are susceptible to wind events.

Wildfire: The Cottonwood Canyon Cove is considered a wild urban interface (WUI). Of particular concern are the narrow private driveways and roads and low water pressure in the Cottonwoods Area, which makes fighting a fire harder. Better landscaping and improved building materials that are more fire-resistant are needed.

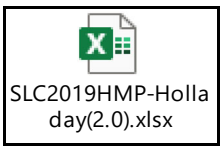
Winter Storms: Snowstorms can have a dramatic effect on regional commerce, transportation, trees, and daily activity and are a major forecast challenge for local meteorologists.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Wildfire	2	15	30
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Landslide and Slope Failure	2	10	20
Dam Failure	1	18	18

Tornado	1	11	11
Civil Disturbance	1	11	11
Avalanche	1	3	3

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.


SLC2019HMP-Holladay(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Medium	2	2		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Medium	2	2		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Bury power lines.	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Holladay	Utilities	High	High	HMA/PDM Grant or other federal funds	Medium	2030	Microbursts and heavy early snow fall (before the leaves have fallen) have caused tree damage and potentially can affect powerlines. Holladay Blvd., Wasatch Blvd, and Holladay Rd. are prone to impact from these events due to the significant number of trees.
Develop a robust cyber security program, incorporating components of the NIST Cybersecurity Framework	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 5: Ensure and promote ways to increase	Cyber Attack	Holladay	IT Contractor	High	Medium	Local Budget	High	2 years	

		government and private sector continuity of services during and after a disaster.									
Increase adult influenza vaccination rates to the Healthy Salt Lake target rate. Currently the rate is 70%	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Public Health Epidemic/ Pandemic	Holladay	SLCo Public Health	High	Medium	Grants, local budget	High		
Develop an outreach program to encourage residence to strengthen structures that are built of unreinforced masonry.	2019	Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more	Earthquake	Holladay		Medium	Low	Local Budget	High	1 year	

		resilient to disasters.									
Road surface improvements	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-hazards	Holladay		High	High	Grants, GO Bonds, Stormwater Fee, Property tax	High	2020-2030 (10 Years)	
Retrofit City Hall	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 5: Ensure and promote ways to increase	Earthquake	Holladay		High	High	HMA/PDM Grant or other federal funds	High	2030	Portions of the building are unreinforced and/or could be seismically retrofitted.

		government and private sector continuity of services during and after a disaster.									
Canal bank stabilization (such as, but not limited to: netting and/or wire mesh)	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flooding	Holladay	Upper Canal Water Co.	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Long-term	Ongoing water loss through the bottom of the canal leads to compromised soil integrity. Saturated and compromised soil will be at a greater risk of liquefaction during a seismic event

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Continue to encourage water conservation utilizing and promoting Jordan Valley Water Conservation outreach material, information from Salt Lake City Department of	2009	Goal 1Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Drought	Holladay Emergency Management		High	Low	Local	High	Ongoing	Reduce hardships associated with water shortages. Limit unnecessary consumption of water throughout the City.

Public Utilities and the State of Utah's "Slow the Flow" program.											
Develop outreach document specific to fire resistant natural vegetation.	2009	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Drought	Holladay Emergency Management		High	Low	Local	High	Ongoing	Study the areas and determine which fire-resistant natural vegetation can be used in these areas of concern.
Assess current communications and interoperable emergency/warning systems.	2009	Goal 3 Enhance and protect the communication and warning/notification systems in the County	Earthquake	Holladay Emergency Management	Communications	Medium	Low	Local	High	Ongoing	Increase and harden emergency and non-emergency communication systems. Provide redundancies in communication systems. Valley Emergency Communications Center (VECC) has been working with cities in the county to update communications, focusing on specific systems, which has included some or all of the following capabilities: • Radio system updated for 800 MHz, Ultra-High Frequency

											(UHF), Very High Frequency (VHF) and Amateur frequencies. • Agency listing with gateway devices, which enable disparate communications systems to link. • VECC paging server capability to text message multiple units/personnel. • Listing of Public Safety Satellite telephones in the County. VECC Dialogic Emergency Notification System, a reverse 911 system used to notify public or for notification of response agencies.
Ensure current natural hazard ordinance(s) are online, linked to Emergency Services website, and easily accessible and can be download. Provide personal, CERT and amateur radio	2009	Goal 7 Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Earthquake	Holladay Emergency Management	Planning and Zoning	High	Low	Local	High	Ongoing	The City of Holladay is part of the countywide earthquake loss reduction and safety education programs. Improve public education regarding earthquake risks and train Community Emergency Response Teams to improve quality of public

training for the citizens of the City.											response to an earthquake.
The City of Holladay is participating in NFIP (National Flood Insurance Program).	2009	Protection of life and property before, during, and after a flooding event. Encourage participation in the National Flood Insurance Program	Flood	Holladay Emergency Management		Medium	Low	Local	Medium	Ongoing	
Update & digitize floodplain maps.	2009	Protection of life and property before, during, and after a flooding event. Provide current FIRMs for emergency planners.	Flood	GIS	Holladay Emergency Management	Medium	Low	Local	Medium	Ongoing	
Develop protocol for working with State and Federal agencies in developing impact of post fire debris flow hazard.	2009	Reduce or eliminate the threat of landslide damage. Reduce the threat of landslides/debris flow following wild fires.	Landslide	Holladay Emergency Management	Fire and Planning and Zoning	Medium	Low	Local	Medium	Ongoing	
Create outreach materials (what to do when severe weather strikes) specific to this group and insert the information the into City-wide newspaper, and	2009	Reduce the threat of life loss due to severe weather. Address Citywide needs of special populations that may be impacted	Severe Weather	Holladay Emergency Management		Medium	Low	Local	Low	Ongoing	The City of Holladay is part of Unincorporated Salt Lake County outreach program with materials for severe weather mitigation planning.

phone books specific to 55 age group developed by County Aging services.		by severe weather conditions.									
Encourage avalanche preparedness for backcountry users.	2009	Reduce the threat of life loss due to severe weather. Prevent damage to critical facilities from Lighting.	Severe Weather	Holladay Emergency Management		Medium	Low	Local	Medium	Ongoing	The City of Holladay does not have avalanches.
Public awareness through "Fire Wise" programs.	2009	Wildfire community education. Reduce overall risk from wild fire through education programs.	Wildland Fire	Holladay Emergency Management	Fire	Medium	Low	Local	High	Ongoing	This objective has been partially accomplished by the development and implementation of the Regional Wildfire Protection Plan that the County participated in. The City of Holladay is part of the Unified Fire Authority in Salt Lake County and is included in the ”Fire Wise” planning process.
Create defensible space.	2009	Wildfire community education. Educate homeowners on the need to create open space free of burnable fuels near structures in urban wild land areas.	Wildland Fire	Fire	Holladay Emergency Management	High	Medium	Local and HMA grants	High	Ongoing	The Regional Wildfire Protection Plan has been a catalyst for the City of Holladay’s building ordnances in these areas and encourages the creation of a defensible space on all properties next to wildlands.
Continue to support and take part in annual Utah Shakeout exercises	2014	Goal 1 Protect the lives, health, and safety	Earthquake	Emergency Manager, Emergency Manage		High This will help to	Local - $2,000 annually	City budget	High	Ongoing	The City continues to enforce building codes on new construction and encourages upgrades on

to promote earthquake awareness.		of the citizens of Salt Lake County before, during, and after a disaster.		Committee, Police Department, Fire Department, and Citizen Corps.		prevent the loss of human life and property losses when a major earthquake occurs.					all remodels. The City participates in the annual Utah Shakeout activities. This event promotes earthquake awareness for the residents, businesses community and City employees. The Shakeout allows the City to practice setting up its Emergency Operation Center and its process of communicating with neighborhoods and business throughout the City. The community volunteers are encouraged to practice C.E.R.T. skills and amateur radio license operators are asked to set nets to practice their skills.
Continue to enforce building codes, development of new codes and zoning ordinances as needed or state codes are updated.	2014	Goal 7 Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Earthquake	City of Holladay Community Development Department.		High This will prevent the loss of human life and economic and property losses	Low - Developer-base funding under specific plan requirements.	Developer-base funding under specific plan requirements.	High	Now and long term	The City requires that construction complies with the adopted building codes and the zoning and development ordinances adopted by the City. A potential natural hazard covered by this mitigation action is earthquake.
Continue to execute training and exercise programs	2014	Goal 6 Advocate, support, and promote the	Earthquake	Emergency Management Committee		High	Low - Less than $1,000 annually	City budget	High	Ongoing	The City of Holladay regularly administers training and participates

		continued coordination and integration of disaster planning efforts throughout the County.				This will help prevent the loss of human life and property losses					in exercises. These events provide participants with opportunities to learn of duties and practices that would be used during a real life major emergency or disaster situation. Coordination of operations would be exercised and allow Holladay Emergency Management to identify the areas of higher and lower performance and how to best improve their efforts.
Educate residents and business through public information and events	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Earthquake	Emergency Management Committee and Citizen Corps Council		Medium This will help prevent the loss of human life and property losses	Low - Less than $1,000 annually	City budget	Medium	Ongoing	The City of Holladay takes great care to get the appropriate information out to the residents and businesses in the community. Through news media and the City web site information on preparedness distributed. The City also encourages the community to attend one or more of the many emergency preparedness fairs that are held in the valley.
Continue to work Salt Lake County Flood Control.	2014	Goal 6 Advocate, support, and promote the continued coordination and	Flooding	City of Holladay, Salt Lake County Public Works and Salt		Medium - This will help to prevent the loss of human life	Low - $10,000 annually	City budget	Medium	Ongoing	The City contracts with Salt Lake County Public Works for flood control. They are the responsible agency for the maintenance of the Big

		integration of disaster planning efforts throughout the County.		Lake City Department of Public Works		and property losses when a major or minor flooding occurs.					Cottonwood Creek and Salt Lake City Department of Public Utilities is responsible for the maintenance of the Salt Lake Jordan canal. The City is responsible for the maintenance of Upper Canal. The City has staff that maintains the Upper. Salt Lake Public Works under contract work with other potential flooding from heavy rainstorms in the City
Continue to enforce building codes/water disposal codes	2014	Goal 7 Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Flooding	City of Holladay Community Development Department.		High This will prevent the loss of human life and economic and property losses	Low - Developer-base funding under specific plan requirements.	Developer-base funding under specific plan requirements.	High	Ongoing	The City requires that construction complies with the adopted building codes and the zoning and development ordinances adopted by the City. A potential natural hazard covered by this mitigation action is flooding.
Continue enforce development codes	2014	Goal 7 Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Flooding	Community Development Department		High This will help prevent the loss of human life and property losses	Low - Less than $1,000 annually	City budget	High	Ongoing	The City of Holladay regularly reviews potential flooding hazards

Educate residents and business through public information	2014	Goal 5 Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	Flooding	Community Development Department		Medium - This will help prevent the loss of human life and economic and property losses.	Low - Less than $1,000 annually	City budget	Medium	Ongoing	The City of Holladay takes great care to get the appropriate information out to the residents and businesses in the community. Through news media and the City web site information.

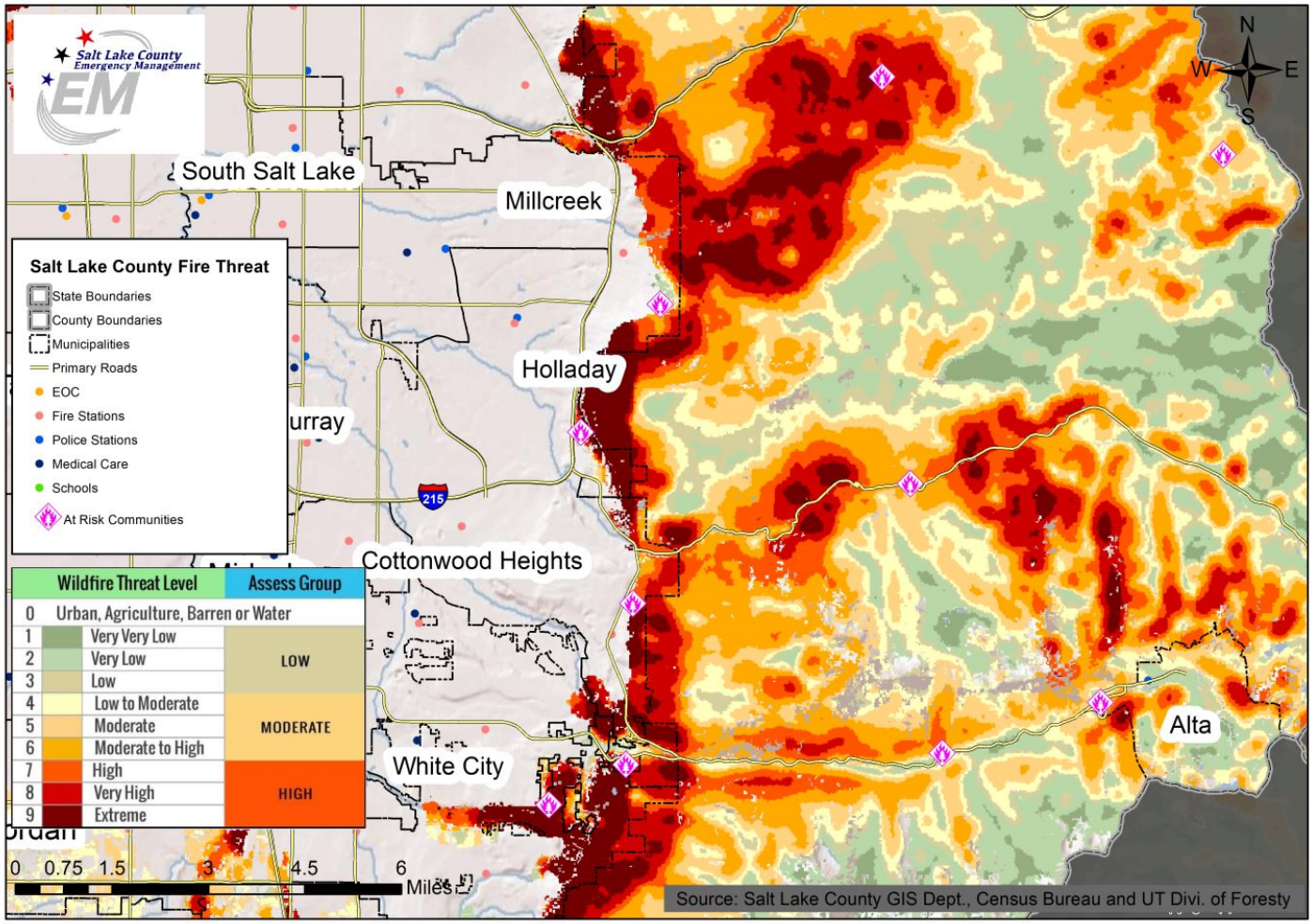
Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal/Objective	Action	Status	Comments
Earthquake	2009`	Increase and harden emergency and non-emergency communication systems. Priority HIGH Ensure adequate coordination of disaster response and recovery activities.	Increase and harden emergency and non-emergency communication systems.	Completed	
Earthquake	2009	The information was updated by the Utah Geological Survey and provided to the City. Portions are available in the Statewide Geographic Database rather than on County GIS. The Central Utah Water Conservancy District has developed GIS based maps of the Red Butte Dam area in northeastern Salt Lake County that identifies earthquake hazards from ground shaking (peak ground acceleration), fault rupture, liquefaction, and landslides for both the 500 year and 2,500 year seismic events.	Update current earthquake maps (liquefaction and fault) and incorporated into the County GIS system. The City of Holladay has access to the County GIS system.	Completed	
Flood	2009	Protection of life and property before, during, and after a flooding event. Priority MEDIUM, Identify Citywide canal systems.	Map and assess for structural integrity canal systems in the City.	Completed	
Flood	2009	Reduce threat of unstable canals throughout the City. Priority LOW, identify dry dams/reservoirs that may have the potential for failure.	Map and assess for structural integrity canal systems in the City.	Not Relevant.	

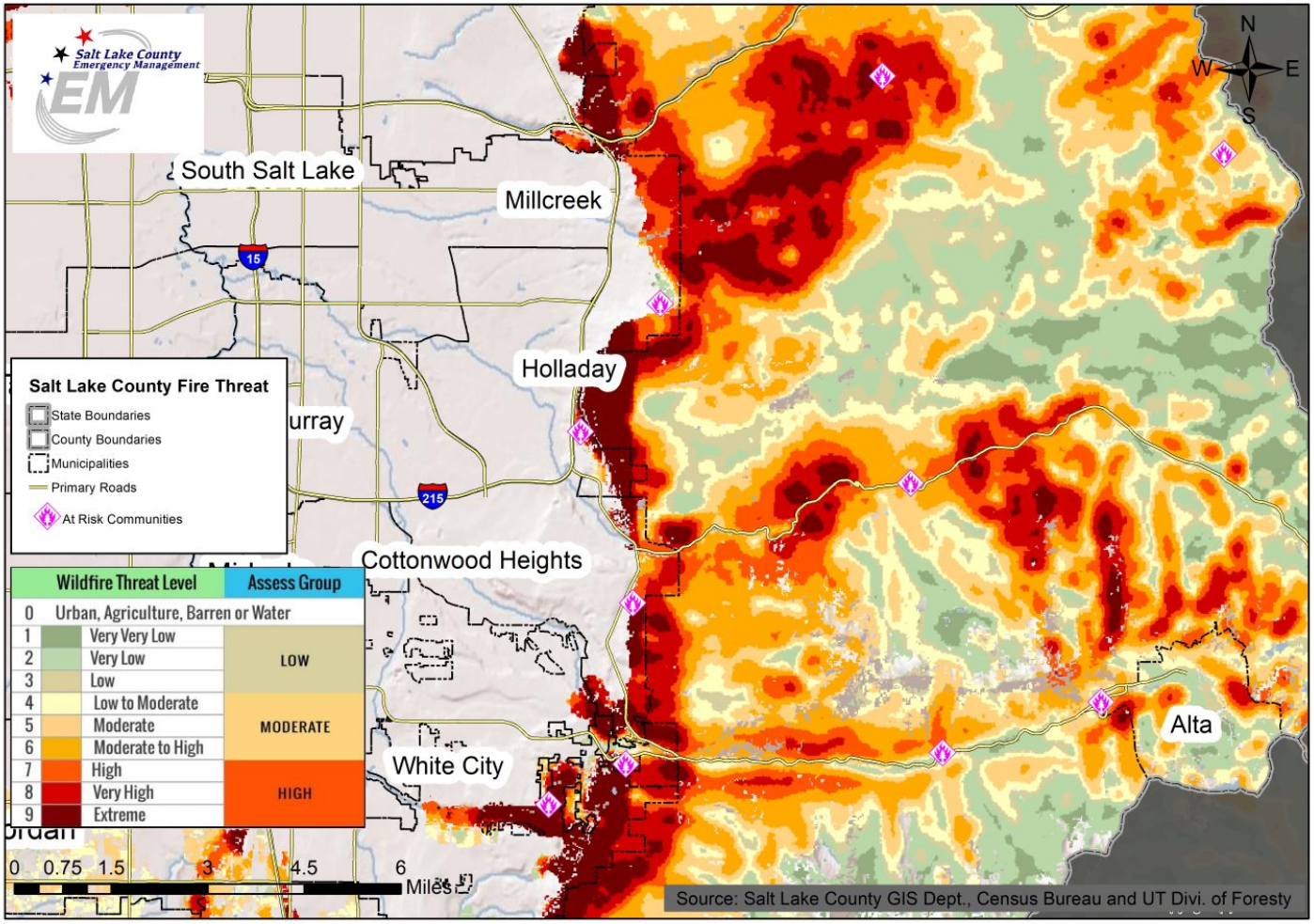
Landslide	2009	Reduce or eliminate the threat of landslide damage. Priority MEDIUM Monitor historical landslide areas.	There are no historical landslide areas in the City.	Completed	
Landslide	2009	Reduce or eliminate the threat of landslide damage. Priority MEDIUM, Improve public awareness regarding high-risk landslide areas.	There are no historical landslide areas in the City.	Completed	
Severe Weather	2009	Reduce the threat of life loss due to severe weather. Priority LOW. Become National Weather Service (NWS) “Storm Ready Community”.	Contact NWS/SLC Office and begin process of becoming a Storm Ready Community.	Completed	The City of Holladay participates in the Storm Ready Community program. The City qualifies as participating by contracting with unincorporated Salt Lake County as part of their program.
Severe Weather	2009	Reduce the threat of life loss due to severe weather. Priority LOW. Become National Weather Service (NWS) “Storm Ready Community”.	Contact NWS/SLC Office and begin process of becoming a Storm Ready Community.	Completed	The NWS, national weather system and the Utah Department of Transportation cooperate to provide this information.

Jurisdiction Maps

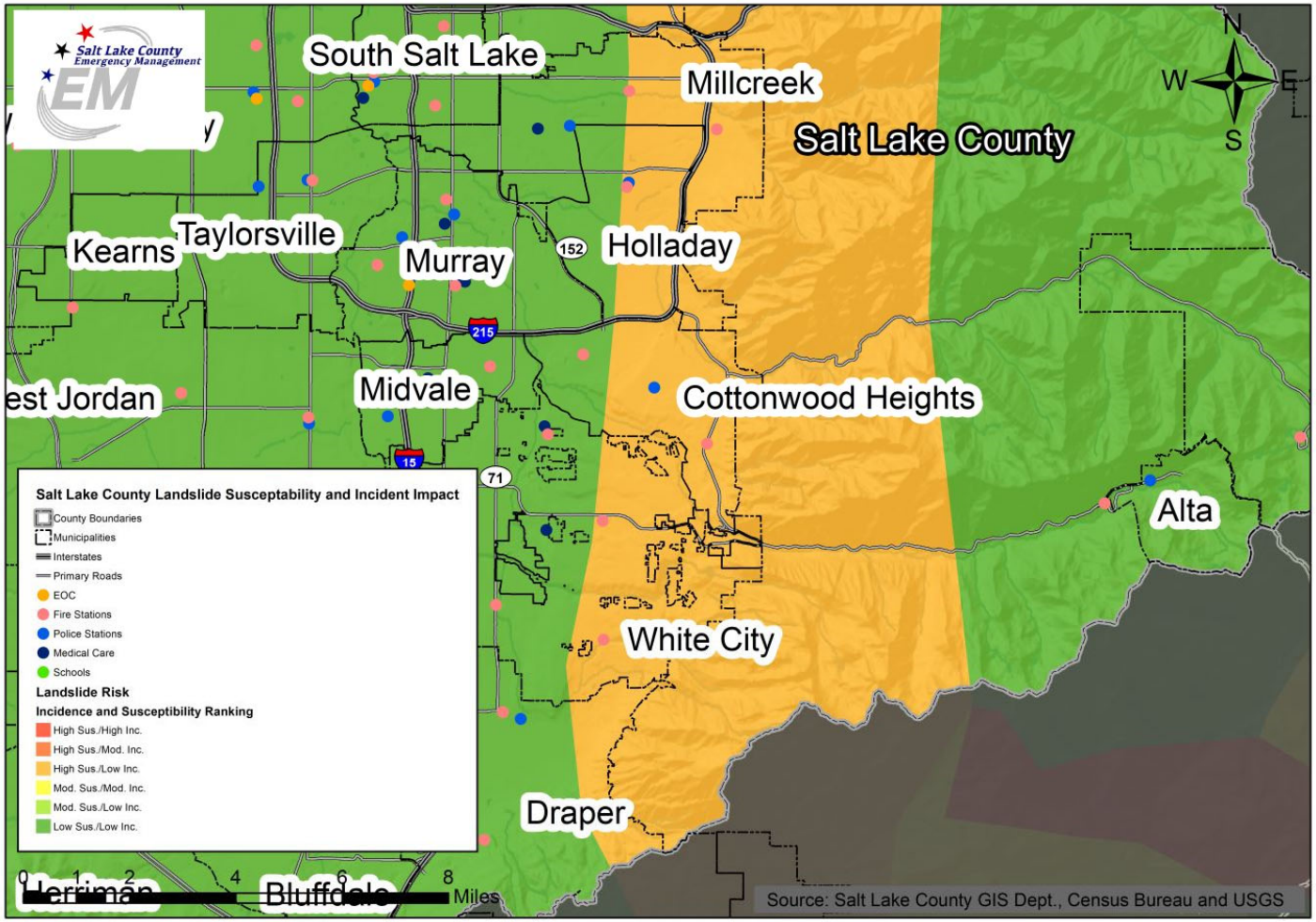
Map: Wildfire Threat Level with Critical Facilities



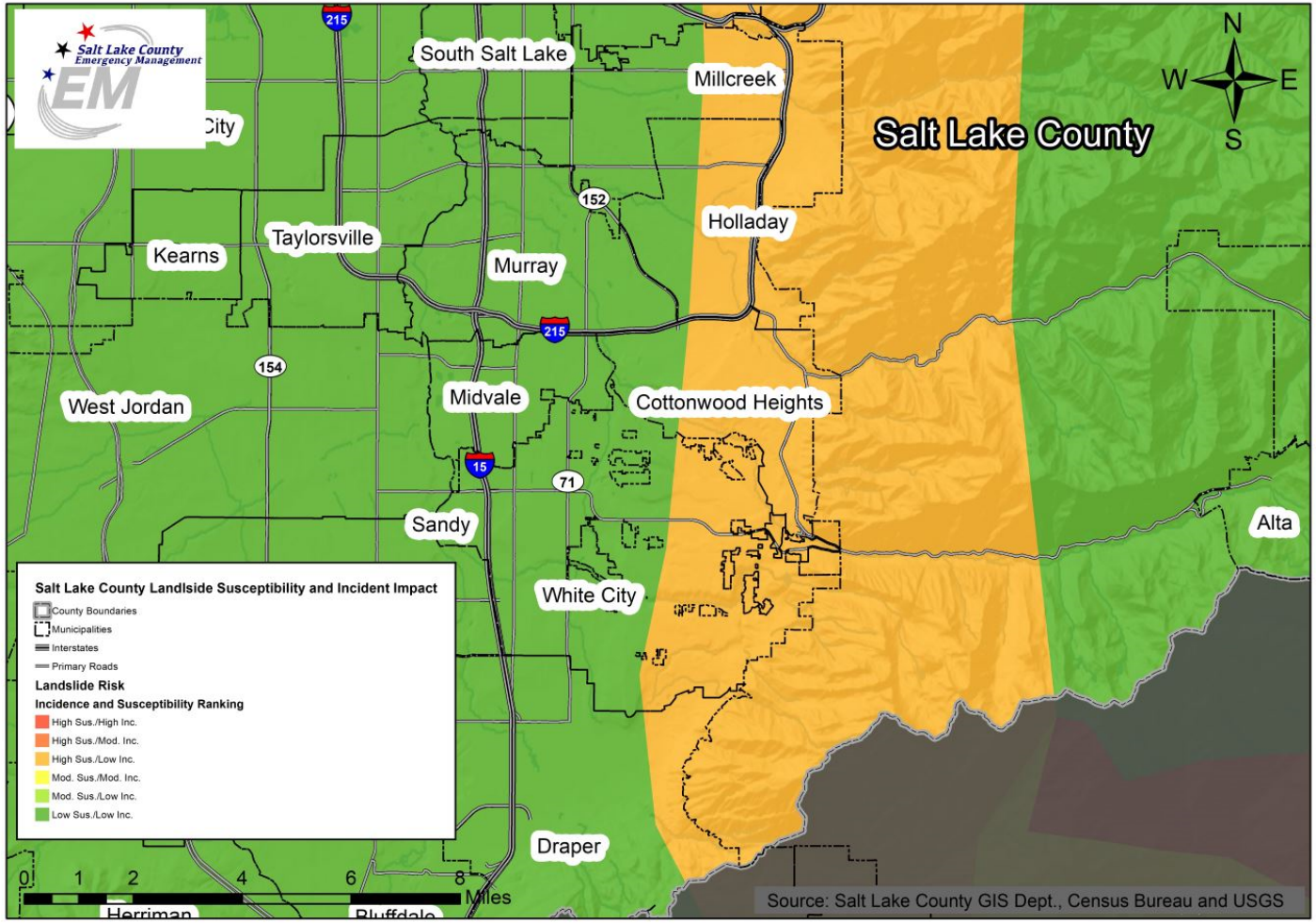
Map: Wildfire Threat Level



Map: Landslide Susceptibility and Incident Impact Potential



Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Midvale City



Hazard Mitigation Plan Point of Contact

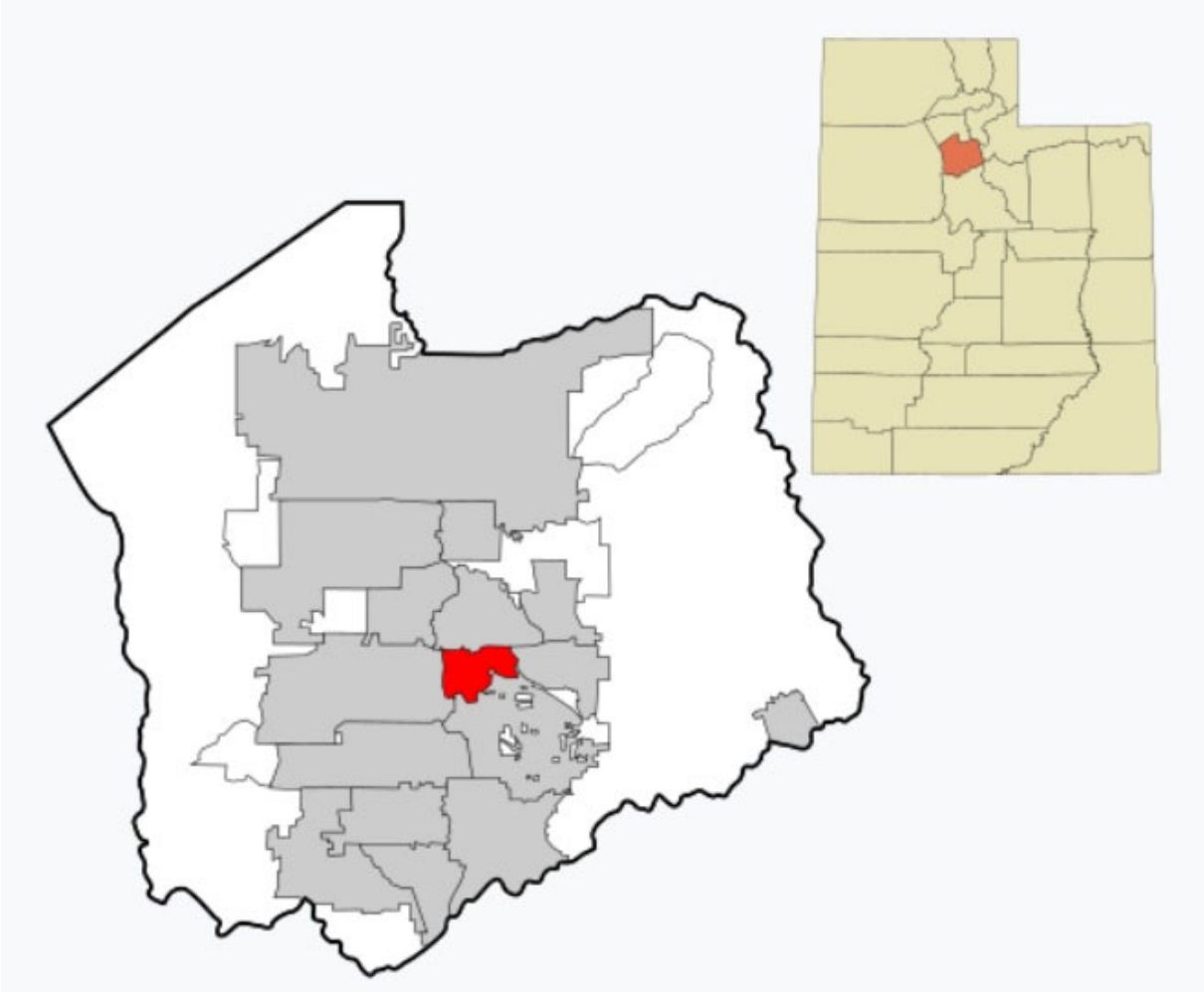
Primary Point of Contact	Alternate Point of Contact
Name: Bryce Haderlie Title: Assistant City Manager and Admin Director Municipal Emergency Management Planner Department: Midvale Address: 7505 S Holden St Midvale, UT 84047 Office Phone: 801-597-5160 Email Address: brycehaderlie@gmail.com Website: https://www.midvalecity.org/departments/emergency-management	Name: Julie Harvey Title: Municipal Emergency Management Planner Department: Unified Fire Address: 7505 S Holden St Midvale, UT 84047 Office Phone: 907-229-8284 Email Address: jharvey@unifiedfire.org Website: https://www.midvalecity.org/departments/emergency-management

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Current Population:** 33,636 (Census v 2018)
- **Population Growth:** The population grew 20.1% from April 1, 2010 (27,999) to July 1, 2018 (Census).
- **Location and Description:** Midvale City is located in the middle of the Salt Lake Urbanized Metropolitan Area comprising the Wasatch Front just twelve miles south of downtown Salt Lake City and some fifteen miles from four mountain resorts defined as Ski City.
- **Brief History:** The eastern part of the city started as an agricultural neighborhood, and the western areas formed mining and milling settlement, each relying on the other for sustenance, protection, social interaction, and commerce. The area was then known as Bingham Junction, and was an important midpoint along the rail between mining in Little Cottonwood Canyon to the east and Bingham Canyon to the west. With the discovery of silver in Little Cottonwood Canyon and in Bingham Canyon, new people rushed to be a part of the growing business and industry located in the middle valley in Midvale City. Along with industry came the hotels, boarding houses, saloons, schools, and the people who made Midvale City's Old Town a center of the community(Midvale).
- **Climate:** The average high temperature is 93 degrees and the average low temperature is 24 degrees. On average, Midvale receives 18 inches of rain and 42 inches of snow a year (Best Places).
- **Public Services:** Midvale City began the Community-Building-Community Initiative (CBC) in 1998 to improve the general well being of Midvale residents. The CBC is a collaborative effort that brings together the stakeholders in the Midvale community, including the residents, in the planning process.
- **Governing Body Format:** Midvale City operates under a traditional form of government and is a City of the third class as determined by Utah law. Hence, it is governed by a six-member Council comprised of five Council Members and a Mayor. The Mayor votes only to break a tie-vote of the Council. The Mayor serves as the Chief Executive Officer and the City Manager serves as Chief Administrative Officer overseeing the day-to-day administrative functions of the City.

- **Development Trends:** Midvale City is over 100 years old, but has experienced hundreds of millions of dollars in new investment these past few years. Within the six square miles comprising Midvale, there is a lot of activity. It's home to a growing population of over 33,000 residents, some 1,300 businesses, and a "day-time" population estimated around 25,000 workers. There are numerous retailers who take advantage of the strategic location that defines Midvale with its unparalleled access to the regional transportation system and its established trade areas. It's home to many top-performing locations, first in-state retailers, mom and pop shops, and one of kind locations (Midvale).



Capability Assessment

The Emergency Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position and supported by the Planning and City Manager positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below.

Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**The Codes, Ordinances & Requirements Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	
Zonings Ordinance(s)	Yes	Yes	
Subdivision Ordinance(s)	Yes	Yes	
Stormwater Management Program	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	
Post Disaster Recovery Program and Ordinance(s)	Yes	No	
Real Estate Disclosure Ordinance(s)	Yes	No	
Growth Management	Yes	Yes	Through Zoning Laws
Site Plan Review Requirements	Yes	Yes	Throughout the code
Public Health and Safety Program Requirements	Yes	Yes	Uses Salt Lake County
Environmental Protection Program and Requirements	Yes	Yes and No	Different ordinances address different aspects of protecting the environment; there isn't a code
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	No	
Habitat Conservation Plan	No	No	
Economic Development Plan	Yes	Yes	Addressed in the General Plan

Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	Recently hired an EM who is working on it; 2016 plan still active
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	Yes	Yes	The County Health department plans are used by Midvale City
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	Incorporated in the EOP

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes, but not eligible to use
Other	Not eligible for block grants according to planning

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full	Engineering Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full	Engineering Department

Planners or engineers with an understanding of natural hazards	Yes	Full	Engineering Department
Surveyors	Yes	Contractor	
Personnel skilled or trained in GIS applications	Yes	Full	Engineering Department
Emergency manager	Yes	Part-time	City Manager contracted through UFA
Grant writers	Yes	Contractor	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	City Manager
Are any certified floodplain managers on staff in your jurisdiction?	Yes
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No (County participates)	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0

- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 11 policies were in force with total coverage of $2,767,000 and total written premium and FPF of $6,193 (FEMA, 2019).
- Midvale City does participate in the National Flood Insurance Program (CID # 490211) and the last FIRM map for the area was issued on 4 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Snow Storm	5 inches of snow	-	2/13/2019	-
High Wind	high winds knocked down power lines in Midvale, with over 2,000 customers losing power	-	10/20/2017	5,000 property damage.
Hail	dime-sized	-	8/13/2017	-
Hail	nickel-sized	-	6/23/2016	-
Flash Flood	Heavy rain over the Salt Lake Valley flooded six residential properties in Midvale and Sandy.		7/6/2013	$15,000 property damage
Flood	Damage was reported in homes, apartments and businesses		6/5/2010	$1,500,000 property damage

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	2,571
Members of the community under 18 years old	8,294
Members of the community that identify as having disability status	2,581
Members of the community that speak English less than "very well"	2,921
Members of the community living below the poverty line	5,471
The number of mobile homes in the community	95
Members of the community without health insurance	5,326
Occupied housing units with tenants without a vehicle	829
Housing units without heating fuel	32

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Flooding: Although located in a semi-arid region, Midvale is subject to cloudbursts and snowmelt floods. Little Cottonwood Creek is the primary source of running water that has flooded in the past and could breach the banks in the area of the Fort Union offices and retail spaces. Mitigation work has been done in this area and the creek is monitored each spring during the heavy run-off. The Jordan River could present unique challenges due to bridge collapse or inundation, bank collapse, flooding of the banks, etc. This could impact east/west traffic flow and flooding of homes and businesses in lower elevations. Little Cottonwood Creek is a potential source of stormwater flash flooding from the canyons and/or valley rain. Underpasses at I-15 are another source of flooding concern. Transportation routes can be cut-off due to this type of event and coordination needs to be enhanced to ensure that pumps owned and operated by UDOT can be quickly activated in these circumstances. Canals and other waterways that are impacted by stormwater may be inundated under extreme storm volumes.

Earthquake: Midvale has a large number of unreinforced brick residences that poses a large problem in the event of a major earthquake. An earthquake is one of the major threats to the city with a number of faults running along the Wasatch Front in close proximity to the eastern border of the city. Other hazards from a seismic event could include bridge and overpass failure on I-15, I-215, intersecting streets, the railroad system, building and road failure from soil liquefaction or ground movement, and similar impacts to utilities and underground infrastructure. Bridge and road failures could literally divide the city in half at I-15 and movement west of the Jordan River could also be impacted by bridge failure. Above ground hazardous material and fuel storage tanks, apartments, schools and areas of high-population are also high-risk properties that may require intense emergency service or rescue efforts. Collapsed structures, urban rescue, clear and open transportation routes, and debris containment and removal are the primary activities and concerns related to an earthquake that the city would need to address. The City will need to establish

adequate interlocal agreements to obtain adequate heavy equipment and operators to deal with debris management and removal. The City is home to the IHC medical warehouse that supplies resources to IHC hospitals and clinics throughout the valley. Ensuring adequate transportation routes in and out of that facility will be a critical obligation.

Winter Storms: Winter storms usually cause power outages that can last up to several days. Home heating becomes a major problem. Each year Midvale has several devastating fires from homeowners using unsafe heating units. The City provides snow removal operations on city-owned streets. Depending on the duration and frequency of a storm(s) the operations may become delayed or hampered. Primary and collector transportation routes will be the first focus on neighborhoods as a second priority. Overhead power lines can be damaged by snow or falling trees and branches which could impact building occupancy.

Drought: Midvale is prone to cyclical droughts. These droughts have been severe enough to require mandatory water rationing. A short- or long-term drought could affect Midvale either by impacting the limited wells that we have in the city or the Jordan Valley Water Conservancy District where most of our water is purchased. Water rationing would be the first source of action that the city would take which would start with landscape water and could expand to other discretionary uses of culinary water. The city has ample water storage for fire-flows and daily fluctuations in demand but interruptions or failures in the water supply or system could prompt aggressive rationing in a local area or city-wide depending on the circumstances. Ensuring that the city has an adequate communication plan will be essential to ensuring that water is rationed correctly under these circumstances.

Problem Soils: Midvale is prone to areas of collapsible soil.

Avalanche: Midvale does not have any terrain within the city limits that would be conducive to avalanches. Avalanches in the Big and Little Cottonwood Canyons could impact local roads and businesses if they created long term shutdowns.

Dam Failure: There are no known hazards from dam failure that would impact Midvale directly.

Extreme Cold: Depending on the length of the cold and severity, heated shelters for citizens who lose heat may be necessary as well as having PPE's for city staff that are required to work outdoors. Power failure is also another impact from extreme cold when electrical distribution systems are and heating equipment is pushed to extremes and routinely fail.

Extreme Heat: High heat can create a variety of hazards ranging from heat-stroke and heat-related illnesses to at-risk citizens and pets, expansion control issues with roads, sidewalks and other transportation routes, air-conditioning system failure with buildings occupied by at-risk citizens as well as specialized equipment and mechanical devices that rely on regulated temperatures.

Landslide/Slope Failure: Midvale does not have terrain susceptible to large landslides or slope failure. Banks and slopes along waterways and lot excavations are the most likely to occur through an earthquake or saturated soils. No specific sites have been identified that require mitigation efforts. Banks along the Jordan River could fail if flooding occurs.

Severe Thunderstorm: Little Cottonwood Creek is a potential source of stormwater flash flooding from the canyons and/or valley rain. Underpasses at I-15 are another source of flooding concern.

Transportation routes can be cut-off due to this type of event and coordination needs to be enhanced to ensure that pumps owned and operated by UDOT can be quickly activated in these circumstances. Lightening can become a hazard to residents outdoors at pools and other gathering places, or to equipment and electronics susceptible to electrical surges.

Tornado/High WInd: While tornados in the Salt Lake valley are rare (Aug. 11, 1999), high winds can create large debris fields and block roads with downed trees and limbs. High profile vehicles blowing over on I-15 are another potential hazard that could impact city streets with diverted traffic.

Wildfire: There are not many urban interface areas in Midvale that would be susceptible to wildfires. The Jordan River corridor is the most likely area that a fire could occur. Firework regulations is the primary form of mitigation for this hazard and code enforcement will need to focus on controlling flammable material in urban interface sites.

Public Health: It is difficult to predict what type of public health hazard could impact Midvale. Working with schools and businesses will be necessary to limit the flow of people and contact between individuals that could spread disease and illness. The City will defer to the Salt Lake County Health Department and CDC for direction on these types of issues. Having sufficient PPE's and equipment for city staff will be necessary to ensure that they can continue to work and function as needed.

Radon: While radon is a known element in Utah and a hazard to human health, mitigation efforts will be addressed through the building codes adopted by the State and individual efforts of citizens.

Civil Disorder/Riot: Civil disorder and riots are possible but not viewed as a high probability in Midvale since there are no large-scale athletic venues, government buildings or similar locations where riots typically occur.

Cyber Attack: The threat of a cyber-attack against individual businesses and or government offices is always a potential threat. Adopting adequate safety processes and procedures, maintaining system security and developing policies and procedures are the first line of defense.

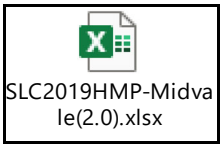
Hazardous Materials Release: Of all possible threats to Midvale, this is probably one of the most likely to impact the community. This is due to the fact that I-15 and US 89 (State Street) runs north to south through the city and I-215 runs east to west with tens of thousands of vehicles passing through the city daily. The railway system and switching yard that runs through the western half of the city, and a number of fuel and hazardous material storage facilities also pose possible threats. It is difficult to know what types of hazards may be released from a transportation vehicle so the city will focus on having a reliable and redundant communication system and an evacuation plan to safely move citizens away from a hazard as quickly as possible.

Terrorism: While an isolated incident of terrorism could impact any of the schools, businesses, or government offices in the city, the likelihood of mass terrorism is unlikely in Midvale due to the fact that there are no large scale athletic venues, government buildings or similar locations where an act of terrorism typically occurs. Terrorism activities towards the road, rail, and other transportation routes pose a threat. It is unclear if fuel and hazardous materials storage facilities could be a terrorist target but it should not be ruled out.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Hazardous Materials Incident	2	18	36
Cyber Attack	2	17	34
Flooding	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Dam Failure	1	21	21
Radon	3	6	18
Tornado	1	12	12
Wildfire	1	10	10
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	7	7
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Low	1	1		Flooding	High	3	6
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Medium	2	4
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	No Impact	0	0
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Low	1	1
Hazardous Materials Incident	High	3	3
Landslide and Slope Failure	Low	1	1
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	Low	1	1

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Ensure that city emergency communication systems (radios, signal boosters, etc.) are functioning and ready for use.	2019	Goal 3: Enhance and protect the communication and warning/notification systems in the County.	All-Hazards	IT	Public Works, UPD, UFA	High	Low ($6,000)	General Fund	High	2020	Functional communication system in an emergency
Gather and update GIS data on city infrastructure to ensure smooth operations during emergency operations.	2019	Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	All-Hazards	Engineering/GIS	Midvale Public Works and Community Development	High	High ($154,000)	General Fund	High	Ongoing	Educated and prepared staff and public
Update and ensure that mutual aid agreements and contacts are in place for emergency response operations. This includes other government agencies, private	2019	Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	All-Hazards	City Manager	City Attorney	Medium	Low ($5,000)	General Fund	Medium	Ongoing	Mutual Aid Agreements and Contracts

businesses, etc. so that resources are available and ready when needed.											
SCADA system for water and sewer system readings and backup generator systems for sewer lift stations.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Midvale Public Works Dept	Midvale IT	High	High ($240,000)	Utility Funds	High	2020	Monitoring and Control of water and sewer utilities and backup power for sewer lift stations
Separate storm water from irrigation ditches.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flooding, Hazardous Materials	City Engineer	Public Works	High	High ($300,000)	Storm Water Utility Fee	High	3-5 years	
Develop a robust cyber security program, incorporating components of the NIST	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Cyber Attack	IT		High	Medium	Local	High	2 years	

Cybersecurity Framework		Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.									
Increase adult influenza vaccination rates to the Healthy Salt Lake target rate. Currently the rate is 70%	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Cyber Attack Public Health Epidemic/ Pandemic	EM	SLCo Public Health	High	Medium	Federal or CDC grants, local budget	High	2 years	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comment
Establish redundancy for dispatch centers and other critical communications	2009	1 – Improve and maintain communications capabilities for emergency operations. 1.2 – Maintain communications	All Hazards	Midvale EM	Medium	High	Local, State, HMA and other Federal Grants	Medium	Ongoing	

		capabilities for critical facilities.								
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness. 5.1 – establish a comprehensive public education program.	All Hazards	Midvale EM	Medium	Low	Local	Medium	Ongoing	
Incorporate information about cascading effects of hazards in education programs	2009	5 – Increase citizen safety through improved hazard awareness. 5.1 – establish a comprehensive public education program.	All Hazards	Midvale EM	Medium	Low	Local	Medium	Ongoing	
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	5 – Increase citizen safety through improved hazard awareness. 5.1 – establish a comprehensive public education program.	All Hazards	Midvale EM	Medium	Low	Local	Medium	Ongoing	
Utilize maps and similar products on County EM website and other media to educate public	2009	5 – Increase citizen safety through improved hazard awareness. 5.1 – establish a comprehensive	All Hazards	Midvale EM, GIS, and Engineering					Ongoing	

on areas at risk to hazards		public education program.								
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	5 – Increase citizen safety through improved hazard awareness. 5.1 – establish a comprehensive public education program.	All Hazards	Midvale EM	Medium	Low	Local	Medium	Ongoing	Revising Plan
Establish and enforce appropriate planning, zoning, and building code ordinances	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All Hazards	Midvale EM and Zoning/Code	Medium	Low	Local	Medium	Ongoing	Revising Plan
Utilize inundation maps to identify potential evacuation areas and routes	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	Dam Failure	Midvale EM and GIS	Medium	Low	Local	Medium	Ongoing	Emergency Manager

Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety information on all identified high hazard dams in the County.	Drought	Midvale EM and Water Department	Medium	Low	Local	Medium	Ongoing	Water Department
Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety information on all identified high hazard dams in the County.	Drought	Midvale EM and Public Works	Medium	Low	Local	Medium	Ongoing	Revising Plan
Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety information on all identified high hazard dams in the County.	Drought	Midvale EM and Water Department	Medium	Medium	HMA and other federal grants	Medium	Ongoing	
Implement water-saving devices and practices in public facilities	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety	Drought	Midvale EM and Water Department	Medium	High	Federal grants	Medium	Ongoing	Water Department

		information on all identified high hazard dams in the County.								
Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety information on all identified high hazard dams in the County.	Drought	Midvale EM, Sewer Department, and Water Department	High	Medium	Local and HMA funds	Medium	Ongoing	
Coordinate public safety water use, such as hydrant testing	2009	1 – Include dam failure inundation in future County and City planning efforts. 1.1 – Review current State dam safety information on all identified high hazard dams in the County.	Drought	Midvale EM and Water Department	Medium	Low	Local	Medium	Ongoing	Working on Public Education campaign
Provide information on landscaping alternatives for persons subject to green area requirements	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Midvale EM	Medium	Low	Local	Medium	Ongoing	Coordinate with City mission

Provide educational materials to unreinforced masonry home and business owners	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	Earthquake	Midvale EM and Building Department	Medium	Low	Local	Medium	Ongoing	Develop information to educate businesses and home owners
Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	Earthquake	Engineering	Medium	High	Federal and state grants	Medium	Ongoing	
Assist Cities with NFIP application	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	Flood	Engineering/State	High	Low	Local	High	Ongoing	
Encourage Communities to actively participate in NFIP	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	Flood	Engineering/State	High	Low	Local	High	Ongoing	

Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flood	Engineering	High	High	Local and federal funds	High	Ongoing	
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flood	Building Dept.	High	High	HMA and other federal funds	High	Ongoing	
Maintain Hazardous Weather Operations Plan according to StormReady requirements	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	Severe Weather	Midvale EM	High	Low	Local	High	Ongoing	Revisions ongoing
Maintain Contact with NWS prior to re-application	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	Severe Weather	Midvale EM	Medium	Low	Local	Medium	Ongoing	Revising Plan
Meet with NWS representative on an annual	2009	1 – Reduce threat of loss of life or property due to	Severe Weather	Midvale EM	High	Medium	Local, County,	High	Ongoing	Revising Plan

basis to receive information on new services and alerts available		extreme weather events 1.2 – Increase awareness of information services provided by NWS					and State			
Assist NWS in making other agencies and departments aware of available resources	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	Severe Weather	Engineering, Water, and City EM	Medium	Low	Local	Medium	Ongoing	
Work with NWS to develop large event venue weather safety and evacuation procedures	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	Severe Weather	Engineering, Water, and City EM	High	Medium	Local, County, State and HMA funds	High	Ongoing	
Midvale will implement the "Firewise" program in conjunction with the UFA.	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Wildland Fire	EM and Fire	High	Low	Local	High	Ongoing	
Midvale has a large number of	2014	Goal 1	Earthquake	Midvale EM	High	Low	Local	High	Ongoing	Midvale Emergency Management will

unreinforced brick residences poses a large problem in the event of a major earthquake.		Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.								present the "Fix the Bricks" program. This program is part of the Salt Lake City and State of Utah effort to mitigate the effects of a large-scale earthquake by minimizing post earthquake personal injury and requirement for outside assistance
Canal Mapping will be discussed at the yearly Emergency Managers Meeting and a subcommittee will be formed on earthquake impacts.	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Flood	Midvale EM	High	Low	Local	High	Ongoing	Midvale Emergency Management will apply for grants for flood mitigation assistance. As each jurisdiction has already identified their flood prone areas through HAZUS and RiskMAP we will utilize existing reports to help prepare plans for mitigation and application for funding.
Our jurisdiction will implement the "Fire is everyone's Fight" program through community outreach.	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Severe Weather	Midvale EM	High	Low	Local	High	Ongoing	Severe weather is inevitable. The best mitigation practice is the timely communication of the event and actions that can be taken to minimize the effects. The biggest threat of severe weather is winter storms. Winter storms usually cause power outages that can last

										up to several days. Home heating becomes a major problem. Each year Midvale has several devastating fires from homeowners using unsafe heating units.
Midvale Emergency Management will work with the County Health Department to assist them in designing their mitigation programs for dealing with pandemics.	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Pandemic	Midvale EM	High	Low	Local	High	Ongoing	"The Salt Lake County Health Department (SLCo HD) continues to improve its emergency response capacity by planning, training, exercising and working with partners and municipalities throughout the county. The SLCoHD Emergency Management Bureau takes the lead within the department and involves all health department staff through planning, training, drills and exercises. The health department follows the principles of Emergency Management: to plan for, respond to, recover from, and mitigate natural and manmade emergencies and disasters. Our goal is

										to do the most good for the most people in the shortest amount of time. “
Emergency Management will conduct a special presentation on “Slow the Flow” to encourage residents to take advantage of the free “Water Check” program.	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Drought	Midvale EM	High	Low	Local	High	Ongoing	Midvale is prone to cyclical droughts. These droughts have been severe enough to require mandatory water rationing.
Midvale Emergency Management will conduct a half day seminar to educate citizens in procuring radon testing kits. A presentation from the Health department will be made.	2014	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Radon	Midvale EM	High	Low	Local	High	Ongoing	When radon becomes trapped in buildings and homes, people breath the radon into their lungs and the gas becomes trapped. The Environmental Protection Agency (EPA) has determined that a level of 4.0 piC/L action level of radon is dangerous for human health. Utah Radon Levels are at or above this level on average.
Midvale Emergency Management will participate in a half-day seminar with the authors of	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before,	Earthquake	Midvale EM	High	Low	Local	High	Ongoing	Midvale is prone to areas of collapsible soil.

the book Geologic Hazards of the Magna Quadrangle, Utah, authored Jessica J. Castleton, Ashley Elliott, Greg N. McDonald to determine testing and mitigation techniques that can be implemented.		during, and after a disaster.								

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	2 – Conduct Training and awareness activities on communication equipment, tools, and systems	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Complete	

		1.1 – Improve communication capabilities			
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	4 – Establish notification capabilities and procedures for emergency personnel	Complete	Revising
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Complete	Revising
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	2 – Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Incomplete	Seeking new revenue & Funding
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	1 – Establish a coordinating group to address geographic data issues	Complete	Contract Company
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	2 – Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings	Complete	“

All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	3 – Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs	Complete	“
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	4 – Provide centralized access to geographic data to emergency planners and responders	Complete	“
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Complete	Revisions
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	2 – Identify and implement additional hazard monitoring capabilities.	Complete	Revisions
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	1 – Utilize GIS to identify facilities and infrastructure at risk	Complete	Contract company
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	Complete	Contract company

All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	3 – Implement improvements to address identified in assessment	Complete	Contract company
All Hazards	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	1 – Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	Complete	Contract company
All Hazards	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	2 – Pursue and implement needed mutual-aid agreements	Complete	Contract company
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Incomplete	Revising
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Not relevant	
Drought	2009	1 – Reduce and prevent hardships associated with water shortages	1 – Set up livestock water rotation in areas of agricultural use	Not relevant	

		1.2 – Address agricultural water shortages in the County			
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Complete	Water Districts MOU
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	1 – Identify structures at risk to earthquake damage	Complete	Building department
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Incomplete	Redevelopment planning
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Incomplete	Planning on going
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	1 – Determine potential flood impacts and identify areas in need of additional flood control structures	Complete	Revisions on going with the State
Flooding	2009	1 – Protection of life and property before, during and after a flooding event	2 – Address identified problems through construction of debris basins, flood retention ponds, energy	Complete	SLCo. Public Works/ City PW

		1.2 – Encourage appropriate flood control measures, particularly in new developments	dissipaters or other flood control structures		
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	1 – Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	Complete	City PW
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	Not Relevant	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Relevant	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Relevant	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Not Relevant	
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Not Relevant	

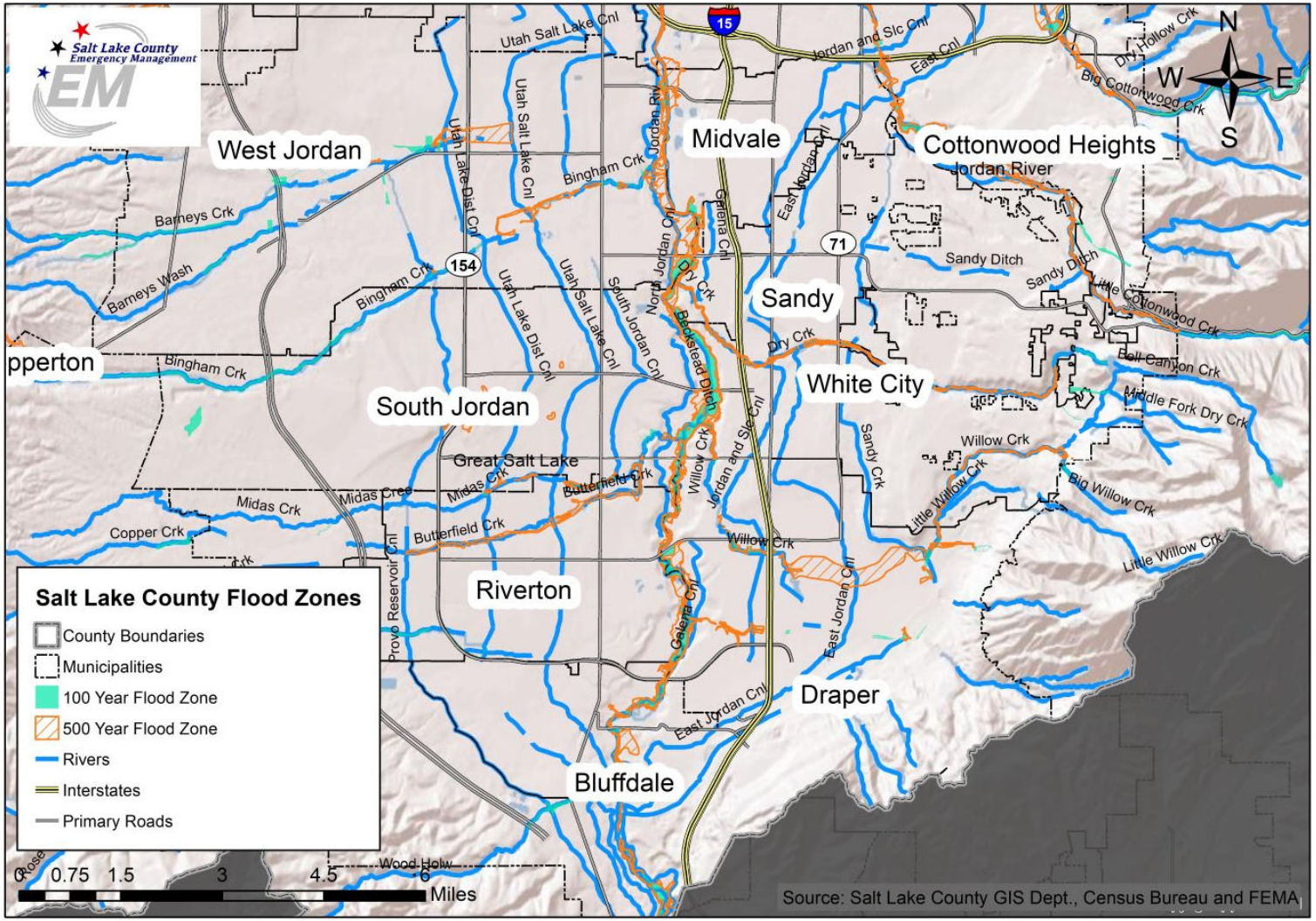
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning,	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses	Not Relevant	

		protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	according to current county addressing standards		
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	1 – Reduce fuels around publically owned structures	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning,	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not relevant	

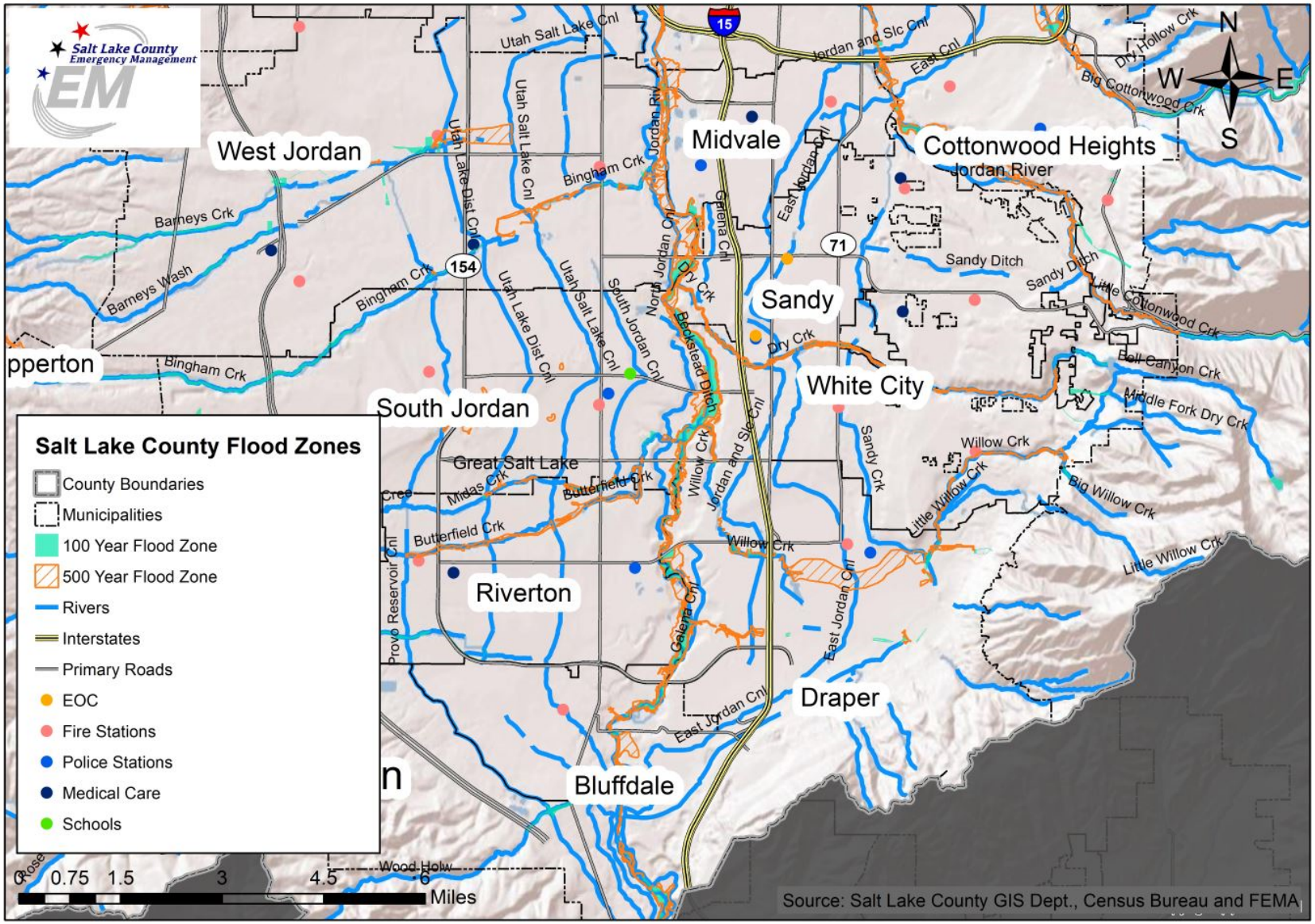
		protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	1 – Adopt the Utah Wildland-Urban Interface Code	Not Relevant	
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Relevant	

Jurisdiction Maps

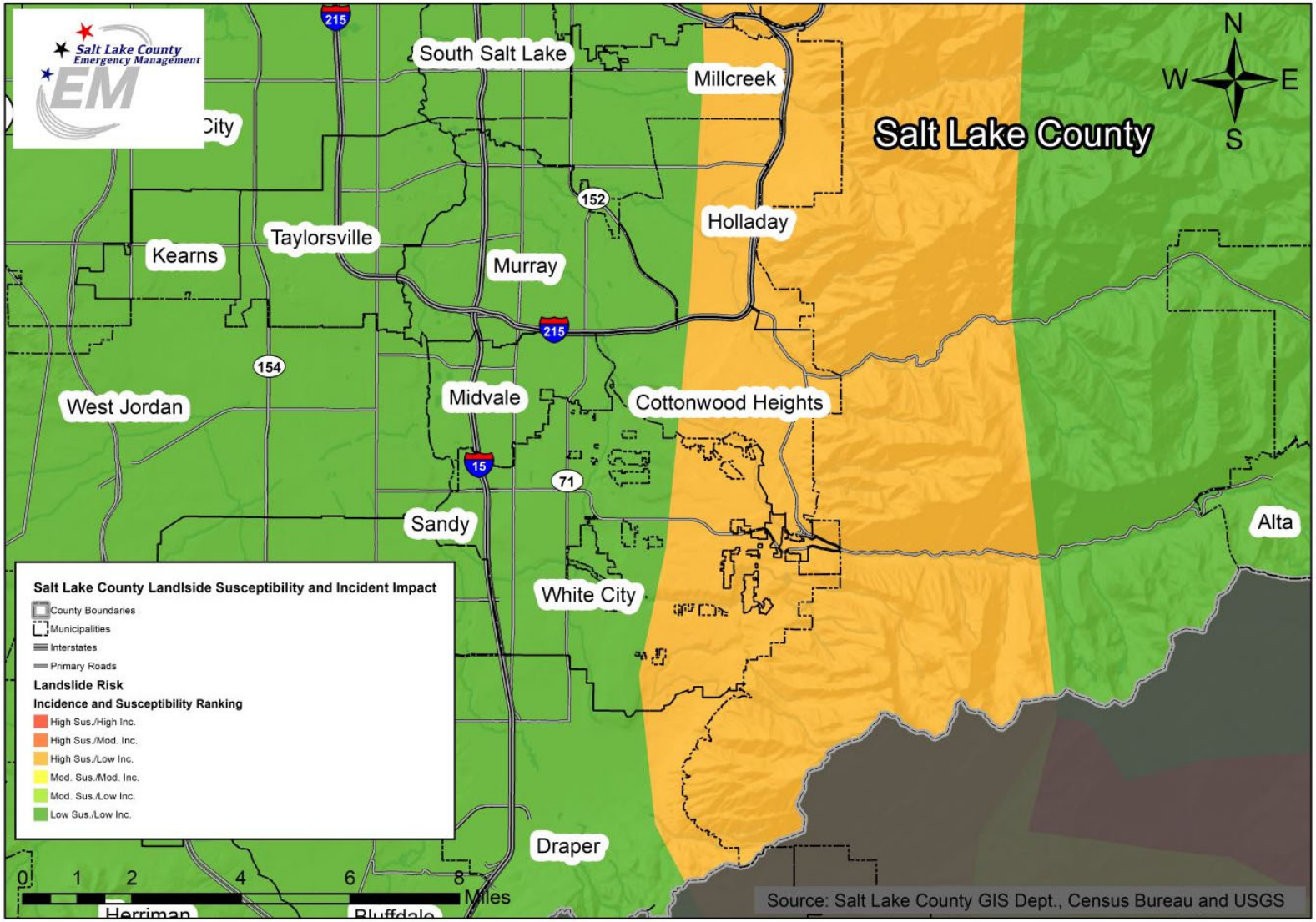
Map: 100 Year and 500 Year Flood Zone



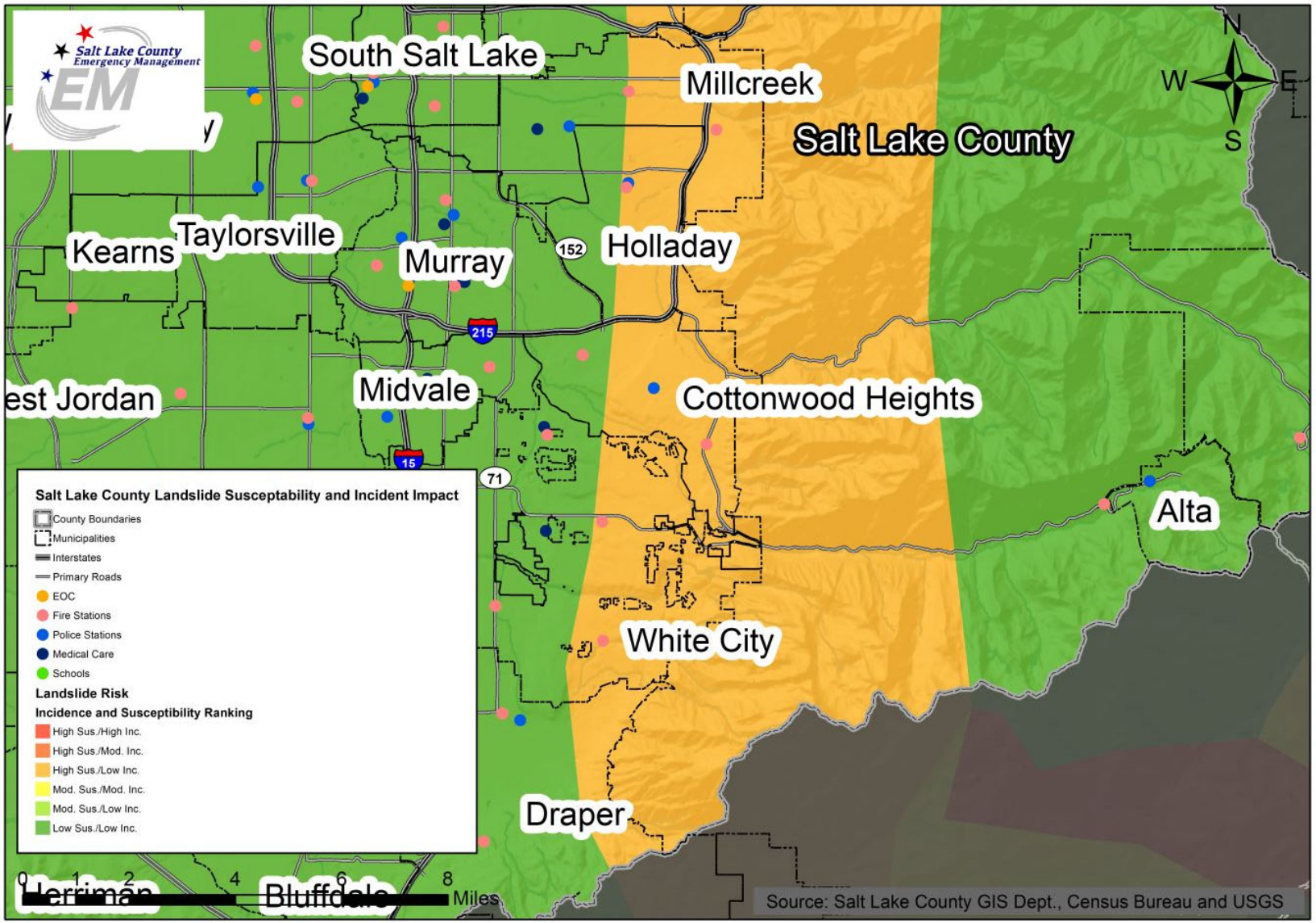
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



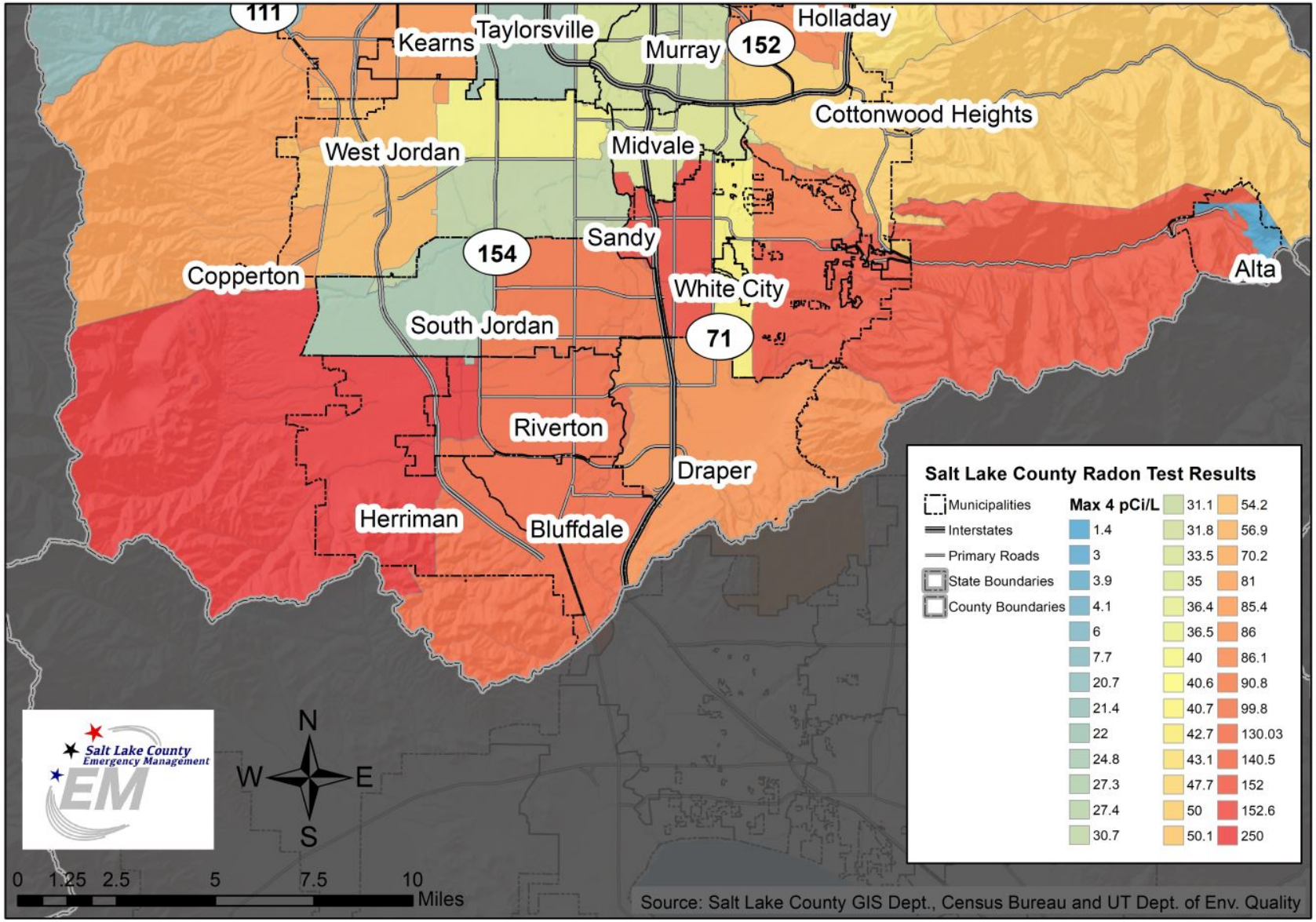
Map: Landslide Susceptibility and Incident Impact Potential



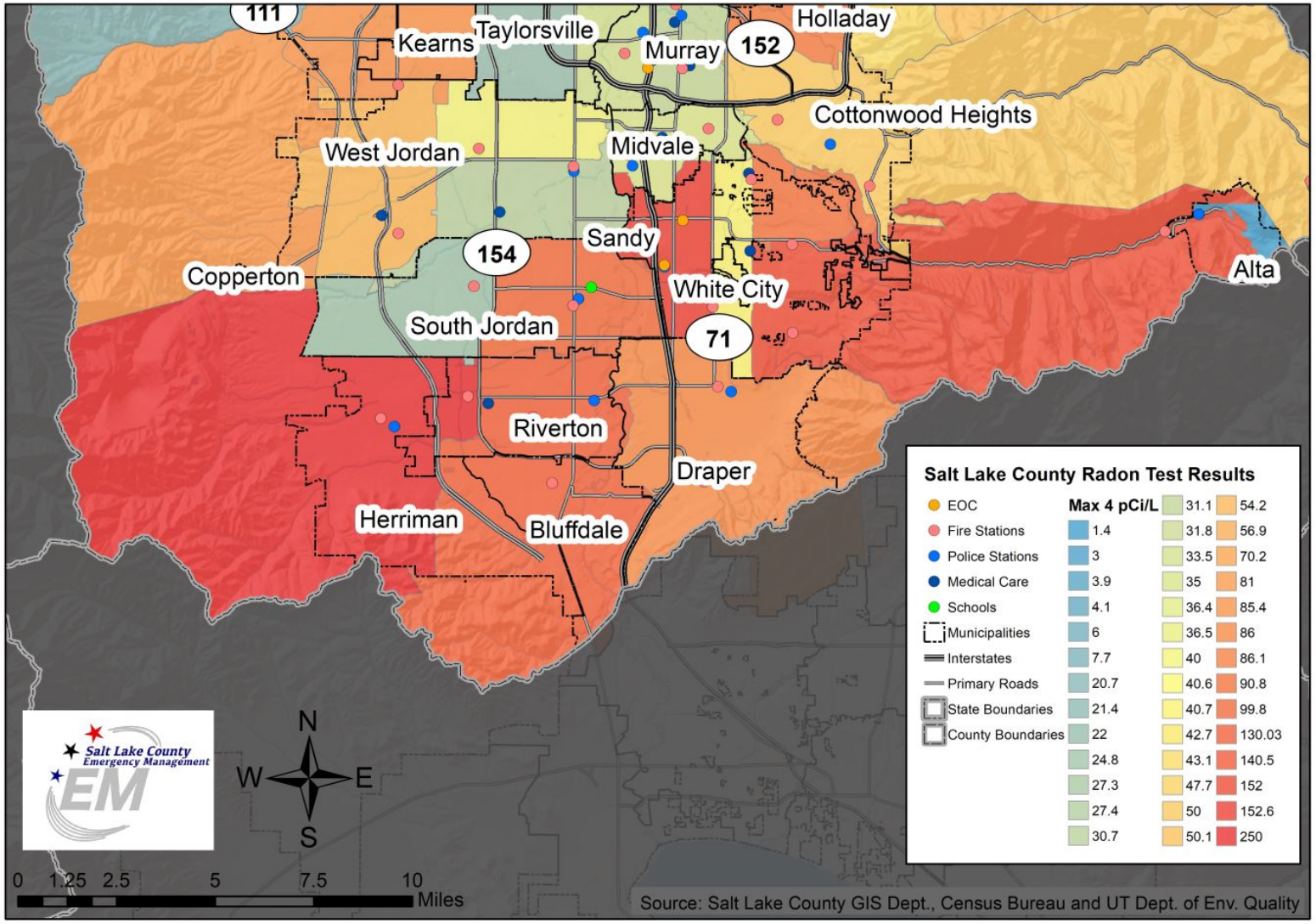
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of Millcreek

Hazard Mitigation Plan Point of Contact

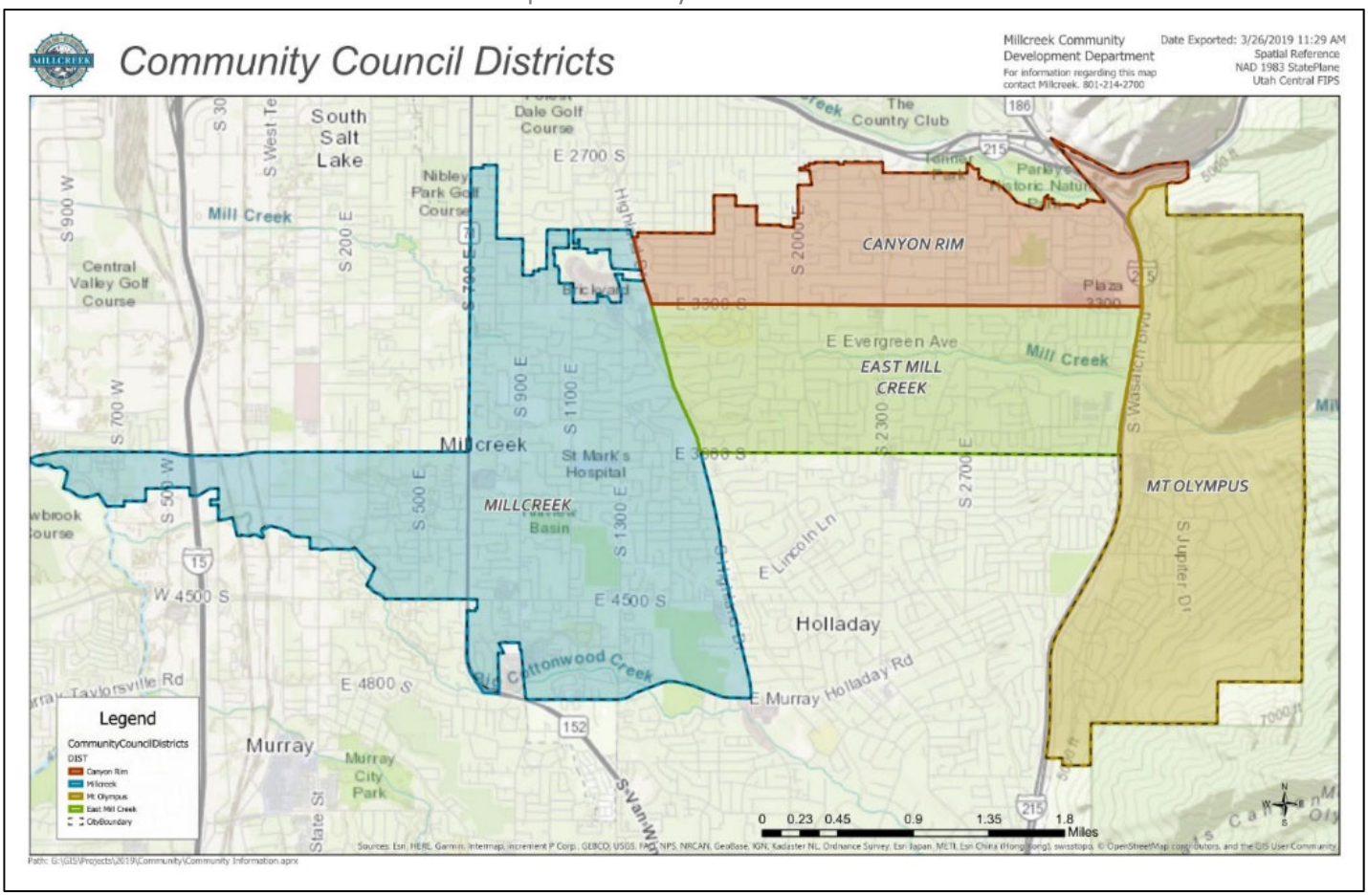
Primary Point of Contact	Alternate Point of Contact
Name: Andrew Clark Title: Emergency Manager Department: Millcreek Office of Emergency Management Address: 3330 South 1300 East, Millcreek, UT 84106 Office Phone: (801) 214-2715 Cell Phone: (801) 688-8608 Email Address: aclark@millcreek.us Website: Millcreek.us	Name: Rita Lund Title: Director of Communications Department: Communications Department Address: 3330 South 1300 East, Millcreek, UT 84106 Office Phone: (801) 214-2707 Cell Phone: (801) 550-5474 Email Address: rlund@millcreek.us Website: Millcreek.us

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** December 28, 2016
- **Current Population:** 61,270 (Census v2018)
- **Population Growth:** According to the U.S. Census Bureau, the population of Millcreek doubled from 30,377 to 62,139 people from 2000 - 2010, due to the consolidation of the East Mill Creek, Canyon Rim, and Mt. Olympus census-designated places (CDP) with the Millcreek CDP. The population has since remained relatively stable, only declining slightly according to the 2015 population estimates from the University of Utah.
- **Location and Description:** Millcreek is located between Salt Lake City and South Salt Lake in the North and Murray and Holladay in the South. It is a largely suburban city, totaling 13.7 sq miles (all land). Millcreek is split into four Community Council Districts, as can be seen in the map below.

Map: Community Council Districts



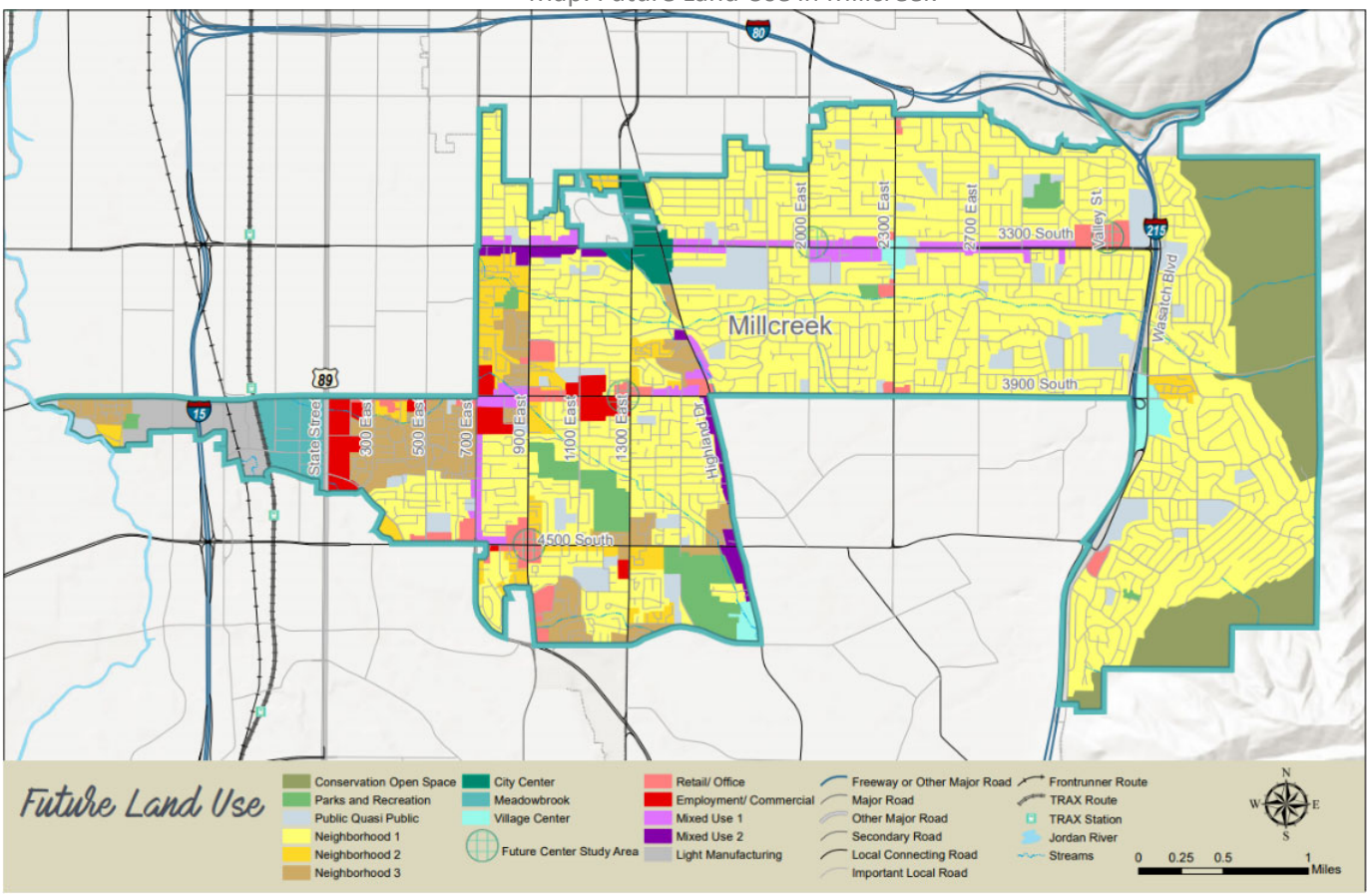
- **Brief History:** The way west was marked by a string of mills built by John Neff, who, in his lifetime, was responsible for building more than 30, but the most enduring of these was the mill built in 1847 in East Mill Creek. This mill became a vital resource to the local community until it was eventually torn down and the land donated to the LDS church. By the 1980s, most of the area now in Millcreek was built out and known by various names, including East Mill Creek, Canyon Rim, and Mount Olympus. The area remained one of the most populous unincorporated areas of Salt Lake County, until the 2016 election when residents established a city government in advance of official incorporation.
- **Climate**: Millcreek gets an average of 58 inches of snow and 21 inches of rain every year. The July high temperature is 91 and the January low is 23 (Best Places).

Table: Climate in Millcreek

	Millcreek, Utah	United States
Rainfall	20.8 in.	38.1 in.
Snowfall	57.9 in.	27.8 in.
Precipitation	91.0 days	106.2 days
Sunny	228 days	205 days
Avg. July High	91.4°	85.8°
Avg. Jan. Low	23.0°	21.7°
Comfort Index (higher=better)	7.1	7
UV Index	4.7	4.3
Elevation	4285 ft.	2443 ft.

- **Governing Body Format:** The Millcreek City Council consists of four members elected by district and the mayor elected at-large. The Mayor is the chief executive officer of the City, a voting member of the Council, and the Council Chair. City departments include City Services, Communications and Programs, Community Development, Economic Development, Finance, Human Resources, Public Safety, and Public Works.
- **Development Trends:** The City of Millcreek adopted its first General Plan as of 2019, a major step forward in guiding the development of the City. Through conversations with the Millcreek community, seven vision themes for future development were identified: unique neighborhoods, vibrant gathering places, a thriving economy, great connections, health and environment, the outdoor lifestyle, and enhanced culture.

Map: Future Land Use in Millcreek



Capability Assessment

The city maintains a full-time staff of 37 and part-time staff of 2 individuals. The Emergency Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by Andrew Clark, Emergency Manager, and supported by Rita Lund, Director of Communications and Programs.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the Legal and Regulatory Capability Table below. The assessment of the jurisdiction's fiscal capabilities is presented in the Fiscal Capability Table below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the Administrative and Technical Capability Table below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the National Flood Insurance Program Compliance Table below. Classifications under various community mitigation programs are presented in the Community Classifications Table below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**Rely on the County's Codes, Ordinances & Requirements**	**Comment**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	No	
Zonings Ordinance(s)	Yes	No	
Subdivision Ordinance(s)	Yes	No	
Stormwater Management Program	Yes	No	
Floodplain Ordinance(s)	Yes	No	
Post Disaster Recovery Program and Ordinance(s)	No	Yes	
Growth Management	No	-	
Site Plan Review Requirements	Yes	No	
Planning Documents			

General or Comprehensive Plan	Yes	No	
Capital Improvement Plan	Yes	No	
Economic Development Plan	Yes	No	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	No	-	In progress
Post-Disaster Recovery Plan	No	-	In progress
Continuity of Operations Plan	No	-	In progress
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	No	Yes	In progress

TABLE: FISCAL CAPABILITY	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Other	NA

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	Available?	Full Time/Part Time/Other	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Public Works/Engineering
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Engineering
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Engineering
Personnel skilled or trained in GIS applications	Yes	Full Time	Public Works
Emergency manager	Yes	Full Time	Emergency Management and Communications
Grant writers	Yes	Full Time	Communication

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Public Works/Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	Engineering/Stormwater
Are any certified floodplain managers on staff in your jurisdiction?	Yes, Stormwater Engineer
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No, not at the moment
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No, but we are interested in joining

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**

Community Rating System (CRS)	No	-	-
Public Protection/ISO	-	-	-
NWS StormReady	No	SL County	-

Jurisdiction-Specific Hazards and Risks

NOAA Natural Hazards 2014-2019

- The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:
- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- The City of Millcreek does participate in the National Flood Insurance Program (CID # 490231) (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	13 inches in Millcreek		3/13/2019	
Winter Storm	11 inches in Upper Millcreek		1/21/2019	
Winter Storm	15.5 inches in Millcreek		3/3/2018	
Winter Storm	13.5 Upper Millcreek		1/19/2018	
Winter Storm	8 inches in Millcreek		2/21/2017	
Winter Storm	14 inches in Upper Millcreek		12/23/2016	
Avalanche	A group of skiers was skiing along Gobblers Knob, between Big Cottonwood and Millcreek Canyons, on the afternoon of January 21. An avalanche, about 600 feet wide, was triggered, and two of the skiers were caught.		1/21/2016	

	One skier was partially buried and sustained minor injuries. The other skier, a 49-year-old male, was fully buried by the avalanche. He did not have a pulse when others dug him out of the snow, and he was pronounced dead later that day when all attempts to resuscitate him proved unsuccessful.			
Winter Storm	21 inches in Upper Millcreek; power outages around the County		12/13/2015	
Winter Storm	14 inches in Upper Millcreek; 118 car crashes in the County resulting in 16 injuries		4/14/2015	
Winter Storm	8 inches in Millcreek and automobile accidents widespread in the County with 13 injuries		3/2/2015	
Winter Storm	12 inches in Upper Millcreek		12/25/2014	
Winter Storm	8.5 in Millcreek		12/7/2013	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	9,386
Members of the community under 18 years old	13,438
Members of the community that identify as having disability status	7,211
Members of the community that speak English less than "very well"	2,948
Members of the community living below the poverty line	6,048
The number of mobile homes in the community	72
Members of the community without health insurance	6,326
Occupied housing units with tenants without a vehicle	1,585
Housing units without heating fuel	25

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only

addresses the hazards and their associated impacts that are relevant and unique to the municipality.

Winter Storms: These storms commonly occur at least once a year, likely more. A significant portion of the community has an increased vulnerability to winter storms, including the elderly and individuals with limited resources. Surviving winter storms requires access to certain resources and mechanisms for remaining warm. Individuals that cannot access these resources, primarily due to economic inaccessibility will need support from the city and County. The significant population of mature trees in the area is also susceptible to damage from severe winter weather.

Avalanche and Landslide: The most vulnerable areas include those that have steep terrain, high precipitation, high earthquake potential, and high population density, and heavy backcountry use. Given the border of the Wasatch Mountains, Millcreek is susceptible to avalanches and landslides.

Earthquake: The Wasatch Front urban corridor is considered to be at risk of a major earthquake, with the most likely culprit being the Wasatch Fault, which runs north to south along the foot of the western slope of the Wasatch Mountains. Secondary hazards possibly associated with a major earthquake in the city are numerous. A major earthquake occurring during a period of high avalanche hazard could trigger numerous destructive avalanches at once and landslides. 65% of building stock is unreinforced masonry. Of this stock, 80% is residential. Also, of concern are the two major splitting faults running through the New City Center. Given the URM building stock and the fault locations, a major earthquake could yield high damage to building and utility failures. Another concern is evacuation for the neighborhood east of Wasatch Blvd.

Flooding: The city is bordered by the Jordan River. Federal Emergency Management Agency (FEMA) has rated floodplains along the Jordan River and its tributaries for expected flood heights and areas susceptible to 100-year flood-frequency inundation. Flash flooding can occur either during a heavy rainfall event or rapid snowmelt. Riverine flooding also can come from Mill Creek, Parley's Creek, Neff's Creek, Big Cottonwood, and the several irrigation canals and ditches. Recently, flooding occurred in the expanded Neff's Creek Floodplain. Flooding is also worse due to the undersized and deteriorating stormwater infrastructure that is also incomplete and not connected in certain areas. An area prone to flooding is the East Bench of Grandeur Park and Mount Olympus. Another area is the swamp at 4500 S. Murray-Holladay Rd.

Wildfire: The western portion of the city is next to conservation open space, which creates a WUI - wildland-urban interface. Wildfires in this area have the potential to spread to the surrounding neighborhood, especially during the dry season. The eastern border of the city is considered a WUI and managed by the Forest Service Wilderness. Wooded Stream Channels are also a concern. Other areas of concern are Grandeur Park, Mount Olympus, Mill Creek, Parley's Creek, Big Cottonwood Creek, and Big Cottonwood Park.

Dam Failure: If Little Dell fails, I-80/I-215 would be impacted.

Extreme Temperatures: Extreme high and low temperatures adversely impact the aging population and is a concern because the jurisdiction has the 2nd highest population of elderly/aging populous in the County and over 55 care and assisted living centers. The area also has a significant homeless population. Also, the area has a major hospital that would need to remain operational with a surge in patients or a power failure.

Landslide/Slope Failure: There are FLOZ areas throughout the city and post-wildfire impact areas have an increased chance of landslides. Areas of primary concern are Neffs Canyon and Canyon Rim edge of Parley's Nature Park.

Tornado/High Winds: The above-ground power lines and mature trees, if damaged, could yield power and infrastructure damage.

Severe Thunderstorm: The Eastern Bench is most heavily impacted by thunderstorm and utility impact can occur.

Cyber Attack: The city digital infrastructure is the most likely target of a digital attack.

Public Health: The area is home to communities that would be more vulnerable to a pandemic or epidemic. These communities may have less access to resources and include refugee, immigrant, and homeless community members. The high elderly population would also be of concern due to their potential to be more susceptible to diseases. Also, the community also has a major hospital and a high number of assisted living facilities.

Hazardous Materials Release: The West Side Industrial Area (West Temple - 300 Nest) houses multiple hazardous materials. Another concern is the Fertilizer Plant on banks of Big Cottonwood Creek. Additionally, HAZMAT transportation happens on the I-80/I-275 and through the utility pipelines. Several years ago, a chemical truck overturned in Parley's Canyon and required evacuation.

Terrorism: Of primary concern for a terrorist attack are the Power sub-stations, Jewish Synagogue on Heritage Way, and the water tanks.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Wildfire	2	19	38
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28

Radon	3	9	27
Terrorism	1	25	25
Dam Failure	1	13	13
Tornado	1	11	11
Civil Disturbance	1	11	11
Landslide and Slope Failure	1	9	9
Avalanche	1	9	9

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Low	1	1		Avalanche	Medium	2	4
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Low	1	1
Dam Failure	Low	1	1
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	Low	1	1
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Low	1	1
Wildfire	High	3	3

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Install Debris Basin and/or Storm Drain/Culvert	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Flood (Riverine), Landslide/Slope Failure	US Forest Service	Salt Lake County, Millcreek City Emergency Management and Public Works Departments	High (Prevent flooding and landslides)	High	FEMA, Utah State, Salt Lake County, Salt Lake City	High	Long-term	Reduce flooding from Neffs Canyon by installing debris basin and/or large storm drain/culvert.
Hazardous Materials Removal	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and	Hazardous Materials Release, Public Health (Pandemic/Epidemic)	Millcreek	Salt Lake County Health Administration and UFA	High (loss avoided includes Death, Property, and Spread of Toxic Chemicals)	High ($20,000,000 - $50,000,000)	FEMA, State, UFA, County-City Funds	High	2025	Removal hazardous materials on West Temple, 400 West, South 3300 and South 4500.

		infrastructure during disasters. Goal 3: Enhance and protect the communication and warning/notification systems in the County. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning									

		efforts throughout the County. Goal 7: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.									
Reinforce Masonry and Chimneys	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters	All-Hazards	Millcreek	City	High (Loss of life and property damage)	Medium	FEMA, State, and County funds	High	Long-term	Reinforce masonry and chimneys to prevent older homes from collapsing.

		Goal 7: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.									
Install Generators at Assisted Living Centers	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	Extreme Cold and Extreme Heat	Millcreek	Salt Lake County Emergency Management	High (Loss of life and displacement)	Medium	FEMA, UFA/EM, Millcreek	High	Short-term	Install generators at assisted living facilities and enact evacuation plans in case of extreme heat or cold.
Generators and hookup installation for	2019	Goal 1: Protect the lives, health, and safety of the citizens	All-Hazards	Millcreek	Salt Lake County, Millcreek City	Medium	High	HMA/PDM Grant or other	Medium	Short-term	

publicly owned and critical facilities		of Salt Lake County before, during, and after a disaster. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.			Emergency Management and Public Works Departments			federal funds			
Conduct a Hazardous Materials Flow Study	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Hazardous Materials	Millcreek	Millcreek City Emergency Management	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Long-term	

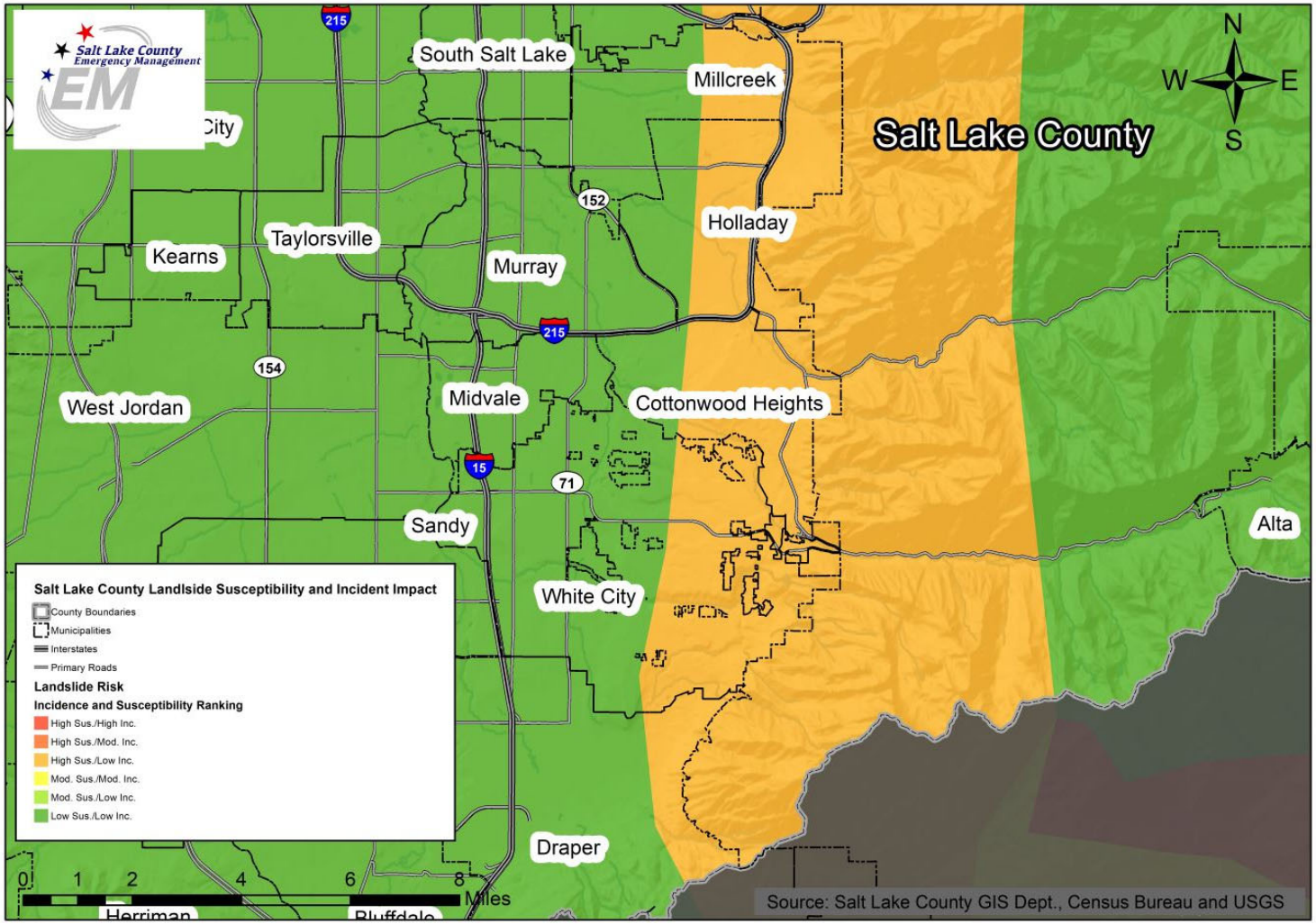
Draft a WUI Plan with fire mitigation goal development including defensible space	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildfire	Millcreek	Millcreek City Emergency Management, Salt Lake County	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Long-term	

Mitigation Table - Ongoing Actions

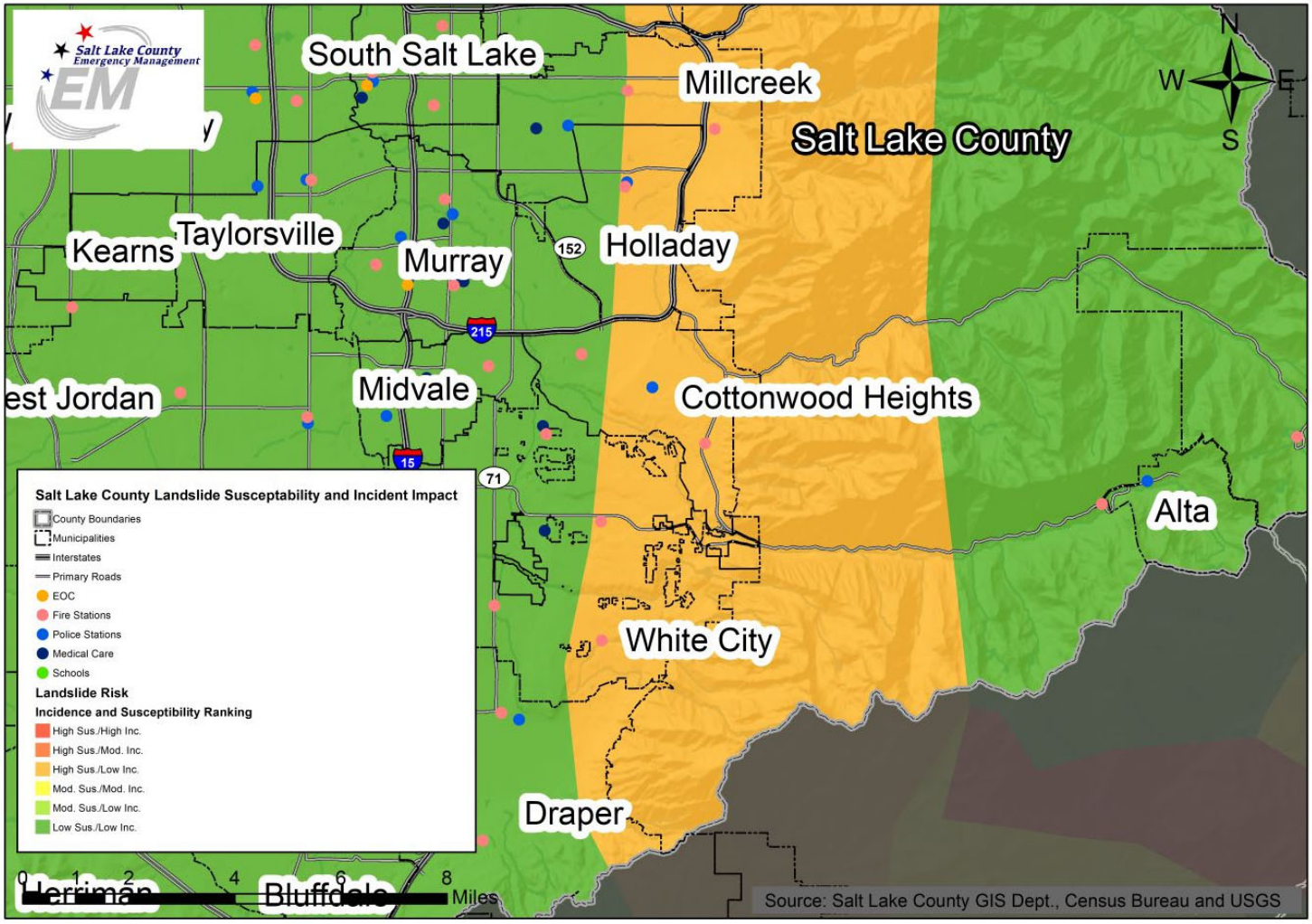
Not applicable since Millcreek did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

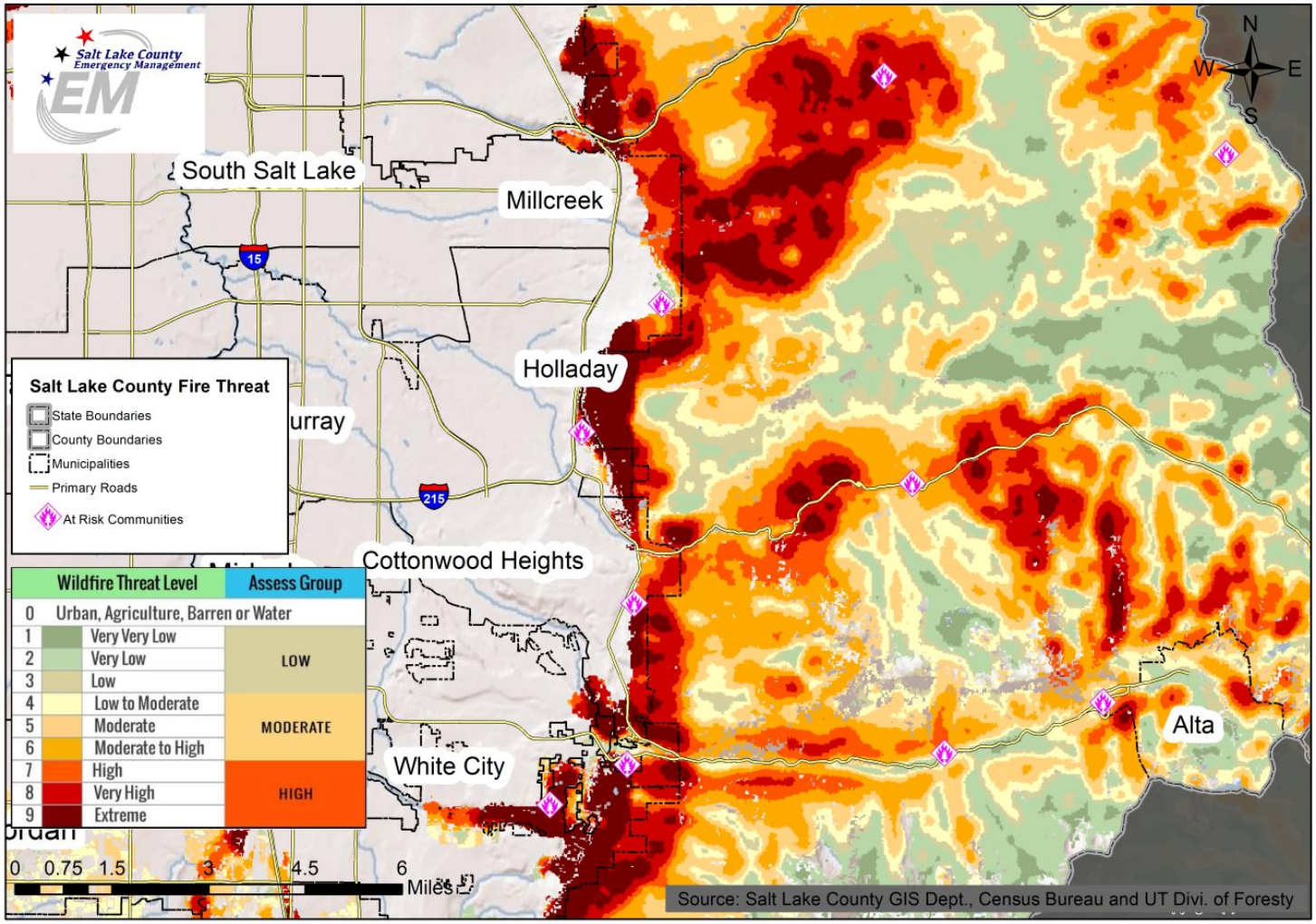
Map: Landslide Susceptibility and Incident Impact Potential



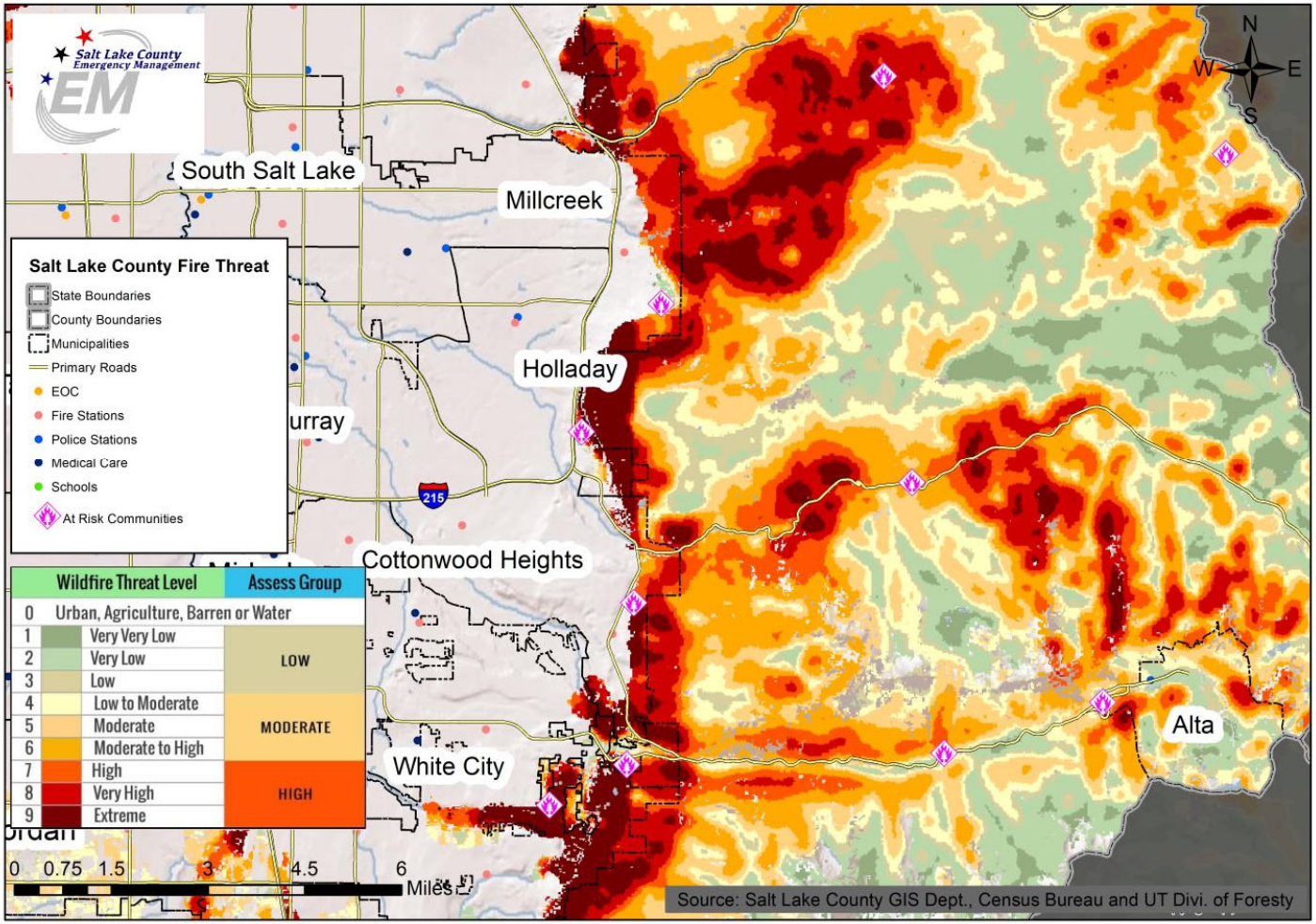
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: Wildfire Threat Level



Map: Wildfire Threat Level with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of Murray



Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
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Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** The County recognizes November 25, 1902, as the official incorporation date and the city was officially recognized as a Third Class City by the State of Utah on January 3, 1903.
- **Current Population:** 49,308 (Census v2018)
- **Population Growth:** The population grew 5.6% from April 1, 2010 (46,685) to July 1, 2018 (Census).
- **Location and Description:** Located on the Wasatch Front in Salt Lake County, Murray covers 12.29 square miles. Murray consists of three distinct geographical areas: the City, which represents the incorporated City within the City limit boundaries; the Sphere of Influence, which corresponds to the City's existing Sphere of Influence; and the study area, which includes unincorporated Salt Lake County lands outside of the City's Sphere of Influence. Murray is characterized by mostly urbanized land uses.
- **Brief History:** The Mormon pioneers came to the Salt Lake Valley in 1847. A pioneer group called the Mississippi Saints arrived one year later and began to develop a scattered settlement in the south end of the valley in the fall of 1848. The area was distinguished by various names such as the Mississippi Ward, Cottonwood, Big Cottonwood, and South Cottonwood. Written history states that at least 20 families were living in the South Cottonwood area in the 1860's. The area remained agricultural until 1869 when a body of ore was found in Park City and additional ore was found in the Little Cottonwood Canyon. Because of its central location and access to the railroad, the first smelter was built in Murray in 1870 and Murray became the home of some of the largest smelters in the region over the next 30 years. The first official post office was established in 1870 as the South Cottonwood Post Office. The area changed over time as the railroad came in, smelting expanded, the territorial road (later known as State St.) was established, and trolley transportation was developed. A business district also began to develop along the transportation corridor. The City received its present name from the post office, which officially changed its name from South Cottonwood Post Office to Murray Post Office in 1883 after the territorial governor and civil war general, Eli Murray.

- **Climate:** The average high temperature is 92 degrees and the average low temperature is 24 degrees. On average, Midvale receives 19 inches of rain and 47 inches of snow a year (Best Places).
- **Public Services:** Through the years, Murray City's crews have responded to a number of disasters, including riverbank flooding, trees being toppled over by microburst winds, and various other weather-relation hazards (Murray).
    - Water and Waste Water: There are three separate entities/systems providing drinking transport water within the Murray City boundaries: 1) Murray City, 2) Jordan Valley Water Conservancy District (JVWCD), and 3) Salt Lake City Public Utilities (SLCPU) through Murray. The Murray City water system supplies water generally west of 900 East. The Murray City water system relies on well water as its predominant supply source producing about 84 percent of annual system water demand. Water for the water system in Murray City's service area is supplied by 8 springs and 19 wells. Each of these water sources is dependent on pumps and motors to deliver water to the water distribution system. The City has emergency standby generation power at six locations. The City has five tanks or reservoirs within its service area with a combined storage capacity of 12 million gallons to provide operating and emergency storage. In the event of an emergency, Murray City has an exchange agreement with SLCPU to provide water. The JVWCD and SLCPU water systems supply water generally east of 900 East. There are no water sources for these two entities located within Murray City. Rather, they provide retail delivery only.
    - Murray City Power: The City of Murray is unique in Salt Lake County as the only city in the county that has a municipally-owned power system. Murray City Power is the utility division that operates the power system in the 9.9 square mile service area, which includes 206 miles of transmission and distribution lines and a customer base of approximately 14,000 residential customers and 3,000 commercial customers. The system load peaks in the summer at just over 100 MW and 60 MW in the winter. Providing reliable energy to the homes and businesses of Murray City is important even in times of disaster, so Murray City installed three generators located at the central substation with a generating capacity of approximately 39 MW to help with system reliability. In normal operation, these generators are used as a peaking resource mostly in the summer months and remain idle until needed. In an emergency situation these generators can be used to provide emergency power to needed areas of the city as long as the natural gas supply is available.
    - Fire Station 81 was rebuilt and will be open in early 2020.
- **Governing Body Format:** Murray City initially created a Mayor-Council form of government. In 1911, a State law changed the form of government for cities of the First and Second Class in Utah from the old Council form to the Commission form of government. This form of government was again reversed in 1981. The City adopted the Mayor-Council form of government, which included an elected Mayor and five City Council members. To ensure staggered terms of the Council, an election is held every two years for half the Council members for four-year terms.
- **Development Trends:** As the hub of Salt Lake County, Murray City provides the solid foundation upon which truly great businesses thrive. The community's strong medical, transportation, retail/professional office, educational and community services provide a more than ideal setting for businesses. Murray City is home to Intermountain Medical Center, which is the largest Intermountain Healthcare facility in the state. Additionally, Fashion Place Mall is located within our City and is a significant contributor to sales tax revenue as one of the premier malls in the state. Loss of either of these employers would

result in thousands of displaced employees and sales tax revenue in the millions of dollars. Murray City has experienced significant growth in housing and commercial development. This growth is due in part to the City's proximity to light rail transportation and freeway access, the draw of our medical services community and an outstanding school district. The City has a reputation for being a safe, close-knit and friendly community in which to raise a family. Land within Murray City is becoming short in supply primarily due to land-locked boundaries. Future development will be restricted to infill construction projects and redevelopment of underutilized areas. Recent zoning changes encourage mixed-use projects and increased building height in certain commercial areas. Remodeling is occurring throughout the city. The Fashion Place Mall is being rebuilt/remodeled. The Intermountain Medical Center has started remodeling and the construction is anticipated to last for at least the next 5 years. Fire Station 81 is being torn down in January 2020 and the new City Hall will be built there. The new Fure Station 81 is currently being built and will be ready in January 2020.

Capability Assessment

The city maintains a full-time staff of 398 and part-time staff of 433 individuals. The Assistant Chief/Fire Marshal is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by Assistant Chief/Fire Marshal position and supported by department heads and staff throughout the city.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	IBC
Zonings Ordinance(s)	Yes	Yes	Updates continuously
Subdivision Ordinance(s)	Yes	Yes	With Zoning
Stormwater Management Program	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	With state and national flood plain program
Post Disaster Recovery Program and Ordinance(s)	No	No	
Real Estate Disclosure Ordinance(s)	No	No	County-level
Growth Management	Yes	Yes	Future land development plan
Site Plan Review Requirements	Yes	Yes	

Public Health and Safety Program and Requirements	Yes	Yes	
Environmental Protection Program and Requirements	No	No	County and State departments
Planning Documents			
General or Comprehensive Plan	Yes	Yes	Always being updated
Capital Improvement Plan	Yes	Yes	10-year plan
Habitat Conservation Plan	No	No	
Economic Development Plan	Yes	Yes	Always being updated by CED
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	
Post-Disaster Recovery Plan	Yes	Yes	Only Mitigation
Continuity of Operations Plan	Yes	Yes	Built similar to other surrounding cities
Public Health Plans	No	No	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	No	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes, with a vote
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Depends

State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	N/A

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full-time	Community and economic development
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full-time	Public Works
Planners or engineers with an understanding of natural hazards	Yes	Full-time	Public Works
Surveyors	No	N/A	
Personnel skilled or trained in GIS applications	Yes	Full-time	4 in GIS
Emergency manager	Yes	Full-time	combination job as fire marshal
Grant writers	Yes	Full-time	combination job as fire marshal

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	No
Who is your jurisdiction's floodplain administrator? (department/position)	No, Maybe Salt Lake County or the state
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No, but we could learn more
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No, but interested in learning more

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	Yes	Murray is an ISO class 3	8/2015
NWS StormReady	-	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 144 policies were in force with total coverage of $28,837,900 and total written premium and FPF of $121,376 (FEMA, 2019).
- City of Murray does participate in the National Flood Insurance Program (CID # 490103) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019). In order to continue to comply with the program, the city adopts floodplain management requirements and enforces those requirements by issuing certificates for new construction. The certificates allow the city to regulate construction in Special Flood Hazard Areas (SFHAs). The GIS and the engineering division department in the city has updated floodplain identification and mapping in order to facilitate issuing certificates or responding to any public requests for information. The city coordinates with Salt County during flood events and monitors current snow pack to evaluate the possibility of flooding conditions.
- Murray City joined the National Flood Insurance Program (NFIP) in 1985. NFIP Insurance data indicates that as of June 30, 2014, there were 140 flood insurance policies in force in the City with $24,569,100 of coverage. Of the 140 policies, 89 of the policies were in A zones (the remaining 51 were in B, C, and X zones). There have been 39 historical claims for flood losses totaling $262,314; most all were for residential properties in A zones but there have been claims in X zones. There were no known repetitive or severe repetitive loss structures.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	7 inches of snow		3/13/2019	
High Wind	The gusts blew down multiple trees and one fell on a house in Murray. More than 7,500 power outages were reported.		4/16/2018	$50,000 property damage
High Wind	Large trees were knocked over and fell onto houses in Murray and Magna, and fence damage was also reported across the area		4/13/2017	$50,000 property damage

High Wind	The strongest gusts in Murray uprooted several trees, one of which fell on a home and damaged it. A shed was also damaged significantly.		1/8/2017	$10,000 property damage
Wildfire			3/31/2015	$20,000 property damage
Flood	Heavy rain during the early morning hours of August 20 led to flooding in West Jordan and Murray, with approximately 25 houses reporting some degree of flood damage. This flooding was most common in driveways, garages, and basements, with some homes receiving significant damage.		8/20/2014	$125,000 property damage
High Wind	The gusts blew down multiple trees and one fell on a house in Murray		4/22/2014	$50,000 property damage
Hail	0.75 diameter		8/20/2011	
Flood	Damage was reported in homes, apartments and businesses in Sandy, Cottonwood Heights, Murray and Midvale. Many of these buildings experienced flooding in backyards, basements, patios, and parking areas. Some damage in these areas was avoided due to an extensive sandbagging effort. Some of the most extensive flood damage occurred in areas of Murray Park, State Street near the park, and surrounding structures to the park, with water as deep as 4 to 5 feet reported in parts of Murray Park.		6/5/2010	$1,500,000 property damage

	It was in this area that the street flooding was most widespread; multiple lanes of traffic on State Street were closed due to flooding, with water as much as a foot deep in some spots. Flooding also occurred on Vine Street, one block west of State Street.			

Community Data to Utilize to Enhance Whole Community Resilience

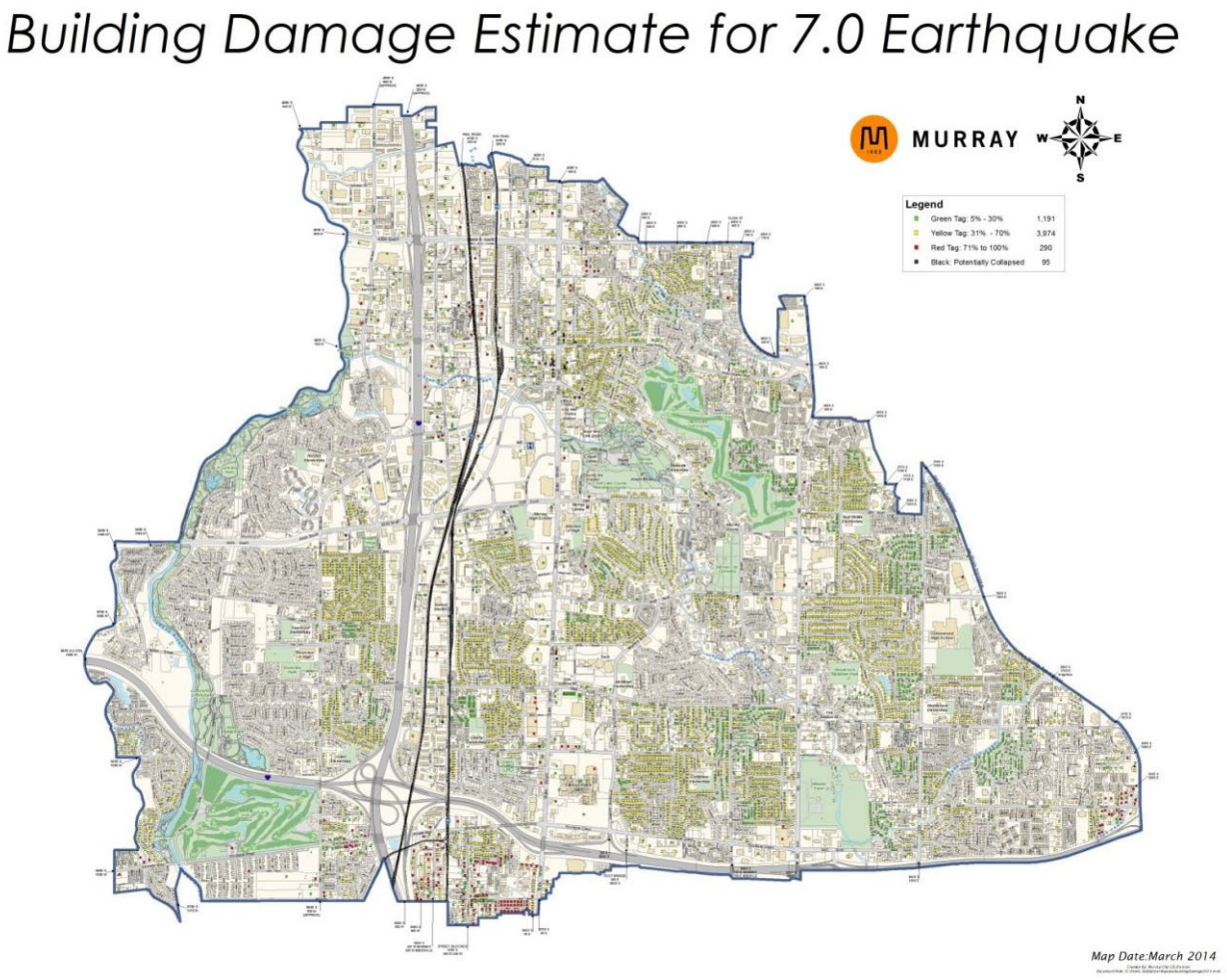
In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	7,898
Members of the community under 18 years old	10,583
Members of the community that identify as having disability status	5,712
Members of the community that speak English less than "very well"	1,354
Members of the community living below the poverty line	5,311
The number of mobile homes in the community	501
Members of the community without health insurance	5,704
Occupied housing units with tenants without a vehicle	921
Housing units without heating fuel	9

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Earthquake: Murray is subject to similar seismic hazards compared to many other parts of the Salt Lake Valley. Several unreinforced masonry buildings are in Murray. Of particular concern to seismic activity due to their location is Fire Station 81, the City Hall Building, Power Department



Head Quarters, and Gas Turbine Plant. Liquefaction is one of the secondary hazards associated with an earthquake.

Vulnerability of people and infrastructure to earthquake hazards in Salt Lake County was obtained from the modeling program HAZUS-MH, completed by FEMA Region VIII.

Jurisdiction	*Total Building Economic Loss*	*Loss Ratio*	*Total Debris (tons)*
Murray	$ 1,777,099,237	25%	1,223,103

Jurisdiction	*Displaced Households*	*Individuals Seeking Public Shelter*	*Total Casualties*	*Life-Threatening Injuries and Fatalities*	*URM Count*
Murray	6,200	3,448	2,147	217	4,987

Jurisdiction	*Life-Threatening Ratio to Total Pop*	*URM Ratio to Total Structures*
Murray	0.467%	37%

Flood: The natural drainages within Murray City are the Jordan River, Little Cottonwood Creek, and Big Cottonwood Creek. Both of the Cottonwood Creeks flow northwest and join the Jordan River in the northwest region of the City. The Jordan River flows north along the west side of Murray City. The East Canal and Jordan and Salt Lake City Canal cut across the southeast corner of the City and flow to the northeast. Other areas of flooding include Wheeler Farm and Murray City Park. There is a lack of drainage by I-15 and Central. 900 East has drainage capacity issues.

Natural Drainages:

- Little Cottonwood Creek

  Little Cottonwood Creek flows through approximately 4.5 miles of Murray City from Union Park Avenue and I-215 to the Jordan River at 4800 S. The creek provides drainage for the Southeast, Central East, Central, and North Basins. It is conveyed through the City by a series of open channels and road crossing structures before discharging to the Jordan River after crossing Murray Boulevard.

- Big Cottonwood Creek

  Big Cottonwood Creek flows through approximately 4.2 miles of Murray City from 1300 E and 4705 S to the Jordan River at 4200 S. The creek provides drainage for the Northeast, East, and North Basins. It is conveyed through the City by a series of open channels and road crossing structures before discharging to the Jordan River after crossing 500 E.

- Jordan River

  The Jordan River flows through approximately 4.6 miles of Murray City along the western border of the City. The Jordan River provides drainage for the West, Central South, Central West, and North Basins.

- Jordan and Salt Lake City Canal

  The Jordan and Salt Lake City Canal flows through approximately 1.9 miles of Murray City from 900 E and I-215 northeast to Van Winkle. The canal provides drainage for the Southeast and Northeast Basins. The canal is conveyed through a series of open channels and culverts before exiting the City boundary. It must be noted that although the canal currently is part of the storm drainage system, especially for older irrigation pipes that also convey storm drain runoff, the canal cannot be used as an outlet for future storm drain projects.

Vulnerability Assessment

The following loss estimates were provided by FEMA Region VIII as part of the Mitigation Planning/Risk MAP partnership.

City	1% Annual Chance			0.2% Annual Chance		
	Structure Exposure	Building and Contents Loss*	Loss Ratio**	Structure Exposure	Building and Contents Loss	Loss Ratio
Murray	79	$1,382,712	0.020%	412	$23,160,899	0.33%

Structure exposure and Hazmat generated losses
Data not available for 1% annual chance loss calculation for x structures.
**Ratio of damages/losses by hazard and total building inventory.

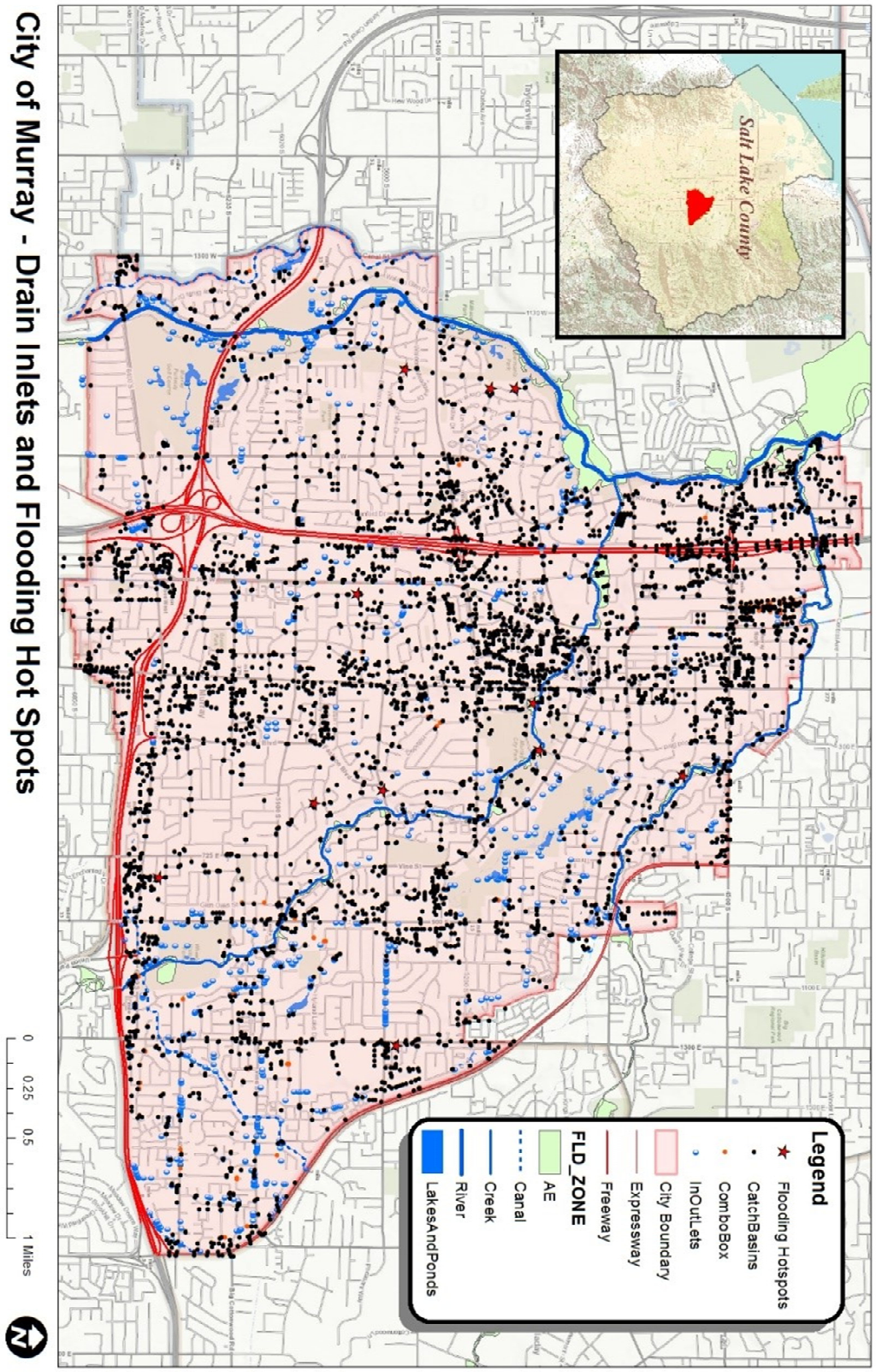


Figure. Murray City' Drain Inlet and Flooding Hot Spot Map

Following the rainstorm of September 1982 and the snowmelt floods of 1983, Salt Lake County passed a $33 million bond to combine with mitigation funds from FEMA. With these funds many flood control projects were constructed to repair damage to the creeks and rivers and to protect the citizens from future flooding events. Among the projects constructed was a detention basin at Wheeler Farm on Little Cottonwood Creek and improvements to the Creek Side Park detention Basin on Big Cottonwood Creek. In addition, numerous channel improvement projects were constructed, including, many thousands of feet of gabion baskets installed on Big and Little Cottonwood Creeks and the Jordan River.

Damaging floods occurred in 1983, 2010 and 2011. Listed below is a summary of these events:

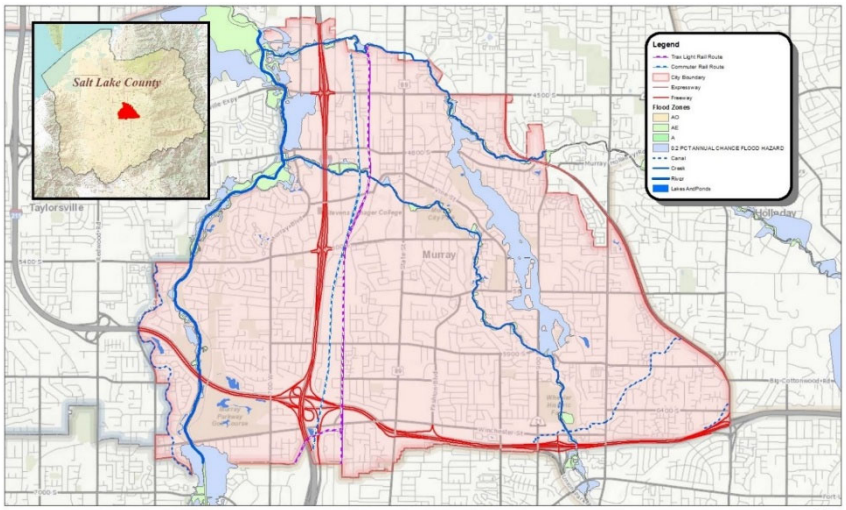
- **1983** – Great Salt Lake Tributaries between Ogden and Salt Lake City flooded due to rapid melting of snowpack having maximum-of-record water content on June 1. A disaster was declared by the President with damage at $621 million. Mitigation measures in Murray included modifications to and replacement of several bridges.
- **2010** – Cool temperatures during early to mid-spring delayed snowmelt runoff from Little and Big Cottonwood Creeks. June rainfall, along with rapidly increasing temperatures, occurred for several days in a row resulting in higher than average spring runoff.
- **2011** – During water year 2011, Utah experienced its wettest 90-day period in history (1948–2011) from March to May. Runoff for water year 2011 was characterized by a delay in the snowmelt runoff and above average total annual stream flow. Despite the above average snowpack, which lasted into the summer of 2011, runoff from snowmelt in 2011 did not create the widespread damage observed in 1983 and 2005. Cooler than normal temperatures resulted in slower snowmelt rates, which produced a prolonged and elevated runoff.

The table below illustrates precipitation at the Salt Lake International Airport and is representative of Murray City's precipitation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Record Precipitation	3.23	4.89	3.97	4.90	4.76	3.84	2.57	3.66	7.04	3.91	3.34	4.37
Average Precipitation	1.37	1.33	1.91	2.02	2.09	0.77	0.72	0.76	1.33	1.57	1.40	1.23
Average Snowfall	13.6	9.9	9.1	4.9	0.6	0.0	0.0	0.0	0.1	1.3	7.0	12.0
Record Snowfall	50.3	32.1	41.9	26.4	7.5	0.0	0.0	0.0	4.0	20.4	33.3	35.2

Table. Murray City' Precipitation (in Inches)

Values at Risk



City of Murray's 100 and 500 Year Floodplains

	Zone A		Zone AE		0.2 pct. – 500 yr.	
Property Type	# Of Parcels	Improved Values($)	# Of Parcels	Improved Value ($)	# Of Parcels	Improved Value ($)
Office			10	19,517,800-26,691,400	12	31,213,700
Commercial			18	10,592,790	55	38,290,680
Industrial			44	15,591,980	82	24,406,350
Open Space			-	-	-	-
Residential			214	44,779,690	557	86,444,690
Total			**286**	**90,482,260**	**706**	**180,355,420**

	Zone AO		Shaded Zone X		Zone X	
Property Type	# Of Parcels	Improved Value ($)	# Of Parcels	Parcels Value ($)	# Of Parcels	Improved Value ($)
Office	-		-		-	-
Commercial	-		-		-	-
Industrial	-		-		-	-
Open Space	-		-		-	-
Residential	-		-		-	-
Total	**-**		-		-	-

Sources: Salt Lake County Assessor's Office
Digital Flood Insurance Rate Map Salt Lake County, Utah and Incorporated Areas, 2014, FEMA

	Total 100-Year Flood*				Total 500-Year Flood		Total Flood**	
Property Type	# Of Parcels		Improved Value ($)		# Of Parcels	Improved Value ($)	# Of Parcels	Improved Value ($)
Office	10	26691400-	19,517,800	26691400	12	31,213,700	22	50,731,500
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-	-	-	-				
	205	165918640	205	165918640				
	277	**251919290**	**277**	**251919290**				
Commercial	18	26691400	10,592,790	26691400	55	38,290,680	73	48,883,470
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-		-	-				
	-							
	205	165918640	205	165918640				
	277	**251919290**	**277**	**251919290**				
Industrial	44	26691400	15,591,980		82	24,406,350	126	39,998,330
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-	-	-	-				
	205	165918640	205	165918640				
	277	**251919290**	**277**	**251919290**				
Open Space	-	26691400	-	26691400	-	-	-	-
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-	-	-	-				
	205	165918640	205	165918640				
	277	**251919290**	**277**	**251919290**				
Residential	214	26691400	44,779,690	26691400	557	86,444,690	771	131,224,380
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-	-	-	-				
	205	165918640	205	165918640				
	277	**251919290**	**277**	**251919290**				
Total	**286**	26691400	**90,482,260**	26691400	**706**	**180,355,420**	992	**270,8**
	18	21704580	18	21704580				
	44	37604670	44	37604670				
	-	-	-	-				
	205	165918640	205	165918640				

	277	**251919290**	**277**	**251919290**			

Table. Count and Improved Value of Parcels in Floodplain by Type of Flood—Murray City
Sources: Salt Lake County Assessor's Office
Digital Flood Insurance Rate Map Salt Lake County, Utah and Incorporated Areas, 2014, FEMA
*Includes Zones A, AE, 0.2 pct., and AO
**Includes Shaded Zone X (500-year) and all 100-year flood zones

# Of Parcels		**Improved Value ($)**	**Estimated Contents Value ($)**	**Total Value ($)**	**Loss Estimate ($)**
100-Year Flood	286	90,482,260	***	***	***
500-Year Flood	706	270,837,680	***	***	***
Total Flood**	**992**	**361,319,940**	***	***	***

Table. Salt Lake County Flood Loss Estimates—Murray City
Sources: Salt Lake County Assessor's Office
Digital Flood Insurance Rate Map Salt Lake County, Utah and Incorporated Areas, 2014, FEMA
*Includes 500-year and 100-year flood data
**Includes Shaded Zone X (500-year) and all 100-year flood zones
*** Data Unavailable

Based on this analysis, the Murray City has assets at risk to the 100-year and greater floods. 286 improved parcels are within the 100-year floodplain for an estimated value of $90 million. An additional 706 improved parcels with an estimated valued of $271 million fall within the 500-year floodplain.

Applying the 20 percent damage factor as previously described, there is a 1 percent chance in any given year of a 100-year flood causing roughly $18 million in damage in the Murray City and a 0.2 percent chance in any given year of a 500-year flood causing roughly $72 million in damage (combined damage from both floods).

Limitations: This model includes many structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Thus, the actual value of assets at risk may be lower than those included herein.

Population at Risk

Based on information from HAZUS-MH (Census 2010) and the digital flood insurance rate map, the following are at risk to flooding in the Murray City:

- 100-year flood: 2,727 people
- 500-year flood: 6,530 people
- Total flood: 9,257 people

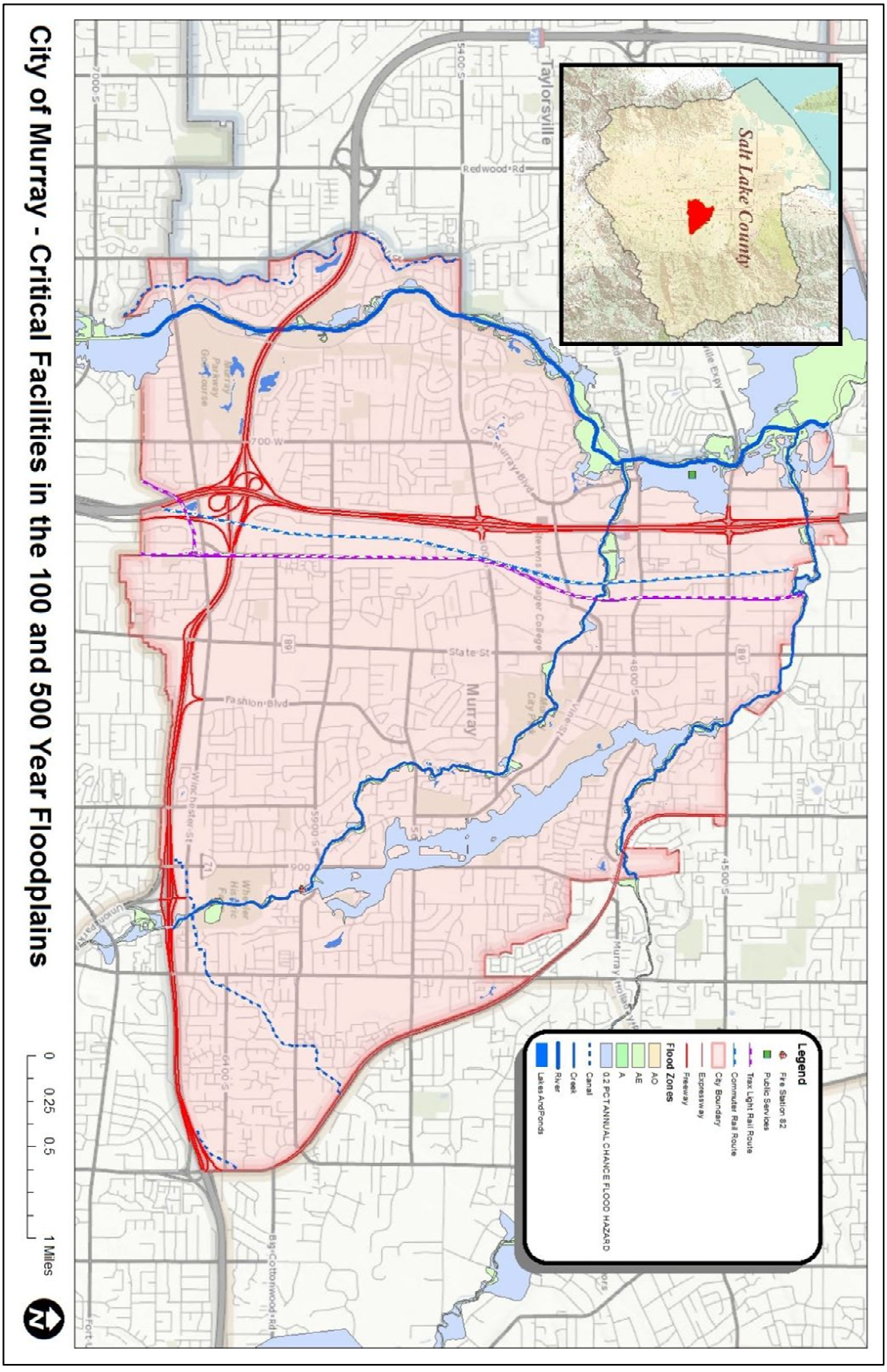
Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. The table below lists the critical facilities in the City's 100- and 500-year floodplains, and the accompanying figure illustrates their locations. The impact to the community could be great if these critical facilities are damaged or destroyed during a flood event.

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
Health Care Facilities	0	0
Schools and Day Care Centers	0	0
Residential Elderly Facilities	0	0
Fire Stations	0	1
Public Utilities	0	1
Total	**0**	**2**

Table. Critical Facilities in the 100- and 500-Year Floodplains: Murray City
Source: Murray City GIS

There are no critical facilities in the City's 100-year floodplain, but according to the risk assessment for the County, floods in Murray tend to be 500-year events. Thus, it is particularly important to note that the critical facilities in the 500-year floodplain are all facilities that serve vulnerable populations and thus should be given special attention.


City of Murray - Critical Facilities in the 100 and 500 Year Floodplains
Salt Lake County
Taylorsville
Murray
Redwood Rd
State St
Fashion Blvd
Murray Blvd
5400 S
4800 S
4500 S
700 W
Legend
Fire Station 82
Public Services
Trax Light Rail Route
Commuter Rail Route
City Boundary
Freeway
Expressway
Flood Zones
AO
AE
A
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
Canal
Creek
River
Lakes And Ponds
0 0.25 0.5 1 Miles

Extreme Temperature: Extreme cold in the region has disrupted agriculture, farming, and crops. Especially vulnerable to extreme cold are the young, elderly, homeless and animals. Wind chill can further the effects of extreme cold. Extreme heat not only causes discomfort, but personal health can be affected through heat cramps, heat exhaustion or heat stroke, particularly affecting vulnerable populations such as the very young, elderly, poor, and homeless. Extreme heat places a substantial burden on power grids through the widespread use of evaporative coolers and air conditioning. This strain can lead to brownouts or blackouts leaving many without power.

Location	Occur in localized areas throughout the city. Although many severe weather phenomena generally have recognizable patterns of recurrence, it is difficult to identify exactly when and where the next event will take place.
Seasonal Pattern	Year round.
Conditions	Vary based on latitude, elevation, aspect and landforms.
Duration	Severe weather hazards generally last hours; some conditions can persist for days.
Secondary Hazards	Wildfire, flooding.
Analysis Used	National Climate Data Center, National Weather Service, Utah Avalanche Center, UDEM, local input, and review of historic events and scientific records.

Dam Failure: While no major dams are located within Murray City, a dam failure nearby could cause property damage within Murray's city limits.

Lake Mary–Phoebe and Salt Lake County Big Cottonwood Spencer's could potentially impact Murray City. The table below estimates the total area, population and buildings vulnerable to dam failure for Murray City.

City	Acres Affected	Population Affected	Structures in Inundation Areas	
			Residential (Replacement Value)	Commercial (Annual Sales)
Murray	1,066	7,423	3,324 $680,090,400	715 $550,016,335

Table. Vulnerability Assessment for Dam Failure, Murray City

The table below estimates infrastructure vulnerable to dam failure in Murray City. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by Murray City Public Services Department.

Item	Length (Miles) or Number of Units	Replacement Cost
Roadways	7.5 miles	$41,435,510
Roadway Bridges	7 bridges	$9,643,120

Railway Segments	2 miles	$2,297,896
Railway Bridges	0 bridges	$0
Water Distribution Lines	2500 feet	$237,500
Gas Lines	0 feet	$0
Sewer Lines	3000 feet	$360,000
Total Estimated Infrastructure Replacement Cost		**$53,974,026**

Table. Infrastructure Vulnerable to Dam Failure, Murray City

Location	Dam locations are located throughout the county, with most of the high and moderate hazard dams in the eastern and southern portion of the county.
Seasonal Conditions	*Rainy Day Failure:* Anytime *Sunny Day Failure:* Spring, late summer
Conditions	*Rainy Day Failure* happens mainly during heavy precipitation events, can have some warning time. *Sunny Day Failure* can happen anytime without warning.
Duration	Hours or days - depends on spillway type and area, maximum cubic feet per second (cfs) discharge, overflow or breach type and dam type.
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.
Analysis Used	Review of BOR inundation maps and plans, FIS, Utah Division of Water Rights.

Problem Soils: There is no specific data or maps related to problem soils within the Murray City. However, there are isolated locations with high groundwater / saturated soils as well as areas that have unconfined fill material. These areas are usually identified in pre-development geotechnical studies and are typically mitigated prior to development. There are also highly corrosive soils in isolated areas of Murray that over time can impact steel water and gas pipelines.

The table below estimates infrastructure vulnerable for the isolated problem soils in Murray City. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by Murray City Public Services Department.

Item	Length (Miles) or Number of Units	Replacement Cost
Roadways	1.5 miles	$1,000,000
Roadway Bridges	0 bridges	$0
Railway Segments	0 miles	$0
Railway Bridges	0 bridges	$0

Water Distribution Lines	10,000 feet	$1,100,000
Gas Lines	6,500 feet	$750,000
Sewer Lines	5,000 feet	$600,000
Total Estimated Infrastructure Replacement Cost		**$3,450,000**

Table. Infrastructure Vulnerable to Problem Soils, Murray City

The table below estimates the total area, population and buildings vulnerable to problem soils in Murray City.

Incorporated Areas	Acres Affected	Population Affected	Structures in Hazard Areas	
			Residential (Replacement Value)	Commercial (Annual Sales)
Murray	5.5	25	2,350,000	850,000

Table. Vulnerability Assessment for Problem Soils, Murray City

Most of the hazards created by problem soil and rock can be reduced or avoided if they are understood and their extent is known. Recognizing where problem soil and rock are found and taking precautions to minimize their effects can reduce the need for costly corrective measures after damage to structures and roads has occurred. The majority of damage to structures results from human activities, usually through addition of water or by loading or excavation, which aggravate potentially unstable conditions. (UNHH 2008, SHMP 2011). All new construction typically requires a stamped and sealed soils report from a geo-technical engineer at the time of submittal for a building permit. The soils report will address the soils and outline the measures required for the soils to support the intended structure.

Location	Wasatch Mountains
Seasonal Conditions	Continuous.
Conditions	Conditions vary by geologic formation.
Duration	Minutes to Years.
Secondary Hazards	Flooding (broken water pipes), fire (broken gas pipes).
Analysis Used	Utah Geological Survey.

Wildfire: Wildfires have occurred by the Jordan River and are most likely to occur during the dry season when there is wind.

HAZMAT: In Murray, below the IMC, there are sealed off tailings at the old towers and the tailings need to be removed. Also of concern are the buildings on top of capped pipes.

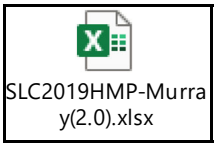
Severe Weather: The Little Cottonwood Plant supplies power to Murray and Murray sells 80% of the power to others. If power were to fail, Murray and other areas would be impacted.

Radon: Murray continues to monitor the situation in case any incidents arise.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	19	38
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Dam Failure	1	21	21
Radon	3	6	18
Tornado	1	12	12
Wildfire	1	10	10
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	6	6
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	No Impact	0	0
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	Low	1	1

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Structural Improvement in Public Buildings	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. Goal 6: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate	Earthquake	Murray EM	Public Works	High (Loss of infrastructure and possible spread of asbestos)	High	HMA/PDM Grant or other federal funds	Medium	Long-term	Upgrade, retrofit, or replace non-reinforced public buildings.

		hazards and to enhance resiliency.									
Procure a generator for the assisted living facility and schools	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	All-Hazards	Murray EM	Public Works	High	Medium	Local and County Funds	High	Short-term	
Conduct Reinforcements for the Power Department Head Quarters	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	Earthquake	Murray EM	Public Works	High	High	HMA/PDM Grant or other federal funds	Medium	Long-term	
Conduct a Flood Study, improve culverts and drainage, elevate roads and bridges, and build up burns.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood	Murray EM	Public Works	High	High	HMA/PDM Grant or other federal funds	Medium	Long-term	
Remove tailings from the old towers	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Murray EM	Public Works	Medium	Medium	HMA/PDM Grant or other federal funds	Low	Short-term	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct training and awareness activities on communications equipment, tools, and systems.	2014	Improve and maintain communications capabilities for emergency operations. Improve communications capabilities	All Hazards	Murray Emergency Management		Medium	Medium - 80,000	Local and State	High	Ongoing	Need more personnel trained with amateur radio, currently working to try and get fire department members to take amateur radio class at a local university.
Improve EOC to allow for a more functional working environment during EOC activations.	2014	Improve and maintain communications capabilities for emergency operations. Improve communications capabilities	All Hazards	Murray Emergency Management		High	Medium - 80,000	Local and State	High	Ongoing	Have obtained EMPG Competitive grant which will allow for the purchase of another monitor, a speaker system in the EOC, and table and chairs for an additional work/break area.

Evaluate vulnerability of critical communications systems.	2014	Maintain communications capabilities for critical facilities. Evaluate vulnerability of critical communications systems.	All Hazards	Murray Emergency Management	Communications	High	Medium - 80,000	Local and State	High	Ongoing	Satellite phones have been purchased; need to train more members on their usage.
Establish redundancy for dispatch centers and other critical communications systems.	2014	Maintain communications capabilities for critical facilities. Evaluate vulnerability of critical communications systems.	All Hazards	Murray Emergency Management	Communications	High	Medium - 80,000	Local and State	High	Ongoing	Installing back-up server for the city.
Establish a coordinating group to address long-term communication needs and implementation strategies.	2014	Improve and maintain communications capabilities for emergency operations. Conduct Communications Strategic Planning.	All Hazards	Murray Emergency Management	Communications	Medium	Medium - 80,000	Local and State	High	Ongoing	The administrative staff of the fire department make up the group. Currently working with amateur radio volunteers to help determine which equipment is still needed.
Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group.	2014	Improve and maintain communications capabilities for emergency operations. Conduct Communications Strategic Planning.	All Hazards	Murray Emergency Management	Communications	High	Medium - 80,000	Local and State	High	Ongoing	An EMPG competitive grant has been awarded for 2014 to help update amatuer radio equipment as well as install speakers in EOC.

Provide education regarding all-natural hazards through live trainings, as well as web-based, print and broadcast media.	2014	Increase citizen safety through improved hazard awareness. Establish a comprehensive public education program.	All Hazards	Murray Emergency Management		Medium	Low - 20,000	Local	High	Ongoing	Mainly through CERT and Murray Journal Articles
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs.	2014	Increase citizen safety through improved hazard awareness. Establish a comprehensive public education program.	All Hazards	Murray Emergency Management		Medium	Low - 20,000	Local	High	Ongoing	Yearly health safety fair and CERT program.
Ensure current hazard ordinances are available for viewing online.	2014	Minimize hazard impacts through the adoption of appropriate prevention measures. Ensure current hazard ordinances are available for viewing online.	All Hazards	Murray Emergency Management		High	Low - 20,000	Local	High		
Provide information on landscaping alternatives for persons subject to green area requirements.	2014	Limit unnecessary consumption of water throughout the County. Provide information on landscaping alternatives for persons subject to green area requirements.	Drought	Murray Emergency Management		Medium	High - 1,000,000	HMA grants and other federal grants	High	Ongoing	Information on Murray Website.
Identify structures at risk to earthquake damage.	2014	Reduce earthquakes losses to infrastructure. Encourage retrofit and rehabilitation of highly susceptible infrastructure.	Earthquake	Public Works	Murray Emergency Management	High	High - 3,000,000	HMA grants and other federal grants	High	Ongoing	
Research feasibility of an incentive program for retrofitting privately-owned buildings,	2014	Reduce earthquakes losses to infrastructure. Encourage retrofit and rehabilitation of highly susceptible infrastructure.	Earthquake	Public Works	Murray Emergency Management	Medium	High - 3,000,000	HMA grants and other federal grants	High		

particularly unreinforced masonry.											
Complete seismic rehabilitation/retrofitting projects of public buildings at risk.	2014	Reduce earthquakes losses to infrastructure. Encourage retrofit and rehabilitation of highly susceptible infrastructure.	Earthquake	Public Works	Murray Emergency Management	High	High - 3,000,000	HMA grants and other federal grants	High	Ongoing	Currently upgrading 2 schools to earthquake standards.
Procure an Engineering Consultant to perform the nonstructural design and geotechnical assessment and review. CUWCD staff will procure contractor and/or install nonstructural bracing per consultant’s design.	2014	Improve seismic hazard understanding and seismic resistance of Central Utah Water Conservancy District's (CUWCD) Red Butte Dam in Salt Lake County. Perform geotechnical assessment and review of Red Butte Dam to determine seismic hazard risk of slope failure on the outlet control structure and cyclic softening failure in the dam foundation soils. Perform a structural engineering analysis and design of nonstructural bracing/anchoring of piping and ancillary equipment in Red Butte Dam's flow control structure." Improve public education regarding earthquake risks to unreinforced masonry buildings	Earthquake	Public Works	Murray Emergency Management	High	High - 3,000,000	HMA grants and other federal grants	Medium		
Determine potential flood impacts and identify areas in need of additional flood control structures.	2014	Protection of life and property before, during and after a flooding event. Encourage appropriate flood control	Flood	Public Works	Murray Emergency Management	Medium	High - 500,000	State and Federal Grants	Medium	Ongoing	

		measures, particularly in new developments.									
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures.	2014	Protection of life and property before, during and after a flooding event. Encourage appropriate flood control measures, particularly in new developments.	Flood	Public Works	Murray Emergency Management	Medium	High - 500,000	State and Federal Grants	Medium	Ongoing	
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems.	2014	Protection of life and property before, during and after a flooding event. Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures.	Flood	Public Works	Murray Emergency Management	High	High - 500,000	State and Federal Grants	High	Ongoing	
Modify/upgrade structures and conveyances as needed to address deficiencies.	2014	Reduce threat of unstable or inadequate flood control structures. Reduce potential for failure of flood control structures.	Flood	Public Works	Murray Emergency Management	High	High - 20,000,000	HMA grants and other federal grants	High	Ongoing	Areas identified with capital improvement plan.
Maintain contact with NWS prior to re-application in 2010.	2014	Reduce threat of loss of life or property due to extreme weather events. Maintain status as a StormReady Community.	Severe Weather	Murray Emergency Management		Low	Low - 20,000	Local	Low		
Install larger and higher vent piping.	2014	The gas turbine plant as well as the compressor building for Murray City lack earthquake resistant construction as well as lack several safety systems for first responders. Install larger vent piping and a remotely activated valve to allow for the release of gas	Gas Turbine Plant	Public Works	Murray Emergency Management	High	High - 160,000	State and Federal Grants	High	Ongoing	Valve has been installed, but wiring to activate the valve is not in place.

		in the system during an emergency.									
Fix existing gas line connections that are earthquake resilient.	2014	The gas turbine plant as well as the compressor building for Murray City lack earthquake resistant construction as well as lack several safety systems for first responders. Fix gas line connections that would be less likely to leak during earthquakes.	Gas Turbine Plant	Public Works	Murray Emergency Management	High	High - 160,000	State and Federal Grants	High	Ongoing	Some connections have been improved. We have applied for a pre-mitigation grant to cover the costs.

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Completed	Murray evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable Example: Murray is looking into purchasing portable amateur radios to use in case the main radio system fails.
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Not completed	Murray does not have any of the mentioned specialized sensors. However, The Murray emergency manager receives alerts from the USGS and NWS via text message and email.
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery	1 – Utilize GIS to identify facilities and infrastructure at risk	Completed	In 2012 Murray GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and

		3.1 – Prevent damage to critical facilities and infrastructure			risk assessment on all structures in the city to evaluate their level of risk.
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	Completed	In 2012 Murray GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk. Example: Routes were established for crews to drive after a disaster in order to evaluate critical areas.
All Hazards	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	1 – Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	Not completed	Murray needs to gather all MOUs into one location for easy reference.
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	2 – Incorporate information about cascading effects of hazards in education programs	Completed	Information is included in all presentations on the effects of cascading hazards.
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Completed	Murray GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city.
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	5 – Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	Not completed	Murray has attended Be Ready Utah workshops and hopes to provide a presentation in Murray in the future.
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Completed	Murray ordinances are available online at: http://murray.utah.gov/

Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Completed	Dam inundation maps are included in emergency operation plans.
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	Not completed.	Dam inundation maps are included in emergency operation plans, however since risk is negligible, no evacuation routes have been identified.
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	Not Completed	This is not applicable to Murray.
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	1 – Identify structures at risk to earthquake damage	Completed	In 2012 Murray GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk.
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	Murray has not participated in this program; however the city supports county level efforts to share this type of information.
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed / Not Applicable	Not applicable to Murray as the referenced dam is located in another jurisdiction.
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed / Not Applicable	Murray does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed / Not Applicable	Murray does not have a Weather Operations Plan and does not participate in the StormReady

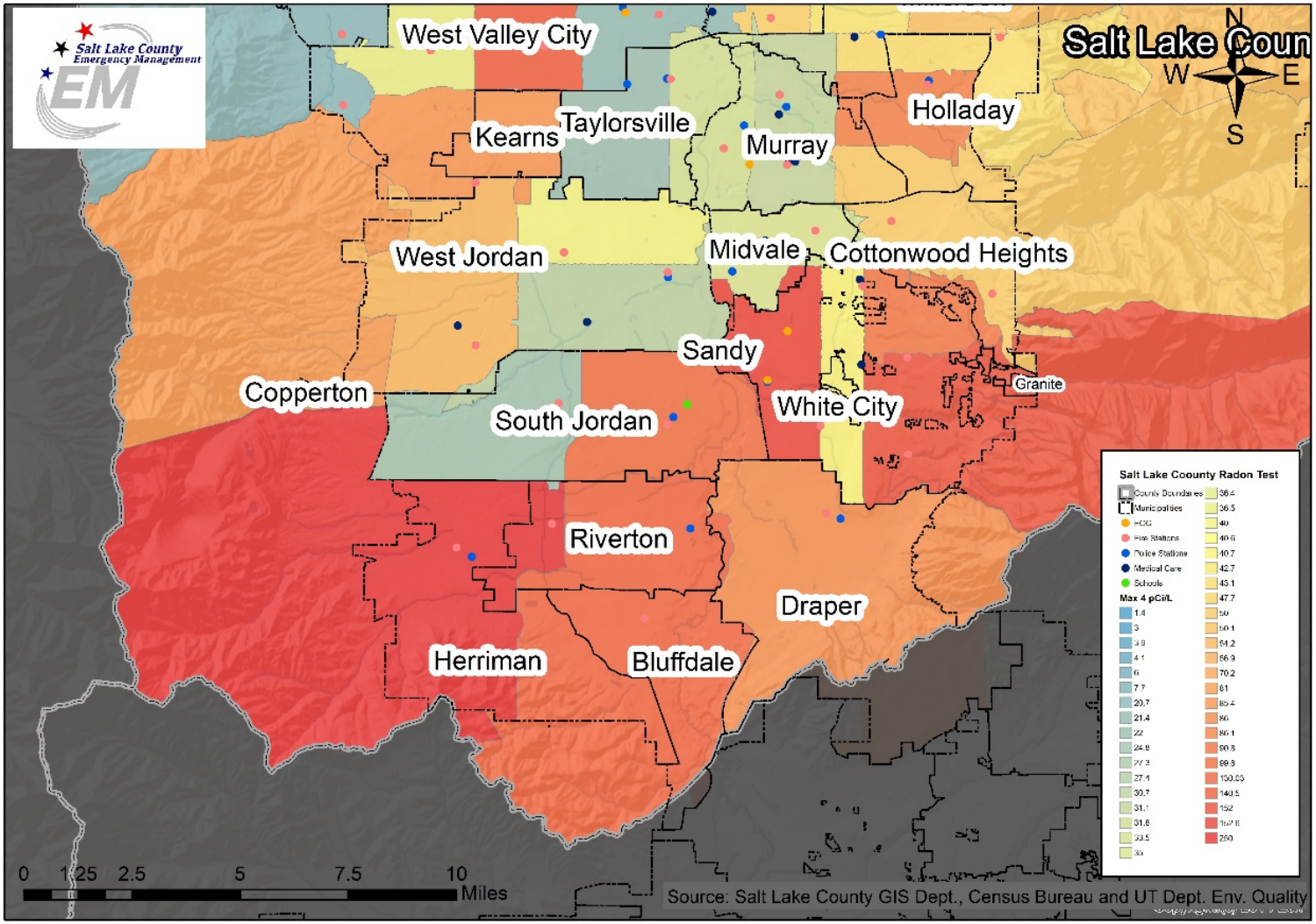
		1.1 – Maintain status as a StormReady Community			program. This is a Salt Lake County level program.
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	Murray has not developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.

Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	Not Completed	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Completed	Addressing of structures in Murray is complete.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	Completed	Addressing of structures in Murray is complete.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	1 – Reduce fuels around publically owned structures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	The Murray water system meets and/or exceeds requirements for providing water flow for firefighting purposes in the City.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.

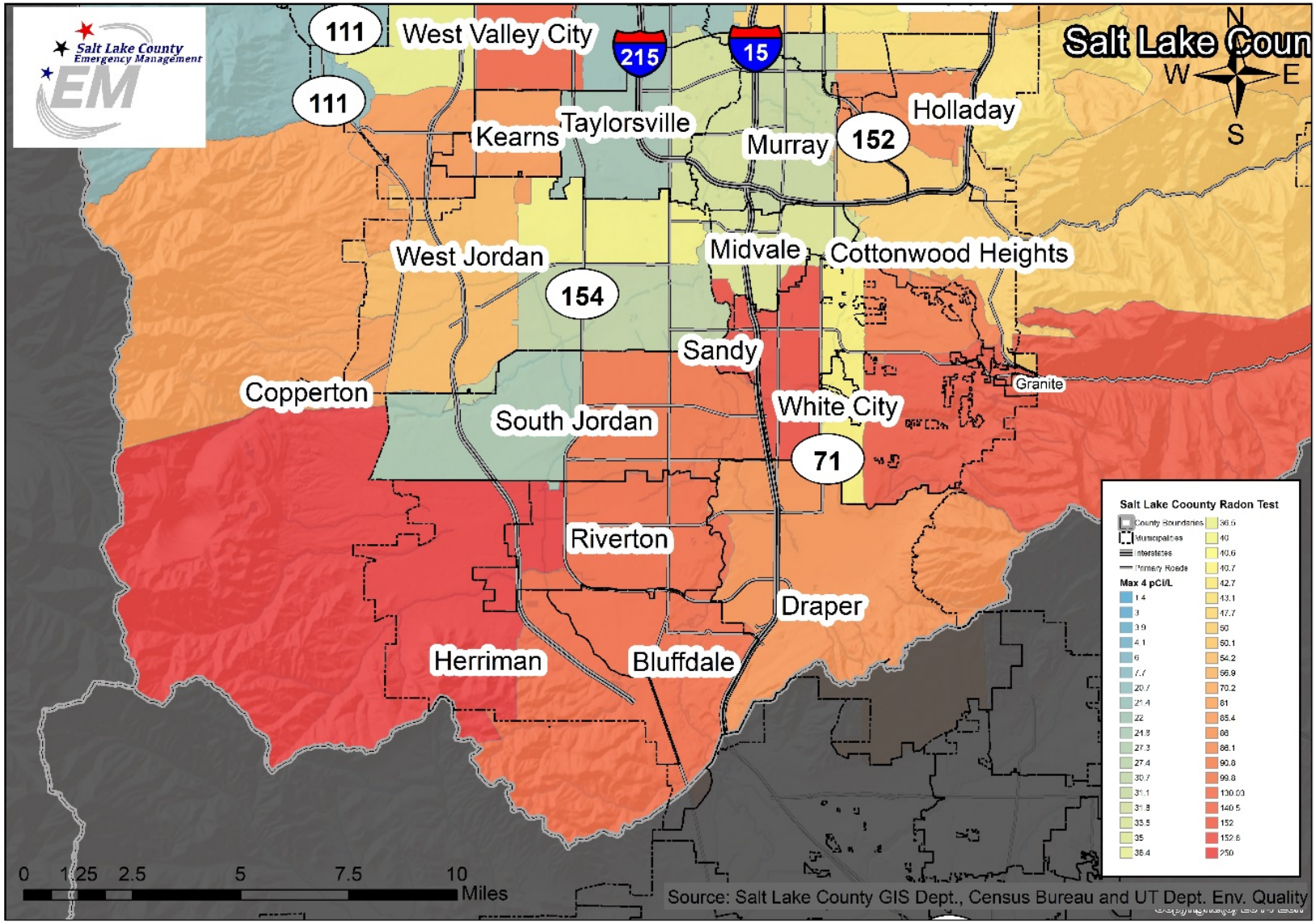
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	1 – Adopt the Utah Wildland-Urban Interface Code	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable.

Jurisdiction Maps

Map: Radon



Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Riverton City

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Scott Chatwin Title: Emergency Manager Department: Administration Address: 12830 South Redwood Road, Riverton Utah 84065 Office Phone: 801-208-3119 Cell Phone: 801-860-9259 Email Address: schatwin@rivertonutah.gov Website: https://www.rivertonutah.gov/	Name: Trace Robinson Title: Public Works Director Department: Public Works Address:12525 South 4150 West, Riverton Utah 84096 Office Phone:801-208-3137 Email Address: trobinson@rivertonutah.gov Website: https://www.rivertonutah.gov/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** July 3, 1967
- **Current Population:** 44,419 (V2018 estimate)
- **Population Growth:** The population grew an estimated 14.4% from the April 2010 Census to July 2018 estimates from 38,753 to 44,419 (Census).

2018 Population	2010 Population Estimate	Estimated % Change 2010-2014	2018 # of Housing Units	2014 Estimated # of Housing Units	Estimated % change 2010-2014
44,419	38,754	4.36%	11,212	11,089	2.63%

- **Location and Description:** The city has a total area of 12.6 square miles (32.6 km²). Riverton shares city borders with South Jordan to the north, Draper to the east, Bluffdale to the south, and Herriman to the west. The city is located in the southwestern corner of the Salt Lake Valley (Census).
- **Brief History:** The first people that lived in the area that is now Riverton settled in the 1850s. They lived in crude, widely scattered, dugout homes along the river bottoms. Archibald Gardner was the largest landowner, and he might have been the first to live on Riverton land, though early accounts disagree. Because of this, the land along the Jordan River and the surrounding area was called Gardnerville. Due to the lack of irrigation water, initial growth was slow. However, the town began to grow as settlers developed a cooperative to build a ditch, which later resulted in a canal that opened cultivation, which attracted new residents. Riverton later became incorporated into a town in 1948 and a city of the third class on July 3, 1967.
  By 1914, Riverton began to prosper as an agricultural community, due to additional water and people. Riverton's business district also thrived. In 1879, a judicial precinct was established, and the settlement's name was officially changed from Gardnerville to Riverton by Judge Charles Smith. The first meetinghouse was constructed in 1879, which served as a church, a schoolhouse, and a community meeting place. A new meetinghouse was planned, and the architect selected was Richard Kletting who also designed the Utah

State Capitol. The entire community worked to haul material, by wagons, including granite from Little Cottonwood Canyon. The Old Dome Church, which it became to be known, continued to be used by the residents until it was torn down in 1940.

Before the turn-of-the-century, Riverton farmers gradually changed from self-sufficient to commercial farming. They specialized in alfalfa, wheat, sugar beets, tomatoes, poultry, sheep, and dairy cows. At this time, the LDS Church began to store tithed produce and livestock on land located at 1150 West 12400 South. This area is now known as Tithing Hill. In 1912, electricity first came to Riverton and in 1913 the Salt Lake and Utah Railroad (Orem Line) was started and went through Riverton west of Redwood Road. It stretched from Salt Lake to Payson and was used as a commuter and freight line. Riverton had its own train depot and trains used this line from 1914 to 1945 after which the rails and ties, along with the depot, were torn down.

Riverton City has worked with residents to continue the traditions started many years before with the annual Town Days event and much more. With Riverton being located in the Salt Lake Valley, residents have quick access to many different types of recreational activities. The Wasatch Mountains, Ski Resorts and Utah Lake are just a short drive to satisfy our many active residents (Riverton website).

- **Climate:** The annual high temperature is 67.3F and low is 43.1F with an average temperature of 55.2F (US Climate Data). On average, Riverton gets 16 inches of rain and 43 inches of snow per year. While warmer than many places in Utah, Riverton gets an average of 133 days in which nighttime temperatures drop below freezing and correlated to being warmer than many places in Utah, Riverton has an average of 46 days that annually reach a temperature above 90F (Best Places).
- **Public Services:** Riverton City provides a full range of services to its residents and businesses. General governmental services provided by the City include building inspection, construction, and maintenance of street lighting, roadways, and parks, as well as recreation and cultural events. The City also provides utility services for culinary water, secondary water, sanitation, and stormwater. Recently, in July 2019, the Police department was created.
- **Governing Body Format:** Riverton, Utah is a city of the 3rd class as defined by Utah State Code, and operates as a “six-member council" form of government, which means there are six elected officials that make up the governing body including a mayor and five council members. [See: Utah Code § 10-3b-301.] City council members are elected for terms of four years. City council holds all authority to adopt ordinances, pass resolutions, adopt annual budgets, regulate zoning and land development, establish city fees, create long-range plans for city services and utilities, and set regulatory standards for the provision of other city services. The mayor serves as chair of the city council and chief executive officer of the city [See: Utah Code § 10-3b-302.]. On December 6, 2011, the Riverton City Council re-codified its municipal ordinances and reaffirmed the long-standing office of the City Manager. The City Manager now oversees the operational and day-to-day responsibilities of managing the cities, its employees, and its services. The City Manager is a full-time position that oversees all city departments and directly reports to the city council and mayor (Riverton Government Website).
- **Development Trends:** According to the Riverton City website, the city is one of the fastest-growing cities in America. Riverton has transformed from a rural farming town into a suburban city. Businesses, housing, and roads have replaced many of the farms and cattle ranges. The growth was supported by the opening of the Intermountain Riverton Hospital in November 2009 and more recently the Mountain View Village shopping center in 2018. The city anticipates continued growth and business expansion while maintaining the 30 community parks. Much like the rest of the southwestern corner of the Salt Lake

Valley, rapid growth in the community is anticipated in the coming years. Supporting the idea of growth was the elimination of business licensing fees in 2018 to encourage new businesses to come to the city.

Capability Assessment

The Emergency Management Coordinator is the Town's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Management Coordinator position and supported by the City Manager position.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY	
	Local Authority Exists to Develop and Implement/ Enforce?
Codes, Ordinances, & Requirements	
Building Code Development and Enforcement	Yes
Zonings Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program and Ordinance(s)	No
Site Plan Review Requirements	Yes
Planning Documents	
General or Comprehensive Plan	Yes

Disaster Planning Documents	
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes
Post-Disaster Recovery Plan	No
Continuity of Operations Plan	No
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Snow Removal Plan.

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Yes

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**

Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	
Planners or engineers with an understanding of natural hazards	Yes	Full Time	
Personnel skilled or trained in GIS applications	Yes	Full Time	
Emergency manager	Yes	Part Time	
Grant writers	Yes		

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Public Works
Who is your jurisdiction's floodplain administrator? (department/position)	Tom Beesley
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**

Community Rating System (CRS)	No		
Public Protection/ISO	No		
NWS StormReady	No		

Jurisdiction-Specific Hazards and Risks

NOAA Natural Hazards 2014-2019

- The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:
- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 17 policies were in force with total coverage of $3,808,000 and total written premium and FPF of $5,642 (FEMA, 2019).
- Riverton City does participate in the National Flood Insurance Program (CID # 490104) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment/ Event Narrative
Hail	1 inch in diameter hail	-	5/25/1996	
Heavy Snow	10 inches at Riverton	-	11/21/1999	
Thunderstorm Wind	Riverton reported a gust to 70 mph (61 kts)	-	8/21/2001	
Thunderstorm Wind	Severe thunderstorms brought strong winds	-	6/1/2002	
Flash Flood	Heavy thunderstorm downpours produced localized flash flooding and	-	9/6/2002	$200,000 in property damage

	caused $200,000 in Salt Lake County			
Hail	nickel size hail (0.88 inches in diameter)	-	8/10/2008	
Hail	penny-size hail (0.75 inches in diameter)	-	8/4/2010	
High Wind	59 mph at Riverton	-	3/26/2012	
Hail	penny-size hail (0.75 inches in diameter)	-	7/16/2013	
Hail	penny-size hail (0.75 inches in diameter)	-	8/20/2014	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	2,911
Members of the community under 18 years old	15,387
Members of the community that identify as having disability status	2,288
Members of the community that speak English less than "very well"	640
Members of the community living below the poverty line	1,776
The number of mobile homes in the community	75
Members of the community without health insurance	2,404
Occupied housing units with tenants without a vehicle	135
Housing units without heating fuel	0

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are relevant and unique to the municipality.

Extreme Temperatures: While only a small percentage of the population, the community 65 years and older are likely to face more health effects than the other residents. Riverton City has a higher annual temperature with some days reaching over 100F, which could cause stress on elderly individuals.

Severe Weather: The Riverton Hospital is an Intermountain Healthcare facility, and any weather event that effects power without properly planned back-up and mutual aid agreements with nearby hospitals could significantly impact the community. Additionally, while rare, events that require evacuation would need to be offered in multiple languages. Lastly, residents in mobile homes will need lead time to find shelter in the event of a severe wind event, which is not uncommon in the area. Every Year Riverton experiences various events related to severe weather. Most of these events are mitigated as a part of ongoing routine maintenance activities.

Based on historical evidence thunderstorms can strike anywhere in the region, mainly during the spring and summer months. Much of the valley's development has occurred on old alluvial fans from the canyon mouths. During heavy rain events, water and debris collect on these same alluvial fans, damaging residential, commercial property and infrastructure.

Canyon winds can bring wind gusts greater than 100 mph through the canyon mouths into the populated areas of the Wasatch Front. Winds are usually strongest near the mouths of canyons and have resulted in the loss of power and the inability to heat homes and businesses. Winds have also damaged roofs, destroyed and knocked down large trees and fences, overturned tractor trailers and railroad cars, and downed small airplanes.

Flooding: Riverton floods are typically localized events running out of mountain canyons or highly developed areas of the City. Flooding in Riverton is typically the result of excessive snowmelt runoff and/or heavy rainfall. Urban areas are also prone to flooding because urban development such as buildings, streets, and parking lots prevent water infiltration into the soil and greatly increase runoff. Undersized piping, manmade drainage channels, or debris that obstructs passageways may further contribute to flooding. Flood damage includes saturation of land and property, erosion, deposition of mud and debris, and fast flowing water.

The major waterways in Riverton include the Jordan River, Rose Creek, Midas Creek, South Jordan Canal, Utah and Salt Lake Canal, Utah Lake Distributing Canal, and the Jacob Welby Canal. The flows of the Jordan River from Utah Lake into Salt Lake County are controlled, and the flood potential is somewhat reduced upstream of the major Jordan River tributaries. The Canals are permitted and controlled by Salt Lake County.

Canal breach: Although not a natural hazard, the flood waters from a breached canal may behave similarly and cause similar types of damage to other flooding incidents. Riverton has irrigation canals that pass through the City including South Jordan Canal, Utah and Salt Lake Canal, Utah Lake Distributing Canal, and Welby Jacobs Canal. Most of these canals are trenched rather than built up bank type structures. There are concerns with bank stability of the South Jordan Canal in the area of Lovers lane. The City is monitoring seepage and stability of the banks in this area. The City is also working with the South Valley Sewer District and the South Jordan Canal Co. to identify hazards and rectify concerns.

Flooding Hazard Profile

Location	Largely in and along Jordan River, Rose Creek Midas Creek, Canals and failed storm drainage systems.
Seasonal Conditions	Spring, and Summer heavy rainfall, and spring snowmelt runoff.
Conditions	Thunderstorms w/heavy rainfall, extended wet periods.

Duration	Flooding can last anywhere from hours to days and even months.
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.
Analysis Used	Review of FIS, FIRM, Army Corp of Engineers Flood Study.

Recent mitigation projects include the following:

- Foothills Regional Detention Basin Riverton Village Regional Detention Basin
- 3600 West Regional Detention Basin and Outfall Mountain View Regional Detention Basin and Outfall Rose Creek Channel Reconstruction a@ 4000 West Rose Creek Safety Project
- Lampton View Storm Drain Project

The following flood events are of notable significance:

- 2010 Sevier Thunderstorms resulting in the flooding of several homes
- 2007 Sevier Thunderstorms resulting in the flooding of several homes

NFIP

Riverton City has no repetitive loss claims due to flooding identified under the National Flood Insurance Program (NFIP).

The City's Community Development Director oversees enforcement of floodplain management requirements adopted by the City, including regulating new construction in Special Flood Hazard Areas (SFHAs); Floodplain identification and mapping, including any local requests for map updates; and Description of community assistance and monitoring activities.

The following loss estimates were provided by FEMA Region VIII, Sept 2013 as part of the Mitigation Planning/Risk MAP partnership.

Structure Exposure and HAZUS-Generated Losses

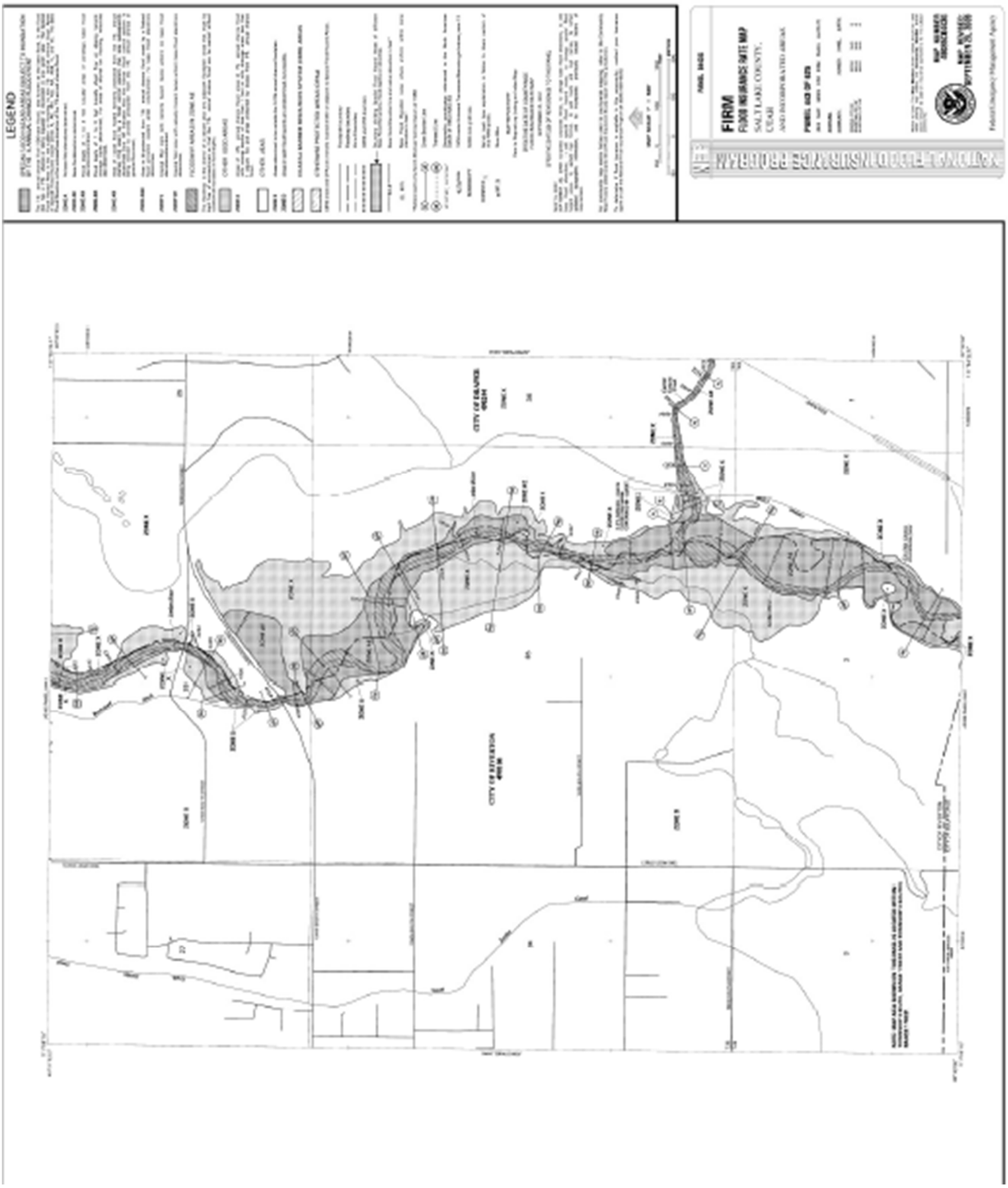
	1% Annual Chance			0.2% Annual Chance		
Jurisdiction		Building and Contents Loss*	Loss Ratio**	Structure Exposure	Building and Contents Loss	Loss Ratio
Riverton	2	$ 14,374	0.000%	102	$ 1,209,806	0.03%

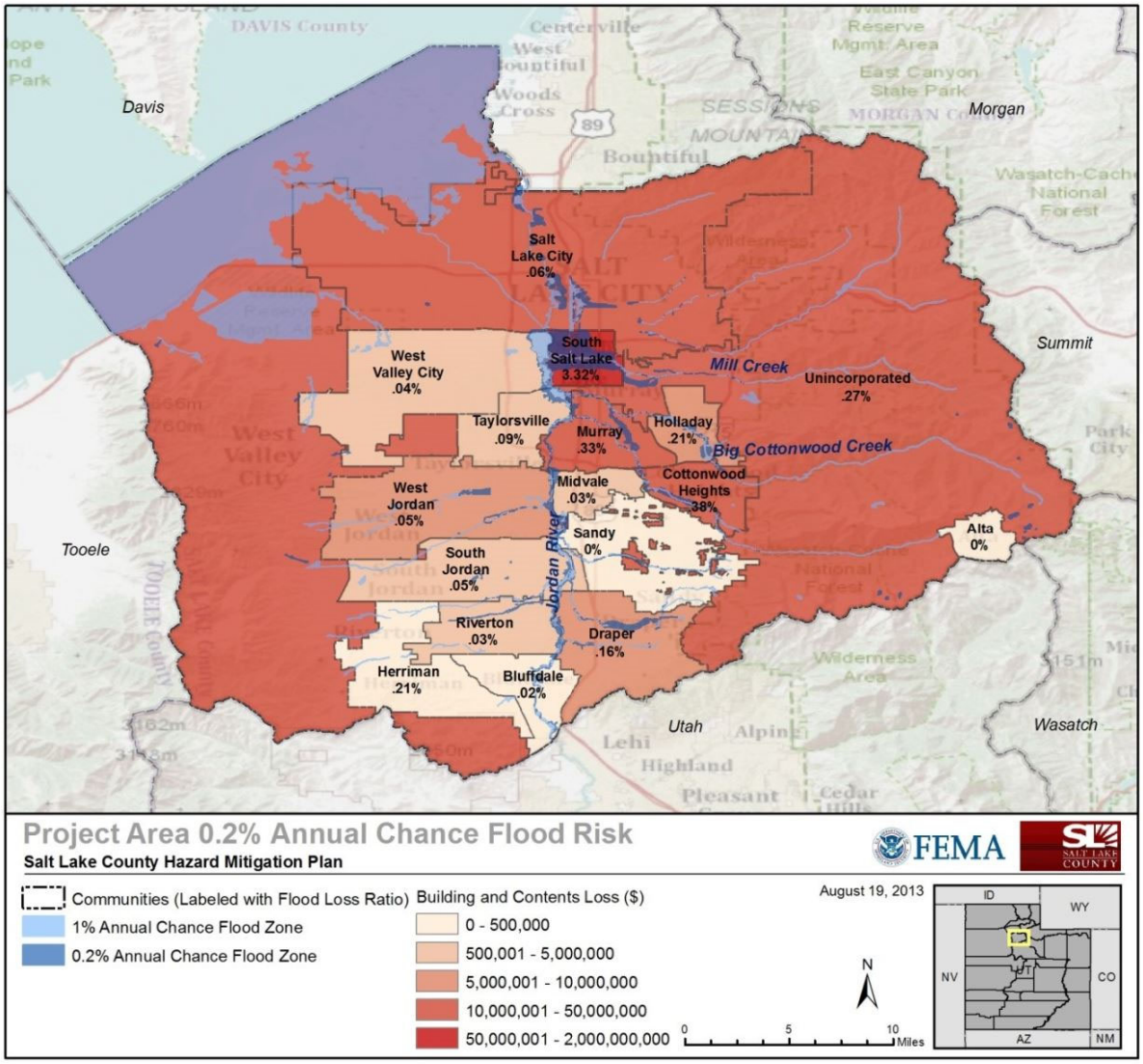
County Wide	
Population Exposure	
1% Annual Chance	7,421
0.2% Annual Chance	23,126

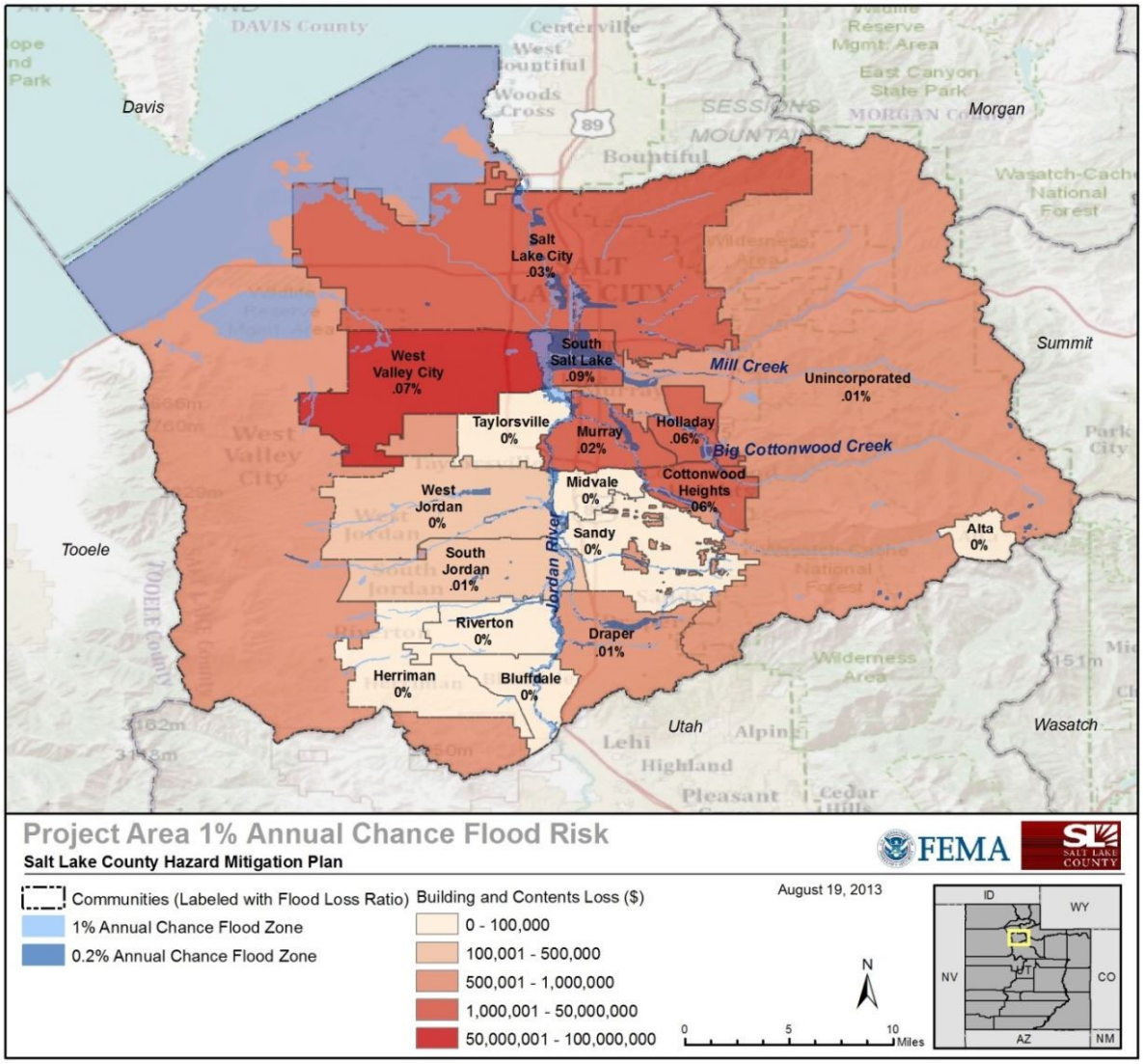
The following vulnerability assessment data for flooding in Salt Lake County is carried over from the WFRC Pre-Disaster Mitigation Plan and was obtained from HAZUS-MH**. Vulnerability was assessed for both 100-year (NFIP Zone A) and 500-year (NFIP Zone B or Zone X (shaded) flood

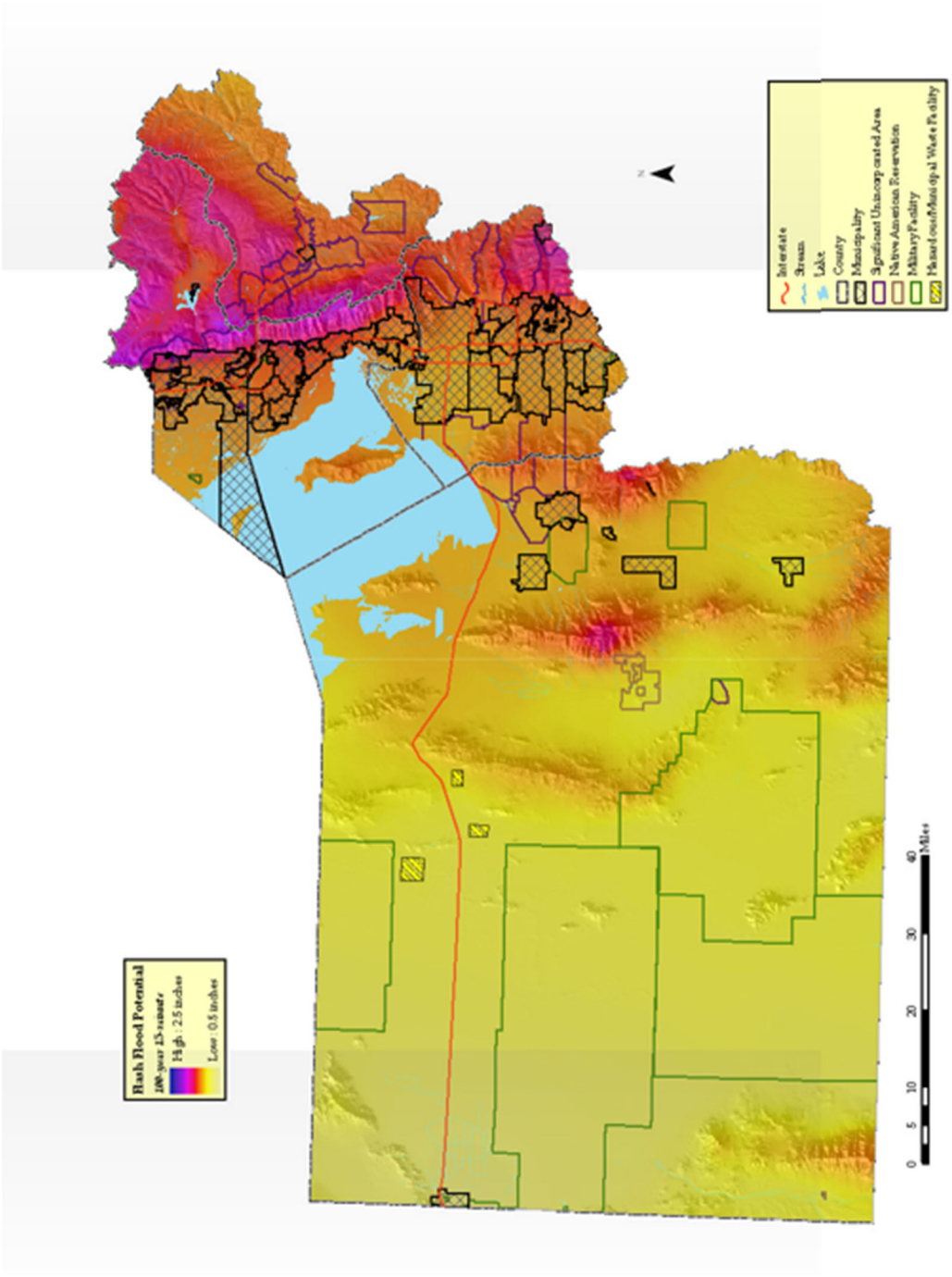
events. Analysis was completed using Digital Flood Insurance Rate Maps (DFIRM). Only streams that contained detailed flood cross-section data could be used. Flooding from the Great Salt Lake was not included. Consequently, the results should be considered conservative.

	Acres Flooded	**Population Displaced**	**Number of Structures in Floodplain**	
			Residential Units (Total Losses)	**Commercial/Industrial Units (Total Losses)**
100-year Flood	990.6	410	68 $15,367,860	46 $69,040,100
500-year Flood	1285.1	1,599	394 $143,637,730	57 $83,899,300


LEGEND
FIRM
FLOOD INSURANCE RATE MAP
SALT LAKE COUNTY,
CEAR
AND INCORPORATED AREAS
NATIONAL FLOOD INSURANCE PROGRAM
CITY OF DRAPER
CITY OF RIVERTON

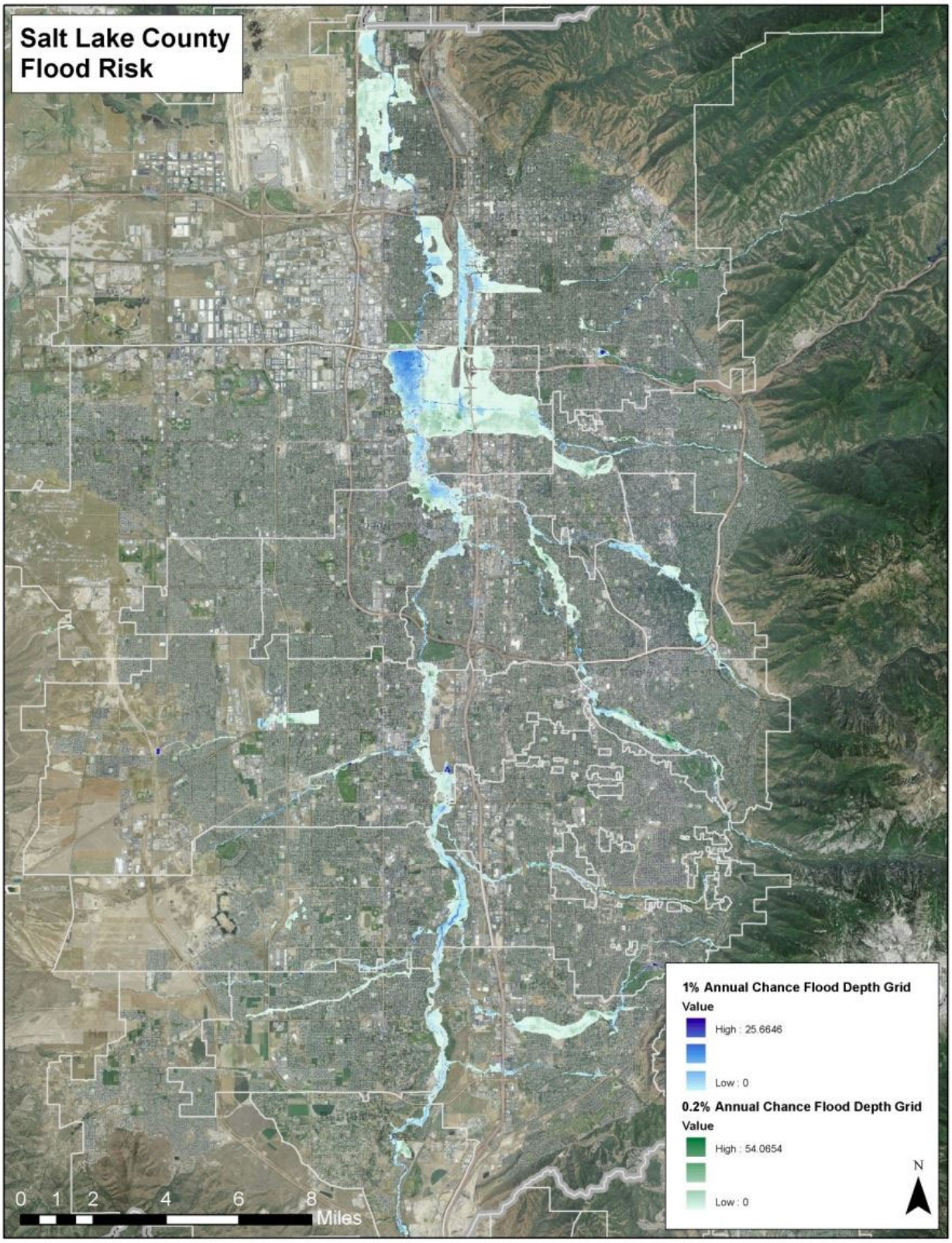

DAVIS County
Davis
Centerville
West Bountiful
Woods Cross
89
Bountiful
Reserve Mgmt. Area
East Canyon State Park
Morgan
Wasatch-Cache National Forest
Salt Lake City .06%
West Valley City .04%
South Salt Lake 3.32%
Mill Creek
Unincorporated .27%
Summit
Taylorsville .09%
Murray .33%
Holladay .21%
Big Cottonwood Creek
Midvale .03%
Cottonwood Heights .38%
West Jordan .05%
Sandy 0%
Alta 0%
Tooele
South Jordan .05%
Jordan River
Riverton .03%
Draper .16%
Herriman .21%
Bluffdale .02%
Utah
Lehi
Alpine
Highland
Pleasant Grove
Cedar Hills
Wilderness Area
Wasatch
Project Area 0.2% Annual Chance Flood Risk
Salt Lake County Hazard Mitigation Plan
FEMA
SALT LAKE COUNTY
Communities (Labeled with Flood Loss Ratio)
1% Annual Chance Flood Zone
0.2% Annual Chance Flood Zone
Building and Contents Loss ($)
0 - 500,000
500,001 - 5,000,000
5,000,001 - 10,000,000
10,000,001 - 50,000,000
50,000,001 - 2,000,000,000
August 19, 2013
N
0
5
10
Miles
ID
WY
NV
CO
AZ
NM


DAVIS County
Davis
Centerville
West Bountiful
Woods Cross
89
Bountiful
SESSIONS MOUNTAIN
Reserve Mgmt. Area
East Canyon State Park
MORGAN
Morgan
Wasatch-Cache National Forest
Salt Lake City .03%
West Valley City .07%
South Salt Lake .09%
Mill Creek
Unincorporated .01%
Summit
Taylorsville 0%
Murray .02%
Holladay .06%
Big Cottonwood Creek
Cottonwood Heights .06%
Midvale 0%
West Jordan 0%
Sandy 0%
Alta 0%
Tooele
South Jordan .01%
Jordan River
Riverton 0%
Draper .01%
Herriman 0%
Bluffdale 0%
Utah
Alpine
Lehi
Highland
Pleasant Grove
Cedar Hills
Wasatch
Wilderness Area
Project Area 1% Annual Chance Flood Risk
Salt Lake County Hazard Mitigation Plan
FEMA
SALT LAKE COUNTY
Communities (Labeled with Flood Loss Ratio)
1% Annual Chance Flood Zone
0.2% Annual Chance Flood Zone
Building and Contents Loss ($)
0 - 100,000
100,001 - 500,000
500,001 - 1,000,000
1,000,001 - 50,000,000
50,000,001 - 100,000,000
August 19, 2013
N
0
5
10
Miles
ID
WY
NV
CO
AZ
NM



11-FF

Regional Flash Flood Hazard (Source: NWS Hydrometeorological Design Studies Center)


Salt Lake County
Flood Risk
1% Annual Chance Flood Depth Grid
Value
High : 25.6646
Low : 0
0.2% Annual Chance Flood Depth Grid
Value
High : 54.0654
Low : 0
N
0 1 2 4 6 8
Miles

Landslide and Slope Failure: Landslides and debris flows are most common in the foothills area west of 4800 West and along the bench above the Jordan River; however, there is no significant reported history of Landslides in Riverton.

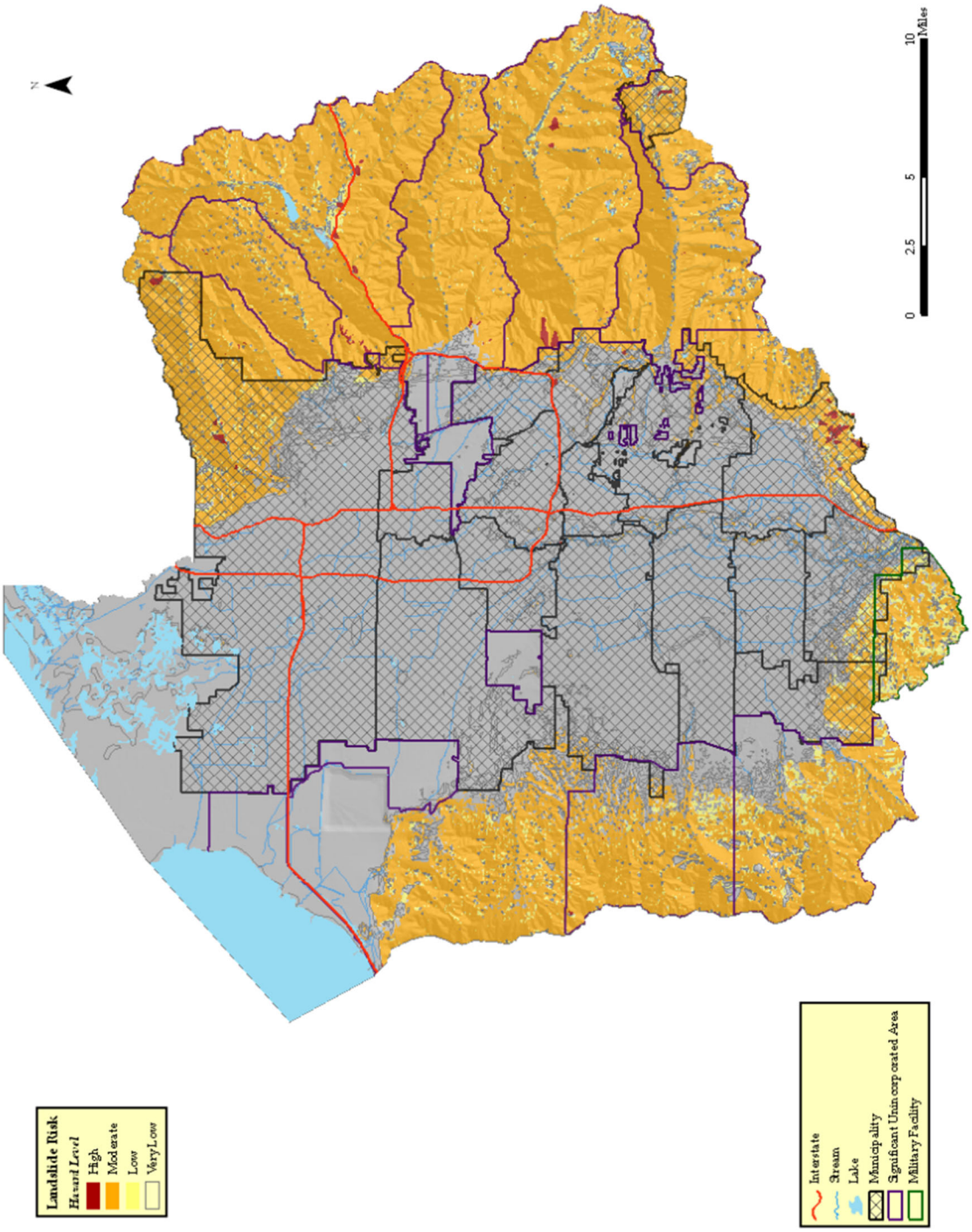
The Table below estimates infrastructure vulnerable to landslides in Riverton. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. The second Table estimates the total area, population, and buildings vulnerable to landslides for individual cities. The Table also examines the same for unincorporated areas.

Item	Length (Miles) or Number of Units	Replacement Cost
Black Ridge Reservoir	1 Reservoir and Dam	
Lovers Lane	1 mile	$800,000
Water Distribution Lines	1 mile	$530,000
Sewer Lines	1 mile	$316,800
Total Estimated Infrastructure Replacement Cost		

Table. Infrastructure Vulnerable to Landslides, Riverton

Areas	Acres Affected	Population Affected	Structures in Areas of Moderate or Greater Hazard	
			Residential (Replacement Value)	Commercial (Annual Sales)
Riverton	87	422	102 $20,869,200	2 $120,490

Table. Vulnerability Assessment for Landslides, Riverton



Dam Failure: There are 3 dams located in Riverton and there is no record of dam failure incidents within Riverton. These dams were built and are maintained by the Riverton City Water

Department. The dams serve various functions such as flood control, water storage, and recreation. Two dams are owned solely by the City and Black Ridge Reservoir is jointly owned with Herriman City. It is the City's responsibility to maintain these dams, and the state regulates its safety. The dam safety hazard is classified as no threat to high risk by the State Engineer. Hazard ratings are determined by downstream uses; size, height and volume; and incremental risk/damage assessments. This classification is based upon the damage caused if the dam were to fail, not the dam's probability of failure. Therefore, the classification of a high hazard dam does not mean that the dam has a high probability of failure. Utah Division of Water Rights inspects high-hazard dams annually, moderate-hazard dams biennially, and low-hazard dams every five years (Living with Dams, UNHH 2008).

Dam Name	**Rating**
Riverton City – 3200 West Pond	High
Riverton City – 4200 West Pond	High
Riverton City – Black Ridge Reservoir	High

A Standard Operation Procedures and Emergency Action Plan has been developed for the 3200 West and 4200 West Irrigation Ponds. Copies of these plans are located at the Riverton City Water Shop located at 3323 Sanborn Drive and the Riverton City Public Works Building located at 12526 South 4150 West.

For the Black Ridge Reservoir there is an Operation Plan entitled "Riverton City/ Herriman City Black Ridge Reservoir Standard Operating Procedures and Emergency Action Plan". Copies of the plan can be found at the following locations:

Riverton City Public Works Building located at 12526 South 4150 West Riverton City Water Shop located at 3323 Sanborn Drive

Riverton City Hall (City Manager's Office) located at 12830 South Redwood Rd

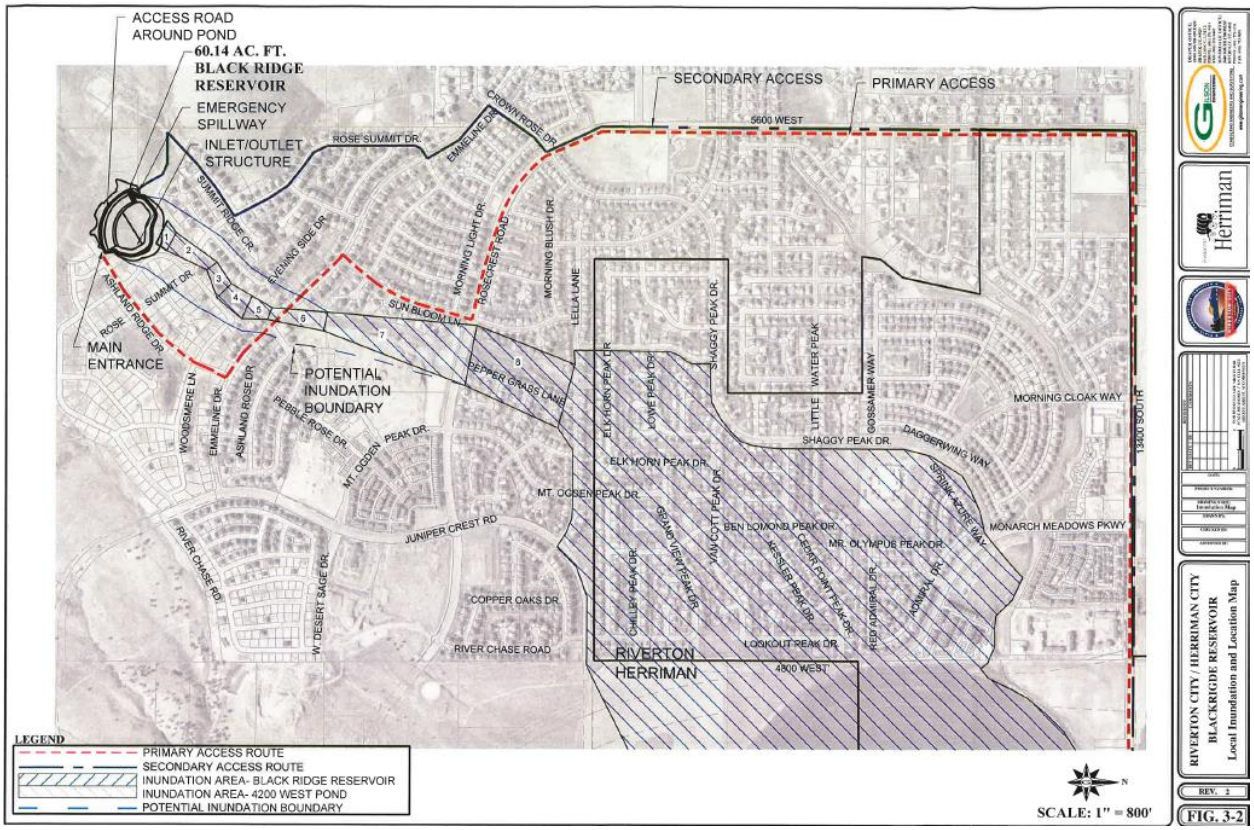
History

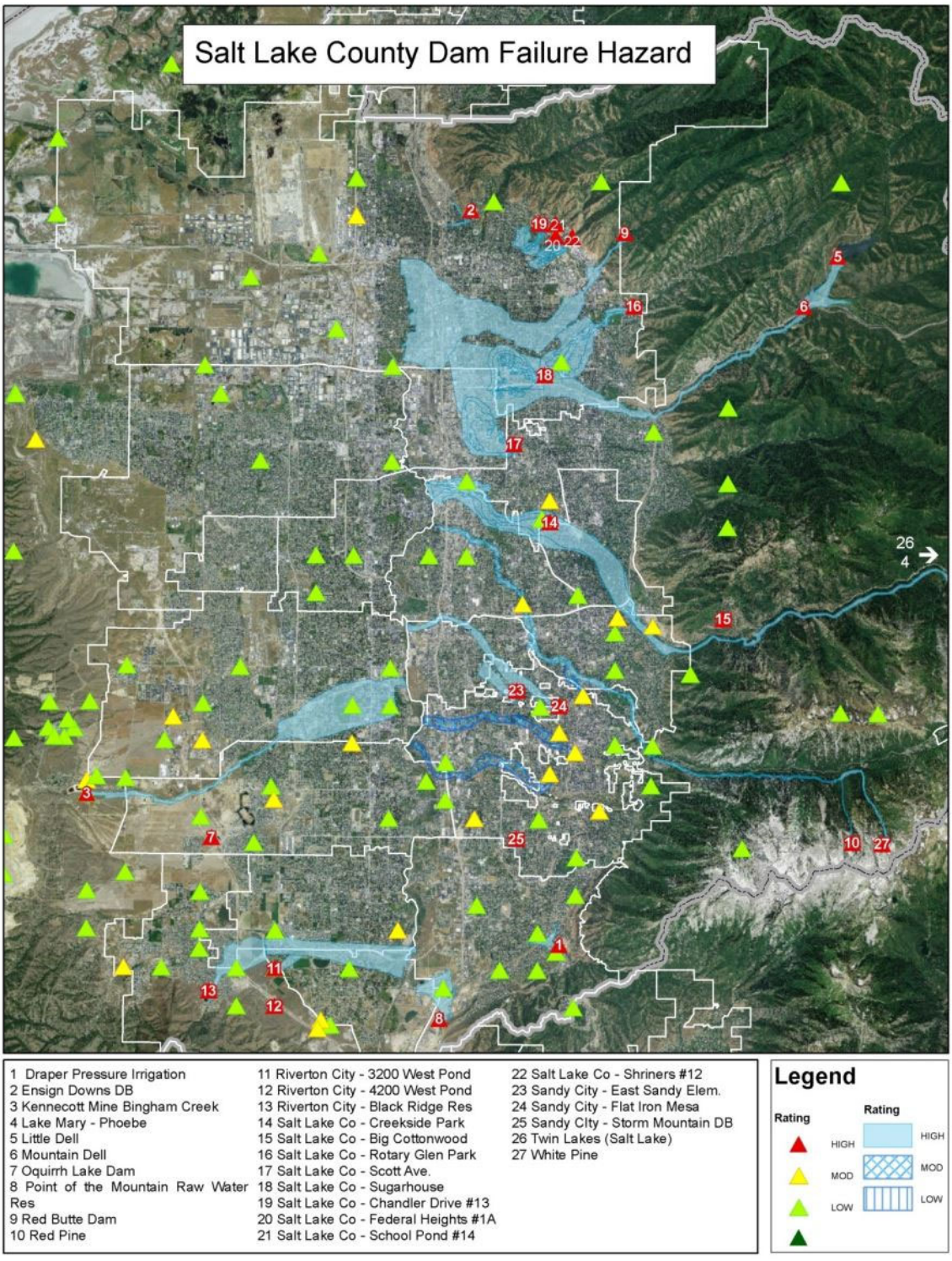
- There is no record of dam failure incidents within Riverton.

Due to the complexity and eminent disaster associated with a failure of the Black Ridge Dam, selected maps and flow charts from the plan have been added to this document for quick reference. This plan outlines the procedures and protocol for emergencies and contains the list of important contacts.

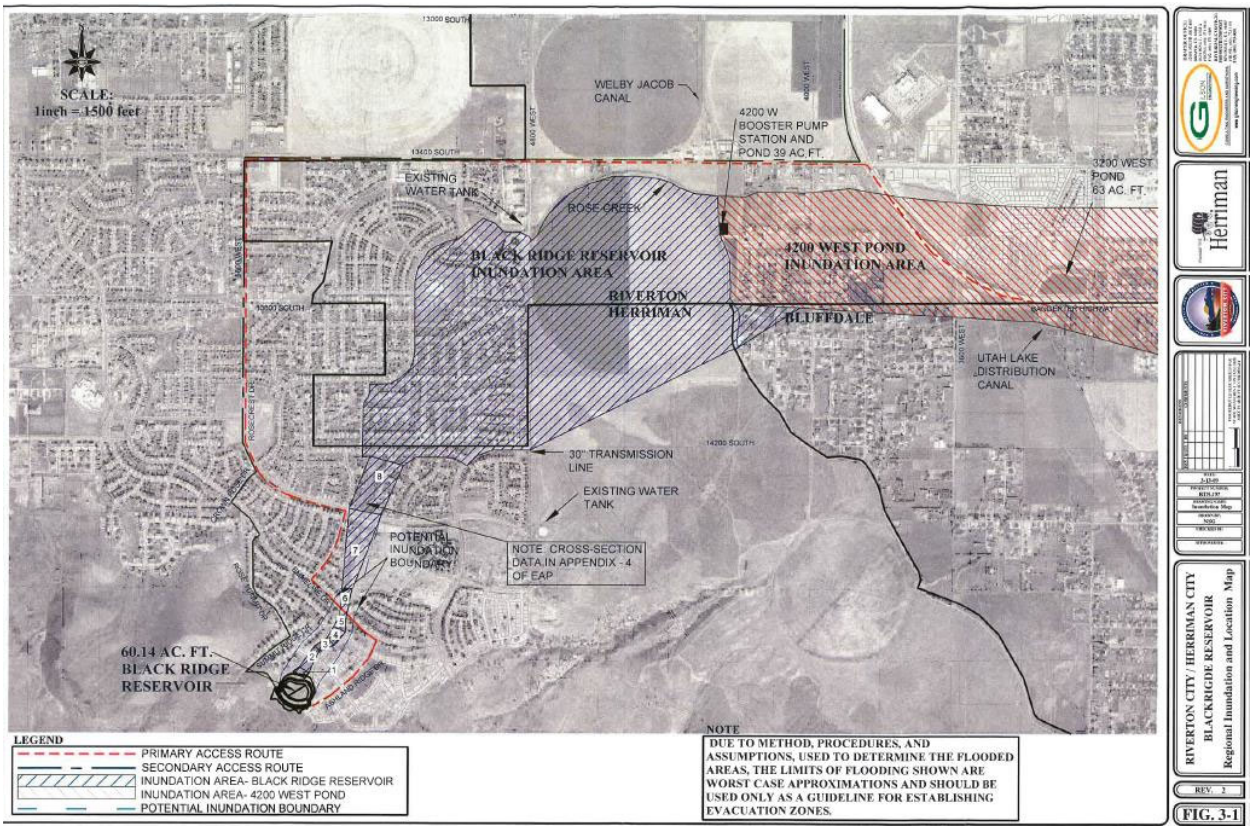
Below is the estimated damage for failure of the dams within Riverton City.

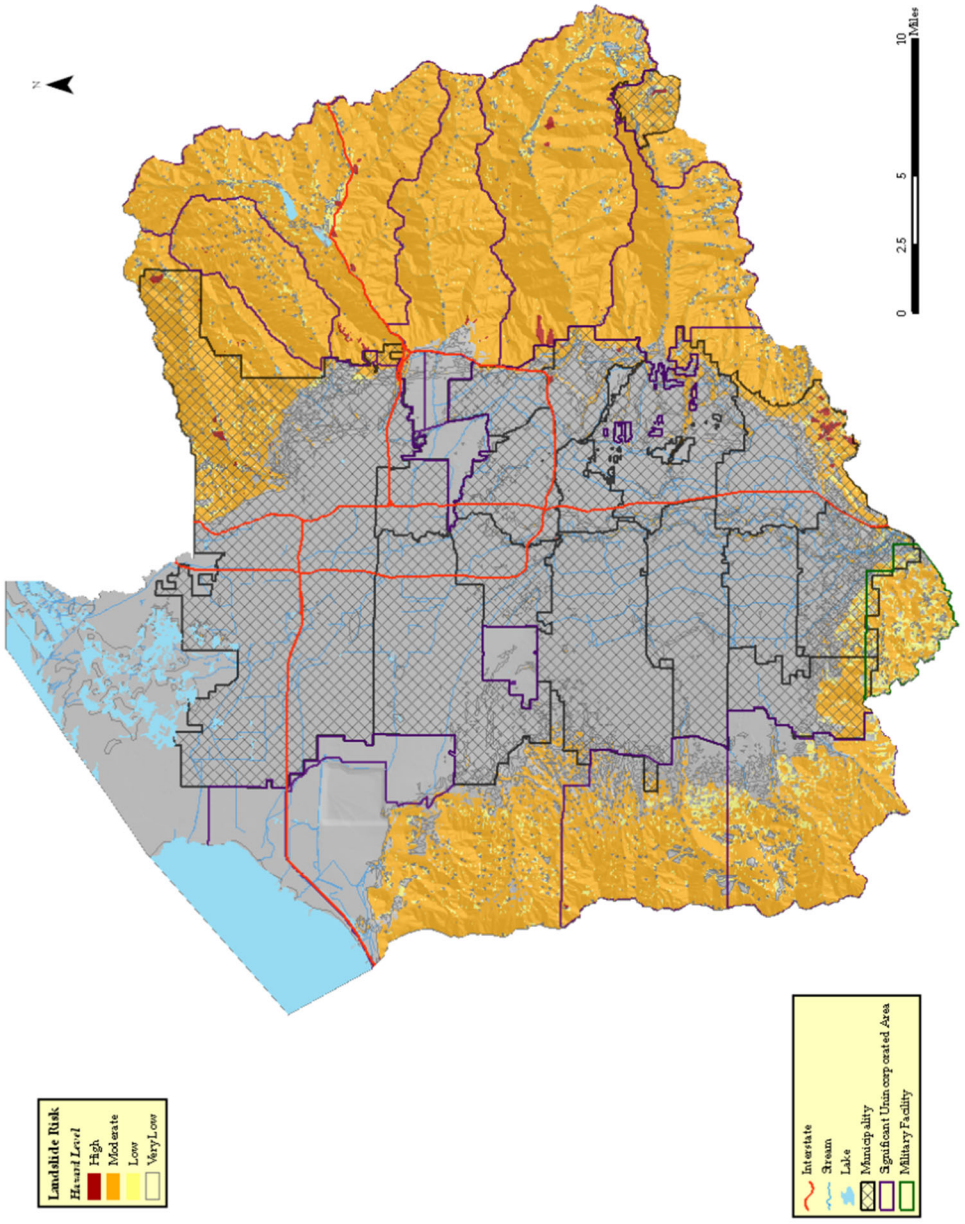
Incorporated Areas	**Acres Affected**	**Population Affected**	**Structures in Inundation Areas**	
			Residential (Replacement Value)	**Commercial (Annual Sales)**
Riverton	853	3,710	969 $198,257,400	28 $14,217,055


ACCESS ROAD AROUND POND
60.14 AC. FT. BLACK RIDGE RESERVOIR
EMERGENCY SPILLWAY
INLET/OUTLET STRUCTURE
SECONDARY ACCESS
PRIMARY ACCESS
5600 WEST
ROSE SUMMIT DR.
CROWN ROSE DR.
EMMELINE DR.
SUMMIT RIDGE CR.
EVENING SIDE DR.
MORNING LIGHT DR.
ROSECREST ROAD
MORNING BLUSH DR.
LELLA LANE
SUN BLOOM LN.
ASHLAND RIDGE DR.
SUMMIT DR.
ROSE
MAIN ENTRANCE
POTENTIAL INUNDATION BOUNDARY
PEPPER GRASS LANE
WOODSMERE LN.
EMMELINE DR.
ASHLAND ROSE DR.
PEBBLE ROSE DR.
MT. OGDEN PEAK DR.
ELK HORN PEAK DR.
LOWE PEAK DR.
SHAGGY PEAK DR.
LITTLE WATER PEAK
GOSSAMER WAY
MORNING CLOAK WAY
13400 SOUTH
SHAGGY PEAK DR.
DAGGERWING WAY
SPRINK AZURE WAY
MT. OGDEN PEAK DR.
VAN COTT PEAK DR.
BEN LOMOND PEAK DR.
MR. OLYMPUS PEAK DR.
MONARCH MEADOWS PKWY
JUNIPER CREST RD
RIVER CHASE RD.
W. DESERT SAGE DR.
GRAND VIEW PEAK DR.
CHILLEY PEAK DR.
KESSLER PEAK DR.
CEDAR POINT PEAK DR.
RED ADMIRAL DR.
ADMIRAL DR.
COPPER OAKS DR.
RIVER CHASE ROAD
RIVERTON
HERRIMAN
LOOKOUT PEAK DR.
4800 WEST
LEGEND
PRIMARY ACCESS ROUTE
SECONDARY ACCESS ROUTE
INUNDATION AREA- BLACK RIDGE RESERVOIR
INUNDATION AREA- 4200 WEST POND
POTENTIAL INUNDATION BOUNDARY
SCALE: 1" = 800'
Herriman
RIVERTON CITY / HERRIMAN CITY
BLACKRIGDE RESERVOIR
Local Inundation and Location Map
REV. 2
FIG. 3-2



Map. Dam Hazard Map, Salt Lake County (Utah Division of Water Rights 2013)


SCALE:
1inch = 1500 feet
WELBY JACOB CANAL
4200 W BOOSTER PUMP STATION AND POND 39 AC.FT.
3200 WEST POND 63 AC. FT.
EXISTING WATER TANK
ROSE CREEK
BLACK RIDGE RESERVOIR INUNDATION AREA
4200 WEST POND INUNDATION AREA
RIVERTON
HERRIMAN
BLUFFDALE
UTAH LAKE DISTRIBUTION CANAL
30" TRANSMISSION LINE
EXISTING WATER TANK
POTENTIAL INUNDATION BOUNDARY
NOTE CROSS-SECTION DATA IN APPENDIX - 4 OF EAP
60.14 AC. FT. BLACK RIDGE RESERVOIR
LEGEND
PRIMARY ACCESS ROUTE
SECONDARY ACCESS ROUTE
INUNDATION AREA- BLACK RIDGE RESERVOIR
INUNDATION AREA- 4200 WEST POND
POTENTIAL INUNDATION BOUNDARY
NOTE
DUE TO METHOD, PROCEDURES, AND ASSUMPTIONS, USED TO DETERMINE THE FLOODED AREAS, THE LIMITS OF FLOODING SHOWN ARE WORST CASE APPROXIMATIONS AND SHOULD BE USED ONLY AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
RIVERTON CITY / HERRIMAN CITY
BLACKRIGDE RESERVOIR
Regional Inundation and Location Map
REV 2
FIG. 3-1



Public Health Epidemic/Pandemic: No defined geographic extent. Pandemics can spread throughout the county/region/state & beyond. Riverton does only have one hospital which would be a major concern in the event of a widespread pandemic. Individuals, families, employers and communities will all experience difficulties dealing with community mitigation measures. Many problems will come from having children dismissed from schools and childcare programs. There are 15,387children less than 18 years old and likely enrolled in school in Riverton City. Secondary disruptions would occur for parents who would need to balance working with tending their children. Tertiary disruptions would occur for employers with absent employees that must stay

home to care for children and could potentially result in workplaces closing or reducing operations and limiting the availability of essential services. Additionally, 2,911 individuals are 65 years of age and would likely be more susceptible to adverse health effects from a pandemic.

Characteristics	Pandemic Severity Index				
	Category 1	Category 2	Category 3	Category 4	Category 5
Case Fatality Ratio (percentage)	<0.1	0.1-<0.5	0.5-<1.0	1.0-<2.0	>=2.0
Excess Death Rate (per 100,000)	<30	30-<150	150-<300	300-<600	>=600
Illness Rate (percentage of the population)	20-40	20-40	20-40	20-40	20-40
Potential Number of Deaths (based on 2008 population estimate*)	<312	312-<1,562	1,562-<3,125	3,125-<6,249	>=6,249
20th Century UT experience	Seasonal Influenza (illness rate 5-20%)	1957, 1968 Pandemic	None	None	1918 Pandemic

Table. Community Mitigation Plan, Appendix H to the Salt Lake Valley Health Department Pandemic Influenza Preparedness and Response Plan

*** 1,041,578 = Salt Lake County population, 2008 estimate, Utah Population Estimate Committee and the Governor's Office of Planning and Budget, 2008 Baseline Economic and Demographic Projections.**

Earthquake: Significant community assets with potential impacts by earthquake hazards were identified by the Planning Team and include:

- Riverton Public Works Building (EOC)
- Riverton Water Shop
- Riverton City Hall
- Water Tanks: Main Tank, High Tank & Garamandi Tank
- Intermountain Health Care Riverton Hospital
- UFA Fire Stations Located at: 12600 S 4150 W, 112662 S 300 W, and 13000 S 2700 W Riverton High School
- South Hills Middle School Oquirrh Middle School Riverton Elementary
- Southland Elementary Midas Creek Elementary
- Rose Creek Elementary Rosamond Elementary Kari Sue School
- Kauri Sue Hamilton School

Vulnerability Assessment

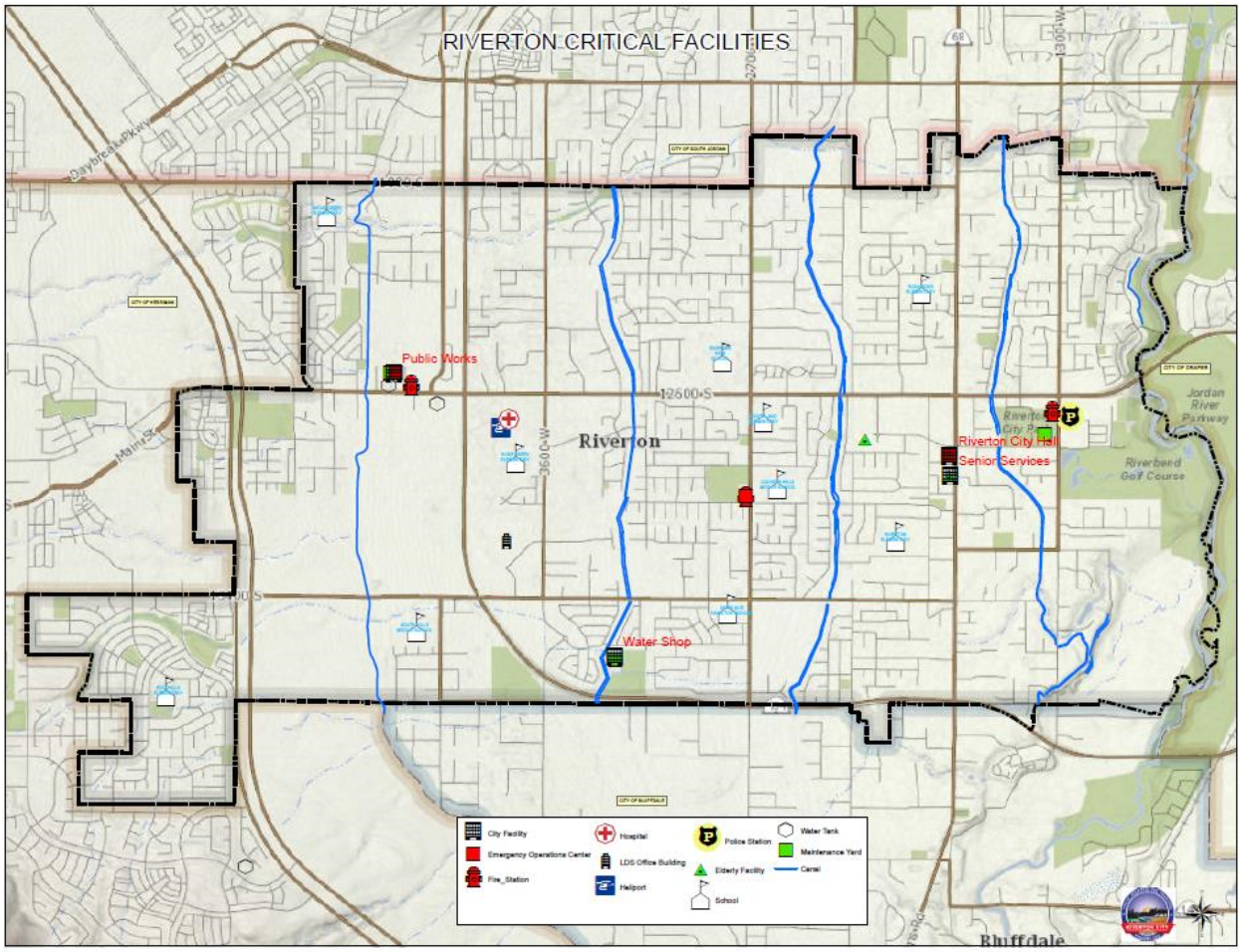
The following values are from the HAZUS analysis performed by WFRC for the 2009 Regional Mitigation Plan. Because no significant changes in the level of risk or the condition of infrastructure, these values are still considered valid estimates of potential impacts to earthquake in Riverton City. They are based on a probabilistic 2500-year event with a Richter magnitude of 7.1 as well as an arbitrary 5.9 event located near the county's most populated areas. These locations and magnitudes were chosen for their likelihood and proximity respectively. Default HAZUS-MH inventory for all infrastructure was used.

Vulnerability of people and infrastructure to earthquake hazards in Riverton City was obtained from the modeling program HAZUS-MH, completed by FEMA Region VIII.

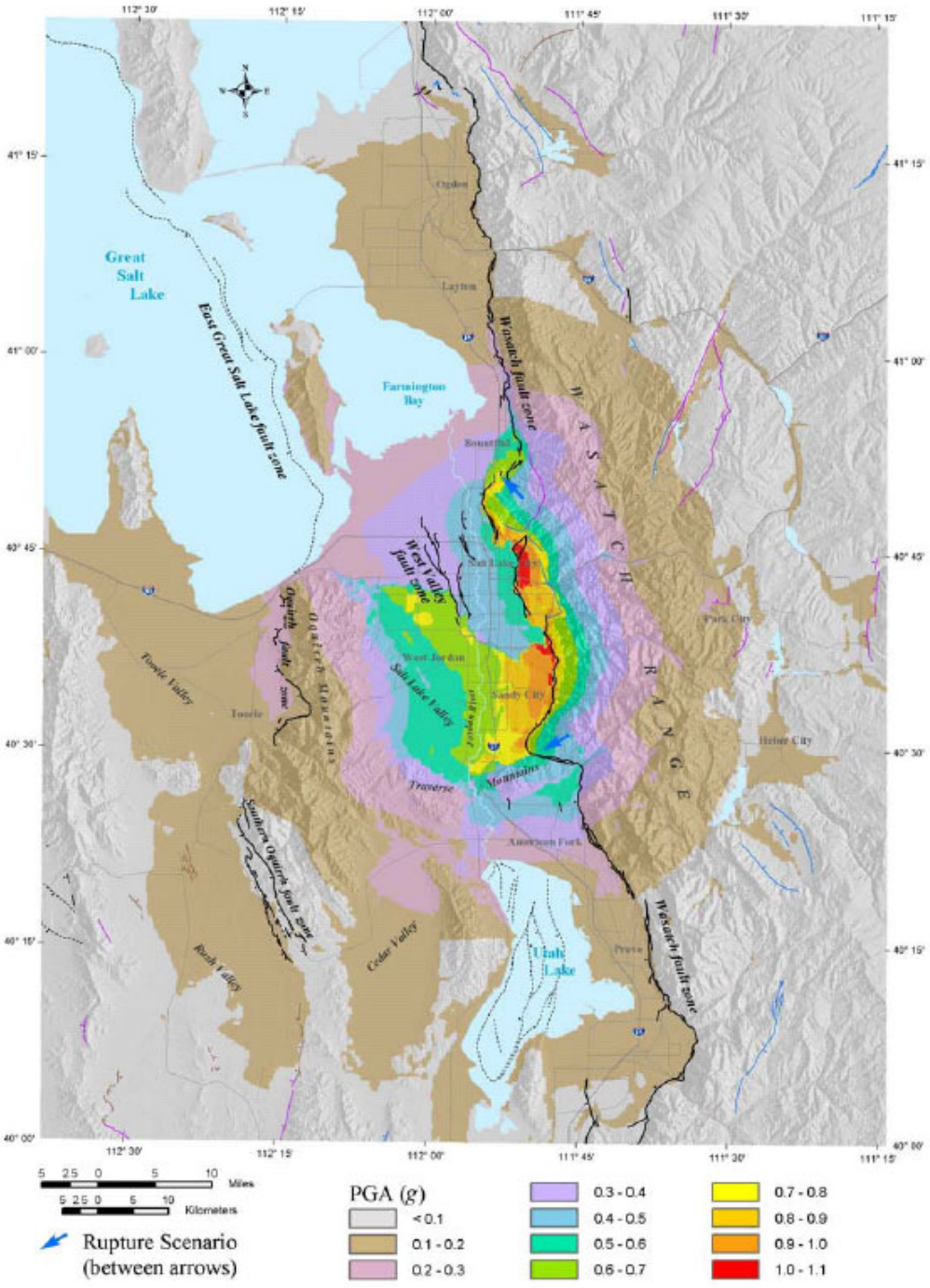
Jurisdiction	*Total Building Economic Loss*	*Loss Ratio*	*Total Debris (tons)*
Riverton	$ 252,898,310	7%	166,609

Jurisdiction	*Displaced Households*	*Individuals Seeking Public Shelter*	*Total Casualties*	*Life-Threatening Injuries and Fatalities*	*URM Count*
Riverton	393	260	100	10	596

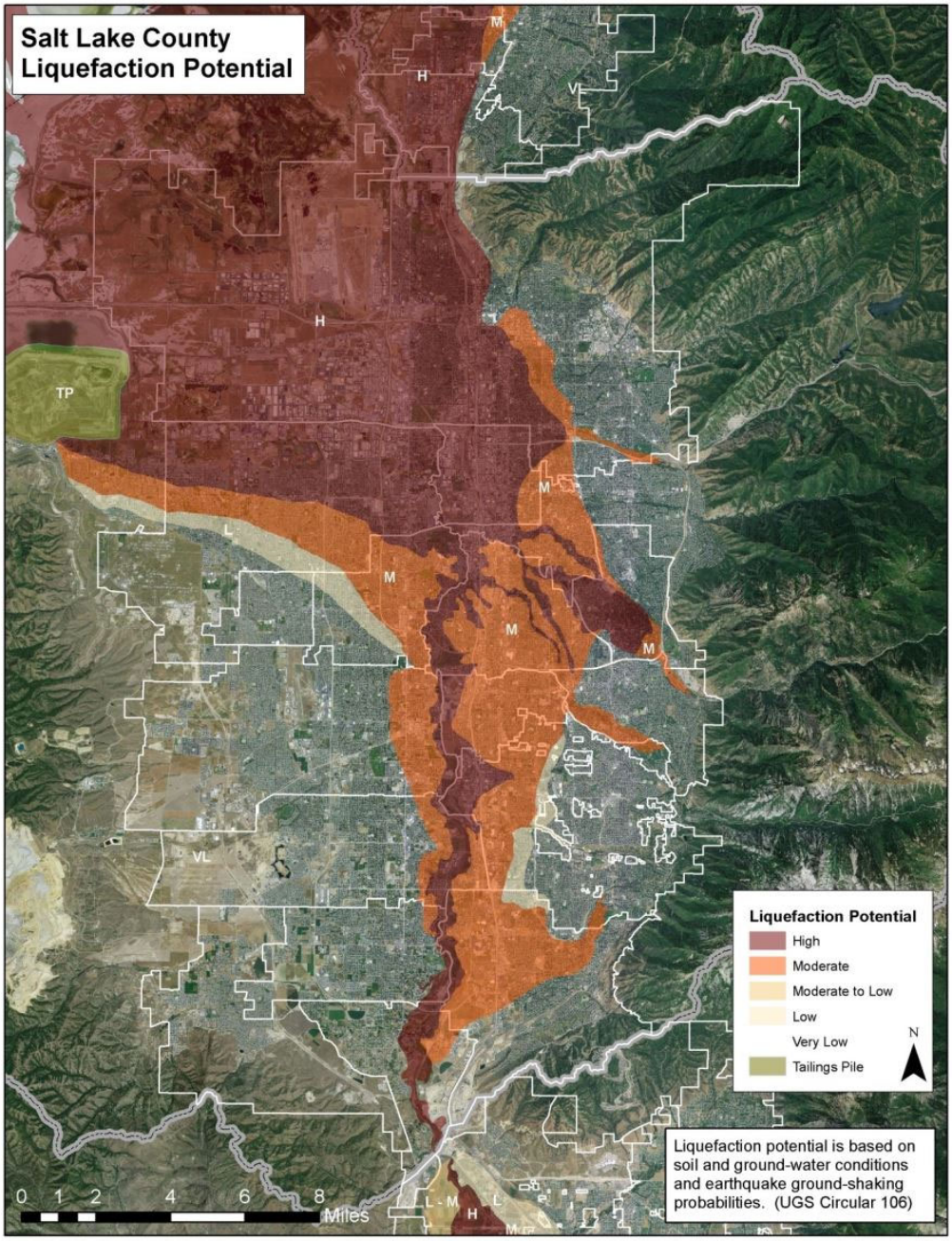
Jurisdiction	*Life-Threatening Ratio to Total Pop*	*URM Ratio to Total Structures*
Riverton	0.025%	6%



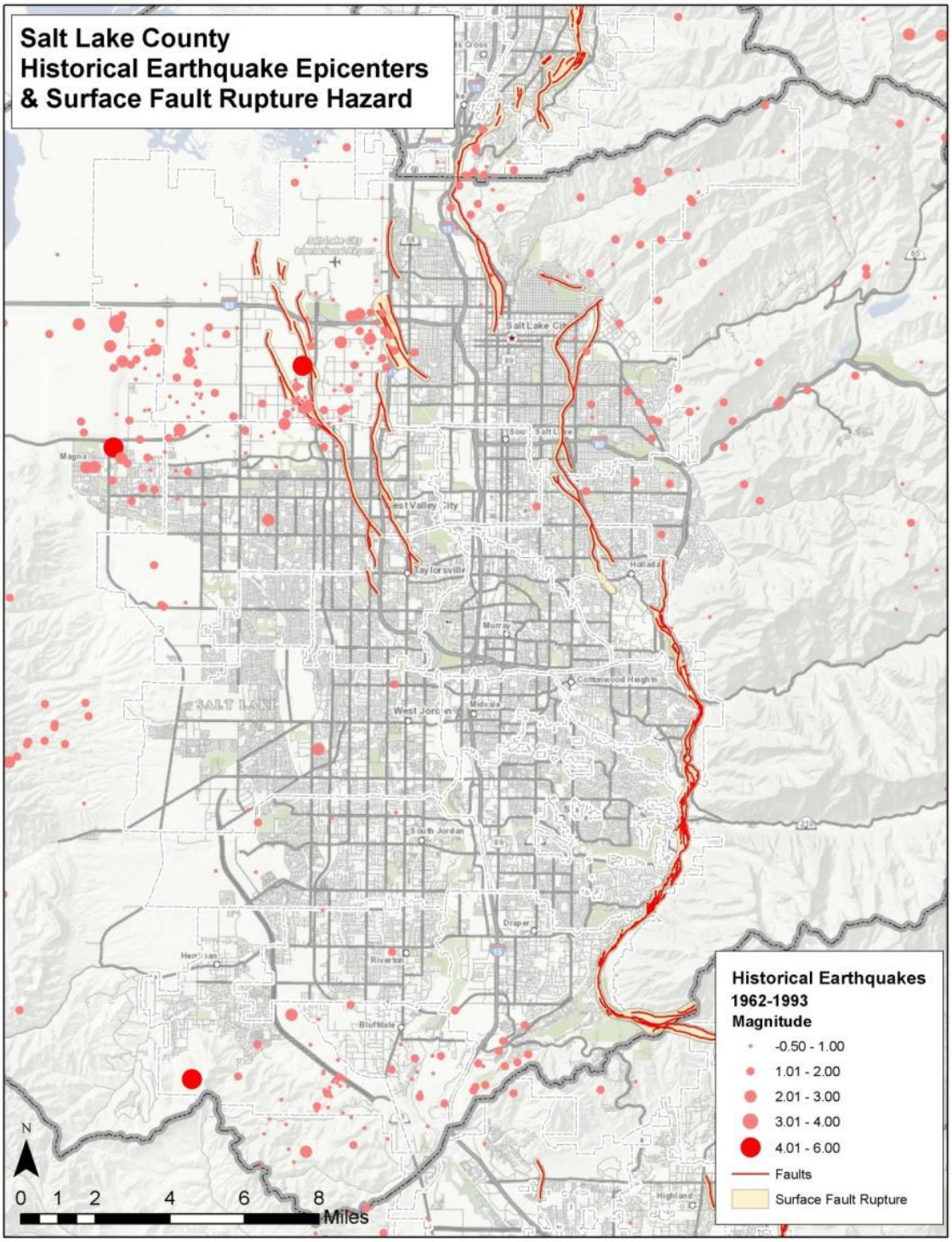
Map: Riverton Critical Facilities (LDS Church)



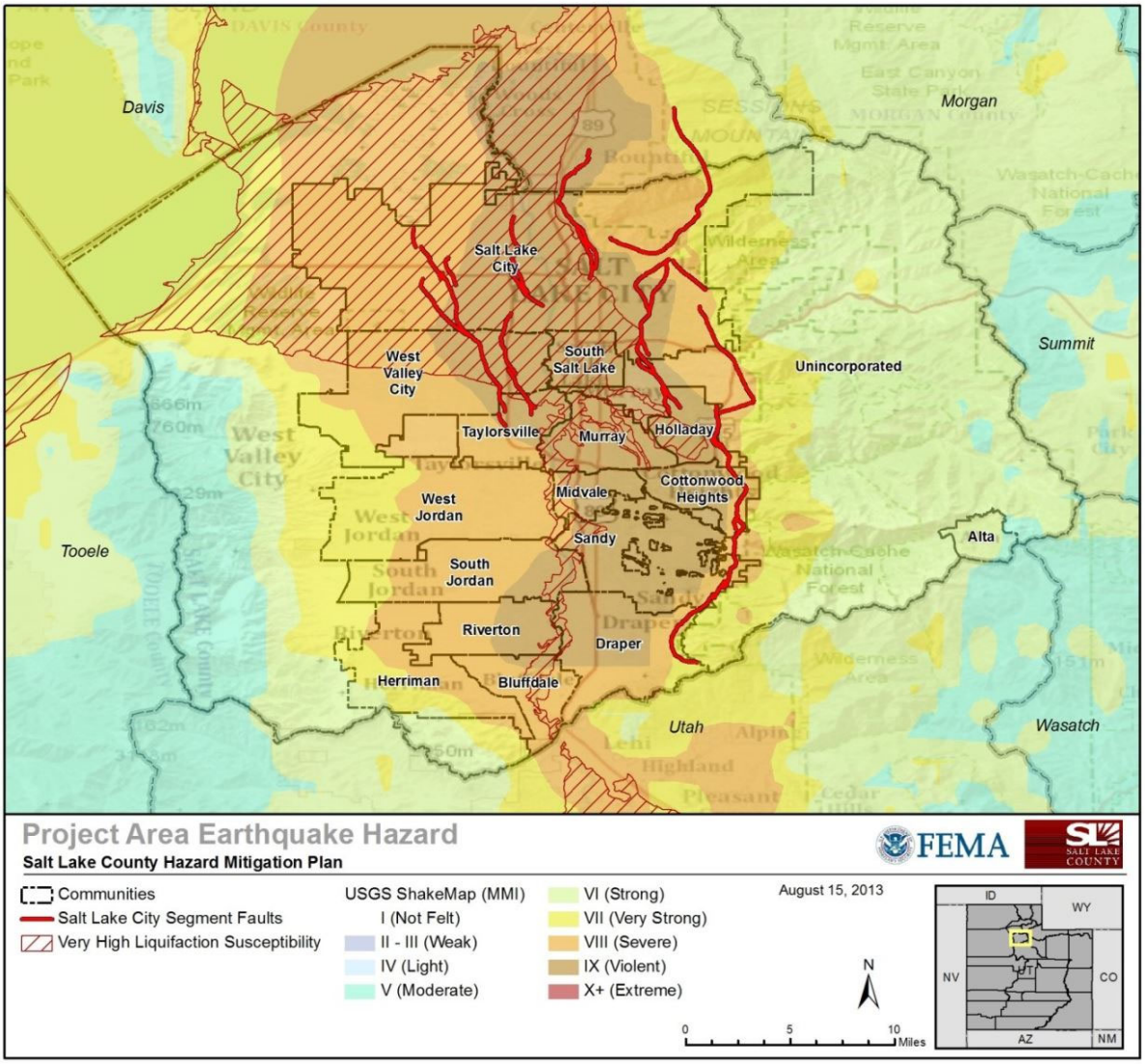
Map from Earthquake-Hazards Scenario for a M 7 Earthquake on the Salt Lake City Segment of the Wasatch Fault Zone, Utah, Utah Geological Survey Special Study 111, 2004



Map. Liquefaction Potential, Salt Lake County



Map 5. Salt Lake County Earthquakes, 1962-1993



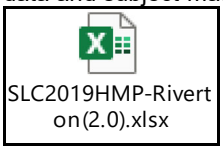
Drought: Due to the unpredictability of drought, it is difficult to identify the areas most threatened and to provide loss estimate values. Utah is the second driest state in the nation. Drought dramatically affects this area because of the lack of water for agriculture and industry, which limits economic activity, irrigation and culinary uses. The severity of the drought results in depletion of agriculture lands and deterioration of soils. In the Wasatch Front region, the risk of drought is high.

Problem Soils: The largest problem in Riverton deals with expansive and collapsible soils. These soils are usually found 4 to 13 feet from the surface and have been identified during the development process in Geotechnical Reports. Most of these types of soils are found between the Jordan River and 4800 West.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	16	32
Cyber Attack	2	14	28
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Dam Failure	1	22	22
Wildfire	2	10	20
Landslide and Slope Failure	2	9	18
Tornado	1	11	11
Civil Disturbance	1	8	8
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	Medium	2	6
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Medium	2	2		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Low	1	1		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Low	1	1		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Bury the canal and install piping and lining to open the canal	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood (Riverine and Urban/Flash Flooding)	Public Works	Riverton City EM	High	High	Grants or Local Funding	High	Long-term	The Eastside Canal (1300W) and South Jordan Canal (primarily southeast portion by the new development are prone to flooding. This project would strength the structural integrity of the canals.
Augment the bridges and canals to increase stormwater capacity	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards, primarily Flood (Riverine and Urban/Flash Flooding)	Public Works	Riverton City EM	High	High	Grants or Local Funding	High	Long-term	This project would ensure the bridges can be utilized by first responders during an emergency event and the bridges would not be flooded.
Increase stormwater culvert and collection area	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Flood (Urban/Flash Flooding)	Public Works	Riverton City EM	Medium	High	HMA/PDM Grant or other federal funds	Medium	Long-term	

		• Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comment
Establish Post-Disaster Action Plan for City Continuity of Operations Plan	2014	Goal 5 Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	All-Hazards	Riverton Emergency Management	High	Medium	HMA and County and state funds	High	Ongoing	Each City Department has been given the assignment to write SOP's for their day to day operations. These procedures are shared between departments and employees are being cross-trained in these procedures.
Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	All-Hazards	Public Works and Riverton Emergency Management	High	Medium	General funds, HMA, and other County grants	High	Ongoing	In the event of an emergency where structural damage has been encountered, the Engineers, Building Inspectors, and Public Works inspectors will be paired to assess the stability and safety of the structure. Two Engineers have been trained in damage assessment. Over the next two years, the City will pursue and train the remainder of our assessment teams.
Setup and Operate City Emergency Operations Centers	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt	All-Hazards	Riverton Emergency Management	High	High	HMA and other federal grants	High	Ongoing	The City recently built a new Public Works Facility to house the City EOC. The Building was built with various training, conference, and meeting rooms to house the various

		Lake County before, during, and after a disaster.								branches of the operation center. The facility has a 1400 AMP generator and has multiple outbuildings, which can be used for various purposes during an emergency. Over the next 3 years or as budget dictates we will add equipment, supplies, and communication capabilities to the facility. Additional facilities will be identified and equipped in the future.
Update and Enhance Riverton City Communications Plans	2014	Goal 3 Enhance and protect the communication and warning/notification systems in the County.	All-Hazards	Communications	High	Medium	General funds and additional grants	High	Ongoing	In July of 2014, Riverton hired a full-time media and communications expert. One of the responsibilities of this position is to set up and provide multiple modes of communication for public outreach in the event of an emergency.
Complete City Culinary Water System Mapping and Models	2014	Goal 6 Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	Flooding and Drought	Public Works and Water Resources Engineer	High	High	Local, state, and federal funds such as HMA	High	Ongoing	A great concern of the City is the protection of the Water System. March 2014 the City move the responsibility of all engineering related to the water system to the Public Works Department. July 2014, the City hired a Water Resources Engineer and began the process of updating the model and mapping the City Network. The process will identify weaknesses and be used to built redundancy in the system.
Complete Critical Storm Drain Facilities	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Flooding	Public Works	High	High	Local, state, and federal funds such as HMA	High	Ongoing	In 2011 Riverton hired a consultant to conduct a study a region of the City prone to flooding and property damage. This study was completed along with other studies conducted by the Engineering Division. From these studies, a list of capital improvement projects and procedures was generated and prioritized. These projects were placed on a 5 to 7-year project list

										which is being funded by the Stormwater Utility. Approximately $1,500,000 has been spent updating the City's infrastructure.
Train Personnel on emergency plans and SOP's	2014	Goal 6 Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	All-Hazards	Riverton Emergency Management	High	Low	Local funds	High	Ongoing	Riverton City has multiple emergency plans and SOP's as it relates to Dam's, Severe Weather, and Flooding. The plans are only familiar to a few City Supervisors. The City will familiarize, train, and cross-train all maintenance and field personal in the emergency operation of these plans.
Implement a GPS Tracking System on City Maintenance Vehicles	2014	Goal 2 Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Riverton Emergency Management	Medium	High	General funds, state and federal grants	Low	Ongoing	In the event of emergency tracking resources and personnel is essential. The City has implemented a program to install real-time GPS tracking on its vehicles. To date, 16 vehicles have been equipped. Additional units will be installed as budget permits.
Conduct an inventory and assessment of communications equipment and systems and identify needs	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All-Hazards	Riverton Emergency Management	Medium	Low	General	Medium	Ongoing	Riverton City continues to improve and maintain its communications capabilities
Conduct Training and awareness activities on communication equipment, tools, and systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All-Hazards	Riverton Emergency Management	Medium	Low	General	Medium	Ongoing	Riverton City continues to participate in training and exercises designed to practice using communication tools and equipment
Examine current data availability and sharing capabilities, evaluate needs, and	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and	All-Hazards	Riverton Emergency	Medium	Low	General	Medium	Ongoing	Riverton city GIS personnel actively participate in several coordinating

identify shortcomings		Access to digital geographic (GIS) hazards data		Management and GIS						groups that address issues associated with geographic data
1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	All-Hazards	Riverton Emergency Management	Medium	Low	Local	Medium	Ongoing	Riverton City continues to educate and implement hazard monitoring networks in its Emergency Operations Center
Utilize GIS to identify facilities and infrastructure at risk	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Riverton Emergency Management and GIS	Medium	Medium	Local and HMA	Medium	Ongoing	As part of Riverton City Public Works facility an EOC component has been added to its infrastructure, efforts to complete other components of the EOC are in progress
Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Public Works	Medium	Medium	Local and HMA	Medium	Ongoing	Riverton City continues to inspect
Implement improvements to address hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to	All-Hazards	Riverton Emergency Management	High	High	HMA and other federal grants	High	Ongoing	Riverton is identifying options and opportunities to address issues

identified in the assessment		critical facilities and infrastructure								
Provide education regarding all-natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Riverton Emergency Management	Medium	Low	Local	Medium	Ongoing	Riverton City attends and participates in community-based trainings
Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Riverton Emergency Management and GIS	Medium	Low	Local	Medium	Ongoing	Riverton City personnel are working to compile a make available hazard maps to help educate the public on potential hazards in the city
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Riverton Emergency Management	High	Low	Local	High	Ongoing	Riverton City educates the community by using programs such as Be Ready Utah to help educate the community during a variety of events
Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Riverton Emergency Management	Medium	Low	Local	Medium	Ongoing	Riverton City continues to educate citizens concerning water consumption

Provide information on landscaping alternatives for persons subject to green area requirements	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	Riverton Emergency Management	Medium	Low	Local	Medium	Ongoing	Through social media, monthly newsletters Riverton City educates and offers information to citizens concerning water consumption
Identify structures at risk to earthquake damage	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	GIS, Fire, and Emergency Management	Medium	Medium	Local	Medium	Ongoing	Riverton City is working with GIS, Fire, Emergency Management on a Risk Management plan, on a risk management plan to evaluate their level of risk,
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flooding	City Engineer and Public Works	Medium	Medium	Local	Medium	Ongoing	The City Engineer and Public Woks Director regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed.
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flooding	City Engineer and Public Works	Medium	High	Local, state, and federal, such as HMA	Medium	Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain the effectiveness of	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs, and improvements to drainage structures,	Flooding	City Engineer and Public Works	High	High	Local, state, and federal, such as HMA	High	Ongoing	The Stormwater Division of the Public Works Department continues to maintain and repair all drainage systems in the City.

stormwater and flood control systems		stormwater systems and flood control structures								
Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding	City Engineer and Public Works	Medium	Medium	Local	Medium	Ongoing	The City Engineering Division in cooperation with the Public Works Department regularly review and inspect City owned infrastructure and make recommendations as needed
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flooding	City Engineer and Public Works	High	High	Local, state, and federal, such as HMA	High	Ongoing	The City Engineering Division in cooperation with the Public Works Department make repairs as needed to deficient structures
Assist NWS in making other agencies and departments aware of available resources	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	Severe Weather	Riverton Emergency Management	Medium	Medium	Local	Medium	Ongoing	Riverton City supports the NWS efforts for education and outreach and makes internal departments aware of NWS resources
Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas	Severe Weather	Riverton Emergency Management	Medium	Medium	Local	Medium	Ongoing	Riverton City supports the efforts for education and outreach

Mitigation Table – Completed and Removed Actions

Category	Year Initiated	Goal/Objective	Action	Status	Comments
All-Hazards	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	1 – Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	Completed	Riverton has formal agreements for Police, Fire, and water.
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	1 – Set up livestock water rotation in areas of agricultural use	Removed	This is not applicable to Riverton City
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Completed	Riverton City has a secondary water system throughout the city
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Removed	Riverton City does not have funding to support this type of program. Riverton does not intend to move this activity forward due to the limited number of URM structures in the community.
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Removed	Due to the age of the City's public buildings, there are not major retrofit or rehabilitation projects needed at this time in Riverton City
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure	1 – Provide educational materials to unreinforced masonry home and business owners	Removed	There are very few URM homes and businesses located in Riverton that would make this activity cost-effective for the City to

		1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings			engage in. Riverton City support county-level efforts to share this type of information
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Removed	Not applicable to Riverton City
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Removed	While active in the NFIP, this mitigation action is no longer needed.
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	2 – Encourage Communities to actively participate in NFIP	Removed	While active in the NFIP, this mitigation action is no longer needed.
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Removed	Riverton City does not have a Weather Operations Plan and does not participate in the Storm Ready Program, This is a Salt Lake County-level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	2 – Maintain Contact with NWS prior to re-application in 2010	Removed	Riverton City does not have a Weather Operations Plan and does not participate in the Storm Ready Program, This is a Salt Lake County-level program

Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Removed	Riverton City has not developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Removed	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Removed	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Removed	Ended program due to very low probability in Riverton City and not applicable
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	2 – Educate homeowners on the need to create defensible space near structures in WUI	Removed	Ended program due to very low probability in Riverton City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Removed	Not considered a threat to Riverton City

		actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective	1 – Reduce fuels around publicly owned structures	Removed	Not considered a threat to Riverton City

		actions and improved fire response capabilities 2.4 – Complete wildfire protection projects			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Removed	Not considered a threat to Riverton City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Removed	Not considered a threat to Riverton City
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Complete	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	Establish agreements to share communications equipment between agencies involved in emergency operations	Removed	No formal agreements exist to share communications equipment can be shared as part of other mutual aid agreements that are in place

All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	Establish redundancy for dispatch centers and other critical communications	Removed	Riverton City relies on the Valley Communications Center (VECC) for dispatch services. They coordinate with other PSAPS to provide redundancy
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Completed	Riverton City recently received a new 800 mg license and purchased upgraded radios to assist with communications
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Complete	
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	4 – Provide centralized access to geographic data to emergency planners and responders	Complete	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	Assist NWS in making other agencies and departments aware of available resources	Complete	Riverton City supports the NWS efforts for education ad outreach and makes internal departments aware of NWS resources
Slope Failure	2009	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Reduce or eliminate the threat of slope failure damage and address landslide hazards in new sub-divisions	Complete	Riverton City Engineering and planning reviews recommendations as provided pertaining to development within the city

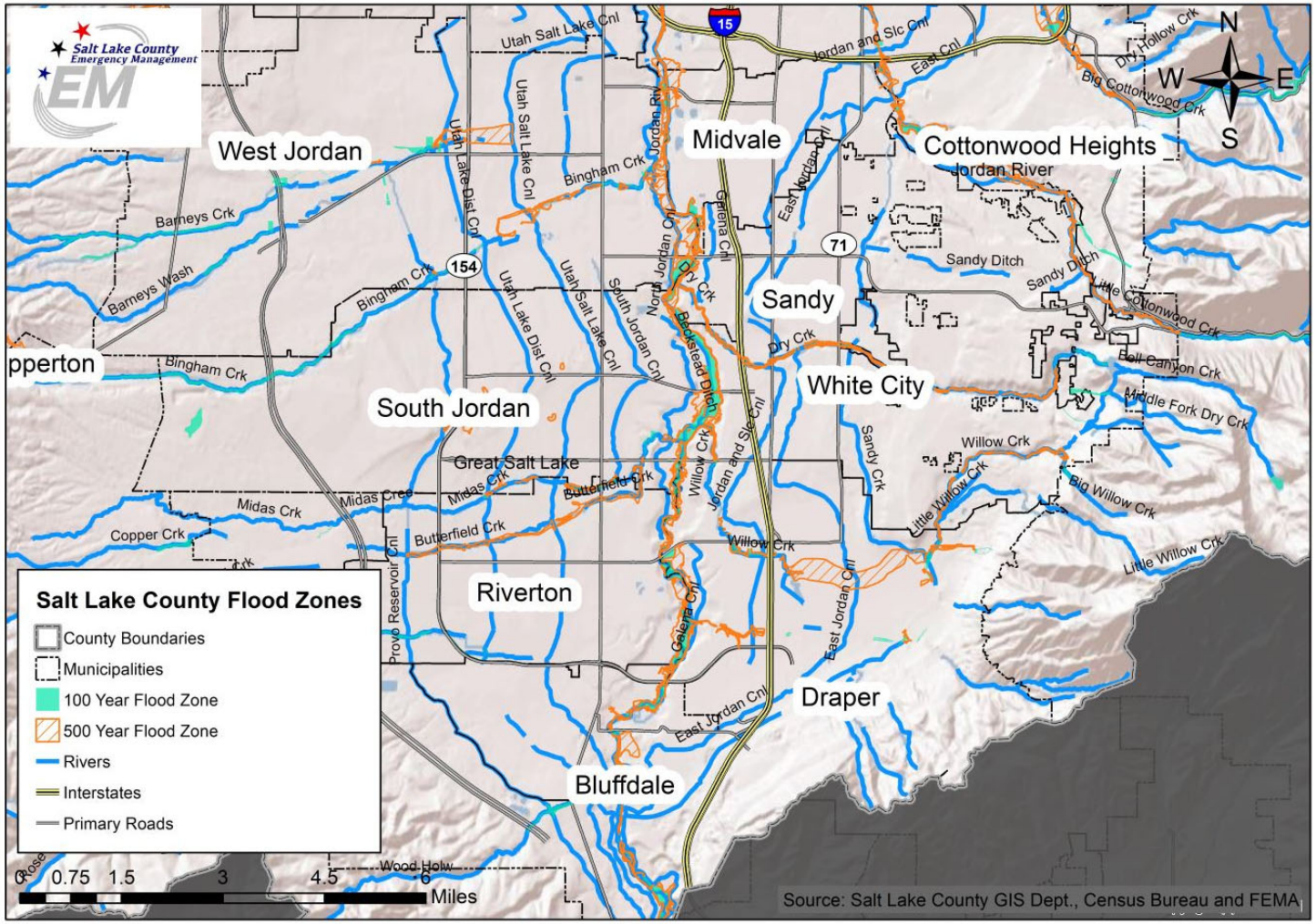
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	Assess existing water flow capabilities, both public and private, and address deficiencies	Complete	The Riverton City water system meets and or exceeds requirements for providing water flow for firefighting purposes in the City
All-Hazards	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with the National Incident Management System (NIMS) requirements	Pursue and implement needed mutual-aid agreements	Complete	Riverton City is working with outside agencies for Mutual-aid agreements
All-Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	Identify and implement additional hazard monitoring capabilities.	Complete	Riverton City continues to implement monitoring capabilities by increasing is data base to allow texting, and other types of social media
All-Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	Incorporate information about the cascading effects of hazards in education programs	Complete	Riverton City attends and participates in training and community outreach programs.
All-Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	Complete	Riverton City education programs are customizable for all kinds of groups and available to all members of the community
All-Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	Establish and enforce appropriate planning, zoning, and building code ordinances	Complete	Riverton City enforces all current ordinance and building codes including ordinances like our Flood Damage Prevention and Land Disturbance ordinances

All-Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	Ensure current hazard ordinances are available for viewing online	Complete	Riverton City continues to update and make available to the public through social media all changes and improvements to ordinances and codes
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	Complete	Riverton City continues to educate and remind the importance of conservation with both culinary and secondary water systems
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Implement water-saving devices and practices in public facilities	Complete	Riverton City has installed a secondary water system throughout the city and is available to all residents. 90% of city parks are watered with secondary water
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	Complete	Riverton City responds immediately to water breaks and leaks. Water department performs regular inspections of water system leaks as well as theft of services.
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Coordinate public safety water use, such as hydrant testing	Complete	Riverton City coordinates all water use, including the testing of hydrants in partnership with the fire department
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events	Meet with NWS representative on an annual basis to receive information on new services and alerts available	Complete	Riverton City participates in briefings provided by NWS

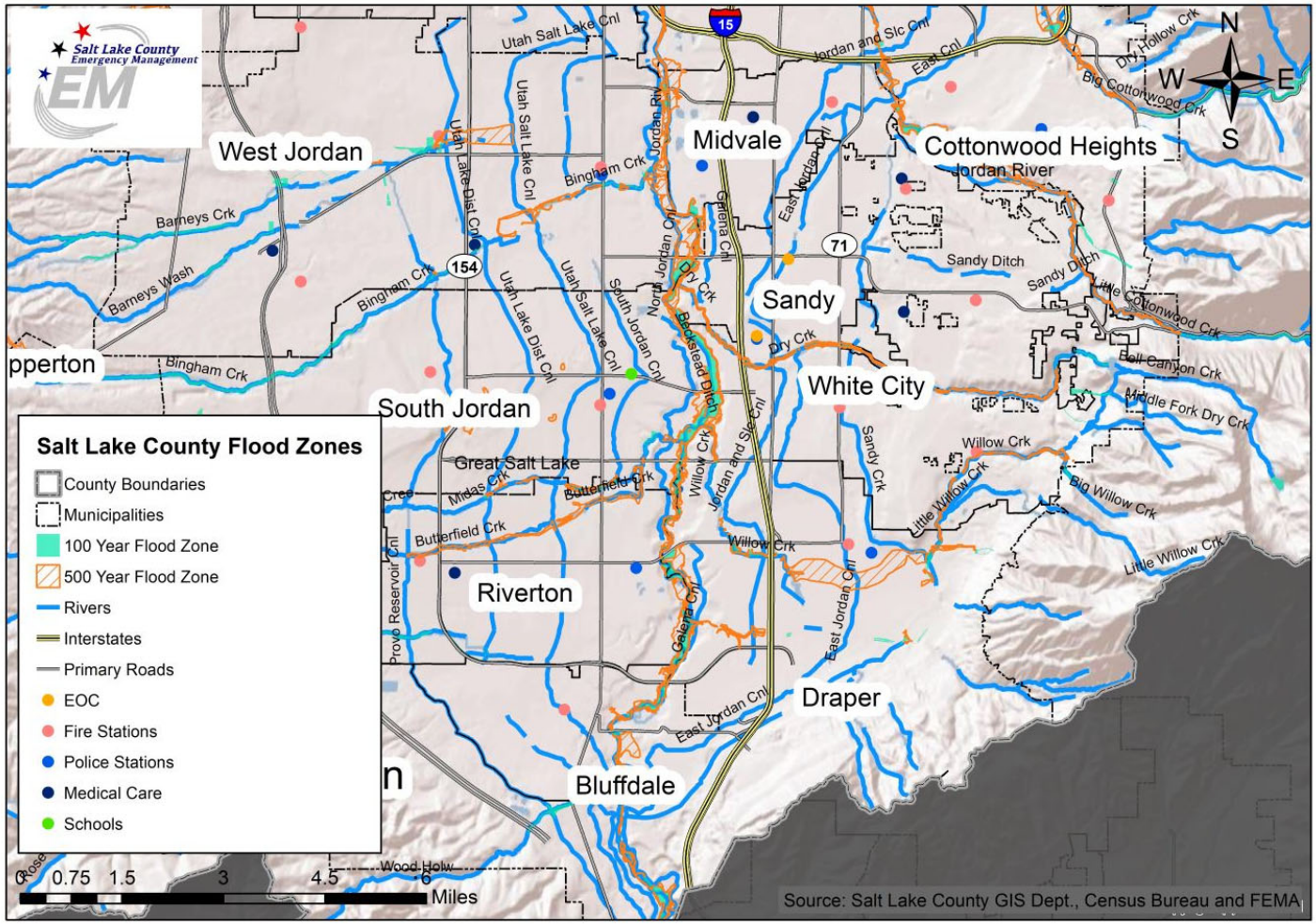
		1.2 – Increase awareness of information services provided by NWS			
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	Assist NWS in making other agencies and departments aware of available resources	Complete	Riverton City supports the NWS efforts for education and outreach and makes internal departments aware of NWS resources
Slope Failure	2009	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Reduce or eliminate the threat of slope failure damage and address landslide hazards in new sub-divisions	Complete	Riverton City Engineering and planning reviews recommendations as provided pertaining to development within the city
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	Assess existing water flow capabilities, both public and private, and address deficiencies	Complete	The Riverton City water system meets and or exceeds requirements for providing water flow for firefighting purposes in the City

Jurisdiction Maps

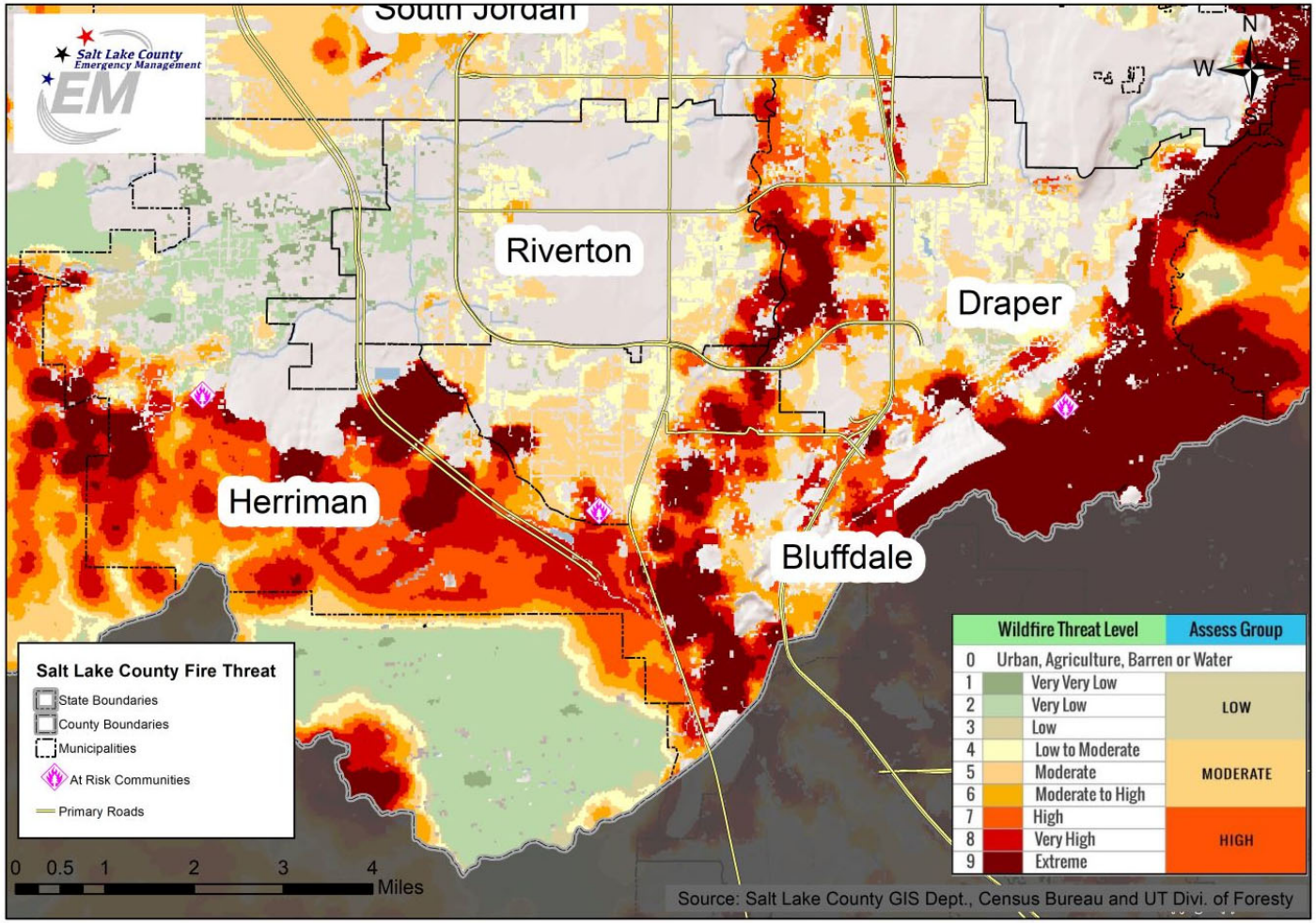
Map: 100 Year and 500 Year Flood Zone



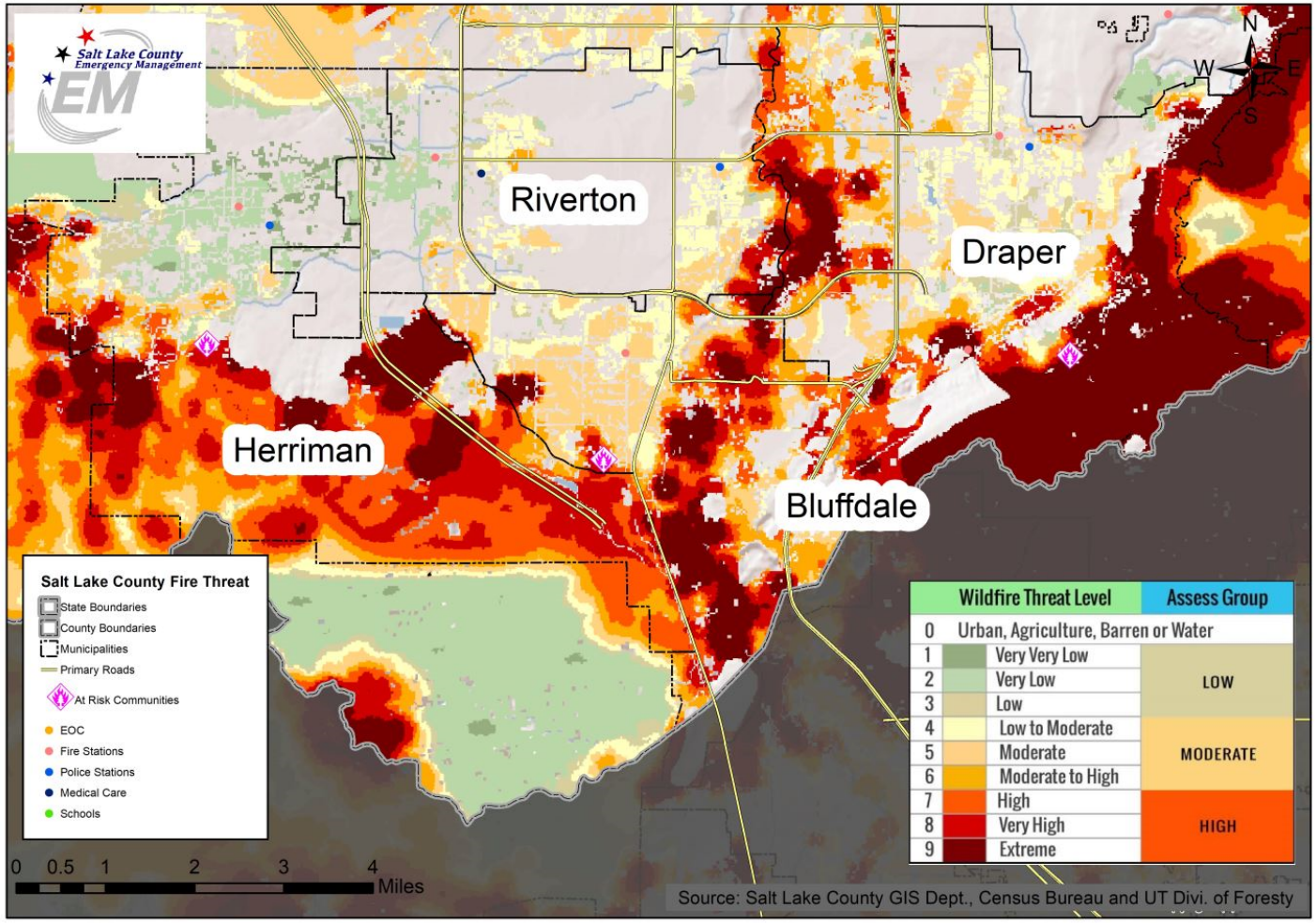
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



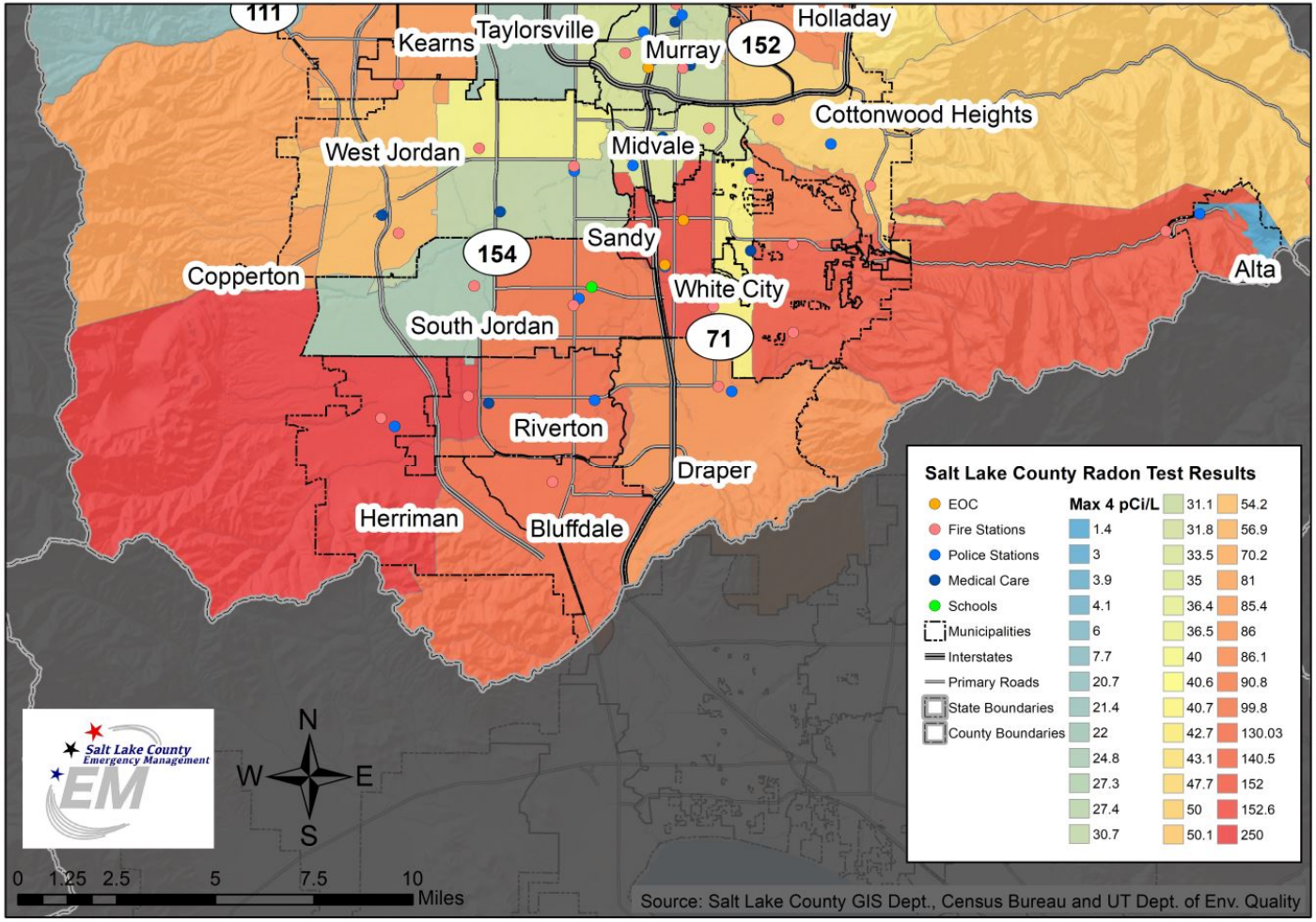
Map: Wildfire Threat Level



Map: Wildfire Threat Level with Critical Facilities



Map: Radon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Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
EOC
Fire Stations
Police Stations
Medical Care
Schools
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
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24.8
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27.4
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Salt Lake County Emergency Management
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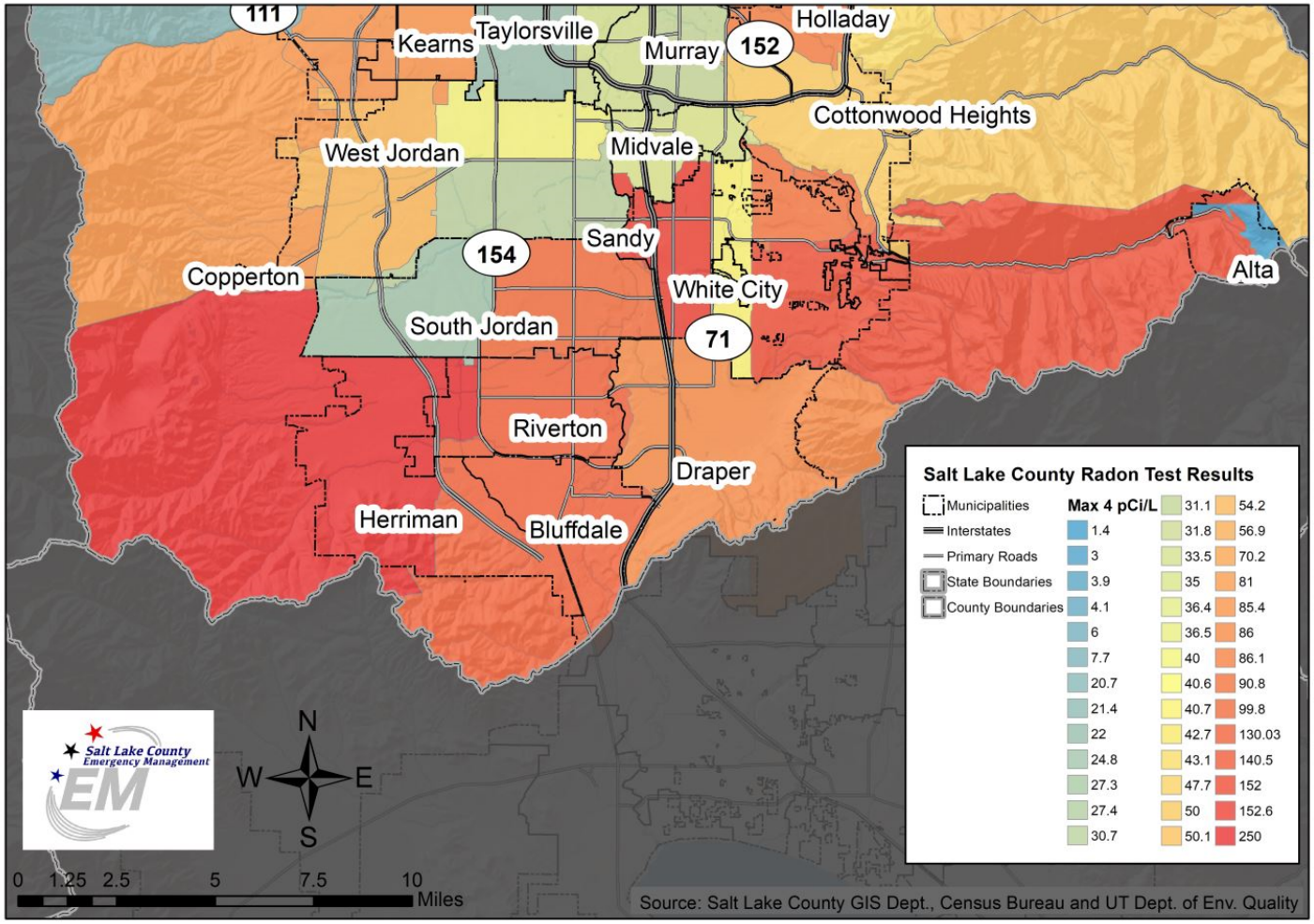
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Salt Lake City

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
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Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1847
- **Current Population:** 200,591 (V2018 estimate)
- **Population Growth:** The population grew an estimated 7.6% from April 1, 2010 to July 1, 2018.

2018 Population	2010 Population Estimate	Estimated % Change 2010-2018	2017 # of Housing Units	2014 Estimated # of Housing Units
200,591	186,443	7.6%	83,676	80,969

Location and Description: Salt Lake City is located in the northeast corner of the Salt Lake Valley surrounded by the Great Salt Lake to the northwest and the steep Wasatch and Oquirrh mountain ranges on the eastern and southwestern borders, respectively. Its encircling mountains contain several narrow glacial and stream carved canyons. Among them, City Creek, Emigration, Millcreek, and Parley's border the eastern city limits. Salt Lake City has a total area of 110.4 mi² and an average elevation of 4,327 feet above sea level. The lowest point within the boundaries of the city is 4,210 feet near the Jordan River and the Great Salt Lake, and the highest is Grandview Peak, at 9,410 feet.

The Great Salt Lake is separated from Salt Lake City by extensive marshlands and mudflats. The metabolic activities of bacteria in the lake result in a phenomenon known as "lake stink", a scent reminiscent of foul poultry eggs, two to three times per year for a few hours. The Jordan River flows through the city and is drainage of Utah Lake that empties into the Great Salt Lake.

The Salt Lake Valley floor is the ancient lakebed of Lake Bonneville, which existed at the end of the last Ice Age. Several Lake Bonneville shorelines can be distinctly seen on the foothills or benches of nearby mountains.

Brief History: The city was founded in 1847 by Brigham Young, Isaac Morley, George Washington Bradley, and several other Mormon followers, who extensively irrigated and cultivated the arid valley. Immigration of international LDS members, mining booms, and the construction of the first transcontinental railroad initially brought economic growth, and the city was nicknamed the Crossroads of the West. It was traversed by the Lincoln Highway, the first transcontinental highway, in 1913, and presently two major cross-country freeways, I-15 and I-

80, intersect in the city. Salt Lake City has since developed a strong outdoor recreation tourist industry based primarily on skiing, and hosted the 2002 Winter Olympics. It is the industrial banking center of the United States.

Climate: The climate of the Salt Lake City area is typically characterized as semi-arid. Under the Köppen climate classification, Salt Lake City has a dry-summer continental climate (DSA), a relatively rare form of the continental climate where a region experiences dry summers and wet winters. The city experiences four distinct seasons. Both summer and winter are long, with hot, dry summers and cold, snowy winters. Spring is the wettest season, while summer is very dry.

The nearby Great Salt Lake is a significant contributor to precipitation in the city. The lake effect can help enhance rain from summer thunderstorms and produces lake-effect snow approximately 6 to 8 times per year, some of which can drop excessive snowfalls. It is estimated that about 10% of the annual precipitation in the city can be attributed to the lake effect.

Salt Lake City features large variations in temperatures between seasons. During summer, there is an average of 56 days per year with temperatures of at least 90 °F (32.2 °C), 23 days of at least 95 °F (35 °C), and five days of 100 °F (37.8 °C). However, the average daytime July humidity is only 22%. Winters are quite cold but rarely frigid. While there is an average of 127 days that drop to or below freezing, and 26 days with high temperatures that fail to rise above freezing, the city only averages 2.3 days at or below 0 °F (−17.8 °C). The record high temperature is 107 °F (42 °C), which occurred first on 26 July 1960 and again on 13 July 2002, while the record low is −30 °F (−34 °C), which occurred on 9 February 1933.

During mid-winter, strong areas of high pressure often situate themselves over the Great Basin, leading to strong temperature inversions. This causes air stagnation and thick smog in the valley from several days to weeks at a time and can result in the worst air-pollution levels in the U.S., reducing air quality to unhealthy levels.

Public Services: Given the nature of Utah's population concentration along the Wasatch Front, it is important that Salt Lake City support regional planning and maintain relationships with Salt Lake County and the other municipalities located in the county. Salt Lake City is a member of Utah's Pre-mitigation planning for the Wasatch Region, comprised of five counties, Salt Lake, Summit, Tooele, Davis, and Utah. The region representatives meet to coordinate activities and funding received from the state through the State Homeland Security Program. Salt Lake City has participated in area Gap Analysis and Threat Assessments and was funded to develop a Local Energy Assurance Plan. The City also has participated with the Regional Resilience and Assessment Program (RRAP) both to look at critical lifelines and their interdependencies, as well as to deeply examine the valleywide water systems and critical nodes. Numerous participating agencies within Salt Lake City, have also been a part of the Urban Area Security Initiative (UASI). The Urban Areas Security Initiative (UASI) Program assists high-threat, high-density Urban Areas in efforts to build and sustain the capabilities necessary to prevent, protect against, mitigate, respond to, and recover from acts of terrorism using a Whole Community Approach. Salt Lake County has received UASI funding for this mission in 2008, 2009, 2010, 2014, and 2017. The Urban Area Working Group (UAWG) includes Salt Lake County with representatives from public safety agencies, volunteer organizations, and the state for regional all-hazards planning, mitigation, response, and recovery. Salt Lake City Code Title 22 et al. Salt Lake City executives are responsible for carrying out plans and policies. City government must be prepared to participate in the post-disaster hazard mitigation team process and pre-mitigation planning as outlined in this document to effectively protect their citizens.

Governing Body Format: The city has an elected 7-member city council that sets the overall policy direction for the city, and helps decide where to focus resources by adopting annual budgets and ordinances. In Salt Lake City, the Mayor and Council are separate but equal branches of the government. The Mayor is the chief executive, and the City Council is the legislative body. Council Members serve four-year terms, work for the city part-time, and are paid. Each Council Member represents one of the city's seven geographical Council Districts of similar population size (SLC website).

Development Trends: As the capital of Utah, Salt Lake City is viewed as the economic and cultural hub of the state. The city continues to grow and expand its workforce and number of residents. The SLC website highlights numerous development projects currently underway in the city. Salt Lake City is still home to the headquarters of The Church of Jesus Christ of Latter-day Saints (LDS Church); however, less than 50% of Salt Lake City's residents are members of The Church of Jesus Christ of Latter-day Saints. This is a much lower proportion than in Utah's more rural municipalities; altogether, LDS members make up about 62% of Utah's population. Large family sizes and low housing vacancy rates, which have inflated housing costs along the Wasatch Front, have led to one out of every six residents living below the poverty line.

Capability Assessment

The City maintains a full-time staff of 2942 and part-time staff of 452 individuals. The SLC Emergency Management Program Director is the City's designated Emergency Manager. Hazard Mitigation Planning efforts are led by SLC Department Directors and supported by SLC Emergency Management Program positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Building Code Development and Enforcement	Yes	Yes	No	
Zonings Ordinance(s)	Yes	Yes	No	Code is adopted per Municipal Land Use Management Act.
Subdivision Ordinance(s)	Yes	Yes	No	Code is adopted per Municipal Land Use Management Act.
Stormwater Management Program	Yes	Yes	No	Phase 1 MS4 - UPDES Permit
Floodplain Ordinance(s)	Yes	Yes	No	Meets FEMA NFIP requirements
Post Disaster Recovery Program and Ordinance(s)	Yes	No	-	
Real Estate Disclosure Ordinance(s)	Yes	-	-	
Growth Management	Yes	-	-	
Site Plan Review Requirements	Yes	Yes	No	
Planning Documents				

General or Comprehensive Plan	Yes	Yes	No	
Capital Improvement Plan	Yes	Yes	No	
Economic Development Plan	Yes	Yes	No	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	-	
Post-Disaster Recovery Plan	Yes	No	-	
Continuity of Operations Plan	Yes	Yes	No	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	-	County's LEPC Plan; SLC specific earthquake annex;

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	-
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY

Staff/Personnel Resources	Available?	Full Time/Part Time/Other	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Full-Time	Community and Neighborhoods
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full-Time	Community and Neighborhoods
Planners or engineers with an understanding of natural hazards	Yes	Full-Time	Community and Neighborhoods and Public Utilities
Personnel skilled or trained in GIS applications	Yes	Full-Time	SLC Information Management Systems/GIS Coordinator
Emergency manager	Yes	Full-Time	SLC Mayor's Office/EM Program/Director
Grant writers	Yes	Full-Time	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Department of Public Utilities
Who is your jurisdiction's floodplain administrator? (department/position)	SLCDPU/Flood Plain Administrator
Are any certified floodplain managers on staff in your jurisdiction?	Yes (3)
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No - Not all flood risk is found in the hazard maps. There are other areas of flood risk that are managed in part by riparian ordinance and lowland ordinances. Updated Maps are needed in several areas - This is currently on the state RISK Map time line.
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Ongoing RISK map and state and federal training
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No - Interested in participation.

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	Yes	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 163 policies were in force with total coverage of $47,848,8000 and total written premium and FPF of $145,067 (FEMA, 2019).
- Salt Lake City does participate in the National Flood Insurance Program (CID # 490105) and the last FIRM map for the area was issued on 08/02/12 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
Thunderstorm Wind	The Salt Lake City International Airport ASOS recorded a peak gust of 68 mph.	-	6/13/2019	
Thunderstorm Wind		-	5/6/2019	
Heavy Snow	2 inches of snow	-	4/6/2019	
Heavy Snow	12 inches of snow	-	3/28/2019	
Heavy Snow	8 inches of snow	-	3/13/2019	
Heavy Snow	14 inches of snow	-	2/3/2019	
Winter Storm	5.9 inches of snow	-	12/1/2018	

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
Hail	1 inch in diameter	-		
Thunderstorm Wind	A maximum wind gust of 58 mph was recorded at the Salt Lake City International Airport Centerfield wind sensor	-	6/18/2018	
Flood		-	9/15/2017	$15,000 property damage.
Lightning	2 injured		7/26/2017	
Flash Flood		-	7/26/2017	$8,750,000 property damage.
High Wind		-	6/12/2017	$40,000 property damage.
High Wind		-	4/13/2017	$50,000 property damage.
Heavy Rain		-	3/23/2017	$20,000 property damage.
Winter Storm	8 inches of snow	-	1/20/2017	
Winter Storm	8.6 inches of snow	-	12/23/2016	
Thunderstorm Wind	67 mph wind gust was recorded by the SLC Airport Wind 3 sensor at Salt Lake City International Airport	-	12/16/2016	
Thunderstorm Wind	64 mph winds	-	5/6/2016	
High Wind	In Salt Lake City, scaffolding collapsed on an assisted living center being built; no one was injured, but debris from the incident covered the road and forced the closure of the northbound lanes of Foothill Drive and Parleys Way during the morning	-	2/17/2016	$200,000 property damage.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
	commute. At Salt Lake City International Airport, winds caused some flight delays, and seven flights were diverted to other cities. Power outages were common across the area due to downed trees and power lines.			
Flash Flood	Heavy rain brought road, parking lot, and basement flooding to the Sugarhouse and Foothill areas of Salt Lake City.	-	10/2/2015	$100,000 property damage.
High Wind	63 mph winds	-	8/7/2015	
High Wind	microburst	-	6/3/2015	
Thunderstorm Wind		-	5/6/2016	
High Wind	A semi-trailer was overturned on Interstate 215 in Salt Lake City, and several large trees were uprooted across the Salt Lake Valley. Winds also caused damage to many fences and yards across the area, including displacing sheds and knocking over at least one cinder block wall. Power outages occurred.	-	4/15/2015	$150,000 property damage.
Wildfire		-	4/15/2015	$50,000 property damage.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
High Wind	Winds caused power outages across the area, with over 4,000 customers in Salt Lake City temporarily losing power.	-	12/30/2014	$30,000 property damage.
Winter Storm	6 inches of snow	-	12/28/2014	
Winter Storm	5-7 inches of snow	-	12/25/2014	
High Wind		-	11/1/2014	$75,000 property damage.
Thunderstorm Wind	62 mph winds	-	9/26/2014	
High Wind		-	8/12/2014	$50,000 property damage.
High Wind		-	6/12/2014	$1,000 property damage.
High Wind		-	4/22/2014	$500,000 property damage.
Winter Storm		-	12/19/2013	$40,000 property damage
Winter Storm		-	1/10/2013	
Winter Storm	9 inches of snow in Salt Lake City	-	3/1/2012	
High Wind	59 mph winds	-	2/25/2012	
High Wind		-	12/1/2011	$250,000 in property damage
High Wind	Damage from this thunderstorm included large trees knocked down in the Avenues neighborhood of Salt Lake City	-	8/22/2010	$200,000 in property damages

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	20,611
Members of the community under 18 years old	40,676
Members of the community that identify as having disability status	18,989
Members of the community that speak English less than "very well"	16,810
Members of the community living below the poverty line	33,759
The number of mobile homes in the community	440 (additional 223 in a boat, RV, or Van)
Members of the community without health insurance	28,164
Occupied housing units with tenants without a vehicle	8,004
Housing units without heating fuel	292

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Flood: Extremely heavy rain causes urban flash flooding throughout the city. Areas to monitor include 13th South between 700 East and State Street, 700 West and North Temple Streets. Much of the city has impervious surfaces which can yield runoff and flooding problems. Flooding can also spread algal blooms into the city rivers and canals. The Wasatch Front has been susceptible to these types of events because of close proximity to the mountain ranges.

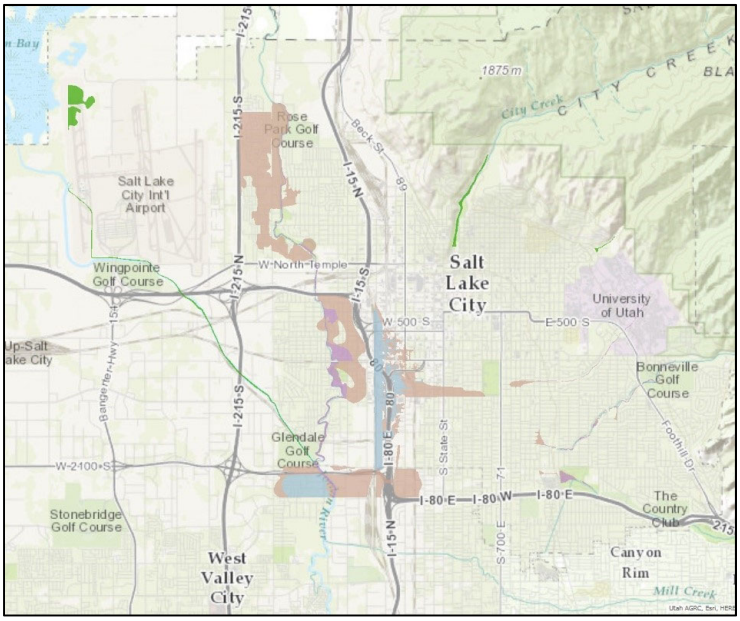
Much of the valley's development has occurred on old alluvial fans from the canyon mouths. During heavy rain events, water and debris collect on these same alluvial fans, damaging residential, commercial property and infrastructure.

Although located in a semi-arid region, Salt Lake City is subject to flash flooding due to heavy rainfall and rapid snowmelt. The Federal Emergency Management Agency (FEMA) has rated floodplains along the Jordan River and its tributaries for expected flood heights and areas susceptible to 100-year flood-frequency inundation. Significant flood mitigation measures were implemented following the major floods of 1983-84 that greatly reduced the flood threat to Salt Lake City. Of the many causes for flooding Salt Lake City's most likely event is from Post-fire debris flow flooding. Enhanced runoff conditions from a fire-damaged watershed can result in debris flow flooding. As fires burn, they destroy vegetation and leave soils in a hydrophobic state, resulting in greater peak flows.

Location

The Jordan River's four major northern tributaries (City, Red Butte, Emigration and Parley's Creeks) are diverted into storm sewers beneath the city. These storm sewers have sufficient capacity to handle the excessive runoff, but must be continually maintained to prevent debris from accumulating. Public works agencies have built debris basins, installed stream-bank protection, and regularly dredge stream channels to reduce flood hazards. Parley's Creek has flood storage capacity at Mountain Dell and Little Dell Reservoirs and is routed through a retention basin in Sugarhouse Park. Big and Little Cottonwood Creeks and have a number of smaller flood storage lakes and ponds providing some flood protection, such as Wheeler Historic Farm. In Salt Lake City, Emigration Creek and Red Butte Creek come together at 700 East and 1300 South and can be discharged in or bypass Liberty Park pond. Parley's Creek discharges to the 1300 South drain at State Street.

Areas to monitor include 13th South between 700 East and State Street, 7th West and North Temple Streets. Retention ponds are also used to store runoff from commercial and residential development areas.



Range of Magnitude

Flooding Hazard Profile

Location	Fire damaged areas where soil is in hydrophobic
Seasonal Conditions	Spring, heavy rainfall, and spring snowmelt runoff.
Conditions	Thunderstorms w/heavy rainfall, extended wet periods.
Duration	Flooding can last anywhere from hours to days and even months.
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.

Analysis Used	Review of FIS, FIRM, Army Corp of Engineers Flood Study.

Past Occurrence

History: The following flood events are of notable significance:

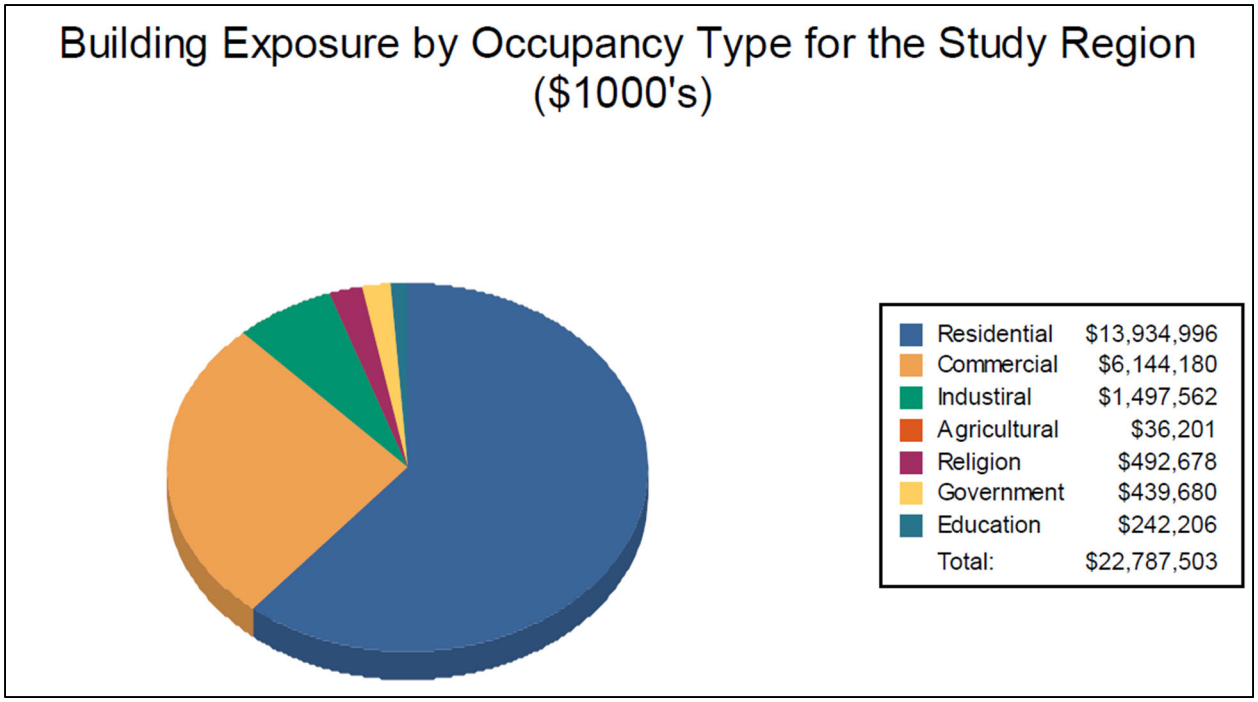
- **2011** - Large snowpack meant larger resulting spring runoff flows
- **2010** - Spring snowmelt combined with heavy rains caused several streams to overtop their banks
- **1987** – Great Salt Lake reached its all-time maximum water level (4211.6 feet)
- **1983** - Large snowpack was coupled with a rain-on-snow event, (City Creek diverted down State Street)
- **1983/1984** - Large snowpack overwhelmed Utah Lake and affected Jordan River downstream
- **1952** - Rapid melt of a large snowpack

Salt Lake City implemented mitigation efforts post 1983-84 floods and subsequently there are no repetitive loss claims due to flooding identified under NFIP.

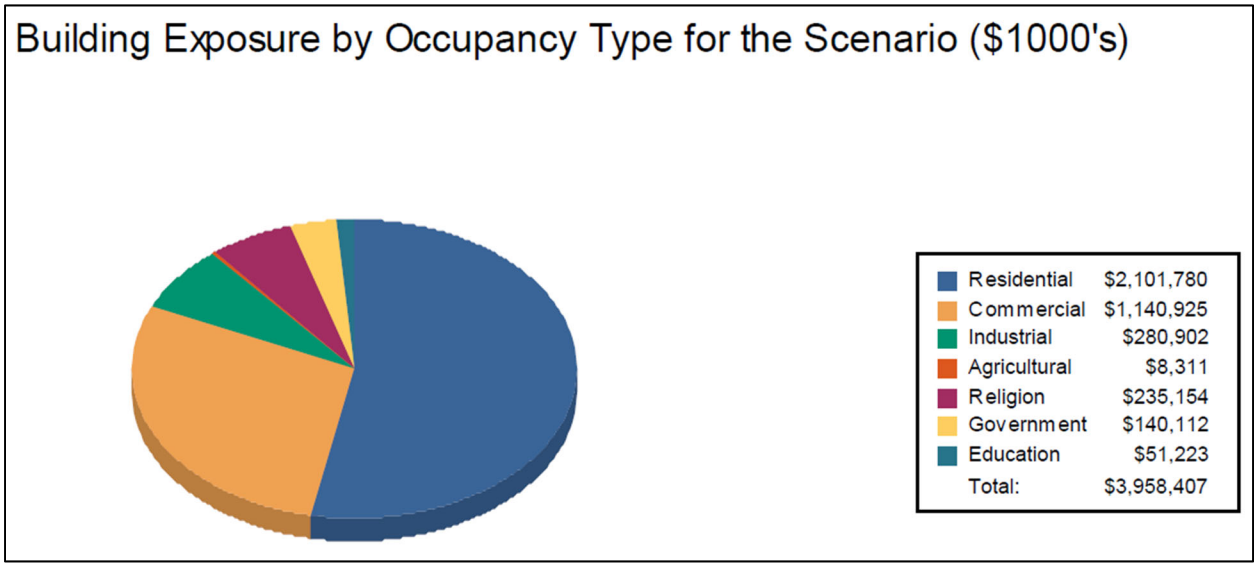
The City's Community Development Director oversees enforcement of floodplain management requirements adopted by the City, including regulating new construction in Special Flood Hazard Areas (SFHAs); Floodplain identification and mapping, including any local requests for map updates; description of community assistance and monitoring activities.

2019 HAZUS

HAZUS estimates that in Salt Lake City, there are 56,473 buildings in the region which have an aggregate total replacement value of 22,788 million dollars. For essential facilities, there are 10 hospitals in the region with a total bed capacity of 1,484 beds. There are 88 schools, 16 fire stations, 7 police stations and 3 emergency operation centers.



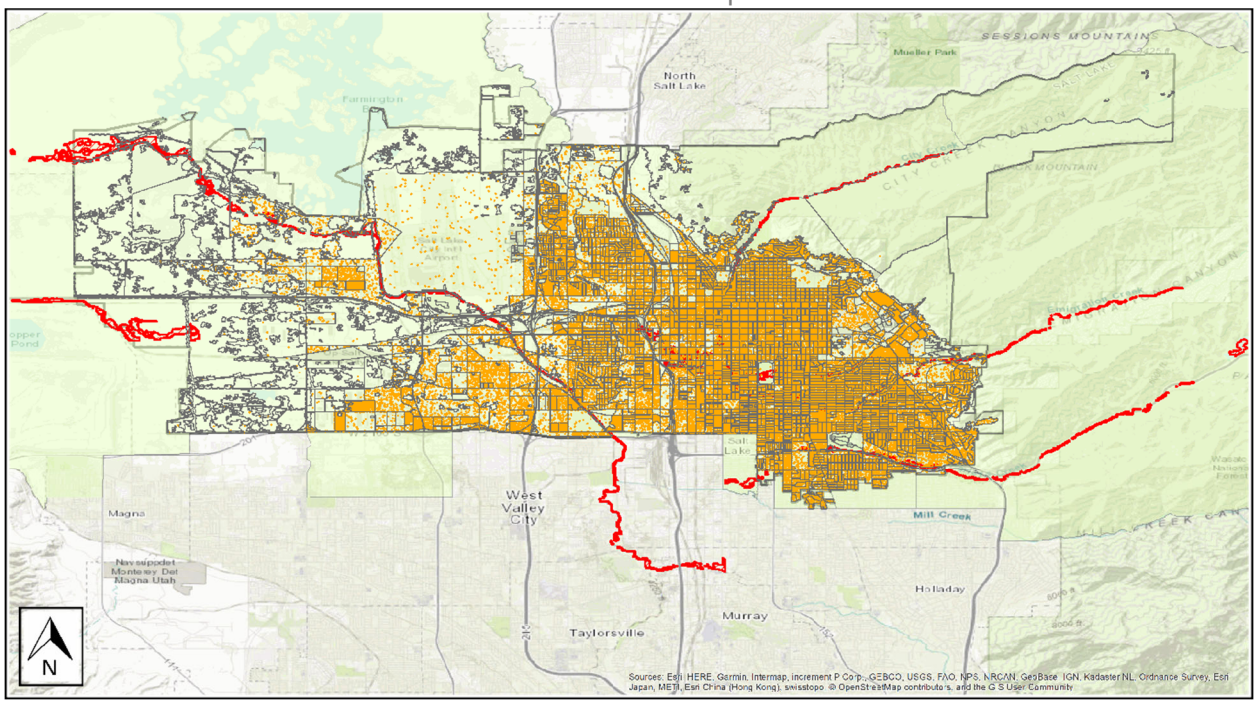
For the 100-year and 500-year flood scenario, building exposure was adjusted to $3,958,407.



100-year Flood HAZUS

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



HAZUS estimates that about 185 buildings will be at least moderately damaged. This is over 58% of the total number of buildings in the scenario. There are an estimated 14 buildings that will be destroyed.

Table: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	15	75	5	25	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	212	54	142	36	17	4	4	1	3	1	14	4
Total	**227**		**147**		**17**		**4**		**3**		**14**	

Total Economic Loss (1 dot = $300K) Overview Map

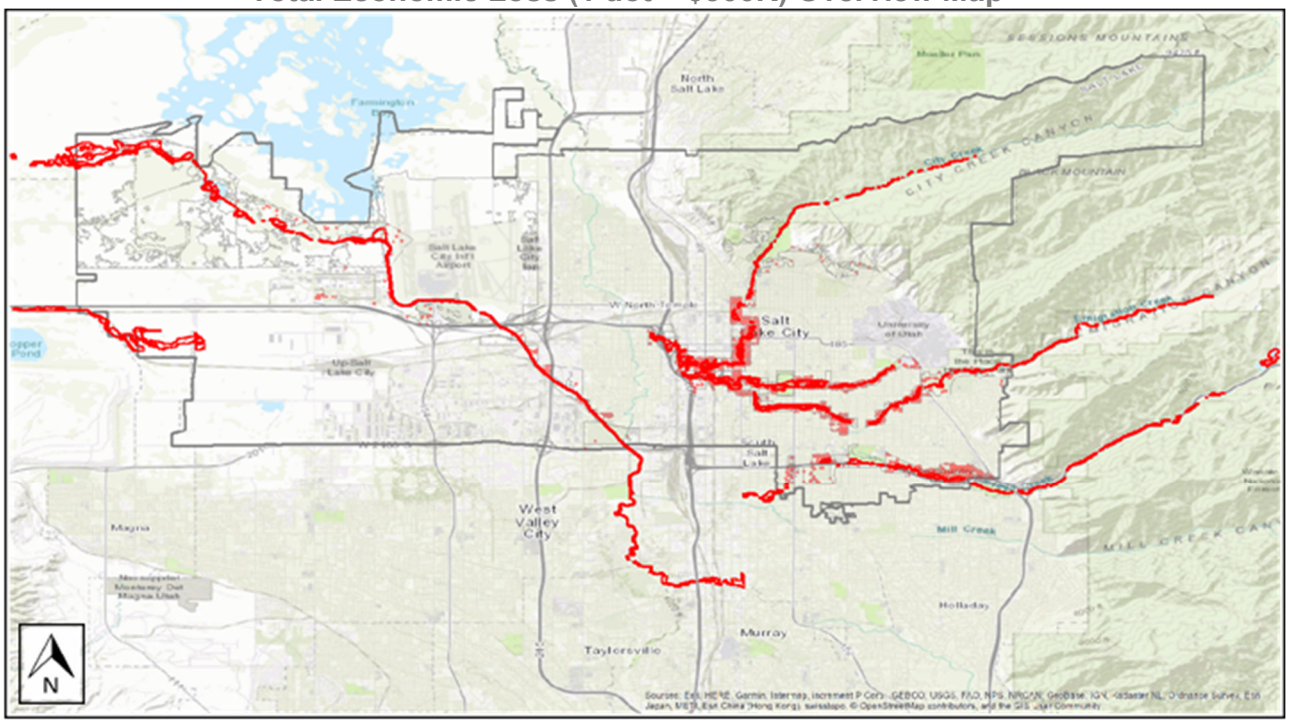


Table: Expected Building Damage by Building Type

	1-10		11-20		21-30		31-40		41-50		>50	
Building Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	6	75	2	25	0	0	0	0	0	0	0	0
Manuf. Housing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	40	60	25	37	1	1	0	0	0	0	1	1
Steel	2	100	0	0	0	0	0	0	0	0	0	0
Wood	179	54	119	36	16	5	4	1	2	1	13	4

Damage from flooding is not anticipated to any essential facilities, including the 1,484 hospital beds.

Table: Expected Damage to Essential Facilities

Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	3	0	0	0
Fire Stations	16	0	0	0
Hospitals	10	0	0	0
Police Stations	7	0	0	0
Schools	88	0	0	0

The model estimates 1,073 households (or 3,219 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 166 people (out of a total population of 186,440) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 286.08 million dollars, which represents

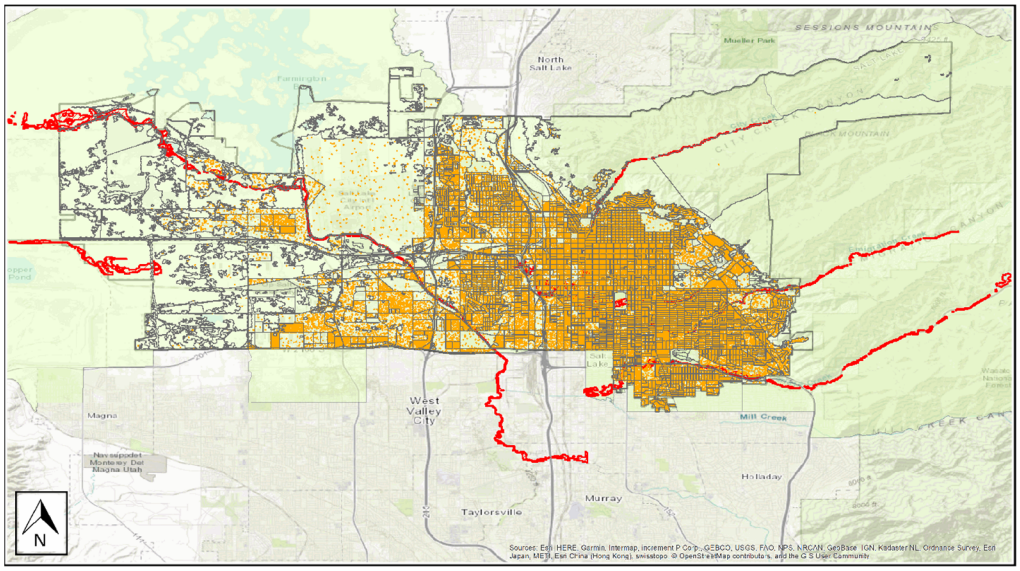
7.23% of the total replacement value of the scenario buildings. The total building-related losses were 77.17 million dollars. 73% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 22.26% of the total loss.

Table: Building-Related Economic Loss Estimates
(Millions of dollars)

Category/Area	Residential	Commercial	Industrial	Others	Total
Building Loss					
Building	26.02	7.33	0.73	0.68	34.76
Content	13.79	21.87	1.64	4.65	41.94
Inventory	0	0.20	0.26	0.01	0.47
Subtotal	39.81	29.40	2.63	5.34	77.17
Business Interruption					
Income	0.74	51.11	0.11	5.33	57.30
Relocation	14.38	17.13	0.16	3.81	35.49
Rental Income	6.99	11.32	0.02	0.80	19.14
Wage	1.76	59.45	0.21	35.56	96.99
Subtotal	23.88	139.01	0.51	45.51	208.91
All Total	63.69	168.41	3.14	50.85	286.08

500-year Flood HAZUS

Study Region Overview Map
Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



HAZUS estimates that about 237 buildings will be at least moderately damaged. This is over 56% of the total number of buildings in the scenario. There are an estimated 15 buildings that will be destroyed.

Table: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	23	70	5	25	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	286	56	178	35	24	5	5	1	5	1	15	3
Total	309		**188**		**24**		**5**		**5**		**15**	

Total Economic Loss (1 dot = $300K) Overview Map

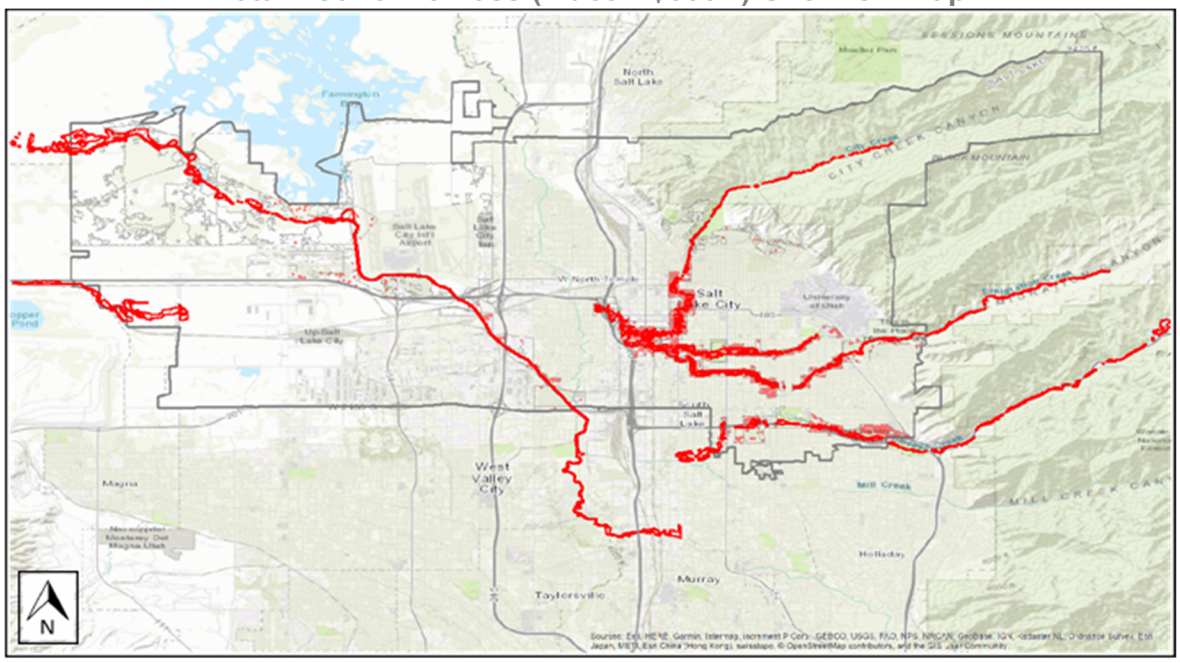


Table: Expected Building Damage by Building Type

	1-10		11-20		21-30		31-40		41-50		>50	
Building Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	8	67	4	33	0	0	0	0	0	0	0	0
Manuf. Housing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	56	62	32	35	1	1	0	0	0	0	2	2
Steel	3	75	1	25	0	0	0	0	0	0	0	0
Wood	241	55	150	34	23	5	5	1	4	1	13	3

Damage from flooding is not anticipated to any essential facilities, including the 1,484 hospital beds.

Table: Expected Damage to Essential Facilities

Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	3	0	0	0
Fire Stations	16	0	0	0
Hospitals	10	0	0	0
Police Stations	7	0	0	0
Schools	88	0	0	0

The model estimates 1,418 households (or 4,254 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 226 people (out of a total population of 186,440) will seek temporary shelter in public shelters.

The total economic loss estimated for the flood is 398.65 million dollars, which represents 10.07% of the total replacement value of the scenario buildings. The total building-related losses were 102.61 million dollars. 74% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 20.09% of the total loss.

Table: Building-Related Economic Loss Estimates
(Millions of dollars)

Category/Area	Residential	Commercial	Industrial	Others	Total
Building Loss					
Building	31.14	11.06	1.08	0.96	44.24
Content	16.59	32.25	2.46	6.42	57.73
Inventory	0	0.27	0.36	0.01	0.64
Subtotal	47.74	43.58	3.91	7.39	102.61
Business Interruption					
Income	1.2	73.76	0.21	6.69	81.87
Relocation	18.89	24.68	0.22	5.07	48.87
Rental Income	9.4	16.27	0.03	1.17	26.87
Wage	2.85	84.29	0.29	51	138.43
Subtotal	32.34	199	0.76	63.94	296.04
All Total	80.08	242.57	4.67	71.33	398.65

Severe Storms: Severe storms can include thunderstorms, lightning, hailstorms, heavy snow or rain. These storms are generally related to high precipitation events during the summer and winter months and can happen anywhere in the region. Damage can be extensive especially for agriculture, farming, and transportation systems; they can also disrupt business due to power outages.

Earthquake: While no major earthquakes have occurred in recent history, the Wasatch Fault poses the greatest threat (more than the West Valley Fault Zone and the East Great Salt Lake Fault Zone). Infrastructure failures, lifeline disruptions, and power outages, along with groundwater contamination and liquification, are potential resulting impacts. Additionally, a high number of unreinforced masonry (URM) buildings and high rise buildings are in the area and can be impacted by earthquakes. Major transportation routes and infrastructure could also be impacted on both a local and national scale, including airports, bridges, and major highways. The

city also has a high concentration of environmental contaminants that could be released during an earthquake.

The Wasatch Fault traces along the base of the Wasatch mountain range. It is made up of 10 segments that act independently, meaning that a part of the fault ruptures separately as a unit during an earthquake. The Salt Lake City Segment traverses Salt Lake County from north to south, roughly along the eastern foothills of the Wasatch Mountains. Within the Salt Lake City segment of the Wasatch Fault are three smaller segments from north to south known as Warm Springs Fault, Virginia Street Fault and the East Bench Fault. Earthquakes originating in any of the five Wasatch faults pose a direct threat to Salt Lake City.

Image of Fault Segments in Salt Lake City

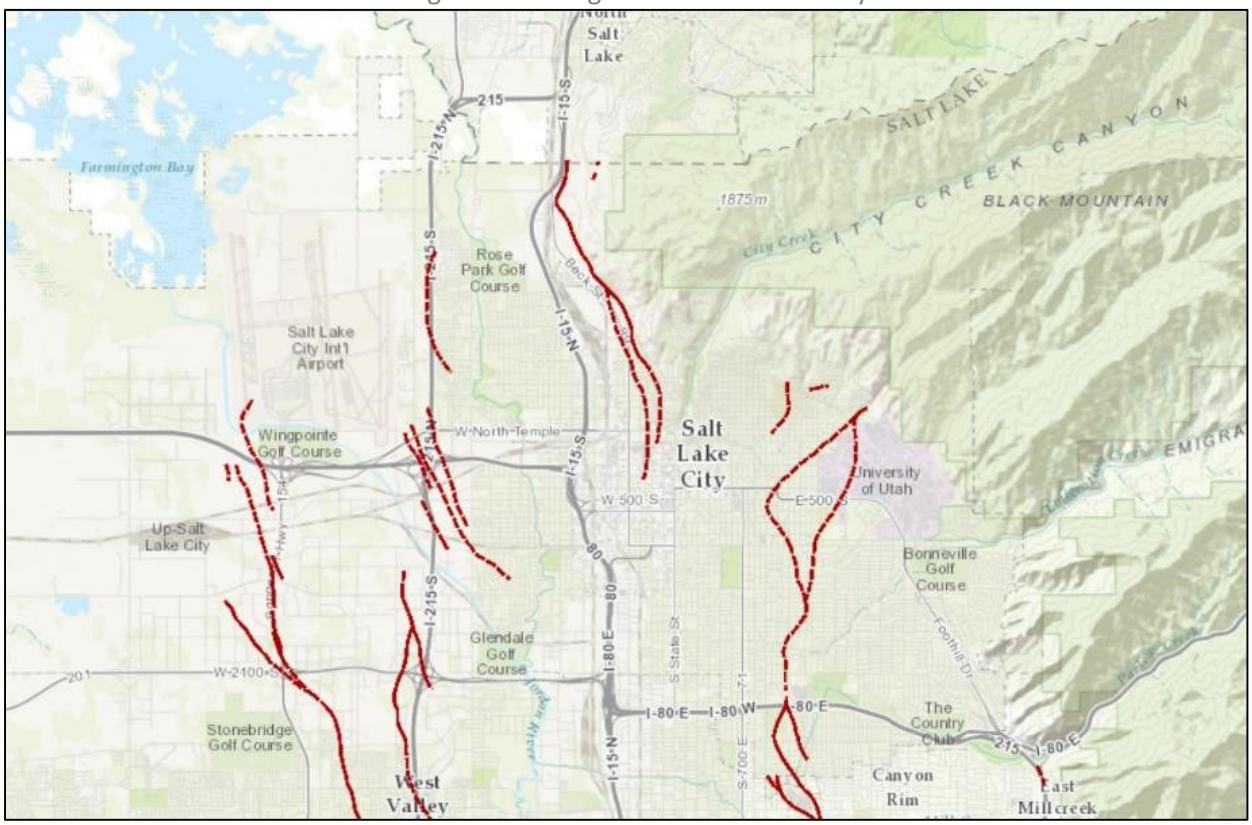


Table. Quaternary Faults, Salt Lake County (UGS 2002, UGS 2006) cal. Yr. B.P.=calendar years before present

Name	Fault Type	Length (km)	Time of Most Recent Deformation	Recurrence Interval
East Great Salt Lake fault zone, Antelope Island section	Normal	35	586 201/-241 cal yr B.P.	4,200 years
Wasatch fault zone, Salt Lake segment	Normal	43	1,300±650 cal yr B.P.	1,300 years
West Valley fault zone, Granger segment	Normal	16	1,500±200 cal yr B.P.	2,600-6,500 years
West Valley fault zone, Taylorsville segment	Normal	15	2,200±200 cal yr B.P.	6,000-12,000 years

Range of Magnitude

Utah experiences approximately 700 earthquakes each year, and approximately six of those have a magnitude 3.0 or greater. On average, a moderate, potentially damaging earthquake (magnitude 5.5 to 6.5) occurs every 10 years. Large earthquakes (magnitude 6.5-7.5) occur on average every 50 years (UNHH 2008). The history of seismic activity in Utah and along the Wasatch Front suggests that it is not a matter of "if" but “when” an earthquake will occur. The probability of a large earthquake occurring along the central segments of the Wasatch Front is 13 percent in 50 years, or 25 percent in 100 years. (The Wasatch Fault, UGS PIS 40)

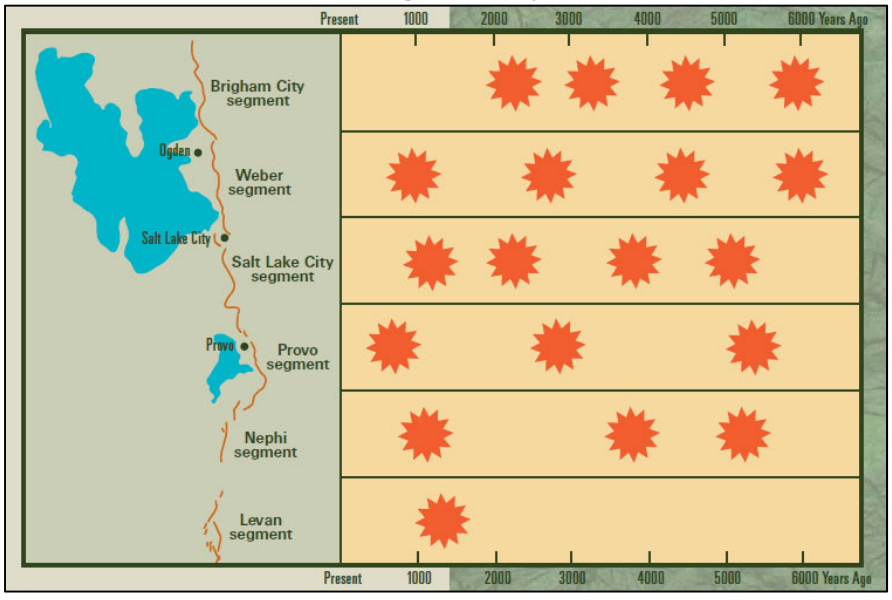
Earthquake Hazard Profile

Location	Fault Activity within the Wasatch area magnitude 5.0 or greater poses a direct threat to Salt Lake City.
Seasonal Pattern	None.
Conditions	Liquefaction potential within areas with shallow ground water. Soil that is comprised of old lakebed sediments. Historic movement along faults. Intermountain Seismic Zone, Wasatch Fault.
Duration	Actual ground shaking will be under one minute, aftershocks can occur for weeks or even months.
Secondary Hazards	Fire, landslide, rock falls, avalanche, flooding, hazardous material release, transportation and infrastructure disruptions, essential service disruptions (communications, utilities).
Analysis Used	Review of hazard analysis plans and other information provided by the University of Utah Seismograph Station, UGS, USGS, FEMA, UDEM, AGRC.

Past Occurrence

Although no surface-faulting earthquakes have occurred on the Wasatch fault in recent history, evidence of numerous prehistoric events exists in the geologic record (The Wasatch Fault, UGS PIS 40) The segments between Brigham City and Nephi have a composite recurrence interval (average time between earthquake events) for large surface-faulting earthquakes (magnitude 7.0-7.5) of 300-400 years. The average repeat time on an individual segment is 1,200-2,600 years. The most recent surface-faulting earthquakes occurred about 500 years ago on the Provo and Weber segments, and about 350 years ago on the Nephi segment. (UNHH 2008)

Table. Wasatch Fault Segments and Timeline of Major Ruptures
("The Wasatch Fault", Utah Geological Survey Public Information Series 40)



Significant earthquakes have occurred in Salt Lake County within the last 50 years. In 1962, a 5.2 Richter magnitude quake jolted the Magna area. In 1992, a magnitude 4.2 quake shook the southern portion of the County.

Liquefaction is one of the secondary hazards associated with an earthquake and affects nearly all of Salt City. The City is located atop the ancient Lake Bonneville lakebed, which is made up of unconsolidated sandy soils. Much of the valley is also subject to shallow ground water and a relatively high earthquake threat.

Future Occurrence

Other faults within Salt Lake County include the West Valley Fault Zone and the East Great Salt Lake Fault Zone. Each of these fault zones has much longer return interval (2,500 years or more) and is not expected to produce a major quake in the near future.

Potential Loss Estimates

Building Damage

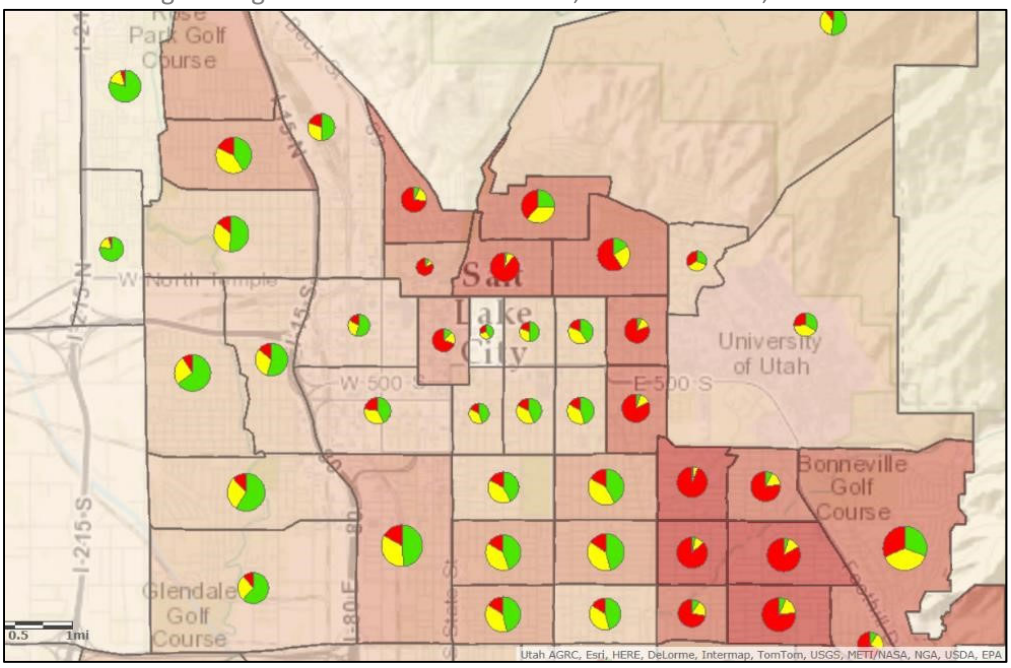
The 2013 HAZUS-MH is the most recent city-level data available and was utilized to classifies building damage into five states: none, slight, moderate, extensive and complete. The Table below lists the number of buildings by occupancy estimated to sustain moderate to complete levels of damage during an arbitrarily-determined Richter magnitude 5.9 (M5.9) earthquake scenarios or a probabilistic Richter magnitude 7.1 (M7.1) earthquake scenario. Also listed are the estimated monetary losses to structures, contents/inventory, and income.

Models show Salt Lake City will have $12,249,473,845 of total building economic loss and 7,966,834 tons of debris. As a result of our 32,341 unreinforced masonry buildings 35,786 households will be displaced, 21,629 individuals seeking public shelter, 13,698 casualties and 1,397 life threatening injuries and fatalities.

Table. Building Damage Counts and Estimated Losses using HAZUS MH

Category	Number of Structures with > 50% Damage		Category	Estimated Losses	
	Salt Lake M5.9	2500-yr M7.1		Salt Lake M5.9	2500-yr M7.1
Residential	30,342	157,705	Structural Losses	$519,320,000	$3,419,030,470
Commercial	1,896	5,199	Non-Structural Losses	$1,818,647,000	$12,331,504,070
Industrial	495	1,367	Content Losses	$719,709,000	$4,114,455,740
Government	167	475	Inventory Losses	$29,216,000	$175,756,410
Education	51	159	Income and Relocation Losses	$623,140,000	$3,263,449,580
Totals	32,951	164,905	Totals	**$3,710,032,000**	**$23,304,196,270**

Building Damage Estimates: Red 70-100%, Yellow 30-70%, Green 5-30%



Transportation and Utilities Damage

Damages to transportation and utility infrastructure are illustrated below. Infrastructure sustaining moderate or worse damage and estimated monetary losses are both shown.

Table. Damage to Transportation and Utilities

Category	Total	At Least Moderate Damage >50%		Estimated Losses	
		Salt Lake M5.9	2500-yr M7.1	Salt Lake M5.9	2500-yr M7.1
Waste Water Facilities	5	2	4	$44,008,000	$146,243,000
Waste Water Pipelines	3.975 km	637 leaks/breaks	14,005 leaks/breaks	$2,294,000	$50,416,000
Potable Water Pipelines	6,625 km	805 leaks/breaks	17,706 leaks/breaks	$2,900,000	$63,744,000
Natural Gas Pipelines	2,650 km	681 leaks/breaks	14,970 leaks/breaks	$2,452,000	$53,893,000
Electrical Power Facilities	7	3	7	$92,024,000	$343,874,000
Communication Facilities	42	9	34	$242,000	$1,478,000
Highway Bridges	698	126	496	$81,646,000	$468,944,000
Railway Bridges	17	0	8	$9,000	$358,000
Railway Facilities	6	0	6	$3,494,000	$7,525,000
Bus Facilities	2	0	2	$490,000	$1,157,000
Airport Facilities	3	0	3	$2,675,000	$7,450,000
Total Losses				$232,234,000	$1,145,082,000

Debris Removal

The table below shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

Table. Debris Generated/Number of Loads

Category	Salt Lake M5.9	2500-yr M7.1
Brick, Wood & Others	581,000 tons / 23,240 loads	3,356,000 tons / 134,240 loads
Concrete & Steel	1,195,000 tons / 47,800 loads	7,678,000 tons / 307,120 loads

Fires Following an Earthquake

Multiple ignitions and broken water mains following an earthquake can make firefighting nearly impossible. HAZUS-MH uses estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake.

Table. Fire Following Event, Population Exposed, and Building Stock Exposed

Category	Number of Structures	
	Salt Lake M5.9	2500-yr M7.1
Ignitions	49	80
Persons Exposed	806	2,116
Value Exposed	$50,232,000	$120,188,000

Casualties

The table below estimates casualties likely to occur during each earthquake scenario. The nighttime scenario (2 a.m. local time) assumes a primarily residential concentration of persons, the daytime scenario (2 p.m. local time) a commercial concentration, and the commute scenario (5 pm. local time) a concentration of persons on commuting routes. Categories of casualties include those not requiring hospitalization (minor), those requiring treatment at a medical facility (major), and fatalities.

Table. Casualties

Night Event	Salt Lake M5.9	2500-yr M7.1	Day Event	Salt Lake M5.9	2500-yr M7.1	Commute Event	Salt Lake M5.9	2500-yr M7.1
Minor	1,024	10,475	**Minor**	1,883	17,110	**Minor**	1,432	13,442
Major	219	3,224	**Major**	502	6,192	**Major**	369	4,688
Fatalities	44	758	**Fatalities**	122	1,742	**Fatalities**	87	1,258

Extreme Temperatures: The city has a high homeless population that could be adversely impacted by extreme temperatures. Salt Lake City is considered one of the nation's biggest Urban Heat Islands, meaning temperatures can greatly increase in cemented areas. Extreme cold temperatures can also impact water pipelines.

Temperatures in Utah can reach the extreme ends of the thermometer. Winter months often experience temperatures below zero degrees Fahrenheit. Summer temperatures regularly reach into the nineties with many days above 100 degrees Fahrenheit. Drastic temperature changes also occur, even in matter of hours. Temperature swings in such a short period of time can cause severe emotional stress in people.

Sub-zero temperatures occur during most winters; however, prolonged periods of extremely cold weather are infrequent. An exception was January 2013, the coldest month on record for Salt Lake City since 1949, with a mean temperature of 19.4 degrees (10.1 degrees below normal), average daily maximum temperature of only 26.6 degrees, and extended periods of inversions. January is generally the coldest month of the year. Historically, extreme cold in the region has disrupted agriculture, farming and crops. Especially vulnerable to extreme cold are the young, elderly, homeless and animals. Wind chill can further the effects of extreme cold.

Extreme heat is “summertime weather that is substantially hotter and/or more humid than average for a location at that time of year”. Extreme heat not only causes discomfort, but personal health can be affected through heat cramps, heat exhaustion or heat stroke, particularly affecting vulnerable populations such as the very young, elderly, poor, and homeless. Extreme heat places a substantial burden on power grids through widespread use of evaporative coolers and air conditioning. This strain can lead to brownouts or blackouts leaving many without power.

While no extreme heat events have been recorded, July is the hottest month in Salt Lake City (averages 90F) followed by August (89F) (US Climate Data)***.*** The most at-risk population to heat events would be the elderly and at-risk populations who do not have air conditioning. Additionally, high temperatures have the potential to correlate to drought and wildfire conditions.

Wildfire: The portions of Salt Lake City that could experience a significant amount of destruction due to a wildland fire include the foothills and the bench areas on or near the Wasatch Range. These WUI areas are threatened most because of the number of forested lands and the increasing population growth spreading into the foothills. Another concern is vegetation type in these areas such as sagebrush, mountain scrub oak, cheatgrass, pinion and juniper trees, and rural and riparian vegetation. Sagebrush and mountain shrub burn hot and fast, spreads easily and is found throughout the county. During prime burning conditions (hot, dry and windy) the pinion juniper class will burn. A wildfire could impact watershed management, communication towers, and lead to evacuation challenges. there is no egress in City Creek Canyon.

Wildfires are particularly concerning in the wildland-urban interface. The wildland-urban interface (WUI) is the line, area or zone where structures or other human development meet or intermingle with undeveloped wildland or vegetative fuel. Homes, storage sheds, recreational facilities, transmission lines and other buildings may meet or intermingle with trees, brush, and grasses in the WUI. The three conditions that affect fire behavior are topography, vegetation and weather.

Topography: Topography includes factors such as slope, aspect and elevation. Fires spread faster upslope because fuels are closer to flames. Aspect influences fuel moisture content. Fuels

tend to be drier on south and west-facing slopes. Higher elevation is related to cooler temperatures and higher relative humidity, as well as changes in vegetative fuel types.

Vegetation: The type of vegetation has a major effect on how quickly a fire will spread. For example, light grasses burn rapidly, whereas heavy, dense fuels like Douglas fir burn slowly but with greater intensity. Different fuels burn at different rates of spread, intensity, and will resist control to different degrees.

Size, continuity and compactness also affect the fuel's rate of spread. Large fuels do not burn as readily as small fuels, and take more heat to ignite. Small fuels ignite easier and fire will spread more rapidly through them. Continuity describes how a fuel is arranged horizontally. Fuels that are broken up in patches burn unevenly and slower than uniform fuels. Compactness is how fuel is arranged vertically. Compact fuels burn slower than tall, deep fuels that have more oxygen available.

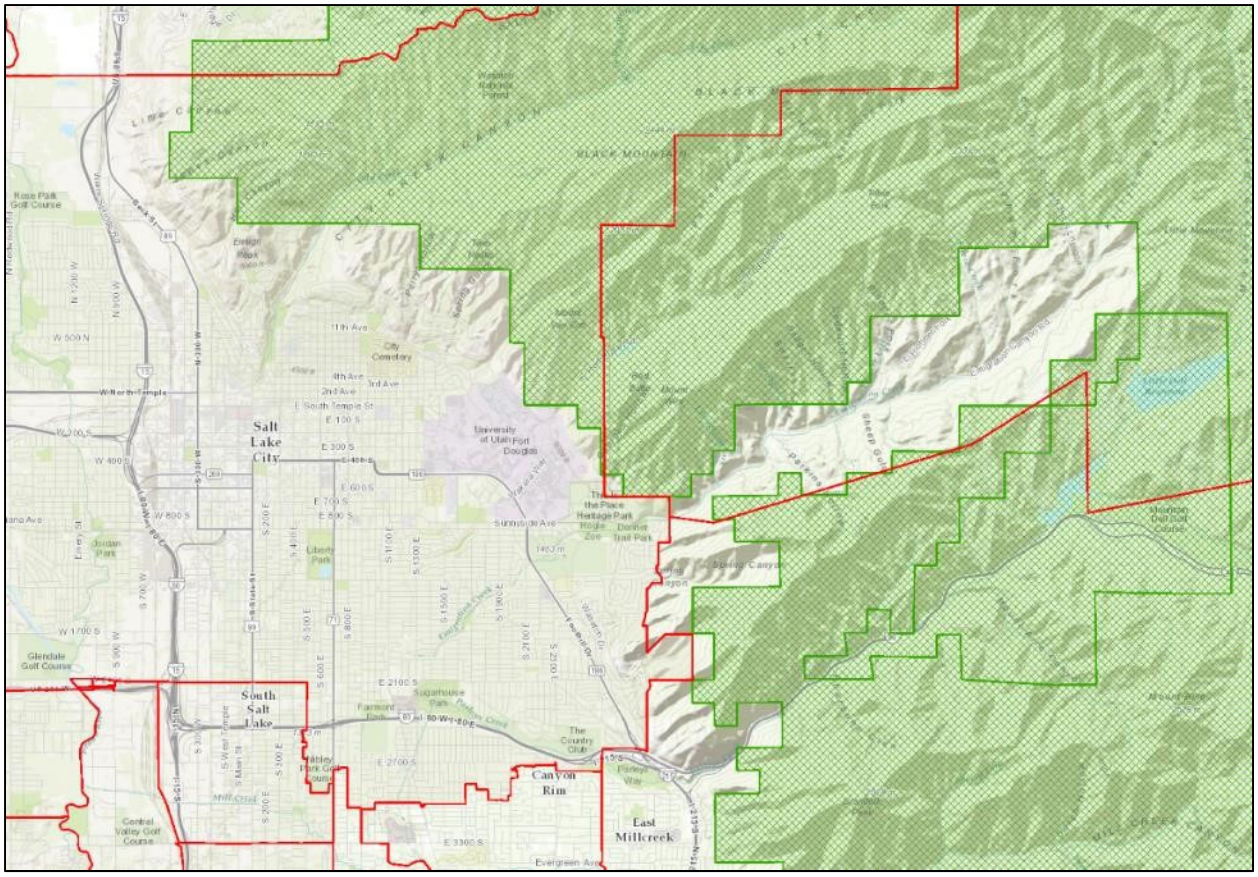
Weather: Weather (temperature, humidity, precipitation, and wind) affects the ease with which a fuel ignites, the intensity at which it burns, and how easy control may be. High temperatures heat fuels and reduce water content, which increases flammability. A decrease in relative humidity causes a proportionate decrease in fuel moisture, promoting easier ignition and more intense burning. Wind carries the heat from a fire into unburned fuels, drying them out and causing them to ignite easier. The wind may also blow burning embers into unburned areas ahead of the main fire that may start spot fires.

Wildfire removes vegetation that protects soil from excessive rainfall and resulting runoff. It also damages soil by making the soil hydrophobic, or water repellent. These conditions contribute to depletion of wildlife resources, soil erosion, water runoff, and in some cases severe slope failures and debris flows.

Providing adequate fire protection in the WUI can be difficult. Local suppression methods and resources may not be suited to wildfire suppression, and personnel can become easily overwhelmed when multiple structures are threatened simultaneously. Energy output from a wildfire may make protection of homes almost impossible and involves tremendous danger to firefighters and homeowners.

Location

The portions of Salt Lake City that could experience significant amount of destruction due to a wildland fire include the foothills and the bench areas on or near the Wasatch Range. These WUI areas are threatened most because of the amount of forested lands and the increasing population growth spreading into the foothills. Another concern is vegetation type in these areas such as sagebrush, mountain scrub oak, cheat grass, pinion and juniper trees, and rural and riparian vegetation. Sagebrush and mountain shrub burn hot and fast, spreads easily and is found throughout the county. During prime burning conditions (hot, dry and windy) the pinion juniper class will burn. The image below illustrates where Salt Lake City's WUI occurs and includes fire response boundaries (red lines) in conjunction with the forestry service areas (green patches).


Salt Lake City
South Salt Lake
Canyon Rim
East Millcreek
Rose Park Golf Course
Glendale Golf Course
Central Valley Golf Course
Jordan Park
Liberty Park
Sugarhouse Park
The Country Club
City Cemetery
University of Utah Fort Douglas
Sunnyside Ave
Foothill Dr
Parleys Way
E South Temple St
E 2100 S
E 3300 S
S 1300 E
S 2100 E
S 3300 E
W 800 S
W 1700 S
W 500 N
W 400 S
S 700 W
S 900 W
S 1100 E
S 1500 E
S 2000 E
S 3200 E
S 3600 E
S 4000 E
S 4500 E
S 5100 E
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Several notable wildfires have occurred in Salt Lake County since the last Mitigation Plan was completed. These include the Corner Canyon Fire in Draper City in August 2008, The Machine Gun fire in Herriman City in September, 2010, and the Rose Crest fire and Pinion Fire also in Herriman City in 2012. These fires prompted major fire response, required evacuations of large numbers of citizens, and created the threat of debris flows in following years. Even though these fires did not occur within Salt Lake City boundaries, the city's resources and capabilities were impacted due to mutual aid response. Recent wildfires within the City include the Ensign Peak grass fire that burned forty acres of hillside behind the Utah State Capitol, although swift action from responders prevented potential damage, injuries, or disaster.

Future Occurrence

As population growth continues, pressure to develop in WUI areas is likely to increase the threats associated with fire. Mitigation measures will need to be recognized and enforced to reduce these threats.

Vulnerability Assessment

The next two tables estimate the total area, population and buildings vulnerable to wildland fire for Salt Lake City. These values are based on the 2013 GIS analysis to account for population growth and new structures. Salt Lake County Assessor data and 2010 Census data were overlaid on the located within Moderate, High or Extreme wildfire risk. Wildfire Hazard Risk data is shown in the preceding map to determine population and structures.

Table. Population vulnerability and structures in areas of Moderate or Greater Hazard, based on BLM Wildfire Hazard data.

Incorporated Areas	Total Population Affected	Total Households	Total Structures	Residential (Total Assessed Value)	Commercial (Total Assessed Value)
Salt Lake City	2680	1095	611	410 $83,640,000	60 $209,789,232

Communities At Risk	Fire Occurrence	Fuels Hazards	Values Protected	Fire Protection Capability	Overall Score
Salt Lake City	2	3	2	1	8

Drought: While not unique from the rest of the County in susceptibility to drought, the main concern would be that much of the County relies on the water production and delivery from Salt Lake City which could drastically decline during a drought.

Range of Magnitude

Drought Hazard Profile:

Location	Countywide

Seasonal Conditions	Impacts typically noticeable in summer, conditions can be year round.
Conditions	Meteorological Drought: Lack of precipitation Agricultural Drought: Lack of water for crop production Hydrologic Drought: Lack of water in the entire water supply Socioeconomic Drought: Lack of water sufficient to support population
Duration	Months, Years
Secondary Hazards	Wildfire, dust storms, air quality.
Analysis Used	National Weather Service, Utah Climate Center, Utah Division of Water Resources, Newspapers, Local input.

Although the agricultural community is usually the most heavily impacted by drought, direct and indirect impacts extend into economic, social, or environmental sectors as well (UNHH 2008).

Times of extended drought can turn into socioeconomic drought, or drought that begins to affect the general population. When this occurs, reservoirs, wells and aquifers are low and conservation measures are required. Some forms of water conservation are water-use restrictions, implementation of secondary water or water recycling and xeriscaping. Other conservation options include emergency water agreements with neighboring water districts or transporting water from elsewhere.

Location

Utah is the second driest state in the nation. Drought dramatically affects this area because of the lack of water for agriculture and industry, which limits economic activity, irrigation and culinary uses. The severity of the drought results in depletion of agriculture lands and deterioration of soils. In the Wasatch Front region, the risk of drought is high.

Salt Lake City falls within two climatic regions: the North Central region (3), and the Northern Mountains region (5). Each of these regions has differing characteristics, but often experience similar drought periods. The two regions experience mild drought (PDSI ≥ -1) every 2.6-3.3 years, moderate drought (PDSI ≥ -2) every 3.7-5.2 years, and severe drought (PDSI ≥ -3) every 6.9-8.5 years. The Northern Mountain region typically experiences droughts less frequently (Utah Division of Water Resources 2007a). Conversely, the Northern Mountain region averages more severe drought conditions at its peak than the Western region. It may be Northern Mountains region simply has more water to lose as the Wasatch and Uinta Mountains receive much more precipitation on average.

Past Occurrence

The most severe drought period in recorded history for the North Central and Northern Mountains regions occurred in 1934 at the height of the Great Depression and during the same drought period (1930 to 1936) that caused the “Dust Bowl” on the Great Plains. The longest drought period varies from 11 years for the North Central region (1953-1963), and 6 years for the Northern Mountains (twice; 1900-1905 and 1987-1992) (Utah Division of Water Resources 2007a).

Vulnerability Assessment

Due to the unpredictability of drought, it is difficult to identify the areas most threatened and to provide loss estimate values. Utah is currently experiencing drought conditions, yet reports are not yet available on the impact of the current drought. However, historical drought records demonstrate that agriculture is typically the economic sector most impacted by drought (UHMP). The 2003 Economic Report to the Governor discusses some of the statewide economic impacts of a drought beginning in 1999. Since it is not known what the local impacts of the current drought will be, this report will serve as the best available loss estimate. It is expected droughts in the future will have similar losses.

High Winds: These events happen with relative frequency and can cause extended power outages and property damage. Above-ground power lines are particularly vulnerable during these events. In addition, residents that live in a mobile home or non-traditional homes like vehicles have a much higher risk of impact than those in traditional housing structures. According to the 2017 American Community Survey, there are approximately 440 mobile homes and 223 non-traditional housing structures within Salt Lake City.

Tornado: Historically, atmospheric conditions have not been favorable for tornado development in Salt Lake due to a dry climate and mountainous terrain. Utah is one of the lowest ranked in the nation for incidences of tornadoes with only one F2 or stronger tornado every seven years. Tornado distribution for the region suggests many tornadoes are funnel clouds aloft coming into contact with the increasing elevation of Salt Lake City's foothills and mountains. Despite this fact, interactions of the relatively cool air of the Great Salt Lake and relatively warm air of urban areas could create situations more favorable for tornado development. This phenomenon possibly contributed to the formation of the August 1999 Salt Lake City tornado. The $170 million in damages caused by this tornado make it the costliest disaster in Salt Lake history.

Winter Storms: Major winter storms can produce five to ten times the amount of snow in the mountains than in the valley locations. Heavy snow can cause a secondary hazard in avalanches.

These conditions can yield extended school closing and business interruption. Power disruption may occur and adversely impact the senior population. Winter weather can also have significant economic costs associated with snow removal, revenue and wage losses from road and airport delays or closures, flooding damage from rapid snowmelt, and agricultural and timber losses from frost and ice. Winter storms can pose a significant threat due to vehicle traffic accidents on icy roads, prolonged exposure to cold, damage to electrical, telephone or communication systems from ice or heavy snow accumulation, and indirectly related health threats such as individuals suffering heart attacks while shoveling snow. Prolonged exposure to cold can cause frostbite or hypothermia and can become life threatening.

Freezing Rain: Freezing rain is rare in Salt Lake City, but occurs on occasion. A freezing rain storm occurred along the Wasatch Front in the record cold January of 2013, causing the closure of all runways at the Salt Lake City International Airport and resulting in numerous traffic accidents.

Fog: Temperature inversions often occur during the winter months as a result of high pressure trapping cold air in the valley. These inversions keep cold, moist air trapped on the valley floor forming super-cooled fog. This fog can cause visibility restrictions and icy surfaces. Wind is needed to clear the inversion and fog. The Great Salt Lake has been shown to affect the prevalence of fog, especially when lake levels are high.

Landslide: Landslides and debris flows are most common in the foothills along the base of the Wasatch Mountain Range from wet climatic conditions. Some major landslide areas include the Grand View Peak rockslide in upper City Creek Canyon. As urbanization spreads into geologically unstable areas, the risk to life and property increases. An event of this nature could disrupt water production and delivery.

Slope instability has not been a major problem in the Salt Lake area. Yet, as development moves higher into the foothills and nearby canyons, slope stability is becoming a major issue affecting future development. Types of slope instability in the Salt Lake area include rock fall, debris flow and debris flood, rotational and transitional slumps, and earth flows. During the unusually wet springs of 1983 and 1984, numerous slope failures in the Wasatch Range resulted in debris flows and floods that caused extensive damage to urban areas north of Salt Lake City. Similar failures occurred in canyons adjacent to Salt Lake City, but none reached developed areas.

Location	Generally in canyon mouths and foothills and areas of recent wildfire activity (Map 11).
Seasonal Pattern	Spring and summer months.
Conditions	Usually caused by the stress release of over-weighted soils or loosening of rock and debris by wind, water or ground shaking.
Duration	Landslides/Rock falls: Hours to Months. Debris flows: Instantaneous.
Secondary Hazards	Flooding (natural dams), traffic accidents.
Analysis Used	Information and maps provided by UGS, UDEM, AGRC.

Past Occurrence

A cluster of historical landslides is visible from the hairpin turn in Bonneville Boulevard in lower City Creek Canyon in Salt Lake City. Movement of the largest and most damaging of these landslides has been monitored since June 1998 by the UGS and the Salt Lake City surveyor. Since June 1998, the toe of the landslide has moved about 24 feet, and the main scarp has offset the ground surface about the same amount. Like most recurrently active landslides in northern Utah, movement typically occurs between March and June as ground-water levels rise following the snowmelt. Four houses at the top of the slide are threatened, and efforts to protect one house have cost in excess of $300,000. In 2006 the landslide reactivated again, moving about 2 feet, despite drier-than-normal conditions in Salt Lake City. (Utah Hazard Mitigation Plan)

Subsidence is possible in City Creek, Emigration, Parley's, and Big Cottonwood Canyons due to the prevalence of dissolvable limestone. Subsidence can also occur in the Avenues area of Salt Lake City due to collapsible soils that are compactable upon wetting.

Table. Vulnerability Assessment for Landslides

Incorporated Areas	Acres Affected	Population Affected	Structures in Areas of Moderate or Greater Hazard	
			Residential (Replacement Value)	Commercial (Annual Sales)
Salt Lake City	15,701	15,762	6,327 $1,294,504,200	176 $47,480,280

Dam Failure: The city is responsible for multiple dams (Little Cottonwood Canyon, Big Cottonwood Canyon, Red Butte Dam, Little Dell, Mt Dell). The dam safety hazard is classified as no threat to high risk by the State Engineer. Hazard ratings are determined by downstream uses, size, height and volume, and incremental risk/damage assesments. The classification is based on the damage caused if the dam were to fail. If the BCC floods, the Salt Lake City Water TX Plant could be heavily impacted. There are 3 high-hazard dams located in Salt Lake City. These dams are built by different agencies, and may serve various functions such as flood control, water storage, recreation, and power generation.

Table. High and Moderate Hazard Dams,
Salt Lake City (Source: Utah Division of Water Rights)

Name	Rating
Little Dell	High
Mountain Dell	High
Red Butte Dam	High

Dam Failure Hazard Profile:

Location	Dam locations are located throughout the county, with most of the high and moderate hazard dams in the eastern and southern portion of the county (Map 13).
Seasonal Conditions	Rainy Day Failure: Anytime Sunny Day Failure: Spring, late summer
Conditions	Rainy Day Failure happens mainly during heavy precipitation events, can have some warning time. Sunny Day Failure can happen anytime without warning.
Duration	Hours or days - depends on spillway type and area, maximum cubic feet per second (cfs) discharge, overflow or breach type and dam type.
Secondary Hazards	Raw sewage/health risk, electrical fires, gas spills.
Analysis Used	Review of BOR inundation maps and plans, FIS, Utah Division of Water Rights.

Past Occurrence

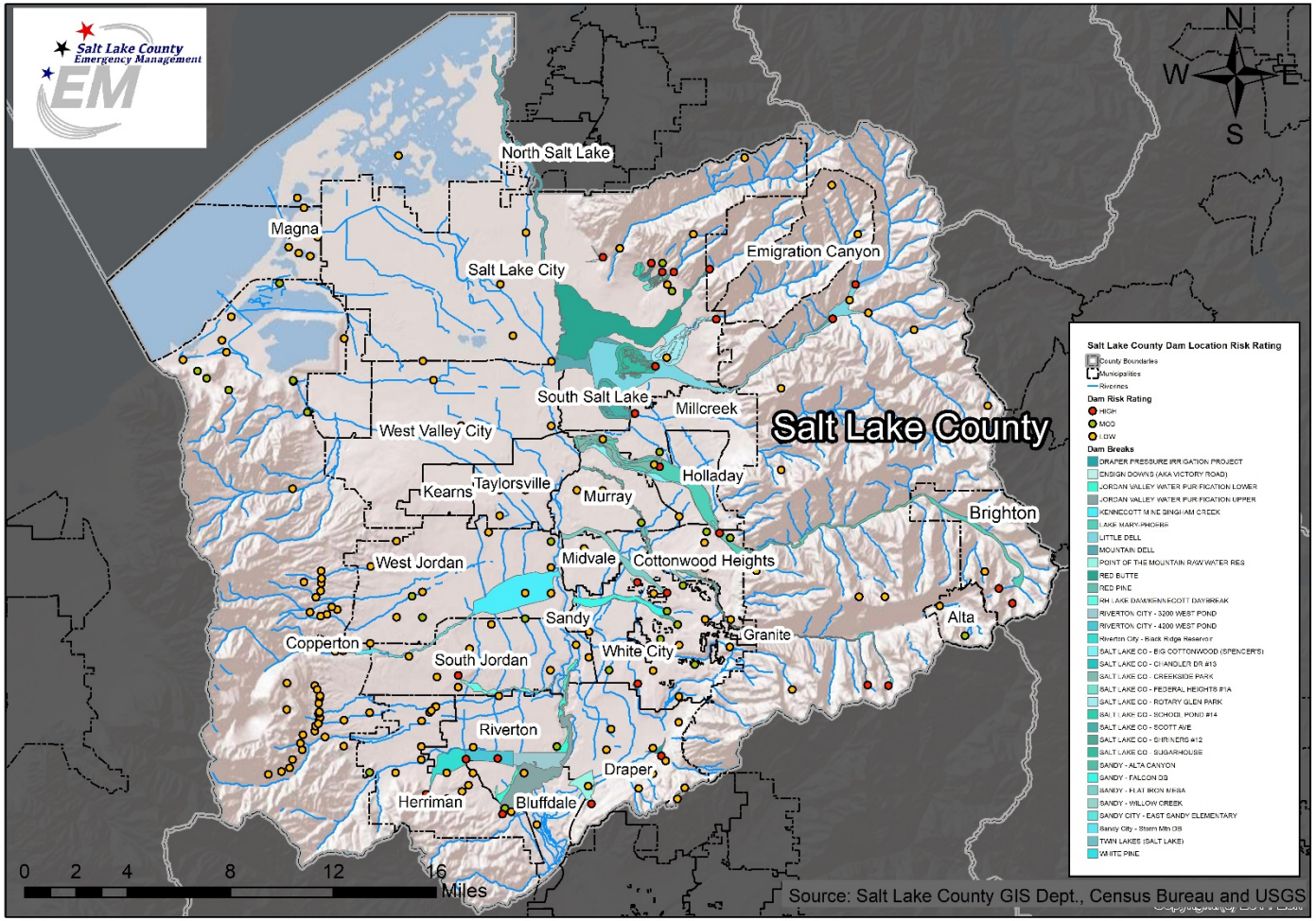
No record was found of dam failure incidents within Salt Lake City.

Vulnerability Assessment

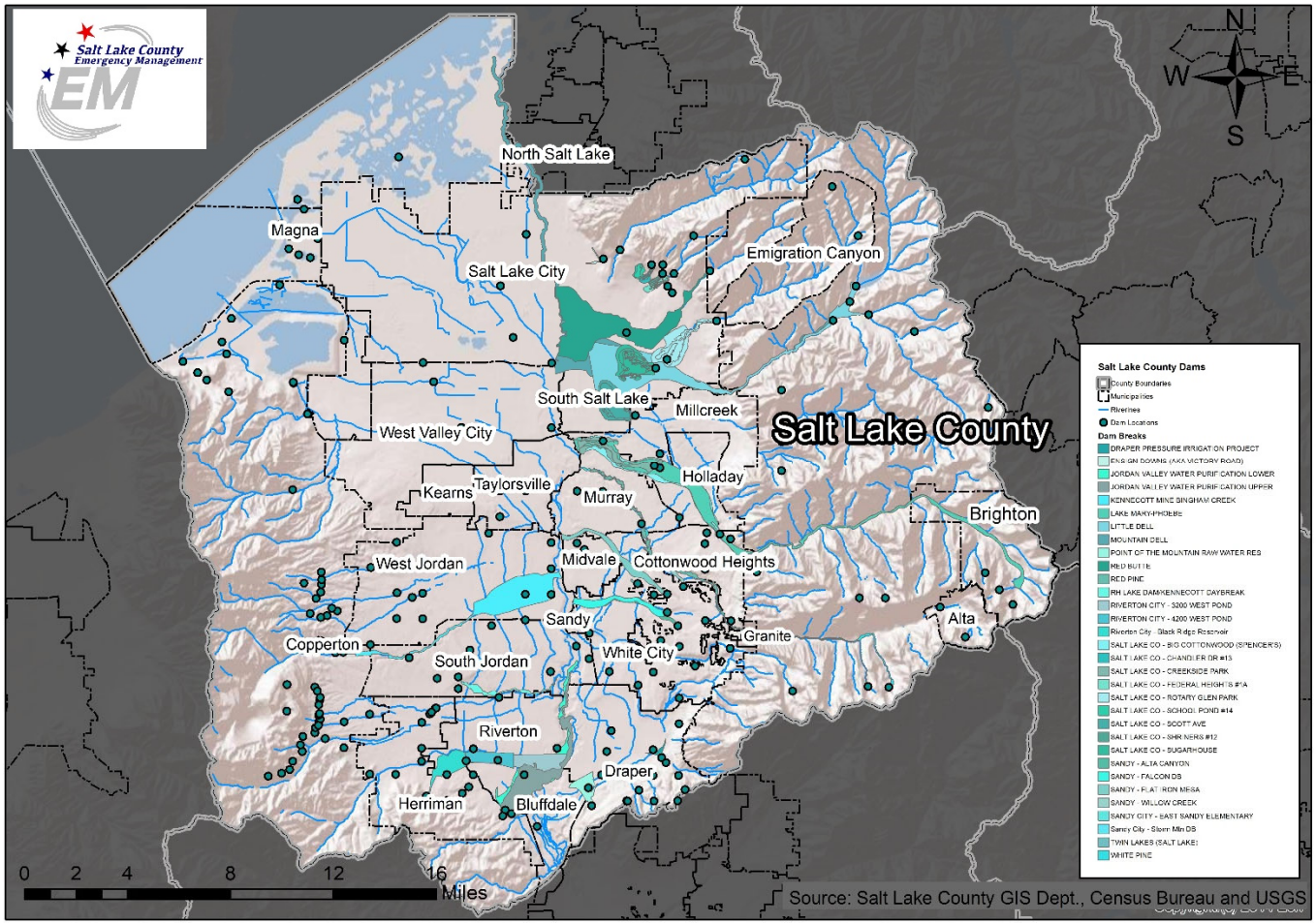
According to the Utah Hazard Mitigation Plan, a hazard evaluation designed by the Federal Energy Regulatory Commission FERC, compiled a ranking of high priority dams based on a number of variables which include: public access, population at risk, breach flow, inundation depth, and dam type. Three of the 50 highest priority dams are located within Salt Lake City.

1. Mountain Dell
2. Little Dell
3. Red Butte Dam

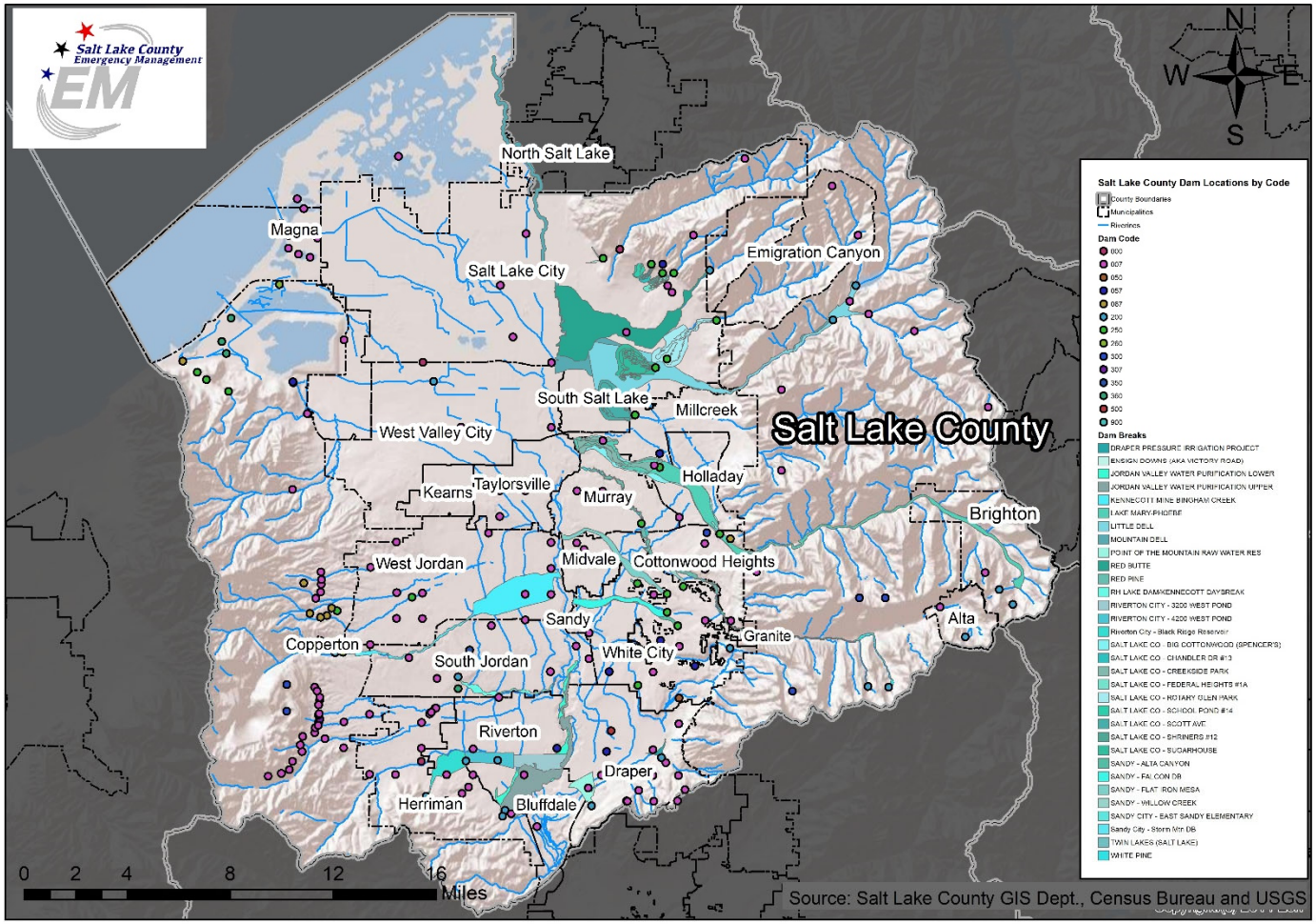
Map: Dam Risk Ranking



Map: Salt Lake County Dam



Map: Dam Location



Avalanche: The water facilities are at risk in the canyons and if the water management is impacted in Salt Lake City, the broader County would also be adversely impacted.

Public Health: The airport is an international airport, which could bring travelers to the area with infectious diseases. The city has a high number of research facilities. The high homeless population would be adversely impacted to a pandemic, as well as residents without healthcare access.

Civil Disorder: The city has a number of high profile figures, targets, and landmarks. Additionally, the city hosts large events and conferences. The state capital, as well as federal, county, and city buildings, including both political and religious sites, may all be vulnerable to violent protests.

Cyber Attack: The large utility infrastructure, as well as government and banking institutions could all be targeted and negatively impacted by a cyber attack.

Terrorism: The city has a dense population with many high priority/profile targets, including international church headquarters. Additionally, the city hosts a number of large events.

Hazardous Materials Release: Salt Lake City is home to industrial centers and bordering refineries. The city has 20 mill tons of HAZMAT materials, not including fuel. Additionally, the rail system through the city carries HAZMAT. In the city, there is also a nuclear reaction research facility. The following table contains data compiled by the Pipeline and Hazardous Materials Safety Administration of all the hazardous materials incidents within Salt Lake City within recent years.

Table. Salt Lake City Hazardous Materials Incidents

Incident Number	Date	Incident Street Address	City	Mode Of Transportation	Transportation Phase	Carrier	Total Damages
E-2014020157	2/4/2014	UNKNOWN	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	J. B. HUNT TRANSPORT, INC.	$1,000
X-2014030329	2/5/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,500
X-2014120394	3/9/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,464
I-2014040438	4/11/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014040531	4/14/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014050113	4/21/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014050116	4/29/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
X-2014120066	5/2/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$3,126
I-2014050204	5/5/2014	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014050216	5/8/2014	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000

I-2014060105	5/5/2014	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014070195	5/27/2014	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
X-2014070122	6/20/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$3,200
I-2014080261	7/2/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014070223	7/10/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$3,500
X-2014080251	7/10/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$3,500
X-2014080318	7/11/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$968
I-2014090365	8/11/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014090492	9/16/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014120008	9/17/2014	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014020123	9/26/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,552
I-2014010261	10/21/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$5,000
I-2014110234	10/29/2014	2040 PARKWAY BLVD.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UNITED PARCEL SERVICE CO.	$798
I-2015010233	11/19/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2014040437	11/28/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,276
X-2014080319	12/19/2014	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
X-2015010162	12/20/2014	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$792
X-2015110077	1/5/2015	2410 SOUTH 2700 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	YRC WORLDWIDE INC.	$2,000
I-2015100323	3/3/2015	1973 West North Temple	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	R & L CARRIERS, INC.	$3,500
I-2015010302	3/18/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
X-2015040386	3/18/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,852
X-2015050315	3/19/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,952
I-2015030480	3/25/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT STORAGE	UPS FREIGHT SERVICES, INC.	$2,000

I-2015040170	3/30/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT STORAGE	UPS FREIGHT SERVICES, INC.	$1,000
I-2015070348	3/30/2015	5178 WEST 150 SOUTH STREET	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	LANDSTAR INWAY, INC.	$4,000
I-2015040321	4/3/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
E-2015040041	4/29/2015	1045 SOUTH 5500 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	YRC WORLDWIDE INC.	$3,800
X-2015060095	4/29/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,526
X-2015060088	5/1/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,526
I-2015060408	5/28/2015	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
I-2015060406	6/2/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$2,000
E-2015080377	6/4/2015	2410 S 2700 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	YRC WORLDWIDE INC.	$2,800
I-2015060690	6/5/2015	500 S OF 600 N OFFRAMP- 2/10 M	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	FORELAND REFINING CORPORATION	$21,000
E-2015030316	6/17/2015	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$3,500
I-2015060374	6/21/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,500
E-2015060339	7/2/2015	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$3,500
X-2015070429	7/3/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$528
I-2015070364	7/8/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$1,000
I-2015080392	8/4/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2015070036	8/15/2015	2781 West 2180 South	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	R & L CARRIERS, INC.	$3,500
I-2015090664	9/8/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$1,500
I-2015100094	9/21/2015	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS FREIGHT SERVICES, INC.	$1,500
I-2015050009	9/28/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,200
I-2015050253	9/28/2015	1045 SOUTH 5500 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	YRC WORLDWIDE INC.	$3,800
X-2015110087	10/3/2015	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,000
E-2015100606	10/12/2015	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$1,000

I-2015120183	11/23/2015	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2015120432	12/13/2015	2410 S 2700 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	YRC WORLDWIDE INC.	$550
I-2016010030	12/30/2015	2900 CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2016020054	12/31/2015	4375 WEST 1385 SOUTH	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$1,800
E-2016010200	1/12/2016	858 S. 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
E-2016010473	1/28/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
E-2016020183	2/9/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2016020216	2/11/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
X-2016020443	2/16/2016	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$510
E-2016030193	2/23/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$2,000
E-2016020524	2/25/2016	384 WRIGHT BROTHERS DRIVE	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	UPS GROUND FREIGHT, INC.	$1,500
I-2016070003	4/15/2016	675 SOUTH GLADIOLA STRET	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	DAL SOGLIO 66, INC.	$26,649
E-2016040361	4/19/2016	2900 WEST CALIFORNIA AV	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
I-2016050001	4/19/2016	4375 WEST 1385 SOUTH	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$2,350
I-2016050080	4/26/2016	4375 WEST 1385 SOUTH	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$2,400
X-2016050362	4/27/2016	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$3,550
E-2016050413	5/23/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,000
E-2016050526	5/27/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
X-2016060393	6/10/2016	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,650
E-2016060258	6/10/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,000
E-2016070101	6/23/2016	UNKNOWN	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	SAIA, INC.	$3,500
E-2016060579	6/24/2016	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
E-2016070158	7/1/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,000

E-2016070502	7/11/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$3,000
E-2016100166	7/17/2016	I-15 FRONTAGE ROAD NEAR W110 S	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	QUALITY CARRIERS, INC.	$5,512
X-2016070617	7/20/2016	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$4,500
E-2016080033	8/2/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2016080221	8/8/2016	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2016090263	9/12/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
X-2016100398	10/10/2016	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,550
E-2016100428	10/10/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2016101129	10/17/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2016110039	10/25/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2016110213	11/7/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2016110328	11/11/2016	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
E-2016120233	12/6/2016	UNKNOWN	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS, LLC	$3,500
E-2017010058	12/6/2016	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2016120326	12/23/2016	858 SOUTH 3760 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2017020006	1/31/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
E-2017020115	2/1/2017	858 SOUTH 3760 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,000
E-2017020355	2/14/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017030197	3/6/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2017030199	3/7/2017	4375 W 1385 S	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$900
E-2017030263	3/8/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017030289	3/10/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
E-2017030659	3/27/2017	858 SOUTH 3760 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,000

E-2017040045	3/30/2017	423 WAKARA WAY	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	UPS GROUND FREIGHT, INC.	$2,500
E-2017050050	4/8/2017	I-80, MM 136	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$58,000
E-2017040311	4/11/2017	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2017040424	4/21/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
E-2017060063	5/25/2017	650 W 800 S	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	UNIVAR USA INC.	$40,889
E-2017050543	5/26/2017	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
E-2017050624	5/30/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
I-2017060197	6/17/2017	5600 W 900 S	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	YRC WORLDWIDE INC.	$3,400
X-2017060663	6/17/2017	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,500
X-2017060680	6/20/2017	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,505
X-2017060684	6/23/2017	UNKNOWN	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,270
E-2017070040	6/26/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017070041	6/26/2017	2900 CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017070213	7/5/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS	$3,000
E-2017070354	7/7/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017070504	7/11/2017	650 DAVIS ROAD	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UPRR EMPLOYEE HEALTH SYSTEMS	$1,520
E-2017070315	7/14/2017	UNKNOWN	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	R & L CARRIERS, INC.	$3,500
E-2017070471	7/13/2017	858 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,500
I-2017070238	7/18/2017	2425 3200 WEST	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	REDDAWAY	$3,450
E-2017070401	7/18/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017080394	7/28/2017	650 DAVIS ROAD	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$1,850
I-2017080099	8/1/2017	4375 WEST 1385 SOUTH	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$600
E-2017080492	8/11/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO CNW, INC.	$3,500

E-2017080475	8/17/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2017090147	8/30/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2017100016	9/19/2017	4375 W. 1385 S	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	REDDAWAY	$3,450
E-2017105397	10/30/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2017110410	11/3/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$3,000
E-2017115034	11/8/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2017110599	11/9/2017	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$5,500
E-2017115100	11/14/2017	858 S. 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,200
E-2017125052	12/7/2017	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,000
E-2017125048	12/7/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2017125126	12/11/2017	650 DAVIS ROAD	SALT LAKE CITY	FRA-RAILWAY	IN TRANSIT	UNION PACIFIC RAILROAD COMPANY INC	$2,010
E-2018010188	12/17/2017	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018010231	12/19/2017	201 EB 900 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	UPS GROUND FREIGHT, INC.	$6,000
E-2017125150	12/27/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS, LLC	$5,000
E-2017125048	12/7/2017	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2018010188	12/17/2017	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018010629	1/26/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
E-2018020185	2/2/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2018025061	2/5/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	XPO LOGISTICS, LLC	$4,500
E-2018025067	2/8/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS, LLC	$1,000
E-2018035213	3/20/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$3,501
E-2018045078	3/20/2018	N/A	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	XPO LOGISTICS FREIGHT, INC.	$3,500
E-2018045017	3/24/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,916

E-2018045034	4/5/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$1,000
E-2018040211	4/13/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
E-2018040212	4/13/2018	2900 CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
E-2018050324	4/29/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018051097	5/15/2018	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018050679	5/22/2018	858 S. 3760 W.	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,000
E-2018060317	5/22/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$1,929
E-2018060445	6/14/2018	1711 SOUTH 4650	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	R L PARAMOUNT TRANSPORTATION SYSTEMS, INC.	$2,500
I-2018080388	6/21/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
E-2018070068	6/27/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$1,371
I-2018070097	6/28/2018	2810 WEST 2200 SOUTH	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	R & L CARRIERS, INC.	$2,500
E-2018070067	7/3/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$2,000
I-2018080532	7/10/2018	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018080152	7/24/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$2,500
I-2018080569	7/26/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT STORAGE	UPS GROUND FREIGHT, INC.	$2,000
E-2018080231	7/27/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS, LLC	$2,719
E-2018080114	7/30/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$3,000
E-2018080611	8/9/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$4,500
E-2018080350	8/10/2018	1750 SOUTH, 500 WEST, SUITE 70	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS FREIGHT, INC.	$4,500
I-2018090504	8/31/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,000
I-2018100026	9/5/2018	4375 W 1385 S	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$600
I-2018090467	9/6/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
E-2018100095	10/2/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$4,500

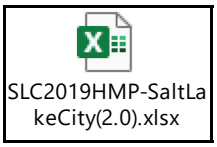
I-2018100392	10/16/2018	2900 WEST CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
E-2018100790	10/24/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2018110468	10/30/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$8,500
E-2018110037	10/30/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO CNW, INC.	$2,500
E-2018110419	11/8/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS	$1,000
E-2018110500	11/19/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000
E-2018120339	12/5/2018	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO LOGISTICS, LLC	$4,500
I-2018120081	12/10/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
I-2018120089	12/11/2018	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,000
I-2019020331	12/21/2018	2900 W CALIFORRIIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$3,500
I-2019020323	1/4/2019	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,500
I-2019020095	1/8/2019	4375 W 1385 S	SALT LAKE CITY	FMCSA-HIGHWAY	LOADING	USF REDDAWAY INC.	$800
I-2019020239	2/5/2019	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,250
I-2019030055	3/1/2019	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2019030221	3/13/2019	4375 W1385 S	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	USF REDDAWAY INC.	$3,450
E-2019030671	3/21/2019	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	IN TRANSIT	XPO CNW, INC.	$4,000
I-2019040267	4/16/2019	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,500
I-2019040255	4/18/2019	2900 CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,250
I-2019040385	4/26/2019	2900 W CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$2,250
I-2019040255	4/18/2019	2900 CALIFORNIA AVE	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	UPS GROUND FREIGHT, INC.	$1,250
E-2019050333	5/8/2019	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO CNW, INC.	$1,000
E-2019050784	5/21/2019	858 S 3760 W	SALT LAKE CITY	FMCSA-HIGHWAY	UNLOADING	XPO LOGISTICS FREIGHT, INC.	$1,000

Source: https://portal.phmsa.dot.gov/analytics/saw.dll?PortalPages

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	19	38
Wildfire	2	18	36
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Civil Disturbance	2	13	26
Terrorism	1	25	25
Dam Failure	1	23	23
Tornado	1	11	11
Landslide and Slope Failure	1	11	11
Avalanche	1	7	7

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Medium	2		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Low	1	1		Avalanche	Low	1	2
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1	1		Avalanche	Unlikely	0	0
Dam Failure	High	3	3		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Medium	2	2		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Seismic Retrofitting of URM buildings (public, residential, multi-family, and business)	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. • Goal 5: Ensure and promote	Earthquake	Division of Emergency Management	TBD	Reduction in the number of injuries and deaths after earthquake	Varies	Varies	High	Ongoing over years	Scope to include promoting, enticing or facilitating the retrofit or rehabilitation of Unreinforced Masonry Buildings (URM) that are highly susceptible to severe damage or collapse and or otherwise posing a threat to the public during ground shake and extreme forces.

		ways to increase government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County. • Goal 7: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.									
Conduct 1200 West Sewer Trunk Rehabilitation	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce	Earthquake, Extreme Cold, Extreme Heat, Flood (Urban/Flash Flooding), Severe Thunderstorm, Severe Winter Weather	Department of Public Utilities	N/A	High (loss avoidance, health and safety, critical facility support)	High ($12 million)	Wastewater Enterprise Fund	High	2025	Scope includes the rehabilitation of the 1200 West sewer trunk main.

		damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct the 2300 E-WILMINGTON AVE-YUMA ST Upsizing Project	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and	Flood (Urban/Flash Flooding), Severe Thunderstorm	Department of Public Utilities	N/A	High (public health, loss avoidance, flooding protection)	High ($2.5 million)	State and Federal Grants	High	TBD	Scope includes the upsizing of the 2300 E-WILMINGTON AVE-YUMA ST . sewer mains for capacity.

		infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct 2100 South Capacity Upgrades	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood (Urban/Flash Flooding), Severe Thunderstorm	Department of Public Utilities	N/A	High (public health, loss avoidance, flooding protection)	High ($5 million)	State and Federal Grants	High	TBD	Scope includes the upsizing of the 2100 S sewer main for capacity.

		• Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct 1200 West Sewer Trunk Rehabilitation	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase	Earthquake, Extreme Cold, Extreme Heat, Flood (Urban/Flash Flooding), Severe Thunderstorm, Severe Winter Weather	Department of Public Utilities	N/A	High (loss avoidance, health and safety, critical facility support)	High ($20 million)	Wastewater Enterprise Fund	High	2030	Scope includes the rehabilitation of the 1200 West sewer trunk main.

		government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct Critical Facility Sewer Rehab and Reliability Project	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of	Earthquake, Extreme Cold, Extreme Heat, Flood (Urban/Flash Flooding), Severe Thunderstorm, Severe Winter Weather	Department of Public Utilities	N/A	High (loss avoidance, health and safety, critical facility support)	High ($15 million)	Wastewater Enterprise Fund	Medium	TBD	Scope includes the rehabilitation of collection sewers downstream of critical facilities and construction

		services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct South Temple Capacity Upgrades	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	Flood (Urban/Flash Flooding), Severe Thunderstorm	Department of Public Utilities	N/A	High (public health, loss avoidance, flooding protection	High ($1.5 million)	State and Federal Grants	High	TBD	Scope includes the upsizing of the south temple sewer main for capacity.

		• Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Upgrade the SLCDPU Admin & Operations Center	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 3: Enhance and protect the communication and warning/notification systems in the County. • Goal 4: Promote education and awareness programs, campaigns, and efforts	All-Hazards	Department of Public Utilities	N/A	High (Emergency response and support)	High ($35 million)	SLCDPU	High	TBD	Scope includes replacement of the SLCDPU Administration and Operations Facility's and and construction of an integrated Dispatch/SCADA/Emergency Response Center.

		designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Conduct SCADA Communications and Security Improvements	2019	• Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase	All-Hazards	Department of Public Utilities	N/A	High (Operational emergency response and response prioritization.)	Medium-High ($250,000 to $5 million)	County, State, or Federal Grants	High	TBD	Scope to include planning and buildout of SCADA infrastructure to promote web base alarming, monitoring capabilities, and communications. Work to include SCADA communications planning, cybersecurity assessment,

		government and private sector continuity of services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									and security recommendations. Planning recommendations would include updates of the utility emergency response plan with recommendations for equipment staging locations, facilities and responses planning
Procure and Stage Items Needed for the Back-up Emergency Response Equipment Staging	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government and private sector continuity of	All-Hazards, Earthquake, Flood (Urban/Flash Flooding), Severe Thunderstorm	Department of Public Utilities	SLCo, Holiday, Milcreek, Cottonwood Heights	Medium (Emergency response time, reduction of infrastructure downtime)	High ($1-$5 million)	County, State, or Federal Grants	Low	TBD	Scope includes the purchase and staging of portable generators, portable pumps, bypass piping, and HDPE fusing equipment to support collections, distributions, and treatment facility emergency response. Work would include the construction of planned staging and operations support facilities throughout the City and County.

		services during and after a disaster. • Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									
Mitigate fuels along east side of East Capitol Blvd to create defensible space	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mitigate fuels along north side of Northmont Way to create defensible space	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

		• Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									
Mitigate fuels in home ignition zones on East Tomahawk Dr., Chandler Dr, and Kristianna Circle	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mow annual rye 25 ft. on either side of the Bonneville Shoreline Trail east of University of Utah	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

		critical facilities, structures, and infrastructure during disasters.									
Mow annual rye and mitigate around the shed north of Rotary Glen on This is the State Park.	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mitigate fuels for ingress / egress along Red Butte Canyon access road.	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

		during disasters.									
Mitigate fuels at the mouth of Emigration under the high rise buildings	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mitigate fuels along east side of Devonshire Road	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

Mitigate fuels for defensible space around the City Creek water treatment plant	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mitigate fuels for ingress/ egress along City Creek Canyon access road up to the Water Treatment Plant	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Mitigate fuels and develop maintenance plan for FS lands in Red Butte Canyon outside of RNA.	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD		TBD	

		Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									
Conduct firewise native seeding for the following Open Space properties: Popperton, Chandler, and Morris Meadows	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD			
Work on passing a local ordinance to allow homeowners to obtain a permit to conduct mitigation efforts on City property abutting their residential property.	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

		• Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 7: Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.									
Work with the State Dept of Natural Resources to establish NFPA Firewise communities in WUI areas (which carry independent mitigation requirements)	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 7: Advocate, support, and	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	

		promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.									
Work with homeowners to help them identify risks such as deteriorating power poles and work with them in finding solutions.	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Wildland Fire	Division of Emergency Management		Reduction in the amount of damage, injury, and death from wildland fire	TBD	TBD	TBD	TBD	
Acquire commercial grade chipper and dump trailer	2019	• Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. • Goal 5: Ensure and promote ways to increase government	All-Hazards	Division of Emergency Management		Additional equipment will aid in the achievement of multiple mitigation efforts throughout the county, as well as aid in the fulfillment of CWPP obligations.	TBD	Grants	TBD	TBD	

		and private sector continuity of services during and after a disaster.									

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct Training and awareness activities on communication equipment, tools, and systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All-Hazards	Salt Lake City Emergency Management	Communications	Medium	Low	Local	Medium	Ongoing	This has to be done on a regular basis for staffing purposes.
Establish a coordinating group to address geographic data issues	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	All-Hazards	GIS	Salt Lake City Emergency Management	High	Medium	Local	High	Ongoing	A GIS position and capabilities were added to our EOC. A GIS working group has been established
Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	All-Hazards	GIS	Salt Lake City Emergency Management	Medium	Low	Local	Medium	Ongoing	GIS working group is trying to address these issue by forming a Common Operating Picture (COP).
Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	All-Hazards	GIS	Salt Lake City Emergency Management	High	Low	Local	High	Ongoing	In conjunction with our other projects new data is added to the GIS layers
Provide centralized access to geographic data to emergency	2009	2 – Improve awareness and analysis of hazards	All-Hazards	GIS	Salt Lake City Emergency Management	High	Low	Local	High	Ongoing	See comment above on forming a COP

planners and responders		2.1 – Improved Quality and Access to digital geographic (GIS) hazards data									
Utilize GIS to identify facilities and infrastructure at risk	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	GIS	Salt Lake City Emergency Management	High	Low	Local	High	Ongoing	GIS data used to estimate which buildings will fail and how much debris they will create. Data on URMs was used to create maps, planning tools and educational materials.
Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Public Works	Salt Lake City Emergency Management	High	Low	Local	High	Ongoing	Gathered data while participating in various programs (LEAP, RRAP, etc.) to use in planning/response. Plan to implement use of IP gateway.
Implement improvements to address hazards identified in assessment	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All-Hazards	Public Works	Salt Lake City Emergency Management	High	Low-High (project dependent)	Local and grants (as needed)	High	Ongoing	Having mobile command center capabilities. Keep 96hr supplies and equipment in various key locations for rapid access to after an event.
Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	Putting them in places that be readily accessed like the WebEOC library

		System (NIMS) requirements									
Pursue and implement needed mutual-aid agreements	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	Continue building mutual aid agreements
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	Added a community preparedness coordinator to staff and we utilize several forms of outreach (fairs, workshops, web pages, social media, etc.)
Incorporate information about cascading effects of hazards in education programs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	Increasing Hazard awareness through our Fix the Bricks program and URM maps. Promote community participation in programs like SAFE neighborhoods
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	Via Fix the Bricks and SAFE Neighborhoods
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All-Hazards	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	We partner with the local Red cross and SLC district on SAFE Neighborhoods Program. We also promote other public educations programs; such as Be Ready Utah.

Establish and enforce appropriate planning, zoning, and building code ordinances	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	All-Hazards	Planning and Zoning		High	Low	Local	High	Ongoing	Adopted current international building code
Complete seismic rehabilitation/retrofitting projects of public buildings at risk	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Public Works	Salt Lake City Emergency Management	High	High	Federal and State grants such as HMA	High	Ongoing	
Maintain Hazardous Weather Operations Plan according to StormReady requirements	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	Severe Weather	Salt Lake City Emergency Management		Medium	Low	Local	Medium	Ongoing	
Incorporate improved addresses in fire-dispatch and other databases	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	Wildland Fire	Fire	Salt Lake City Emergency Management	High	Low	Local	Medium	Ongoing	
Assess existing water flow capabilities, both public and private, and address deficiencies	2009	2 – Improve safety from wildfire hazards through planning, protective	Wildland Fire	Public Works	Salt Lake City Emergency Management	Medium	Low	Municipal	Medium	Ongoing	

		actions and improved fire response capabilities 2.4 – Complete wildfire protection projects									
Assist communities in developing Community Wildfire Protection Plans or similar plans	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	Wildland Fire	Fire	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	
Identify structures at risk to earthquake damage through HAZUS data and building inspections.	2014	Reduce earthquakes losses to infrastructure Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Public Works	Salt Lake City Emergency Management	Medium	Low	Municipal	High	Ongoing	
Provide educational materials to unreinforced masonry home and business owners. Particularly marketing Fix the Bricks Program to educate home and business owners about masonry reinforcement (update from 2009)	2014	Reduce earthquakes losses to infrastructure Improve public education regarding earthquake risks to unreinforced masonry buildings	Earthquake	Salt Lake City Emergency Management		Medium	Low	Municipal	Medium	Ongoing	Fix the Bricks was added to our community outreach materials and publications
Encourage communities to actively participate in NFIP (update from 2009)	2014	Protection of life and property before, during and after a flooding event Provide 100% availability of the National Flood Insurance Program (NFIP).	Flooding	Salt Lake City Emergency Management		High	Low	Municipal	Medium	Ongoing	Participate in NFIP as a community

Determine potential flood impacts and identify areas in need of additional flood control structures (update from 2009)	2014	Protection of life and property before, during and after a flooding event Encourage appropriate flood control measures, particularly in new developments.	Flooding	Public Works	Salt Lake City Emergency Management	Medium	Low	Municipal	Medium	Ongoing	Evaluated regularly
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures (updated from 2009)	2014	Protection of life and property before, during and after a flooding event Encourage appropriate flood control measures, particularly in new developments.	Flooding	Public Works	Salt Lake City Emergency Management	High	Low	Municipal	Medium	Ongoing	
Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures (updated from 2009)	2014	Protection of life and property before, during and after a flooding event	Flooding	Public Works	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	
Identify and assess structures for deficiencies (updated from 2009)	2014	Reduce threat of unstable or inadequate flood control structures Reduce threat of unstable or inadequate flood control structures	Flooding	Public Works	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	
Modify structures as needed to address deficiencies (updated from 2009)	2014	Reduce threat of unstable or inadequate flood control structures Reduce threat of unstable or inadequate flood control structures	Flooding	Public Works	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	

Increase public awareness through “Fire Wise” program (updated from 2009)	2014	Community education on wildfire hazard Reduce risk from wild fire through education programs	Wildland Fire	Salt Lake City Emergency Management	Fire	Medium	Low	Municipal	High	Ongoing	
Educate homeowners on the need to create defensible space near structures in WUI (updated from 2009)	2014	Community education on wildfire hazard Educate homeowners on the need to create defensible space near structures in WUI.	Wildland Fire	Salt Lake City Emergency Management	Fire	Medium	Low	Municipal	High	Ongoing	Part of Firewise
Provide waste removal, such as chipping of green waste by Public Works, following designated fuel clearing day/week (updated from 2009)	2014	Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities Assist homeowners with creating defensible space near structures in WUI areas.	Wildland Fire	Public Works	Salt Lake City Emergency Management and Fire	High	Low	Municipal	High	Ongoing	
Work with experts and communities to develop or update evacuation plans (updated from 2009)	2014	Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities Improve evacuation capabilities for WUI areas.	Wildland Fire	Salt Lake City Emergency Management		High	Low	Municipal	High	Ongoing	
Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response (updated from 2009)	2014	Improve safety from wildfire hazards through planning, protective actions and improved fire	Wildland Fire	Salt Lake City Emergency Management	Transportation	High	Low	Municipal	High	Ongoing	

		response capabilities Improve evacuation capabilities for WUI areas.									
Reduce fuels around publicly owned structures (updated from 2009)	2014	Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities Complete wildfire protection projects	Wildland Fire	Fire	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	
Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard (updated from 2009)	2014	Reduce or eliminate the threat of slope failure damage. Reduce the threat of slope failures following wildfires.	Wildland Fire	Fire	Salt Lake City Emergency Management	Medium	Low	Municipal	Medium	Ongoing	
Coordinate with Utah Geological Survey and other agencies to understand current slope failure threats/potential (updated from 2009)	2014	Reduce or eliminate the threat of slope failure damage Monitor historic landslide areas.	Wildland Fire	Salt Lake City Emergency Management	Public Works and GIS	High	Low	Municipal	Medium	Ongoing	
Utilize recommendations provided by State Geologic Hazards Working Group to address land-use and planning for new developments (updated from 2009)	2014	Reduce or eliminate the threat of slope failure damage Address landslide hazards in new sub-divisions.	Wildland Fire	Salt Lake City Emergency Management	Public Works and GIS	High	Low	Municipal	High	Ongoing	
Meet with NWS representative on an annual basis to receive information on new services and alerts available (updated from 2009)	2014	Reduce threat of loss of life or property due to extreme weather events Maintain status as a StormReady Community	Tornado	Salt Lake City Emergency Management		Low	Low	Municipal	Low	Ongoing	

Assist NWS in making other agencies and departments aware of available resources (updated from 2009)	2014	Reduce threat of loss of life or property due to extreme weather events Increase awareness of information services provided by NWS.	Tornado	Salt Lake City Emergency Management		Medium	Low	Municipal	Medium	Ongoing	
Work with the NWS to develop large event venue weather safety and evacuation procedures (updated from 2009)	2014	Reduce threat of loss of life or property due to extreme weather events Increase awareness of information services provided by NWS.	Tornado	Salt Lake City Emergency Management		High	Low	Municipal	High	Ongoing	
Implement water-saving devices and practices in public facilities (updated from 2009)	2014	Reduce and prevent hardships associated with water shortages Limit unnecessary consumption of water	Drought	Public Works	Salt Lake City Emergency Management	High	Low	Municipal	High	Ongoing	SLC policy that public facilities meet LEEDs silver standard at a minimum
Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc. (updated from 2009)	2014	Reduce and prevent hardships associated with water shortages Limit unnecessary consumption of water	Drought	Public Works	Salt Lake City Emergency Management		Low	Municipal	High	Ongoing	
Coordinate public safety water use, such as hydrant testing (updated from 2009)	2014	Reduce and prevent hardships associated with water shortages Limit unnecessary consumption of water	Drought	Fire	Salt Lake City Emergency Management		Low	Municipal	High	Ongoing	
Provide information on landscaping alternatives for persons subject to green area	2014	Reduce and prevent hardships	Drought	Salt Lake City Emergency Management			Low	Municipal	High	Ongoing	

requirements (updated from 2009)		associated with water shortages Limit unnecessary consumption of water									

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal/Objective	Action	Status	Comments
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Completed	Capabilities were assessed and new communications systems have been implemented.
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Completed	Some of the current systems are shared across the valley and have agreements for who is responsible for maintenance, etc.
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	4 – Establish notification capabilities and procedures for emergency personnel	Completed	Completed procedures and capabilities outline
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Completed	Evaluation completed
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	2 – Establish redundancy for dispatch centers and other critical communications	Completed	New Integrated communications system across the valley.
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Completed	A group was formed that played a role in the systems we have now.
All-Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	2 – Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Completed	A group was formed that played a role in the systems we have now.
All-Hazards	2009	2 – Improve awareness and analysis of hazards	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather	Removed	Upon further research, this action was not economically feasible

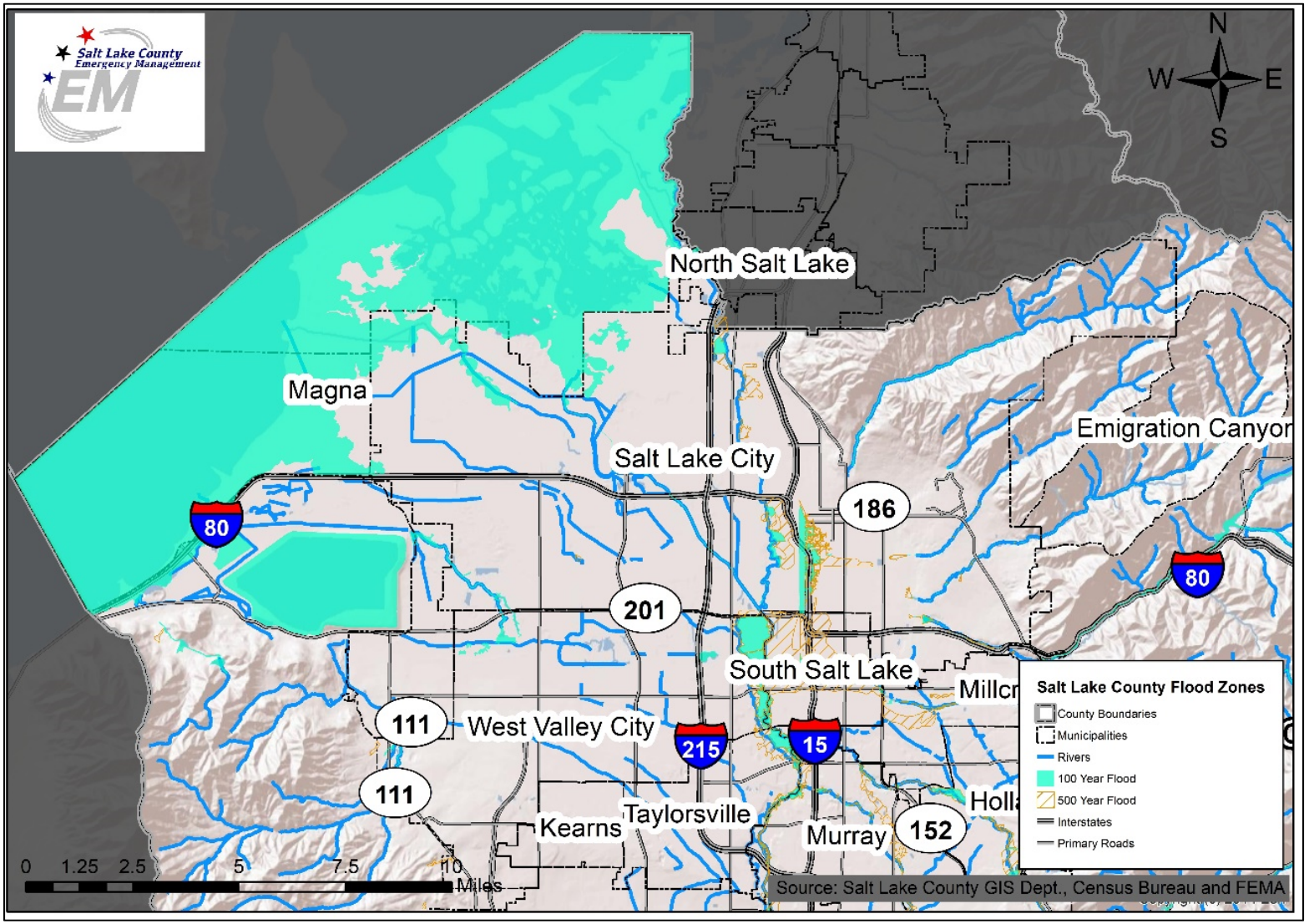
		2.2 – Improve and expand hazard monitoring capabilities	stations, stream gages, seismograph stations, road conditions, etc.		
All-Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	2 – Identify and implement additional hazard monitoring capabilities.	Removed	Upon further research, this action was not economically feasible
All-Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Removed	However we do post hazard maps and public outreach materials on our local jurisdictions webpage.
All-Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Completed	Available online
Dam Failure	2009 & 2014 update	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Completed	Added to plans
Dam Failure	2009 & 2014 update	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	Completed	Added to evacuation plans
Drought	2009 & 2014 update	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	1 – Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	Completed	Outreach material distributed
Drought	2009 & 2014 update	1 – Reduce and prevent hardships associated with water shortages	2 – Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	Completed	We coordinate regularly with our Public Utilities Department

		1.1 – Limit unnecessary consumption of water throughout the County			
Drought	2009 & 2014 update	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Completed	Investigation complete
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	Removed	After a benefit/time analysis, decided the mitigation action was no longer worth pursuing
Drought	2009 & 2014 update	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Removed	Upon further research, this action was not economically feasible
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	1 – Identify structures at risk to earthquake damage	Completed	Used data to create URM maps, planning tools and education materials.
Earthquake	2009 & 2014 update	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Completed	Established Fix the Bricks Program
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Removed	Upon further research, this action was not economically feasible
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Removed	The cities are able to do their own applications with minimal assistance needed

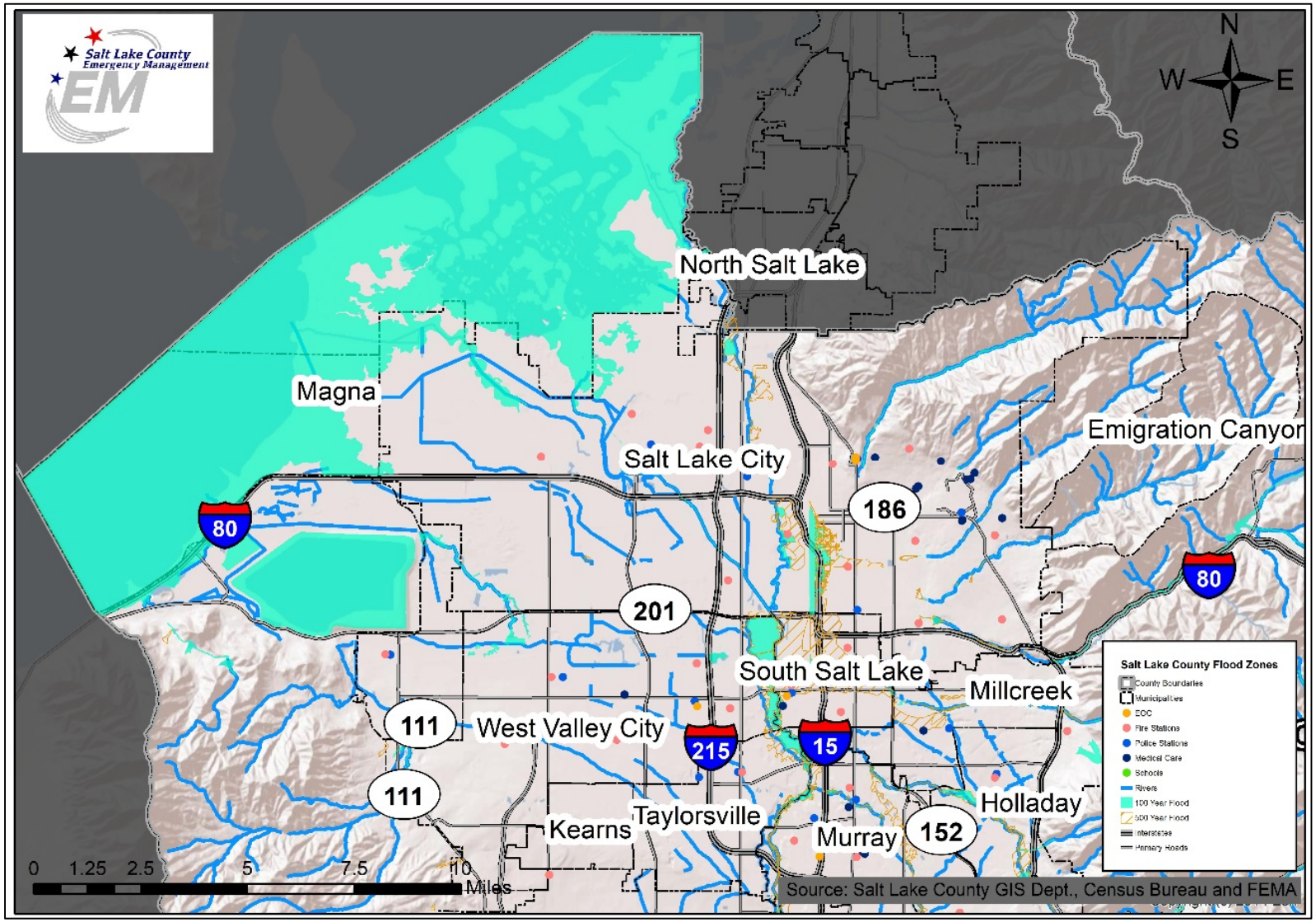
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	Removed	Benefit analysis demonstrated that time dedication to this activity was not needed
Wildland Fire	2009 & updated in 2014	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Removed	The County handles the promotion
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Removed	The time needed to complete the listing was not feasible
Wildland Fire	2009 & updated in 2014	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Removed	Upon further research, this action was not economically feasible
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	1 – Adopt the Utah Wildland-Urban Interface Code	Completed	Adopted
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Completed	Finished defining the WUI

Jurisdiction Maps

Map: 100 Year and 500 Year Flood Zone



Map: 100 Year and 500 Year Flood Zone with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of Sandy

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Jeffory Mulcahy Title: Emergency Manager Department: Emergency Management Address: 10000 Centennial Parkway, Sandy, UT 84070 Office Phone: (801) 568-7279 Cell Phone: (801) 558-8689 Email Address: jmulcahy@sandy.utah.gov Website: https://sandy.utah.gov/departments/emergency-management

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1893
- **Current Population:** 96,901 (Census v2018)
- **Population Growth:** The population grew 7.7% from April 1, 2010 (89,977) to July 1, 2018 (Census).
- **Location and Description:** Sandy is in the southeast quadrant of Salt Lake County. Sandy covers 22.3 square miles. Adjacent to Sandy City on its east is the Wasatch Mountains and the base of those mountains are within the boundaries of Sandy. Adjacent to Sandy City on its west is the Jordan River, which is the city boundary line between Sandy and West Jordan / South Jordan. Draper City borders Sandy to the South and Midvale and Cottonwood Heights border Sandy to the north. Sandy is characterized by a mixture of land uses, comprising commercial, industrial, residential, agricultural, vacant land and 2,000 acres of open space areas within its boundaries. The open space area is used for recreational purposes by residents of Sandy and the surrounding communities and has many multi-use trails and areas within.
- **Brief History:** The area was first used by nomadic bands of Paiute, Shoshone, and Bannock Indians who roamed along the base of the mountains as they traveled from their winter home at Utah Lake to their summer fishing grounds at Bear Lake. Permanent settlers first moved into Sandy during the 1860s and 1870s because of the availability of land in the less crowded southern end of the Salt Lake Valley. The original plat was essentially one square mile, situated on an alluvial terrace running north and south along the eastern edge of the Jordan River drainage system and paralleling the mountain range. Mining shaped Sandy's first four decades. The railroad was also significant in determining the course of Sandy's history. Built-in 1873, the railroad connected Sandy to Salt Lake City and facilitated the transportation of ore and other products both in and out of the area. A streetcar line in 1907 facilitated the transportation of locals to jobs in Salt Lake City, and the automobile later continued to serve that function. When the mines failed in the 1890s, Sandy faltered, then underwent a significant economic transformation into an agricultural community. The fact that Sandy did not disappear, like so many other mining towns that dwindled with their mother lodes, was due to its location, resources, and the spirit of its inhabitants.
- **Climate:** Sandy has an average annual temperature of 53.7°F and receives 15.69 inches of rain.

- **Public Services:** The Sandy City has a Sandy City Citizen Corps Council that is the connection between Sandy City and its residents with issues regarding emergency preparedness. Sandy City also facilitate Sandy Ready Your Business which promotes business readiness. Other services offered by the city include Animal Services, City Recorder Services, Community Development Services, Community Events Services, Finance & Purchasing, Fire Department Services, Human Resources, Justice Court, Parks & Recreation, Police Services, Public Utilities Services, and Public Works Services (Sandy City).
- **Governing Body Format:** Sandy is a Strong Mayor City of the First Class. Sandy has seven City Council representatives governing over it.
- **Development Trends:** Current development trends are aimed at not increasing the risk to hazards. One trend is that multi-family buildings are being built in the city. Sandy City is Utah's sixth-largest city. Sandy experienced tremendous growth both in land area and population during the past thirty years. The annexation of previously unincorporated land has resulted in growth from 6.6 square miles in 1970 to nearly 23 square miles today. Annexations combined with new construction resulted in population growth from 6,438 to 87,461 in that same time period. Many of the new homes built during the '70s and the '80s were bought by young families which resulted in one of the lowest median ages in the nation. In recent years, the population has aged as many of the children in young families have grown and left home. This demographic shift has had an effect on the city budget in such areas as declining participation in recreation programs and a reduced rate of growth in both sales tax revenue and state road funds which are based partially on population. Commercial growth, however, continues along the I-15 corridor which in turn continues to fuel a strong economy and tax base and provides job opportunities for residents. The I-15 corridor and TRAX light rail line on the west side of the city provide both access to downtown Salt Lake City (approximately 15 miles to the north) and the opportunity to be a commercial center for the south end of the valley. To address the growing needs of Sandy City and to accommodate regional growth, a vision for the creation of a city center has been developed, called the Cairns District. The Cairns Master Plan is a culmination of more than six years of planning to reimagine the future of Sandy's downtown area (a printer friendly version is also available). Design guidelines for the area are currently being developed based on the goals and policies outlined in this plan (Cairns Master Plan).

Capability Assessment

The City has an Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	No	
Zonings Ordinance(s)	Yes	Yes	No	
Subdivision Ordinance(s)	Yes	Yes	No	
Stormwater Management Program	Yes	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	Yes	
Post Disaster Recovery Program and Ordinance(s)	Yes	No	Yes	
Real Estate Disclosure Ordinance(s)	No	No	No	
Growth Management	Yes	Yes	Yes	
Site Plan Review Requirements	Yes	Yes	No	
Planning Documents				
General or Comprehensive Plan	Yes	Yes	No	
Capital Improvement Plan	Yes	Yes	No	
Economic Development Plan	Yes	Yes	Yes	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	No	

Post-Disaster Recovery Plan	Yes	Yes	No	
Continuity of Operations Plan	Yes	No	Yes	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Yes

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Comm Dev/Pub Works/Pub Utilities

Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Comm Dev/Pub Works/Pub Utilities
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Pub Works/Pub Utilities
Personnel skilled or trained in GIS applications	Yes	Full Time	IT/Comm Dev/Pub Works/Pub Utilities
Emergency manager	Yes	Full Time	Administration/Emergency Mgr
Grant writers	No	NA	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Public Utilities
Who is your jurisdiction's floodplain administrator? (department/position)	Public Utilities/Chief Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	Yes	-	-
NWS StormReady	Yes	-	12/5/2018

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 39 policies were in force with total coverage of $11,544,000 and total written premium and FPF of $16,110 (FEMA, 2019).
- The City of Sandy does participate in the National Flood Insurance Program (CID # 490106) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	2 inches	-	4/6/2019	-
Heavy Snow	17 inches	-	3/1/2019	-
Water Contamination			2/2019	
Heavy Snow	6 inches	-	2/13/2019	-
Winter Storm	18 inches	-	1/21/2019	-
Winter Storm	6.5 inches	-	12/1/2018	-
Hail	Quarter- to half-dollar-sized hail	-	6/18/2018	-
Winter Storm	25 inches	-	2/18/2018	-
Winter Storm	16 inches	-	1/19/2018	-
High Wind & Winter Storm	66 mph & 10 inches	-	2/21/2017	-
Winter Storm	15 inches	-	1/20/2017	-
High Wind	66 mph	-	1/18/2017	10,000 property damage.
Winter Storm	12 inches		12/23/2016	

High Wind	72 mph; Power outages were common across the area due to downed trees and power lines.	-	2/17/2016	200,000 property damage.
Winter Storm	7 inches	-	12/24/2015	-
Hail	0.88	-	5/27/2015	-
Hail	0.88	-	5/18/2015	-
Winter Storm	12 inches; The worst conditions on roadways occurred on the morning commute of April 15, with 118 crashes reported, including 16 that resulted in injuries. During the evening commute on April 15, a woman was killed in a multicar crash on State Route 201 near the Interstate 80 on-ramp. The victim lost control of her vehicle on the snow-packed road, and was then rear-ended by another vehicle traveling the same route. In addition, a Utah Highway Patrol trooper was injured while responding to the scene.	-	4/14/2015	-
Winter Storm	14 inches	-	12/25/2014	-
High Wind	A tree with a diameter of approximately 3 inches was knocked down by thunderstorm winds in Sandy.	-	8/3/2014	1,000 property damage.

High Wind	60 mph	-	3/1/2014	-
Winter Storm	Power outages were common, with over 14,000 customers losing power. Along State Route 201, a utility pole broke, with power lines falling across the roadway. These power lines shut down the road for several hours in both directions.	-	12/19/2013	-
Flooding		-	2011	-
Wildfire		-	8/25/2011	-
Flooding and Debris Flow		-	8/19/2010	-

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	11,624
Members of the community under 18 years old	25,579
Members of the community that identify as having disability status	7,281
Members of the community that speak English less than "very well"	2,746
Members of the community living below the poverty line	5,255
The number of mobile homes in the community	662 (additionally 15 in either a boat, RV, Van, or equivalent)
Members of the community without health insurance	7,058
Occupied housing units with tenants without a vehicle	1,199
Housing units without heating fuel	105

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Earthquake: Sandy has the potential for a large earthquake. Any building that sits on the fault line will be vulnerable. The hospital, water tanks, and a senior center are close to or on the fault line. Also of concern are the buildings built with unreinforced masonry (URM) which includes the homes in Historic Sandy neighborhood and Old City Hall (occupied by Parks and Recreation Department). Of significant concern, many high priority public and private buildings and many critical infrastructure facilities are located within or across the major fault zones in the region. These facilities include very large waterlines, large irrigation canals, utilities, railroads, and major transportation routes. However, the potential damage is not limited to fault zone areas. Fine-grained, lake-bottom sediments are common in Sandy and are susceptible to liquefaction-induced ground failure during a large earthquake. Each incident may require a unique response from Sandy City and in the instance of a major earthquake outside assistance will be necessary. Many homes in Sandy are without a vehicle, which would make evacuation difficult. In addition to earthquakes, steep mountains adjacent to the city create a potential for landslides, debris flows, rock falls, and snow avalanches.

Wildfire: Perhaps the most likely hazard in Sandy City is the potential for damage and loss of life and property through fire events. Dimple Dell Regional Park is the area with the highest potential for a wildfire. Additionally, the Wasatch is a concern. A lot of residents live in both of these areas. Fires can occur within the urban fabric of the community or as wildfires in the hillside areas of the community and mountainous areas adjacent to the city. Each incident may require a unique response from Sandy City. Although traditionally a majority of wildfires have been caused naturally, mostly by lightning, as development encroaches on the hillsides and lower slopes of the Wasatch Mountains, wildfires caused by humans will likely increase. Sandy City has adopted strict zoning and planning ordinances to help mitigate the hazard for wildfires. As the eastern border of the City lies within the urban-wildland interface, constant education and enforcement are practiced along with the communities in this area.

Flooding: Although located in a semi-arid region, Sandy City is subject to thunderstorms and snowmelt flooding. The development ordinances of the city require geotechnical studies to identify areas of shallow groundwater, artesian wells, and other water hazards. During high snow and rainfall years, the groundwater table can move closer to the surface. Flooding can also result from leakage of unlined irrigation canals, flood irrigation practices, and septic tank drain fields. Overflow from Little Cottonwood Creek causes homes to flood almost every year. Big Willow Creek, Little Willow Creek, and Rocky Mouth Creek also have the potential to flood houses nearby.

The development ordinances of the city require geotechnical studies to identify areas of shallow ground water, artesian wells, and other water hazards. During high snow and rain fall years, the groundwater table can move closer to the surface. Flooding can also result from leakage of unlined irrigation canals, flood irrigation practices, and septic tank drain fields.

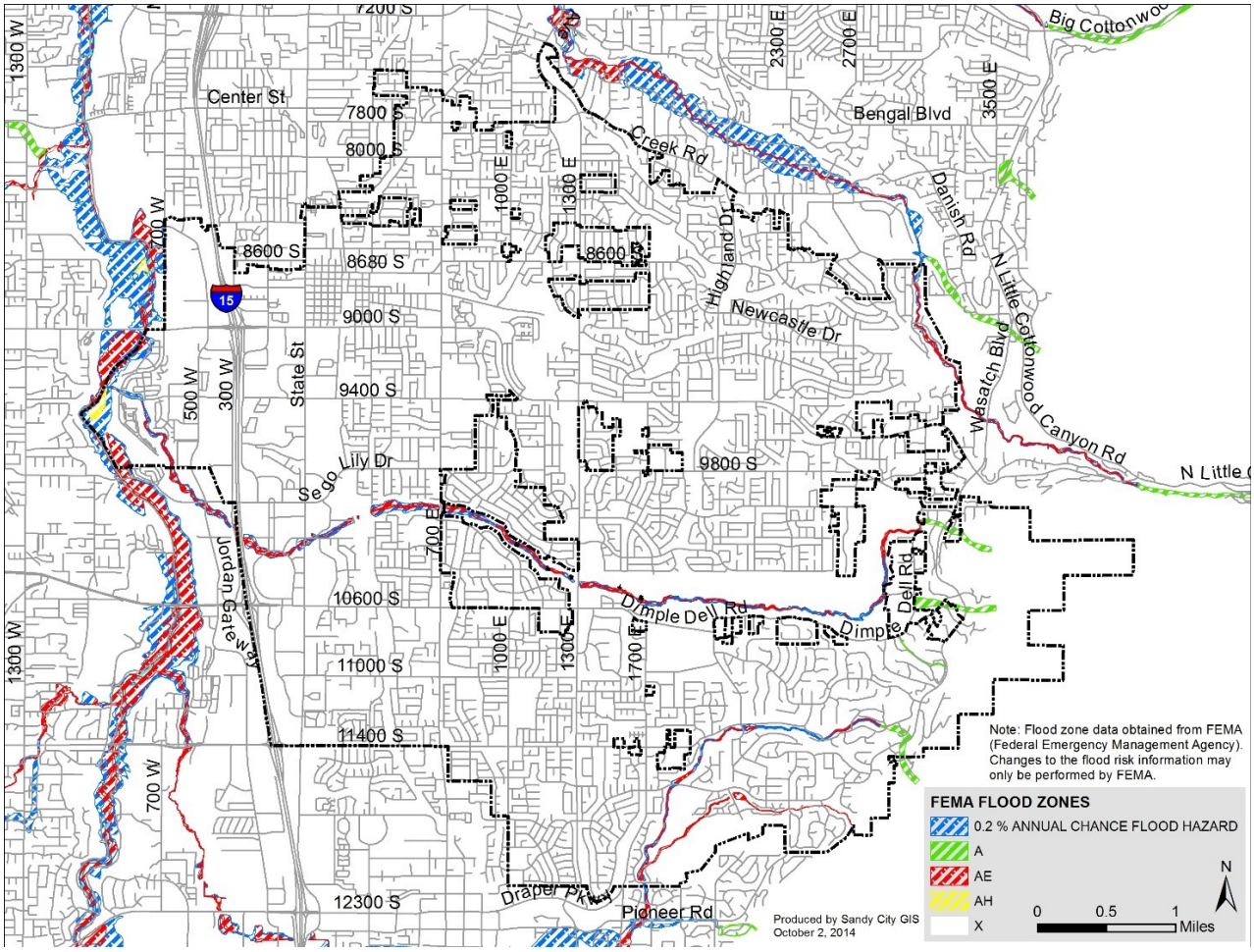
NFIP in Sandy City

Sandy City does not have any repetitive loss claims due to flooding identified under the National Flood Insurance Program (NFIP). Sandy City does participate in the NFIP.

Sandy City's Community Development Director and Public Utilities Director coordinate to enforce the floodplain management requirements adopted by the City, including:

1. Regulating new construction in Special Flood Hazard Areas (SFHAs)
2. Floodplain identification and mapping, including any local requests for map updates and descriptions of community assistance and monitoring activities.

Figure. The City of Sandy's Flood Zones



Jordan Watershed:

Salt Lake County created a Flood Risk Report for each city in the county in 2014. This report includes the flood risk assessment results of the Jordan Watershed Risk MAP Project. The Jordan River runs along the west border of Sandy City. A flood risk is defined as an accumulation of water over normally dry areas. Floods become hazards to people and property by inundating

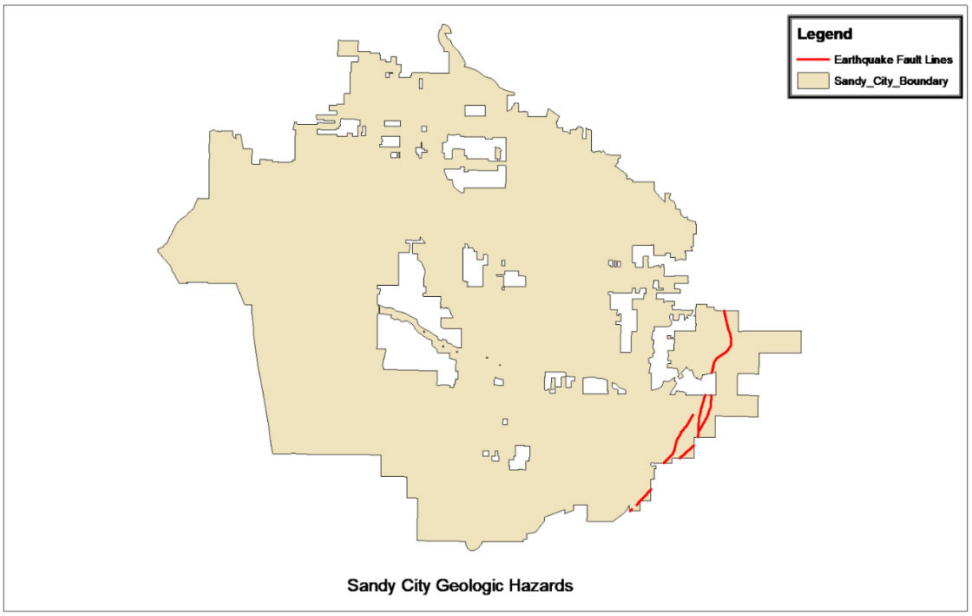
developed areas. Flood losses range from damage to landscaping and debris generation to building damage and injury or death.

Structure Occupancy Type	1% Annual Chance Structure Exposure	1% Annual Chance Building and Contents Loss	0.2% Chance Structure Exposure	0.2% Chance Building and Contents Loss
Commercial	-	-	56	$ 2,260,858
Residential	220	$ 5,541,815	447	$ 17,912,175
Total	**220**	**$ 5,541,815**	**470**	**$ 188,173,033**

Table . City of Sandy – Estimated Flood Loss Information

Landslide: Numerous geologic hazards exist in Sandy and throughout the Salt Lake Valley that could result in an emergency situation or disaster. While recent history there have not been any significant landslides, steep mountains adjacent to the city create a potential for landslides, debris flows, and rockfalls. Earthquake hazards are likely to include ground shaking, ground rupture, tectonic deformation, liquefaction, seismically induced slope failures and phenomena related to ground-water effects. Wildfires can remove necessary vegetation, which can result in unstable soils for extended periods of time. The most proactive approach to minimizing landslide impact is to avoid development in inappropriate areas. The potential for geologic events can be partially mitigated through proper placement of development. Each incident may require a unique response from Sandy City, and in the instance of a major mudslide or debris flow, outside assistance will be necessary.

Figure. The City of Sandy's Geologic Hazards



Winter Storms: Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. This challenge is heightened in Sandy City because of the

wide variety of local climatic features, such as significant elevation changes, atypical wind patterns, and mountainous slopes located immediately adjacent to city boundaries. Sandy has one of the highest elevations in the whole County and from east to west, there is a 1,000 foot elevation difference. These local features can impact the severity of winter storms.

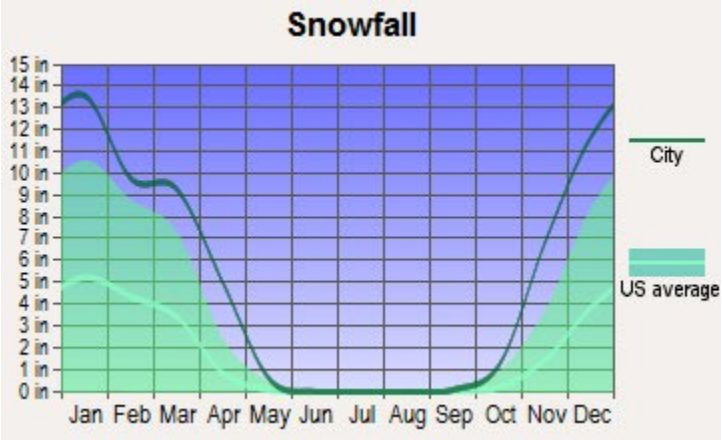


Figure. The City of Sandy's Average Snowfall

Severe Weather: The potential for severe weather is a reality in Sandy City and the surrounding region. These weather events are not isolated to any climatic season, but rather can occur at any time during the year. During the spring and summer months, heavy rains can fall upon soils in a desert climate that may not readily percolate creating surface runoff, mudslides, debris flow, flooding, and other water-related damage. During the winter months, heavy snowfall is possible, especially in higher elevations of the community. While Sandy City is typically self-reliant in weather-related events, severe weather may require assistance from outside agencies.

Avalanche: The likelihood of avalanches impacting Sandy City is primary in the area near the mouth of Little Cottonwood Canyon where homes are built and other highly susceptible areas that are in the unincorporated area. This is the area on the east side of the City that is adjacent to the Wasatch Mountains, but there has been no historical avalanche activity in that area of the City.

Dam Failure: The Sandy City Public Utilities maintains a waterway at Bell's Canyon Reservoir. The dam is on a regular maintenance and inspection schedule. There is no history of problems at this reservoir and in the event of failure, flooding would occur along the riverways.

Drought: Sandy City has large swings in temperature and in precipitation amounts during any year and is susceptible to drought. The City encourages landscaping that is friendly to the desert climate of Utah and when drought conditions occur the City would restrict the use of water for outdoor landscaping.

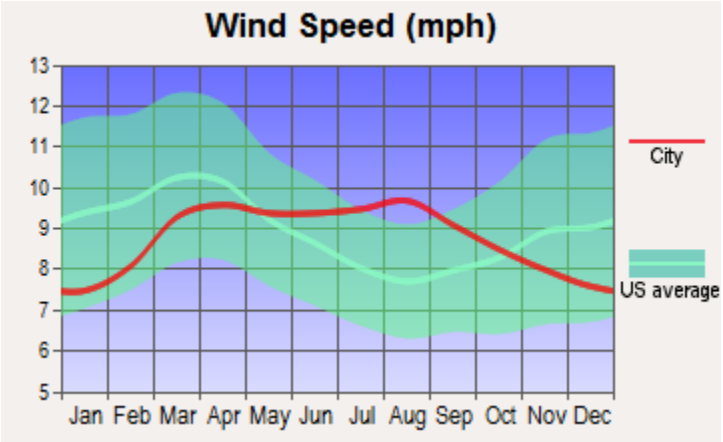
Sandy City Average Temperature Table

Month	Temp. (min)	Temp. (max)	Temp. (avg)	Precipitation
January	-2°F	58°F	29°F	1.3"
February	5°F	66°F	35°F	1.1"
March	15°F	74°F	43°F	1.9"

April	21°F	90°F	50°F	2.1"
May	30°F	93°F	61°F	1.3"
June	39°F	100°F	70°F	1.4"
July	54°F	105°F	82°F	0.2"
August	46°F	103°F	78°F	0.5"
September	35°F	96°F	66°F	1.2"
October	27°F	86°F	52°F	1.4"
November	4°F	75°F	42°F	0.9"
December	0°F	59°F	29°F	1.4"

Table. Sandy City Average Temperature Table

High Wind: Although infrequent, Sandy City is subject to severe damage resulting from tornadoes and extremely high winds often called microburst winds.



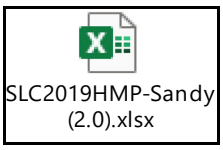
HAZMAT: Key facilities and assets are in a high hazard area for a HAZMAT incident. Rio Tinto Stadium, BD Medical, Expo Center, Mega Plex, High Rise, Light Rail Track, and other buildings in this corridor are of concern. BD Medical and Steris are of concern in this area given the materials that are onsite and potential for HAZMAT.

Public Health/Pandemic: In partnership with local and state public health officials, other federal agencies, medical and public health professional associations, infectious disease experts from academia and clinical practice, and international and public service organizations, Sandy City will incorporate all reasonable strategies to educate its residents and prepare for a measured response in the instance of a public health emergency.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Wildfire	2	19	38
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Dam Failure	1	22	22
Landslide and Slope Failure	1	13	13
Tornado	1	11	11
Civil Disturbance	1	11	11
Avalanche	1	9	9

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Low	1	1		Avalanche	Medium	2	4
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Medium	2	2		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Low	1	1
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Low	1	1
Wildfire	High	3	3

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Dry Creek Improvement Project	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County. Goal 7: Advocate, support, and promote the use of laws and local regulations and	Dam Failure, Extreme Heat, Flood, Severe Thunderstorm, Severe Winter Weather	Sandy City Public Utilities	Sandy City, Salt Lake County Flood Control	High	High ($1.1 million)	Sandy City and Salt Lake County Flood Control budgets, local, state, and federal (HMA) grants	High	2020	Sandy City is partnering with Salt Lake County Flood Control to complete flood control improvements for the Dry Creek Channel. The 1% annual chance storm runoff flows (100-year event) for Dry Creek through the Sandy City Cairns downtown area is 550 cubic feet per second (cfs). The existing box culvert located east of State Street and along 10200 South only has a capacity of approximately 00 cfs. Much of Cairns downtown area including the South Town Mall area could experience significant flooding under existing conditions in a 100-year event. The Sry Creek Improvements at 10300 South project includes installing a parallel box culvert and new inlet structure to provide the additional capacity. The improvements are

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
		ordinances aimed to mitigate hazards and to enhance resiliency.									critical to eliminate the current flooding potential and to accommodate the redevelopment plans in the Cairns downtown area. Construction on the project will begin January 2020 and will be completed May 2020.

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Provide education and outreach to residents and businesses located on the benches.	2014	Sandy City resides beneath the west-facing slopes of the Wasatch Mountains, with homes residing on the benches of those slopes. Threat of heavy snow and subsequent avalanche is a weak threat due to the amount of snow the valley typically receives, the distance and height of the mountains and the fact that the slope faces west. A large	Avalanche	Public Works, Public Information Office	Greater awareness of potential of avalanches and coordination of mitigation efforts with residents and the City.	None	N/A	Low	Ongoing	

		snowfall and avalanche, however, would have a moderate impact to the homes and infrastructure of neighborhoods on the benches.								
Work with the Sandy City Public Utilities Department to identify drainage pathways and seek cost/benefit analysis of placing diversion structures or add capacity for drainage.	2014	Work with the Sandy City Public Utilities Department to identify drainage pathways and seek cost/benefit analysis of placing diversion structures or add capacity for drainage.	Dam Failure	Public Utilities	Would allow for greater planning along flood plain and increase awareness regarding mitigation plans.	None	N/A	Low	Ongoing	
Development of a 5-year Water Conservation Plan	2014	Located in the heart of the intermountain west as part of the Great Salt Lake Valley, the City is in a desert climate defined by lack of water and periods of drought conditions. Measures must be taken to conserve water and to address water shortages for both culinary and agricultural uses.	Drought	Public Works				High	Ongoing	
Offer Annual Sprinkler Maintenance Workshops to promote efficient and effective watering of landscapes.	2014	Located in the heart of the intermountain west as part of the Great Salt Lake Valley, the City is in a desert climate defined by lack of water and periods of drought conditions. Measures must be taken to conserve water and	Drought	Public Works	Public education on how to maintain and operate a sprinkler system will help conserve water by avoiding waste from leaks and/or ineffective systems and practices.			Medium	Ongoing	Offered annually

		to address water shortages for both culinary and agricultural uses.								
Promotion of "Water Week" with elementary students to promote best management practices for water conservation.	2014	Located in the heart of the intermountain west as part of the Great Salt Lake Valley, the City is in a desert climate defined by lack of water and periods of drought conditions. Measures must be taken to conserve water and to address water shortages for both culinary and agricultural uses.	Drought	Public Works	Teaching elementary students about water conservation will help promote best management practices in the homes of residents and helps share information about how individuals can make a difference in conserving water.			Medium	Ongoing	Annually in May of each year.
Install automatic gas shut off fixtures on any City-owned buildings or structures with gas service/meter that do not have one currently.	2014	Install automatic gas shut off fixtures on any City-owned buildings or structures with gas service/meter that do not have one currently.	Earthquake	Administrative Services – Facilities Division	Automatic shut off valves will stop the flow of gas after a significant event if there is damage to the system. This could potentially save the structure from potential fire or a hazardous materials incident.	$50,000 - $100,000	General Fund, Grants	Low	Ongoing	Activity to be considered as part of any capital improvement project or as part of any building remodel, if warranted, or as funding is made available through specific grants as available.
Distribution of earthquake hazard preparedness / response information. Post such information on the City's website.	2014	Install automatic gas shut off fixtures on any City-owned buildings or structures with gas service/meter that do not have one currently.	Earthquake	Administrative Services – Emergency Management, Information Technology	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.	< $5,000	General Fund	Medium	Ongoing	Distribution of earthquake related information is ongoing / continuous. Additional emphasis and effort will be placed on distribution of materials at some City sponsored events such as the annual Health, Safety & Preparedness fair.

Maintain community participation in the National Flood Insurance Program.	2014	Flooding risks exist in the community from a variety of sources, including; riverine flooding, infrastructure failures (canal breech, dam failure, water main rupture), and groundwater sources. Areas near the Jordan River are in a mostly undeveloped state.	Flood	Development Services	Participation in the National Flood Insurance requires the City to maintain and enforce a flood damage prevention ordinance and other regulatory authorities to minimize the effects of flooding to structures in the community. Enforcement of the ordinance will reduce the number of structures at risk of damage from flooding. Participation also aids in distributing public information and awareness of flood hazards.	< $5,000	General Fund	Medium	Ongoing	The City of Sandy is currently participating in the National Flood Insurance Program and intends to maintain its eligibility to participate during the next five-year period.
Distribution of flood hazard and flood preparedness / response information such as the "Flooding: What you should Know when Living in Utah" brochure which the City partnered in developing in 2014, or similar types of information. Post such information on the City's website.	2014	Flooding risks exist in the community from a variety of sources, including; riverine flooding, infrastructure failures (canal breech, dam failure, water main rupture), and groundwater sources. Areas near the Jordan River are in a mostly undeveloped state.	Flood	Administrative Services – Emergency Management, Information Technology	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.	< $5,000	General Fund	Medium	Ongoing	Distribution of flood related information is ongoing / continuous. Additional emphasis and effort will be placed on distribution of materials at some City sponsored events such as the annual Health, Safety & Preparedness fair.
Update of the City's Stormwater Master Plan to include specific flood mitigation projects in flood prone areas of the City.	2014	Flooding risks exist in the community from a variety of sources, including; riverine flooding, infrastructure failures (canal breech, dam failure, water main rupture), and groundwater sources. Areas near the Jordan River are	Flood	Public Works, Development Services	Once updated, the Stormwater Master Plan will identify specific infrastructure needs that will help reduce the potential for flooding. The Plan will be used in determining priority based needs throughout the City. Funding for specific projects may come from	$50,000 - $100,000	General Fund, Enterprise Funds	High	Ongoing	Scheduled for completion.

		in a mostly undeveloped state.			a variety of sources and will appear as part of the capital improvements plan.					
Perform a comprehensive soil sample of slope areas of the City	2014	Sandy City resides at the base and in the foothills of the Wasatch Mountains. Hazard risks associated with landslide are moderate to severe. For this reason the Sandy City Building Officials, and Planning Department has made and continues to enforce strict regulations on building in areas susceptible to flooding. Continued study of landslide areas and zoning enforcement will be ongoing. Most of the land area of the City has been built out so there may be possible pressure to allow building on areas where landslides may be more likely to occur.	Landslide	Community Development	Provide greater leverage in denying building in susceptible areas.	$20,000 - $30,000	Grants, budget	Medium	Ongoing	1-5 years
Development of a Pandemic Response & Recovery Plan	2014	A pandemic is a global disease outbreak. A pandemic flu is a virulent human flu that causes a global outbreak, or pandemic, of serious illness. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity,	Pandemic	Administrative Services – Emergency management, Fire Department - EMS	Having a response and recovery plan will help the City to be more prepared, identify potential protocols for response and implement strategies that prioritize public safety and help reduce the economic impacts on the City from the potential effects of a pandemic crisis.	< $5,000	General Fund, Grants	Medium	Ongoing	Annual Reviews

		and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in very short time. The City of Sandy is located in the middle of a larger urban area that is influenced by a tremendous amount of travel into and out of the area on a daily basis, making the area even more susceptible to potential situations where a pandemic may result.								
Creation of a radon hazard map showing potential areas of the community that may be affected by radon.	2014	Outdoor radon levels never reach dangerous concentrations because air movement scatters radon into the atmosphere. Radon is a hazard in buildings because the gas collects in enclosed spaces. Radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer.	Radon	Administrative Services – Emergency Management, Information Technology, Development Services	A map showing the extent of the hazard will be useful in helping residents determine if they should consider testing for radon and/or engaging in their own efforts to mitigate radon in their structures. The map will also help to raise awareness of the issue in the community.	< $5,000	General Fund	Medium	Ongoing	

Distribution of information on Radon. Post such information on the City's website.	2014	Outdoor radon levels never reach dangerous concentrations because air movement scatters radon into the atmosphere. Radon is a hazard in buildings because the gas collects in enclosed spaces. Radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer.	Radon	Administrative Services – Emergency Management, Information Technology	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.	< $5,000	General Fund	Medium	Ongoing	Additional emphasis and effort will be placed on distribution of materials at some City sponsored events such as the annual Health, Safety & Preparedness fair.
Promote public education in the community regarding severe weather. Post such information on the City's website.	2014	Severe weather can have a significant impact on the community, affecting transportation, regional commerce, and other daily activities. Severe weather can cause significant damage to property and pose a risk to life safety.	Severe Weather	Administrative Services – Emergency Management, Information Technology	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes.	< $5,000	General Fund, Grants	Medium	Ongoing	Distribution of flood related information is ongoing / continuous. Additional emphasis and effort will be placed on distribution of materials at some City sponsored events such as the annual Health, Safety & Preparedness fair.
Support of community education programs that raise awareness and provide information to property owners on how to protect their structures from wildfire damage. Post such information on the City's website.	2014	Seen as a significant threat to the City of Sandy, the City has exposure in the eastern interface areas of the community. Utah's typical wildfire season is late May through October with lightning and miscellaneous human activities	Wildland Fire	Administrative Services – Emergency Management, Fire Department, Information Technology	Raised awareness of people who may determine to live in areas that are at risk for wildland fire.	< $5,000	General Fund, Grants	Low	Ongoing	Distribution of wildland fire related information is ongoing / continuous. Additional emphasis and effort will be placed on distribution of materials at some City sponsored events such as the annual Health, Safety & Preparedness fair.

		causing the majority of fires.								
Maintain a wildland fire response unit.	2014	Seen as a significant threat to the City of Sandy, the City has exposure in the eastern interface areas of the community. Utah's typical wildfire season is late May through October with lightning and miscellaneous human activities causing the majority of fires.	Wildland Fire	Fire Department	Provides the City with an initial response unit as well as the ability to support neighboring jurisdictions with their response efforts.	$100,000	General Fund, Grants	Low	Ongoing	A replacement wildfire response unit to be purchased.
Prohibit the use of fireworks in high risk areas.	2014	Seen as a significant threat to the City of Sandy, the City has exposure in the eastern interface areas of the community. Utah's typical wildfire season is late May through October with lightning and miscellaneous human activities causing the majority of fires.	Wildland Fire	Fire Department	Fireworks restrictions in high risk areas help reduce the potential for ignition sources and the need for additional response units.	Minimal	General Fund, Grants	Medium	Ongoing	Annually consider the need and issue restrictions as appropriate.
Training for firefighters in wildland firefighting.	2014	Seen as a significant threat to the City of Sandy, the City has exposure in the eastern interface areas of the community. Utah's typical wildfire season is late May through October with lightning and miscellaneous human activities causing the majority of fires.	Wildland Fire	Fire Department	While we only have a few firefighters that are "red card" certified, our firefighters could receive training in wildland fire so there are better able to assist if needed.	$50,000	General Fund, Grants	Low	Ongoing	Annual consideration.

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	2 – Conduct Training and awareness activities on communication equipment, tools, and systems	
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Need to complete
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	4 – Establish notification capabilities and procedures for emergency personnel	Included as part of the Sandy City EOP
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Done, in conjunction with Salt Lake City Dispatching
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	2 – Establish redundancy for dispatch centers and other critical communications	Handled by Dispatch Services throughout Salt Lake County
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	1 – Establish a coordinating group to address long-term communication needs and implementation strategies	Sandy City Emergency Management Team

All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	1 – Establish a coordinating group to address geographic data issues	Sandy City GIS & Emergency Management Team
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	2 – Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings	Sandy City GIS
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	3 – Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs	Sandy City GIS
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.1 – Improved Quality and Access to digital geographic (GIS) hazards data	4 – Provide centralized access to geographic data to emergency planners and responders	Sandy City GIS, Sandy City Emergency Operations Center
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	1 – Utilize GIS to identify facilities and infrastructure at risk	Sandy City GIS
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	3 – Implement improvements to address identified in assessment	Facility improvements to critical infrastructure completed, on-going
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	1 – Establish and enforce appropriate planning, zoning, and building code ordinances	Sandy City Community Development Department

All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Sandy City Community Development Department
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	1 – Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	Sandy City Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	2 – Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	Sandy City Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Sandy City Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	4 – Implement water-saving devices and practices in public facilities	Sandy City Parks and Recreation

Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	5 – Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	Sandy City Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	6 – Coordinate public safety water use, such as hydrant testing	Sandy City Fire Department, Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	7 – Provide information on landscaping alternatives for persons subject to green area requirements	Sandy City Public Utilities
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	N/A
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	No
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	1 – Identify structures at risk to earthquake damage	Sandy City GIS
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Have not completed

Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	1 – Determine potential flood impacts and identify areas in need of additional flood control structures	Sandy City GIS, Sandy City Public Utilities
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	2 – Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	Sandy City Public Utilities
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	1 – Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	Sandy City Public Utilities, Storm Water Division
Flooding	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	1 – Identify and assess structures for deficiencies	Sandy City Public Utilities
Flooding	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	2 – Modify structures as needed to address deficiencies	Sandy City Public Utilities
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	StormReady City

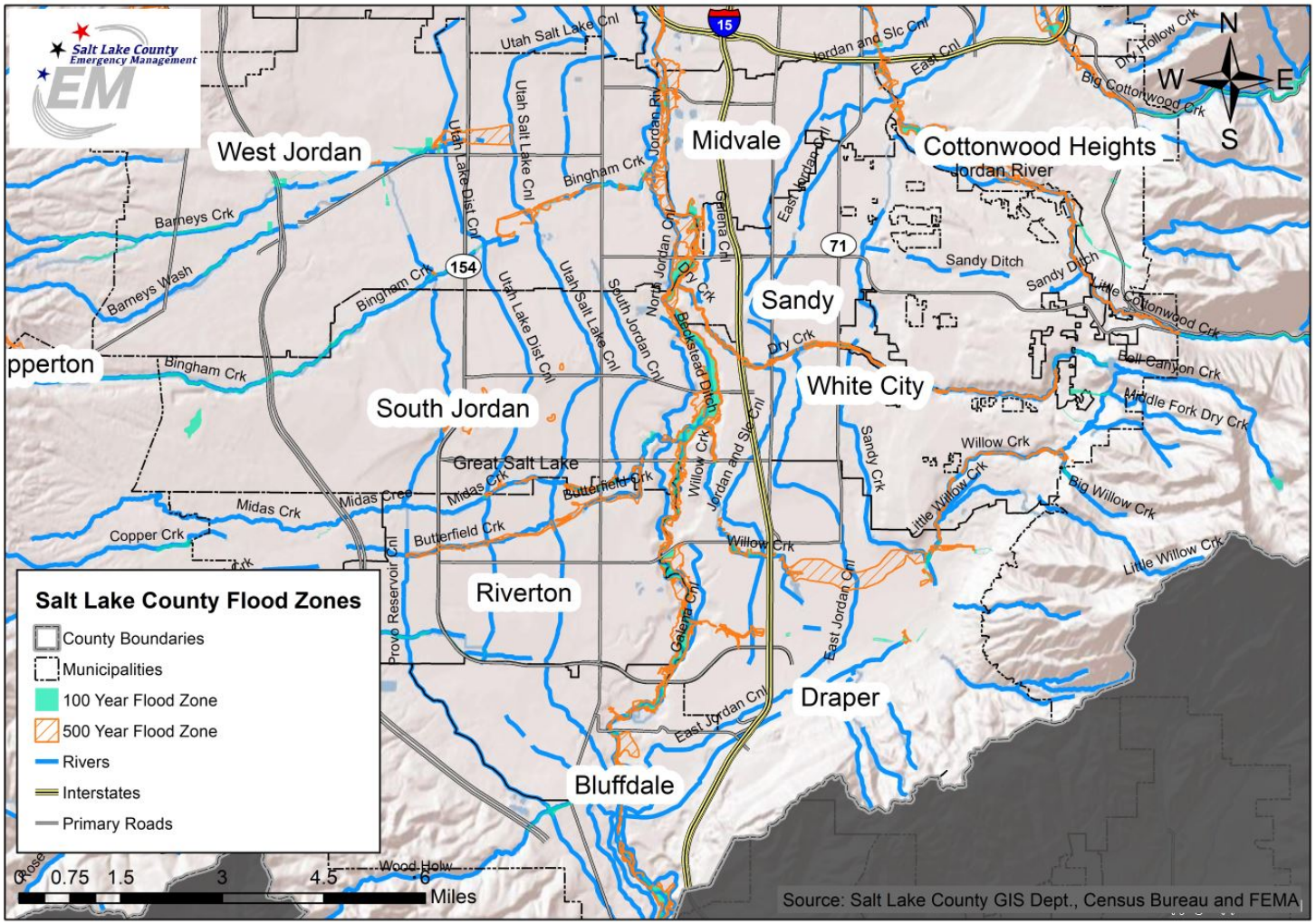
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	2 – Assist NWS in making other agencies and departments aware of available resources	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	On-going
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Sandy City has a severe weather annex to the Emergency Operations Plan – need to update
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Sandy City Community Development Department – Overlay Zones
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Sandy City Community Development Department – Overlay Zones
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Sandy City Fire Department
Wildland Fire	2009	1 – Community education on wildfire hazard	2 – Educate homeowners on the need to create defensible space near structures in WUI	Sandy City Fire Department

		1.1 – Reduce risk from wildfire through education programs		
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Sandy City Public Works Department – Spring and Fall Clean Up
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	Sandy City Fire Department
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	On-going
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Sandy City Community Development Department
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	1 – Reduce fuels around publically owned structures	Sandy City Parks and Recreation
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Sandy City Fire Department

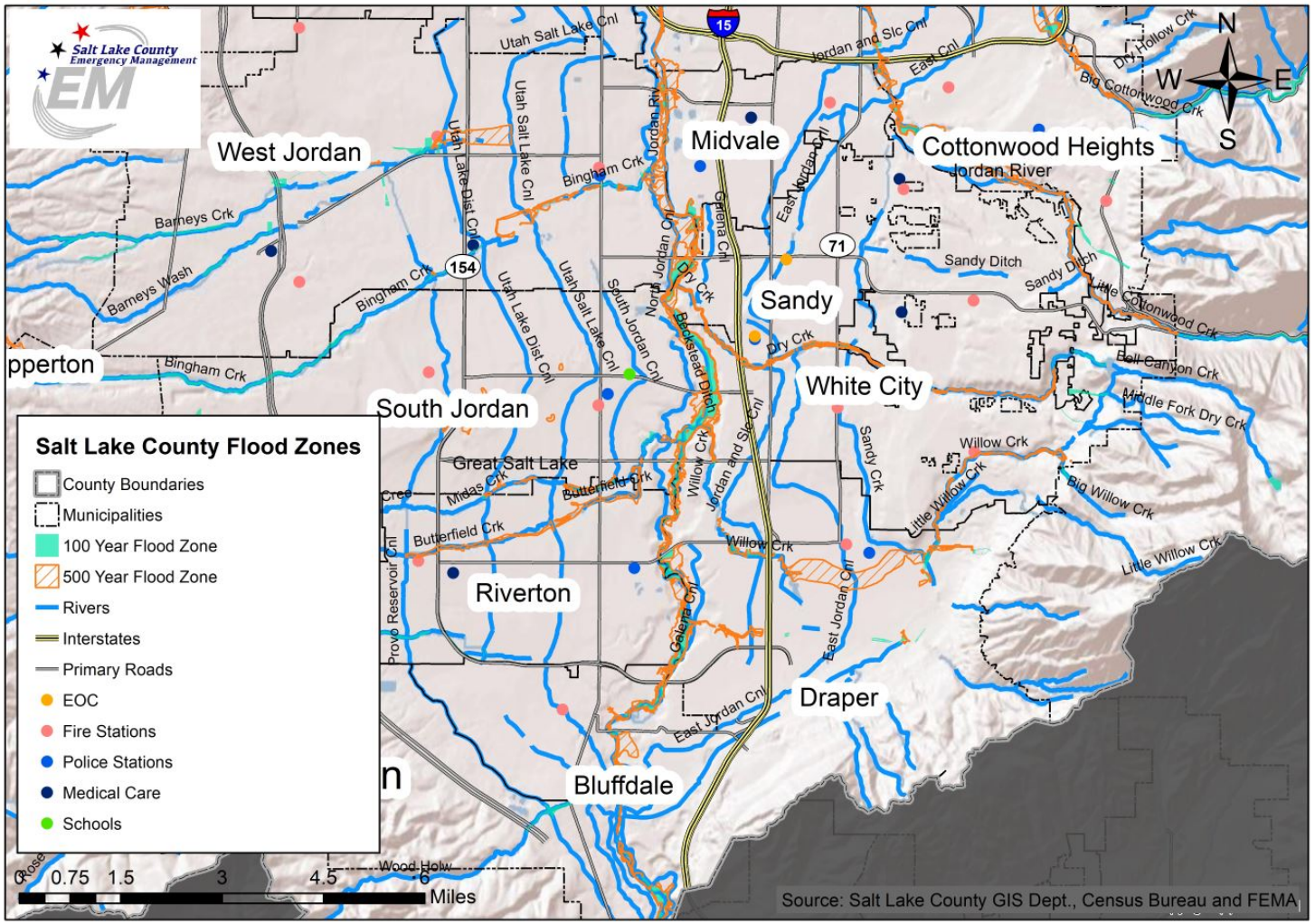
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Sandy City Public Utilities
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Sandy City Fire Department
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Sandy City GIS

Jurisdiction Maps

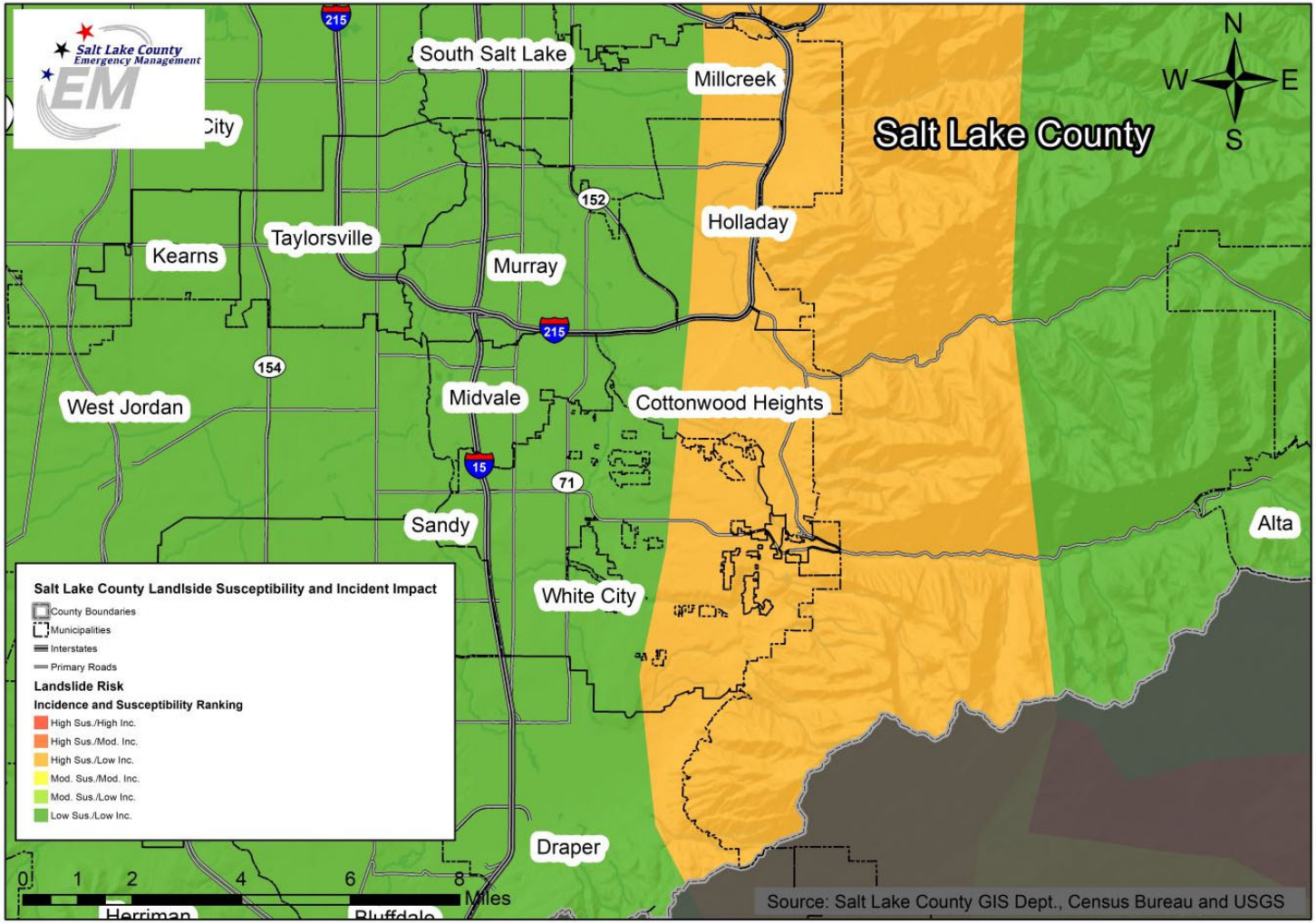
Map: 100 Year and 500 Year Flood Zone



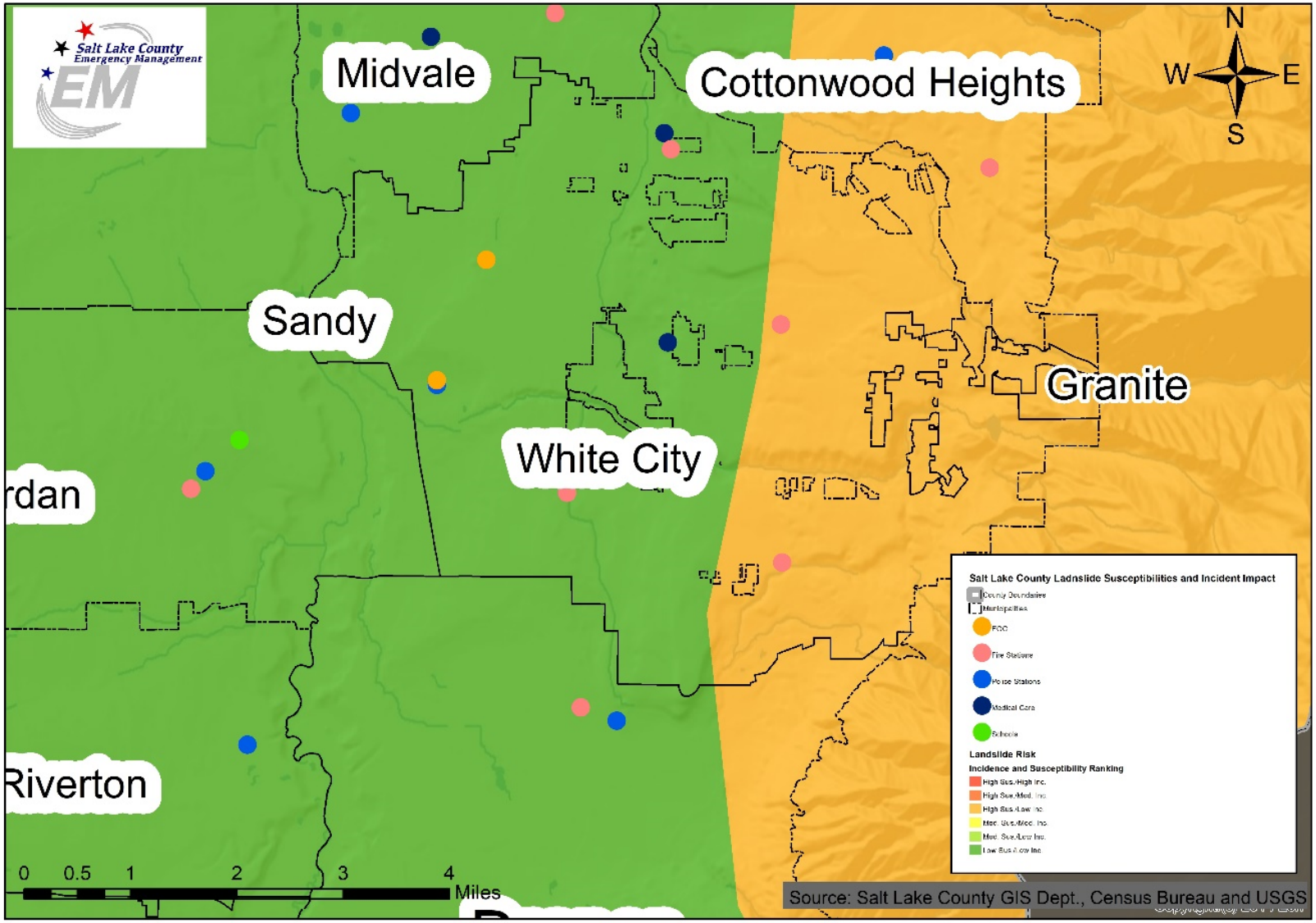
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



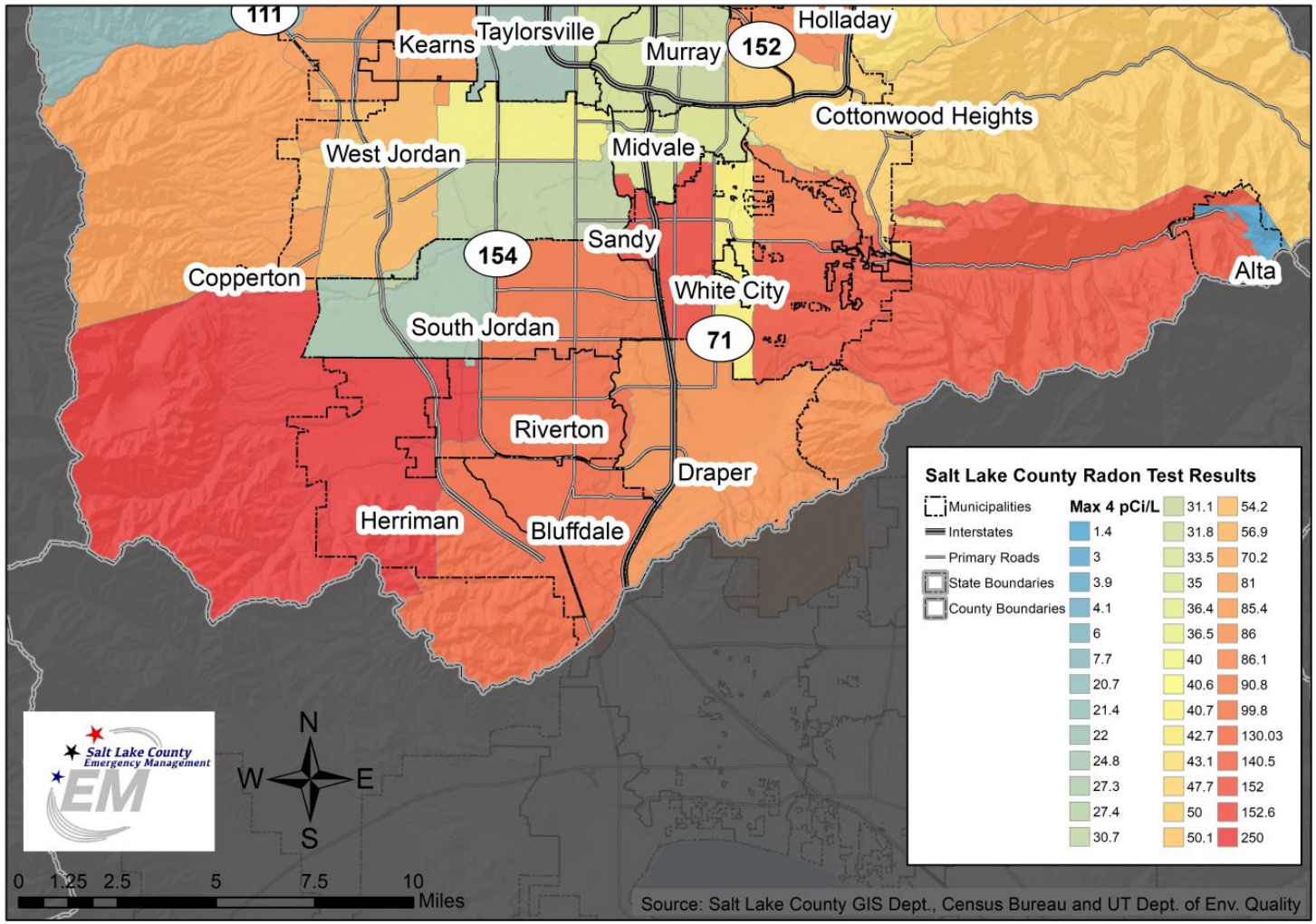
Map: Landslide Susceptibility and Incident Impact Potential



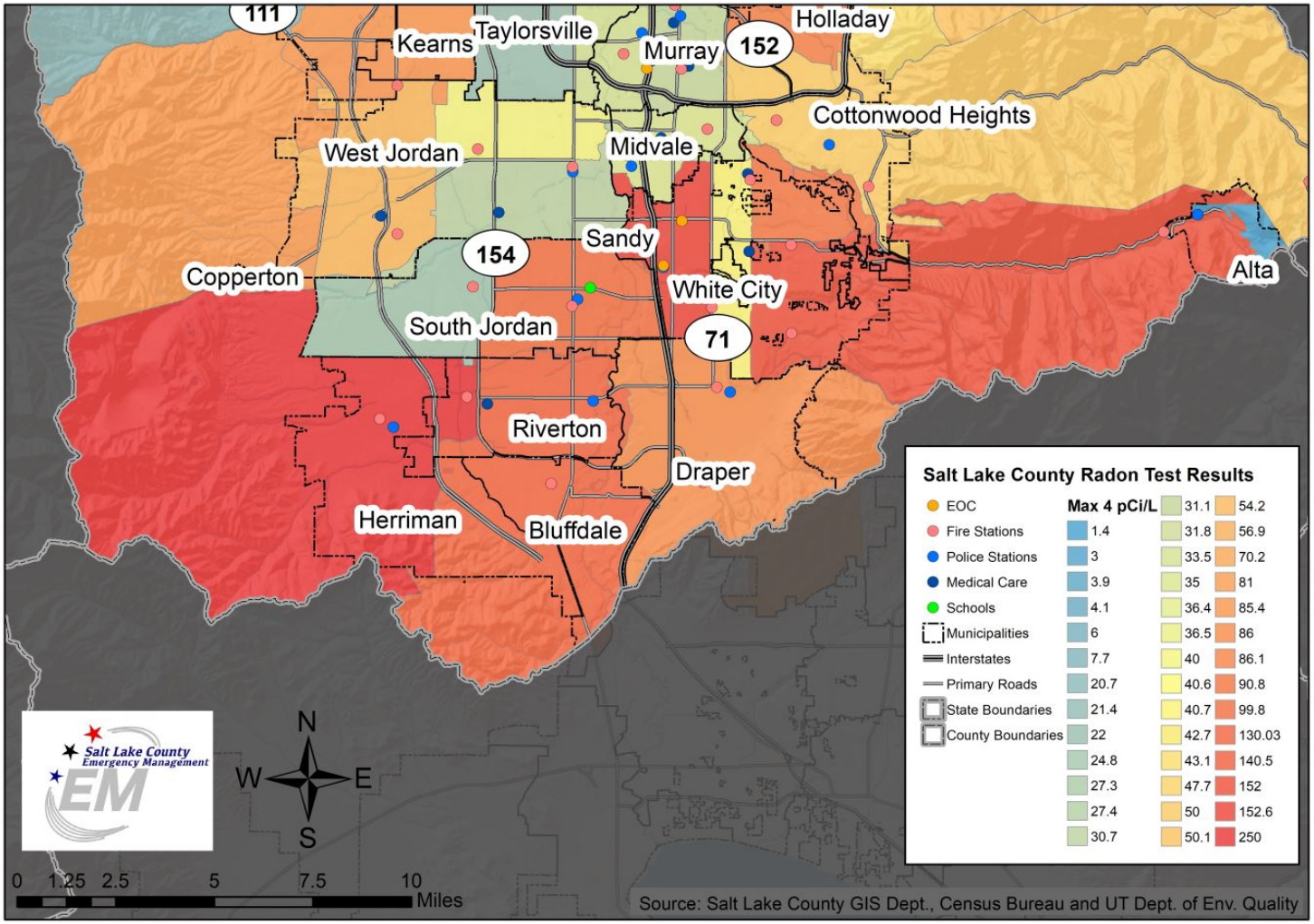
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of South Jordan



Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Aaron Sainsbury Title: Emergency / Safety Manager Department: Address: 1600 W. Towne Center Drive | South Jordan, UT 84095 Office Phone: (801) 330-2902 Cell Phone: (801) 254-3742 Email Address: asainsbury@sjc.utah.gov Website: http://www.sjc.utah.gov/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1935 (first settled in 1859)
- **Current Population:** 74,149 (Census V2018)
- **Population Growth:** The population grew approximately 46.9% percent from April 1, 2010 (50,473) to July 1, 2018 (74,149) (Census). South Jordan was primarily a rural farming community when it became incorporated as a town in 1935. In 1960, the population was 1,354, and by 1970 the population had more than doubled to 2,942. Housing gradually started to replace farmland as the population once again more than doubled by 1980 to 7,492 and nearly doubled by 1990 to 13,106. South Jordan's exponential growth since the early 1970s has brought all the challenges and opportunities of growth (SJC).
- **Location and Description:** South Jordan occupies 22.1 square miles in the southwestern portion of Salt Lake County. The City is located between the Cities of West Jordan to the north, Sandy to the East, Draper to the southeast, Riverton to the south, Herriman to the southwest and the Oquirrh Mountains on the west. Significant geographic features include the Jordan River near the City's eastern boundary which flows from south to north through the city. Elevations in South Jordan range from approximately 4,300 feet near the Jordan River and rises gently to about 5,200 feet at the City's western boundary on the slopes of the Oquirrh Mountains. The entire area is located in the area once covered by Lake Bonneville and as a result, the area is fairly flat and the soils are mostly old lakebed sediments. One notable exception is an old sandbar that creates a bluff like topography just west of the Bangerter Highway. South Jordan is centrally located between Provo and Ogden, the Wasatch Front Region. It extends westward from the interstate freeway, I-15, to state road U-111 and between about 9400 south and 11800 South. It is easily accessible by road, within minutes of the Salt Lake International Airport, and is intersected by rail line. Freeway ramps off of Interstate 15 are located at 10600 South and 11400 South. The valley's light rail system (TRAX) that has two stations to the western portion of the city. The commuter rail line connecting from Ogden to Provo also has a station in South Jordan.
- **Brief History:** South Jordan was settled in 1859 by Alexander and Catherine Lince Beckstead. Like many of the first settlers in the Salt Lake Valley, their first home was a cave dug out of the riverbank. These first homes were "a good-sized room" (14 ft. sq.),

dug into the hill, with large sun-dried adobe bricks on the front wall. Large logs covered with plants, willows, and mud and dirt formed the roof.

- **Climate:** The summer high temperature is around 92 and the winter low temperature is 22. On average, South Jordan receives 18 inches of rain and 44 inches of snow each year (Best Place).
- **Public Services:** Though residential development in the Salt Lake valley has mushroomed, South Jordan is committed to preserving its natural beauty. Along the banks of the Jordan River, South Jordan City is cooperating with other government, non-profit and private groups to set aside a significant area for the South Jordan Riverway Wildlife Enhancement project.
- **Governing Body Format:** South Jordan City is governed by a six-member council form of government. The City Council is composed of six members, one of whom is mayor. All members are elected by the residents of the City during a municipal election held every two years. Each seat consists of a four-year term. Councilmember terms are staggered. Two members and a mayor are elected at one time, and two years later the other three members are elected. The mayor and council are responsible for setting city policy and the City Manager is responsible for the day-to-day operations (SJC).
- **Development Trends:** Beginning in 1960, the City's population would double or nearly double every decade through the present day. South Jordan is experiencing tremendous population and commercial growth which is projected to continue. South Jordan has evolved from a community known for its agricultural land use to a community known for its residential use. Nearly two-thirds of the total acreage of the City is or is planned to be used for residential designations. The agricultural feel still exists through larger parcels that continue to be farmed and areas of exceptionally low-density residential. Beginning in 2003, the Daybreak-planned community building started. In total, the community will have a maximum of 20,000 residential units.
- **Critical Facilities and Infrastructure:** A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Essential facilities are those that if damaged would have devastating impacts on disaster response and recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are the third category.

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Essential facilities are those that if damaged would have devastating impacts on disaster response and recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are the third category.

Essential Facilities at Risk (City Owned)

Facility	Location	Function
City Hall	1600 W Towne Center Drive	Emergency Operations Center
Public Safety Building	10655 South Redwood Road	Police Department Emergency Operations Center
Fire Station 61	10758 S Redwood Road	Fire / EMS / HAZMAT

Fire Station 62	4022 W South Jordan Parkway	Fire / EMS / Heavy Rescue
Fire Station 63	10451 South 1055 West	Fire / EMS
Fire Station 64	5443 West Lake Avenue	Fire / EMS
Public Works Building	10996 S Redwood Road	Public Works Emergency Operations Center
Animal Shelter	10882 S Redwood Road	Animal Services
Community Center	10778 S Redwood Road	Emergency Operations Center Possible Sheltering Location
City Hall Annex Building	1600 West Towne Center Drive	Emergency Operations Center Possible Sheltering Location
Gale Center	10300 S Beckstead Ln	Possible Sheltering Location
Mulligans	692 W South Jordan Parkway	

Essential Facilities at Risk (Non-City Owned)

Facility	**Location**	**Function**
Bingham High School	2160 W 10400 South	Possible Sheltering Location
Valley High School	325 W 11000	Possible Sheltering Location
South Jordan Middle School	10245 S 2700 West	Possible Sheltering Location
Elkridge Middle School	3659 W 9800 South	Possible Sheltering Location
Elk Meadows Elementary	3448 W 9800 South	Possible Sheltering Location
Jordan Ridge Elementary	2636 W 9800 South	Possible Sheltering Location
Monte Vista Elementary	11121 S 2700 West	Possible Sheltering Location
South Jordan Elementary	11205 S 1375 West	Possible Sheltering Location
Welby Elementary	4130 W 9580 South	Possible Sheltering Location
Daybreak Elementary	4544 W Harvest Moon Drive	Possible Sheltering Location
Eastlake Elementary	4389 W Isla Daybreak Rd	Possible Sheltering Location
Golden Fields Elementary	10252 South Split Rock Drive	Possible Sheltering Location

Salt Lake County Library	10673 S Redwood Road	
Salt Lake County Fair Grounds	2100 W 11400 South	Open Space / Possible Sheltering Location
South Jordan Health Center / University of Utah Hospital	5126 W Daybreak Pkwy	Medical Services

Essential Infrastructure at Risk

Facility	**Location**	**Function**
Tank 1A	<undisclosed for security>	Water Storage
Tank 1B	<undisclosed for security>	Water Storage
Tank 2	<undisclosed for security>	Water Storage
Tank 3A	<undisclosed for security>	Water Storage
Tank 3B	<undisclosed for security>	Water Storage
Tank 5A	<undisclosed for security>	Water Storage
Tank 5B	<undisclosed for security>	Water Storage
Tank 6	<undisclosed for security>	Water Storage
Tank 7/8	<undisclosed for security>	Water Storage
Semaphore	9790 South & 4000 West	Traffic Control
Semaphore	9800 South & 3200 West	Traffic Control
Semaphore	9800 South & 2700 West	Traffic Control
Semaphore	Shields Lane & 1300 West	Traffic Control
Semaphore	Shields Lane & 1000 West	Traffic Control
Semaphore	10600 South & 4000 West	Traffic Control
Semaphore	11400 South & 4000 West	Traffic Control
Semaphore	11800 South & 4000 West (Shared)	Traffic Control
Semaphore	11800 South & 3600 West (Shared)	Traffic Control
Semaphore	11800 South & 3200 West (Shared)	Traffic Control
Semaphore	11800 South & 2700 West (Shared)	Traffic Control
Semaphore	Shields Lane & Jordan Gateway (Shared)	Traffic Control
Canal Service Roads	Various	Service Access

Capability Assessment

The city maintains a full-time staff of 357 and part-time staff of 193 individuals. The Emergency/Safety Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the City Mitigation Planning team position and supported by City Leadership.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	
Zonings Ordinance(s)	Yes	Yes	
Subdivision Ordinance(s)	Yes	Yes	
Stormwater Management Program	Yes	Yes	
Floodplain Ordinance(s)	Yes	No	
Post Disaster Recovery Program and Ordinance(s)	Yes	Yes	
Real Estate Disclosure Ordinance(s)	No	No	
Growth Management	No	No	Zoning Ordinance
Site Plan Review Requirements	Yes	Yes	

Public Health and Safety Program and Requirements	No	No	Salt Lake County Coordinates
Environmental Protection Program and Requirements	Yes	Yes	
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	Yes	
Habitat Conservation Plan	No	N/A	BLM-UT
Economic Development Plan	Yes	Yes	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	
Post-Disaster Recovery Plan	Yes	Yes	Part-3 EMP
Continuity of Operations Plan	No	No	
Public Health Plans	No	N/A	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes

Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	Use of Reserve Funds

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Engineering
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Engineering
Surveyors	Yes	Full Time	Engineering
Personnel skilled or trained in GIS applications	Yes	Full Time	Information Technology
Emergency manager	Yes	Full Time	Administrative Services
Grant writers	No	Full Time	Finance

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	City Engineer
Are any certified floodplain managers on staff in your jurisdiction?	Yes
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes

Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 44 policies were in force with total coverage of $11,307,500 and total written premium and FPF of $17,548 (FEMA, 2019).
- The City of South Jordan does participate in the National Flood Insurance Program (CID # 490107) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	Widespread heavy snowfall due to a lake effect snow band		3/1/2019	
Hail	Quarter-sized hail		6/18/2018	
Hail			5/5/2018	
High Wind	Trees were uprooted		4/13/2017	
Winter Storm	10 inches		12/24/2015	
Flooding	In South Jordan, 11 homes in the Sunstone subdivision experienced basement flooding, with water several inches deep.		9/14/2013	$100,000 in property damage
Thunderstorm Wind	Multiple large trees were knocked down, including a few that fell on houses and caused damage to roofs.		6/12/2013	$50,000 in property damage
Slope Failure	A significant landslide triggered by mining		4/10/2013	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
	activities occurred just west of South Jordan at the Kennecott Copper Mine.			
Earthquake	An earthquake with a magnitude of 2.3 and epicenter in South Jordan. Ground shaking felt over parts of the Salt Lake Valley		5/28/2007	
Flooding	Heavy rains ran across roadways and flooded a few parks in South Jordan.			
Earthquake	An earthquake with a magnitude of 2.1 and epicenter in South Jordan. Ground shaking felt over parts of the Salt Lake Valley		2/8/2006	
Heavy Snow	6 inches		2/4/2005	
Earthquake	Earthquake magnitude of 2.9 and epicenter in South Jordan		5/24/2001	
Winter Storm	Power outages were also noted in portions of South Jordan.		12/19/1998	
Earthquake	Earthquake magnitude of 4.7 and epicenter in South Jordan		2/20/1981	
Earthquake	Earthquake magnitude 2.2 and epicenter in South Jordan		12/17/1981	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific details must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	6,016
Members of the community under 18 years old	21,943
Members of the community that identify as having disability status	4,053
Members of the community that speak English less than "very well"	1,310
Members of the community living below the poverty line	1,878
The number of mobile homes in the community	0 (however, 26 reside in a boat, RV, van, or equivalent)
Members of the community without health insurance	3,216
Occupied housing units with tenants without a vehicle	494
Housing units without heating fuel	35

Jurisdiction-Specific Hazards and Impacts Summary

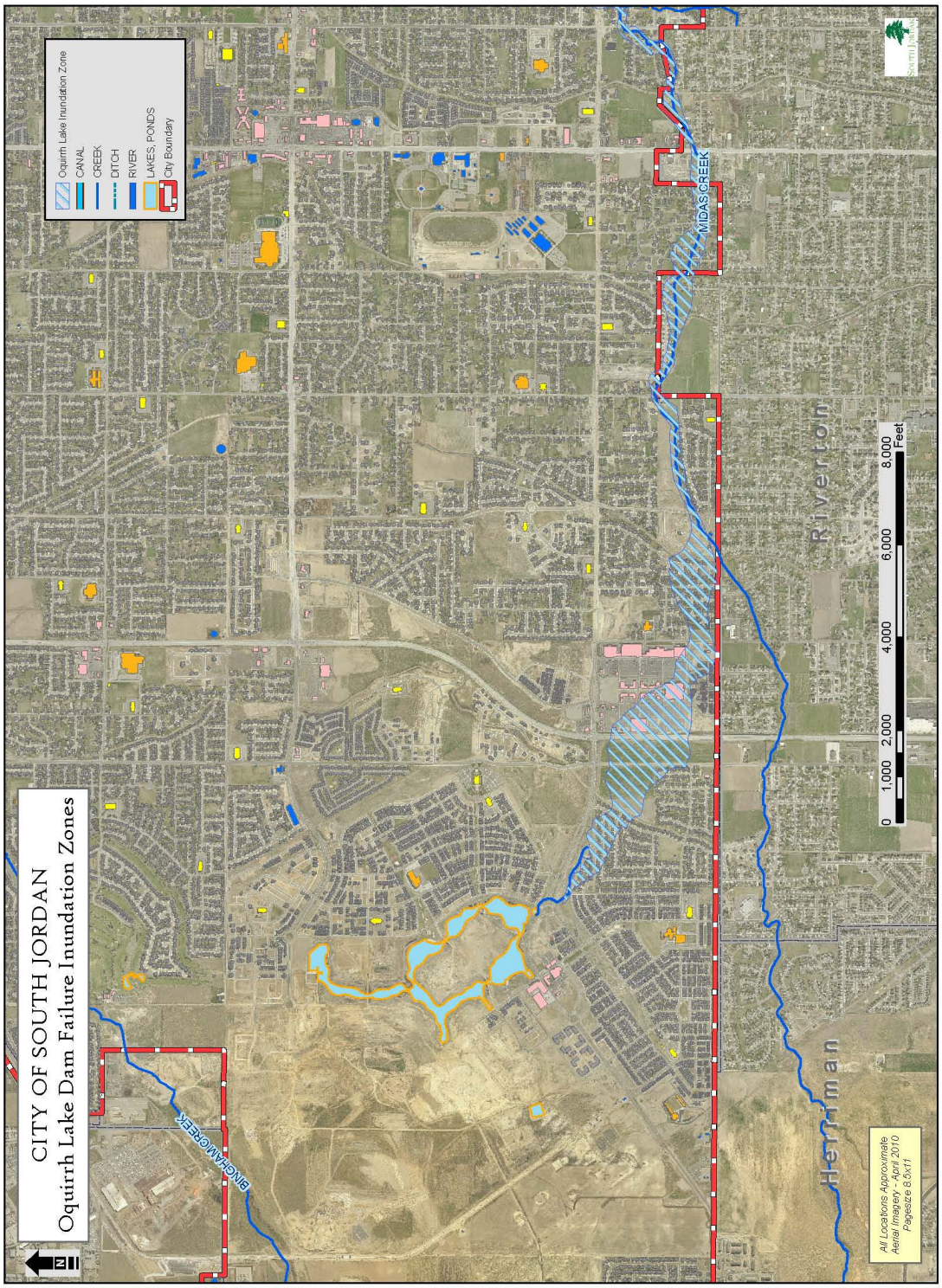
Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Dam Failure: The largest dam located in South Jordan is the Oquirrh Lake Dam located in the Daybreak Development area in the western portion of the city and is owned and operated by the Kennecott Land Company. The dam is classified as a “medium dam” due to its storage capacity and proximity to an urban population according to Utah Administrative Code Rules R655-12. However, due to the downstream location of residential structures and the Bangerter Highway, the State Engineer has classified the dam as a “High” hazard Dam.

Hydraulic and Structural Information

Year Built 2006
Structural Height: 17 Feet
Hydraulic Height: 11 Feet
Reservoir Area at Spillway Crest: Acres
Reservoir Storage at Spillway Crest: 800 Acft
Reservoir Storage at Dam Crest: 1100 Acft
Dam Crest Elevation: 4804 Feet MSL
Dam Crest Length: 230 Feet
Dam Crest Width: 20 Feet

FIGURE: Dam Inundation Area



Flooding: Riverine flooding can be expected along the Jordan River, Midas Creek, and Little Willow Creek. The potential for flooding also exists along the old channel of Bingham Creek (usually dry unless there is a storm), the Beckstead Ditch and any of the four canals which transverse the city (Welby Jacob Canal, Utah Distributing Canal, Utah Salt Lake Canal, & South Jordan Canal). Localized floods and flash flooding are possible in all areas of the City. Subsurface flooding problems near the Jordan River and eastern portions of the city. See the FEMA Flood Insurance Rate Map for details on other known mapped special flood hazard areas. An area has also been identified for potential inundation due to failure at the Oquirrh Lake Dam (See the Oquirrh Lake Dam Emergency Action Plan).

Historic Events in South Jordan:

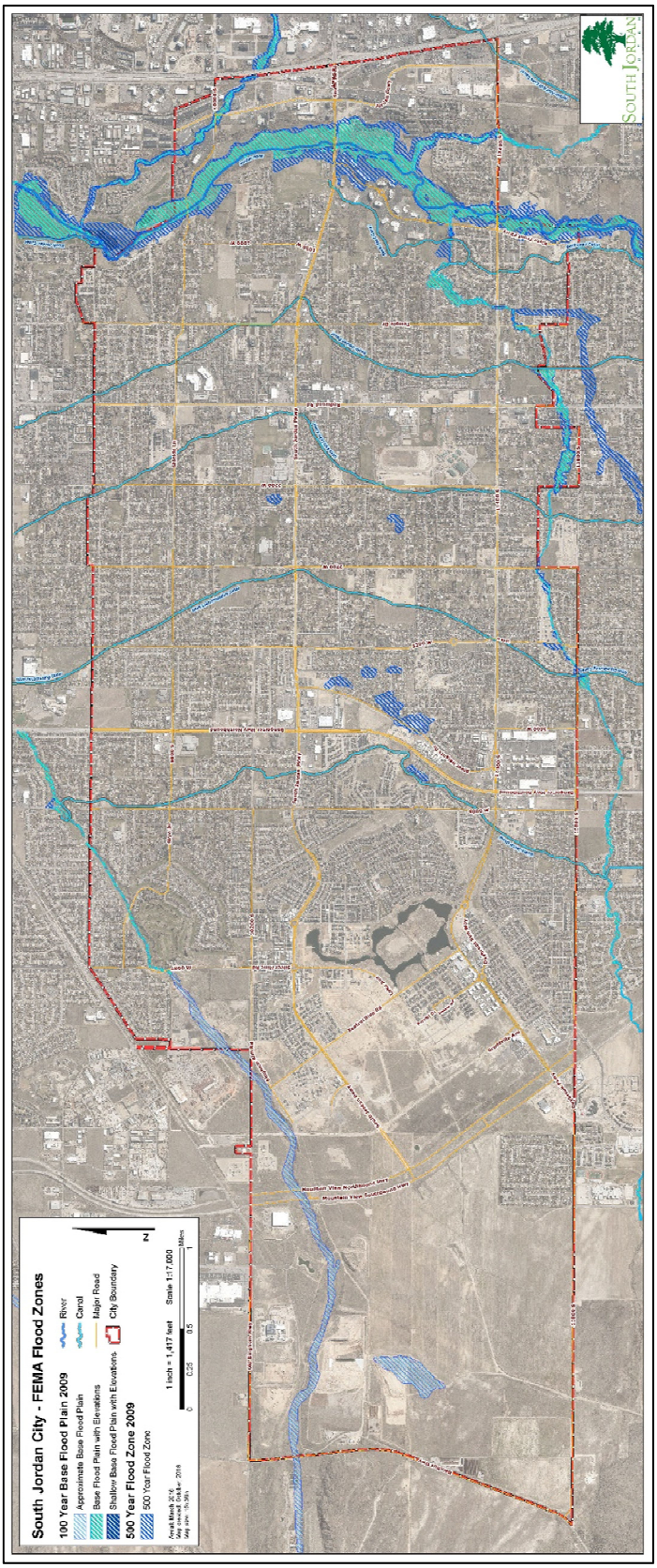
- August 2013 - 21 homes affected by thunderstorm flooding on west side of South Jordan.
- December 2010 - Several homes were flooded from groundwater seeping into basements in the area of 1300 West.
- August 2007 - 30 homes affected by thunderstorm flooding on west side of South Jordan.

NFIP:

- FIRM #: 49035CIND0B Map Revision Date: September 25, 2009
- Panels that cover South Jordan include: 0416G, 0417G, 0436G, 0437G, 0441G, 0442G, 0429G, 0433G, and 0434G.
- There are no NFIP insured structures located in the jurisdiction that are considered repetitive flood loss properties. The City of South Jordan intends to continue participating in the NFIP and maintain its continued compliance with NFIP requirements.

Structures with a Specific Flooding Risk (as per FEMA FIRM)		
100 year floodplain (Zones A, AH, AO, AE)	count	%
Residential (Single Family Dwellings)	35	0.21
Residential (Accessory Buildings)	33	0.52
Commercial Businesses	4	1.72
Public (Accessory Buildings)	7	4.76
	Total	79
500 year floodplain (Zones X)	count	%
Residential (Single Family Dwellings)	130	0.78
Residential (Accessory Buildings)	53	0.83
Commercial Businesses	13	4.44
Commercial Businesses (Accessory Buildings)	1	0.43
Public (Accessory Buildings)	3	2.04
Total	200	

FIGURE: FLOOD ZONE



Earthquake: The entire city is at risk for ground shaking and certain areas are at risk for liquefaction. The residents that reside in non-traditional housing are especially at risk. The entire city is at risk for ground shaking. Certain areas are at risk for liquefaction; however, there is minimal chance for a significant surface rupture.

Historic Events in South Jordan:

- 2007 - 28 May: Earthquake with a magnitude 2.3 and epicenter in South Jordan. Ground Shaking felt over parts of the Salt Lake Valley
- 2006 - 8 Feb: Earthquake with a magnitude of 2.1 and epicenter in South Jordan. Ground shaking felt over parts of the Salt Lake Valley.
- 2001 - 24 May: Earthquake magnitude of 2.9 and epicenter in South Jordan
- 1981 - 20 Feb: Earthquake magnitude of 4.7 and epicenter in South Jordan
- 1981 - 17 Dec: Earthquake magnitude 2.2 and epicenter in South Jordan

Structures with a Liquefaction Specific Risk

High Risk	count	%
Church Accessory	1	1.85
Church Meetinghouse	1	2.70
Commercial Accessory	37	15.95
Commercial Business	33	11.26
Commercial Office	2	18.18
Commercial Utility	1	20.00
Public Accessory	24	16.33
Public Bldg	1	11.11
Public Utility	1	1.85
Residential Accessory	186	2.93
Residential Dwelling	518	3.11
Residential MDU	13	22.03
Total	818	

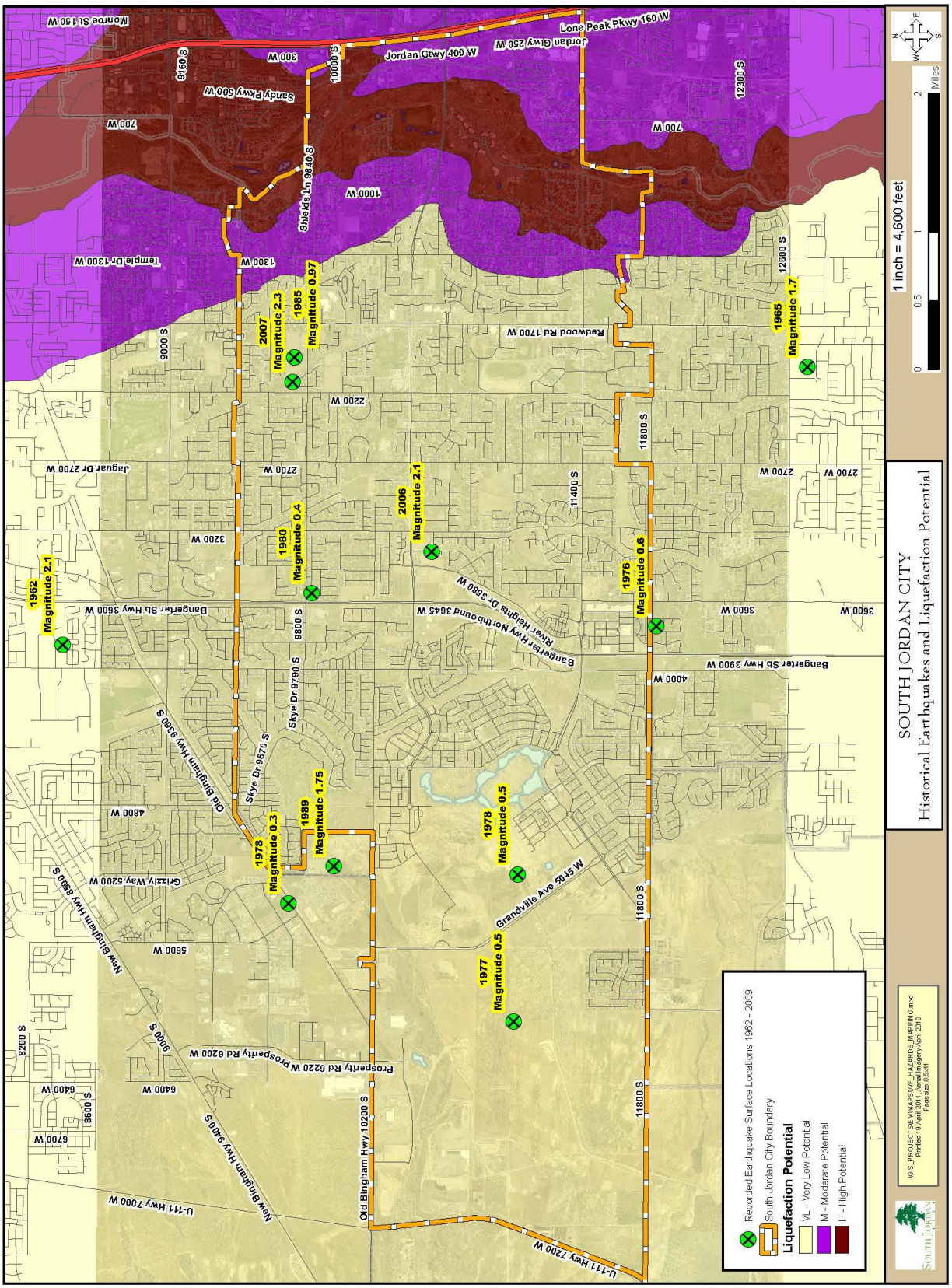
Moderate Risk		
Church Accessory	6	11.11
Church Meetinghouse	3	8.11
Church Temple	1	33.33

Commercial Accessory	72	31.03
Commercial Business	61	20.82
Commercial Office	1	9.09
Public Utility	1	1.85
Residential Accessory	1,095	17.25
Residential Clubhouse	1	5.88
Residential Dwelling	1,501	9.01
Residential MDU	37	62.71
School	2	10.53
School Accessory	1	1.27
Total	2,782	

Low Risk

All other buildings	20,444

FIGURE: LIQUEFACTION POTENTIAL



Slope Failure: Given South Jordan's relatively flat geography and location near the center of the Salt Lake Valley, this hazard is not common. Areas of the community that may be affected include the very western portions of the city at the foot of the Oquirrh Mountains near Bacchus Highway, and some areas near the Jordan River Corridor. There may be other areas that might have some unique geologic or geographic conditions where a slope failure may occur.

Wildfire: South Jordan does have some urban-wildland interface along the Jordan River and Bingham Creek and the western portions of the city. The areas of highest concern for wildfire are the undeveloped areas along the Jordan River where natural vegetation is abundant and the other undeveloped areas, open areas, some agricultural areas

Most events have been small grass and brush fires. No significant events have occurred.

Drought: Because of the fact that much of the community's drinking water comes from snowmelt, dry winter can have serious implications in terms of how much water is available for the following summer season. Most locations have sufficient water reservoirs to make it through one dry winter. The real problem becomes back to back dry winter seasons.

Historic Events in South Jordan:

- 1896 – 1907 Statewide drought conditions
- 1930 – 1936 Statewide drought conditions
- 1953 – 1965 Statewide drought conditions
- 1974 – 1978 Statewide drought conditions
- 1988 – 1993 Statewide drought conditions
- 1999 – 2003 Statewide drought conditions

High Wind: South Jordan has experienced high winds in the past and can expect future events. The residents that reside in non-traditional housing are especially at risk to wind events. One weather-related phenomenon that occurs that should be noted is that of weather-related inversions. These inversions tend to occur most often in the months of December, January and February when pockets of cold air become trapped in the valley between the Oquirrh Mountain range and the Wasatch Mountain range. These temporary inversions can last several days and lead to poor air quality for residents in the valley and restrictions placed on burning some types of fuels.

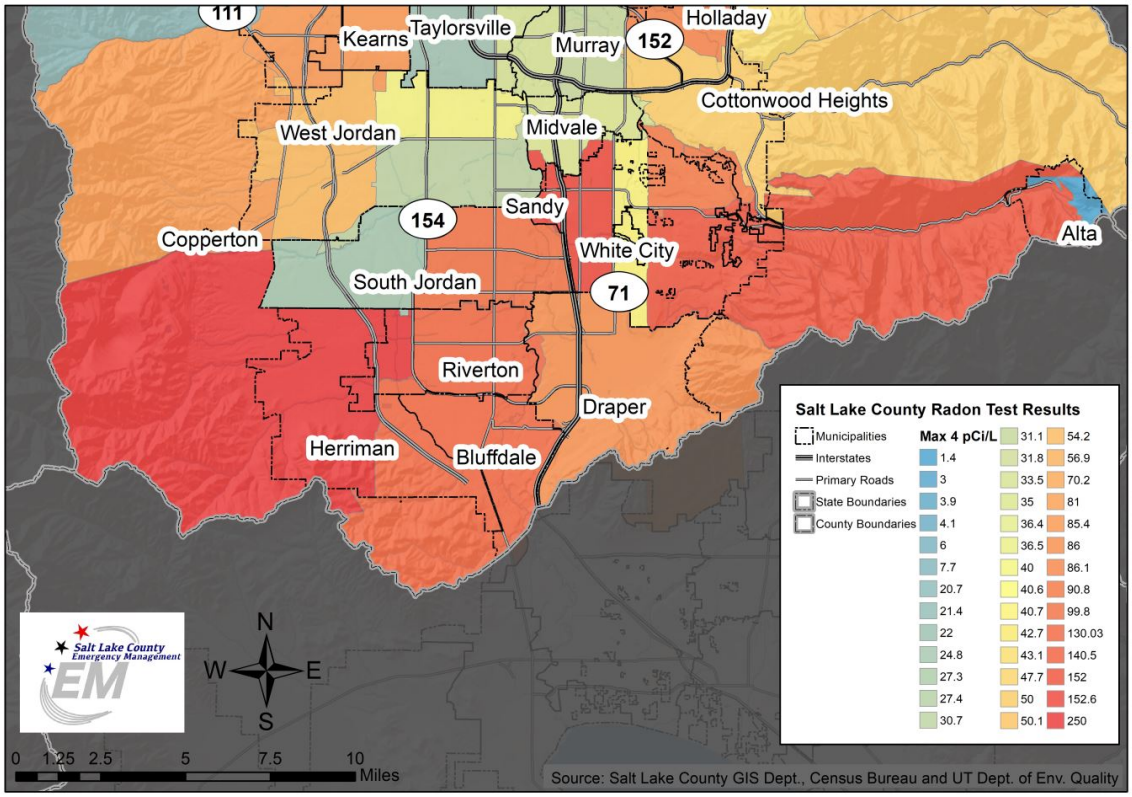
Severe Weather: South Jordan is well known for its rapid and often severe changes in weather. Severe weather common in the city includes winter storms, large scale wind events, thunderstorms, lightning, hail, tornadoes, flooding, and avalanches. While some types of these events can be predicted, others will occur with little or no warning.

One weather related phenomenon that occurs most often from December to February are inversions. These inversions tend occur when pockets of cold air become trapped in the valley between the Oquirrh Mountain range and the Wasatch Mountain range. These temporary inversions can last several days and lead to poor air quality for residents in the valley and restrictions placed on burning some types of fuels.

Thunderstorms occur in South Jordan on an annual basis. Sometimes the intensity of these storms can cause them to be quite destructive to property, create flash floods, and interrupt power services. The community members over 65 are particularly vulnerable to the impacts of life-sustaining supports interrupted by prolonged power outages.

Radon: The entire city is subject to this type of event, although its effects and severity may vary from one location to another. Radon is a radioactive gas released from the nuclear decay process of uranium and radium, which are trace elements of many soils.

FIGURE: RADON



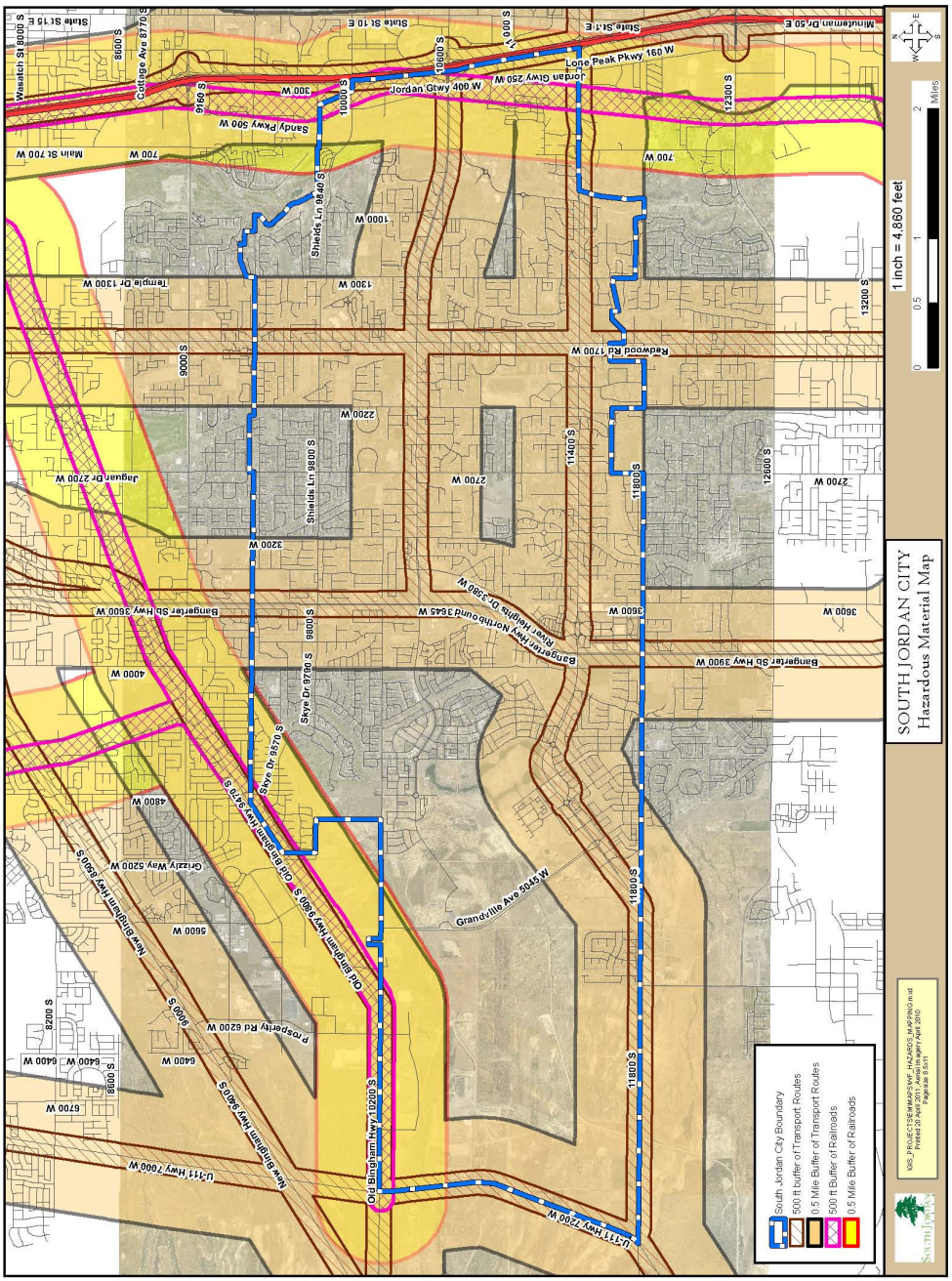
Pandemic: The potential for a pandemic to have a noticeable impact on the city has increased as worldwide travel and commerce in the area has increased.

Hazardous Materials: Spills can occur along the major roadways that run through the city.

Historic Events in South Jordan:

- 2000 Merit Medical

FIGURE: HAZMAT RISK (TRANSPORTATION)



Fallen Aircraft: South Jordan City lies in the flight paths of two airports, Salt Lake International and Airport #2. Under normal flight patterns most plans landing at these airports make their landing approach from south to north over the city. Other air traffic over the city includes helicopters and small aircraft for various purposes.

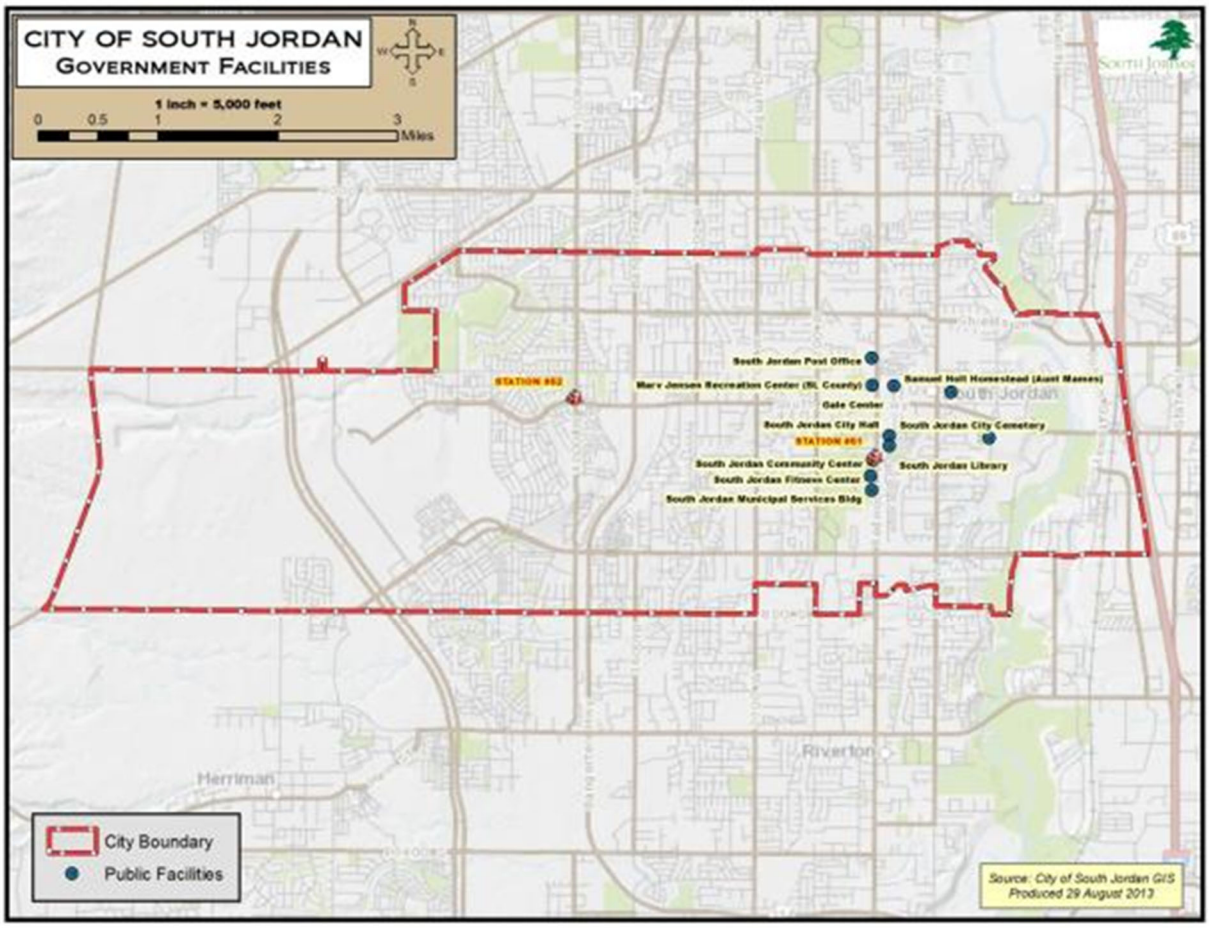
While not common, for planning purposes this hazard could also include any other falling objects such as meteor or asteroid, or any other large objects that could create a hazardous situation.

- Historic Events in South Jordan: June 2002 - Small plane crash in U-111 on west side of City

Terrorism: Public gathering places, community icons or monuments, government buildings, schools, churches, and commercial buildings may be potential targets.

Historic Events in South Jordan:

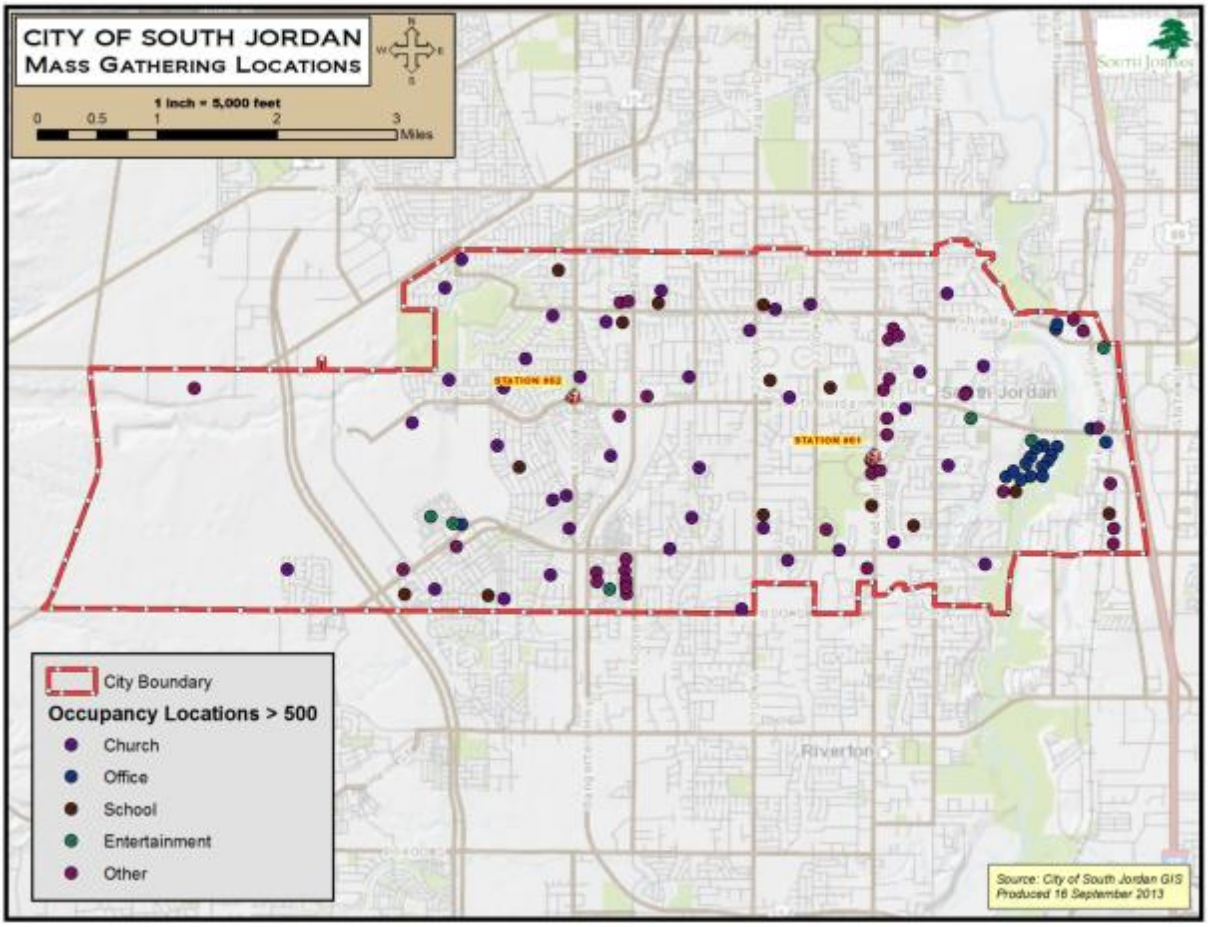
- Release of mink from various mink farms have resulted in acts of violence on several occasions.



Civil Disturbance: Similar to terrorism and acts of violence, public gathering places, community icons or monuments, government buildings, schools, churches, and commercial buildings may be potential targets.

Historic Events in South Jordan:

- December 25, 2010 Oquirrh Mountain temple incident



Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34

Hazardous Materials Incident	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Dam Failure	1	22	22
Radon	3	6	18
Tornado	1	12	12
Wildfire	1	10	10
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	6	6
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.

SLC2019HMP-South Jordan(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	No Impact	0	0
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	Low	1	1

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Bury powerlines and upgrade key utilities in the older sections of the community to ensure greater resiliency to severe weather.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Severe Weather	Public Works	Utilities	Medium	High	Local and Private Funds, HMA Grants	Medium	Long-term	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comment
Establish notification capabilities and procedures for emergency personnel	2009	All Hazards	South Jordan	High	Medium	Local, State and Federal Grants	High	Ongoing	South Jordan continues to work on notification tools and procedures to be in harmony with changing technology and equipment
Establish a coordinating group to address long-term communication needs and implementation strategies	2009	All Hazards	South Jordan	Medium	Low	Local	Low	Ongoing	No formal coordinating group exists yet, but South Jordan engages in discussions with other jurisdictions and the county regarding this issue

Implement improvements to address hazards identified in assessment	2009	All Hazards	South Jordan	High	High	HMA, federal, and state	High	Ongoing	South Jordan is identifying options and opportunities to address issues identified during the risk assessments in 2013 and 2019
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	All Hazards	South Jordan	High	Low	Local Funds	High	Ongoing	South Jordan Emergency Management continues to provide several public education classes for groups to discuss the hazards in the community and what residents can do to be prepared
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	All Hazards	South Jordan	High	Low	Local Funds	High	Ongoing	South Jordan's education programs are customizable for all kinds of groups and available to all members of the community
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	All Hazards	South Jordan	High	Low	Local Funds	High	Ongoing	South Jordan has worked with Be Ready Utah and other programs to make presentations in South Jordan and will continue to invite them to events and other activities in the community
Coordinate with water districts to plan for, develop and/or expand secondary water	2009	Drought	South Jordan	Medium	High	County and State funds	Medium	Ongoing	South Jordan continues to encourage the development of secondary water, where feasible. Several areas have been added to the secondary water system in the last 5 years.
Encourage Communities to actively participate in NFIP	2009	Flood	South Jordan	High	Low	Local	High	Ongoing	South Jordan actively participates in the NFIP
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	Flood	South Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineer and Public Works Director regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	Flood	South Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures Example: Significant construction efforts were completed on Midas Creek including upsizing culverts, channel stabilization, etc.

Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	Flood	South Jordan	High	High	Federal, County, and State funds	High	Ongoing	The Stormwater Division of the Public Works Department continues to maintain and repair all drainage systems in the City
Modify structures as needed to address deficiencies	2009	Flood	South Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineering Division in cooperation with the Public Works Department make repairs as needed to deficient structures
Assist NWS in making other agencies and departments aware of available resources	2009	Severe Weather	South Jordan	Medium	Low	Local	Low	Ongoing	South Jordan supports the NWS efforts for education and outreach and makes internal departments aware of NWS resources
Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	2009	Severe Weather	South Jordan	Medium	Low	Local	Medium	Ongoing	South Jordan supports the efforts for education and outreach
Maintain community participation in the National Flood Insurance Program. Flooding risks exist in the community from a variety of sources, including; riverine flooding, infrastructure failures (canal breech, dam failure, water main rupture), and groundwater sources. Areas near the Jordan River are in a mostly undeveloped state.	2014	Flood	Development Services	High	Low <$5,000	General Fund	High	Ongoing	Participation in the National Flood Insurance requires the City to maintain and enforce a flood damage prevention ordinance and other regulatory authorities to minimize the effects of flooding to structures in the community. Enforcement of the ordinance will reduce the number of structures at risk of damage from flooding
Distribution of flood hazard and flood preparedness / response information such as the “Flooding: What you should Know when Living in Utah” brochure which the City partnered in developing in 2014, or similar types of information. Post such information on the City’s website.	2014	Flood	Administrative Services – Emergency Management, Information Technology	Medium	Low <$5,000	General Fund	Medium	Ongoing	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.

Update of the City's Stormwater Master Plan to include specific flood mitigation projects in flood prone areas of the City.	2014	Flood	Public Works, Development Services	Medium	High - $50,000- $100,000	General Fund, Enterprise Funds	Medium	Ongoing	Once updated, the Stormwater Master Plan will identify specific infrastructure needs that will help reduce the potential for flooding. The Plan will be used in determining priority based needs throughout the City. Funding for specific projects may come from a variety of sources and will appear as part of the capital improvements plan.
Install automatic gas shut off fixtures on any City-owned buildings or structures with gas service/meter that do not have one currently. Train staff to check the meter immediately following an earthquake event and shut off service if necessary	2014	Earthquake	Administrative Services – Facilities Division	Medium	Medium - $50,000- $100,000	General Fund, Grants	Medium	Ongoing	Automatic shut off valves will stop the flow of gas after a significant event if there is damage to the system. This could potentially save the structure from potential fire or a hazardous materials incident.
Distribution of earthquake hazard preparedness / response information. Post such information on City's website	2014	Earthquake	Administrative Services – Emergency Management, Information Technology	Medium	Low <$5,000	General Fund	Medium	Ongoing	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.
Support of community education programs that raise awareness and provide information to property owners on how to protect their structures from wildfire damage. Post such information on the City's website.	2014	Wildland Fire	Administrative Services – Emergency Management, Fire Department, Information Technology	Medium	Low < $5,000	General Fund, Grants	Medium	Ongoing	Raised awareness of people who may determine to live in areas that are at risk for wildland fire.
Maintain a wildland fire response unit.	2014	Wildland Fire	Fire Department	High	High - $100,000	General Fund, Grants	High	Ongoing	Provides the City with an initial response unit as well as the ability to support neighboring jurisdictions with their response efforts.

Prohibit the use of fireworks in high risk areas.	2014	Wildland Fire	Fire Department	Low	Minimal	General Fund, Grants	Low	Ongoing	Fireworks restrictions in high risk areas help reduce the potential for ignition sources and the need for additional response units.
Training for firefighters in wildland firefighting.	2014	Wildland Fire	Fire Department	High	Medium - $50,000	General Fund, Grants	High	Ongoing	Continue providing training to firefighters in wildland fire so there are better able to assist if needed.
Maintain automatic/mutual aid agreements and assist neighboring jurisdictions as requested.	2014	Wildland Fire	Fire Department	Medium	Low - Minimal	General Fund, Grants	Medium	Ongoing	Having automatic and mutual aid agreements will help the community be more prepared with access to resources when needed. It will also make it easier to assist neighboring jurisdictions if requested
Rebate program to promote water conservation	2014	Drought	Public Works	Low	Low	Local	Low	Ongoing	The City offers rebates to persons who upgrade their existing infrastructure with new devices that use less water. This includes fixing leaking toilets and upgrading to low flow, installing smart irrigation systems, planting drought tolerant plants, etc. The results of these efforts should reduce the consumption of water by users in the community.
Development of a 5-year Water Conservation Plan	2014	Drought	Public Works	Medium	Low	Local	Low	Ongoing	
Offer Annual Sprinkler Maintenance Workshops to promote efficient and effective watering of landscapes.	2014	Drought	Public Works	Low	Low	Local	Low	Ongoing	Public education on how to maintain and operate a sprinkler system will help conserve water by avoiding waste from leaks and/or ineffective systems and practices.
Promotion of “Water Week” with elementary students to promote best management practices for water conservation.	2014	Drought	Public Works	Medium	Low	Local	Medium	Ongoing	Teaching elementary students about water conservation will help promote best management practices in the homes of residents and helps share information about how individuals can make a difference in conserving water.
Provide real-time water use data to customers	2014	Drought	Public Works	Medium	Medium	Local	Medium	Ongoing	Water users can monitor their own use of water resources in real time to help them

									make determinations about their water use practices.
Development of a Pandemic Response & Recovery Plan	2014	Pandemic	Administrative Services – Emergency management, Fire Department - EMS	Low	Medium	General Fund, Grants	Low	Ongoing	Having a response and recovery plan will help the City to be more prepared, identify potential protocols for response and implement strategies that prioritize public safety and help reduce the economic impacts on the City from the potential effects of a pandemic crisis.
Engage in the process to become a "Storm Ready Community" with the National Weather Service.	2014	Severe Weather	Administrative Services – Emergency Management, Public Works	Medium	Medium $25,000-$50,000	General Fund, Grants	Medium	Ongoing	Participation in the "Storm Ready Community" will help raise awareness of the dangers of severe weather and provide tools to the community to aid in preparing for and responding to severe weather events.
Promote public education in the community regarding severe weather. Post such information on the City's website.	2014	Severe Weather	Administrative Services – Emergency Management, Information Technology	Medium	Low < $5,000	General Fund, Grants	Medium	Ongoing	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes.
Support of community education programs that raise awareness and provide information to property owners on the dangers and risks of avalanches. Post such information on the City's website, including links to the Utah Avalanche Center.	2014	Avalanche	Administrative Services – Emergency Management, Information Technology	Medium	Low < $5,000	General Fund, Grants	Medium	Ongoing	Raised awareness of people who may desire to participate in activities that are at risk for avalanche.
Creation of a radon hazard map showing potential areas of the community that may be affected by radon.	2014	Radon	Administrative Services – Emergency Management, Information Technology, Development Services	High	Low < $5,000	General Fund	High	Ongoing	A map showing the extent of the hazard will be useful in helping residents determine if they should consider testing for radon and/or engaging in their own efforts to mitigate radon in their structures. The map will also help to raise awareness of the issue in the community.

Distribution of information on Radon. Post such information on the City's website.	2014	Radon	Administrative Services – Emergency Management, Information Technology	High	Low < $5,000	General Fund	Medium	Ongoing	Dissemination of information raises public awareness, resulting in a more knowledgeable community that is prepared for potential threats. It also helps build community support for other hazard mitigation efforts such as strong building codes and enforcement of existing codes such as the flood damage prevention ordinance.
Development of a Communications Response Team and Emergency Communications Plan	2014	All Hazards	Administrative Services, Police Department, Fire Department, Public Works	Medium	Medium >$50,000	General Funds, Grants	Medium	Ongoing	A communication response team will help to ensure that the City can develop and maintain a viable communication system that will enable the City to have communications capabilities after a significant event occurs.
Adoption and Enforcement of Building Codes	2014	All Hazards	Development Services	Medium	Medium	General Funds, Grants	Medium	Ongoing	Adopting and enforcing appropriate building codes will ensure that new construction projects will benefit from new technologies, construction design, and lessons learned from previous disasters.

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Action	Status	Comments
All Hazards	2009	1 – Evaluate vulnerability of critical communications systems	Completed	South Jordan evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable Example: The development of a second / redundant radio system for the Police, Fire, and Public Works Departments
All Hazards	2009	1 – Utilize GIS to identify facilities and infrastructure at risk	Completed	In 2013 South Jordan GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk
All Hazards	2009	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment	Completed	In 2013 South Jordan GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk

		resources and redundancy, and adequate emergency procedures		
All Hazards	2009	2 – Incorporate information about cascading effects of hazards in education programs	Completed	Information is included in all presentations on the effects of cascading hazards
All Hazards	2009	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Completed	South Jordan GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city
All Hazards	2009	2 – Ensure current hazard ordinances are available for viewing online	Completed	All current South Jordan ordinances are available online at: http://www.sterlingcodifiers.com/codebook/index.php?book_id=488
Dam Failure	2009	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Completed	The inundation map for the dam at Oquirrh Lake is included in the City's Emergency Management Plans
Dam Failure	2009	2 – Utilize inundation maps to identify potential evacuation areas and routes	Completed	The inundation map for Oquirrh Lake has been considered in identifying potential evacuation routes, if needed
Drought	2009	1 – Set up livestock water rotation in areas of agricultural use	Not Completed	This is not applicable to South Jordan
Earthquake	2009	1 – Identify structures at risk to earthquake damage	Completed	In 2013 South Jordan GIS, Fire and Emergency and Risk Management personnel did an extensive hazard and risk assessment on all structures in the city to evaluate their level of risk
Earthquake	2009	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not Completed	South Jordan does not have funding to support this type of program. South Jordan does not intend to move this activity forward due to the very limited number of URM structures in the community and the lack of potential funding sources to support it
Earthquake	2009	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Completed	Due to the age of the City's public buildings (most having been built in the last 15 years) there are no major retrofit or rehabilitation projects needed at this time in South Jordan
Earthquake	2009	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	There are very few URM homes and businesses located in South Jordan that would make this activity cost effective for the City to engage in. South Jordan supports county level efforts to share this type of information

Earthquake	2009	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed / Not Applicable	Not applicable to South Jordan as the referenced dam is located in another jurisdiction.
Flooding	2009	1 – Assist Cities with NFIP application	Not Completed / Not Applicable	South Jordan has been a participating community in the NFIP since 1974
Severe Weather	2009	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed / Not Applicable	South Jordan does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed / Not Applicable	South Jordan does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	South Jordan has not developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Increase public awareness through “Firewise” program	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Provide waste removal, such as chipping of green waste by public	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

		works, following designated fuel clearing day/week		
Wildland Fire	2009	1 – Work with experts and communities to develop or update evacuation plans	Not Completed	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Completed	South Jordan has an adequate transportation network to support evacuation and emergency response
Wildland Fire	2009	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Completed	Addressing of structures in South Jordan is complete
Wildland Fire	2009	2 – Incorporate improved addresses in fire-dispatch and other databases	Completed	Addressing of structures in South Jordan is complete
Wildland Fire	2009	1 – Reduce fuels around publically owned structures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Implement fire breaks and other protective measures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	The South Jordan water system meets and/or exceeds requirements for providing water flow for firefighting purposes in the City
Wildland Fire	2009	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Adopt the Utah Wildland-Urban Interface Code	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
All Hazards	2009	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Completed	South Jordan has and will continue to improve and maintain its communication capabilities, but capabilities adequately meet the need of the department.

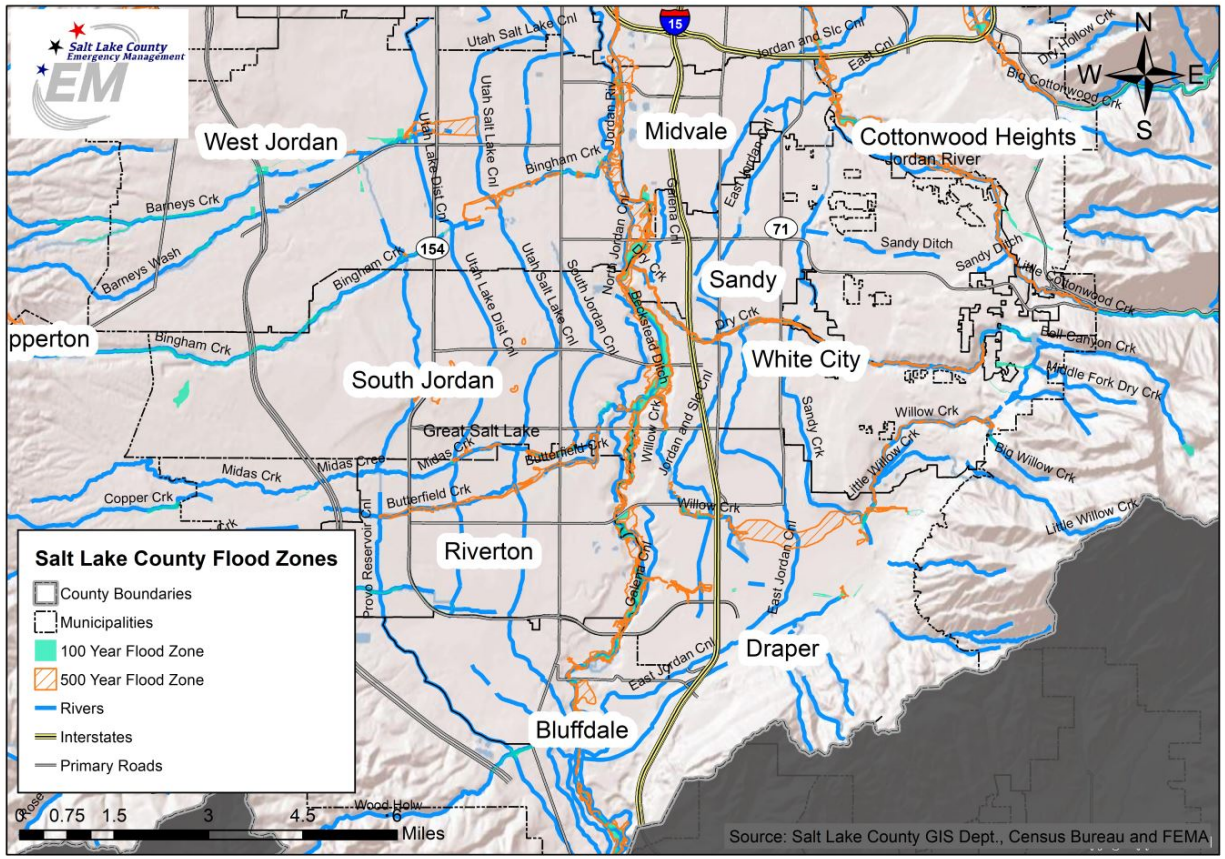
All Hazards	2009	2 – Conduct Training and awareness activities on communication equipment, tools, and systems	Completed	South Jordan has built the use of communication equipment into training and exercises.
All Hazards	2009	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Completed	While no formal agreements exist to share communications equipment, but communications equipment can be shared as part of other mutual aid agreements that are in place
All Hazards	2009	Establish redundancy for dispatch centers and other critical communications	Completed	South Jordan relies on the Valley Emergency Communications Center (VECC) for dispatch services. They coordinate with other PSAPS to provide redundancy.
All Hazards	2009	Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Completed	South Jordan has upgraded existing equipment and purchased new equipment to maintain operability
All Hazards	2009	1 – Establish a coordinating group to address geographic data issues	Completed/Ongoing	South Jordan GIS personnel actively participate in several coordinating groups that address issues associated with geographic data
All Hazards	2009	2 – Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings	Completed/Ongoing	South Jordan GIS personnel actively participate in several coordinating groups that address issues associated with geographic data
All Hazards	2009	3 – Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs	Completed/Ongoing	South Jordan GIS personnel continue to develop and add to the geographic data as part of the City's overall geographic information systems
All Hazards	2009	4 – Provide centralized access to geographic data to emergency planners and responders	Completed	South Jordan GIS personnel make data available to first responders and others involved in emergency management efforts
All Hazards	2009	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Completed	South Jordan has implemented the use of monitoring equipment such as stream gages, seismographs, SNOTEL sites to provide situational awareness and forecasting capabilities

All Hazards	2009	2 – Identify and implement additional hazard monitoring capabilities.	Completed	Example: The South Jordan emergency manager receives alerts from the USGS and NWS via text message and email
All Hazards	2009	1 – Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	Completed	South Jordan has formal agreements for Police, Fire, and Water
All Hazards	2009	2 – Pursue and implement needed mutual-aid agreements	Completed	South Jordan is currently working on participation in a new public works MAA
All Hazards	2009	1 – Establish and enforce appropriate planning, zoning, and building code ordinances	Completed	South Jordan enforces all current ordinances and building codes including ordinances like our Flood Damage Prevention and Land Disturbance ordinances.
Drought	2009	2 – Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	Completed	South Jordan has hired a Water Conservation Manager who coordinates with the Jordan Valley Water Conservancy District and leads the City's programs for water conservation
Drought	2009	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Completed	South Jordan has a variety of incentive programs that it offers to its residents related to water conservation.
Drought	2009	4 – Implement water-saving devices and practices in public facilities	Completed	South Jordan has implemented several projects including using secondary water to irrigate public parks instead of culinary water
Drought	2009	5 – Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	Completed	The South Jordan Water Division responds immediately to all reports of leaks and performs regular system maintenance, including actively monitoring for leaks, theft of services, etc.
Drought	2009	6 – Coordinate public safety water use, such as hydrant testing	Completed	The South Jordan Water Division coordinates all water use, including the testing of hydrants in partnership with the fire department

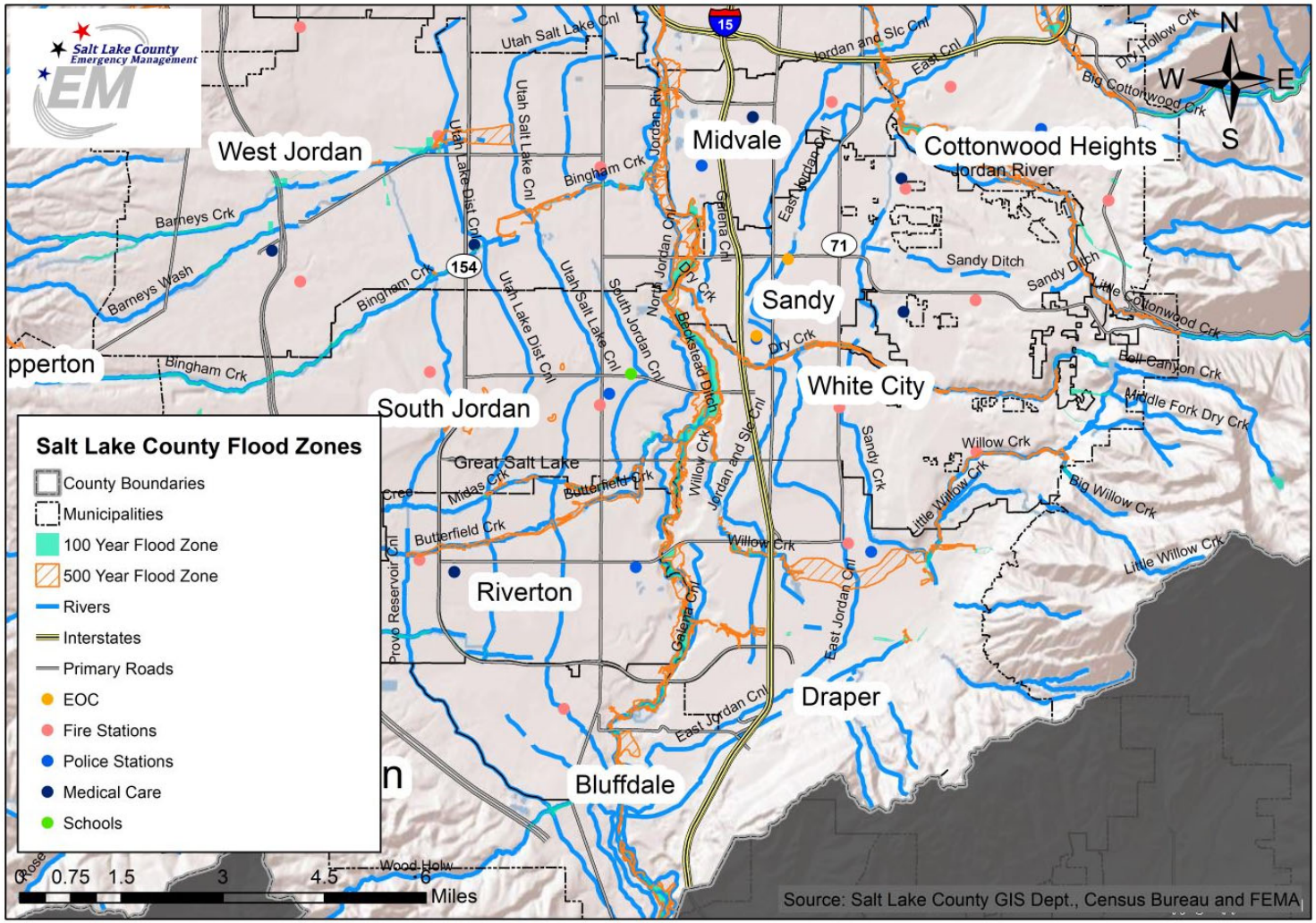
Drought	2009	7 – Provide information on landscaping alternatives for persons subject to green area requirements	Completed	South Jordan offers a variety of information and training classes on topics ranging from proper sprinkler use and maintenance to alternative plants and other vegetation that can be used.
Drought	2009	1 – Identify and assess structures for deficiencies	Completed	The City Engineering Division in cooperation with the Public Works Department regularly review and inspect City-owned infrastructure and make recommendations as needed
Severe Weather	2009	Meet with NWS representative on an annual basis to receive information on new services and alerts available	Completed	South Jordan participates in briefings provided by NWS representatives on an annual basis
Slope Failure	2009	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Completed	South Jordan Engineering and Planning reviews recommendations as provided pertaining to development within the City
Wildland Fire	2009	2 – Define wildland-urban interface and develop digital maps of the WUI	Completed	South Jordan GIS and Fire Department have created maps indicating areas that may have an increased risk for wildfire.

Jurisdiction Maps

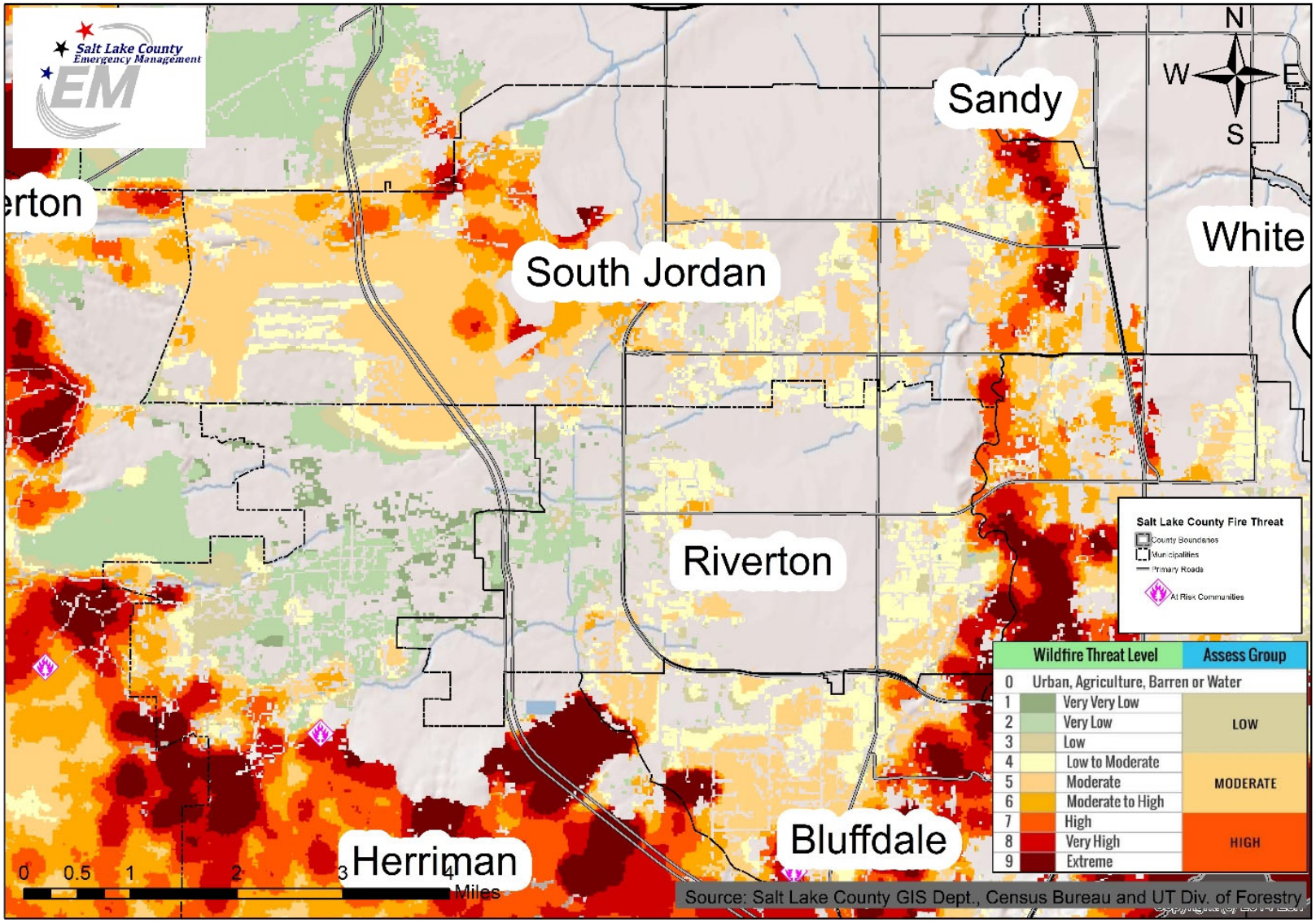
Map: 100 Year and 500 Year Flood Zone



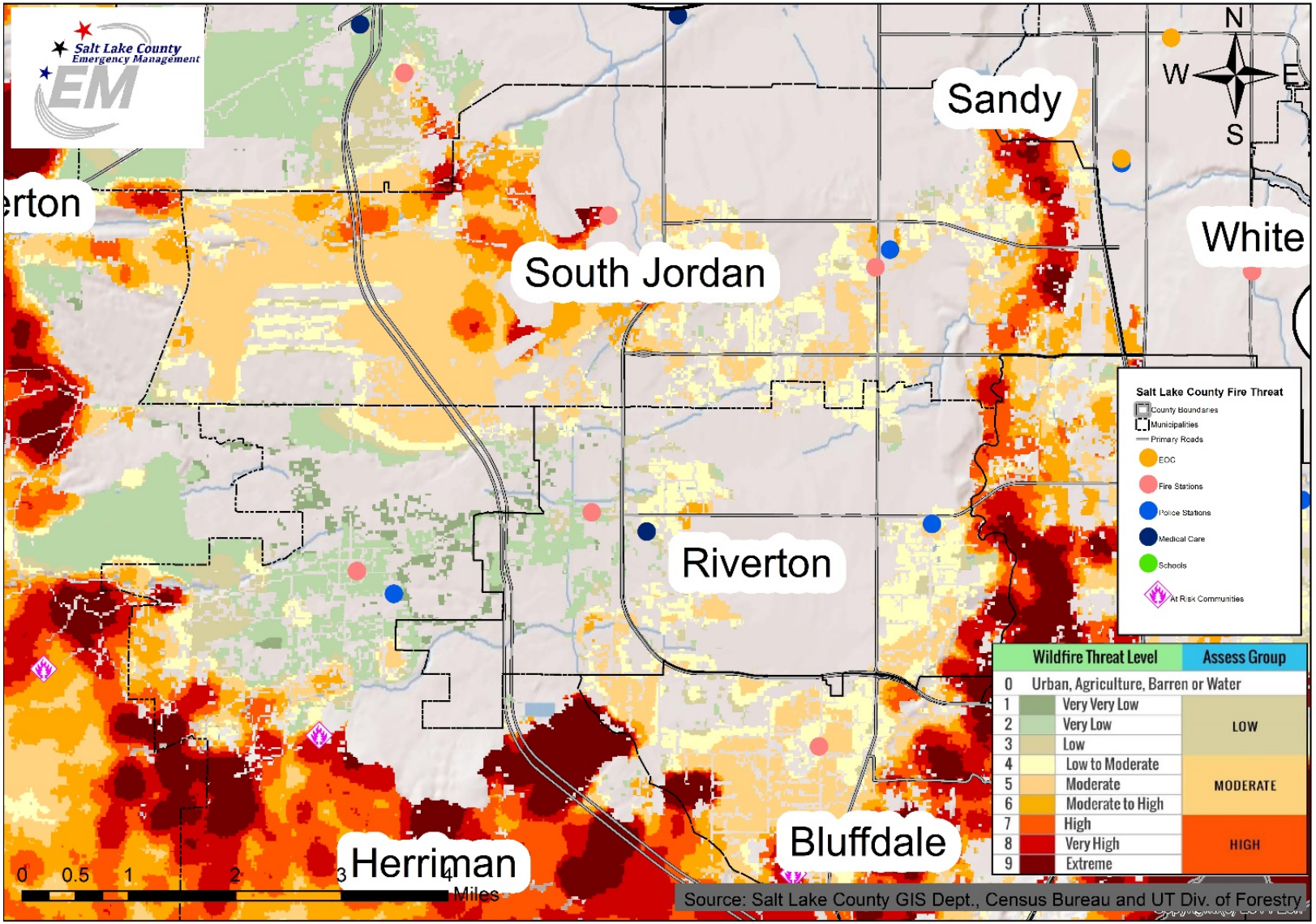
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



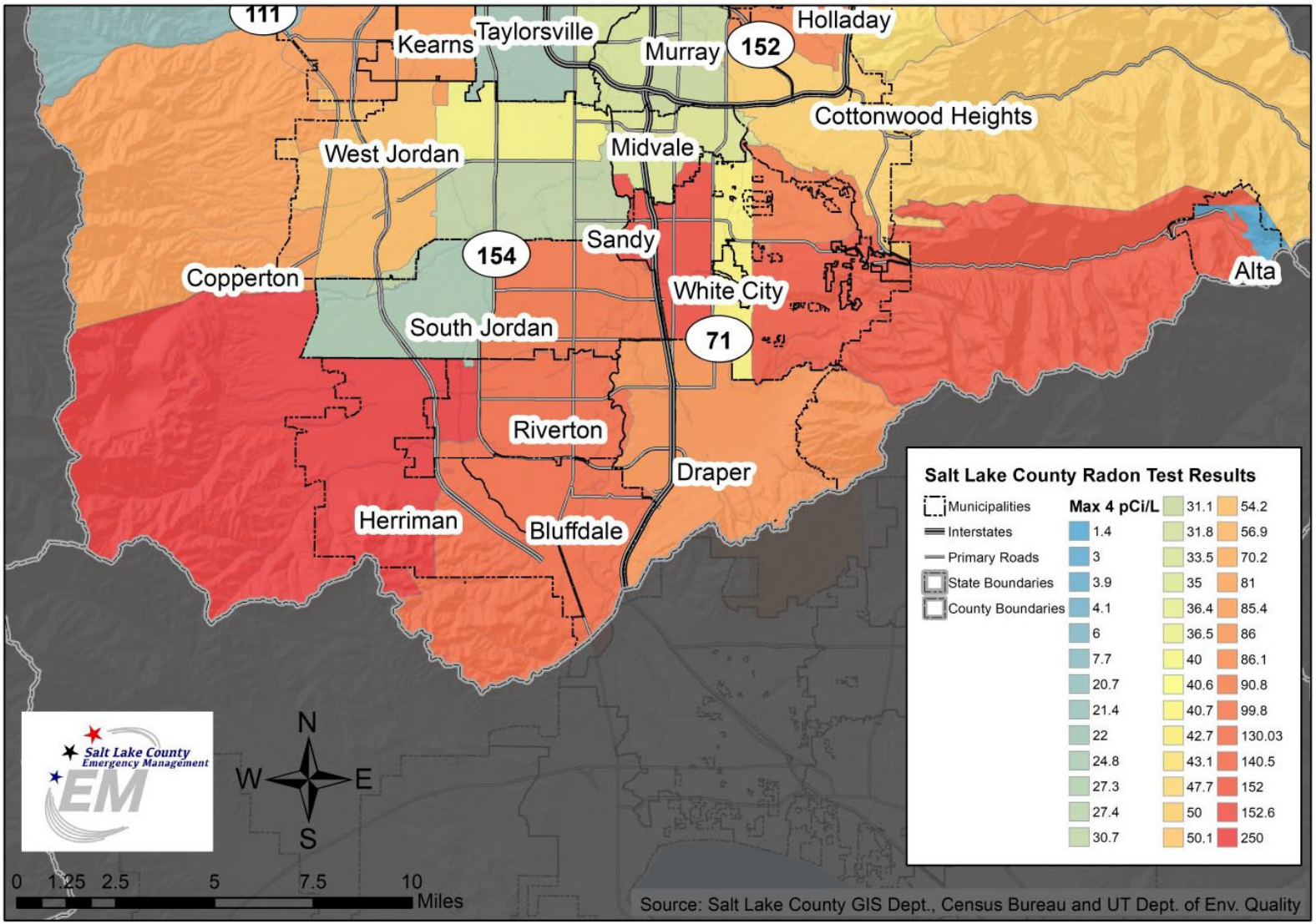
Map: Wildfire Threat Level



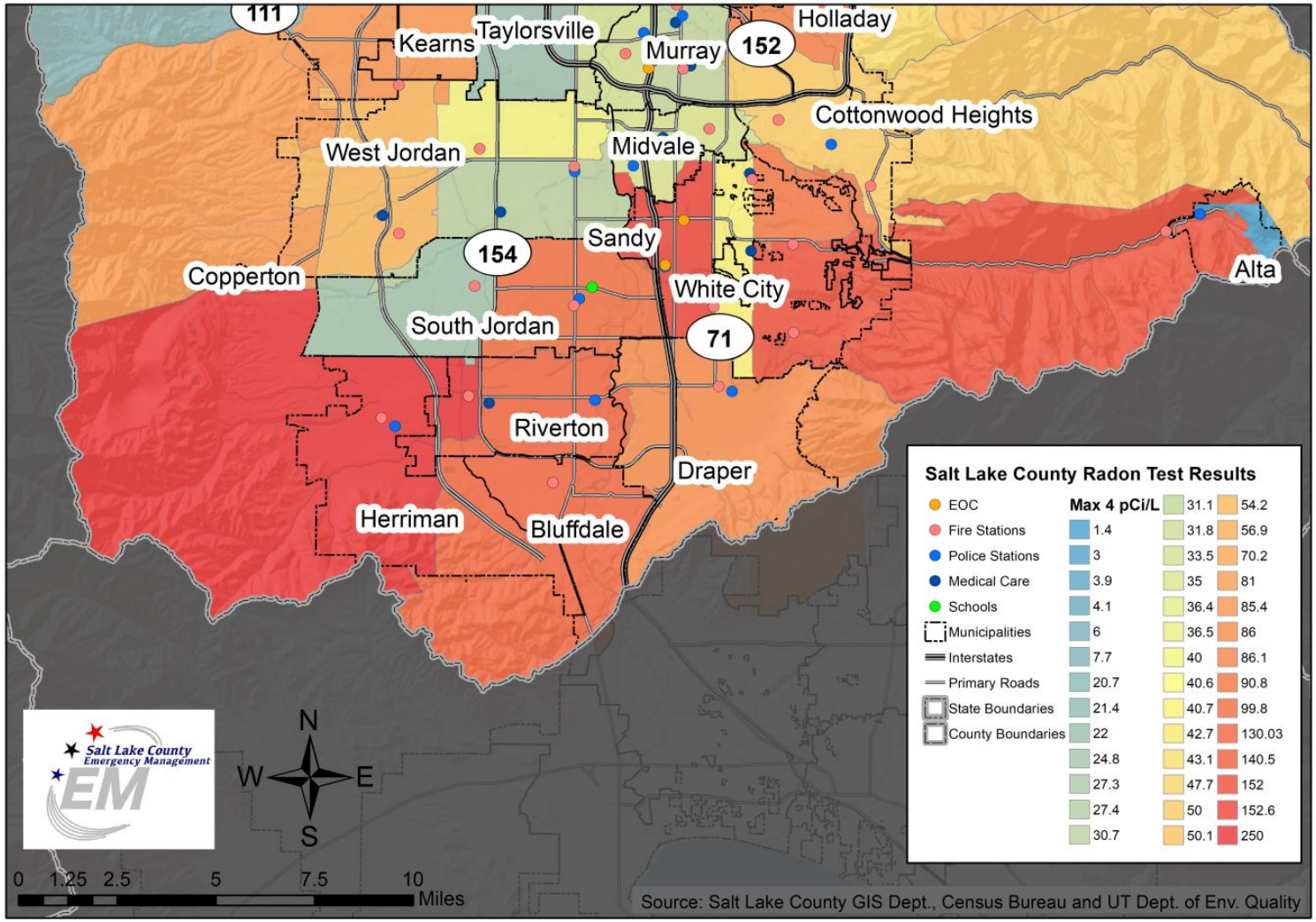
Map: Wildfire Threat Level with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of South Salt Lake

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Blaine Daimaru Title: Emergency Manager Department: Fire Address: 220 East Morris Ave. South Salt Lake, UT 84115 Office Phone: (801) 464-6726 Cell Phone: (801) 673-2390 Email Address: bdaimaru@southsaltlakecity.com Website: http://www.southsaltlakecity.com/department-listings/fire/communityeducation

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1938
- **Current Population:** 25,365 (Census v2018)
- **Population Growth:** The population has grown 7.6% from April 1, 2010 (23,574) to July 1, 2018 (Census).
- **Location and Description:** The City of South Salt Lake is located at the heart of Salt Lake County and is central to the region's employment, transportation, and government partners. The City occupies 7 square miles and shares borders with Salt Lake City, West Valley, and Unincorporated Salt Lake County.
- **Brief History:** Originally, South Salt Lake was made up of three distinct unincorporated areas: Millcreek to the north, Central Park and Southgate to the south. Jesse Fox Jr. developed the area South Salt Lake refers to as Central Park around 1890. It runs approximately from State Street to 300 East and 2500 South to 3000 South. On Thursday, September 29, 1938, a meeting was called to order at 8:30 p.m. by Robert R. Fitts. Also, in attendance at this meeting were Alma Kasteler, A.S. Dykman, Clyde H. Peck, and Ariel A. Jensen. The official resolution as passed by Salt Lake County creating the Town of South Salt Lake and appointing the first town board was read. Board members took their oath before Justice Herman Gygi. And so, it began, the Town of South Salt Lake with Mr. Fitts as the first town president. The town was created because of a need for a sewer system. Salt Lake City was going to annex the area in 1936 but couldn't get a sewer system to the area for several years. According to Mr. Fitts, the community needed other things as well, like a bank, post office, and fire department. After a close vote, residents approved incorporation. The sewer system was a Works Project Administration project. The deadline to file the sewer system plans was two days after the city was incorporated. The project began in 1939 at a cost of $462,000. The original boundary of South Salt Lake was from 5th East to 3rd West and 2100 South to the center of Millcreek stream. Over the years the population grew, businesses came, and schools were built. On August 1, 1950, the population was such that the Town of South Salt Lake became the City of South Salt Lake and declared a third-class city by the county. This changed the form of government to a mayor and city council. During his administration, Marlow Callahan went from Town President to the first mayor of The City of South Salt Lake. In the 1990s, South Salt Lake

annexed portions of unincorporated Salt Lake County to the south, and nearly doubled the boundaries of the City and population.

- **Climate:** The City of South Salt Lake has an average annual temperature of 52 degrees F and receives an average of 16.1 inches of rain. While the average temperature is relatively temperate, each season can bring unique and sometimes unpredictable weather patterns. During the summer months, the average temperature can exceed 90 degrees F. In the winter months the average temperature is 27 degrees F with temperatures dipping below well below during the night time hours.
- **Public Services:** The city has numerous departments, including the newly established Urban Livability Department. In addition to this department, others related to mitigation include work closely with other city departments; Community Development Department, Public Works, Police Department, Fire Department, City Attorney's Office, and the Salt Lake County Health Department (South Salt Lake).
- **Governing Body Format:** South Salt Lake City is divided into five geographic districts, with a council member representing each district. Additionally, there are two council members who represent the entire city as At Large representatives. The city also has a mayor. Additionally, South Salt Lake City is divided into five geographic districts, with planning commissioners representing each district. The city has a Redevelopment Agency (RDA), which is a tool used by local governments to clean up blight and to implement the development goals of communities. Each RDA consists of the elected council or commission which is the RDA Board by state statute. The RDA Board adopts the plans, policies, and budgets which are implemented by the agency. The city also has an award-winning youth city council is a city-sponsored organization made up of local high school students (South Salt Lake).
- **Development Trends:** The City is a major business provider of the County with over 2,000 businesses and brings approximately 40,000 workers to the City each day. Business areas account for approximately two-thirds of the land-use area of jurisdiction. The municipality is the crossroads for the region's transportation network. The major interstates of I-15 and I-80 intersect within the municipal boundaries. The City's residents are among the highest users of public transportation thanks to major bus routes, three light rail stations and three new stops as part of the South Salt Lake/Salt Lake City streetcar. The City is also the center for government, utility, and education. The State of Utah, Salt Lake County, Utah Transit Authority, and Granite School District have offices and key facilities in South Salt Lake which encompasses approximately 21% of the land in South Salt Lake. Due to the City's proximity to Salt Lake City and vast transit networks, the City has seen a substantial increase in homebuilding. Because the City is essential "built out" land is in short supply and the cost of land can be expensive. For this reason, most development in the City is more of urban nature with small-lot single-family detached homes, townhomes and multi-family development.

Capability Assessment

The city maintains a full-time staff of 0 and part-time staff of 2 individuals. The Emergency Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the City's Elected and Current Administration.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY				
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances & Requirements**	**Comments**
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	No	
Zonings Ordinance(s)	Yes	Yes	No	
Subdivision Ordinance(s)	Yes	Yes	No	
Stormwater Management Program	Yes	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	Yes	
Post Disaster Recovery Program and Ordinance(s)	Yes	No	Yes	
Real Estate Disclosure Ordinance(s)	Yes	No	-	
Growth Management	Yes	Yes	-	
Site Plan Review Requirements	Yes	Yes	-	

Planning Documents				
General or Comprehensive Plan	Yes	Yes	-	
Capital Improvement Plan	Yes	No	-	
Economic Development Plan	Yes	Yes	-	
Disaster Planning Documents				
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	-	
Post-Disaster Recovery Plan	Yes	No	-	
Continuity of Operations Plan	Yes	No	-	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	-	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes

Development Impact Fees for Homebuyers or Developers	Yes
Other	-

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	
Planners or engineers with an understanding of natural hazards	Yes	Full Time	
Personnel skilled or trained in GIS applications	Yes	Full Time	
Emergency manager	Yes	Part Time	
Grant writers	No	NA	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Community Development
Who is your jurisdiction's floodplain administrator? (department/position)	None
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes/General Training
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**

Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 23 policies were in force with total coverage of $6,845,200 and total written premium and FPF of $26,854 (FEMA, 2019).
- The City of South Salt Lake does participate in the National Flood Insurance Program (CID # 490219) and the last FIRM map for the area was issued on 08/02/12 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	7 inches of snow		3/28/2019	
High Wind	widespread power outages		6/12/2017	$40,000 in property damage
Winter Storm	8 inches of snow		1/20/2017	
Hail	penny-sized hail		8/10/2016	
Winter Storm	6 inches of snow and hundreds of car accidents		3/2/2015	
Winter Storm	6 inches of snow		12/7/2013	
High Wind	Power lines were knocked down in multiple locations, most notably in South Salt Lake		4/8/2013	$35,000 in property damage
Winter Storm	8 inches of snow		1/27/2013	

Winter Storm	14 inches of snow		1/10/2017	$1,000 in property damage
Thunderstorm Wind	Thunderstorm winds caused a 20' tree to fall on a 2 story home in South Salt Lake.		7/30/2018	$10,000 in property damage

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	**Number in Community**
Members of the community over 65 years old	1,657
Members of the community under 18 years old	6,082
Members of the community that identify as having disability status	2,394
Members of the community that speak English less than "very well"	3,503
Members of the community living below the poverty line	5,240
The number of mobile homes in the community	98
Members of the community without health insurance	5,125
Occupied housing units with tenants without a vehicle	1,005
Housing units without heating fuel	67

*County jail is located in South Salt Lake. The Homeless Resource Center will be in the city.

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

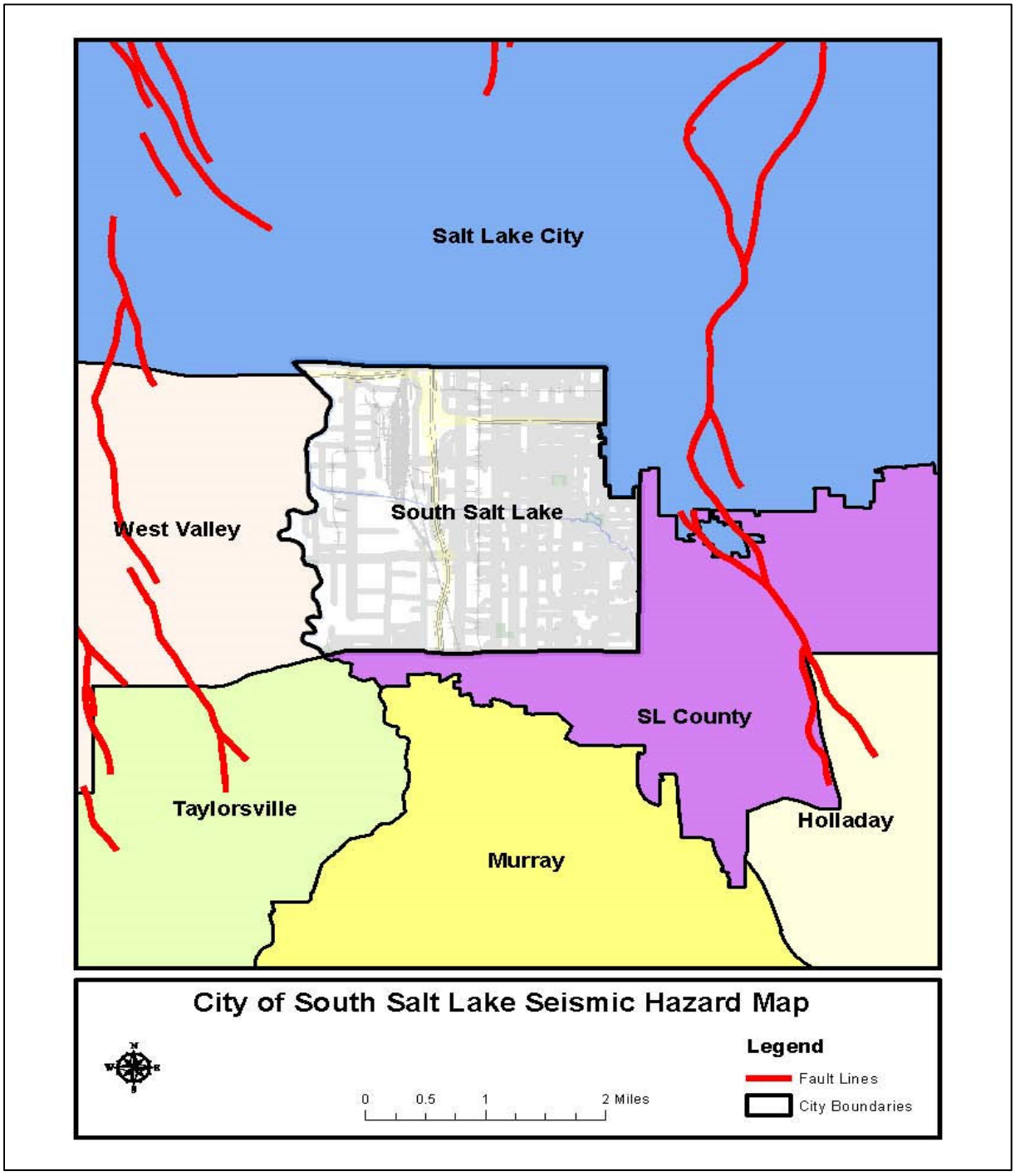
Extreme Temperatures: Temperatures above 95 and below 32 are not uncommon in the area. These temperatures can yield negative health consequences. The area has a high number of individuals without health insurance and accessing adequate treatment could be a problem.

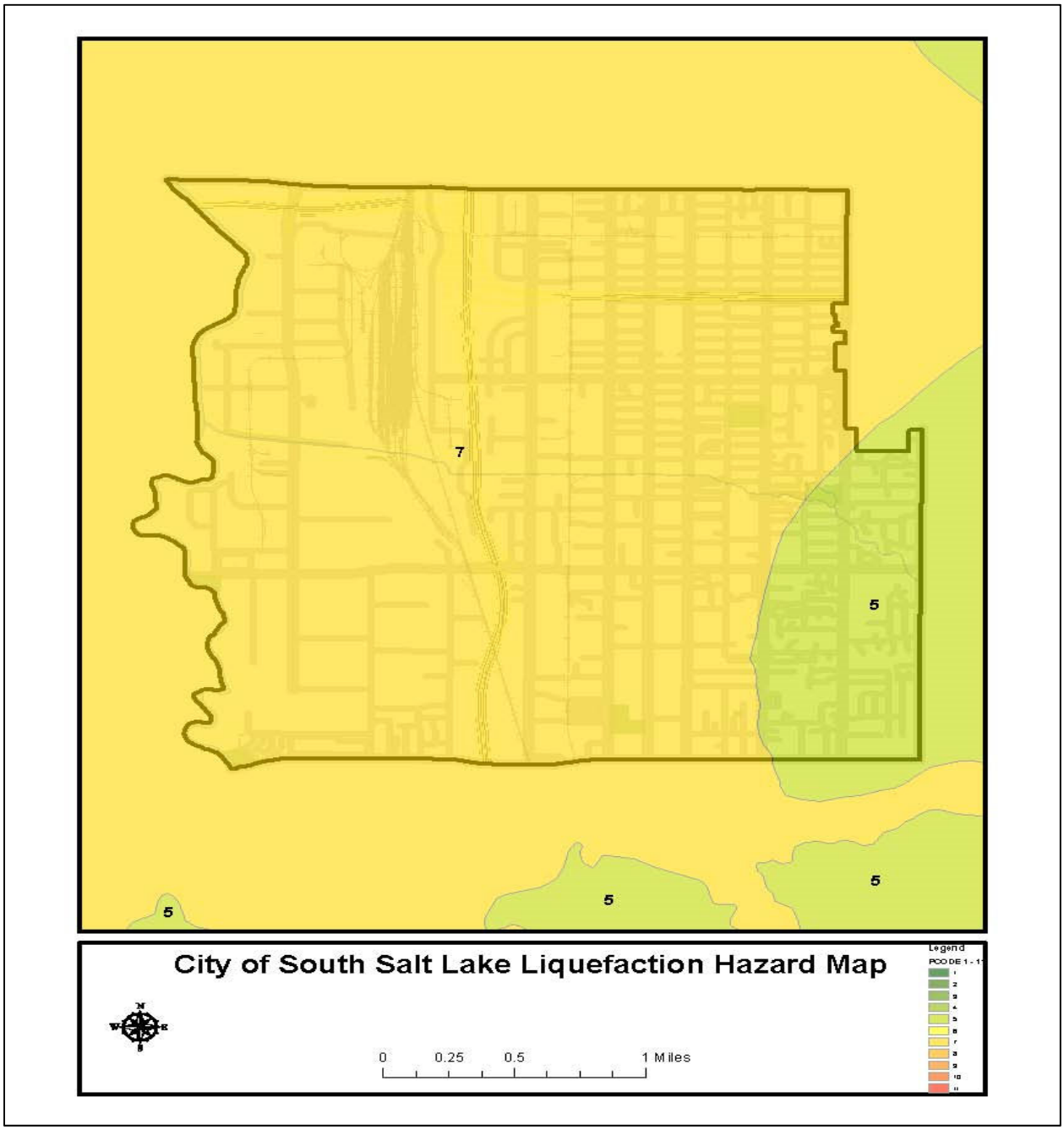
Winter Storms: These events are not uncommon and can highly impact traffic and business continuity. South Salt Lake has a very high vulnerable population.

High Wind: These events can knock out power, which for sustained periods can yield negative health effects, especially for elderly members of the community.

Hazardous Materials: New apartment complexes are being built in the city, and some are in close proximity to the rail line.

Earthquake (Seismic Hazard):

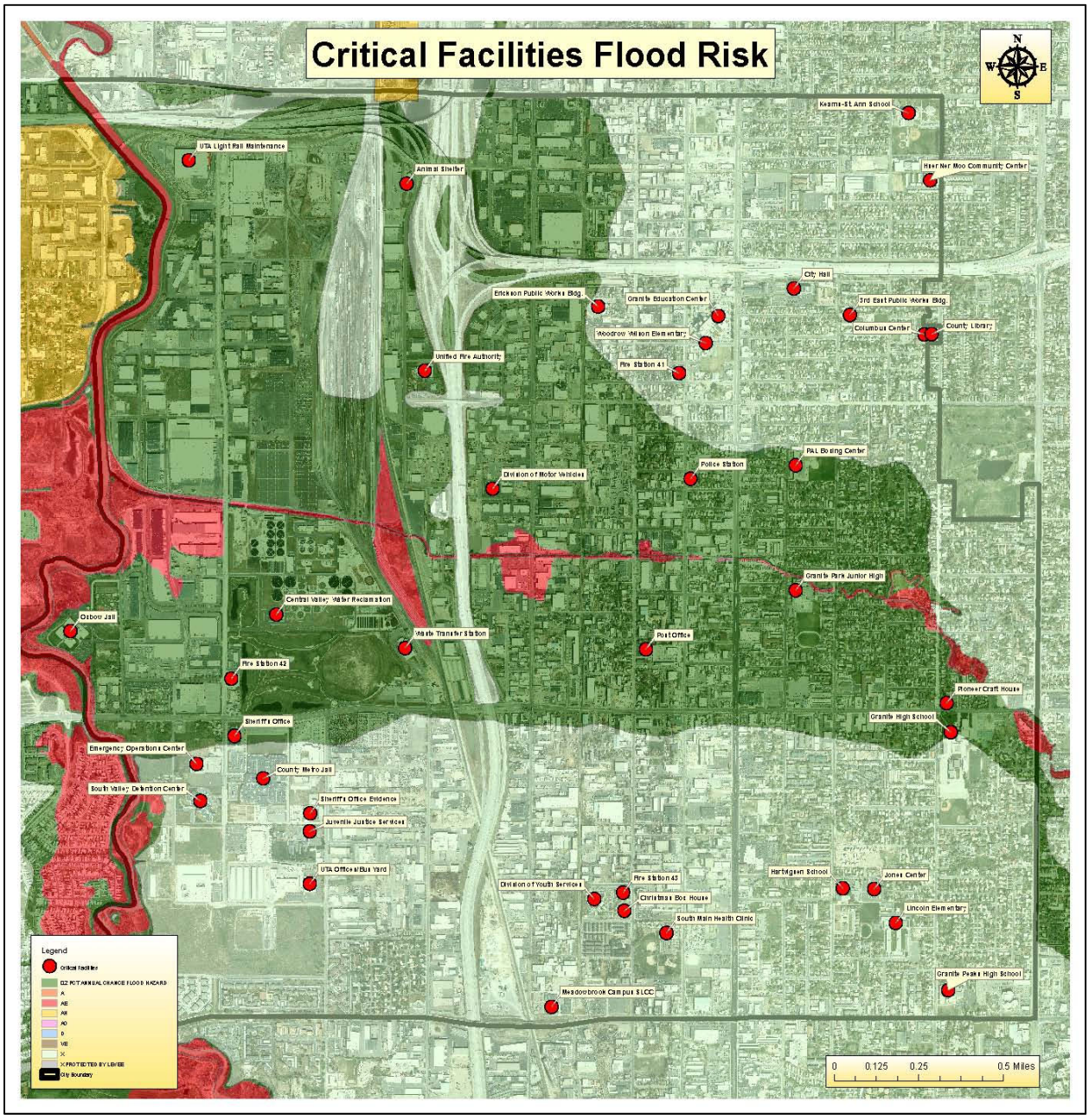




Liquefaction Hazard and Damage Estimates:

- PCODE 5: $450,839,620
- PCODE 7: $3,091,978,400

Flooding:

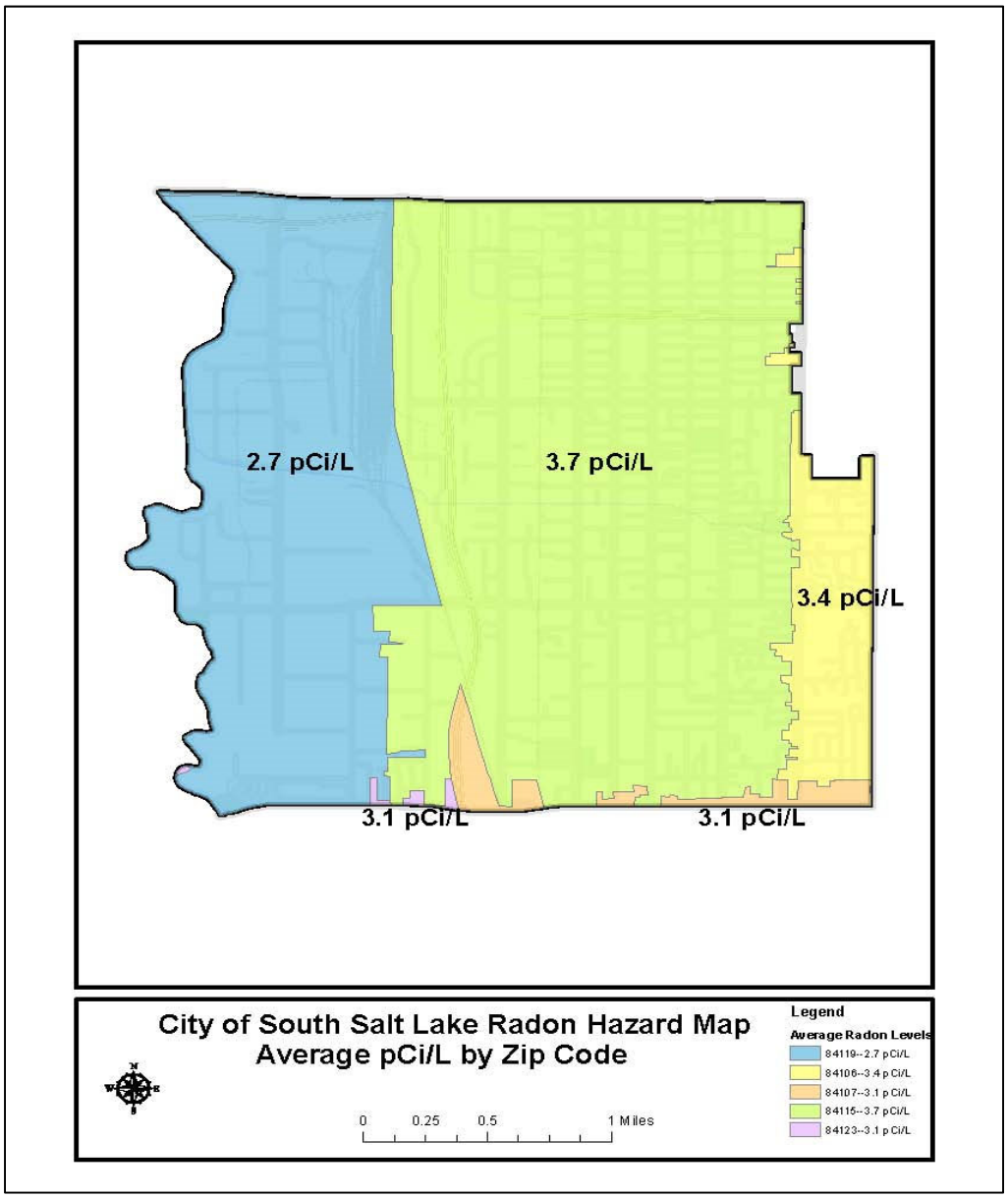


Flood Hazard:

- AE flood zone: $111,586,350
- .2 flood zone: $1,465,354,400
- X flood zone: $2,129,059,520

Radon: Radon is a radioactive gas that has no smell, taste, or color. It comes from the natural decay of uranium that is found in nearly all rock and soil. When geologic conditions are favorable, the potential increases for high indoor levels of radon.

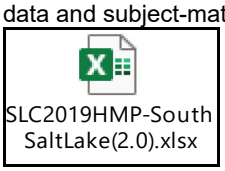
Outdoor radon levels never reach dangerous concentrations because air movement scatters radon into the atmosphere. Radon is a hazard in buildings because the gas collects in enclosed spaces. Radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer. Radon is the second leading cause of lung cancer in the United States.



Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	19	38
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Radon	3	6	18
Dam Failure	1	17	17
Tornado	1	12	12
Civil Disturbance	1	8	8
Wildfire	1	3	3
Landslide and Slope Failure	1	0	0
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	No Impact	0	0

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	No Impact	0	0		Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	No Impact	0	0		Wildfire	No Impact	0	0

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	No Impact	0	0
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	No Impact	0	0

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct an inventory and assessment of communications equipment and systems and identify needs	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	So. S.L. Emergency Management		Medium	Low	Local	Medium	Ongoing	So. S.L. continues to improve and maintain its communication capabilities.
Conduct Training and awareness activities on communication equipment, tools, and systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	So. S.L. Emergency Management		High	Low	Local	High	Completed /Ongoing	So. S.L. participates in training and exercises designed to practice using communication tools and equipment. Example: using amateur radio volunteers to support special events like the 4TH of July Celebration to exercise its communication equipment as well as to train and practice.

Establish agreements to share communications equipment between agencies involved in emergency operations	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	So. S.L. Emergency Management	Communications	Medium	Low	Local	Medium	Ongoing	No formal agreements exist to share communications equipment, but communications equipment can be shared as part of other mutual aid agreements that are in place
Establish notification capabilities and procedures for emergency personnel	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	So. S.L. Emergency Management	Communications	High	Low	Local	High	Ongoing	So. S.L. continues to work on notification tools and procedures to be in harmony with changing technology and equipment
Evaluate vulnerability of critical communications systems	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	All Hazards	Public Works and Communications	So. S.L. Emergency Management	High	Low	Local	High	Ongoing	So. S.L. evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable
Establish a coordinating group to address long-term communication needs and	2009	1 – Improve and maintain communications capabilities for emergency operations	All Hazards	So. S.L. Emergency Management	Communications	Medium	Low	Local	Low	Ongoing	No formal coordinating group exists yet, but So S.L. engages in discussions with other jurisdictions

implementation strategies		1.3 – Conduct communications Strategic Planning									and the county regarding this issue
Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards	Communications	So. S.L. Emergency Management	High	Low	Local	High	Ongoing	So. S.L. has upgraded existing equipment and purchased new equipment to maintain operability
Utilize GIS to identify facilities and infrastructure at risk	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All Hazards	GIS	So. S.L. Emergency Management	High	Medium	Local	High	Ongoing	So. S.L. GIS, Fire and Emergency and Risk Management personnel are working on a risk assessment on all structures in the city to evaluate their level of risk
Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All Hazards	Public Works	So. S.L. Emergency Management, GIS, and Fire	High	Medium	Local	High	In Process	So. S.L. GIS, Fire and Emergency and Risk Management personnel are working on a risk assessment on all structures in the city to evaluate their level of risk

emergency procedures											
Pursue and implement needed mutual-aid agreements	2009	4 – Improve response capabilities through mutual-aid agreements 4.1 – Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements	All Hazards	So. S.L. Emergency Management		Medium	Low	Local	Medium	Completed / Ongoing	So. S.L. is currently working on participation in a new public works MAA
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – establish a comprehensive public education program	All Hazards	So. S.L. Emergency Management		Medium	Low	Local	Medium	In Process	So. S.L. Emergency Management is meeting with groups to discuss the hazards in the community and what residents can do to be prepared
Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	All Hazards	So. S.L. Emergency Management		Medium	Low	Local	Medium	Ongoing	So. S.L. Emergency Management is meeting with groups to discuss the hazards in the community and what residents can do to be prepared

Provide information on landscaping alternatives for persons subject to green area requirements	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	Drought	So. S.L. Emergency Management		Medium	Low	Local	Low	Ongoing	So. S.L. encourages water conservation
Identify structures at risk to earthquake damage	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	Public Works	So. S.L. Emergency Management, GIS, and Fire	High	Medium	Local	High	In Process	So. S.L. GIS, Fire and Emergency and Risk Management personnel are working on a risk assessment on all structures in the city to evaluate their level of risk
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flood	City Engineer and Public Works		High	Medium	Local	High	Completed / Ongoing	The City Engineer and Public Works Director regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood	Flood	City Engineer and Public Works		High	High	State and Federal Grants such as HMA	High	Completed / Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures

other flood control structures		control measures, particularly in new developments									
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	Flood	Public Works		High	Medium to High	Local and as needed, apply for state and federal grants	High	Completed / Ongoing	The Public Works Department continues to maintain and repair all drainage systems in the City
Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flood	City Engineer and Public Works		High	Medium	Local	High	Completed / Ongoing	The City Engineering Office in cooperation with the Public Works Department regularly review and inspect City-owned infrastructure and make recommendations as needed
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for	Flood	City Engineer and Public Works		High	Medium to High	Local and as needed, apply for state and federal grants	High	Completed / Ongoing	The City Engineering Office in cooperation with the Public Works Department make repairs as needed to deficient structures

		failure of flood control structures									
Train and Certify City Inspectors to Conduct Pre/Post-Disaster Damage Assessment	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Earthquake	South Salt Lake Community Development Department		High	Low - $2,500	General Fund	High	As trainings become available in the local area	This will improve response and the recovery during an event through pre-training and certifications. Currently our staff is certified in the model codes (International Building, Plumbing, Mechanical, International Residential and NFPA Electrical code). Specific training will enhance the individuals responsible for preforming the assessment of structures and facilities impacted by disasters. City inspectors will play a vital role in pre-disaster building assessment for city owned public buildings by training on potential seismic issues. Pre-training is vital for both response and recovery to reduce in loss of life, relocate populations, and

											ensure in the rebuilding of the local economies.
Conduct a Seismic Vulnerability Assessment of City owned critical facilities	2014	Goal 2 Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	South Salt Lake Community Development Department		High	Medium - Inspector Salary	General Fund	High	Ongoing	The city is interested in preforming a building-specific, seismic vulnerability assessment of city-owned critical facilities, and to include the infrastructure. Included in this assessment will be recommended mitigation alternatives that meet the goals and objectives of this plan. This will prevent the loss of human life, economic and property loss to City owned facilities
Conduct a Geotechnical Study	2014	Goal 1 Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Problem Soils	South Salt Lake Community Development and Public Works departments		High	High	Paid for by developer.	High	Ongoing	The city requires a soils investigation report referred to as “Geotechnical Study” on most large building or structures. Geotechnical studies play a major role for site development projects. This study

		Goal 2 Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									has been required for the better part of five years. Two conditions play a substantial part in South Salt Lake City soil make up, ground water and lake bottom type soils. Much of our city is located on or close to an aquifer. The City and developer know what types of soils that are being built upon. An engineer is makes recommendations for structural and soil improvements.

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Action	Status	Comments
All Hazards	2009	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Not Addressed	Funding constraints
All Hazards	2009	2 – Identify and implement additional hazard monitoring capabilities.	Not Addressed	Funding constraints
Dam Failure	2009	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Not Applicable	This is not applicable to So. S.L.

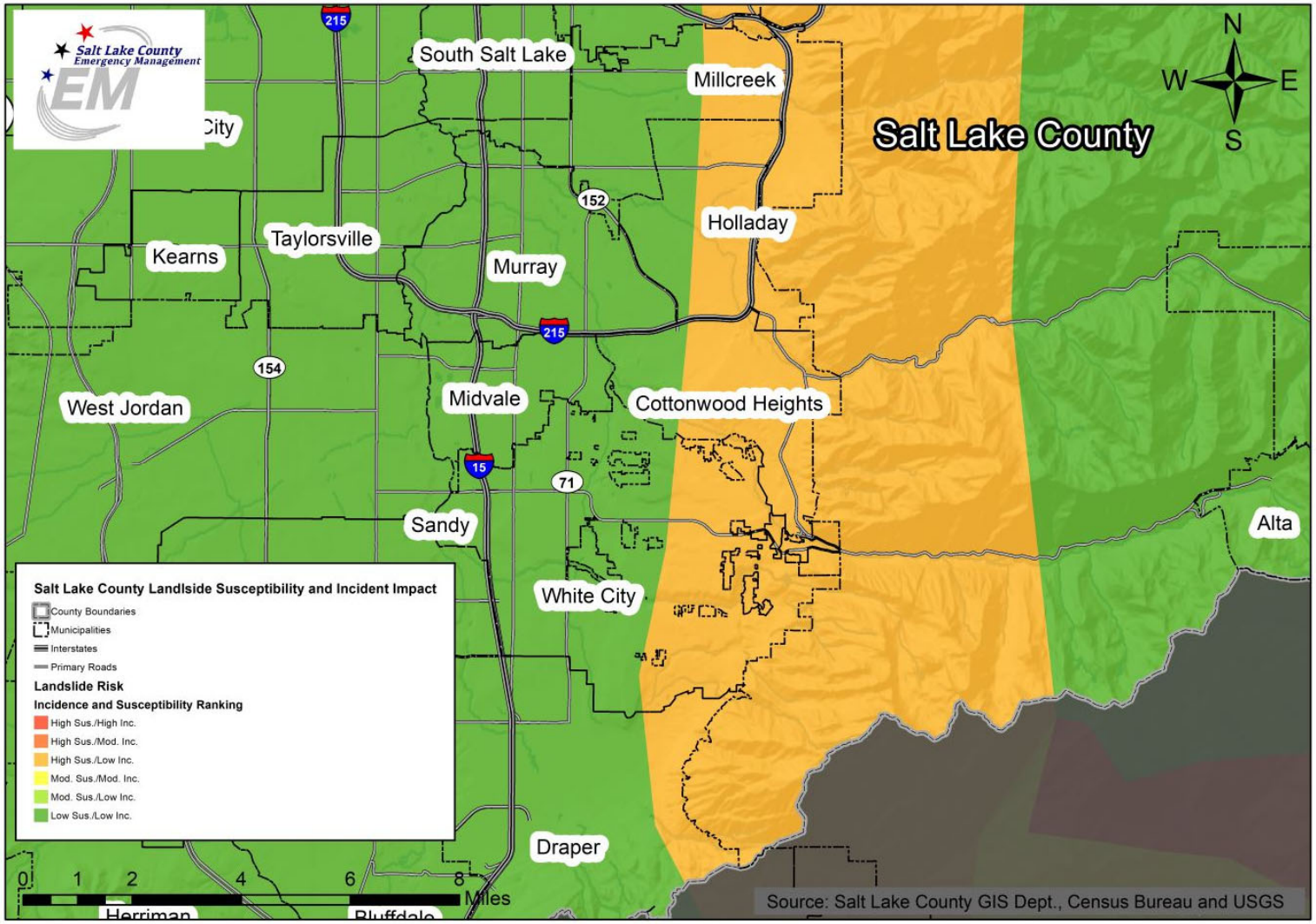
Dam Failure	2009	2 – Utilize inundation maps to identify potential evacuation areas and routes	Not Applicable	Coordinate through other GIS initiatives
Drought	2009	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Not Applicable	Funding constraints
Drought	2009	1 – Set up livestock water rotation in areas of agricultural use	Not Applicable	This is not applicable to So. S.L.
Drought	2009	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Not Applicable	This is not applicable to So. S.L.
Earthquake	2009	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not Applicable	No Research
Earthquake	2009	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Addressed	Funding constraints
Earthquake	2009	1 – Provide educational materials to unreinforced masonry home and business owners	Not Addressed	Focus on other educational outreach
Earthquake	2009	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Applicable	Funding constraints
Flooding	2009	1 – Assist Cities with NFIP application	Not Addressed	City participates in NFIP
Flooding	2009	2 – Encourage Communities to actively participate in NFIP	Not Addressed	City participates in NFIP
Severe Weather	2009	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Applicable	So. S.L. does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	2 – Maintain Contact with NWS prior to re-application in 2010	Not Applicable	So. S.L does not have a Weather Operations Plan and does not participate in the StormReady

				program. This is a Salt Lake County level program
Severe Weather	2009	1 – Meet with NWS representative on an annual basis to receive information on new services and alerts available	Not Applicable	Coordinate with County
Severe Weather	2009	2 – Assist NWS in making other agencies and departments aware of available resources	Not Applicable	Coordinate with County
Severe Weather	2009	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	Not Applicable	Coordinate with County
Severe Weather	2009	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Applicable	Coordinate with County
Slope Failure	2009	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Applicable	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Increase public awareness through “Firewise” program	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Work with experts and communities to develop or update evacuation plans	Not Completed	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and	Completed	Addressing of structures in So. S.L. is complete

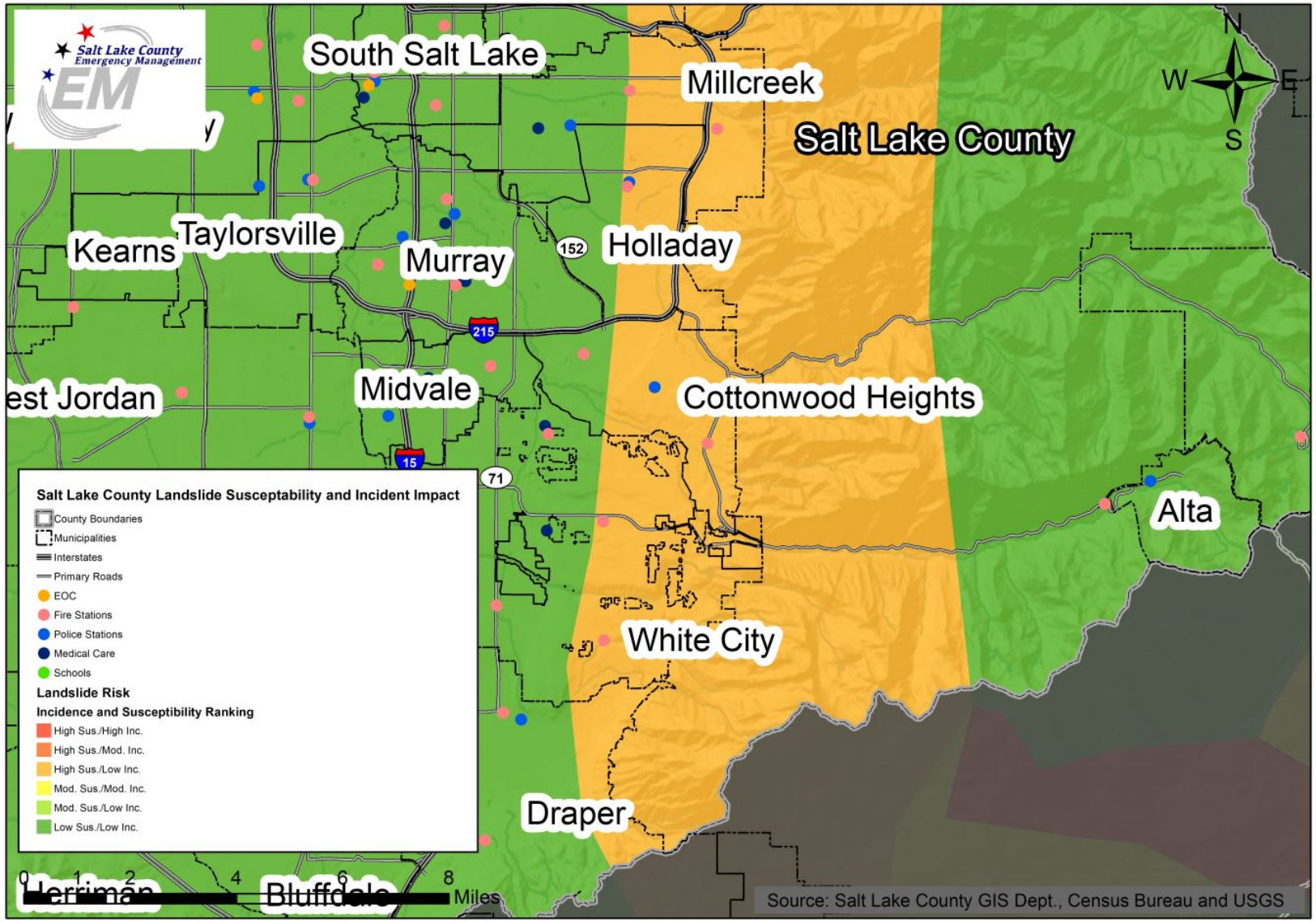
		assign addresses according to current county addressing standards		
Wildland Fire	2009	2 – Incorporate improved addresses in fire-dispatch and other databases	Completed	Addressing of structures in So. S.L. is complete
Wildland Fire	2009	1 – Reduce fuels around publically owned structures	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Implement fire breaks and other protective measures	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	The So. S.L. water system meets exceeds requirements for providing water flow for firefighting purposes in the City
Wildland Fire	2009	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Adopt the Utah Wildland-Urban Interface Code	Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Applicable	This is a very low probability event for the City and not applicable

Jurisdiction Maps

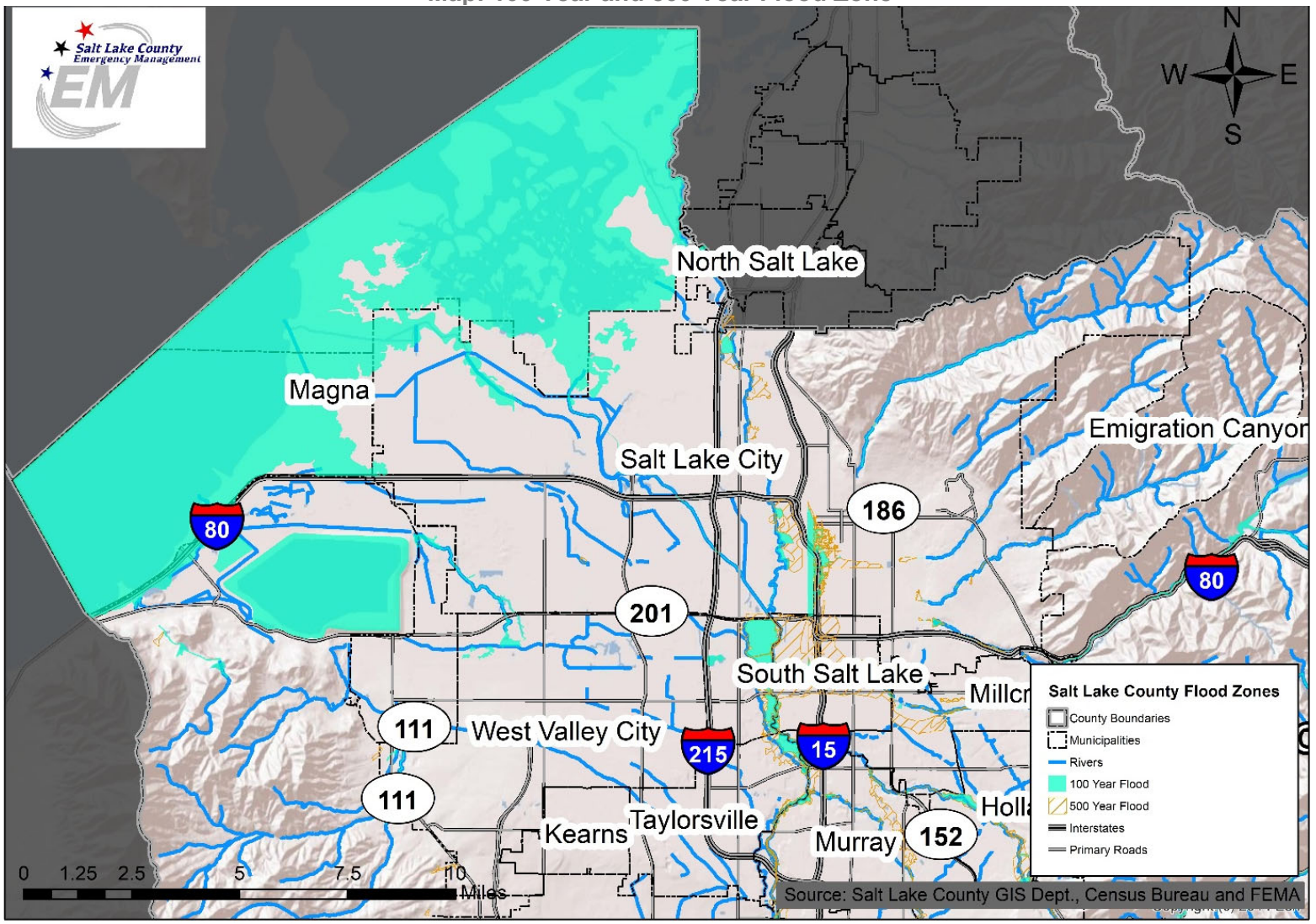
Map: Landslide Susceptibility and Incident Impact Potential



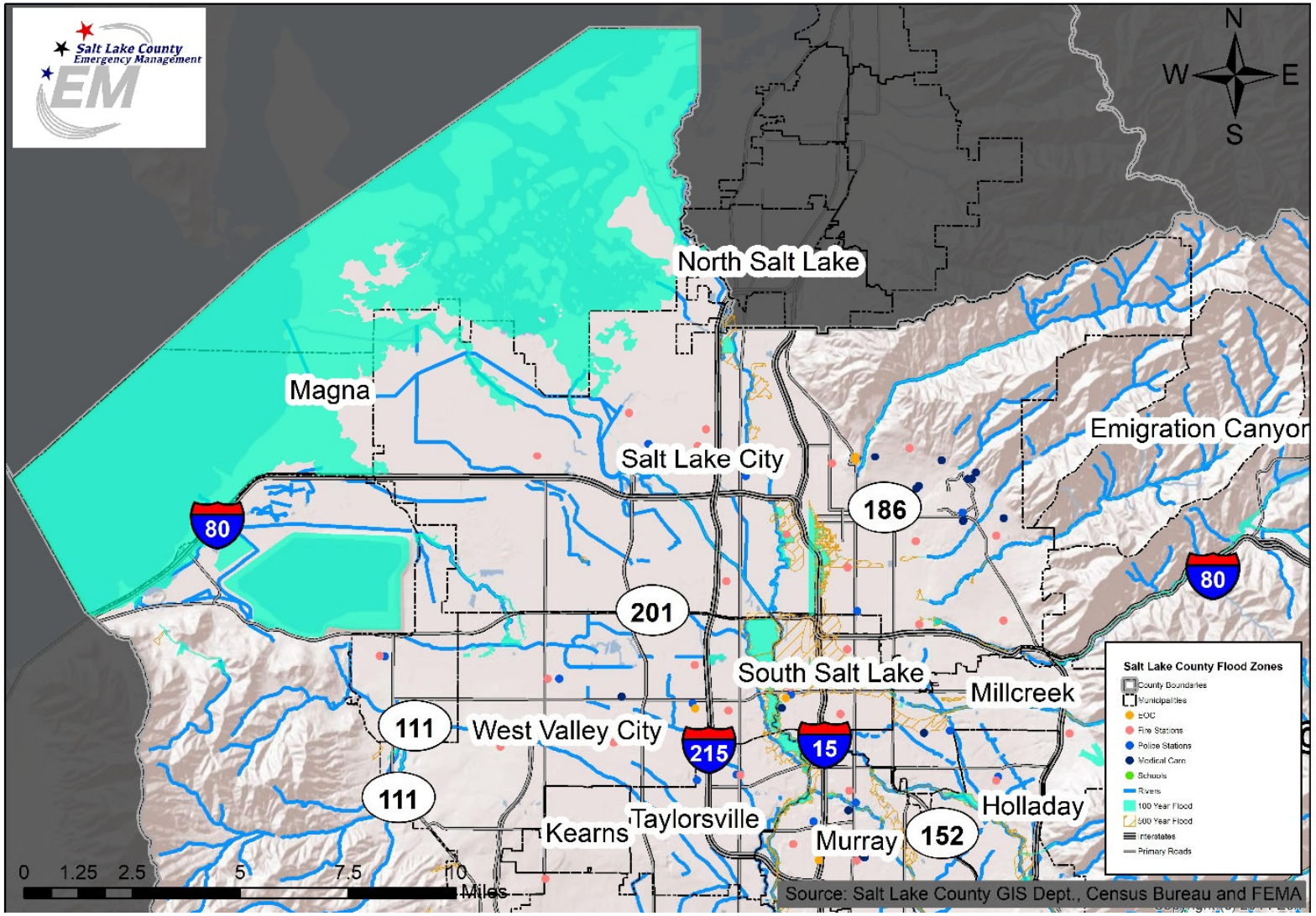
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: 100 Year and 500 Year Flood Zone



Map: 100 Year and 500 Year Flood Zone with Critical Facilities

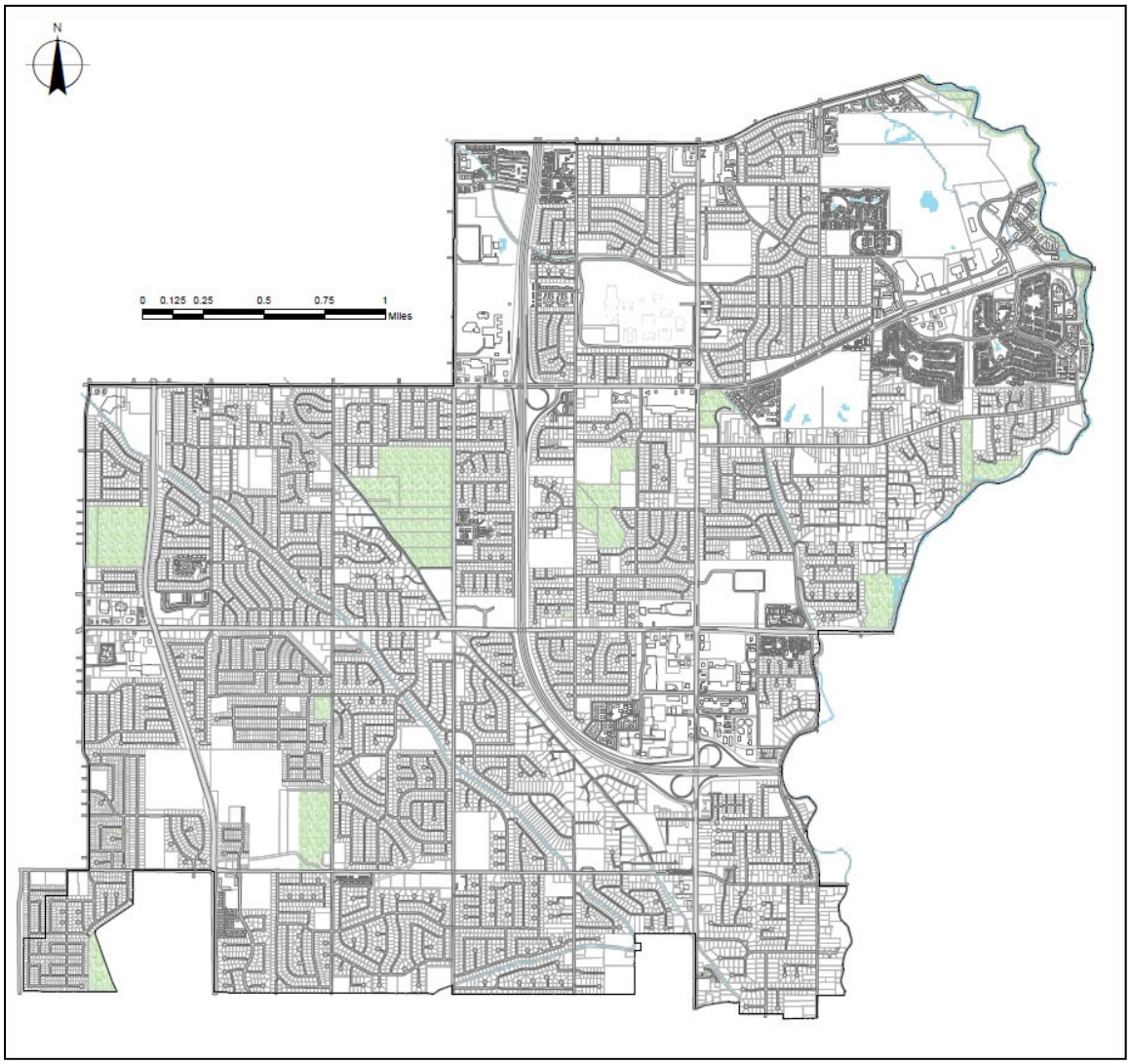


2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: City of Taylorsville

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Donny Gasu Title: Emergency Response Coordinator Department: Emergency Preparedness Address: 2600 West Taylorsville Blvd. Office Phone: (801) 955-2092 Cell Phone: (801) 707-1724 Email Address: dgasu@taylorsvilleut.gov Website: https://www.taylorsvilleut.gov/government/emergency-preparedness



Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** July 1, 1996
- **Current Population:** 60,192 (Census v2018)
- **Population Growth:** The population grew 2.6% from April 1, 2010 (58,691) to July 1, 2018 (Census).
- **Location and Description:** The City of Taylorsville is located in the center of the Salt Lake Valley lying just west of the Jordan River covering 10.8 square miles. The City is encircled by neighboring jurisdictions including West Jordan, West Valley, and Murray Cities as well as an unincorporated area, Kearns. In the near distance, the city is propped central to the Wasatch and Oquirrh Mountain ranges. Much of the land is dedicated to developed residential and commercial use while large areas still remain open.
- **Brief History:** Named after the prominent Utah figure, John Taylor who resided in what would become Taylorsville during the 1880s, the first settlers arrived in Taylorsville in 1848 utilizing the close access to the Jordan River to water their crops. The town slowly grew through the 19th century in areas known as Taylorsville, Bennion, and Kearns. Much of the area was purchased by the federal government for a military training facility during WWII which brought with it much of the infrastructure including water and sewage. In the 1980s many businesses began to develop in the area of Taylorsville bringing with them larger amounts of residents. Because of the increase in population, residents became concerned for the high growth rates affecting other aspects including public safety. Later in 1995, residents in Taylorsville, Bennion, and Kearns voted with a 70% majority to incorporate which was later completed in 1996 during the State of Utah's centennial celebrations making Taylorsville "Utah's Centennial City."
- **Climate:** The City of Taylorsville has an average annual temperature of 53.1°F and receives 14.7 inches of precipitation.
- **Public Services:** The City offers many emergency preparedness programs, including a CERT, amateur radio emergency communications, and CPR classes
- **Governing Body Format:** Taylorsville has an elected mayor and 5 elected council members. Additionally, the city has a Youth City Council (Taylorsville).
- **Development Trends:** Recently, an LDS temple was built in the city. While most of the City's land has already been developed and/or dedicated to a specific purpose, the community has continued to grow. Over the past quarter-century, the population has continued to grow at a steady rate, albeit much slower than many western cities in the County. Taylorsville is proud to have the head offices of Salt Lake Community College at its Taylorsville Redwood Campus where thousands of students are able to receive their secondary education in many trade and traditional fields. Businesses like American Express, Sorenson Research Park, Utah Department of Transportation, Nelson Laboratories as well as others are all found within the City and provide wonderful employment opportunities to many Taylorsville residents and others in the neighboring communities. To that end, the city has rolled out a "20/20 Vision" for the Year 2020 and beyond. That vision focuses on new business and economic growth taking place across the city, as well as development opportunities and projects on the horizon. It includes efforts to bring new business and housing to the city, plans for prime development locations, transportation and land use (Taylorsville).

Capability Assessment

Regulatory Tool	Yes/No
General plan	Yes
Zoning ordinance	Yes
Subdivision ordinance	Yes
Site plan review requirements	Yes
Floodplain ordinance	Yes
Other special purpose ordinance (stormwater, water conservation, wildfire)	Yes
Building code	Yes
Fire department ISO rating	Yes
Erosion or sediment control program	Yes
Stormwater management program	Yes
Capital improvements plan	Yes
Economic development plan	Yes
Local emergency operations plan	Yes
Flood Insurance Study or other engineering study for streams	Yes

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 15 policies were in force with total coverage of $3,558,000 and total written premium and FPF of $5,267 (FEMA, 2019).
- The City of Taylorsville does participate in the National Flood Insurance Program (CID # 490248) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- To date, the City of Taylorsville does not have repetitive loss properties.
- The City's Community Development Director oversees enforcement of floodplain management requirements adopted by the City, including regulating new construction in Special Flood Hazard Areas (SFHAs); Floodplain identification and mapping, including any local requests for map updates; description of community assistance and monitoring activities.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Flash Flood		-	9/11/2019	-
Heavy Snow	5 inches	-	3/28/2019	-
Heavy Snow	9 inches	-	3/13/2019	-
Heavy Snow	7 inches	-	3/1/2019	-
Heavy Snow	18 inches	-	2/3/2019	-
Hail	0.75 diameter	-	8/22/2018	-
Heavy Snow	14 inches	-	2/18/2018	-
Lightning Strike & Flash Flood	2 injured	-	7/26/2017	8,750,000 in property damage
Heavy Snow	7 inches	-	2/21/2017	-
Heavy Snow	8.5 inches	-	12/24/2015	-
Flash Flood	Heavy rain caused flash flooding in Taylorsville during the early morning hours of July 4. The flooding occurred at the Atherton Park Apartments, where water flowed into 24 basement-level apartments. Only four of these apartments experienced significant damage, but approximately 75 people were temporarily displaced by the flooding.	-	7/4/2013	$40,000 in property damage
Thunderstorm Winds	Multiple large trees were knocked down in West Jordan, South Jordan, and Taylorsville,	-	6/12/2013	$50,000 in property damage

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
	including a few that fell on houses and caused damage to roofs.			
Flash Flood	In Taylorsville, at least a half dozen homes had flooded basements near the intersection of 5400 South and 3200 West. Water caused a sinkhole to form in the roadway around 6200 South and 2700 West, buckling and collapsing the street.	-	7/26/2011	$350,000 in property damage

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	6,889
Members of the community under 18 years old	16,056
Members of the community that identify as having disability status	6,114
Members of the community that speak English less than "very well"	4,609
Members of the community living below the poverty line	6,753
The number of mobile homes in the community	901 (additionally 5 reside in a boat, RV, van, or equivalent)
Members of the community without health insurance	8,272

Occupied housing units with tenants without a vehicle	1,007
Housing units without heating fuel	45

Jurisdiction-Specific Hazards and Impacts Summary

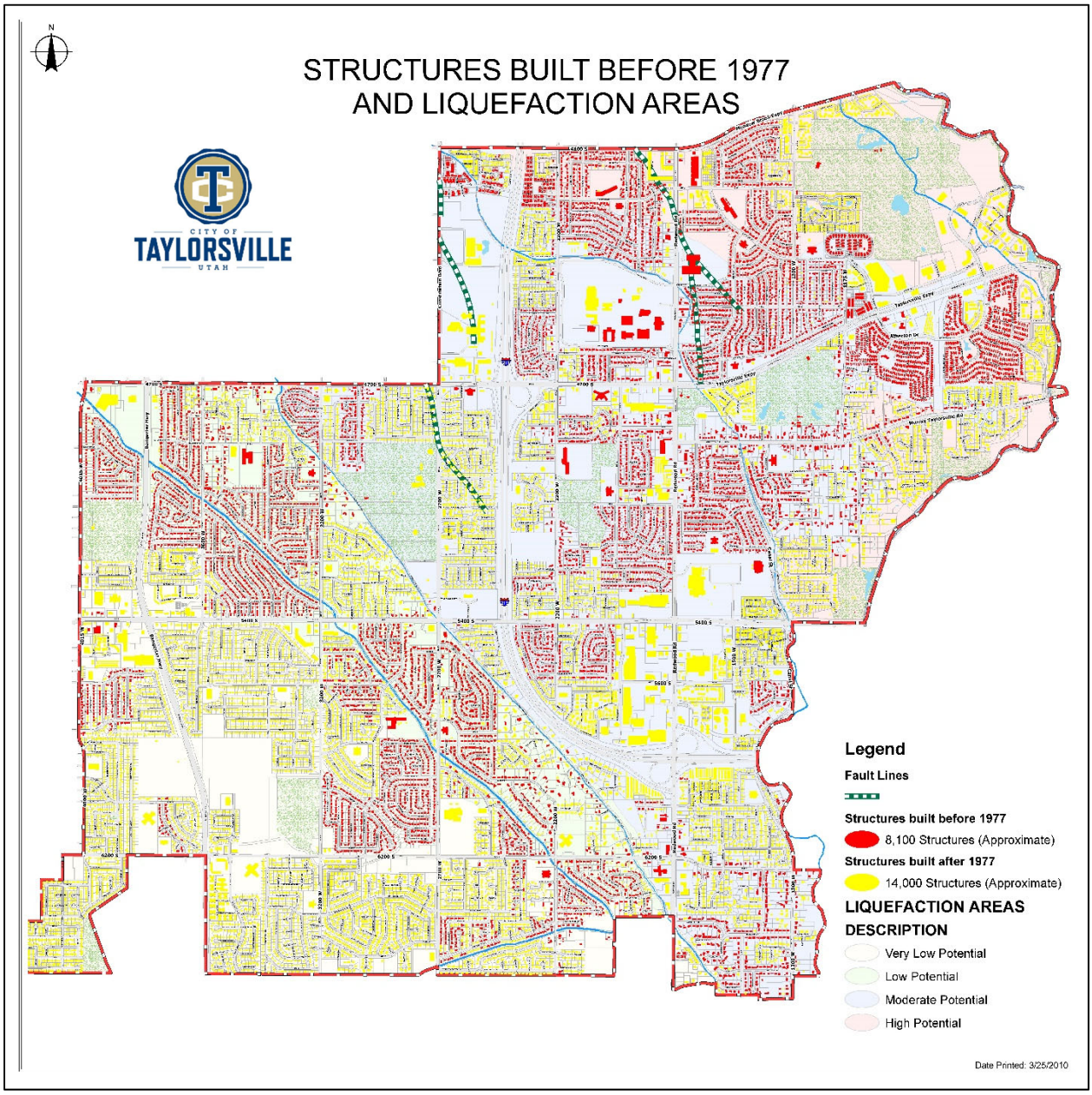
Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Drought: The City of Taylorsville can have large variance in the temperature and precipitation from season to season. High heat and low precipitation as seen in the past can cause a shortage of water to the residents and businesses in the area. Businesses and residents are encouraged to be conservative in their landscaping and maintenance of their green spaces particularly in periods of lower water availability.

Extreme Temperatures: The City of Taylorsville can have large variance in the temperature and precipitation from season to season. High heat and low precipitation as seen in the past can cause a shortage of water to the residents and businesses in the area. Businesses and residents are encouraged to be conservative in their landscaping and maintenance of their green spaces particularly in periods of lower water availability.

Earthquake: Of significant concern, many high priority public and private buildings and many critical infrastructure facilities are located within or across the major fault zones in the region. Buildings built prior to 1972 are constructed in a fashion more susceptible to seismic activity. These facilities include very large waterlines, large irrigation canals, utilities, railroads and major transportation routes. However, potential damage is not limited to fault zone areas. Fine-grained, lake-bottom sediments are common in Taylorsville and are susceptible to liquefaction-induced ground failure during a large earthquake. Each incident may require a unique response from the City and in the instance of a major earthquake outside assistance will be required.

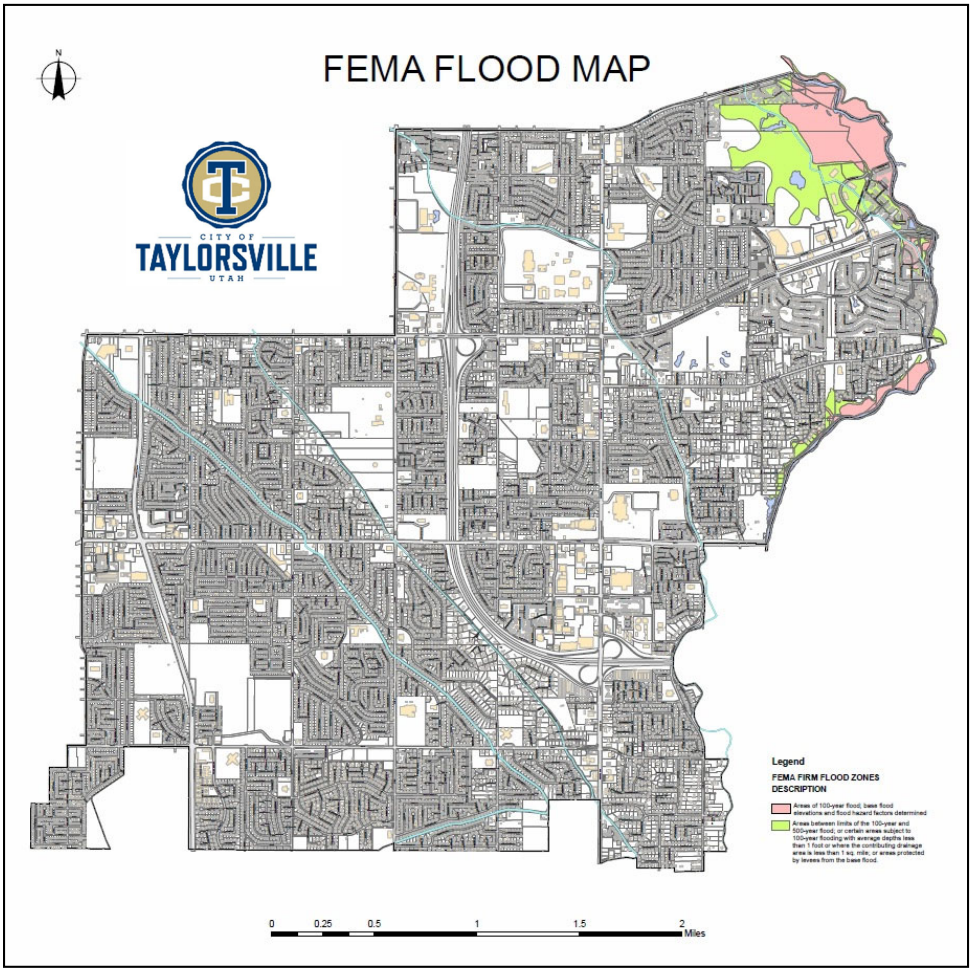
Figure. The City of Taylorsville – Earthquake Vulnerability



Flooding: Although located in a semi-arid region, the City of Taylorsville is subject to thunderstorms and snowmelt flooding. Significant flooding occurred in the Salt Lake Valley in 1983 and to a lesser extent in 1984, and again in 2011 resulted in the construction of some sediment basins, installation of stream-bank protection, and the cleaning of stream channels to reduce flood hazards. Flood plains along the Jordan River and its tributaries have been rated for expected flood heights by the Federal Emergency Management Agency (FEMA) and areas susceptible to flooding have been delineated on the Federal Insurance Rate Maps (FIRM). These maps are updated as development occurs and channel obstructions, culvert modifications, and other changes alter potential flood heights and velocities. The development ordinances of the city require geotechnical studies to identify areas of shallow groundwater, artesian wells, and other

water hazards. During high snow and rainfall years, the groundwater table can move closer to the surface. Flooding can also result from leakage of unlined irrigation canals, flood irrigation practices, and septic tank drain fields. The Jordan River runs along much of the northeastern border of the City. This poses a threat to many homes and areas built along that stretch. Parts of the area also are impacted by stormwater drainage issues.

Figure. The City of Taylorsville - Flood Zones



Jordan Watershed: The Jordan River runs along the eastern border of the City of Taylorsville. A flood risk is defined as an accumulation of water over normally dry areas. Floods become hazards to people and property by inundating developed areas. Flood losses range from damage to landscaping and debris generation to building damage and injury or death.

Structure Occupancy Type	1% Annual Chance Structure Exposure	1% Annual Chance Building and Contents Loss	0.2% Chance Structure Exposure	0.2% Chance Building and Contents Loss
Total	**1**	**$ 11,139**	**58**	**$ 4,075,208**

Table. City of Taylorsville – Estimated Flood Loss Information

Winter Storms: The potential for severe weather is a reality in the City of Taylorsville and the surrounding region. These weather events are not isolated to any climatic season, but rather can occur at any time during the year. During the spring and summer months, heavy rains can fall upon soils in a desert climate that may not readily percolate creating surface runoff, mudslides, debris flow, flooding, and other water-related damage. During the winter months, heavy snowfall is possible. Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. Snowfall is particularly influenced by the Great Salt Lake, which can produce localized snow bands or lake effect accumulations several times each winter.

HAZMAT: The City is a central part of the County and receives a high traffic flow, including hazardous materials traveling through the area.

Public Health Emergencies/Pandemic: In partnership with local and state public health officials, other federal agencies, medical and public health professional associations, infectious disease experts from academia and clinical practice, and international and public service organizations, the City of Taylorsville will incorporate all reasonable strategies to educate its residents and prepare for a measured response in the instance of a public health emergency.

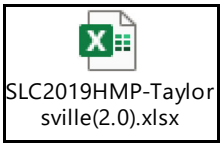
Radon: The 2017 Radon Study showed that radon is not a major concern for the area.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	19	38
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Dam Failure	1	19	19
Radon	3	6	18

Tornado	1	12	12
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	6	6
Wildfire	1	3	3
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.


SLC2019HMP-Taylorsville(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)	Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1	Avalanche	No Impact	0	0
Dam Failure	Low	1	Dam Failure	Medium	2	6
Drought	Medium	2	Drought	High	3	9
Civil Disturbance	Low	1	Civil Disturbance	Low	1	3
Cyber Attack	Medium	2	Cyber Attack	High	3	9
Earthquake	Medium	2	Earthquake	High	3	9
Flooding	Medium	2	Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2	Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1	Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2	Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3	Radon	Medium	2	6
Severe Weather	High	3	Severe Weather	High	3	9
Severe Winter Weather	High	3	Severe Winter Weather	High	3	9
Terrorism	Low	1	Terrorism	Medium	2	6
Tornado	Low	1	Tornado	Low	1	3
Wildfire	Low	1	Wildfire	No Impact	0	0

Probability [No Weighted Factor]	**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)	**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)	**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)	**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)	**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	4
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	No Impact	0	0		Wildfire	No Impact	0	0

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	No Impact	0	0
Dam Failure	Medium	2	2
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	No Impact	0	0
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	No Impact	0	0

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Medium	2	6
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Fix and repair drainage by increasing drainage area and expanding inlets and outlets	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flood (Riverine and Urban/Flash Flooding)	Taylorsville EM	Public Works	High	Medium	Local Funds	High	2020	
Conduct a Hazardous Material Flow Study	2019	• Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. • Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Hazardous Materials Release	Taylorsville EM	Public Works	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Short-term	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Establish agreements to share communications equipment between agencies involved in emergency operations	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	Taylorsville Emergency Management	Medium	Low	Local	Medium	Ongoing	Taylorsville is in the process of entering an MOU with the Taylorsville HAMnet to utilize their services during an emergency.
Establish notification capabilities and procedures for emergency personnel	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	All Hazards	Taylorsville Emergency Management	Medium	Low	Local	Medium	Ongoing	Taylorsville continues to work on notification tools and procedures to be in harmony with changing technology and equipment.
Establish a coordinating group to address long-term communication needs and implementation strategies	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards	Taylorsville Emergency Management	Medium	Low	Local	Low	Ongoing	No formal coordinating group exists yet, but Taylorsville engages in discussions with other jurisdictions and the county regarding this issue

Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	2009	1 – Improve and maintain communications capabilities for emergency operations 1.3 – Conduct communications Strategic Planning	All Hazards	Taylorsville Emergency Management	High	Low	Local	High	Ongoing	Taylorsville has upgraded existing equipment and purchased new equipment to maintain operability
Implement improvements to address identified in assessment	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	All Hazards	Taylorsville Emergency Management	High	Medium to High	State and Federal Grants, project dependent	High	In Process	Taylorsville is identifying options and opportunities to address issues.
Identify structures at risk to earthquake damage	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	Earthquake	City Engineering Division	High	High	State and Federal Grants such as HMA	High	Ongoing	Taylorsville is in the process of identifying which structures are at a particular risk.
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flood	City Engineering Division	High	Low	Local	High	Ongoing	The City Engineer regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed

Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	1 – Protection of life and property before, during and after a flooding event 1.2 – Encourage appropriate flood control measures, particularly in new developments	Flood	City Engineering Division	High	High	State and Federal Grants such as HMA	High	Ongoing	The City Engineer oversees the construction of flood control structures
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	1 – Protection of life and property before, during and after a flooding event 1.3 – Provide maintenance, repairs and improvements to drainage structures, storm water systems and flood control structures	Flood	Taylorsville-Bennion Improvement District	High	Medium	Local	High	Ongoing	Taylorsville-Bennion Improvement District continues to maintain and repair all drainage systems in the City
Identify and assess structures for deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of flood control structures	Flood	City Engineering Division	High	Medium	Local	High	Ongoing	The City Engineering Division in cooperation with Salt Lake County Public Works regularly review and inspect City-owned infrastructure and make recommendations as needed
Modify structures as needed to address deficiencies	2009	2 – Reduce threat of unstable or inadequate flood control structures 2.1 – Reduce potential for failure of	Flood	City Engineering Division	High	High	State and Federal Grants such as HMA	High	Ongoing	The City Engineering Division in cooperation with Salt Lake County Public Works make repairs as needed to deficient structures

		flood control structures								
Continue to Enforce Building Codes, Development Codes and Zoning Ordinance	2009	Goal 7 Advocate, support, and promote the use of laws and local regulations and ordinances aimed to mitigate hazards and to enhance resiliency.	Earthquake, Flood and Severe Weather	City of Taylorsville Building Division, City of Taylorsville Community Development Department	High	Low	Developer-based funding under specific plan requirements	High	Now and Long term	The City requires that construction complies with the adopted building codes and the zoning and development ordinances adopted by the City. This will prevent the loss of human life and economic and property losses.
Continue to Execute Training and Exercise Program	2009	Goal 4 Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Earthquake, Pandemic, Flood and Severe Weather	Emergency Management	High	Low - Less than $1,000 annually	City budget	High	Now and Long term	The City of Taylorsville regularly administers training and participates in exercises. These events provide participants with opportunities to learn of duties and practices that would be used during a real-world emergency or disaster situation. Coordination of operations would be exercised and allow Taylorsville Emergency Management to identify the areas of higher and lower performance and how to best improve their efforts. This will help to prevent the loss of human life and property losses when a major emergency or disaster event occurs.
Educate Residents and Businesses through the Public	2009	Goal 4 Promote education and awareness programs,	All Hazards	Public Information Officer,	High	Low - Less than $1,000 annually	City budget	High	Now and Long term	The City of Taylorsville takes great care to get the appropriate information out to the residents and businesses in the

Information and Events		campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.		Emergency Manager						community. To this measure, the City has started an annual Emergency Preparedness Fair where participants are able to obtain the information that would benefit them in their situation. Further, the City invests a great amount of time and resources to putting out information to the public through traditional and modern methods including social media. These efforts provide the community with the information that is necessary to get assist their preparedness and mitigation efforts. This will prevent the loss of human life and economic and property losses.

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.2 – Maintain communications capabilities for critical facilities	1 – Evaluate vulnerability of critical communications systems	Completed	Taylorsville evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness	2 – Incorporate information about cascading effects of	Completed	Information is included in all presentations on the effects of cascading hazards

		5.1 – Establish a comprehensive public education program	hazards in education programs		
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Completed	Taylorsville GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Completed	All current Taylorsville ordinances are available online at: http://www.sterlingcodifiers.com/codebook/index.php?book_id=540
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	Not Completed	This is not applicable to Taylorsville
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings,	Not Completed	Taylorsville does not have funding to support this type of program.

		1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	particularly unreinforced masonry		
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Completed	Due to the age of the City's public buildings (most having been built in the last 15 years) there are no major retrofit or rehabilitation projects needed at this time in Taylorsville
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	Taylorsville supports county level efforts to share this type of information
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed / Not Applicable	Not applicable to Taylorsville as the referenced dam is located in another jurisdiction.
Flooding	2009	1 – Protection of life and property before, during and after a flooding event 1.1 – Provide 100% availability of the National Flood Insurance Program	1 – Assist Cities with NFIP application	Not Completed / Not Applicable	Taylorsville actively participates in the NFIP
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed / Not Applicable	Taylorsville does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed /	Taylorsville does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program

		1.1 – Maintain status as a StormReady Community		Not Applicable	
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.4 – Examine the vulnerability of patrons at large event venues to extreme weather events	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	Taylorsville has not developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Community education on wildfire hazard	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

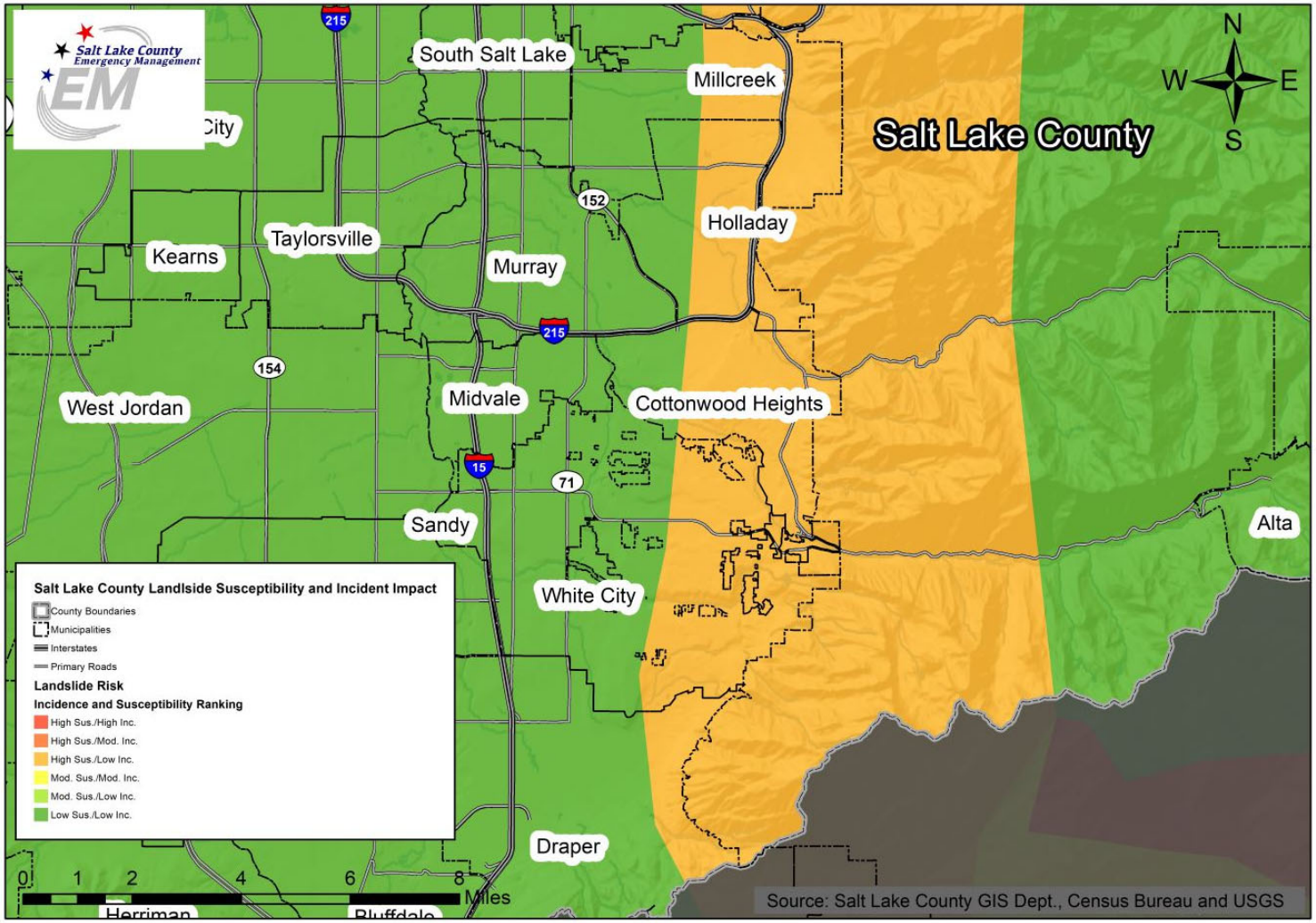
		1.1 – Reduce risk from wildfire through education programs			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

		2.3 – Improve addressing system in WUI areas to facilitate emergency response	current county addressing standards		
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	1 – Reduce fuels around publically owned structures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities	4 – Assist communities in developing Community Wildfire Protection Plans or similarA plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

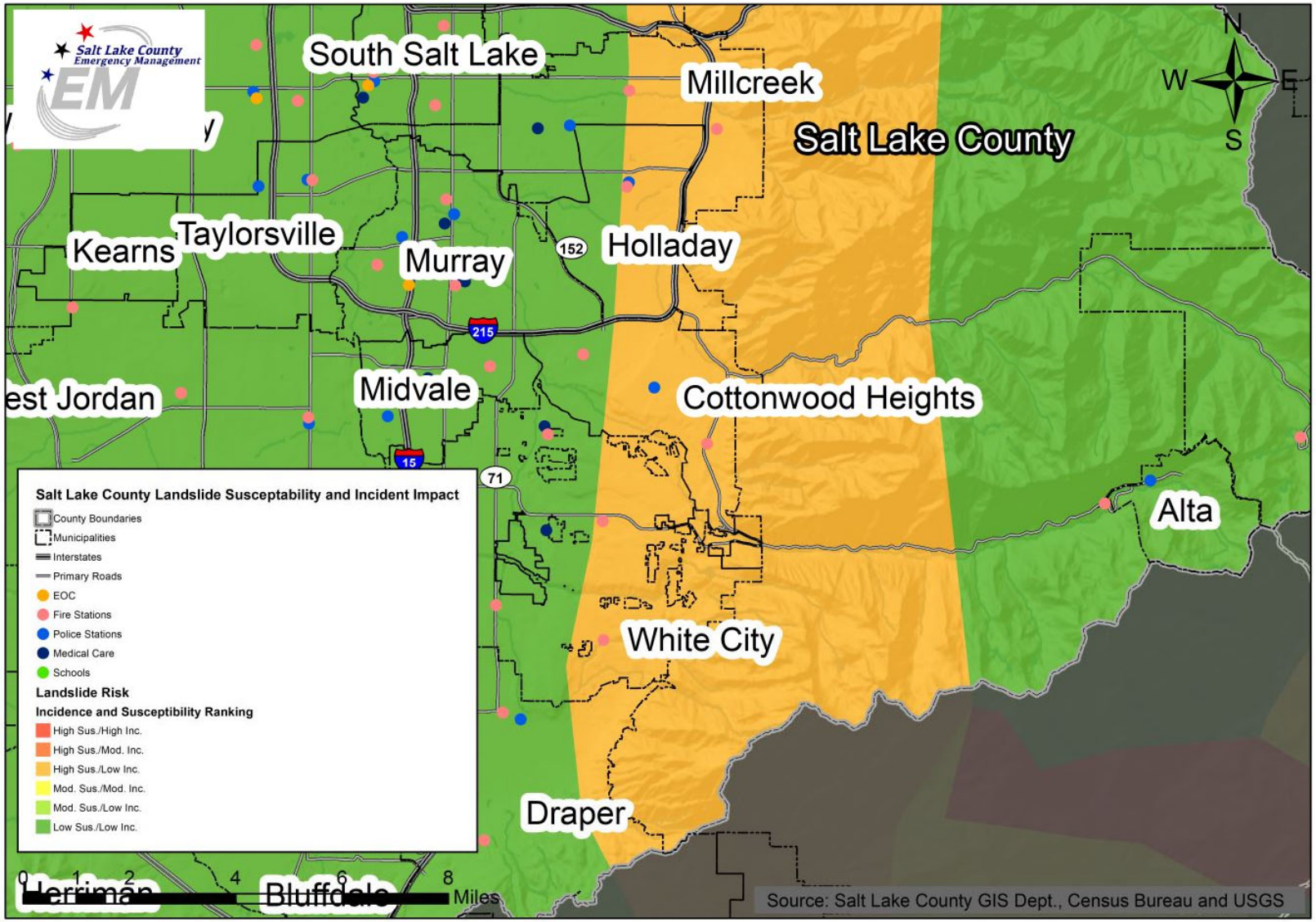
		2.4 – Complete wildfire protection projects			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	1 – Adopt the Utah Wildland-Urban Interface Code	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

Jurisdiction Maps

Map: Landslide Susceptibility and Incident Impact Potential



Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: West Jordan City

Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Jared Smith Title: Emergency Manager Department: Emergency Management (under the Human Resources Department) Address: 8000 S Redwood Road Office Phone: 801-569-5147 Cell Phone: (801) 440-6995 Email Address: jared.smith@westjordan.utah.gov Website: https://www.westjordan.utah.gov/emergencymanagement

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1967 (city) and 1941 (town)
- **Current Population:** 116,046 (Census v2018)
- **Population Growth:** From April 1, 2010 (103,601) to July 1, 2018, grew 12% (Census).
- **Location and Description:** The city land area is 32 sq. miles. The city occupies the west-central portion of the Salt Lake Valley, which is surrounded by the Oquirrh and Wasatch mountains. It shares borders with Taylorsville, Kearns, South Jordan, Sandy, Murray, Midvale, Copperton, West Valley City and unincorporated Salt Lake County. West Jordan is fortunate to have a large share of vacant land left for future growth within Salt Lake County.
- **Brief History:** Settlement of the land along the Jordan River in the area that is now West Jordan began in the fall of 1849. Due to the imminent onset of winter and the lack of readily available timber, the first homes were “dugouts” excavated into the hillsides above the river. Most of these dugouts were replaced the following spring as soon as weather permitted the hauling of timber from Bingham Canyon. By 1853, the population of the West Jordan area was 361. In more recent history, the residents of West Jordan petitioned the County Commission for incorporation as a town in 1941. West Jordan became a third-class city in 1967, and after reaching a population of 104,128 residents, West Jordan officially became a first-class city on December 3, 2007 (West Jordan General Plan 2012).
- **Climate:** The average high temperature is 92 degrees and the low temperature is 23 degrees. Additionally, the rain average is 20 inches of rain per year and 53 inches of snow a year (Best Places).
- **Public Services:** The city offers a multitude of services to the residents. The city also has an emergency communications center and an active LEPC. The West Jordan LEPC fulfills the federal requirements for chemical reporting and emergency planning as specified in federal law 42 USC Chapter 116, the Community Right-to-Know Act (West Jordan).
- **Governing Body Format:** The City of West Jordan operates under the Strong Mayor form of government. Under this form, the Mayor acts as the chief executive officer for the City. The City Council is the legislative body for the City and is responsible for all legislative policies for the City.(West Jordan).
- **Development Trends:** West Jordan is Utah’s fourth-largest city, with an estimated population in March of 2014 over 108,000 residents.

Capability Assessment

The city maintains a full-time staff of 500 and part-time staff of 100 individuals. The Risk/Emergency Manager is the city's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager position and supported by the Human Resources Director positions.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY

	Local Authority Exists to Develop and Implement/ Enforce?	A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?	Comments
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	
Zonings Ordinance(s)	Yes	Yes	
Subdivision Ordinance(s)	Yes	Yes	
Stormwater Management Program	Yes	Yes	
Floodplain Ordinance(s)	Yes	Yes	
Post Disaster Recovery Program and Ordinance(s)	Yes	Yes	
Real Estate Disclosure Ordinance(s)	N/A	N/A	
Growth Management	No	No	

Site Plan Review Requirements	Yes	Yes	
Public Health and Safety Program and Requirements	No	Yes	County Function
Environmental Protection Program and Requirements	No	Yes	County Function
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	Yes	
Habitat Conservation Plan	No	No	
Economic Development Plan	Yes	Yes	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	Yes	
Post-Disaster Recovery Plan	Yes	Yes	
Continuity of Operations Plan	Yes	No	In-Progress
Public Health Plans	No	No	County Function
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes

Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	N/A

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full	Development Services - City Engineer
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full	Development Services - City Engineer
Planners or engineers with an understanding of natural hazards	Yes	Full	Development Services - City Engineer
Surveyors	Yes	Full	Development Services - Surveyor
Personnel skilled or trained in GIS applications	Yes	Full	Public Works - GIS Staff
Emergency manager	Yes	Full	Human Resources - Emergency Manager
Grant writers	Yes	Full	Public Works - Capital Projects

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Engineering
Who is your jurisdiction's floodplain administrator? (department/position)	City Engineer

Are any certified floodplain managers on staff in your jurisdiction?	Yes
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	Yes	3	2010
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 26 policies were in force with total coverage of $7,395,000 and total written premium and FPF of $16,096 (FEMA, 2019).
- West Jordan City does participate in the National Flood Insurance Program (CID # 490108) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	5 inches of snow	-	4/6/2019	-
Heavy Snow	7 inches of snow		3/13/2019	
Heavy Snow	22 inches of snow		2/3/2019	
Hail	Quarter sized hail		6/13/2016	
Flooding	This flooding was most common in driveways, garages, and basements, with some homes receiving significant damage.		8/20/2014	
Flooding	In West Jordan, about 10 apartment units were flooded with water and mud, and portions of the Mountain View Corridor were closed so that the Utah Department of Transportation could drain retention ponds that had filled with the heavy rainfall.		9/14/2013	
Thunderstorm Wind	A microburst occurred near the intersection of Utah State Route 111 and New Bingham Highway in West Jordan, knocking over or snapping a series of power poles. Rocky Mountain Power reported that 37 large transmission poles and 4 smaller distribution poles were damaged and had to be replaced. This temporarily knocked out power to about 3,000 customers, as well as closing State Route 111 for several hours. The downed power lines also dragged a couple of metal poles supporting traffic signals to the ground. Despite the destruction, two sensors very close to the intersection (the SR-85 at Dannon Way sensor and the Trans-Jordan Landfill sensor) only		8/5/2013	

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
	recorded peak wind gusts of 45 mph and 42 mph respectively.			
Thunderstorm Wind	multiple large trees were knocked down in West Jordan, South Jordan, and Taylorsville, including a few that fell on houses and caused damage to roofs.		6/12/2013	
Lake-Effect Snow	8 inches of snow		3/22/2013	
Winter Storm	6 inches of snow		3/6/2012	
Winter Storm	12 inches of snow		12/29/2010	
Winter Storm	14 inches of snow		11/28/2010	
Winter Storm	8 inches of snow		11/23/2010	
Winter Storm	15 inches of snow		11/20/2010	
Thunderstorm Wind	58 mph wind		8/20/2010	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	7,887
Members of the community under 18 years old	35,713
Members of the community that identify as having disability status	7,700
Members of the community that speak English less than "very well"	6,105
Members of the community living below the poverty line	8,331
The number of mobile homes in the community	924
Members of the community without health insurance	11,399

Occupied housing units with tenants without a vehicle	543
Housing units without heating fuel	11

Jurisdiction-Specific Hazards and Impacts

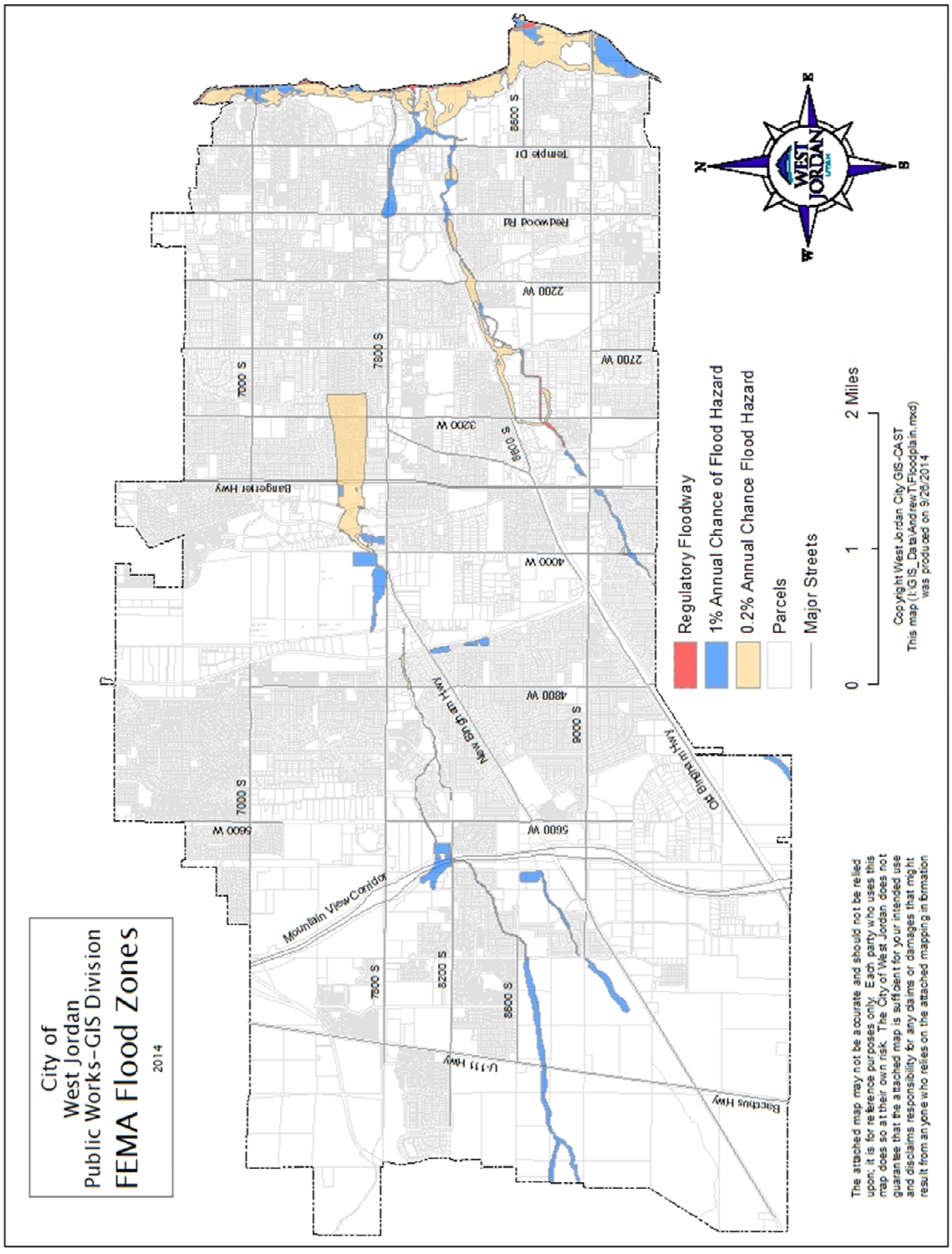
Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Flooding: Riverine flooding can be expected along the Jordan River, Midas Creek, and Little Willow Creek. The potential for flooding also exists along the old channel of Bingham Creek (during heavy rains), the Beckstead Ditch and any of the four canals which transverse the city. (Welby Jacob Canal, Utah Distributing Canal, Utah Salt Lake Canal, & South Jordan Canal.) Localized floods and flash flooding are possible in all areas of the City. Subsurface flooding problems exist near the Jordan River and eastern portions of the city. Historic effects in West Jordan.

- August 2014 –17 homes were flooded when rainfall runoff overwhelmed storm water capability.
- August 2013 - An apartment complex in the southwest portion of the city sustain a river of mud from accumulate flow across the dry farm areas to the west.

West Jordan City doesn't have any repetitive flood loss claims identified under the National Flood Insurance Program (NFIP).

The City Engineer oversees enforcement of floodplain management requirements adopted by the City, including regulating new construction in Special Flood Hazard Areas (SFHAs); Floodplain identification and mapping, including any local requests for map updates and community assistance and monitoring activities. This is part of an integrated development review process that involves the Office of Development Assistance and all supporting departments within the city to include, Engineering, Economic Development, Planning, Building and Safety, and the Fire Marshal.


City of
West Jordan
Public Works-GIS Division
FEMA Flood Zones
2014
Regulatory Floodway
1% Annual Chance of Flood Hazard
0.2% Annual Chance Flood Hazard
Parcels
Major Streets
0
1
2 Miles
Copyright West Jordan City GIS-CAST
This map (I:\GIS_Data\Andrew T\Floodplain.mxd)
was produced on 9/26/2014
The attached map may not be accurate and should not be relied upon; it is for reference purposes only. Each party who uses this map does so at their own risk. The City of West Jordan does not guarantee that the attached map is sufficient for your intended use and disclaims responsibility for any claims or damages that might result from an yone who relies on the attached mapping information
Mountain View Corridor
Bangerter Hwy
New Bingham Hwy
Old Bingham Hwy
Redwood Rd
Temple Dr
7000 S
7800 S
8200 S
8600 S
8800 S
9000 S
5600 W
4000 W
4800 W
2200 W
2700 W
3200 W

Dam Failure: The largest dam located in West Jordan is the Bateman Pond dam located at 6800 South 1100 West. Other dams that are listed with the State of Utah are all dams created by the construction of water detention basins that meet individual planning requirements.

Earthquake: The entire city is at risk for ground shaking. Certain areas are at risk for liquefaction; however, there is a minimal chance for surface rupture. East of Redwood Road is especially vulnerable. No large-scale events have been recorded in West Jordan.

Wildfire: West Jordan does have some urban-wildland interface along the Jordan River and the western portions of the city. Specifically, at risk is the undeveloped areas along the Jordan River where natural vegetation is abundant and other undeveloped areas, open areas, some agricultural areas. Historically, most events have been small grass and brush fires. No significant events have occurred. Wildfire is a growing concern for the city as development expands.

Severe Weather and Winter Storms: The entire city is subject to these events. The substantial population over 65 is particularly vulnerable to sustained power outages and extreme temperatures. West Jordan is well known for its rapid and often severe changes in weather. Severe weather common in the city includes winter storms, large scale wind events, thunderstorms, lightning, hail, tornadoes, and flooding. While some types of these events can be predicted, others will occur with little or no warning.

Tornado and High Wind: The entire city is susceptible to high wind events, especially the more than 900 mobile homes in the city. Historic High Wind Events in West Jordan:

- High Wind Event - August 2013: 60 large electrical transmission poles were toppled along SR-111

One weather related phenomenon that occurs most often from December to February are inversions. These inversions tend occur when pockets of cold air become trapped in the valley between the Oquirrh Mountain range and the Wasatch Mountain range. These temporary inversions can last several days and lead to poor air quality for residents in the valley and restrictions placed on burning some types of fuels.

Drought: West Jordan has a semi-arid desert climate and a few weeks without rain are not uncommon. However, when the weeks turn to months, serious problems can arise. Because much of our drinking water comes from snowmelt, a dry winter can have serious implications in terms of how much water is available for the following summer season. Most locations in the city have enough water reservoirs to make it through one dry winter; however multiple years of dry winter seasons is a concern, particularly for agriculture in the area.

Historic Events in West Jordan:

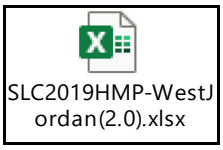
- 1896 – 1907 Statewide drought conditions
- 1930 – 1936 Statewide drought conditions
- 1953 – 1965 Statewide drought conditions
- 1974 – 1978 Statewide drought conditions
- 1988 – 1993 Statewide drought conditions
- 1999 – 2003 Statewide drought conditions

Public Health Emergencies/Pandemic: The potential for a pandemic to have a noticeable impact on the city has increased as worldwide travel and commerce in the area has increased.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Terrorism	1	25	25
Dam Failure	1	21	21
Radon	3	6	18
Tornado	1	12	12
Wildfire	1	10	10
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	6	6
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Medium	2	2		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	No Impact	0	0		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Medium	2	2		Tornado	Unlikely	0	0
Wildfire	Low	1	1		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Increase the size and capacity of drainage facilities	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Flooding	City of West Jordan	Public Works	High	High ($10,000,000)	Local and Federal Grants, such as HMA	Medium	2025	Increase the capacity of stormwater in the City and reduce the flood areas throughout the City. Continue to identify areas of the City that store and drain stormwater throughout the City. There are several areas of drainage that require larger culverts and or pipes to handle the inconsistent rainfall and stormwater throughout the City.
Seismic Retrofitting of the water tanks	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	City of West Jordan		Medium	High	Local and Federal Grants, such as HMA	Medium	Long-term	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comment
Establish notification capabilities and procedures for emergency personnel	2009	All Hazards	West Jordan	High	Medium	Local, State, and Federal Grants	High	Ongoing	West Jordan continues to work on notification tools and procedures to be in harmony with changing technology and equipment. We are in the process of purchasing a complete phone system for the city that has notification features as well as disaster level system redundancy.
Establish a coordinating group to address long-term communication needs and implementation strategies	2009	All Hazards	West Jordan	Medium	Low	Local	Low	Ongoing	The Utah Communications Authority provides the coordination of radio channels throughout the state of Utah.
Utilize GIS to identify facilities and infrastructure at risk	2009	All Hazards	West Jordan GIS	High	Medium	Local	High	Ongoing	West Jordan has an ongoing project to GPS locate critical infrastructure and key resources. This includes a dedicated frequency for reporting data to the City.
Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	2009	All Hazards	West Jordan	High	Medium	Local and County	High	Ongoing	West Jordan Fire Prevention and Emergency Management has an ongoing program to review city facilities for safety and code compliance. We also work with the city's risk manager and insurance company to review city properties for hazards.
Implement improvements to address hazards identified in assessment	2009	All Hazards	West Jordan	High	High	HMA, federal, and state	High	Ongoing	West Jordan is identifying options and opportunities to address issues identified during the risk assessments.
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media	2009	All Hazards	West Jordan	High	Low	Local Funds	High	Ongoing	West Jordan Emergency Management provides several public education classes. Our Ready West Jordan program and variations of that 2 ½ hour class.

Develop education programs to target specific groups including homeowners, developers, schools and people with special needs	2009	All Hazards	West Jordan	High	Low	Local Funds	High	Ongoing	West Jordan's education programs are customizable for all kinds of groups and available to all members of the community
Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	2009	All Hazards	West Jordan	High	Low	Local Funds	High	Ongoing	West Jordan has worked with Be Ready Utah and other programs to make presentations in West Jordan and will continue to invite them to events and other activities in the community
Coordinate with water districts to plan for, develop and/or expand secondary water	2009	Drought	West Jordan	Medium	High	County and State funds	Medium	Ongoing	West Jordan has been supportive of Jordan Valley Water Conservancy Districts program to recover and treat ground water at the facility here in West Jordan.
Encourage Communities to actively participate in NFIP	2009	Flood	West Jordan	High	Low	Local	High	Ongoing	West Jordan actively participates in the NFIP
Determine potential flood impacts and identify areas in need of additional flood control structures	2009	Flood	West Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineer and Public Works Director regularly review the impact of development and the need for flood control infrastructure and make recommendations as needed
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures	2009	Flood	West Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineer and Public Works Director oversee the construction of flood control structures Example: Significant construction efforts were completed on Midas Creek including upsizing culverts, channel stabilization, etc.
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems	2009	Flood	West Jordan	High	High	Federal, County, and State funds	High	Ongoing	The Stormwater Division of the Public Works Department continues to maintain and repair all drainage systems in the City
Identify and assess structures for deficiencies	2009	Flood	West Jordan	High	Low	Local	High	Ongoing	The City Engineering Division in cooperation with the Public Works Department regularly review and inspect City-owned infrastructure and make recommendations as needed

Modify structures as needed to address deficiencies	2009	Flood	West Jordan	High	High	Federal, County, and State funds	High	Ongoing	The City Engineering Division in cooperation with the Public Works Department make repairs as needed to deficient structures
Assist NWS in making other agencies and departments aware of available resources	2009	Severe Weather	West Jordan	Medium	Low	Local	Low	Ongoing	West Jordan supports the NWS efforts for education and outreach and makes internal departments aware of NWS resources
Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	2009	Severe Weather	West Jordan	Medium	Low	Local	Medium	Ongoing	West Jordan supports the efforts for education and outreach
Increase public awareness and compliance with keeping storm drains and ditches free from debris, particularly green waste.	2014	Flood	Public Works Department, Storm Water Manager	High	Medium - $57,000	General Fund	High	Ongoing	Storm water systems are designed to function unimpeded by green waste and other forms of debris. Residents who live near ditches and canals have been found to have dumped grass clippings and tree trimmings into these storm water assets. West Jordan has developed a stormwater master plan
Increase emphasis in our code enforcement efforts to create defensible space between undeveloped fields and residential and commercial property.	2014	Wildland Fire	City Attorney, Code Enforcement	High	Medium - $57,000	General Fund	High	Ongoing	A significant amount of acreage in the city is still used as wheat dry farm. There are also developable plots of land that exceed 5 acres in size. A vegetation fire can spread rapidly with prevailing winds and spread to fencing, out buildings and finally to primary structures that may be located along the rural-urban interface.
Educate residents on the IPAWS system to provide greater warning for individuals living in areas being impacted by severe weather.	2014 [update and modified in 2019]	Severe Weather	West Jordan Emergency Management	High	Low - $5,000	General Fund	High	Ongoing	West Jordan is large enough that different parts of the city can be impacted by weather events. People become less motivated to respond when they receive general warnings and then do not experience an event. Thus targeting the impacted areas with information is more beneficial

Emphasis needs to be placed on the development of a citywide continuity of operations plan.	2014	Pandemic	West Jordan Emergency Program Manager West Jordan Facilities Manager West Jordan IT Manager	High	Medium - $57,000	General Fund	High	Ongoing	West Jordan is becoming more densely populated and the potential for rapid transmission of a disease is increased. West Jordan also has a young population of small children who are propone to habits of touching and tasting that can spread disease rapidly through schools and daycares. We have plans for continuity of command but need to work on the ability to work remotely and to relocate major operations if necessary.
Participate in a public awareness campaign to alert homeowners to the presence of radon gas production from the soil.	2014	Radon	West Jordan Emergency Program Manager	Low	Low	County	Low	Ongoing	

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Action	Status	Comments
All Hazards	2009	1 – Evaluate vulnerability of critical communications systems	Completed	West Jordan evaluates areas of vulnerability and develops solutions to ensure communication systems or alternate solutions are viable Example: The development of a Public Works 800 MHz channel to be a backup to the statewide 800 MHz system for Police and Fire.
All Hazards	2009	2 – Incorporate information about cascading effects of hazards in education programs	Completed	Information is included in all presentations on the effects of cascading hazards
All Hazards	2009	4 – Utilize maps and similar products on County EM website and other media to educate public on areas at risk to hazards	Completed	West Jordan GIS personnel have compiled and made available hazard maps to help educate the public on potential hazards in the city
All Hazards	2009	2 – Ensure current hazard ordinances are available for viewing online	Completed	All current West Jordan ordinances are available online at: http://www.wjordan.com
Dam Failure	2009	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	Completed	Individual dam plans are created for the detention basins meeting the dam requirements.

Dam Failure	2009	2 – Utilize inundation maps to identify potential evacuation areas and routes	Completed	A copy of the FEMA Flood Plain map is included in the mitigation plan.
Drought	2009	1 – Set up livestock water rotation in areas of agricultural use	Not Completed	This is not applicable to West Jordan
Earthquake	2009	1 – Identify structures at risk to earthquake damage	Completed	West Jordan identified the Sugar Factory Tower and buildings as a hazard and had them razed. Fire Station 54 had seismic concerns and has been torn down and is currently being rebuilt.
Earthquake	2009	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	Not Completed	West Jordan does not have funding to support this type of program. West Jordan does not intend to move this activity forward due to the very limited number of URM structures in the community and the lack of potential funding sources to support it
Earthquake	2009	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	Not Completed	Fire Station 54 is currently being rebuilt from the ground up due in part to seismic concerns.
Earthquake	2009	1 – Provide educational materials to unreinforced masonry home and business owners	Not Completed	There are very few URM homes and businesses located in West Jordan that would make this activity cost effective for the City to engage in. West Jordan supports county level efforts to share this type of information
Earthquake	2009	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	Not Completed / Not Applicable	Not applicable to West Jordan as the referenced dam is located in another jurisdiction.
Flooding	2009	1 – Assist Cities with NFIP application	Not Completed / Not Applicable	West Jordan is a participating community in the NFIP.
Severe Weather	2009	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Not Completed / Not Applicable	West Jordan has a Weather Operations Plan for city events and shares this as a best practice with community groups.
Severe Weather	2009	2 – Maintain Contact with NWS prior to re-application in 2010	Not Completed / Not Applicable	West Jordan does not have a Weather Operations Plan and does not participate in the StormReady program. This is a Salt Lake County level program
Severe Weather	2009	1 – Work with NWS to develop large event venue weather safety and evacuation procedures	Not Completed	West Jordan has developed a large event venue weather safety plan and/or evacuation procedures with the NWS
Slope Failure	2009	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

Slope Failure	2009	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Increase public awareness through “Firewise” program	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Educate homeowners on the need to create defensible space near structures in WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Designate and promote county-wide annual initiative for clearing fuels	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	1 – Work with experts and communities to develop or update evacuation plans	Not Completed	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	Completed	West Jordan has an adequate transportation network to support evacuation and emergency response
Wildland Fire	2009	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	Completed	Addressing of structures in West Jordan is complete
Wildland Fire	2009	2 – Incorporate improved addresses in fire-dispatch and other databases	Completed	Addressing of structures in West Jordan is complete
Wildland Fire	2009	1 – Reduce fuels around publically owned structures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Implement fire breaks and other protective measures	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	Completed	The West Jordan water system meets and/or exceeds requirements for providing water flow for firefighting purposes in the City
Wildland Fire	2009	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable

Wildland Fire	2009	1 – Adopt the Utah Wildland-Urban Interface Code	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
Wildland Fire	2009	2 – Define wildland-urban interface and develop digital maps of the WUI	Not Completed / Not Applicable	This is a very low probability event for the City and not applicable
All Hazards	2009	1 – Conduct an inventory and assessment of communications equipment and systems and identify needs	Completed	West Jordan has and will continue to improve and maintain its communication capabilities, but capabilities adequately meet the need of the department.
All Hazards	2009	2 – Conduct Training and awareness activities on communication equipment, tools, and systems	Completed	West Jordan has built the use of communication equipment into training and exercises.
All Hazards	2009	3 – Establish agreements to share communications equipment between agencies involved in emergency operations	Completed	While no formal agreements exist to share communications equipment, but communications equipment can be shared as part of other mutual aid agreements that are in place
All Hazards	2009	Establish redundancy for dispatch centers and other critical communications	Completed	West Jordan relies on the Valley Emergency Communications Center (VECC) for dispatch services. They coordinate with other PSAPS to provide redundancy.
All Hazards	2009	Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group	Completed	West Jordan has upgraded existing equipment and purchased new equipment to maintain operability
All Hazards	2009	1 – Establish a coordinating group to address geographic data issues	Completed/Ongoing	West Jordan GIS personnel actively participate in several coordinating groups that address issues associated with geographic data
All Hazards	2009	2 – Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings	Completed/Ongoing	West Jordan GIS personnel actively participate in several coordinating groups that address issues associated with geographic data
All Hazards	2009	3 – Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs	Completed/Ongoing	West Jordan GIS personnel continue to develop and add to the geographic data as part of the City's overall geographic information systems
All Hazards	2009	4 – Provide centralized access to geographic data to emergency planners and responders	Completed	West Jordan GIS personnel make data available to first responders and others involved in emergency management efforts

All Hazards	2009	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	Completed	West Jordan has implemented the use of monitoring equipment such as stream gages, seismographs, SNOTEL sites to provide situational awareness and forecasting capabilities
All Hazards	2009	2 – Identify and implement additional hazard monitoring capabilities.	Completed	Example: The West Jordan emergency manager receives alerts from the USGS and NWS via text message and email
All Hazards	2009	1 – Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	Completed	West Jordan has formal agreements for Police, Fire, and Water
All Hazards	2009	2 – Pursue and implement needed mutual-aid agreements	Completed	West Jordan is currently working on participation in a new public works MAA
All Hazards	2009	1 – Establish and enforce appropriate planning, zoning, and building code ordinances	Completed	West Jordan enforces all current ordinances and building codes including ordinances like our Flood Damage Prevention and Land Disturbance ordinances.
Drought	2009	2 – Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts	Completed	West Jordan has hired a Water Conservation Manager who coordinates with the Jordan Valley Water Conservancy District and leads the City's programs for water conservation
Drought	2009	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	Completed	West Jordan has a variety of incentive programs that it offers to its residents related to water conservation.
Drought	2009	4 – Implement water-saving devices and practices in public facilities	Completed	West Jordan has implemented several projects including using secondary water to irrigate public parks instead of culinary water
Drought	2009	5 – Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	Completed	The West Jordan Water Division responds immediately to all reports of leaks and performs regular system maintenance, including actively monitoring for leaks, theft of services, etc.
Drought	2009	6 – Coordinate public safety water use, such as hydrant testing	Completed	The West Jordan Water Division coordinates all water use, including the testing of hydrants in partnership with the fire department

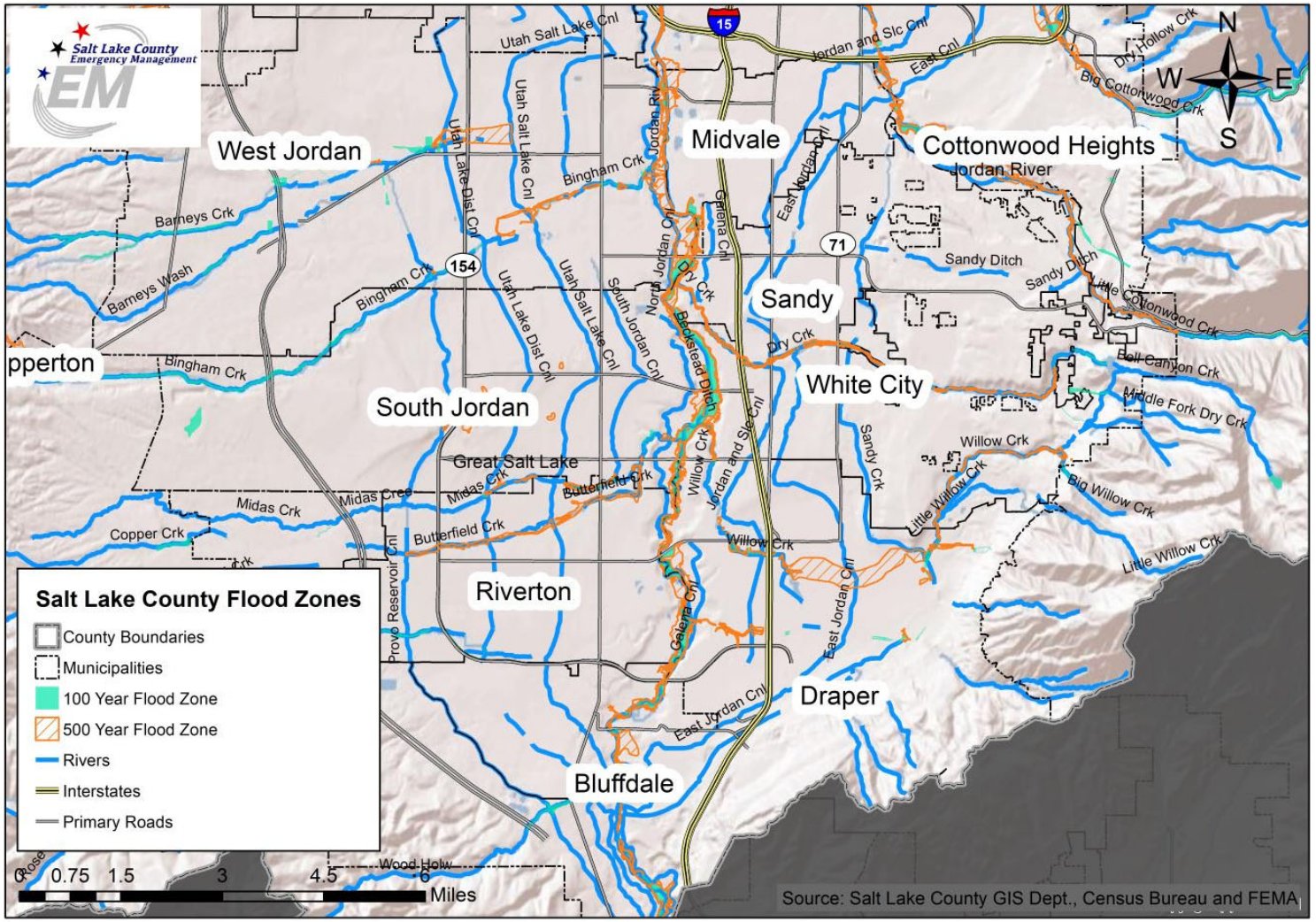
Drought	2009	7 – Provide information on landscaping alternatives for persons subject to green area requirements	Completed	West Jordan offers a variety of information and training classes on topics ranging from proper sprinkler use and maintenance to alternative plants and other vegetation that can be used.
Severe Weather	2009	Meet with NWS representative on an annual basis to receive information on new services and alerts available	Completed	West Jordan participates in briefings provided by NWS representatives on an annual basis
Slope Failure	2009	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	Completed	West Jordan Engineering and Planning reviews recommendations as provided pertaining to development within the City
Drought	2009	Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County	Completed	Public information was developed and continues to be utilized to increase public awareness
Problem Soils	2009	Continue the current application of West Jordan development standards which require soil sampling as part of the geo-technical reports submitted for property development.	Completed/Not applicable	Action taken by private home or business owners. Geo-technical reports are paid for by the person making application for development in the city.
Infestation	2009	Continue the annual West Jordan weed abatement program through the Code Enforcement unit of the West Jordan City Attorney's Office.	Completed/Not applicable	Weed abatement on private property is the responsibility of the owner

Action	Year Initiated	Hazard	Agency Lead	Benefit	Cost	Funding Source	Priority	Status	Comment
Increase the number of residents who are trained to set up and operate an emergency shelter.	2014	Earthquake	Emergency Manager and Fire Department	High	Medium	General Fund	High	Removed	Complete
Enforce the West Jordan Hillside Ordinance to ensure that new development occurs within the requirement.	2014	Slope Failure	West Jordan City Engineer	Low	High - $100,000	General Fund	Low	Complete	We avoid developing in a manner that would risk home and business development to long term problems and costs. It is possible to construct buildings on slopes that have high potential for slipping. Slopes that are too steep impede

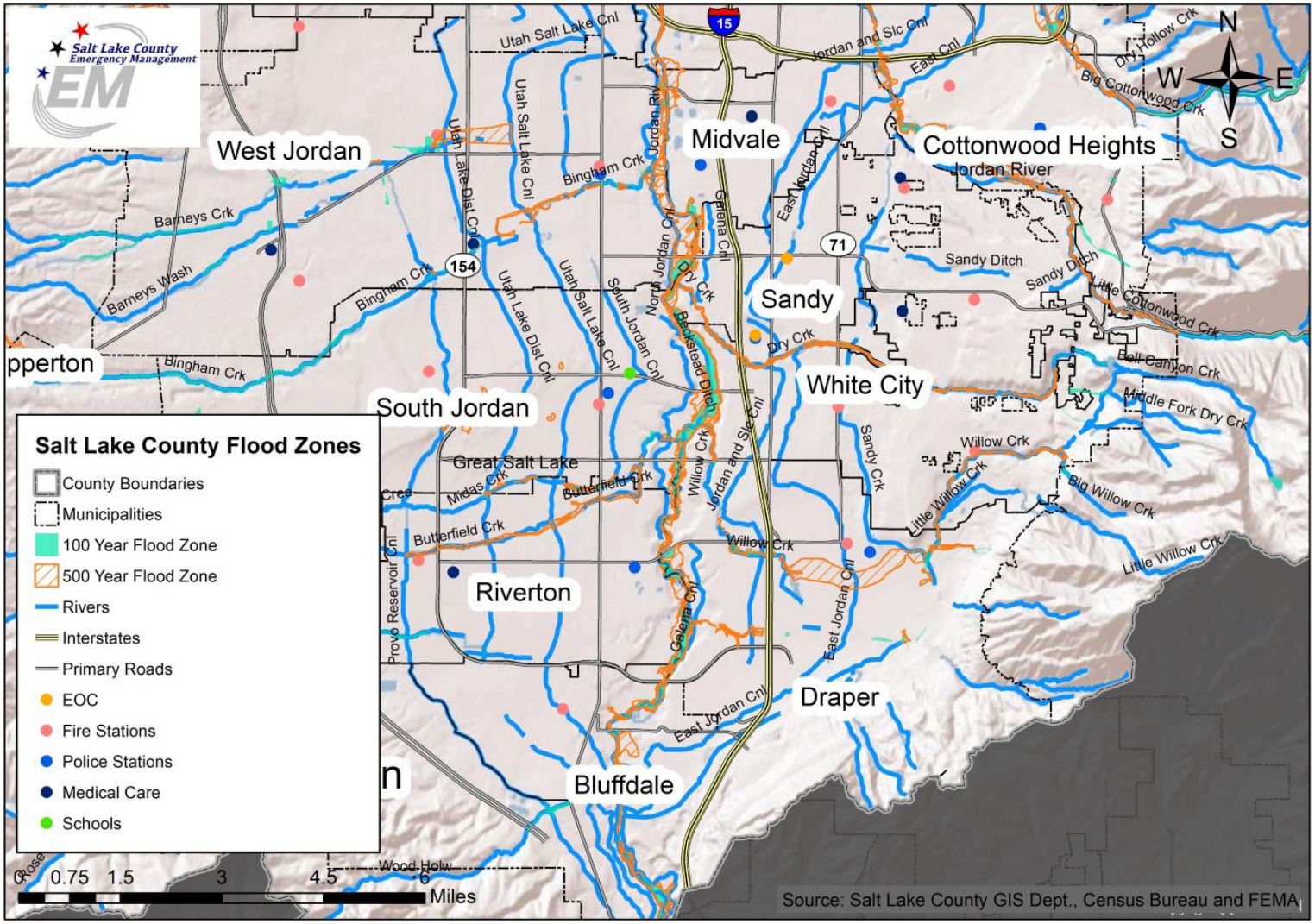
									the ability of the fire department to respond to an emergency.
Create a patterned inspection program to look for signs of weakness in the dam structure.	2014	Dam Failure	West Jordan Public Works Director	Low	Low - $25,000	General Fund	Low	Complete	Bateman Pond has a dam that stores water year-round. Most of our dams are detention basins that serve as park space and are filled falling a significant weather event. This program has been created.
West Jordan is researching the possibility of obtaining water from treated wastewater and post-industrial use water sources.	2014	Drought	West Jordan Public Works Director	Medium	High - $5,000,000	General Fund, HMA, and private funding	Medium	Complete	West Jordan is a water supplier to the community from well sources as well as purchasing water from Jordan Valley Water Conservancy District. Increasing population and industry are putting a significant demand on conventional water supplies.

Jurisdiction Maps

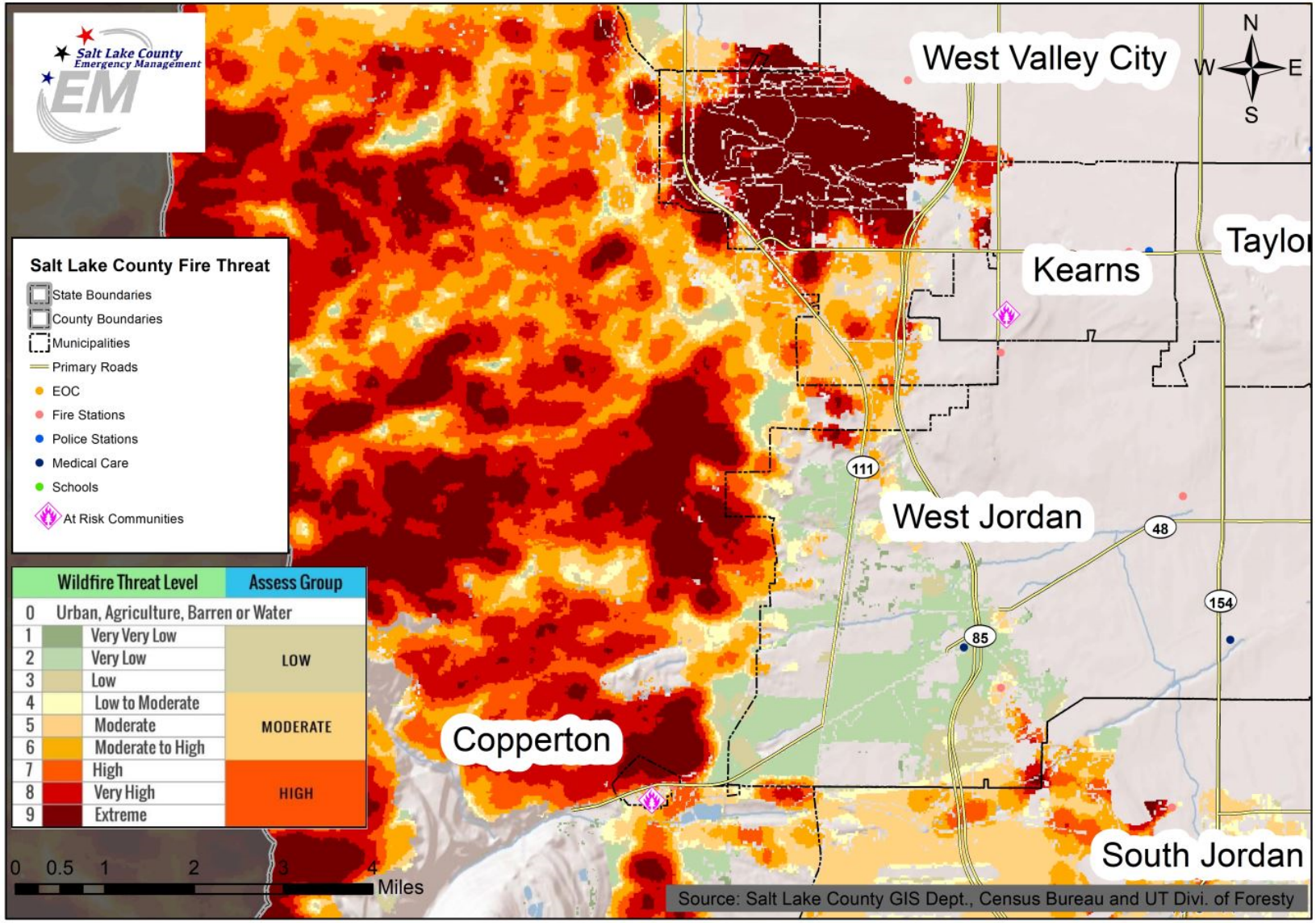
Map: 100 Year and 500 Year Flood Zone



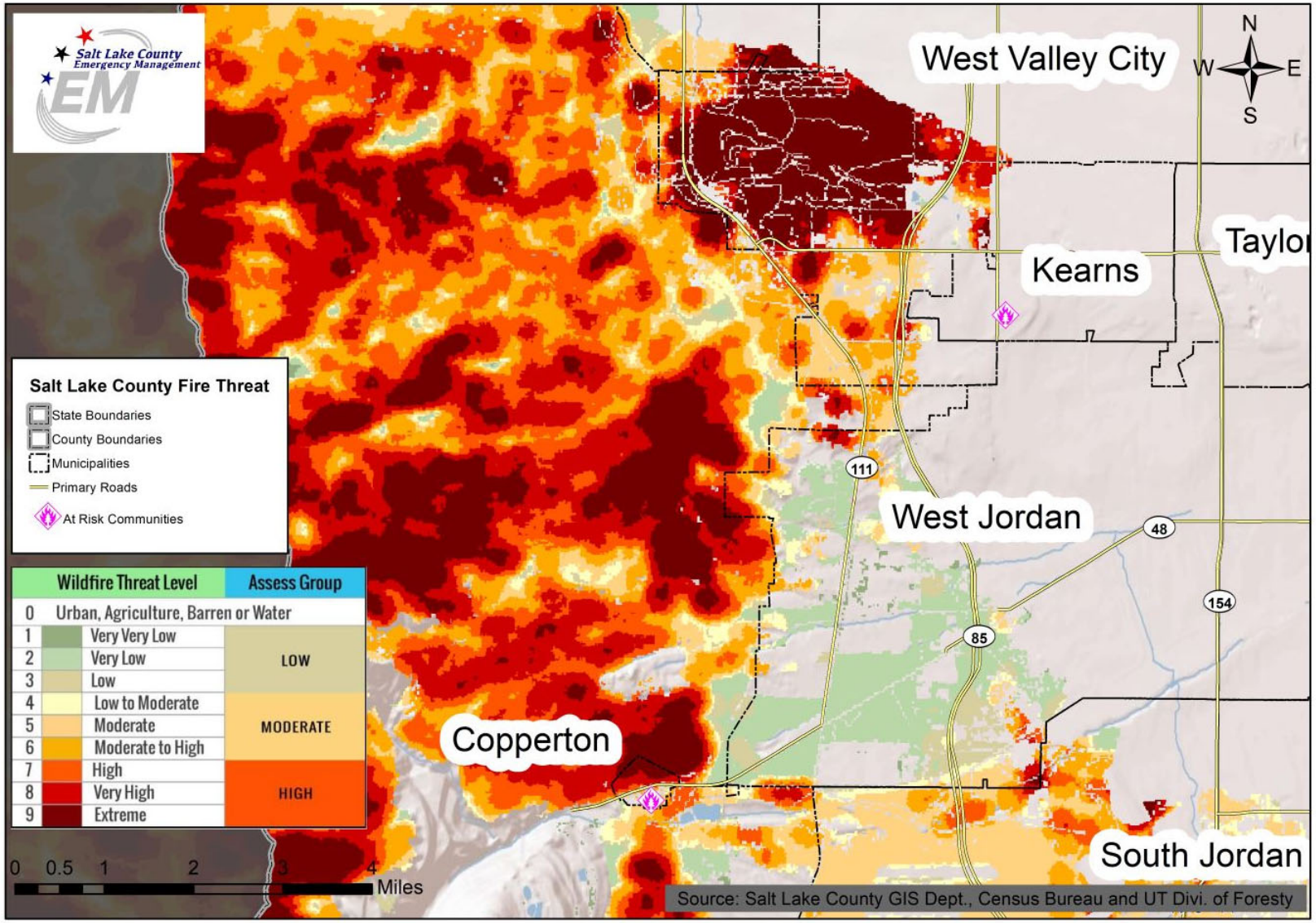
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



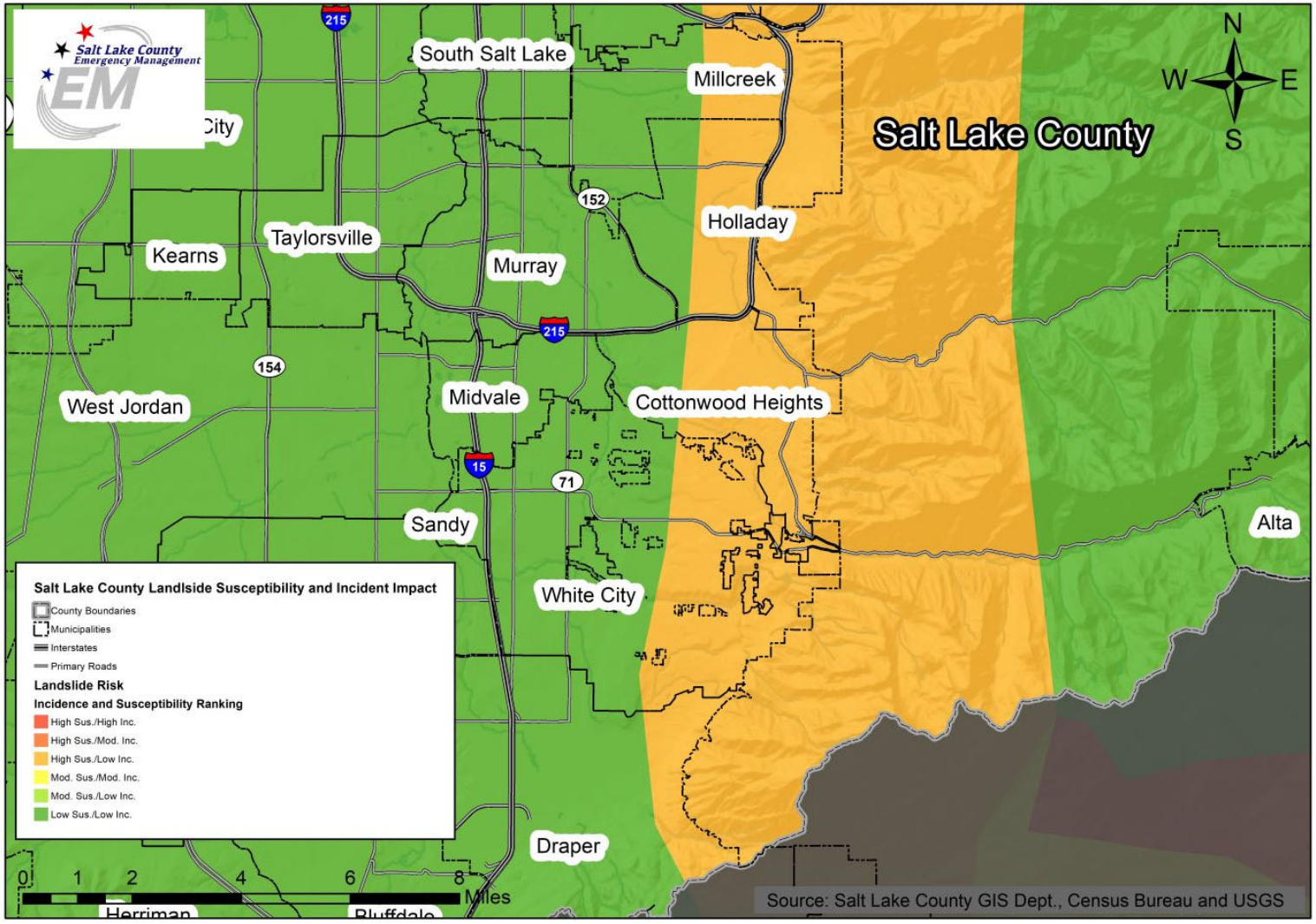
Map: Wildfire Threat Level



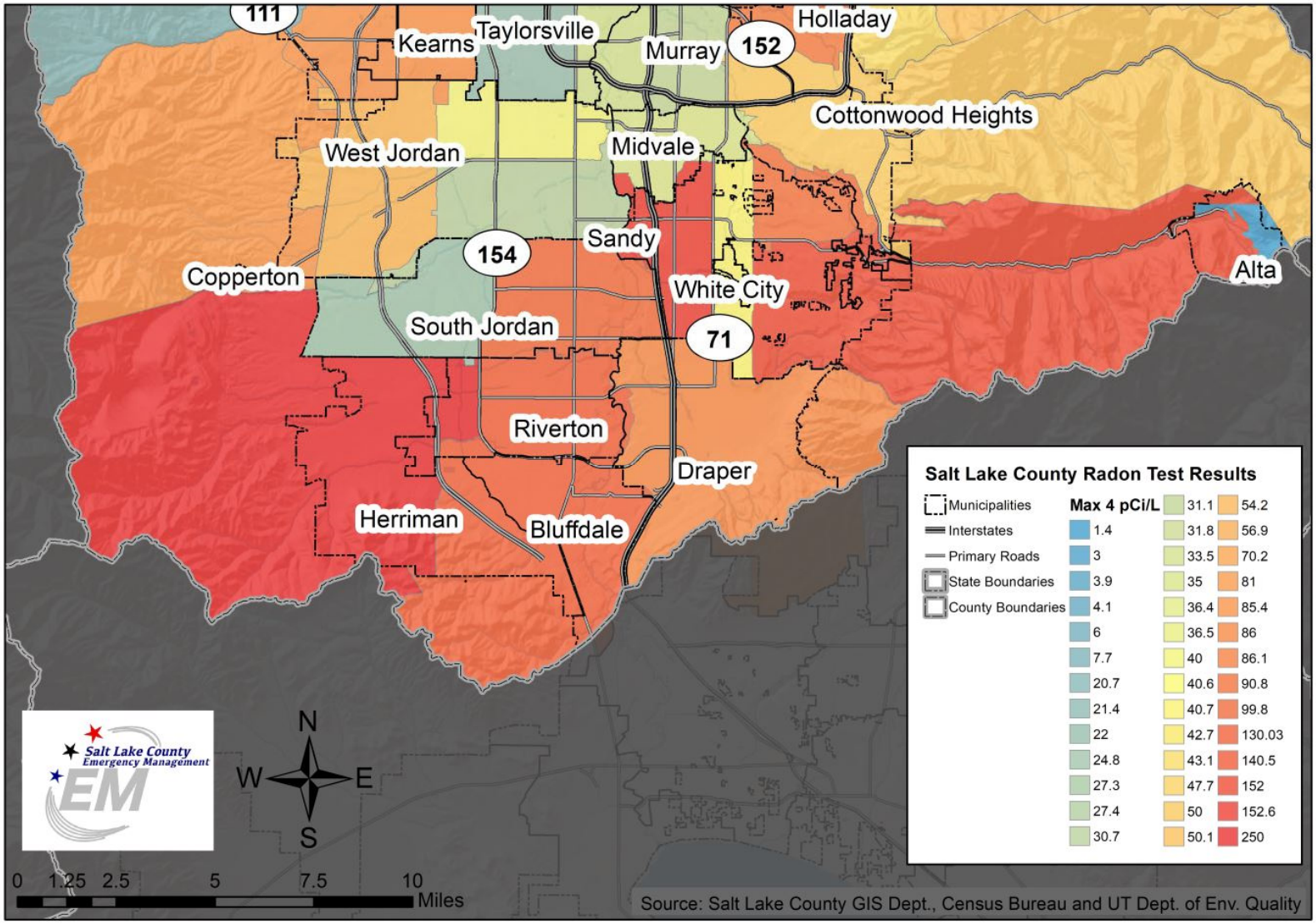
Map: Wildfire Threat Level with Critical Facilities



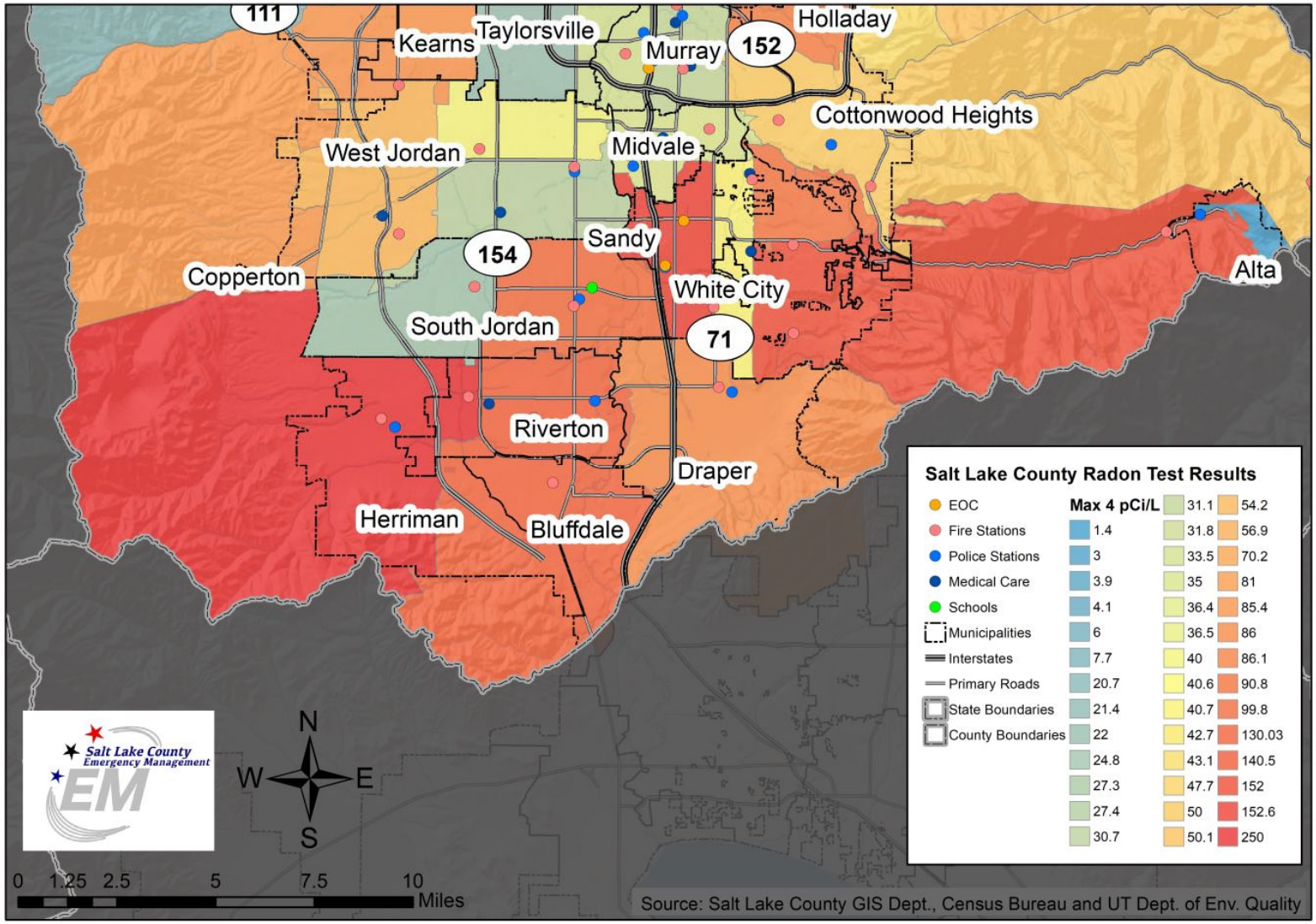
Map: Landslide Susceptibility and Incident Impact Potential



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: West Valley City



Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: John Evans Title: Fire Chief and Emergency Services Director Department: Fire Address: 3600 S Constitution Boulevard West Valley City, UT 84119 Office Phone: (801) 963-3337 Cell Phone: (801) 232-0337 Email Address: john.evans@wvc-ut.gov Website: https://www.wvc-ut.gov/1562/Be-Ready-WVC	Name: Chris Beichner Title: Deputy Fire Chief Department: Fire Address: 3600 S Constitution Boulevard West Valley City, UT 84119 Office Phone: 801-963-3336 Website: https://www.wvc-ut.gov/1562/Be-Ready-WVC

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 1980
- **Current Population:** 136,401 (Census v2018).
- **Population Growth:** The population grew 5.3% from April 1, 2010 (129,491) to July 1, 2018 (Census).
- **Location and Description:** The city is located in the suburbs of Salt Lake City and the majority of the space is land (25.4 sq mi) and a very small portion is water (01. sq mi).
- **Brief History:** West Valley City, despite being Utah's second-largest city, is a relatively young city. Incorporated in 1980, the city does not have the deep civic traditions of older Utah communities like Ogden, Salt Lake City or Provo. By the 1870s and 1880s canals were dug across the west side of the valley, bringing water from the Jordan River that became invaluable for irrigation. After World War II, the residents united in a Granger-Hunter Improvement District to provide culinary water and modern sewer services. Established in 1950, this organization gave the area the ability to provide a neighborhood with water allowing new subdivisions to become a reality, and the residential boom was on. Farms disappeared or shrunk as suburbia encroached. Businesses appeared along major corridors like 3500 South and Redwood Road to fill the needs of the growing community. Area residents began to organize, first in groups like the Lions Club, Rotary Club, Valley West Chamber of Commerce, and Daughters of the Utah Pioneers. From these civic-minded organizations came the Granger-Hunter Community Council in 1964. After a failed incorporation effort in 1978, a successful one occurred in 1980, and West Valley City was officially born July 1, 1980. The early years for West Valley City were rough. In fact, new city leaders were faced with a disincorporation vote on the ballot just a week after their July 1 swearing ins. Disincorporation failed and the city was here to stay, but the recession of the early 1980s was not kind to the infant municipality and finances were rough. But through prudent management, the city got on its feet, even paying cash for a new City Hall that was completed in 1990. Because of its relatively affordable housing, West Valley City was a popular place to settle for new immigrants coming to the Salt Lake Valley(West Valley City).

- **Climate:** The average high temperature is 92 degrees and the average low temperature is 24 degrees. On average, West Valley City receives 18 inches of rain and 42 inches of snow a year (Best Places).
- **Public Services:** The city offers community members the opportunity to participate on city boards and committees, including Board of Adjustments, Clean and Beautiful Committee, Historical Preservation Commission, License Hearing Board, Planning Commission, Professional Standards Review Board, and Sister City Committee
- **Governing Body Format:** West Valley City has a nonpartisan, city manager form of government. The mayor fills a role similar to the chairman of the board, with the City Council acting as the board. The mayor is a voting member of the City Council, and City Council has six councilors.
- **Development Trends:** The population of West Valley City, as with the rest of the Wasatch Front, is expected to grow through 2030 and beyond. Currently, high-rise buildings are being built and there are still large areas of older homes. As development continues, more education opportunities on remodeling and retrofitting should be presented for residents. Internal growth, potential annexation and increases in density in some areas will all impact the overall population of the City. The current and expected future population also indicates a transition toward an older population. significant growth in population is expected not only in West Valley City but among all Wasatch Front communities. Rapidly changing demographics and population growth will place different demands on aging housing stock. As West Valley City is approaching build-out in terms of raw land, these changes will raise important questions as to how the city grows, what is built, and where to invest resources and prepare for the future. Economic development has continued to be a priority for West Valley City's leaders. Business parks like Lake Park Corporate Center, West Ridge Commerce Park, Decker Lake Business District and Metro Business Park include corporate headquarters, regional offices and world-wide distribution centers for companies like Verizon Wireless, Frito Lay, Backcountry.com, United Parcel Service (UPS) and Discover Card. Economic development activities in the heart of the city include a complete redevelopment of Valley Fair Mall, and an all-new transit oriented development, Fairbourne Station (West Valley City).

Capability Assessment

The Fire Chief is the Town's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager/Fire Chief position(s).

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY

	Local Authority Exists to Develop and Implement/ Enforce?	A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?	Rely on the County's Codes, Ordinances & Requirements	Comments
Codes, Ordinances, & Requirements				
Building Code Development and Enforcement	Yes	Yes	No	
Zonings Ordinance(s)	Yes	Yes	No	
Subdivision Ordinance(s)	Yes	Yes	No	
Stormwater Management Program	Yes	Yes	No	
Floodplain Ordinance(s)	Yes		Yes	
Post Disaster Recovery Program and Ordinance(s)	No	No	Yes	
Real Estate Disclosure Ordinance(s)	Yes	Yes	No	
Growth Management	Yes	Yes	No	
Site Plan Review Requirements	Yes	Yes	No	
Planning Documents				
General or Comprehensive Plan	Yes	Yes	No	
Capital Improvement Plan	Yes	Yes	No	
Economic Development Plan	Yes	Yes	No	
Disaster Planning Documents				
Comprehensive Emergency Management	Yes	Yes	Yes	

Plan/ Local Emergency Operations Plan				
Post-Disaster Recovery Plan	Yes	No	-	
Continuity of Operations Plan	Yes	Yes	-	
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	Yes	Yes	Some are in the process.

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Community Development
Engineers or professionals trained in building or	Yes	Full Time	Community Development

infrastructure construction practices			
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Public Works Limited
Personnel skilled or trained in GIS applications	Yes	Full Time	IT Department
Emergency manager	Yes	Part Time	Fire Chief
Grant writers	Yes	Part Time	Finance

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	Public Works
Who is your jurisdiction's floodplain administrator? (department/position)	Public Works
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes, Limited.
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	Yes, Limited.

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0

- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 103 policies were in force with total coverage of $27,519,900 and total written premium and FPF of $119,447 (FEMA, 2019).
- West Valley City does participate in the National Flood Insurance Program (CID # 490245) and the last FIRM map for the area was issued on 09/25/09 (FEMA, 2019).
- The city will continue to participate in the NFIP through various efforts including but not limited to floodplain management, ordinance development and review, technical assistance, compliance inspections, and community education on flood hazards.

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	4 inches of snow		2/13/2019	
Heavy Snow	9 inches of snow		2/22/2018	
Hail	quarter-sized, ping-pong-sized, to golf-ball-sized		6/13/2016	
Hail	1-inch diameter		8/6/2014	
Winter Storm	7 inches of snow, power outages including downed power lines and hundreds of car accidents		12/19/2013	
Winter Storm	6 inches		12/7/2013	
Winter Storm	11 inches		12/29/2010	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	10,759
Members of the community under 18 years old	43,437

Members of the community that identify as having disability status	11,275
Members of the community that speak English less than "very well"	19,165
Members of the community living below the poverty line	18,631
The number of mobile homes in the community	2,416
Members of the community without health insurance	28,061
Occupied housing units with tenants without a vehicle	1,454
Housing units without heating fuel	22

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Earthquake: The Wasatch Fault poses the greatest threat to the area. Other faults within West Valley City include the West Valley Fault Zone and the East Great Salt Lake Fault Zone. Each of these fault zones has a much longer return interval (2,500 years or more) and is not expected to produce a major quake in the near future. Other faults of concern are the Taylorsville and Granger Fault. With any earthquake, liquefaction is a concern, as well as the potential high impact on the unreinforced masonry structures and structures built before 1974.

Name	Fault Type	Length (km)	Time of Most Recent Deformation	Recurrence Interval
West Valley fault zone, Granger segment	Normal	16	1,500±200 cal yr B.P.	2,600-6,500 years
West Valley fault zone, Taylorsville segment	Normal	15	2,200±200 cal yr B.P.	6,000-12,000 years

Table. Quaternary Faults, Salt Lake County (UGS 2002, UGS 2006) cal yr B.P.=calendar years before present

Vulnerability Assessment

The following values are from the HAZUS analysis performed in the previous Mitigation Plan. Because no significant changes in the level of risk or the condition of infrastructure, these values are still considered valid estimates of potential impacts to earthquake in Salt Lake County and West Valley areas. They are based on a probabilistic 2500-year event with a Richter magnitude of 7.1 as well as an arbitrary 5.9 event located in close proximity to West Valley's most populated areas. These locations and magnitudes were chosen for their likelihood and proximity respectively. Default HAZUS-MH inventory for all infrastructure was used.

Vulnerability of people and infrastructure to earthquake hazards in West Valley City was obtained from the modeling program HAZUS-MH, completed by FEMA Region VIII.

Jurisdiction	*Total Building Economic Loss*	*Loss Ratio*	*Total Debris (tons)*
West Valley City	$ 1,890,864,776	15%	1,280,884

Jurisdiction	*Displaced Households*	*Individuals Seeking Public Shelter*	*Total Casualties*	*Life-Threatening Injuries and Fatalities*	*URM Count*
West Valley City	5,830	4,944	1,686	169	7,143

Jurisdiction	*Life-Threatening Ratio to Total Pop*	*URM Ratio to Total Structures*
West Valley City	0.130%	23%

Building Damage

HAZUS-MH classifies building damage into five states: none, slight, moderate, extensive and complete. The Table below lists the number of buildings by occupancy estimated to sustain moderate to complete levels of damage during an arbitrarily-determined Richter magnitude 5.9 (M5.9) earthquake scenarios or a probabilistic Richter magnitude 7.1 (M7.1) earthquake scenario. Also listed are the estimated monetary losses to structures, contents/inventory, and income.

Category	**Number of Structures with > 50% Damage**		**Category**	**Estimated Losses**	
	Salt Lake M5.9	**2500-yr M7.1**		**Salt Lake M5.9**	**2500-yr M7.1**
Residential	30,342	157,705	Structural Losses	$519,320,000	$3,419,030,470
Commercial	1,896	5,199	Non-Structural Losses	$1,818,647,000	$12,331,504,070
Industrial	495	1,367	Content Losses	$719,709,000	$4,114,455,740
Government	167	475	Inventory Losses	$29,216,000	$175,756,410
Education	51	159	Income and Relocation Losses	$623,140,000	$3,263,449,580
Totals	32,951	164,905	Totals	**$3,710,032,000**	**$23,304,196,270**

Table. Building Damage Counts and Estimated Losses using HAZUS MH

Debris Removal

The Table below shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

Category	Salt Lake M5.9	2500-yr M7.1
Brick, Wood & Others	581,000 tons / 23,240 loads	3,356,000 tons / 134,240 loads
Concrete & Steel	1,195,000 tons / 47,800 loads	7,678,000 tons / 307,120 loads

Table. Debris Generated/Number of Loads

Fires Following an Earthquake

Multiple ignitions and broken water mains following an earthquake can make firefighting nearly impossible. HAZUS-MH uses estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake.

Casualties

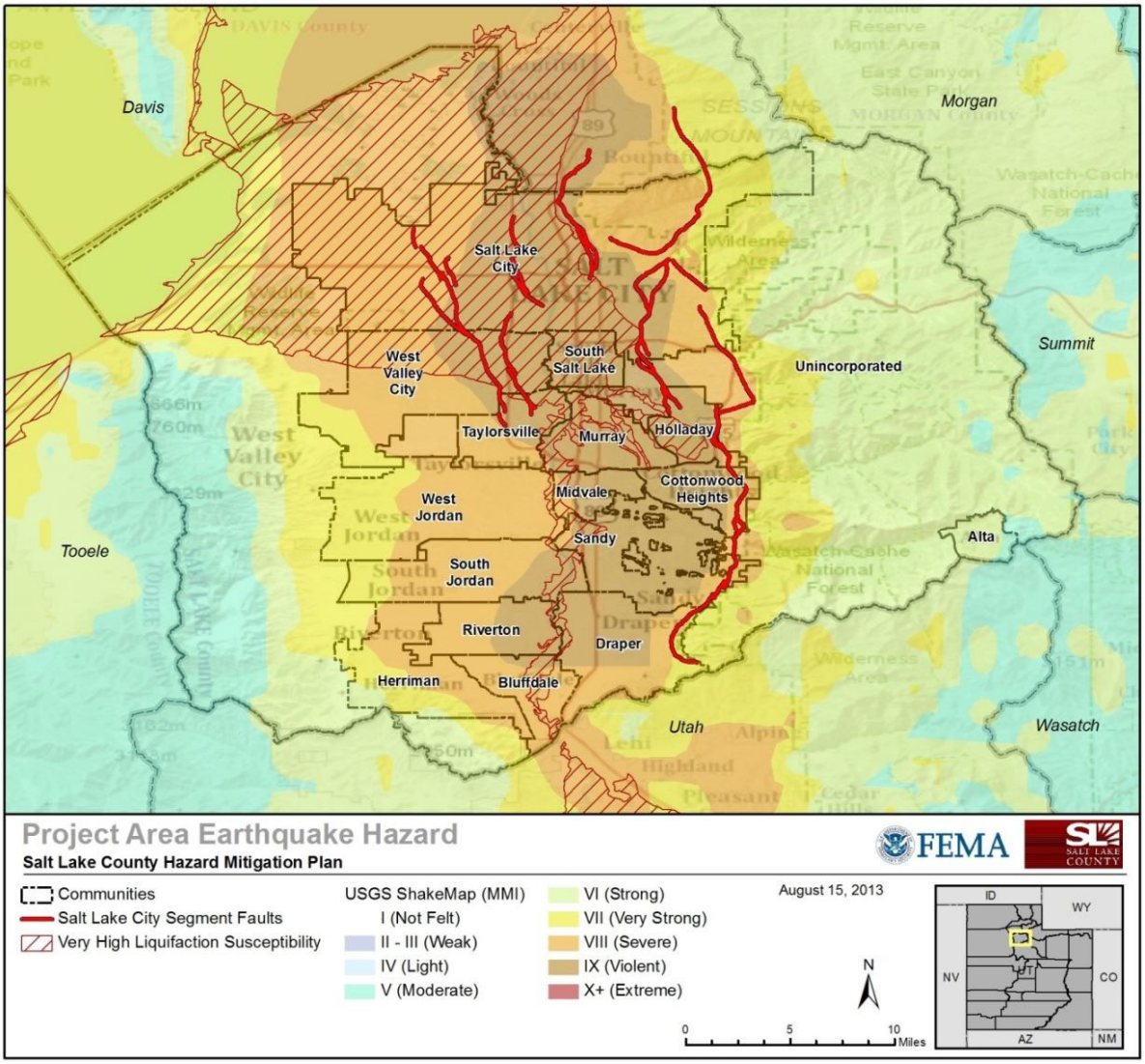
The Table below estimates casualties likely to occur during each earthquake scenario. The nighttime scenario (2 a.m. local time) assumes a primarily residential concentration of persons, the daytime scenario (2 p.m. local time) a commercial concentration, and the commute scenario (5 pm. local time) a concentration of persons on commuting routes. Categories of casualties include those not requiring hospitalization (minor), those requiring treatment at a medical facility (major), and fatalities.

Night Event	Salt Lake M5.9	2500-yr M7.1	Day Event	Salt Lake M5.9	2500-yr M7.1	Commute Event	Salt Lake M5.9	2500-yr M7.1
Minor	1,024	10,475	**Minor**	1,883	17,110	**Minor**	1,432	13,442
Major	219	3,224	**Major**	502	6,192	**Major**	369	4,688
Fatalities	44	758	**Fatalities**	122	1,742	**Fatalities**	87	1,258

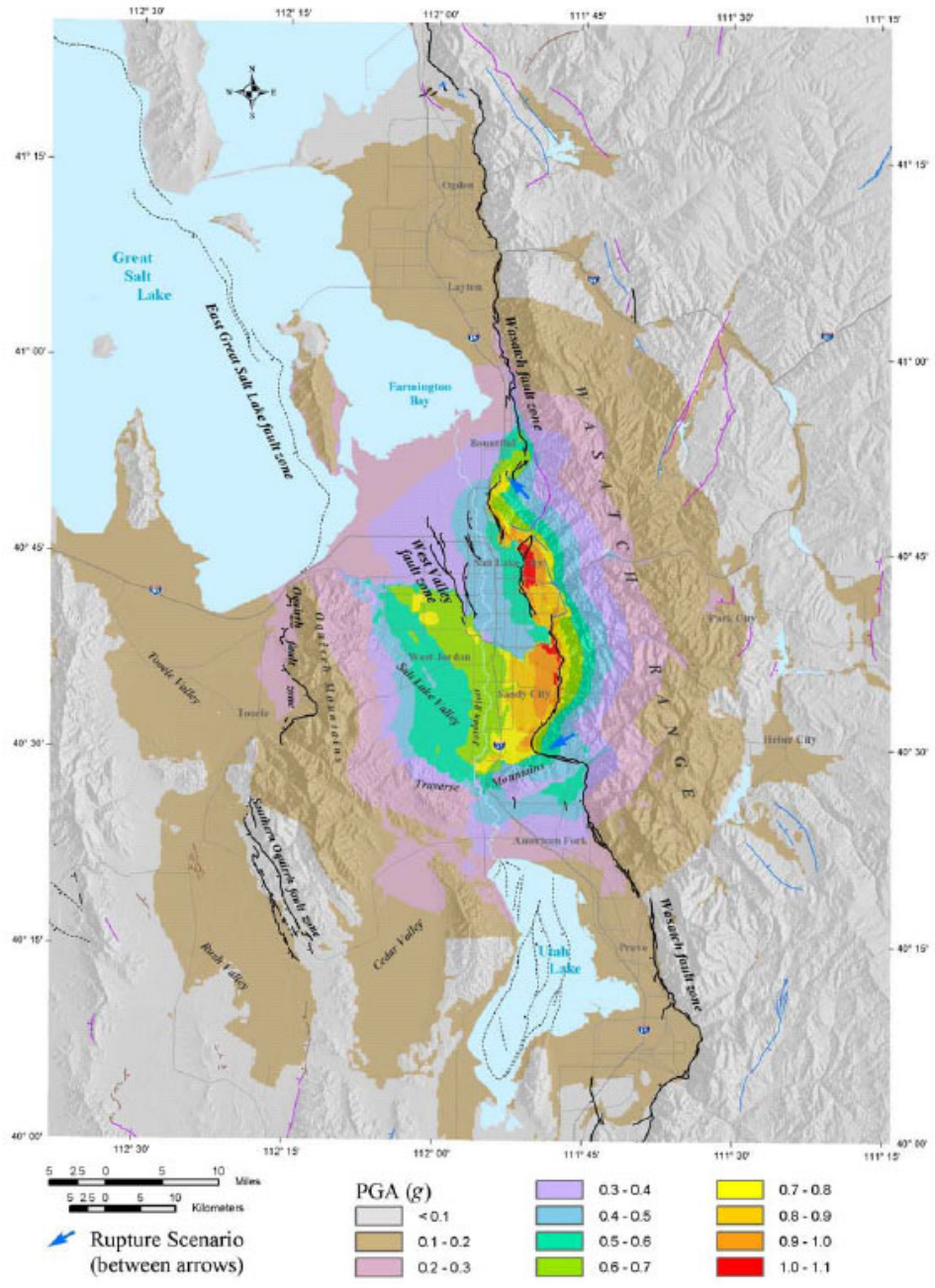
Table. Casualties

Community Assets

Additional significant community assets with potential impacts by earthquake hazards were identified by the Planning Team. These include areas of concern, critical facilities and infrastructure, areas of future development, major employers or economic sectors, cultural or historic facilities, significant populations, or significant natural resources.



Map from Earthquake-Hazards Scenario for a M 7 Earthquake on the Salt Lake City Segment of the Wasatch Fault Zone, Utah, Utah Geological Survey Special Study 111, 2004.



Flooding: Flooding in West Valley City is typically the result of excessive snowmelt runoff and/or heavy rainfall. Snowmelt flooding is usually the result of the rapid melting of snowpack and occurs between April through June and occurs along the major existing streams and waterways. Thunderstorms can produce high intensity, short-duration heavy rainfall that occurs over a relatively small area in the summer months. However, flooding can also occur from non-thunderstorm rainfall events. The flows of the Jordan River from Utah Lake into West Valley City are controlled and the flood potential from is somewhat reduced upstream of the major Jordan River tributaries. A concern in the area is the uncertified levees at 3800 S. The bridge over the river at 3900 is too low and easily impacted by flooding. Also, the lack of drainage in the eastern part of the city adds to flooding concerns, particularly the area east of Lester St in Chesterfield

and east of 1300 W South of 3500 S. Urban flooding is a concern for South Bourne Circle, Atlas Way-north end, 4000 W. and 4100-4700 S., and Stanton Dr./ 3285 S. Intersection.

West Valley City has no recurring loss properties identified under the National Flood Insurance Program (NFIP).

Location

Flooding in West Valley City is typically the result of excessive snowmelt runoff and/or heavy rainfall. Snowmelt flooding is usually the result of rapid melting of snowpack and occurs between April through June and occurs along the major existing streams and waterways. Thunderstorms can produce high intensity, short duration heavy rainfall that occurs over a relatively small area in the summer months. However, flooding can also occur from non-thunderstorm rainfall events.

The flows of the Jordan River from Utah Lake into West Valley City are controlled and the flood potential from is somewhat reduced upstream of the major Jordan River tributaries. Parley's Creek has flood storage capacity at Mountain Dell and Little Dell Reservoirs and is routed through a retention basin in Sugarhouse Park. Big and Little Cottonwood Creeks and have several smaller flood storage lakes and ponds providing some flood protection, such as Wheeler Historic Farm. In Salt Lake City, Emigration Creek and Red Butte Creek come together at 700 East and 1300 South and can be discharged in or bypass Liberty Park pond. Parley's Creek discharges to the 1300 South drain at State Street.

A concern in the area is the uncertified levees at 3800 S. The bridge over the river at 3900 is too low and easily impacted by flooding. Also, the lack of drainage in the eastern part of the city adds to flooding concerns, particularly the area east of Lester St in Chesterfield and east of 1300 W South of 3500 S. Urban flooding is a concern for South Bourne Circle, Atlas Way-north end, 4000 W. and 4100-4700 S., and Stanton Dr./ 3285 S. Intersection.

History:

The following flood events are of notable significance:

2011 - Large snowpack meant larger resulting spring runoff flows
2010 - Spring snowmelt combined with heavy rains caused several streams to overtop their banks
1987 – Great Salt Lake reached its all-time maximum water level (4211.6 feet)
1983 - Large snowpack was coupled with a rain-on-snow event, (City Creek diverted down State Street)
1983/1984 - Large snowpack overwhelmed Utah Lake and affected Jordan River downstream
1952 - Rapid melt of a large snowpack

During the past 149 years, the Great Salt Lake has peaked three times above 4,211 feet above sea level: 4,211.60 feet in June 1873, 4,211.50 feet in June 1986 and 4,211.60 feet in June 1987.

Vulnerability Assessment

The following loss estimates were provided by FEMA Region VIII, as part of the Mitigation Planning/Risk MAP partnership.

Structure Exposure and HAZUS-Generated Losses

	1% Annual Chance			0.2% Annual Chance		
Jurisdiction	Structure Exposure	Building and Contents Loss*	Loss Ratio**	Structure Exposure	Building and Contents Loss	Loss Ratio
West Valley City	399	$90,923,943	0.704%	173	$4,741,553	0.04%
County Total	**1,533**	**$118,217,947**		**6,763**	**$320,309,430**	**0.23%**
Population Exposure						
1% Annual Chance					7,421	
0.2% Annual Chance					23,126	

Agricultural Losses

Losses are computed according to the number of days in which the crops are inundated with water. All numbers are estimated for a flood occurring near April 15th.

	100-year Losses Day 3	**100-year Losses Day 7**	**500-year Losses Day 3**	**500-year Losses Day 7**
Barley	$45,134	$60,179	$49,078	$65,438
Corn Silage	$565,932	$754,577	$566,310	$820,518

Debris Removal

The Table below shows how much debris would be generated by flooding and how many loads it would take to remove the debris, based on a capacity of 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

Category	**100-year**	**500-year**
Finishes	37,402 tons/1,497 loads	44,481 tons/1,780 loads
Structures	64,725 tons/2,589 loads	69,936 tons/ 2,798 loads
Foundations	61,660 tons/2,467 loads	66,747 tons/2,670 loads
Totals	163,786 tons/6,553 loads	181,164 tons/7,248 loads

Severe Weather: Severe weather common in the city includes winter storms, large scale wind events, thunderstorms, lightning, hail, tornadoes, flooding, and avalanches. While some types of these events can be predicted, others will occur with little or no warning.

High Winds: High winds can occur with or without the presence of a storm and are unpredictable in regard to time and place. West Valley City has experienced high winds in the past and can expect future events.

Thunderstorms: Damage can be extensive especially for agriculture, farming, and transportation systems.

Winter Storm: Winter storms can pose a significant threat due to vehicle traffic accidents on icy roads, prolonged exposure to cold, damage to electrical, telephone or communication systems from ice or heavy snow accumulation, and indirectly related health threats such as individuals suffering heart attacks while shoveling snow. Prolonged exposure to cold can cause frostbite or hypothermia and can become life-threatening. Winter weather can also have significant economic costs associated with snow removal, revenue and wage losses from road and airport delays or closures, flooding damage from rapid snowmelt, and agricultural and timber losses from frost and ice. Of primary concern for the area is roof damage on old low slope roofs, the homeless population being impacted, and the lack of snowplowing resources.

Extreme Temperature: The area experiences both cold and very high-temperature conditions. Extreme heat not only causes discomfort, but personal health can be affected through heat cramps, heat exhaustion or heat stroke, particularly affecting vulnerable populations such as the very young, elderly, poor, and homeless. Extreme heat places a substantial burden on power grids through the widespread use of evaporative coolers and air conditioning. This strain can lead to brownouts or blackouts leaving many without power. Historically, extreme cold in the region has disrupted agriculture, farming, and crops. Especially vulnerable to extreme cold are the young, elderly, homeless and animals. Wind chill can further the effects of extreme cold. Extreme Cold impacts the old water and gas infrastructure.

Drought: Although the agricultural community is usually the most heavily impacted by drought, direct and indirect impacts extend into economic, social, or environmental sectors as well.

Dam Failure: The Dam on Riter Canal (5300 W) would impact the area, including a few homes, if it failed.

Wildfire: Areas near SR-III (need gate access) are at risk for wildfire. The town also has a significant homeless population and wildfires can cause adverse impacts to these community members.

Public Health: Like the winter storm and wildfire concerns, the homeless population could be adversely impacted by a pandemic.

Civil Disorder/Riot: USANA and Maverik Center are areas of concern for these events due to being gathering sites.

Hazardous Materials Release: ATK (Northrup Gruman) Explosion is the biggest HAZMAT event to have occurred. The railroad carries loads of hazardous materials through the town and Hexcel Carbon Fiber Management plant houses hazardous materials.

Radon: Radon is a radioactive gas released from the nuclear decay process of uranium and radium, which are trace elements of many soils. The entire city is subject to this type of event.

Terrorism: The ICE facility could be a target.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	19	38
Cyber Attack	2	17	34
Hazardous Materials Incident	2	15	30
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Dam Failure	1	21	21
Tornado	1	11	11
Civil Disturbance	1	10	10
Wildfire	1	10	10
Landslide and Slope Failure	1	6	6
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.

SLC2019HMP-West Valley(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Medium	2	6
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Medium	2	2		Dam Failure	High	3	6
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	No Impact	0	0		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Low	1	1		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Procure generators and hookups for publicly-owned buildings and facilities assisting functional access needs populations.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Hazardous Materials Release	West Valley City EM	Public Works and ALF	High	High	HMA/PDM Grant or other federal funds	High	Short-term	
Conduct a Hazardous Flow Study	2019	Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	All-Hazards	West Valley City EM	Public Works	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Short-term	

Mitigation Table - Ongoing Actions

Action	Year Initiated	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct an inventory and assessment of communications equipment and systems and identify needs	2009	All Hazards	Emergency Management	High	Low	Local	Medium	Ongoing	Currently we have upgraded radio and comms systems. Inventory of all local assets complete
Establish agreements to share communications equipment between agencies involved in emergency operations	2009	All Hazards	Emergency Management and Communications	Medium	Low	Local	Medium	Ongoing	Working with Salt Lake County
Evaluate vulnerability of critical communications systems	2009	All Hazards	Emergency Management and Communications	High	Low	Local	Medium	Ongoing	Looking at each emergency to see weakness
Establish a coordinating group to address long-term communication needs and implementation strategies	2009	All Hazards	Emergency Management and Communications	Medium	Low	Local	Medium	Ongoing	Working with City comms group for this
Compile inventory of mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies	2009	All Hazards	Emergency Management	Medium	Low	Local	Medium	Ongoing	Completed all fire and ems. Working with Public works and police now
Incorporate information about cascading effects of hazards in education programs	2009	All Hazards	Emergency Management	Medium	Low	Local	Medium	Ongoing	Working with city to have continual education
Develop education programs to target specific groups including homeowners,	2009	All Hazards	Emergency Management	Medium	Low	Local	Medium	Ongoing	We have completed adult programs and are now working on an

developers, schools and people with special needs									elementary school program
Implement water-saving devices and practices in public facilities	2009	Drought	Emergency Management and Public Works	Medium	Medium	Local and grants	Medium	Ongoing	City facilities are changing over fixtures for conservation in city owned buildings
Assist Cities with NFIP application	2009	Flood	Emergency Management	Medium	Low	Local	Low	Ongoing	Advise citizens and businesses of program
Encourage Communities to actively participate in NFIP	2009	Flood	Emergency Management	Medium	Low	Local	Medium	Ongoing	Provide education to citizens in EM programs
Identify and assess structures for deficiencies	2009	Flood	Emergency Management and Public Works	Medium	Medium	Local and grants	Medium	Ongoing	Provide education to citizens in EM programs
Modify structures as needed to address deficiencies	2009	Flood	Emergency Management and Public Works	Medium	High	Local and grants	Medium	Ongoing	Provide education to citizens in EM programs
Maintain Contact with NWS prior to re-application in 2010	2009	Severe Weather	Emergency Management	Medium	Low	Local	Medium	Ongoing	Work always on plans with NWS
Conduct training and awareness activities on communications equipment, tools, and systems.	2014	All Hazards	Fire and Emergency Management	High	Minimal	Local	High	Ongoing	West Valley completes monthly tests
Establish notification capabilities and procedures for emergency personnel.	2014	All Hazards	Fire and Emergency Management - Dispatch	High	Minimal	Local	High	Ongoing	West Valley uses the VECC callback system for personnel
Establish redundancy for dispatch centers and other critical communications systems.	2014	All Hazards	MIS	Medium	Medium - $60,000	Local	High	Ongoing	West Valley has this with VECC and also our own 800mhz radio repeater system; We have trained all personnel working in emergency operations

Acquire, upgrade, and/or integrate communications equipment and systems as determined by coordinating group.	2014	All Hazards	Fire/EMS	Medium	High - $500,000	Federal and state grants	High	Ongoing	New Radio Systems; Budget issue upgrading as we can with current budgets
Establish a coordinating group to address geographic data issues.	2014	All Hazards	CED/MIS	Medium	Minimal	Local	Medium	Ongoing	West Valley GIS is always updating the maps
Examine current data availability and sharing capabilities, evaluate needs, and identify shortcomings.	2014	All Hazards	Municipal	High	Low - $10,000	Local	Medium	Ongoing	Working on Gap Analysis
Update and expand data on hazards, critical facilities, and critical infrastructure according to assessed needs.	2014	All Hazards	Fire and Emergency Management	High	Low - $10,000	Local	Medium	Ongoing	West Valley not currently done but has some items within the Digital Sandbox
Provide centralized access to geographic data to emergency planners and responders.	2014	All Hazards	GIS	Medium	Low - Minimal	Local	Medium	Ongoing	Working with GIS Department).
Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gauges, seismograph stations, road conditions, etc.	2014	All Hazards	Municipal	Medium	Low -$4,000	Local	Medium	Ongoing	West Valley City looking at weather strand
Identify and implement additional hazard monitoring capabilities.	2014	All Hazards	Municipal	High	High	Municipal	Medium	Ongoing	Further research needed
Utilize GIS to identify facilities and infrastructure at risk.	2014	All Hazards	MIS	High	Low-$5,000	Local	High	Ongoing	Continually accessing

Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures.	2014	All Hazards	Municipal	High	Medium - $25,000	Municipal	High	Ongoing	Education strategy.
Pursue and implement needed mutual-aid agreements.	2014	All Hazards	All	Medium	Low - $5,000	Municipal	Medium	Ongoing	West Valley Fire and Police are done working on other departments
Provide education regarding all natural hazards through live trainings, as well as web-based, print and broadcast media.	2014	All Hazards	Emergency Management	High	Low	Local	High	Ongoing	West Valley CERT
Utilize maps and similar products on City EM website and other media to educate public on areas at risk to hazards.	2014	All Hazards	MIS	High	Low - $5,000	Local	High	Ongoing	Continually update
Continue to encourage water conservation utilizing and promoting outreach material from all water districts in the County.	2014	Drought	Water Districts	High	Low	Municipal	High	Ongoing	Ongoing outreach
Emergency Managers will coordinate with local water districts/public utilities to support ongoing conservation efforts.	2014	Drought	Public Works and West Valley Education	High	Low	Local	High	Ongoing	Ongoing outreach
Identify structures at risk to earthquake damage.	2014	Earthquake	Emergency Management	High	Low - $5,000	Local	High	Ongoing	West Valley HAZUS
Research feasibility of an incentive program for retrofitting privately-owned	2014	Earthquake	Emergency Management	High	High	State and Federal grants,	High	Ongoing	West Valley Planning Process

buildings, particularly unreinforced masonry.						such as HMA			
Complete seismic rehabilitation/retrofitting projects of public buildings at risk.	2014	Earthquake	Municipal	High	High - $17,000,000	Municipal and additional grants	High	Ongoing	West Valley City working plan
Provide educational materials to unreinforced masonry home and business owners.	2014	Earthquake	Emergency Management	Medium	Low - $10,000	Municipal	Medium	Ongoing	Ongoing outreach to citizens
Determine potential flood impacts and identify areas in need of additional flood control structures.	2014	Flood	Public Works and West Valley Planning	Medium	Low	Municipal	Medium	Ongoing	Continual process
Address identified problems through construction of debris basins, flood retention ponds, energy dissipaters or other flood control structures.	2014	Flood	Public Works	Medium	High - $1,000,000	Municipal	Medium	Ongoing	West Valley – Continual with all developments and up-grades to storm water drains near Jordan River.
Establish maintenance and repair programs to remove debris, improve resistance and otherwise maintain effectiveness of storm water and flood control systems.	2014	Flood	Public Works	High	Medium - $75,000 annually	Local	High	Ongoing	West Valley City on-going maintenance
Maintain Hazardous Weather Operations Plan according to StormReady requirements.	2014	Severe Weather	Emergency Management	Low	Low	Local	Low	Ongoing	Work on Storm Wise Program
Assist NWS in making other agencies and departments aware of available resources.	2014	Severe Weather	Staff	Medium	Low	Local	Medium	Ongoing	Advise citizens on website
Work with the NWS to develop large event venue weather safety and evacuation procedures.	2014	Severe Weather	Emergency Management	High	Low - $10,000	Local	High	Ongoing	West Valley to develop a plan with event areas

Mitigation Table - Completed and Removed Actions

Category	Year Initiated	Goal / Objective	Action	Status	Comments
All Hazards	2009	1 – Improve and maintain communications capabilities for emergency operations 1.1 – Improve communication capabilities	4 – Establish notification capabilities and procedures for emergency personnel	Done	Worked with Dispatch and reverse 911 for our system
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	1 – Integrate existing hazard monitoring networks in emergency operations centers. Utilize sensors such as weather stations, stream gages, seismograph stations, road conditions, etc.	No Progress	Funding and personnel
All Hazards	2009	2 – Improve awareness and analysis of hazards 2.2 – Improve and expand hazard monitoring capabilities	2 – Identify and implement additional hazard monitoring capabilities.	No Progress	Funding and personnel
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	2 – Assess critical facilities for hazard exposure, structural weaknesses, power, communications and equipment resources and redundancy, and adequate emergency procedures	Done	Have completed this for city owned facilities
All Hazards	2009	3 – Ensure critical facilities can sustain operations for emergency response and recovery 3.1 – Prevent damage to critical facilities and infrastructure	3 – Implement improvements to address identified in assessment	Done	completed this for city owned facilities
All Hazards	2009	5 – Increase citizen safety through improved hazard awareness 5.1 – Establish a comprehensive public education program	5 – Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, be Ready Utah, the National Weather Service, etc.	Done	All of our programs work with the groups listed

All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	1 – Establish and enforce appropriate planning, zoning, and building code ordinances	Done	City building uses latest codes
All Hazards	2009	6 – Improve public safety through preventative regulations 6.1 – Minimize hazard impacts through the adoption of appropriate prevention measures	2 – Ensure current hazard ordinances are available for viewing online	Done	Codes available at city hall
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	1 – Include dam inundation maps in current County, City and Special Service District Emergency Operations Plans	NA	Dam's not hazard in this city
Dam Failure	2009	1 – Include dam failure inundation in future County and City planning efforts 1.1 – Review current State dam safety information on all identified high hazard dams in the County	2 – Utilize inundation maps to identify potential evacuation areas and routes	NA	Dam's not hazard in this city
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	3 – Investigate feasibility of implementing an incentive program to encourage the use of low-flow appliances and fixtures in homes and businesses	NA	City does not own water system
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	2 – Research feasibility of an incentive program for retrofitting privately-owned buildings, particularly unreinforced masonry	No Progress	Funding issues

Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.1 – Encourage retrofit and rehabilitation of highly susceptible infrastructure	3 – Complete seismic rehabilitation/retrofitting projects of public buildings at risk	No Progress	Funding issues
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.2 – Improve public education regarding earthquake risks to unreinforced masonry buildings	1 – Provide educational materials to unreinforced masonry home and business owners	Done	Provide information at all events. This will always be on going
Earthquake	2009	1 – Reduce earthquakes losses to infrastructure 1.3 – Improve Seismic Hazard understanding and seismic resistance of CUWCD Red Butte Dam in Salt Lake County.	1 – Procure Engineering Consultant to perform the nonstructural design and geotechnical assessment and review.	None	Funding issues
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.1 – Maintain status as a StormReady Community	1 – Maintain Hazardous Weather Operations Plan according to StormReady requirements	Done	Emergency plan information
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.2 – Increase awareness of information services provided by NWS	1 – Meet with NWS representative on an annual basis to receive information on new services and alerts available	Done	Meeting on plans but will always be ongoing
Severe Weather	2009	1 – Reduce threat of loss of life or property due to extreme weather events 1.3 – Encourage safe practices in avalanche prone areas	1 – Assist Forest Service Utah Avalanche Forecast Center and other organizations in promoting avalanche hazard awareness for backcountry users	N/A	No Avalanches

Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.1 – Reduce the threat of slope failures following wildfires	1 – Develop protocol for working with State and Federal agencies in reducing the impact of post-fire debris flow hazard	N/A	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.2 – Monitor historic landslide areas	1 – Coordinate with the Utah Geological Survey and other agencies to understand current slope failure threats/potential	N/A	
Slope Failure	2009	1 – Reduce or eliminate the threat of slope failure damage 1.3 – Address landslide hazards in new sub-divisions	1 – Utilize recommendations provided by the State Geological Hazards Working Group to address land-use and planning for new developments	N/A	
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	1 – Increase public awareness through “Firewise” program	N/A	No wildland in City
Wildland Fire	2009	1 – Community education on wildfire hazard 1.1 – Reduce risk from wildfire through education programs	2 – Educate homeowners on the need to create defensible space near structures in WUI	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.1 – Assist homeowners with creating defensible space near structures in WUI areas	1 – Designate and promote county-wide annual initiative for clearing fuels	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities	2 – Provide waste removal, such as chipping of green waste by public works, following designated fuel clearing day/week	N/A	No wildland in City

		2.1 – Assist homeowners with creating defensible space near structures in WUI areas			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	1 – Work with experts and communities to develop or update evacuation plans	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.2 – Improve evacuation capabilities for WUI areas	2 – Evaluate transportation network and address needed improvements to facilitate evacuation and emergency response	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	1 – Identify all facilities, businesses, and residences, particularly in the canyons, and assign addresses according to current county addressing standards	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.3 – Improve addressing system in WUI areas to facilitate emergency response	2 – Incorporate improved addresses in fire-dispatch and other databases	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities	1 – Reduce fuels around publicly owned structures	N/A	No wildland in City

		2.4 – Complete wildfire protection projects			
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	2 – Implement fire breaks and other protective measures	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	3 – Assess existing water flow capabilities, both public and private, and address deficiencies	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.4 – Complete wildfire protection projects	4 – Assist communities in developing Community Wildfire Protection Plans or similar plans	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	1 – Adopt the Utah Wildland-Urban Interface Code	N/A	No wildland in City
Wildland Fire	2009	2 – Improve safety from wildfire hazards through planning, protective actions and improved fire response capabilities 2.5 – Encourage proper development practices in the WUI	2 – Define wildland-urban interface and develop digital maps of the WUI	N/A	No wildland in City

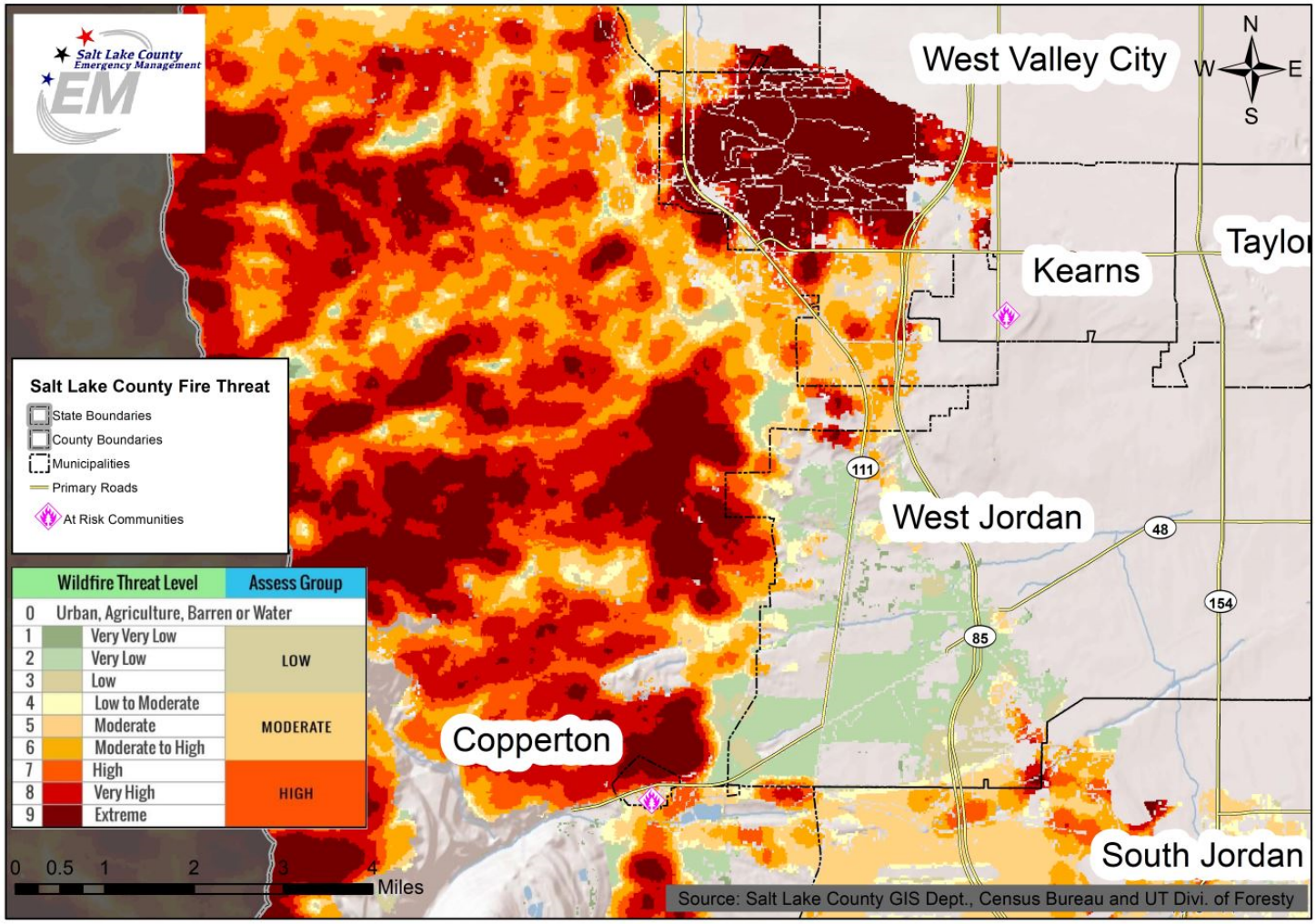
All Hazards	2014	Improve and maintain communications capabilities for emergency operations. This mitigation strategy applies to all listed hazards. Conduct Communications Strategic Planning	Establish a coordinating group to address long-term communication needs and implementation strategies.	Complete	
All Hazards	2014	Improve response capabilities through mutual-aid agreements. This mitigation strategy applies to all listed hazards. Utilize mutual-aid agreements in accordance with National Incident Management System (NIMS) requirements.	Compile inventory of current mutual-aid agreements and memoranda of understanding (MOU) and identify deficiencies.	Complete	
All Hazards	2014	Increase citizen safety through improved hazard awareness. This mitigation strategy applies to all listed hazards. Establish a comprehensive public education program.	Develop education programs to target specific groups including homeowners, developers, schools and people with special needs.	Complete	
All Hazards	2014	Increase citizen safety through improved hazard awareness. This mitigation strategy applies to all listed hazards. Establish a comprehensive public education program.	Coordinate with existing public education programs such as the American Red Cross, Utah Living with Fire, Be Ready Utah, the National Weather Service, etc.	Complete	
All Hazards	2014	Improve public safety through preventative regulations. This mitigation strategy applies to all listed hazards. Minimize hazard impacts through the adoption of appropriate prevention measures.	Establish and enforce appropriate planning, zoning, and building code ordinances.	Complete	

All Hazards	2014	Improve public safety through preventative regulations. This mitigation strategy applies to all listed hazards. Minimize hazard impacts through the adoption of appropriate prevention measures.	Ensure current hazard ordinances are available for viewing online.	Complete	
Severe Weather	2014	Maintain status as a StormReady Community Increase awareness of information services provided by NWS.	Meet with NWS representative on an annual basis to receive information on new services and alerts available.	Complete	
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	5 – Repair, maintain and improve water distribution infrastructure to prevent loss from leakage, breaks, etc.	Removed	City does not own water system
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	6 – Coordinate public safety water use, such as hydrant testing	Removed	City does not own water system
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.1 – Limit unnecessary consumption of water throughout the County	7 – Provide information on landscaping alternatives for persons subject to green area requirements	Removed	City does not own water system
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.2 – Address agricultural water shortages in the County	1 – Set up livestock water rotation in areas of agricultural use	Removed	City does not own water system

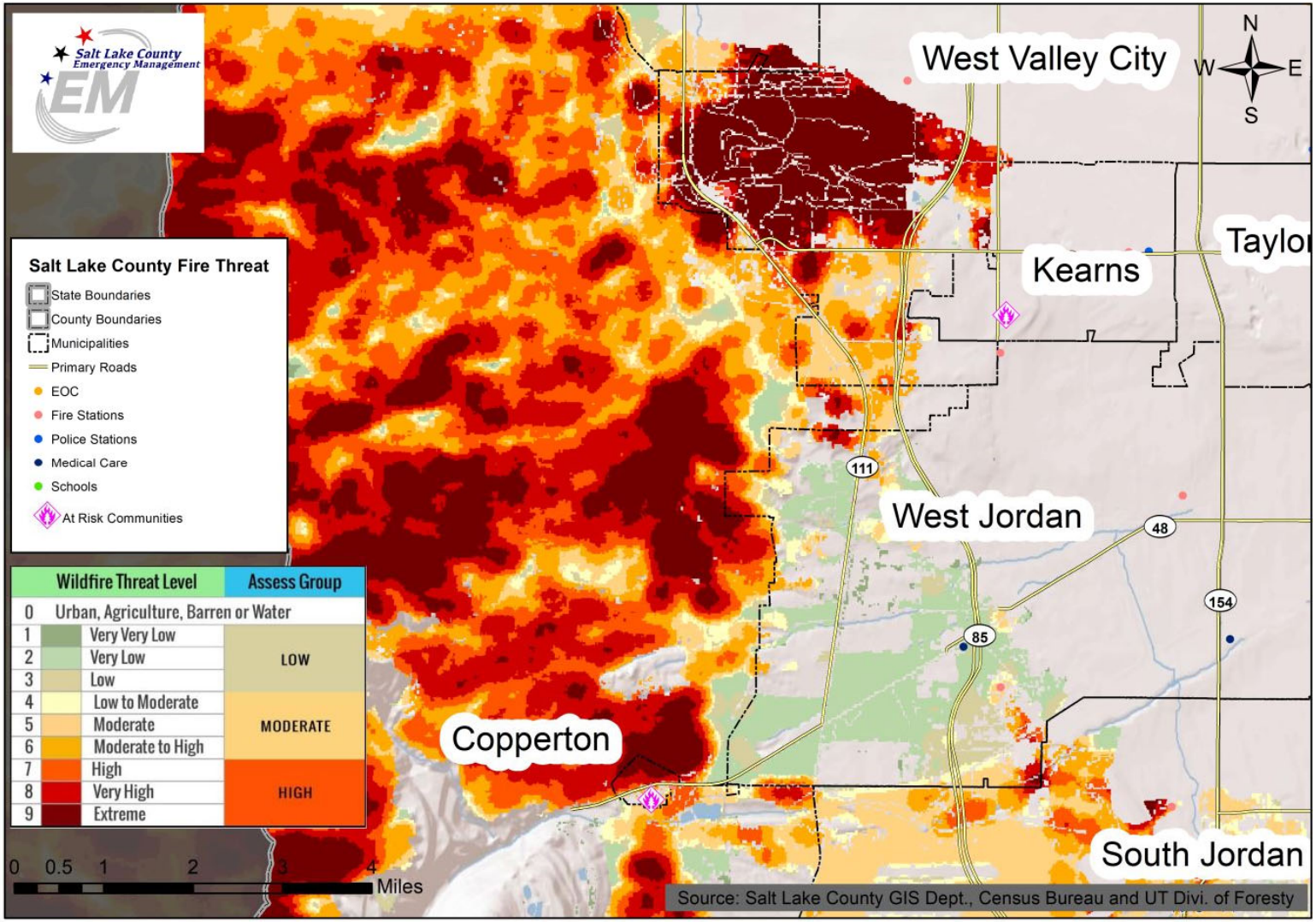
Drought	2009	1 – Reduce and prevent hardships associated with water shortages 1.3 – Encourage development of secondary water systems	1 – Coordinate with water districts to plan for, develop and/or expand secondary water	Removed	City does not own water system

Jurisdiction Maps

Map: Wildfire Threat Level



Map: Wildfire Threat Level with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Copperton Metro Township

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Sean Clayton **Title:** Chair **Department:** Council Members **Office Phone:** (801) 615-3900 **Email** **Address:** seanclayton@coppertonutah.org **Website:** https://coppertonutah.org/	**Name:** Apollo Pazell **Title:** Vice Chair **Department:** Council Members **Office Phone:** (801) 386-0476 **Email** **Address:** apollopazell@coppertonutah.org **Website:** https://coppertonutah.org/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** 2015
- **Current Population:** As of the 2017 estimates, the population was determined to be 579* (Census 2017).
- **Population Growth:** In 2010, the Census determined the population to be 826. This shows a decline in population by just under 250 people. * The population may have been higher in both 2010 and 2017. The township boundaries (designated by the county) includes a greater area to the west than that of the CDP (designated by the U.S. Census).
- **Location and Description:** Located at the mouth of the Bingham Canyon and about 25 miles from Salt Lake City.
- **Brief History:** The town's history is directly linked to the mining industry. Copperton was established by the Utah Copper Company as a residential area and "model city" for its employees and later a "showplace for company-subsidized family life." Construction of housing ended in the 1930s and company furnished housing ended in 1955. After that, a private real estate developer managed the homes for employees. Copperton is the only mining town remaining for the Bingham Canyon Mine after Lark was torn down in 1980 (Online Utah).
- **Climate:** Each year, Copperton gets about 88 inches of snow and 23 inches of rain. The summer high temperature is 90 and the low winter temperature is 20 (Best Places).
- **Governing Body Format:** The town is served by a City Council of 5 members with one serving as Chair, one as Vice-Chair, and one as Treasurer (Coppertown).
- **Development Trends:** The township has an active Community Council and Lion's Club. Recently, the township has been working to improve parks in the community. While the community was originally developed due to the mining industry, today, only a handful of residents work for the mine.

Capability Assessment

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	Per Utah Code 10-9a
Zonings Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Subdivision Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Stormwater Management Program	Yes	Yes	Per Utah Code 10-9a
Floodplain Ordinance(s)	Yes	No	County Maintained
Post Disaster Recovery Program and Ordinance(s)	Yes	Yes	Currently under review for updates
Real Estate Disclosure Ordinance(s)	Yes	Yes	Overpressure Ordinance
Growth Management	Yes	Yes	General Plan update
Site Plan Review Requirements	Yes	Yes	Performed by MSD
Public Health and Safety Program and Requirements	No	Yes	County Requirement
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	-	
Economic Development Plan	Yes	-	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	No	No	County Plan
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	

TABLE: FISCAL CAPABILITY

Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	-
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Other	Greater Salt Lake Municipal Services District
Engineers or professionals trained in building or infrastructure construction practices	Yes	Other	Greater Salt Lake Municipal Services District
Planners or engineers with an understanding of natural hazards	Yes	Other	Greater Salt Lake Municipal Services District
Surveyors	Yes	Other	SLCO
Personnel skilled or trained in GIS applications	Yes	Other	GSLMSD
Emergency manager	Yes	-	County Supported
Grant writers	No	-	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	GSLMSD
Who is your jurisdiction's floodplain administrator? (department/position)	Planning Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A

Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- Copperton Metro Township does not participate in the National Flood Insurance Program (FEMA, 2019).

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

*The NOAA data did not capture any events for Copperton; however, given the locations presented for the events listed below, these events were interpreted as having an impact on Copperton Metro Township.

Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment**
Heavy Snow	13-19 inches in Copperton		11/21/1999	
Flood	Debris Flow		8/19/2010	
Flood	Spring Flooding along the Creek		2011	
Winter Storm*			2/5/2019	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	**Number in Community**
Members of the community over 65 years old	121
Members of the community under 18 years old	68
Members of the community that identify as having disability status	66
Members of the community that speak English less than "very well"	0

Members of the community living below the poverty line	0
The number of mobile homes in the community	0
Members of the community without health insurance	0
Occupied housing units with tenants without a vehicle	19
Housing units without heating fuel	0

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Winter Storms: Given the location of the community to the Bingham Canyon, the area receives a considerable amount of snow each year in comparison to the rest of the County.

Wildfire: Given the dry climate and location of the town to wilderness areas, wildfires can potentially impact the area.

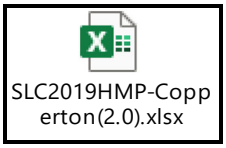
Hazardous Material: The Trans-Jordan Landfill is located in the town.

Earthquake: Soil liquefaction occurs in many areas.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Wildfire	3	19	57
Severe Winter Weather	3	18	54
Severe Weather	3	17	51
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Radon	3	9	27
Hazardous Materials Incident	2	13	26
Drought	2	13	26
Terrorism	1	25	25
Tornado	2	12	24
Civil Disturbance	1	10	10
Dam Failure	1	10	10
Landslide and Slope Failure	1	10	10
Avalanche	1	7	7

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Medium	2		Tornado	Low	1	3
Wildfire	High	3		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Low	1	1		Avalanche	Low	1	2
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Medium	2	4
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Medium	2	4
Severe Winter Weather	High	3	3		Severe Winter Weather	Medium	2	4
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Medium	2	2		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Low	1	1
Dam Failure	Low	1	1
Drought	Low	1	1
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Low	1	1
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	Medium	2	2

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Low	1	3
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

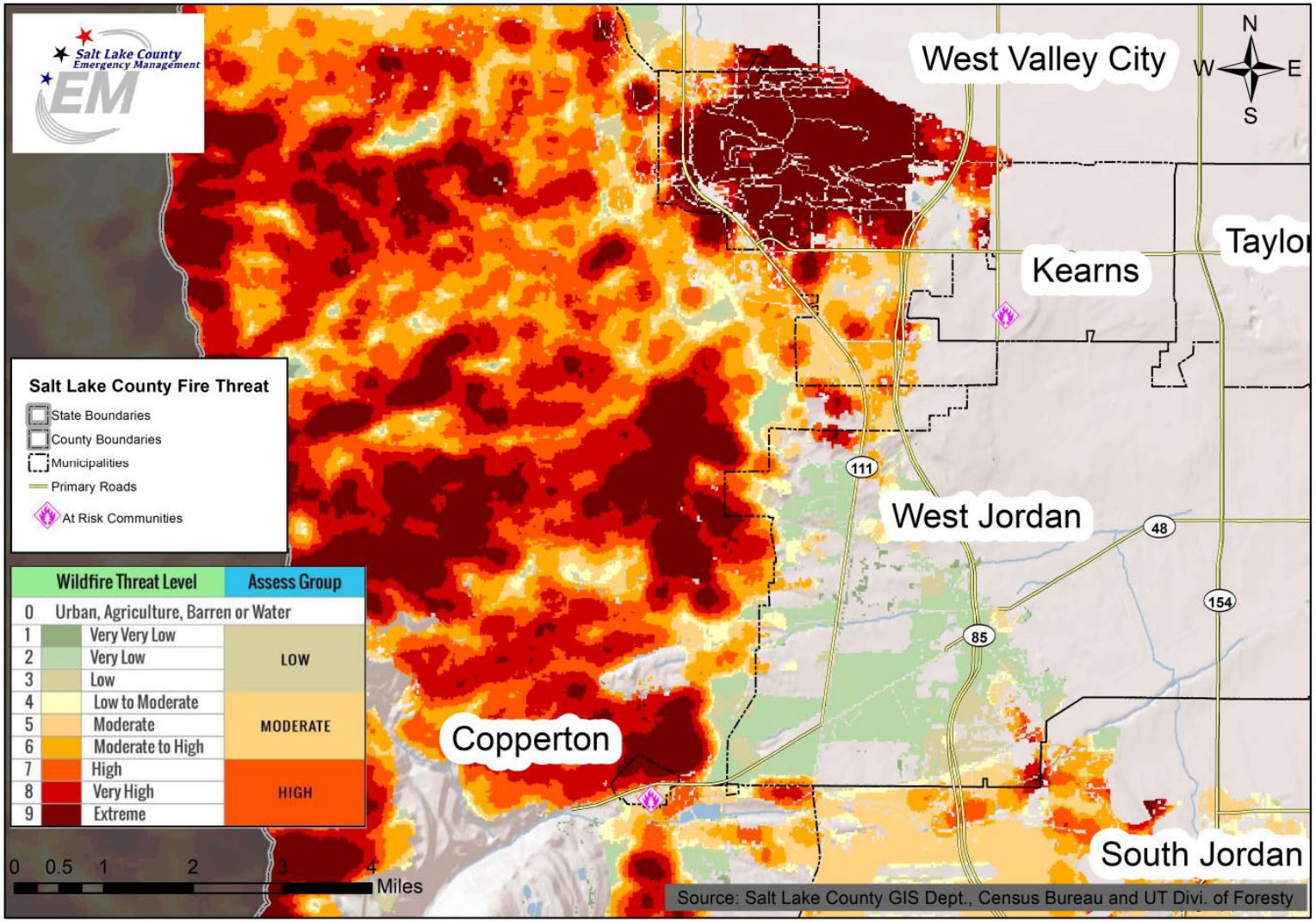
Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct seismic retrofitting and implement a program for residents similar to the “Fix the Bricks” initiative. Provide additional education and materials to the public regarding the earthquake risk and potential mitigation actions that can be taken.	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Earthquake	Copperton	GSL MSD	High	High	PDM Grant or other federal funds	High	Long-term	

Mitigation Table - Ongoing Actions

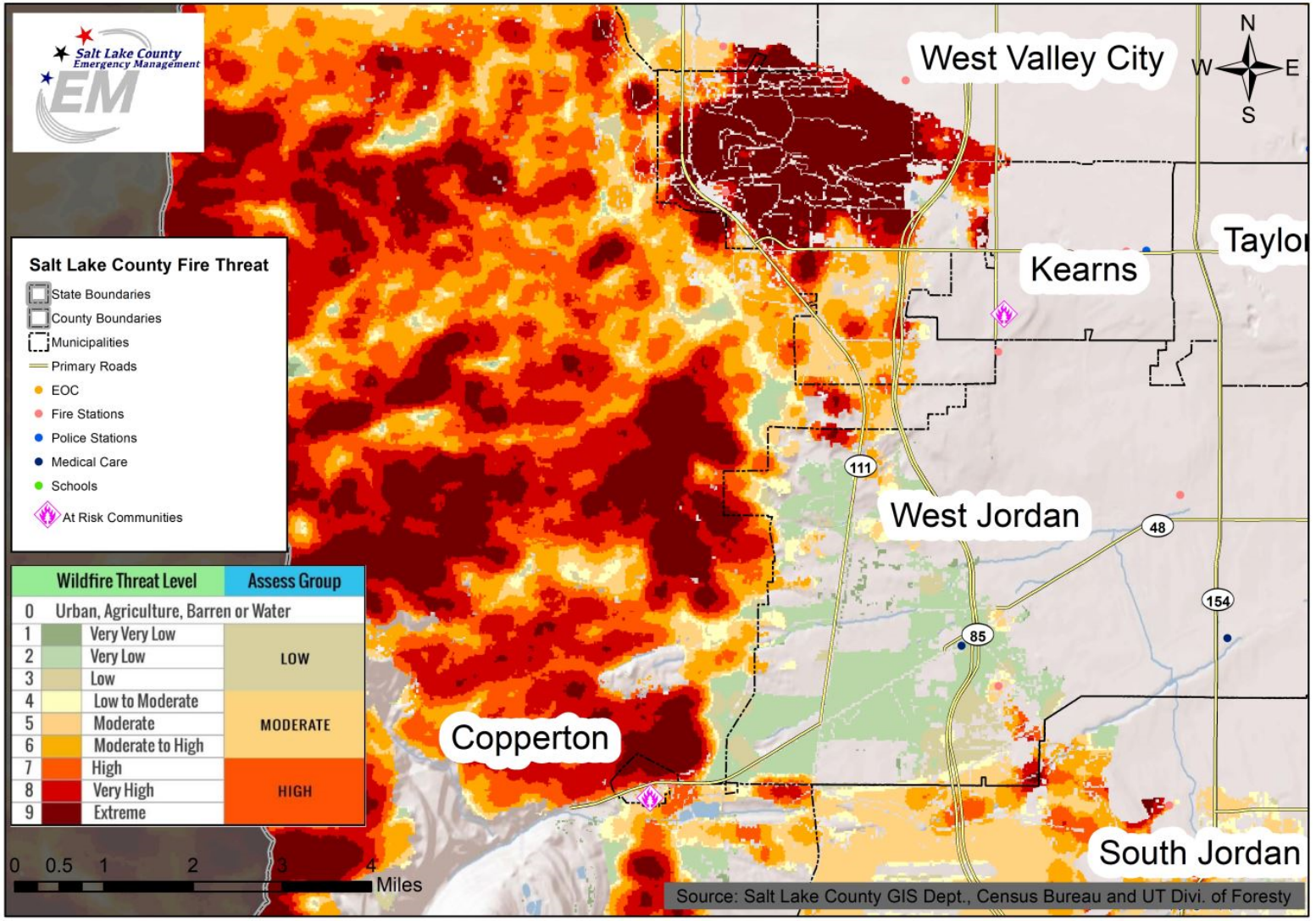
Not applicable since Copperton did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

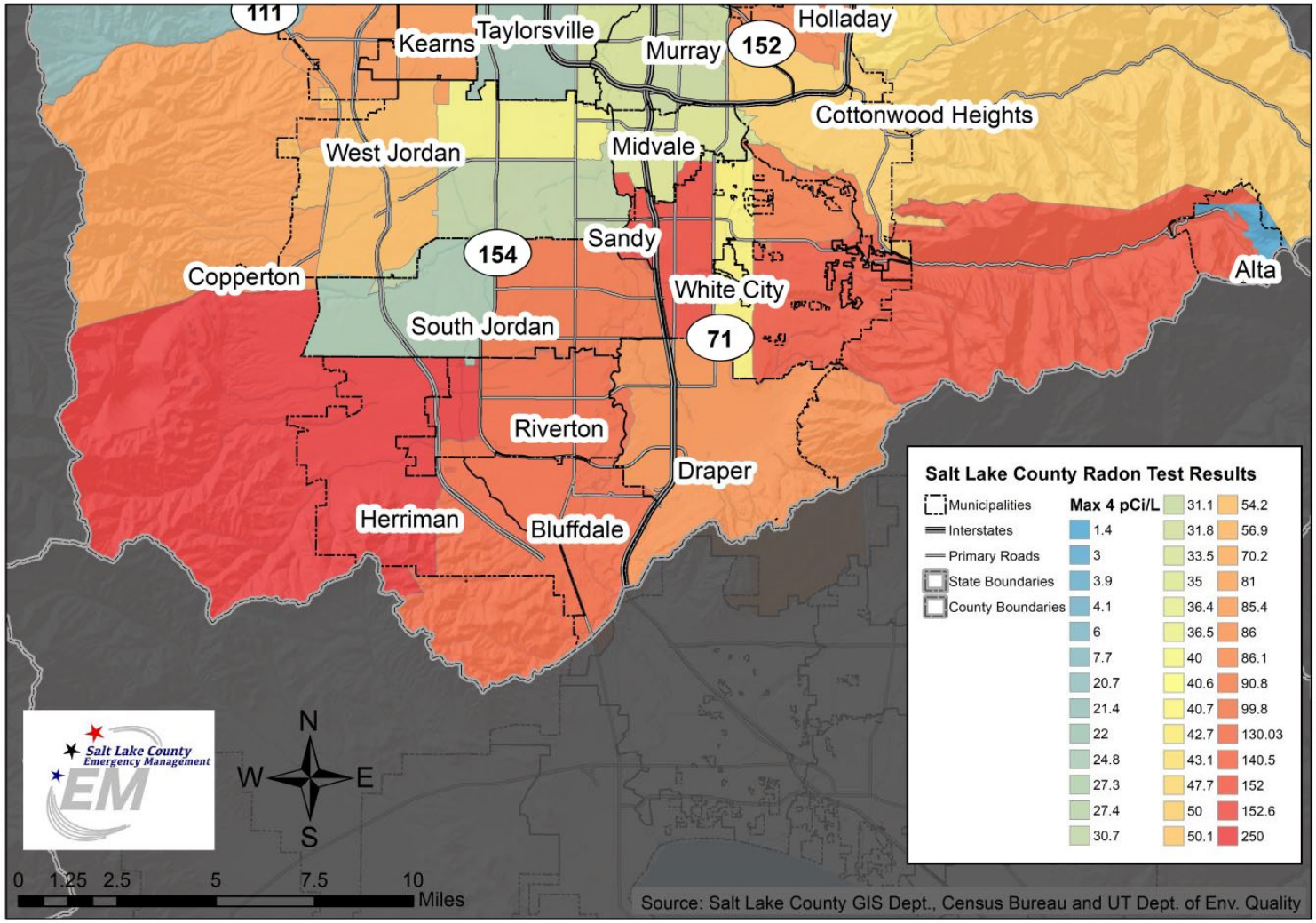
Map: Wildfire Threat Level



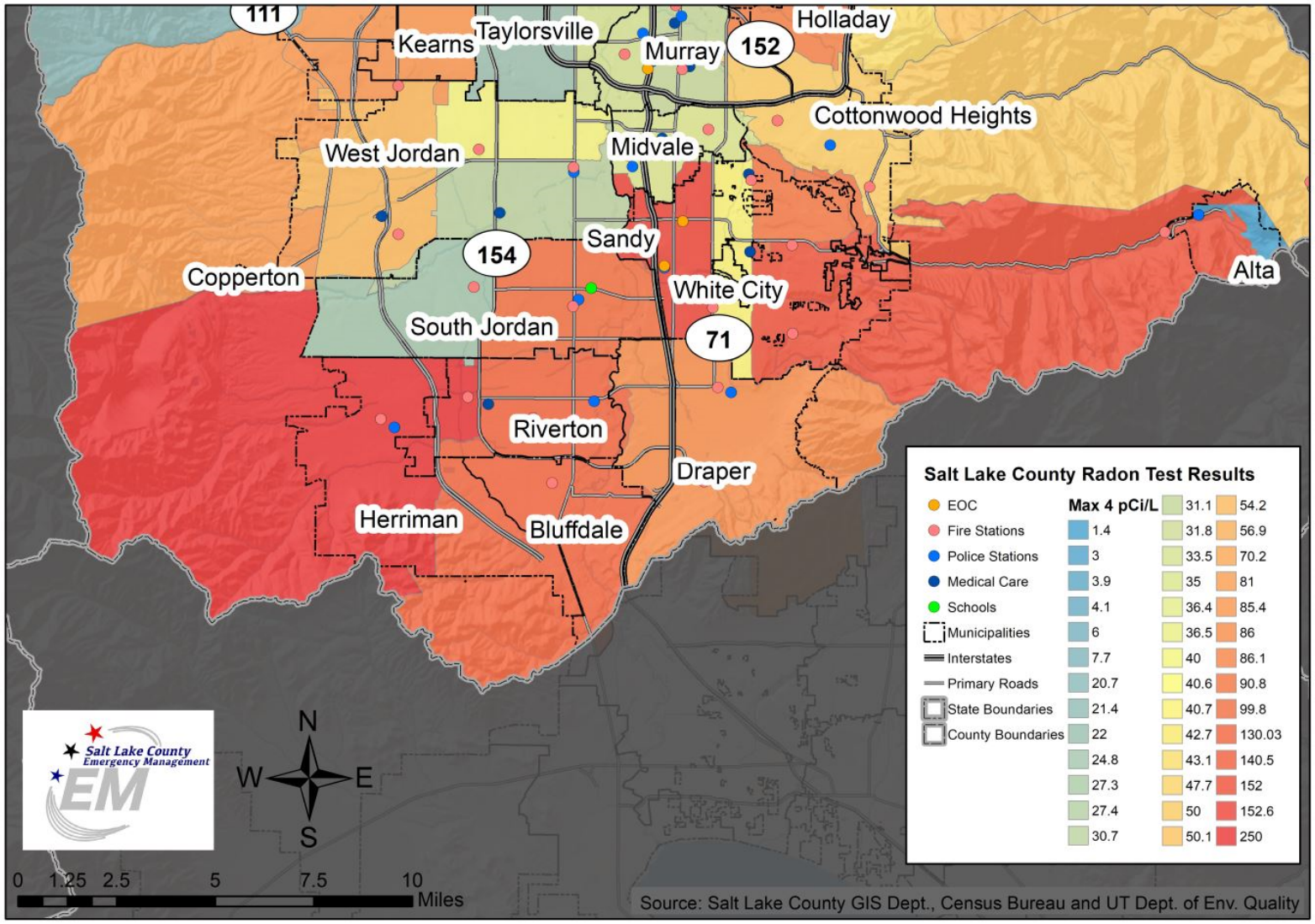
Map: Wildfire Threat Level with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Emigration Canyon Metro Township

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Joe Smolka Title: Mayor Department: N/A Address: 5025 E. Emigration Canyon Road Salt Lake City, UT 84108 Office Phone: (801) 560-3543 Cell Phone: (801) 560-3543 Email Address: joesmolka@ecmetro.org Website: https://www.ecmetro.org/	Name: Jennifer Hawkes Title: Deputy Mayor Department: N/A Address: 5025 E. Emigration Canyon Road Salt Lake City, UT 84108 Office Phone: 385-240-1400 Email Address: jenniferhawkes@ecmetro.org Website: https://www.ecmetro.org/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** Emigration Canyon Metro Township is a Utah municipality created by a vote of the residents of Emigration Canyon in 2015. Incorporation took place in 2017.
- **Current Population:** 1,931 (Census 2017)
- **Population Growth:** The 2017 population grew by a little less than 400 from the 2010 population of 1,567 (Census).
- **Location and Description:** Emigration Canyon Township encompasses a large portion of northeastern Salt Lake County within the Wasatch Mountain Range of northern Utah. Elevations in Emigration Township range from about 5,100 feet near the mouth of the canyon to just over 8,900 feet at the summit of Lookout Peak along the northern township boundary
- **Brief History:** Emigration Canyon was the original route used by pioneers entering the area. Throughout Emigration Canyon, there are several historic markers designating camps, trail markers, and milestones where the Mormon Pioneers passed on their way to the Salt Lake Valley. In 1961, a portion of Emigration Canyon, located in This Is the Place Heritage Park, was declared a National Historic Landmark because of the canyon's significance in the Mormon migration of the 19th century. Emigration Canyon was also important in the early days for the natural resources that it supplied to the growing population in the Salt Lake Valley. Timber was cut and brought to a sawmill at Little Mountain where it was processed for use in the city. In addition to timber, there was also an abundance of lime in the canyon, which was quarried and burned in lime kilns. Evidence of early quarrying may still be found today in some exposed rock areas (Emigration Canyon Township General Plan).
- **Climate:** Emigration Canyon Township is characterized as Intermountain Semi Desert by the US Department of Agriculture. Emigration Canyon's climate, like Salt Lake County and the rest of the southwestern states, is very dry. Emigration Canyon has all four seasons with moderately hot summers and cold winters. July is typically the hottest time of the year, with an average high of 89 degrees; the average low in January is at 20 degrees. The average annual precipitation is 19.4 inches. Emigration Canyon's average low precipitation is in July at .74 inches, and its average high is in May at 2.09 inches (Emigration Canyon Township General Plan).
- **Public Services:** The Township has all of the municipal powers available to Utah municipalities under the Utah Municipal Code with the exception of certain taxing

powers. It does not have the power to enact a property tax or a municipal energy taxes (sometimes called franchise taxes). The Township council has the authority to enact laws and ordinances to carry out its responsibilities such as land use and development regulations (zoning). As long as these laws are not inconsistent with the Utah Municipal Code and other state statutes. The Township is a member of the Greater Salt Lake County Municipal Services District. This District provides six municipal type services to the residents of the Township. The Township is also a participating member of the Unified Police Department and the Unified Fire Authority located in Salt Lake County (Emigration website).

- **Governing Body Format:** The Township is governed by an elected council consisting of five members, one of whom is selected by the others to be the chair/mayor. The Council is the legislative body of the Township. The chair/mayor is the chief executive officer of the Township. The Emigration Canyon Planning Commission is a board created and appointed by the Emigration Canyon Metro Township Council (Emigration website).
- **Development Trends:** A variety of commercial developments and ventures were tried in Emigration Canyon over the first century of settlement. Emigration Canyon became more accommodating to year-round living as automobiles became commonplace. The Emigration Canyon Township study area includes approximately 12,000 acres. The majority of this acreage is currently undeveloped. Approximately 4,800 acres or 40% of the total land is privately owned. The rest of the land in Emigration Canyon is publicly owned or managed—either by the U.S. Forest Service, which manages around 4,100 acres (34%), or Salt Lake City, which owns approximately 3,100 acres (26%). Emigration Canyon has a limited commercial development. Currently, existing commercial establishments include Ruth's Diner and the Sun and Moon Cafe. It is unlikely that commercial development will expand greatly beyond these sites, due to conditions placed on the existing commercial zones, the lack of commercial zoning available elsewhere in the canyon, the land constraints of the environment, and the limited desire for additional commercial zoning in the township. Traffic safety conflicts on Emigration Canyon Road, waste disposal issues, and the quality of water (Emigration Creek) have become notable issues for canyon residents (Emigration Canyon Township General Plan). Since the devastating fire in 1988, many new high-end homes have been built where the fire occurred.

Capability Assessment

The town maintains a full-time staff of 0 and part-time staff of 0 individuals. The Emergency Response Coordinator is the Town's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Response Coordinator position and supported by Greater Salt Lake Municipal Services District (Land Use Planning, Building Inspection, Code Enforcement, Stormwater Program, and Public Works Operations), Unified Fire Authority (Fire Protection Services), Unified Police Department (Police Services), and Wasatch Front Waste and Recycling District (Trash/Refuse Collection).

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications

under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Comments**
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	Per Utah Code 10-9a
Zonings Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Subdivision Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Stormwater Management Program	Yes	Yes	Per Utah Code 10-9a
Floodplain Ordinance(s)	Yes	No	County Maintained
Post Disaster Recovery Program and Ordinance(s)	Yes	Yes	Currently under review for updates
Real Estate Disclosure Ordinance(s)	Yes	Yes	Overpressure Ordinance
Growth Management	Yes	Yes	General Plan update
Site Plan Review Requirements	Yes	Yes	Performed by MSD
Public Health and Safety Program and Requirements	No	Yes	County Requirement
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	-	
Economic Development Plan	Yes	-	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	No	No	County Plan
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes and No
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Other	Greater Salt Lake Municipal Services District
Engineers or professionals trained in building or infrastructure construction practices	Yes	Other	Greater Salt Lake Municipal Services District
Planners or engineers with an understanding of natural hazards	Yes	Other	Greater Salt Lake Municipal Services District
Surveyors	Yes	Other	SLCO
Personnel skilled or trained in GIS applications	Yes	Other	GSLMSD
Emergency manager	No	-	
Grant writers	No	-	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	GSLMSD
Who is your jurisdiction's floodplain administrator? (department/position)	Planning Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A

Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- Emigration does not participate in the National Flood Insurance Program (FEMA, 2019).

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment**
Winter Storm	24 inches in Emigration Canyon		1/5/2019	
Winter Storm	Storm totals in the Wasatch Mountains north of Interstate 80 included 32 inches of new snow in Emigration Canyon. In addition, winds were strong ahead of and with the initial cold front, with peak recorded wind gusts of 80 mph at the Snowbasin Straw Top sensor.		1/10/2013	
Flood	Emigration Creek, which had been flowing as low as 18 cfs the previous day, rose as high as 136 cfs, above the flood stage of 130 cfs.		4/18/2011	Did receive some FEMA dollars for stream bank stabilization

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	Emigration Canyon received 15 inches of snow.		3/25/2009	
Flood	Heavy rains combined with snowmelt to bring the Emigration Creek above its banks and flood 5 homes along the bank. Damage amounts estimates from newspaper clippings.		4/15/2006	$50,000
Heavy Wind	Another strong south wind event as a Pacific storm approached the state. Some winds reached hurricane force, with numerous power outages along the Wasatch Front and in the Cache Valley. Several reports of damage were also received, mainly from downed trees. The road up Emigration Canyon was blocked for a while as an 18-inch diameter tree was blown across it.		11/23/1998	
Tornado	A cold core funnel cloud touched down for 5 seconds in a gentleman's backyard in Emigration Canyon.		9/12/1998	$2,000
Flood	Highest stream flow in recorded history. So much debris that it clogged the gages.		6/9/1989	
Wildfire	Significant wildfire in 1988. Since 1988, there have been over 12 fires.		Labor Day 1988	
Flood	Road washed out in multiple places, specifically in the Pinecrest area. A lot of mitigation happened after this flood.		1983	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	222
Members of the community under 18 years old	425
Members of the community that identify as having disability status	66
Members of the community that speak English less than "very well"	6
Members of the community living below the poverty line	157
The number of mobile homes in the community	0

Members of the community without health insurance	0
Occupied housing units with tenants without a vehicle	11
Housing units without heating fuel	0

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

A general concern for the community is the limited ingress and egress to and from Emigration Canyon Metro Township. This poses a major concern as it relates to the multiple natural and manmade hazards that could affect the community.

Winter Storms: Winter Storms are common in Emigration. Poor drainage in some areas of the canyon creates road icing in the winter and creates a traffic safety issue.

Earthquake: No known active faults have been mapped within Emigration Canyon Township. The nearest active fault is the Salt Lake segment of the Wasatch Fault, located about two-and-a-half miles west of the mouth of Emigration Canyon. Seismic hazards in Emigration Township will come primarily from the seismic waves that are generated during large earthquakes, should such an event occur. However, given the nature of sediments found in the Emigration Canyon, the soil liquefaction potential is typically considered below average.

Flood: Stream flooding is highly likely and has the potential to cause roadway washouts. Emigration Creek and its tributaries are the principal drainages carrying runoff through Emigration Canyon. Most creeks have well-defined channels that have experienced historic flooding. Some small drainages flow continuously and some intermittently throughout the year. All drainage tributaries have the potential for high flows during the spring runoff period. After a winter of heavy precipitation, many parts of Emigration Canyon dealt with high water and flooding issues during the Spring of 2011. Jurisdictional wetlands have been delineated by the U.S. Army Corps of Engineers along Emigration Creek. Chances of riverine flooding greatly increase post-wildfire.

Wildfire: Very high risk of wildfires in Emigration. While the community is a Firewise community, fires are hard to fight given the area's terrain. Residential development in Emigration Canyon often interfaces with areas of undeveloped canyon lands that exist in a natural state. This bordering of residential development on open lands or what is termed the Wildland-Urban Interface (WUI) is part of the charm of the canyon for many residents. The WUI area has inherent risks associated with it, mainly dangers from a wildfire that can and do occur in the foothills and canyons from time to time. Whether these fires are started due to natural causes such as lightning, or by human activities, they can quickly spread across the thicker natural vegetation of undeveloped areas and threaten adjacent residential development.

Wind: Given the differing elevation and a large number of trees in the town, heavy winds can occur and impact some areas much worse than others, typically involving knocking large trees over, which is especially problematic when a fallen tree blocks a road.

Landslide/Slope Failure: Several places in Emigration Canyon would experience road closure if a landslide were to occur.

Avalanche: Rare occurrences every 1-5 years with minimal impact on the community.

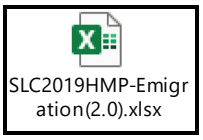
Dam Failure: If a dam failure occurred in Parley Canyon, Emigration Canyon Road would become the primary route to Interstate 80.

Hazardous Materials: Crude oil pipelines with no catch basins have the potential to infiltrate waterways and the environment should there be a leak or failure.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Wildfire	3	26	78
Flooding	3	22	66
Earthquake	2	27	54
Severe Winter Weather	3	18	54
Landslide and Slope Failure	2	19	38
Severe Weather	3	12	36
Public Health Epidemic/ Pandemic	2	17	34
Cyber Attack	2	17	34
Avalanche	2	14	28
Hazardous Materials Incident	2	13	26
Drought	2	13	26
Terrorism	1	25	25
Radon	2	6	12
Tornado	1	10	10
Civil Disturbance	1	10	10
Dam Failure	1	7	7

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.



Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Medium	2		Avalanche	Medium	2	6
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	High	3		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Medium	2		Landslide and Slope Failure	Medium	2	6
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	Medium	2		Radon	Medium	2	6
Severe Weather	High	3		Severe Weather	Medium	2	6
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	High	3		Wildfire	High	3	9

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Medium	2	2		Avalanche	Medium	2	4
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	Medium	2	4
Flooding	Medium	2	2		Flooding	High	3	6
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Medium	2	2		Landslide and Slope Failure	High	3	6
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Medium	2	4
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	Medium	2	4
Wildfire	Medium	2	2		Wildfire	High	3	6

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**	**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)	**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)	**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)	**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)	**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Medium	2	2
Dam Failure	Low	1	1
Drought	Low	1	1
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	Medium	2	2
Flooding	Medium	2	2
Hazardous Materials Incident	Low	1	1
Landslide and Slope Failure	Medium	2	2
Public Health Epidemic/ Pandemic	Medium	2	2
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Medium	2	2
Wildfire	High	3	3

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Unlikely	0	0
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Medium	2	6
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2	6
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Medium	2	6

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)

Catastrophic Factor—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Low potential that this hazard could be catastrophic (Impact Factor = 1)
Unlikely—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

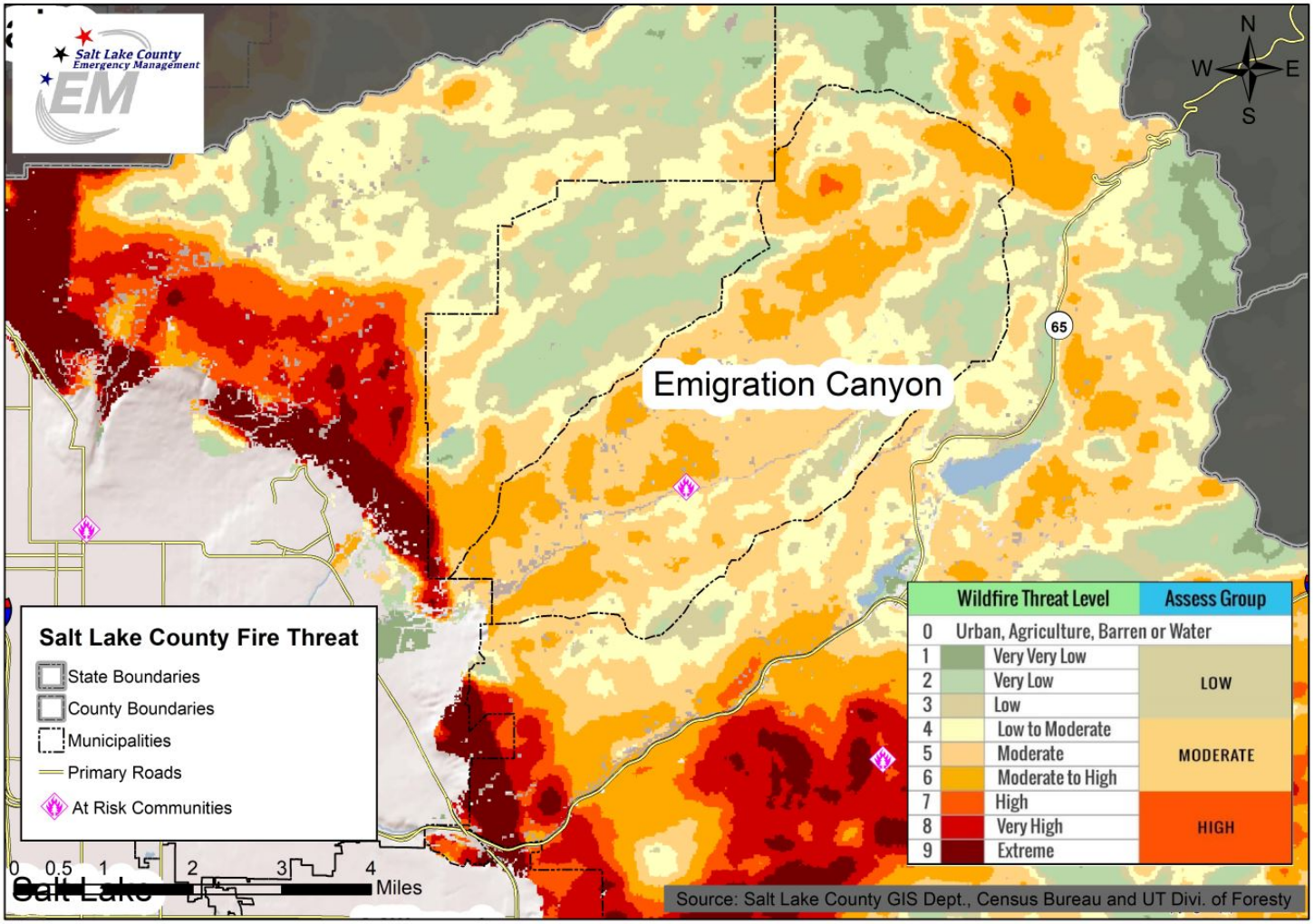
Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct a Slope Stabilization Study	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Landslides, Avalanche, Earthquake	Emigration Canyon	MSD	High	Medium	HMA/PDM Grant or other federal funds	High	Short-term	Utilize study to prioritize slope stabilization projects.
Bury Powerlines to mitigate power outages and mitigate wildfires.	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards	Emigration Canyon	Utilities	High	High	HMA/PDM Grant or other federal funds	Medium	Long-term	

Mitigation Table - Ongoing Actions

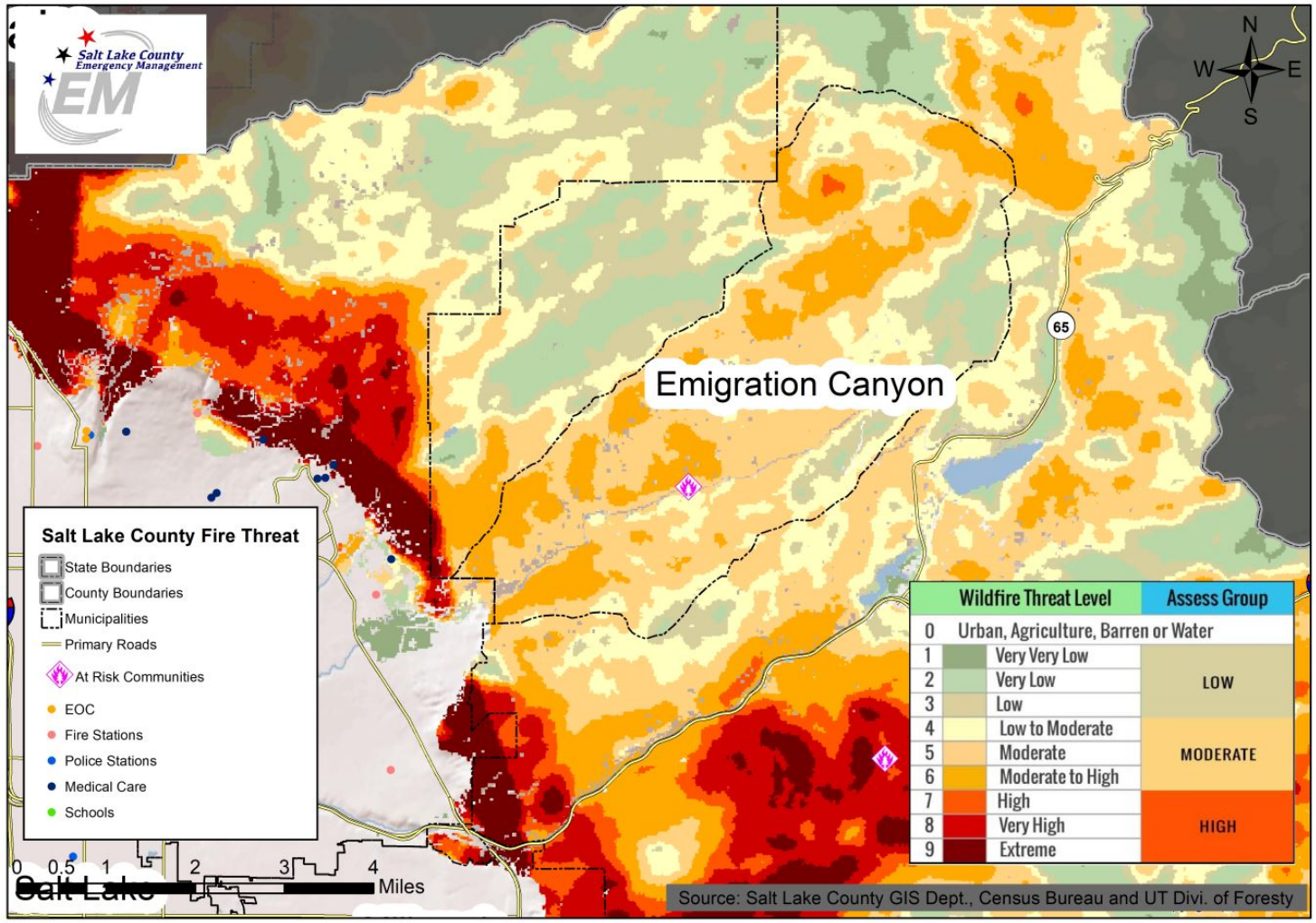
Not applicable since Emigration Canyon did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

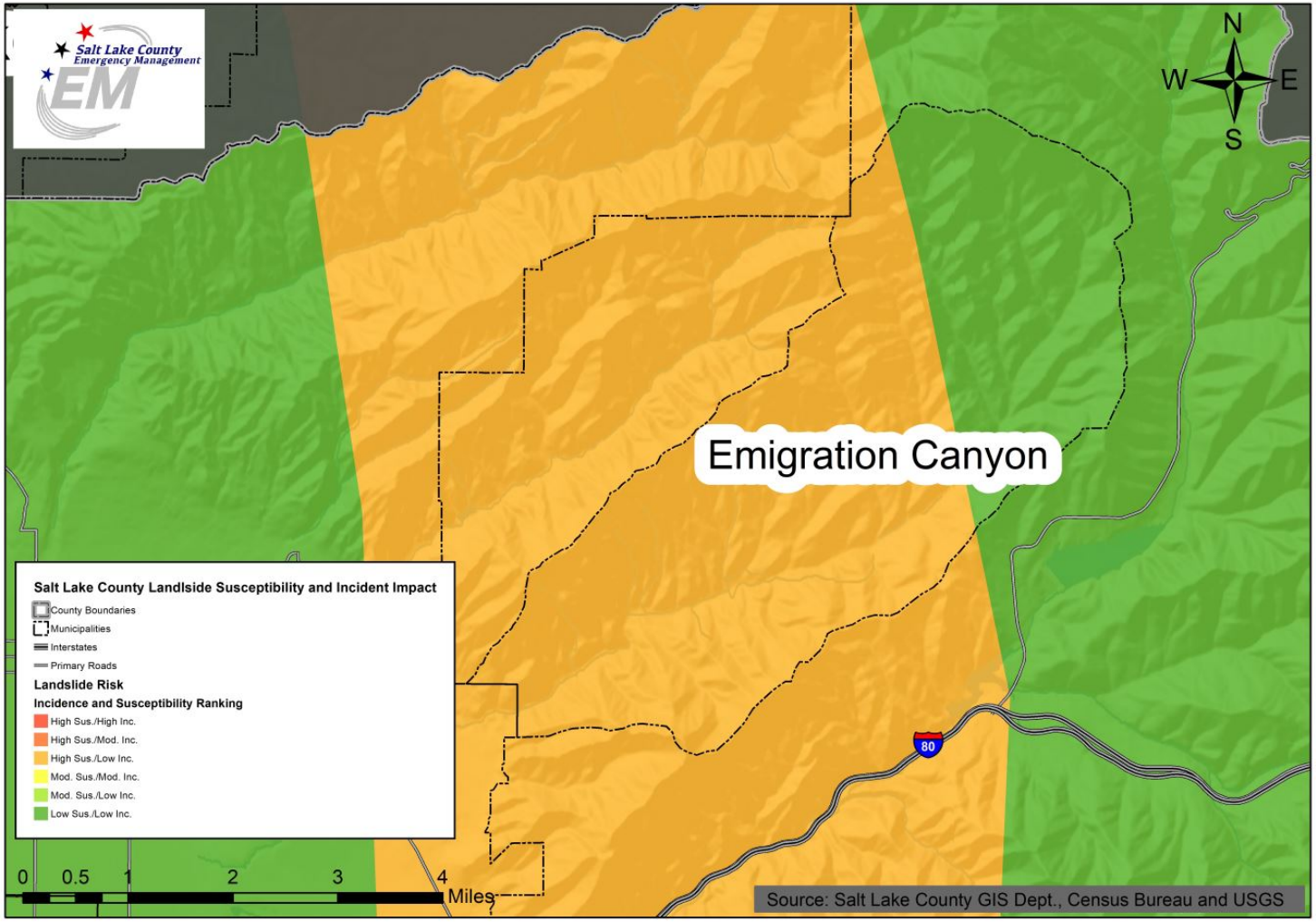
Map: Wildfire Threat Level



Map: Wildfire Threat Level with Critical Facilities



Map: Landslide Susceptibility and Incident Impact Potential



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Kearns Metro Township

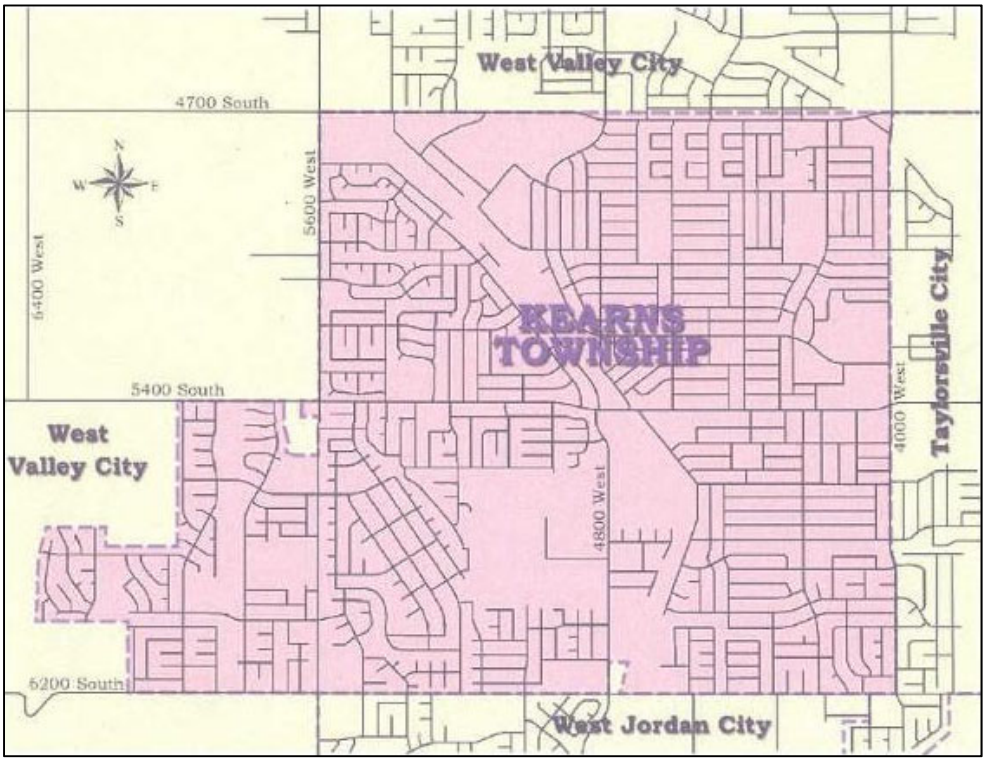
Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Kelly Bush **Title:** Mayor **Department:** N/A **Address:** 4956 West 6200 South Suite #527 Kearns, Utah 84118 **Office Phone:** (801) 654-2123 **Email Address:** lobkb973@hotmail.com **Website:** https://www.kmtutah.org/	**Name:** Tina Snow **Title:** Deputy Mayor **Department:** N/A **Address:** 3600 Constitution Blvd West Valley City, UT 84119 **Office Phone: (801) 979-9457** **Email Address:** grlsnow40@comcast.net **Website:** https://www.kmtutah.org/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** Founded in 1942, and the first Metro Township election was held in 2016.
- **Current Population:** According to the 2017 American Community Survey, the population of the Kearns census designated place (CDP) was 37,194.
- **Population Growth:** The 2010 U.S. Census recorded approximately 35,731 people with the Kearns CDP. The 2017 figure of 37,194 indicates a growth rate of about 4% over this period.
- **Location and Description:** Kearns Metro Township is located in Salt Lake County, Utah, between West Valley City, the City of Taylorsville, and West Jordan City. It has a total land area of approximately 4.8 square miles.



- **Brief History:** Kearns was originally Kearns Army Air Base and functioned as a United States training facility during World War 2. After the war, the Air Force turned the inactive base over to the State of Utah. Local development soon followed and many houses and businesses began to be built. In the years of 2010-2015 a movement began and Kearns officially became a Metro Township. In 2016 the first election was held for the Metro Township to elect the first council members. There were 5 elections for each of the 5 districts in the Kearns Metro Township. In 2017 the first council members of the Metro Township were sworn into office.
- **Climate:**

	Kearns, Utah	United States
Rainfall	19.5 in.	38.1 in.
Snowfall	54.0 in.	27.8 in.
Precipitation	92.0 days	106.2 days
Sunny	225 days	205 days
Avg. July High	91.9°	85.8°
Avg. Jan. Low	24.5°	21.7°
Comfort Index (higher=better)	7.2	7
UV Index	4.7	4.3
Elevation	4531 ft.	2443 ft.

Source: https://www.bestplaces.net/climate/city/utah/kearns

- **Governing Body Format:** The governing body is the Kearns Metro Township Council comprised of a mayor and four council members. Also active within the Township are the Kearns Planning Commission and Kearns Community Council.
- **Development Trends:** According to the U.S. Census Bureau 2012 survey of business owners, there were approximately 1,442 businesses in the Kearns CDP. American Community Survey data from 2015 to 2017 indicate that the total civilian employed population 16 years and older rose 6% from 17,582 to 18,663. During this same time span, the industries that grew the most in terms of absolute number of jobs were Health Care and Social Assistance, Information, and Retail Trade. The industries that lost the most

jobs were Transportation and Warehousing, Construction, and Professional, Scientific, and Technical Services. Many of the homes were built prior to 1954.

Capability Assessment

Hazard Mitigation Planning efforts are supported by Greater Salt Lake Municipal Services District.

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY

	Local Authority Exists to Develop and Implement/ Enforce?	A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?	Comments
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	Per Utah Code 10-9a
Zonings Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Subdivision Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Stormwater Management Program	Yes	Yes	Per Utah Code 10-9a
Floodplain Ordinance(s)	Yes	No	County Maintained
Post Disaster Recovery Program and Ordinance(s)	Yes	-	
Real Estate Disclosure Ordinance(s)	Yes	-	
Growth Management	Yes	Yes	General Plan update
Site Plan Review Requirements	Yes	Yes	Performed by MSD
Public Health and Safety Program and Requirements	No	Yes	County Requirement
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	-	
Economic Development Plan	Yes	-	
Disaster Planning Documents			

Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	No	No	County Plan
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	-
Incur Debt through General Obligation Bonds	Yes and No
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Other	Greater Salt Lake Municipal Services District
Engineers or professionals trained in building or infrastructure construction practices	Yes	Other	Greater Salt Lake Municipal Services District
Planners or engineers with an understanding of natural hazards	Yes	Other	Greater Salt Lake Municipal Services District
Surveyors	Yes	Other	SLCO
Personnel skilled or trained in GIS applications	Yes	Other	GSLMSD
Emergency manager	Yes	-	County supported
Grant writers	No	-	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	GSLMSD
Who is your jurisdiction's floodplain administrator? (department/position)	Planning Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- Kearns Metro Township does not participate in the National Insurance Flood Program (FEMA, 2019).

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Winter Storm	12.5 inches of snow		1/19/2018	
High Winds	High Winds occur often; in 2018 a wind incident affected		2018	

	trees, homes and shingles.			
Fires	Near the railroad tracks		ongoing	Neighborhoods periodically need to be evacuated.
Winter Storm	8 inches of snow		12/24/2015	
Hail	1.5 inches in diameter		8/4/2011	
Flood	In Kearns, water was 9 to 12 inches deep across several roads, making them impassable.		7/26/2011	$350,000
Flood	standing water accumulated 1 to 3 feet in low lying areas.		7/22/2008	
Heavy Snow	10 inches		11/26/2005	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community
Members of the community over 65 years old	2,409
Members of the community under 18 years old	12,211
Members of the community that identify as having disability status	2,959
Members of the community that speak English less than "very well"	4,095
Members of the community living below the poverty line	4,242
The number of mobile homes in the community	198
Members of the community without health insurance	6,594
Occupied housing units with tenants without a vehicle	255
Housing units without heating fuel	11

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only

addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Earthquake: Portions of Kearns are on the major fault zones in the region. However, the potential damage is not limited only to the fault zone areas. Fine-grained, lake-bottom sediments are common in the area and are susceptible to liquefaction-induced ground failure during a large earthquake. Each incident may require a unique response from Kearns and in the instance of a major earthquake outside assistance will be required.

Homes east of the railroad tracks (4420 West) were built between 1954-1960. These older homes may be constructed of unreinforced masonry. Several schools in the area are being rebuilt and reinforced. The Olympic Oval serves as a designated shelter for Kearns, and additional retrofitting/reinforcing may be necessary.

Flooding: Although located in a semi-arid region, Kearns is subject to thunderstorms and snowmelt flooding. Significant flooding occurred in the Salt Lake Valley in 1983 and to a lesser extent in 1984, and again in 2011.

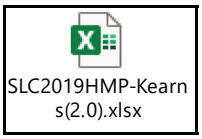
Winter Storms and Thunderstorms: The potential for severe weather is a reality in Kearns and the surrounding region. These weather events are not isolated to any climatic season, but rather can occur at any time during the year. During the spring and summer months, heavy rains can fall upon soils in a desert climate that may not readily percolate creating surface runoff, mudslides, debris flow, flooding, and other water-related damage. During the winter months, heavy snowfall is possible. Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. Snowfall is particularly influenced by the Great Salt Lake, which can produce localized snow bands or lake effect accumulations several times each winter.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	18	54
Severe Weather	3	17	51
Public Health Epidemic/ Pandemic	2	21	42
Hazardous Materials Incident	3	13	39
Flooding	2	17	34
Radon/Asbestos	3	9	27
Drought	2	13	26

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Tornado	2	12	24
Cyber Attack	2	11	22
Terrorism	1	22	22
Dam Failure	1	15	15
Wildfire	1	10	10
Civil Disturbance	1	10	10
Landslide and Slope Failure	1	6	6
Avalanche	0	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.


SLC2019HMP-Kearns(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	None	0		Avalanche	No impact	0	0
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	Medium	2	6
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	High	3		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Low	1	3
Tornado	Medium	2		Tornado	Low	1	3
Wildfire	Low	1		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	4
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Medium	2	4
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Medium	2	4
Severe Winter Weather	High	3	3		Severe Winter Weather	Medium	2	4
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Low	1	1		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Low	1	3
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	No Impact	0	0		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Medium	2	2		Tornado	Unlikely	0	0
Wildfire	Low	1	1		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**		**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)		**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)		**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)		**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)		**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/ Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Asbestos Removal	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Public Health (Asbestos), Hazardous Materials Release	Utah DEQ	Kearns	High	High	HMA/PDM Grant or other federal funds	Medium	Long-term	
Seismic Retrofitting	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	Kearns	MSD	High	High	HMA/PDM Grant or other federal funds	Medium	Long-term	
Fireline along the railroad tracks to mitigate wildfires from occurring and affecting	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Wildfire	Union Pacific Railroad	Kearns	Medium	High	Railroad or other state and federal funds	Medium	Long-term	

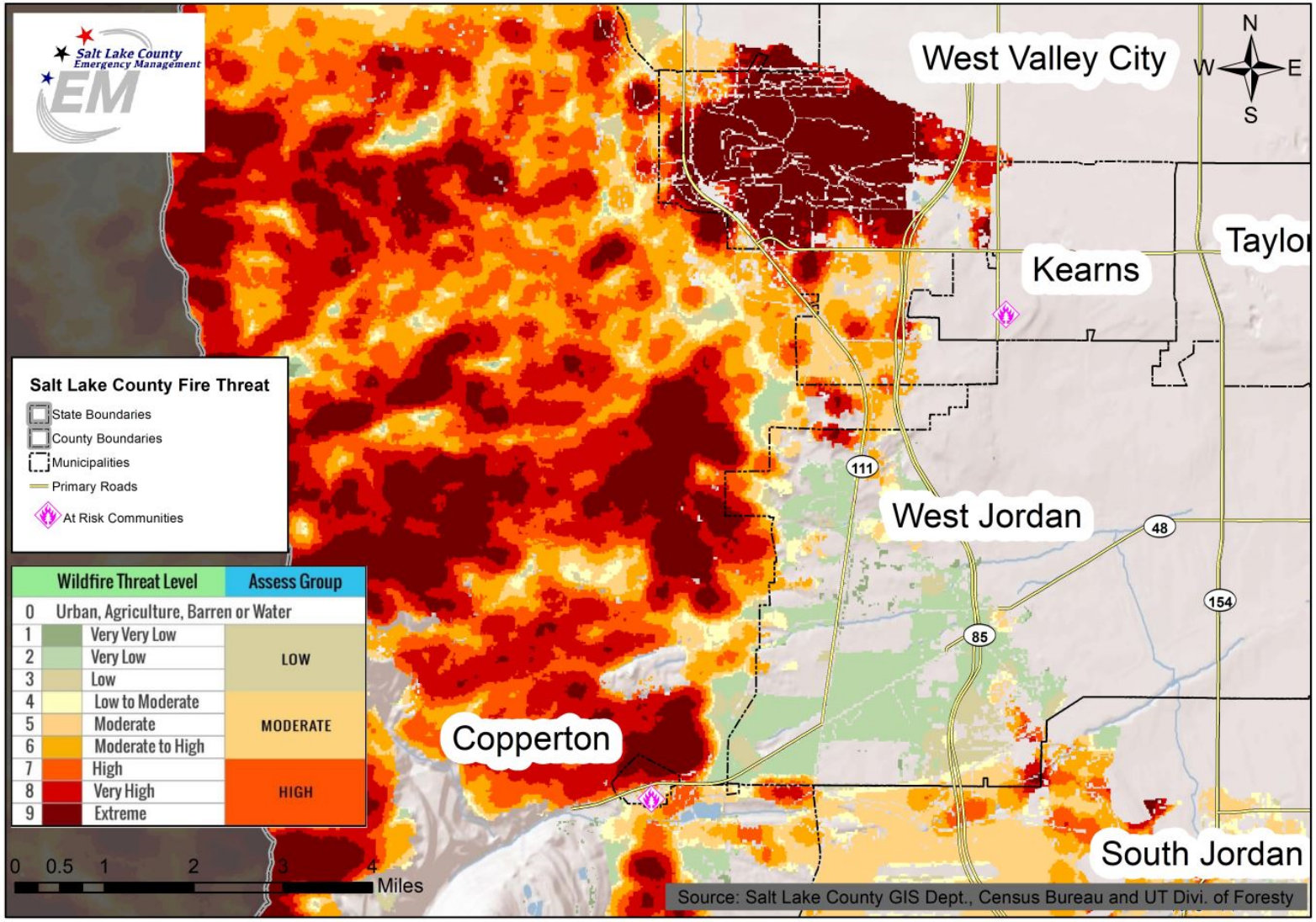
nearby neighborhoods		Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.									
Procure and install an emergency notification system	2019	Goal 3: Enhance and protect the communication and warning/notification systems in the County.	All-Hazards	Kearns	Salt Lake County Emergency Management	High	Medium	HMA/PDM Grant, local funds, or state funds	Medium	Short-term	Interested in a system similar to Magna
Create an Emergency Operations Plan	2019	Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	All-Hazards	Kearns	MSD	High	Medium	Local budget or state funds	High	Short-term	
The bridge at 4015 W lacks load capacity for emergency services vehicles, and needs to be replaced or retrofitted. This is an important roadway that connects many communities in the County.	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All-Hazards; Flooding, Winter Storms, Severe Thunderstorms	Kearns	Taylorsville	High	High	HMA/PDM Grant or other federal funds	High	Long-term	Connects Taylorsville, West Valley, and Kearns

Mitigation Table - Ongoing Actions

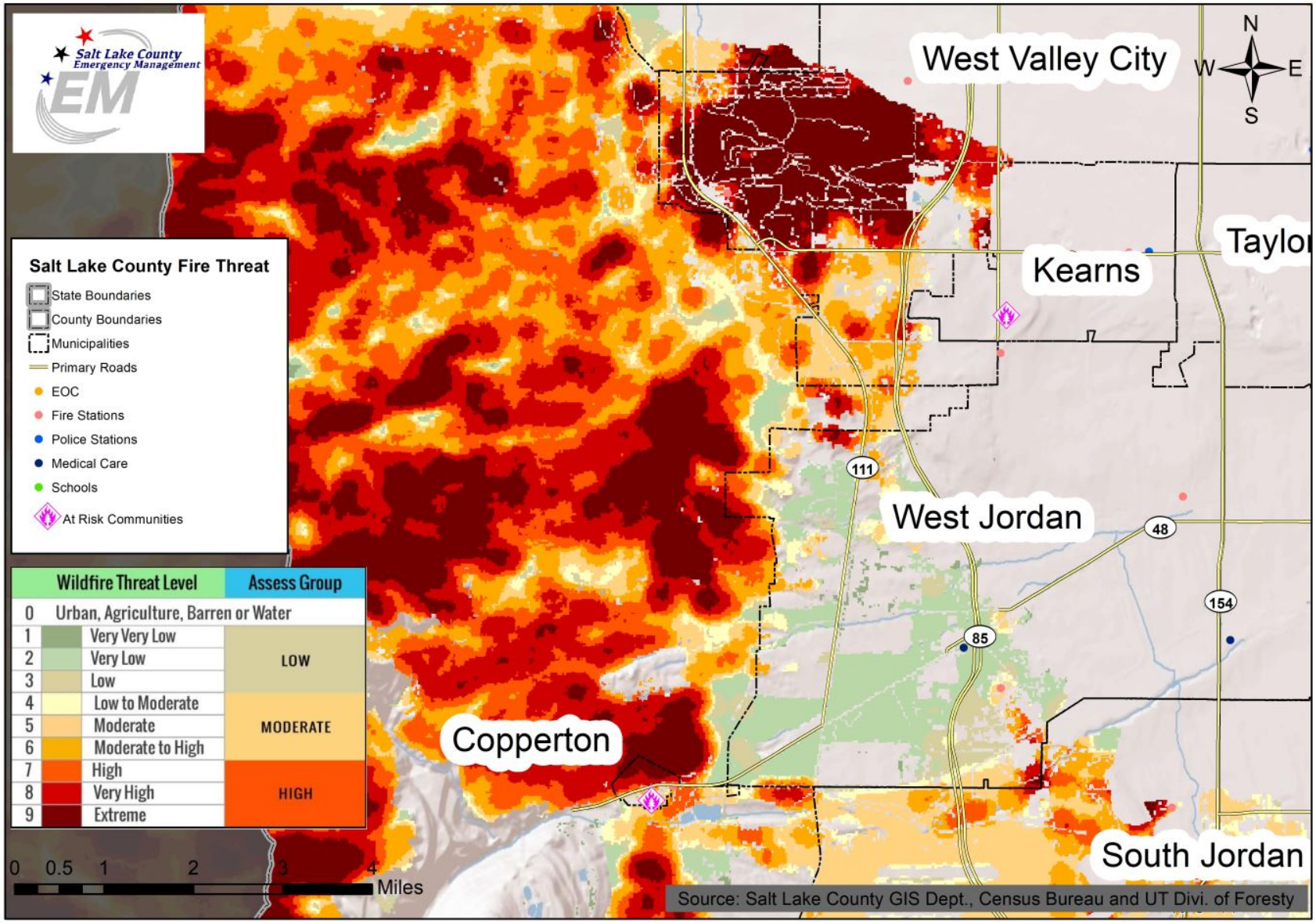
Not applicable since Kearns did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

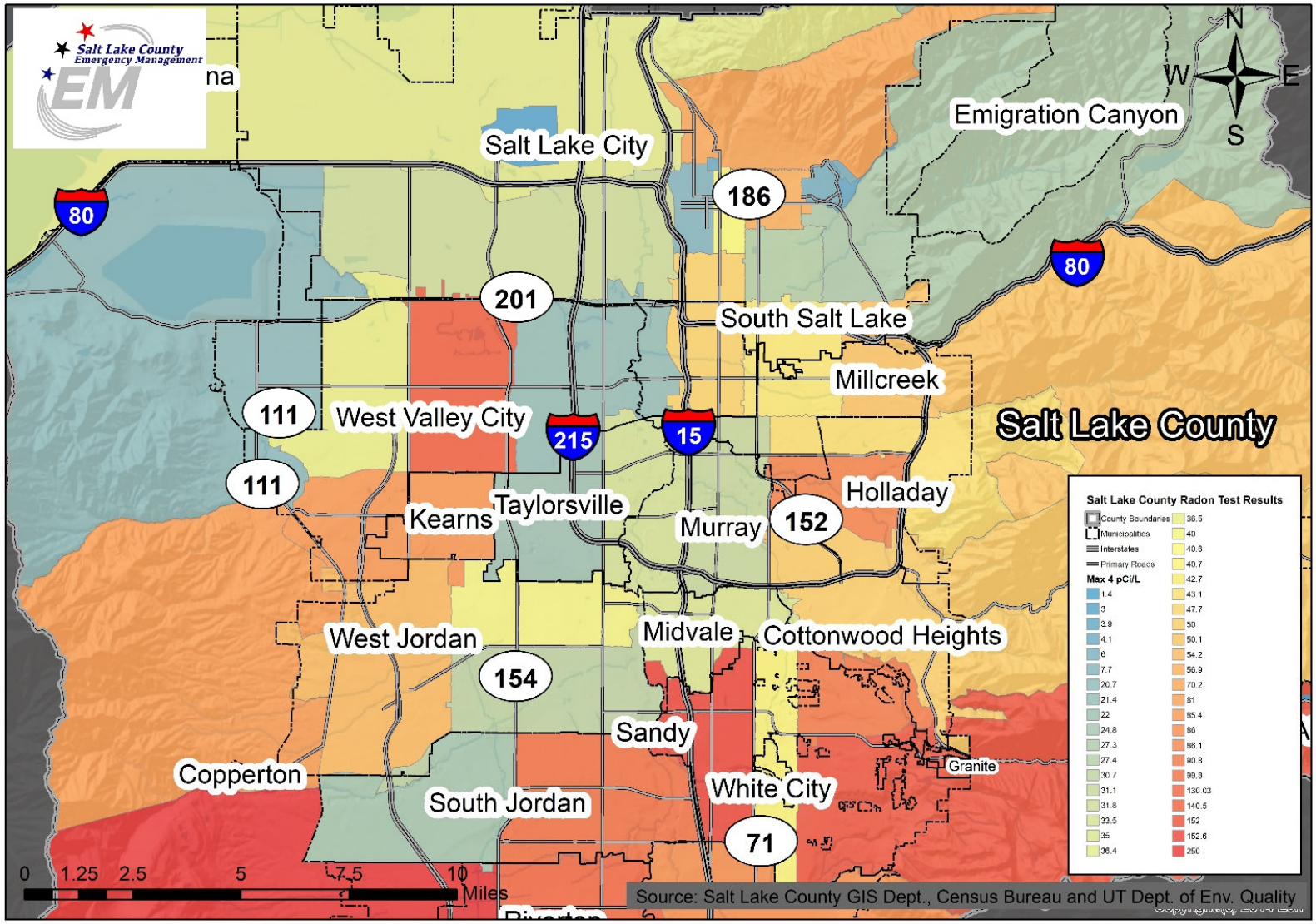
Map: Wildfire Threat Level



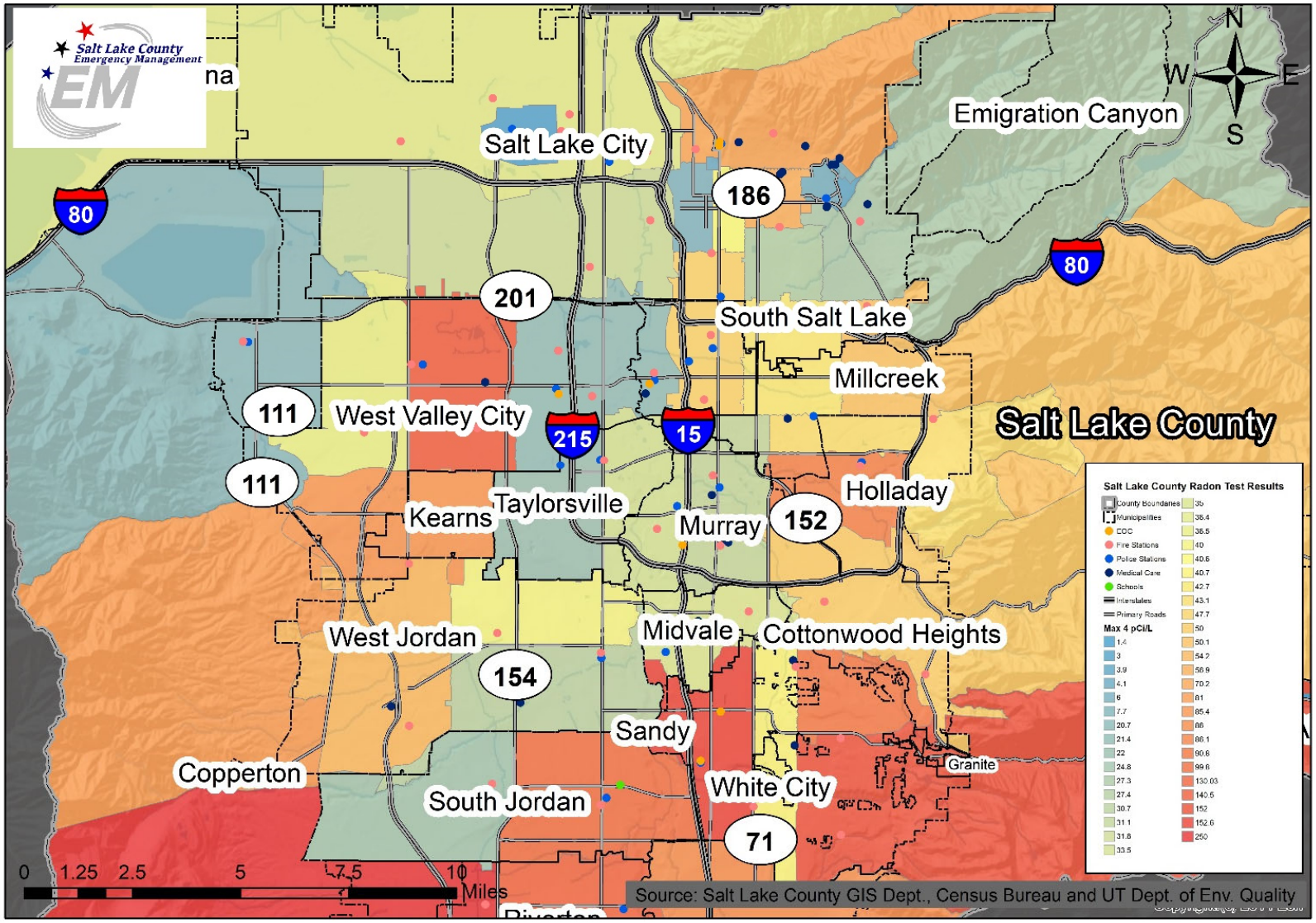
Map: Wildfire Threat Level with Critical Facilities



Map: Radon


Salt Lake County Emergency Management
EM
N
W
E
S
Salt Lake City
Emigration Canyon
186
80
201
South Salt Lake
Millcreek
111
West Valley City
215
15
Salt Lake County
111
Holladay
Taylorsville
Kearns
Murray
152
Midvale
Cottonwood Heights
West Jordan
154
Sandy
Granite
Copperton
White City
South Jordan
71
0 1.25 2.5 5 7.5 10 Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality
Salt Lake County Radon Test Results
County Boundaries
Municipalities
Interstates
Primary Roads
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
88.1
90.8
99.8
130.03
140.5
152
152.6
250

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: Magna Metro Township

Hazard Mitigation Plan Point of Contact

Primary Point of Contact	Alternate Point of Contact
Name: Greg Schulz **Title:** Administrator **Department:** **Address:** 8952 West Magna Main Street (2700 South) **Office Phone:** 385-258-3690 **Cell Phone:** 801-419-3071 **Email Address:** Greg.schulz@magnacity.org **Website:** https://www.magnametrotownship.org/	**Name:** Dan Peay **Title:** Mayor **Department:** N/A **Address:** 8952 West Magna Main Street Magna, Utah 84044 **Office Phone:** 801-209-9407 **Email Address:** Dan.peay@magnacity.org **Website:** https://www.magnametrotownship.org/

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** Settled in 1853; Incorporated in 2017
- **Current Population:** 28,257 (ACS 2017)
- **Population Growth:** In 2000, the population was 22,770, and in 2010, the population was 26,505. Following this pattern, the Magna Metro Township continues to grow in population size.
- **Location and Description:** 3,066.2/sq mi
- **Brief History:** Magna Utah is an incorporated municipality of Salt Lake County that began as a small settlement in the mid-1800s and was called Pleasant Green. Mining activity came to the scene at the turn of the century, and once the foundations of a modern town were laid, the name was changed to Magna in 1906. Historic Magna Main Street has served as the heart of the community and a commercial center for decades, and the local economy fluctuated along with the fortunes of the copper mine. Within the boundaries lies a portion of the Great Salt Lake and the historic Saltaire concert hall (Chamber of Commerce). The Legislature authorized most unincorporated-area voters to choose their futures in 2015. All unincorporated townships would become municipalities, but voters in each could choose whether to make their community a Metro Township or a City. Magna voters elected to become a Metro Township. Metro Townships are a new type of municipality with most of a city's revenue collection powers. These voters also chose to receive their services from the Greater Salt Lake Municipal Services District (MSD).
- **Climate:** On average, the hottest temperature is 91.7 degrees in the summer and December is the snowiest month of the year (9.7 inches on average) (Best Places).
- **Public Services:** The Magna Metro Township does not provide most of its municipal-type services. Like most Metro Townships, services are performed by contract, or through participation in a local district. By participating in local districts, Metro Townships benefit from leveraging economies of scale that individually, no Metro Township could achieve on its own through self-provision of services. The overwhelming majority of the municipal-type services being provided to the metro townships through a Local District or Interlocal Contract Agency has a member of their respective Metro Township Council serving and voting on the Board of Trustees of each of those entities. Examples of this active participation and management of services include the Greater Salt Lake Municipal Services District, the Unified Police Department/Salt Lake Valley Law Enforcement

Service Area, Unified Fire Department/Unified Fire Service Area, and Wasatch Front Waste and Recycling District (Magna).

- **Governing Body Format:** A Magna Metro Township is a municipality with a governing board. The Metro Township Council is comprised of five members who are elected to serve, just like cities and towns elect their councils. The Mayor of the Metro Township is currently chosen by a vote of the Metro Township Council – the same way some towns choose their Mayor. The Metro Township has a budget it must manage; municipal laws, rules, and regulations it must create, change, and enforce; and state laws it must follow and enforce. In fact, the state laws the Metro Township must work within are generally the same laws cities and towns must conduct their business by – including the state laws for land use (Magna).
- **Development Trends:** Magna is home to major employers Rio Tinto and ATK. Between the copper and rockets that workers at these companies produce, Magna's efforts can be seen all over the world and even in space. Alorica is also a large employer. In the next 5-7 years, the community will add many new single and multi-family units.

Capability Assessment

The town maintains a full-time staff of 0 and part-time staff of 0 individuals. The Emergency Response Coordinator is the Town's designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Response Coordinator position and supported by Greater Salt Lake Municipal Services District (Land Use Planning, Building Inspection, Code Enforcement, Stormwater Program, and Public Works Operations), Magna Water District (Potable Water, Secondary Water, and Sewer), Unified Fire Authority (Fire Protection Services), Unified Police Department (Police Services), and Wasatch Front Waste and Recycling District (Trash/Refuse Collection).

The assessment of the jurisdiction's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability Table* below. The assessment of the jurisdiction's fiscal capabilities is presented in the *Fiscal Capability Table* below. The assessment of the jurisdiction's administrative and technical capabilities is presented in the *Administrative and Technical Capability Table* below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance Table* below. Classifications under various community mitigation programs are presented in the *Community Classifications Table* below.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	**A Jurisdiction-Specific Code, Ordinance and/or Requirement Currently Exists?**	**Comments**

Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	Yes	Yes	Per Utah Code 10-9a
Zonings Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Subdivision Ordinance(s)	Yes	Yes	Per Utah Code 10-9a
Stormwater Management Program	Yes	Yes	Per Utah Code 10-9a
Floodplain Ordinance(s)	Yes	No	County Maintained
Post Disaster Recovery Program and Ordinance(s)	Yes	Yes	Currently under review for updates
Real Estate Disclosure Ordinance(s)	Yes	Yes	Overpressure Ordinance
Growth Management	Yes	Yes	General Plan update
Site Plan Review Requirements	Yes	Yes	Performed by MSD
Public Health and Safety Program and Requirements	No	Yes	County Requirement
Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	No	In progress
Economic Development Plan	Yes	No	In progress
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	No	No	County Plan
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes and No
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Other	Greater Salt Lake Municipal Services District
Engineers or professionals trained in building or infrastructure construction practices	Yes	Other	Greater Salt Lake Municipal Services District
Planners or engineers with an understanding of natural hazards	Yes	Other	Greater Salt Lake Municipal Services District
Surveyors	Yes	Other	SLCO
Personnel skilled or trained in GIS applications	Yes	Other	GSLMSD
Emergency manager	No	-	

Grant writers	No	-	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	GSLMSD
Who is your jurisdiction's floodplain administrator? (department/position)	Planning Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The Natural Hazard Events Table lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).

- Magna Metro Township does not participate in the National Flood Insurance Program (FEMA, 2019).

TABLE: RECENT NATURAL HAZARD EVENTS
(NOAA Data with additions from the jurisdiction representatives)

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Hail	0.88 in diameter		5/15/2018	
High Wind	Large trees were knocked over and fell onto houses in Murray and Magna, and fence damage was also reported across the area		4/13/2017	$50,000 in property damage
High Wind	Shingles were blown off of homes and other roof damage was reported in several locations, especially in the Magna and Grantsville areas. In addition, multiple large trees and traffic light poles were knocked down across the area.		3/17/2014	$80,000 in property damage
Winter Storm	12 inches of snow		12/7/2013	
Winter Storm	12 inches of snow		12/31/2013	
Winter Storm	7 inches of snow		3/6/2012	
Winter Storm	9 inches of snow		3/1/2012	
Winter Storm	11 inches of snow		11/28/2010	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community

Members of the community over 65 years old	1,854
Members of the community under 18 years old	9,037
Members of the community that identify as having disability status	2,475
Members of the community that speak English less than "very well"	2,269
Members of the community living below the poverty line	3,218
The number of mobile homes in the community	204
Members of the community without health insurance	4,222
Occupied housing units with tenants without a vehicle	328
Housing units without heating fuel	6

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Winter Storms: These storms bring extremely low temperatures to the area, which can be particularly dangerous for elderly members of the community and members of the community without health insurance due to the health-issues correlated with these types of weather events.

High Wind: These events are especially dangerous for the community members that reside in mobile homes.

Avalanche: In the last 20 years, development has increased in Little Valley, which is an area susceptible to avalanches. As development expands to the west/southwest, avalanche risk will likely increase in this area.

Landslide/Slope Failure: Pleasant Green Cemetery is located on Copper Bend Drive which can be impacted by these events. This is a steep area and a rail line is located at the foot of the hill.

Earthquake: Many edifices on main street, downtown Magna, and elementary schools are not seismically retrofitted. Soil liquefaction occurs in many areas. An earthquake could cause Tailings Pond to fail, which would affect the highway and other roadways.

Flooding: Storm drains cannot currently handle the increased flooding in the area. Of particular concern is that if Tailings Pond failed, downtown Magna and beyond would likely flood.

Wildfire: Magna is located at the base of the Oquirrh's and Rio Tinto Land which is in the wildland-urban interface (WUI). The buildings in Old Magna are older and flammable. An area of particular concern is 8800-26th South.

Radon: Old Magna is considered a red spot (very high) for radon since most homes were built before 1975. Many homes have not gone through radon remediation.

Hazardous Materials: Multiple areas of concern exist in Magna including the potential for a critical explosion of solid rocket fuel at Northrup Grumman that could impact South Magna, the transportation of hazardous materials along major roadways, and rail transportation of materials through the area.

Terrorism: Northrup Grumman and Rio Tinto could be targeted.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Wildfire	2	17	34
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	15	30
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Tornado	1	11	11
Dam Failure	1	10	10
Civil Disturbance	1	8	8
Landslide and Slope Failure	1	7	7
Avalanche	1	7	7

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.

SLC2019HMP-Magna(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	Low	1	3
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Low	1	3
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Medium	2	6

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	Low	1	1		Avalanche	Low	1	2
Dam Failure	Low	1	1		Dam Failure	Low	1	2
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Medium	2	2		Wildfire	Medium	2	4

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Avalanche	Low	1	1
Dam Failure	Low	1	1
Drought	Medium	2	2
Civil Disturbance	Medium	2	2
Cyber Attack	Medium	2	2
Earthquake	High	3	3
Flooding	Medium	2	2
Hazardous Materials Incident	Medium	2	2
Landslide and Slope Failure	Low	1	1
Public Health Epidemic/ Pandemic	High	3	3
Radon	No Impact	0	0
Severe Weather	Low	1	1
Severe Winter Weather	Medium	2	2
Terrorism	High	3	3
Tornado	Low	1	1
Wildfire	Medium	2	2

Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Unlikely	0	0
Dam Failure	Low	1	3
Drought	Low	1	3
Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	6
Earthquake	High	3	9
Flooding	Low	1	3
Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	9
Radon	Unlikely	0	0
Severe Weather	Unlikely	0	0
Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	9
Tornado	Unlikely	0	0
Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Conduct Urban Interface Wildfire Mitigation	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Wildfire	Magna	UFA	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Long-term	
Conduct Seismic Upgrades	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities,	Earthquake	Magna	GSL MSD School District	High	High	HMA/PDM Grant or other federal funds	High	Long-term	Provide seismic upgrades to downtown Magna Metro Township, elementary schools, and

		structures, and infrastructure during disasters. Goal 3: Enhance and protect the communication and warning/notification systems in the County. Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.									Brockbank Campus.
Storm Drain System Overhaul	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster. Goal 6: Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the County.	Flood (Urban/Flash Flooding) and Public Health (Pandemic/ Epidemic)	Magna	GSL MSD	High	High $10-15 million	HMA/PDM Grant or other federal funds	Medium	Long-term	Completely overhaul the storm drain system from 8400 to the west.

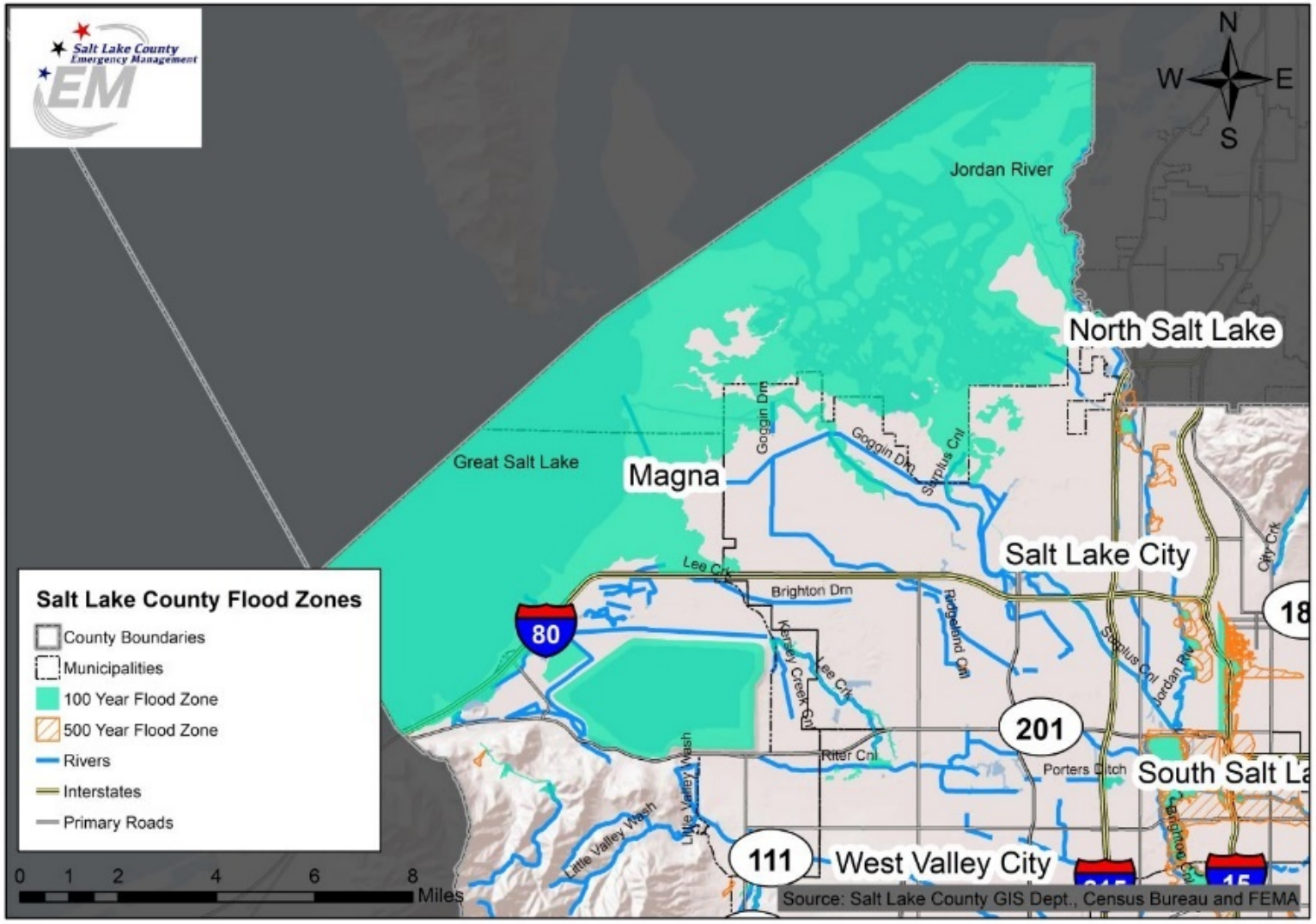
Slope Stabilization at locations like, but not limited to: Copper Bend Drive	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Landslide	Magna	GSL MSD	Medium	Medium	HMA/PDM Grant or other federal funds	Medium	Long-term	
Radon testing and remediation	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Radon	Magna		High	Low	Local and/or State funds	Medium	Ongoing	Encourage residents to test for radon and conduct appropriate remediation. Find radon hot spots in Magna.
Conduct Hazardous Materials Flow Study	2019	Goal 1: Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	HAZMAT	Magna	GSL MSD	High	Medium	US DOT or related Federal Grants	High	Short-term	

Mitigation Table - Ongoing Actions

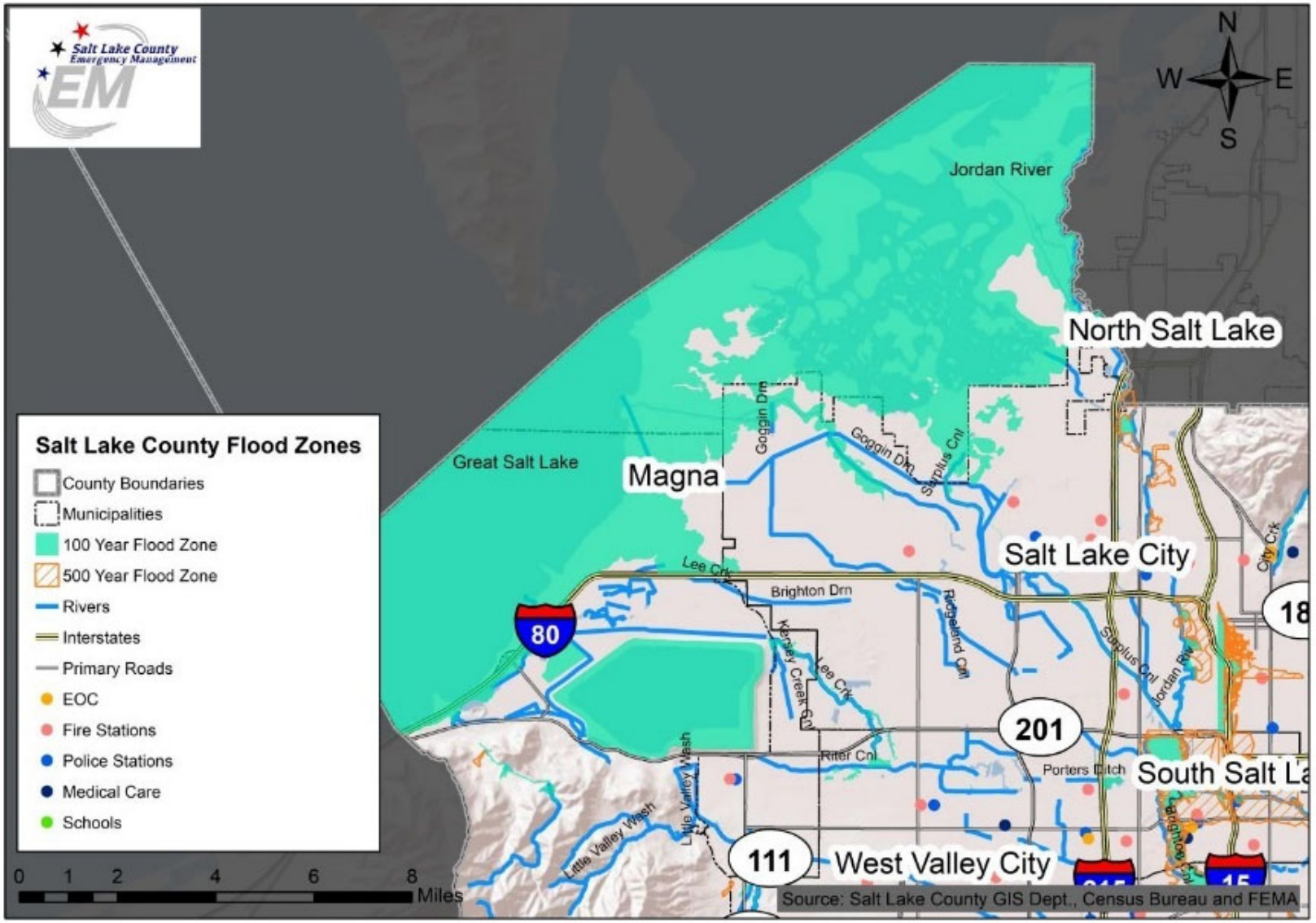
Not applicable since Magna did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

Map: 100 Year and 500 Year Flood Zone with



Map: 100 Year and 500 Year Flood Zone with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Annex: White City Metro Township

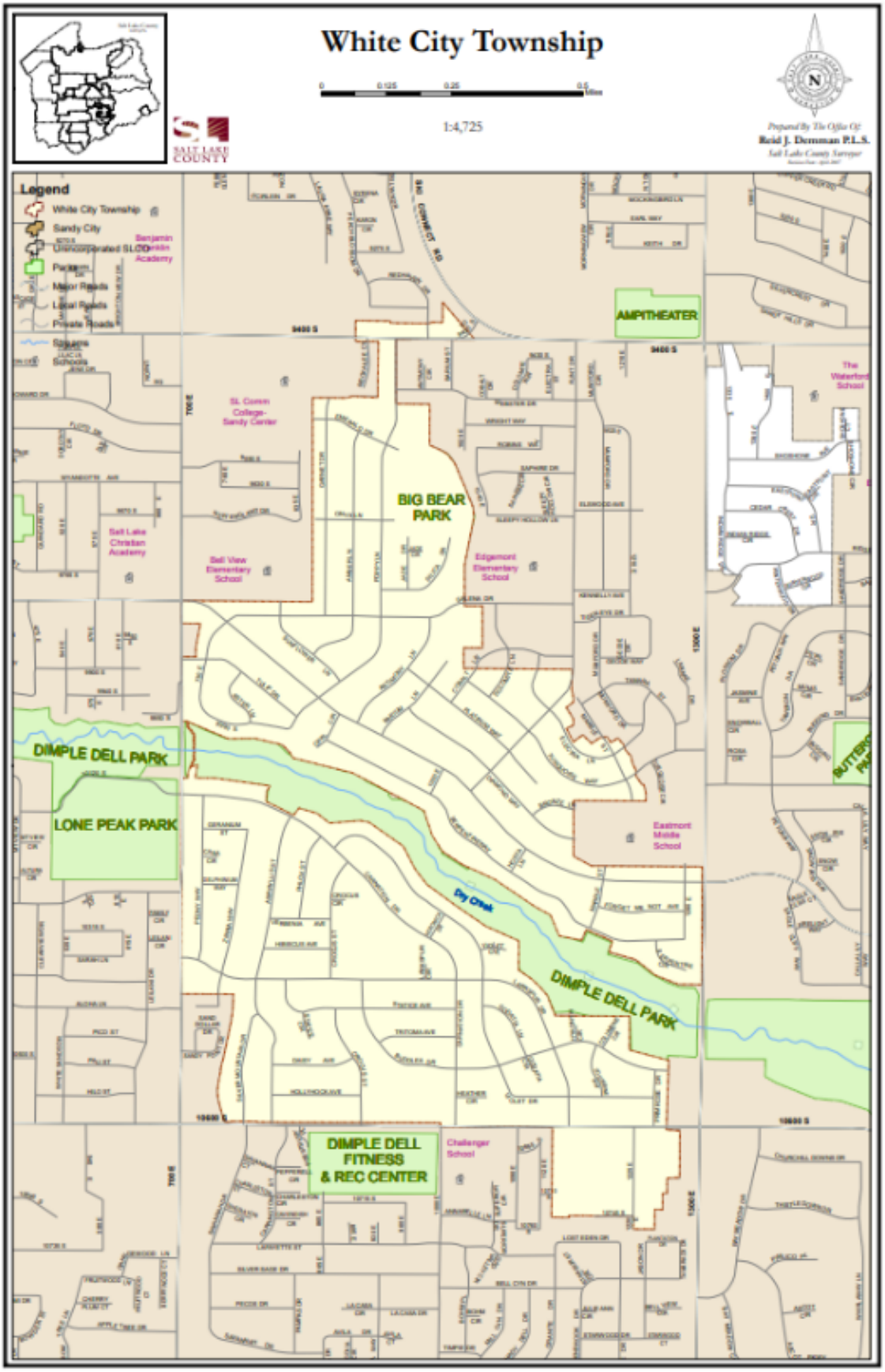
Hazard Mitigation Plan Point of Contact

Primary Point of Contact
Name: Paulina Flint **Title:** Mayor **Department:** City Council **Address:** 10467 S Carnation Dr White City, UT 84094 **Office Phone:** 801-571-5257 **Email Address:** pbflint@yahoo.com; paulina.flint@whitecity-ut.org **Website:** https://www.whitecity-ut.org

Jurisdiction Profile

The following is a summary of key information about the jurisdiction and its history:

- **Date of Incorporation:** Granted the status of township by The Salt Lake County Council on September 26, 2006 and transitioned to a metro township in January 2017.
- **Current Population:** According to U.S. Census 2017 population estimates, there are approximately 5,270 within White City census-designated place (CDP).
- **Location and Description:** White City Township is an enclave of the City of Sandy in Northern Utah in the Southeast portion of Salt Lake County. It currently has a total land area of approximately .9 square miles.


White City Township
1:4,725
Prepared By The Office Of:
Reid J. Demman P.L.S.
Salt Lake County Surveyor
SALT LAKE COUNTY
Legend
White City Township
Sandy City
Unincorporated SLCO
Parks
Major Roads
Local Roads
Private Roads
Schools
Benjamin Franklin Academy
AMPITHEATER
The Waterford School
St. Comm College-Sandy Center
BIG BEAR PARK
Salt Lake Christian Academy
Bell View Elementary School
Edgemont Elementary School
DIMPLE DELL PARK
LONE PEAK PARK
Eastmont Middle School
Dry Creek
DIMPLE DELL PARK
DIMPLE DELL FITNESS & REC CENTER
Challenger School
9400 S
7800 E
1300 E
10600 S

- **Brief History:** White City was started by developers Ken White and Cannon Papanicholas in 1955. Ken White named "White City" and it became listed as a "census designated place" by the US Census Bureau. The first homes were built along Galena Drive in 1957. White City Water Company was developed to service the area owned by these developers. Later, in 1961, Sandy Suburban Service District was started to service this same area. Edgemont Elementary was the first school built, one of three elementary schools and one middle school within walking distance. The majority of White city was built in the fifties and sixties. White City was granted the status of township by the Salt Lake County Council on September 26, 2006. White City then transitioned to a metro township in January 2017.
- **Climate:**

	White City, Utah	United States
Rainfall	21.0 in.	38.1 in.
Snowfall	61.2 in.	27.8 in.
Precipitation	86.7 days	106.2 days
Sunny	227 days	205 days
Avg. July High	92.2°	85.8°
Avg. Jan. Low	21.5°	21.7°
Comfort Index (higher=better)	7.1	7
UV Index	4.7	4.3
Elevation	4583 ft.	2443 ft.

Source: https://www.bestplaces.net/climate/city/utah/white_city

- **Governing Body Format:** The White City Metro Township Council is the municipal government for White City. The five-member council is elected at-large from the community. Per State Law the Mayor is chosen by the Council to serve as White City's executive, and the Mayor chairs all council meetings. Services within the city include the following: various boards and commissions, the Greater Salt Lake Municipal Services District, a Mosquito Abatement District, Parks and Recreation, the Unified Fire Service Area, Salt Lake Unified Police Department, Wasatch Front Waste and Recycling District, and the White City Water Improvement District.
- **Development Trends:** Single-family homes are the dominant land use type and total over 98 percent of the dwellings in the White City Community, with the most common zone designation being R-1-8 which is a single-family residential zone that requires a minimum 8000 square foot lot per dwelling. There are no medium or high-density residential housing units in the community. 95% of the homes were built between 1940 and 1979 in White City. Preservation of the existing single-family neighborhoods is a high priority in the community. Except for the one existing commercial property within the Township all commercial activity for the community is found outside of its boundaries. The area is

considered a bedroom community with low rental rates and has already built out. A young population has started to move to the area. A new elementary school was built in 2017.

Capability Assessment

The town maintains a full-time staff of 0 and part-time staff of 0 individuals. Hazard Mitigation Planning efforts are supported by Greater Salt Lake Municipal Services District (Land Use Planning, Building Inspection, Code Enforcement, Stormwater Program, and Public Works Operations), Unified Fire Authority (Fire Protection Services), Unified Police Department (Police Services), and Wasatch Front Waste and Recycling District (Trash/Refuse Collection).

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Real Estate Disclosure Ordinance(s)	Yes	Yes	Overpressure Ordinance
Growth Management	Yes	Yes	General Plan update
Site Plan Review Requirements	Yes	Yes	Performed by MSD
Public Health and Safety Program and Requirements	No	Yes	County Requirement

Planning Documents			
General or Comprehensive Plan	Yes	Yes	
Capital Improvement Plan	Yes	-	
Economic Development Plan	Yes	-	
Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post-Disaster Recovery Plan	Yes	No	
Continuity of Operations Plan	Yes	No	
Public Health Plans	No	No	County Plan
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	No	

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	Yes and No
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes
Other	No

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Other	Greater Salt Lake Municipal Services District
Engineers or professionals trained in building or infrastructure construction practices	Yes	Other	Greater Salt Lake Municipal Services District
Planners or engineers with an understanding of natural hazards	Yes	Other	Greater Salt Lake Municipal Services District

Surveyors	Yes	Other	SLCO
Personnel skilled or trained in GIS applications	Yes	Other	GSLMSD
Emergency manager	Yes	-	County supported
Grant writers	No	-	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	GSLMSD
Who is your jurisdiction's floodplain administrator? (department/position)	Planning Director
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	No	-	-
Public Protection/ISO	No	-	-
NWS StormReady	No	-	-

Jurisdiction-Specific Hazards and Risks

The *Natural Hazard Events Table* lists all past occurrences of natural hazards within the jurisdiction. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0
- As of 6/30/2019, 0 policies were enforced (FEMA, 2019).
- White City Metro Township does not participate in the National Flood Insurance Program (FEMA, 2019).

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA Data with additions from the jurisdiction representatives)

*The NOAA data did not capture any events for White City; however, given the locations presented for the events listed below, these events were interpreted as having an impact on White City Metro Township.

Type of Event	Description	FEMA Disaster Number (if applicable)	Date	Preliminary Damage Assessment
Heavy Snow	2 inches	-	4/6/2019	-
Heavy Snow	17 inches	-	3/1/2019	-
Heavy Snow	6 inches	-	2/13/2019	-
Winter Storm	18 inches	-	1/21/2019	-
Winter Storm	6.5 inches	-	12/1/2018	-
Winter Storm	25 inches	-	2/18/2018	-
Winter Storm	16 inches	-	1/19/2018	-
High Wind & Winter Storm	66 mph & 10 inches	-	2/21/2017	-
Winter Storm	15 inches	-	1/20/2017	-
High Wind	66 mph	-	1/18/2017	10,000 property damage.
Winter Storm	12 inches		12/23/2016	
High Wind	72 mph; Power outages were common across the area due to downed trees and power lines.	-	2/17/2016	200,000 property damage.
Winter Storm	7 inches	-	12/24/2015	-
Winter Storm	12 inches	-	4/14/2015	-
Winter Storm	14 inches	-	12/25/2014	-
High Wind	60 mph	-	3/1/2014	-
Winter Storm		-	12/19/2013	-
Flooding		-	2011	-
Flooding		-	8/19/2010	-

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, jurisdiction-specific nuances must be understood, and key factors are highlighted below: (ACS 2017)

Factors	Number in Community

Members of the community over 65 years old	815*
Members of the community under 18 years old	1,448
Members of the community that identify as having disability status	654
Members of the community that speak English less than "very well"	156
Members of the community living below the poverty line	419
The number of mobile homes in the community	0
Members of the community without health insurance	567
Occupied housing units with tenants without a vehicle	79
Housing units without heating fuel	0

**Local officials believe the number of Elderly in White City may be underreported.*

Jurisdiction-Specific Hazards and Impacts

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the municipality.

Earthquake: White City has the potential for a large earthquake. Reports indicate that thousands of deaths, billions of dollars of damage to private property, extended loss of utility services, overwhelmed medical facilities, and other catastrophic incidents will occur if a major earthquake occurs in the Salt Lake and/or Utah Valley. Eighty percent of the buildings/homes in White City are made of unreinforced masonry.

Wildfire: The potential for damage and loss of life and property through fire events, especially in Dimple Dell Park is a possibility.

Flooding: The majority of flooding concerns have been mitigated and riverine flooding is not a concern. Although located in a semi-arid region, White City is subject to thunderstorms and snowmelt flooding.

Winter Storms and Severe Weather: Winter weather systems and snowstorms over northern Utah can have a dramatic effect on regional commerce, transportation, and daily activity and are a major forecast challenge for local meteorologists. Severe winter weather and severe weather are probable in White City.

Avalanche: The likelihood of avalanches impacting White City is unlikely.

High Wind: Although infrequent, White City is subject to severe damage resulting from extremely high winds often called microburst winds. While no impact has previously occurred, the trees in the area could be impacted.

Extreme temperature: Given the location, temperatures can get lower than other parts of the County and both extreme cold and heat adversely impacts the elderly in the community.

Landslide/Slope Failure: Homes along Dimple Dell Park are at a slight risk during an earthquake.

Radon: The community is at low risk for radon.

Hazard Risk Ranking

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Earthquake	2	30	60
Severe Winter Weather	3	16	48
Severe Weather	3	15	45
Public Health Epidemic/ Pandemic	2	21	42
Flooding	2	17	34
Cyber Attack	2	17	34
Hazardous Materials Incident	2	14	28
Drought	2	14	28
Radon	3	9	27
Terrorism	1	25	25
Wildfire	2	10	20
Dam Failure	1	15	15
Tornado	1	11	11
Civil Disturbance	1	11	11
Landslide and Slope Failure	1	7	7
Avalanche	1	0	0

*To access the full probability and impact scores, please click the link below to download the Excel file. The excel file consists of two tabs. The first tab includes the variables and scores specific to the community based on best available data and subject-matter input; and the second tab provides the overall summary output based on the assessment.

SLC2019HMP-White City(2.0).xlsx

Hazard Event	Probability (High, Medium, Low)	Probability Factor (Adjust Probability Factor to Change Scores)		Hazard Event	Population Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	Low	1		Avalanche	No Impact	0	0
Dam Failure	Low	1		Dam Failure	Low	1	3
Drought	Medium	2		Drought	High	3	9
Civil Disturbance	Low	1		Civil Disturbance	Medium	2	6
Cyber Attack	Medium	2		Cyber Attack	High	3	9
Earthquake	Medium	2		Earthquake	High	3	9
Flooding	Medium	2		Flooding	Medium	2	6
Hazardous Materials Incident	Medium	2		Hazardous Materials Incident	Medium	2	6
Landslide and Slope Failure	Low	1		Landslide and Slope Failure	Low	1	3
Public Health Epidemic/ Pandemic	Medium	2		Public Health Epidemic/ Pandemic	High	3	9
Radon	High	3		Radon	High	3	9
Severe Weather	High	3		Severe Weather	High	3	9
Severe Winter Weather	High	3		Severe Winter Weather	High	3	9
Terrorism	Low	1		Terrorism	Medium	2	6
Tornado	Low	1		Tornado	Low	1	3
Wildfire	Medium	2		Wildfire	Low	1	3

Probability [No Weighted Factor]		**People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows: **[Weighted Factor: 3]**
High—Significant hazard event is likely to occur annually (Probability Factor = 3)		**High**—30% or more of the population is exposed to a hazard (Impact Factor = 3)
Medium—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)		**Medium**—15% to 29% of the population is exposed to a hazard (Impact Factor = 2)
Low—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)		**Low**—14% or less of the population is exposed to the hazard (Impact Factor = 1)
Unlikely—There is little to no probability of significant occurrence or the recurrence interval is greater than every 100 years (Probability Factor = 0)		**No impact**—None of the population is exposed to a hazard (Impact Factor = 0)

Hazard Event	Property Exposed (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Property Damages from Major Event (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (2)
Avalanche	No Impact	0	0		Avalanche	No Impact	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	4
Drought	No Impact	0	0		Drought	No Impact	0	0
Civil Disturbance	Low	1	1		Civil Disturbance	Low	1	2
Cyber Attack	No Impact	0	0		Cyber Attack	No Impact	0	0
Earthquake	High	3	3		Earthquake	High	3	6
Flooding	Medium	2	2		Flooding	Medium	2	4
Hazardous Materials Incident	Low	1	1		Hazardous Materials Incident	Low	1	2
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Low	1	2
Public Health Epidemic/ Pandemic	No Impact	0	0		Public Health Epidemic/ Pandemic	No Impact	0	0
Radon	No Impact	0	0		Radon	No Impact	0	0
Severe Weather	High	3	3		Severe Weather	Low	1	2
Severe Winter Weather	High	3	3		Severe Winter Weather	Low	1	2
Terrorism	Low	1	1		Terrorism	High	3	6
Tornado	Low	1	1		Tornado	High	3	6
Wildfire	Low	1	1		Wildfire	Low	1	2

Property Exposed—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event. **[Weighted Factor: 1]**		**Property Damages**—Values were assigned based on the expected total ***property damages incurred*** from the hazard event. It is important to note that values represent estimates of the loss from a **major event** of each hazard based on historical data for each event or probabilistic models/studies. **[Weighted Factor: 2]**
High—25% or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)		**High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
Medium—10% to 24% of the total assessed property value is exposed to a hazard (Impact Factor = 2)		**Medium**—More than $500,000, but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
Low—9% or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)		**Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)		**No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Hazard Event	Impact on Economy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)		Hazard Event	Potential for Catastrophy (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (3)
Avalanche	No Impact	0	0		Avalanche	Unlikely	0	0
Dam Failure	Low	1	1		Dam Failure	Medium	2	6
Drought	Medium	2	2		Drought	Low	1	3
Civil Disturbance	Medium	2	2		Civil Disturbance	Unlikely	0	0
Cyber Attack	Medium	2	2		Cyber Attack	Medium	2	6
Earthquake	High	3	3		Earthquake	High	3	9
Flooding	Medium	2	2		Flooding	Low	1	3
Hazardous Materials Incident	Medium	2	2		Hazardous Materials Incident	Low	1	3
Landslide and Slope Failure	Low	1	1		Landslide and Slope Failure	Unlikely	0	0
Public Health Epidemic/ Pandemic	High	3	3		Public Health Epidemic/ Pandemic	High	3	9
Radon	No Impact	0	0		Radon	Unlikely	0	0
Severe Weather	Low	1	1		Severe Weather	Unlikely	0	0
Severe Winter Weather	Medium	2	2		Severe Winter Weather	Unlikely	0	0
Terrorism	High	3	3		Terrorism	High	3	9
Tornado	Low	1	1		Tornado	Unlikely	0	0
Wildfire	Low	1	1		Wildfire	Low	1	3

Economic Factor—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, worker wages and local tax revenues or on the impact on the local gross domestic product (GDP). **[Weighted Factor: 1]**	**Catastrophic Factor**—The potential that an occurrence of this hazard could be catastrophic. **[Weighted Factor: 3]**
High—Where the total economic impact is likely to be greater than $10 million (Impact Factor = 3)	**High**—High potential that this hazard could be catastrophic (Impact Factor = 3)
Medium—Total economic impact is likely to be greater than $100,000, but less than or equal to $10 million (Impact Factor = 2)	**Medium**—Medium potential that this hazard could be catastrophic (Impact Factor = 2)
Low—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)	**Low**—Low potential that this hazard could be catastrophic (Impact Factor = 1)
No Impact—Virtually no significant economic impact (Impact Factor = 0)	**Unlikely**—Virtually no potential that this hazard could be catastrophic (Impact Factor = 0)

Mitigation Strategies and Actions

2019 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014.

Mitigation Table - New Actions

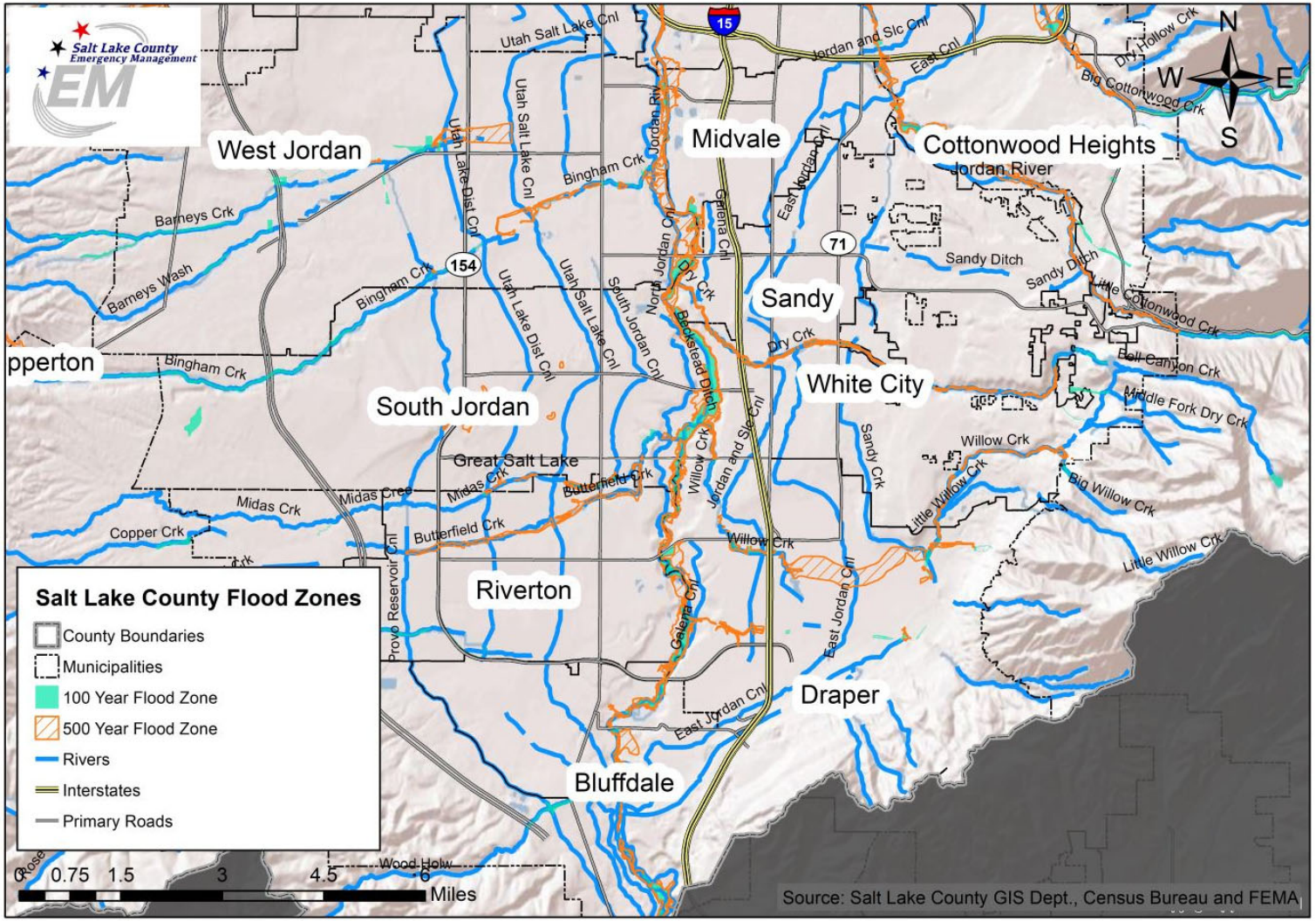
Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Supporting Agency(ies)	Benefit	Cost	Funding Source	Priority	Timeframe	Comments
Establish an emergency fund to support response and recovery operations.	2019	Goal 5: Ensure and promote ways to increase government and private sector continuity of services during and after a disaster.	All-Hazards	White City	GSL MSD	High	Medium	Local Funds	Medium	Ongoing	The emergency fund will support grant matches and future investments in mitigation.
Conduct seismic retrofitting and implement a program for residents similar to the “Fix the Bricks” initiative. Provide additional education and materials to the public regarding the earthquake risk and potential mitigation actions that can be taken. Develop a training program for contractors so they become qualified to conduct seismic retrofitting.	2019	Goal 2: Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters. Goal 4: Promote education and awareness programs, campaigns, and efforts designed to encourage citizens, private and public entities to mitigate and become more resilient to disasters.	Earthquake	White City	GSL MSD	High	High	PDM Grant or other federal funds	High	Long-term	The community will start with generating a list of qualified contractors that can conduct seismic retrofitting. Currently there is a shortage of qualified contractors.

Mitigation Table - Ongoing Actions

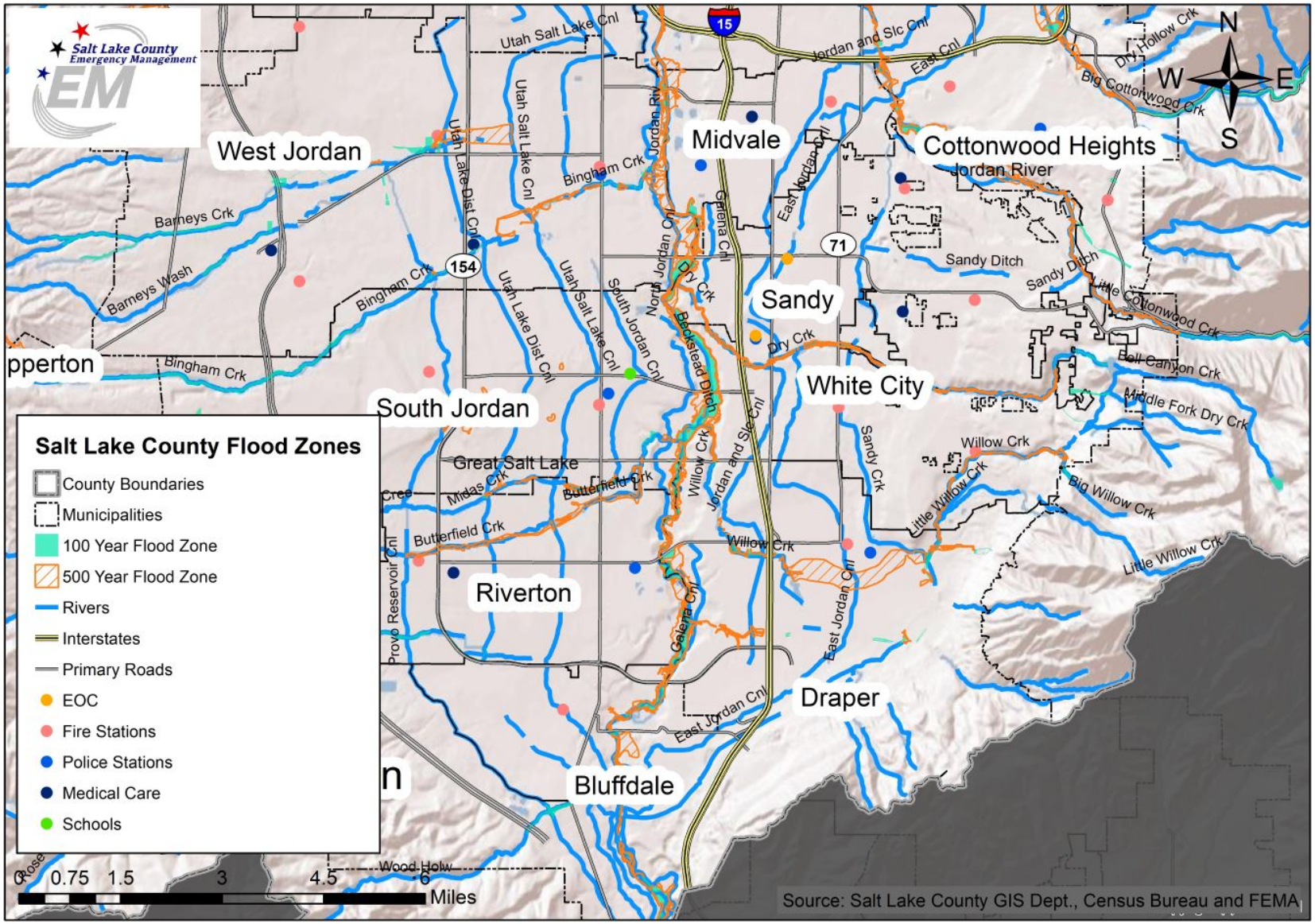
Not applicable since White City did not participate as an incorporated jurisdiction in 2014.

Jurisdiction Maps

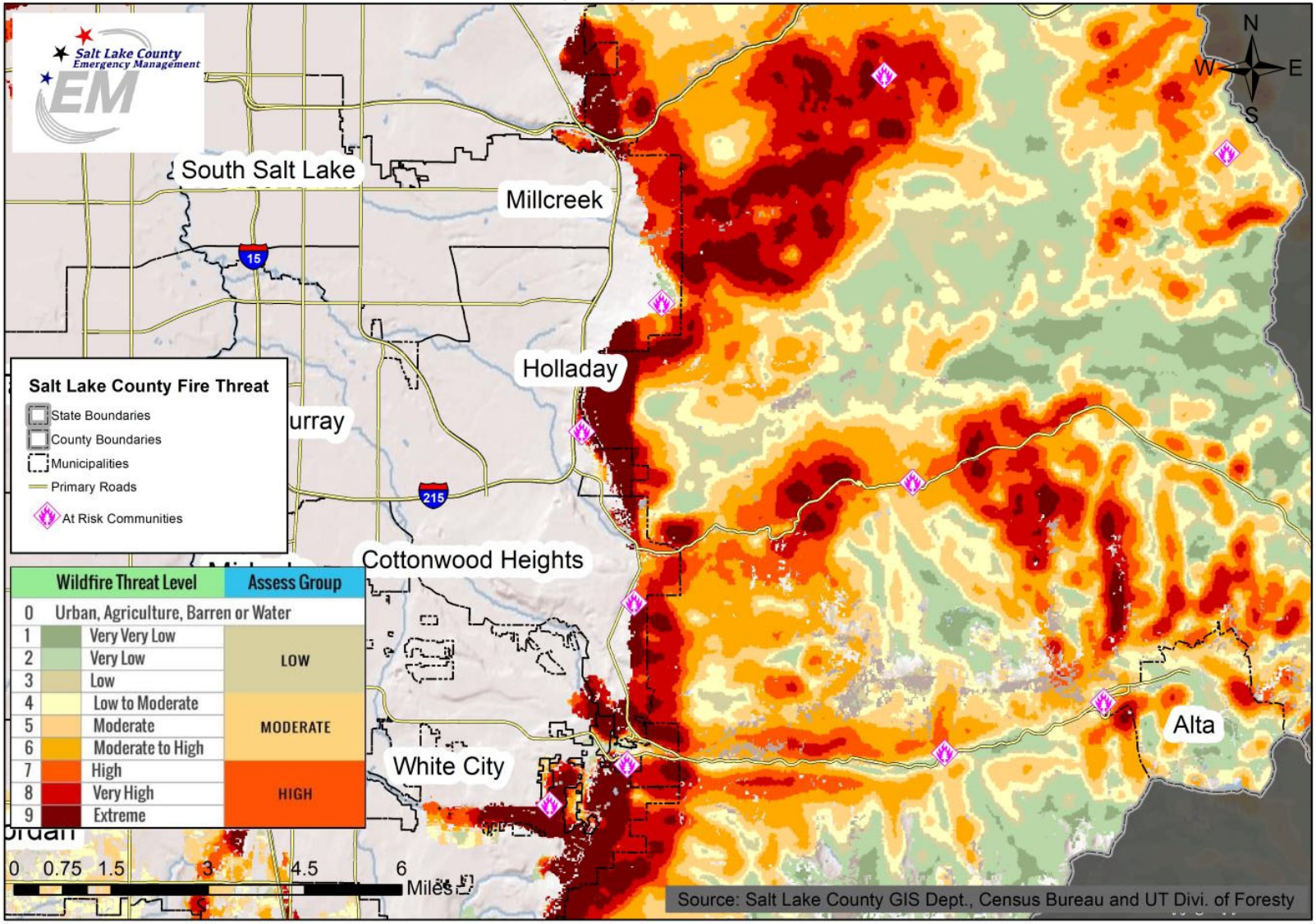
Map: 100 Year and 500 Year Flood Zone



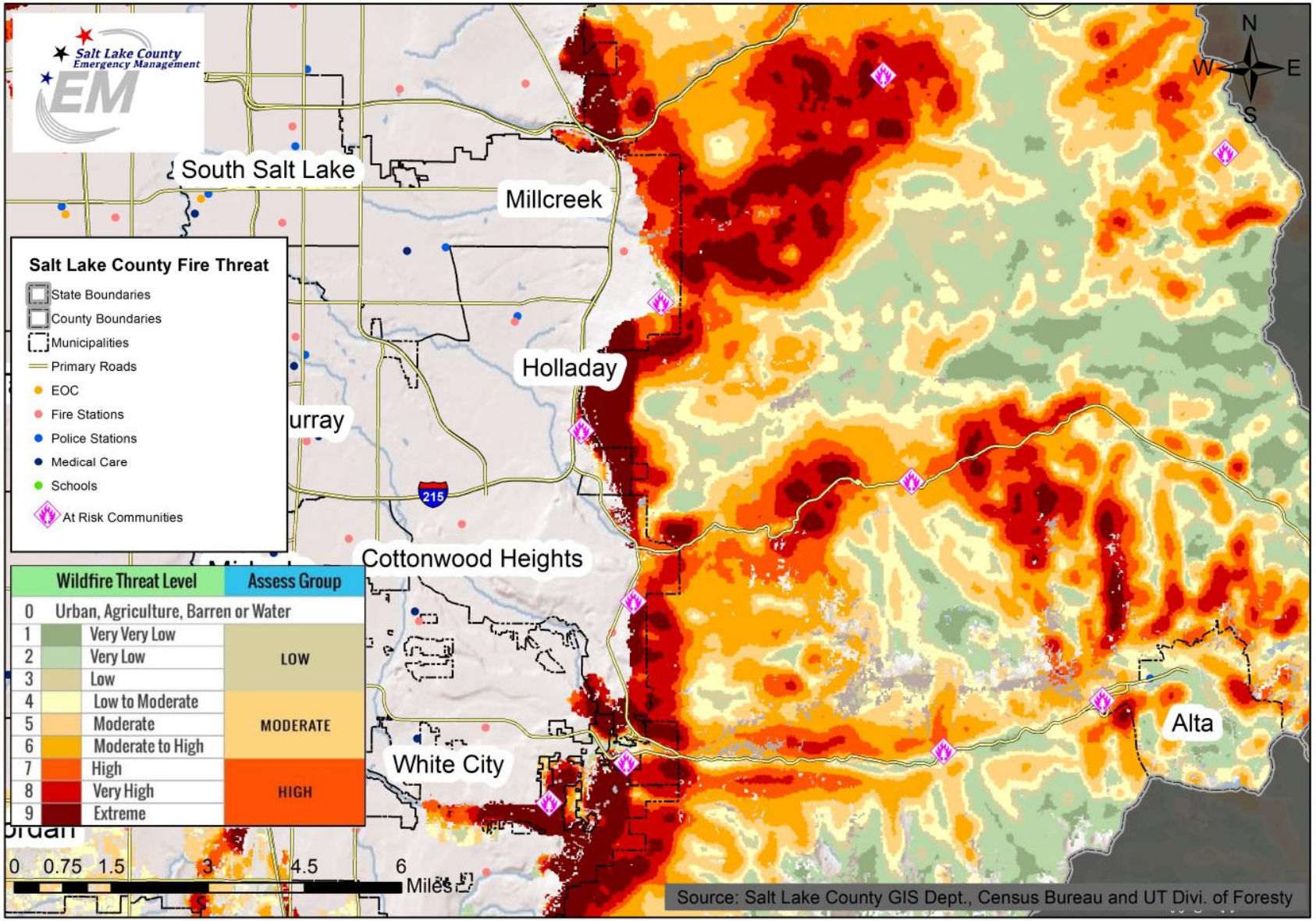
Map: 100 Year and 500 Year Flood Zone with Critical Facilities



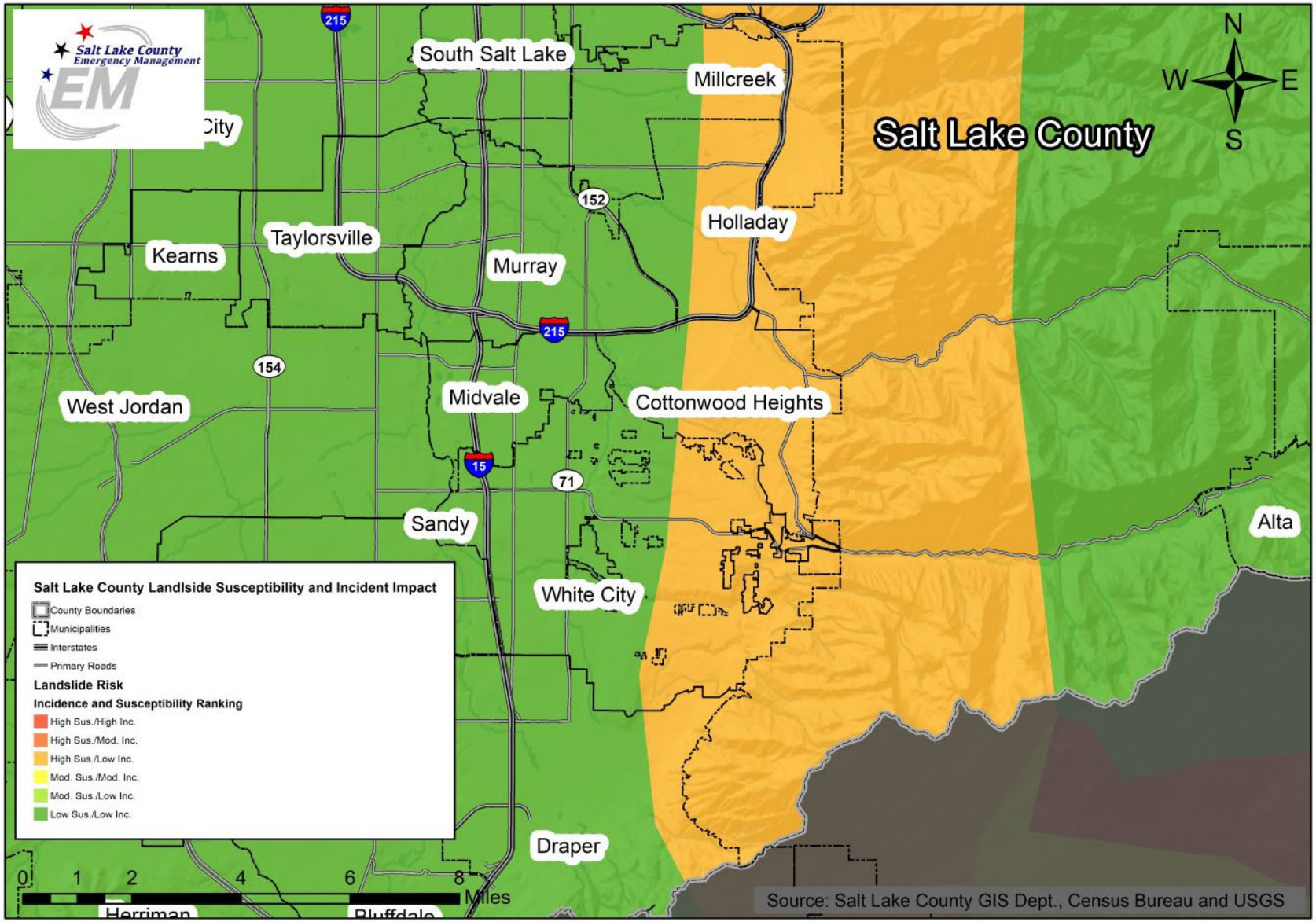
Map: Wildfire Threat Level



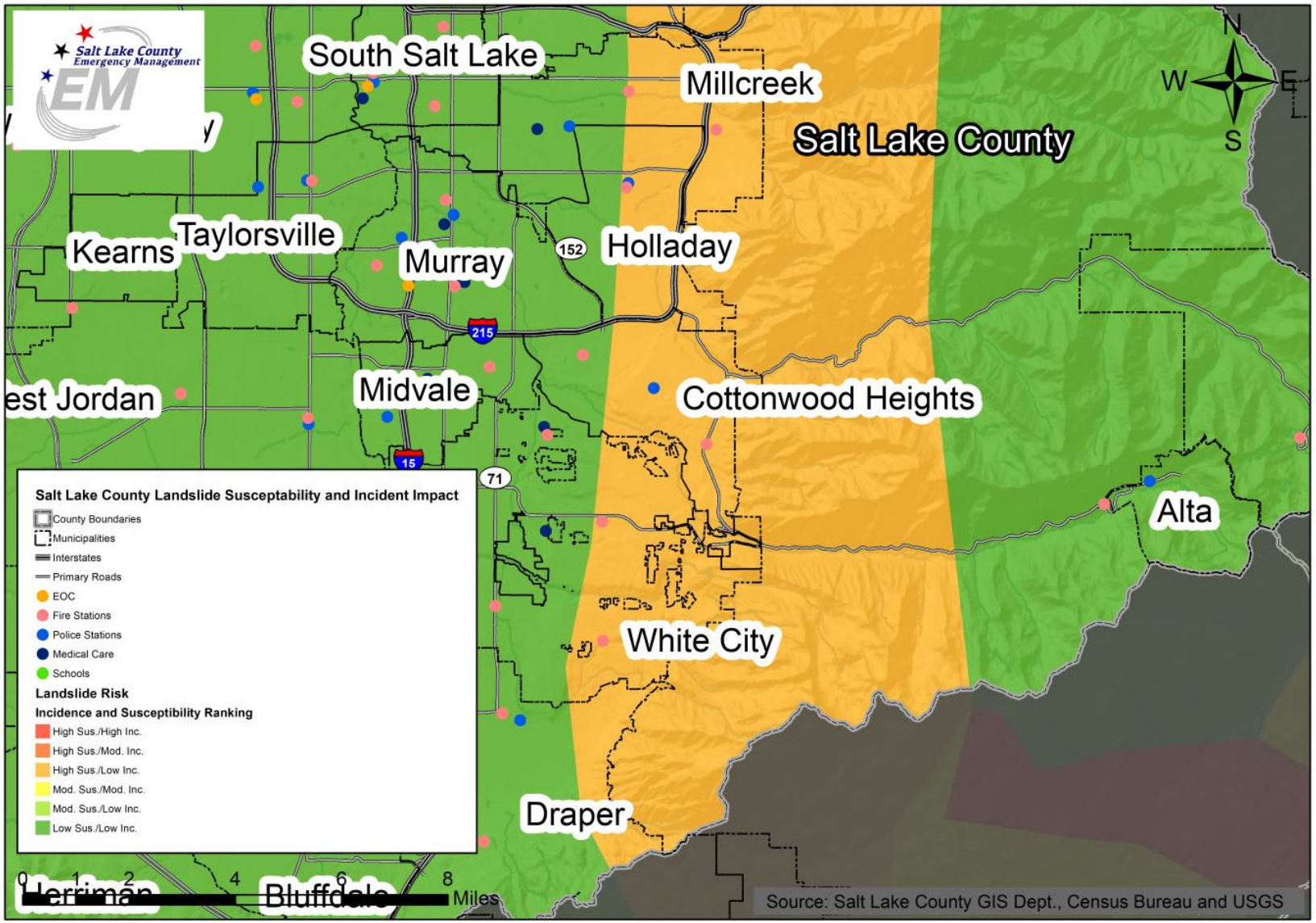
Map: Wildfire Threat Level with Critical Facilities



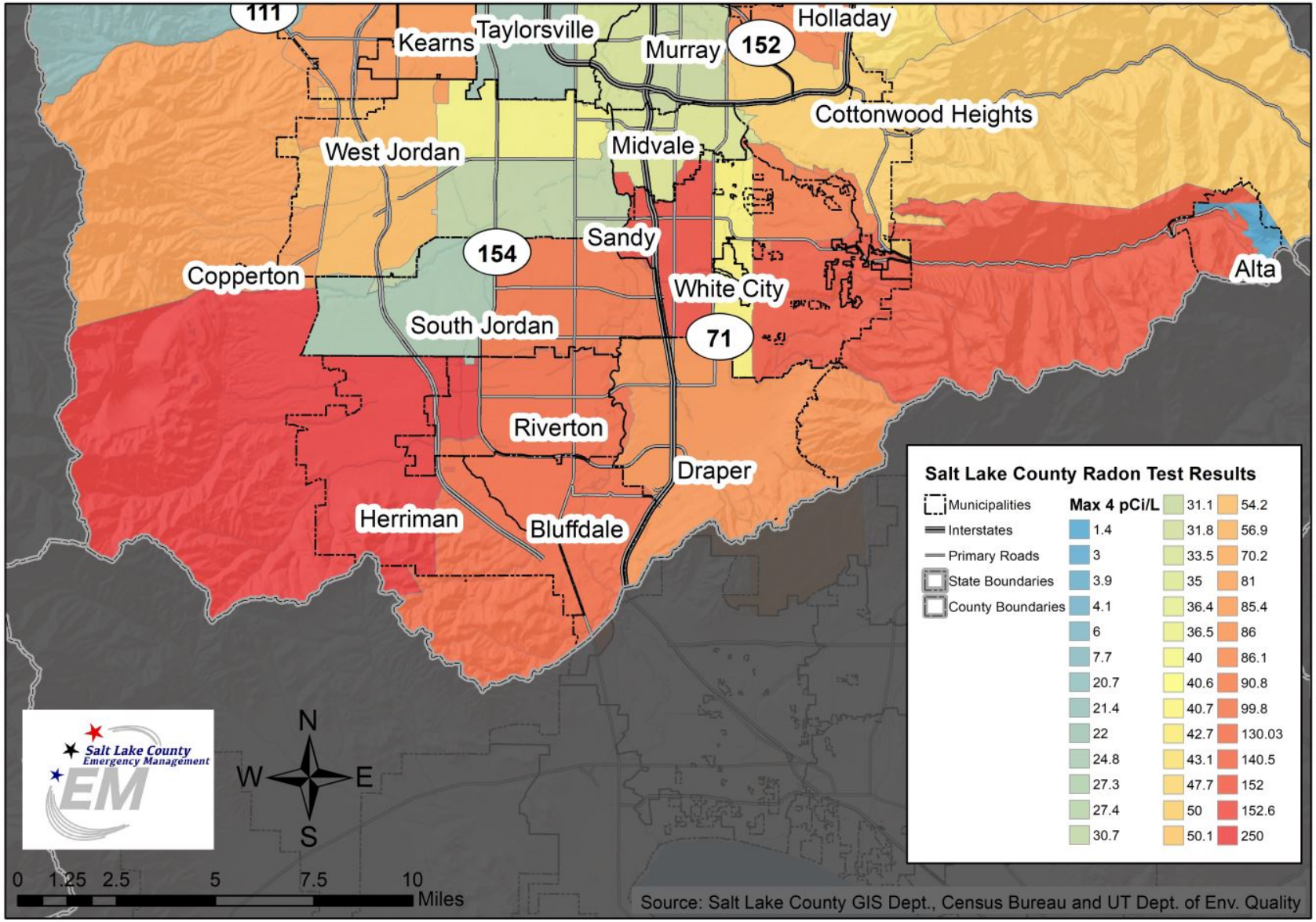
Map: Landslide Susceptibility and Incident Impact Potential



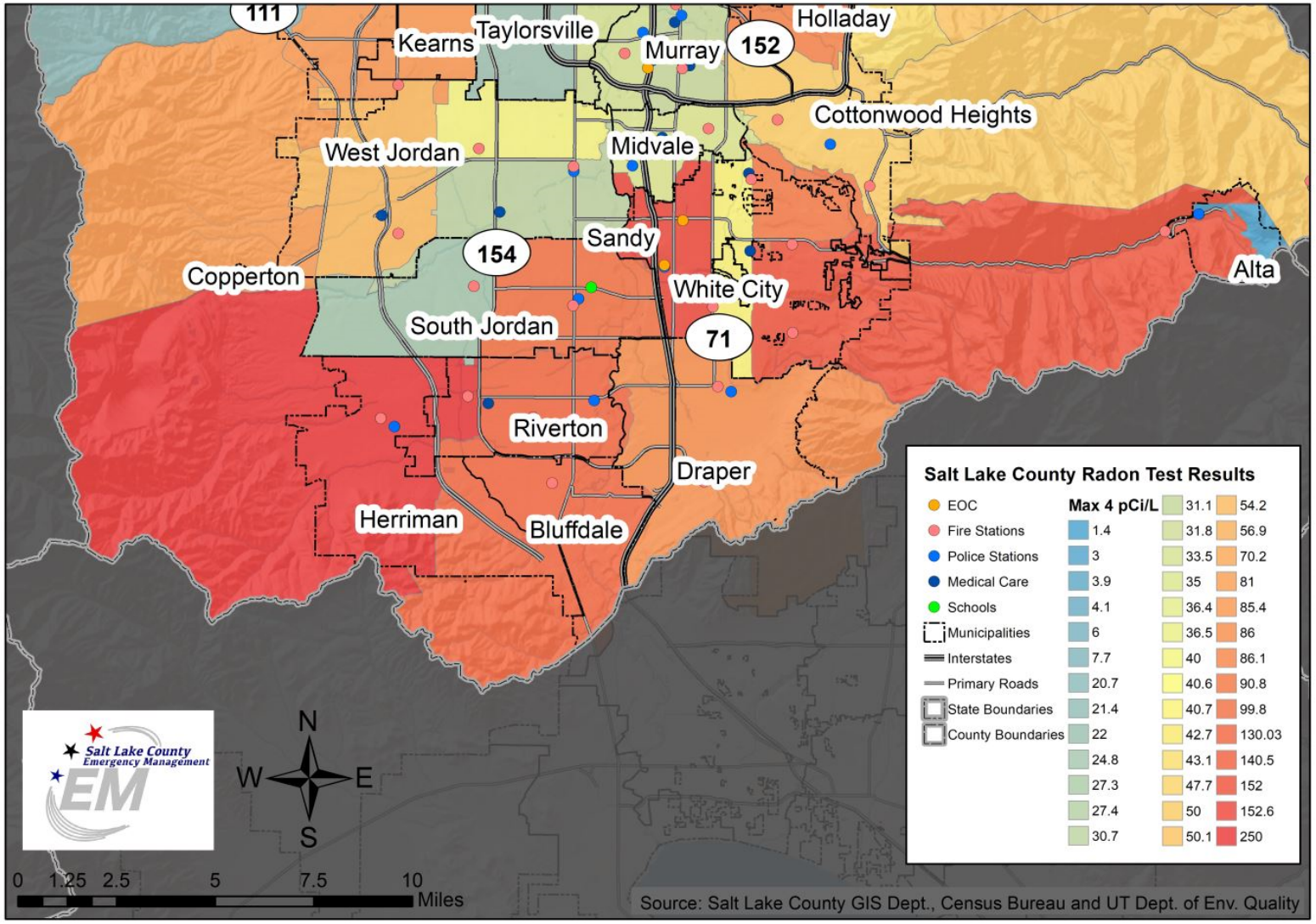
Map: Landslide Susceptibility and Incident Impact Potential with Critical Facilities



Map: Radon


111
Kearns
Taylorsville
Murray
152
Holladay
Cottonwood Heights
West Jordan
Midvale
Sandy
154
Copperton
White City
Alta
South Jordan
71
Riverton
Draper
Herriman
Bluffdale
Salt Lake County Radon Test Results
Municipalities
Interstates
Primary Roads
State Boundaries
County Boundaries
Max 4 pCi/L
1.4
3
3.9
4.1
6
7.7
20.7
21.4
22
24.8
27.3
27.4
30.7
31.1
31.8
33.5
35
36.4
36.5
40
40.6
40.7
42.7
43.1
47.7
50
50.1
54.2
56.9
70.2
81
85.4
86
86.1
90.8
99.8
130.03
140.5
152
152.6
250
Salt Lake County Emergency Management
EM
N
W
E
S
0 1.25 2.5 5 7.5 10
Miles
Source: Salt Lake County GIS Dept., Census Bureau and UT Dept. of Env. Quality

Map: Radon with Critical Facilities



2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Jurisdictional Appendix: Salt Lake Community College

Addendum

April 2021

Hazard Mitigation Plan Point of Contact

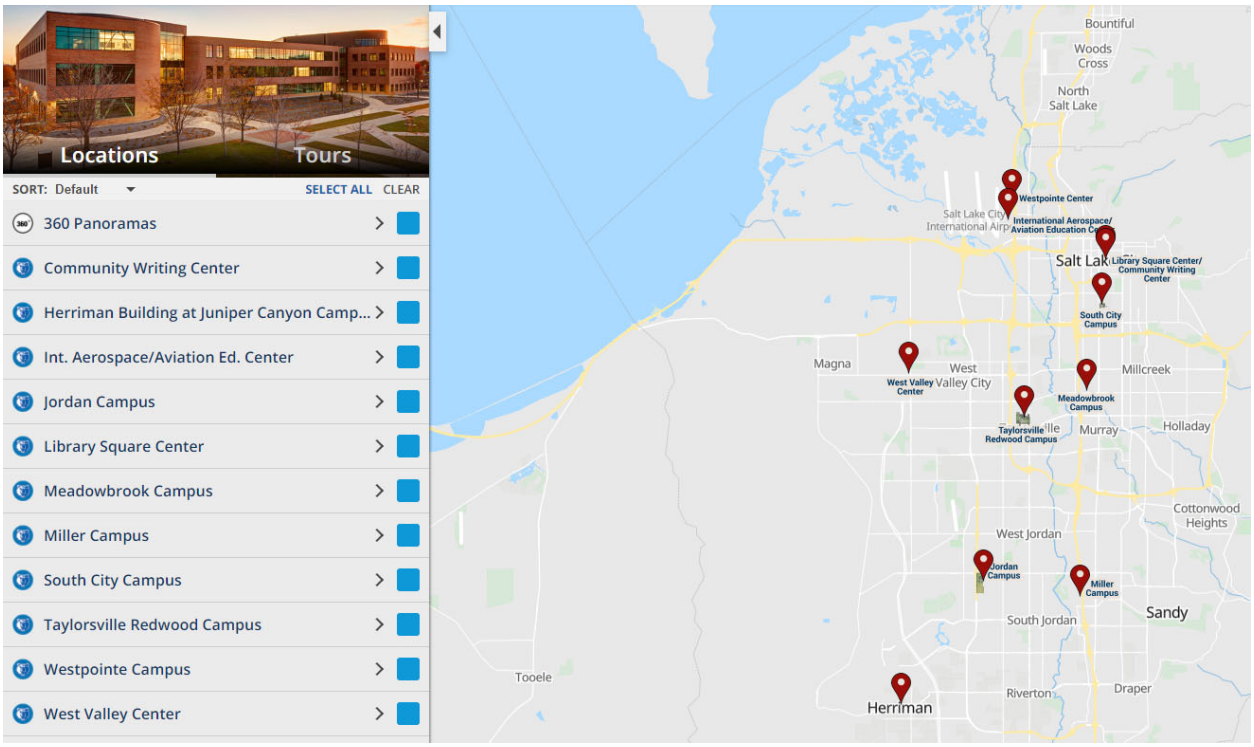
Primary Point of Contact

Name: Lisa L. Schwartz
Title: Emergency Manager
Department: Salt Lake Community College Campuses
Address: 4365 South 2200 West | GFSB 124 Salt Lake City, Utah 84123 Office Phone: 801-957-4963
Cell Phone: 801-870-5153
Email Address: lisa.schwartz@slcc.edu
Website: http://www.slcc.edu/police/emergency-management.aspx

Jurisdiction Profile

The following is a summary of key information about the Sale Lake Community College.

- Locations: Salt Lake Community College is Utah's largest college with the most diverse student body. It serves more than 60,000 students on 10 campuses and with online classes. The locations are highlighted on the map below with a red tab (http://www.slcc.edu/).



Salt Lake Community College's Emergency Management Program: The program is committed to the preparation for, response to, recovery from, and reduction or elimination of losses from natural and technological hazards that may negatively affect its students, faculty, staff, visitors, property and College facilities.

To accomplish this, Emergency Management:

- Establishes and promotes a foundation for emergency management and the framework for effective plans and procedures
- Develops and aligns achievable emergency management goals and objectives with the vision, mission, and purpose of SLCC
- Defines procedures pertinent to the execution of the Emergency Management Program
- Identifies, establishes, and maintains good working relationships with internal and external emergency management partners
- Strengthens program continuity and viability by identifying source funding, recommending normal budget levels, and establishing expected benchmarks or milestones

Hazard and Vulnerability Assessment

The section below has two parts of evaluation that is demonstrated by the tables below, the Hazard and Vulnerability Assessment which includes natural hazards that have been identified

and ranked using the **Kaiser** Permanente Hazard Vulnerability Analysis (**HVA**) Tool. Included in this analysis is the Capability Assessment.

Hazards and Risks Hazards

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are relevant and unique to the college.

It should be noted that this annex only includes the natural hazards. Other hazards related to infrastructure, human incidents, hazardous materials, and infectious outbreak were assessed, but were not included for security purposes.

Dam Failure

Several campus facilities, specifically in the northern part of Salt Lake County, reside in multiple inundation areas. Due to security purposes, those dams and facilities are not noted in this plan.

Earthquake

Multiple facilities are located between major faults. The Westpointe Campus is adjacent to a fault in a high liquefaction area. Multiple campuses are older buildings, and due to their age and susceptibility of Salt Lake County to earthquakes, they are inherently at risk.

Public Health

Due to the diverse nature of the college and various programs/trainings to support refugees and other vulnerable populations, certain facilities, such as the Meadowbrook Campus, may have a higher risk of public health concerns.

Civil Disorder/Riot

Like all universities, a concern for the college is the potential for riots and protests. SLCC supports diversity, accommodates large gatherings, and as a result, may attract various protests and events. Although not provided in this annex, the full comprehensive risk assessment acknowledges the human incident related hazards and risks and assesses that these risks are increasing.

Capability Assessment

The issues considered to evaluate response included:

1. Time to marshal an on-scene response
2. Scope of response capacity
3. Historical evaluation of response success

The results in the green columns in the tables below represent the response capacity available internally and externally for the various campuses and facilities. This evaluation of capabilities is based on two parts:

1. The college's response and recovery resources along with emergency planning, training, and exercise efforts performed within the college
2. The readiness of external resources and coordination of planning, training, and exercises with other entities.

Meadowbrook Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	2.0	1.0	2.0	0.0	2.0	2.0	33%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	3.0	0.0	2.0	1.0	22%	5
High Winds < F3 (fujita scale 40-157mph)	3.0	1.0	3.0	2.0	0.0	2.0	2.0	56%	3
Severe Heat / Extended Drought	1.0	2.0	1.0	1.0	0.0	2.0	2.0	15%	8
Earthquake > 5.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	78%	1
Liquefaction	3.0	3.0	3.0	3.0	1.0	2.0	1.0	72%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	3.0	0.0	2.0	2.0	19%	7
Wild Fire	1.0	0.0	3.0	3.0	0.0	0.0	0.0	11%	9
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	1.0	3.0	2.0	2.0	0.0	2.0	2.0	20%	6
AVERAGE SCORE	1.45	1.55	1.91	2.00	0.27	1.45	1.27	23%	
		RISK = PROBABILITY * SEVERITY							
		0.23	0.48	0.47		NATURAL EVENTS			

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 11 Est. Building(s)/Facility(ies) Value on Campus: $12,088,000.

Taylorsville Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	1.0	2.0	2.0	0.0	2.0	2.0	33%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	2.0	0.0	2.0	2.0	22%	6
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	1.0	0.0	2.0	2.0	33%	4
Severe Heat / Extended Drought	1.0	2.0	2.0	1.0	0.0	2.0	2.0	17%	8
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	2.0	3.0	3.0	2.0	2.0	2.0	78%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	8
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	1.0	0.0	2.0	2.0	33%	4
AVERAGE SCORE	1.36	1.36	1.82	1.36	0.45	1.45	1.45	20%	

RISK = PROBABILITY * SEVERITY

0.20 0.45 0.44

NATURAL EVENTS

Taylorsville/Redwood: Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 2,449 Est. Building(s)/Facility(ies) Value on Campus: $240,897,000.

West Valley Campus Site

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	1.0	2.0	2.0	0.0	2.0	1.0	30%	6
Tornado >F3 (fujita scale 158-206mph)	1.0	2.0	2.0	3.0	0.0	3.0	2.0	22%	7
High Winds < F3 (fujita scale 40-157mph)	3.0	1.0	2.0	2.0	0.0	2.0	2.0	50%	3
Severe Heat / Extended Drought	1.0	2.0	1.0	2.0	0.0	2.0	2.0	17%	9
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	2.0	3.0	3.0	3.0	2.0	2.0	83%	2
Flood (heavy rain, snow melt, dam inundation)	2.0	1.0	2.0	3.0	0.0	2.0	2.0	37%	4
Wild Fire	1.0	1.0	2.0	3.0	0.0	2.0	2.0	19%	8
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	1.0	0.0	2.0	2.0	33%	5
AVERAGE SCORE	2.00	1.67	2.11	2.44	0.67	2.11	1.89	40%	

RISK = PROBABILITY * SEVERITY

0.40 0.67 0.60

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 83 Est. Building(s)/Facility(ies) Value on Campus: N/A

Library Square Campus Site

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	3.0	0.0	2.0	2.0	24%	7
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	2.0	0.0	2.0	2.0	37%	4
Severe Heat / Extended Drought	2.0	2.0	1.0	2.0	0.0	2.0	2.0	33%	6
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	3.0	3.0	3.0	0.0	2.0	2.0	72%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	8
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
AVERAGE SCORE	1.45	1.55	1.73	1.73	0.27	1.45	1.45	22%	

RISK = PROBABILITY * SEVERITY

0.22	0.48	0.45

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 61 Est. Building(s)/Facility(ies) Value on Campus: N/A

South City Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	3.0	0.0	2.0	2.0	24%	7
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	2.0	0.0	2.0	2.0	37%	4
Severe Heat / Extended Drought	2.0	2.0	1.0	2.0	0.0	2.0	2.0	33%	6
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	2.0	3.0	3.0	0.0	2.0	2.0	67%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	8
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
AVERAGE SCORE	1.45	1.45	1.73	1.73	0.27	1.45	1.45	22%	

RISK = PROBABILITY * SEVERITY

0.22	0.48	0.45

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 811 Est. Building(s)/Facility(ies) Value on Campus: $117,247,000.

Writing Center Campus Site

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	3.0	0.0	2.0	2.0	24%	7
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	2.0	0.0	2.0	2.0	37%	4
Severe Heat / Extended Drought	2.0	2.0	1.0	2.0	0.0	2.0	2.0	33%	6
Earthquake > 5.0	3.0	3.0	3.0	2.0	3.0	2.0	2.0	83%	1
Liquefaction	3.0	3.0	3.0	3.0	0.0	2.0	2.0	72%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	8
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
AVERAGE SCORE	1.45	1.55	1.73	1.64	0.27	1.45	1.45	22%	

RISK = PROBABILITY * SEVERITY

0.22 0.48 0.45

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): N/A Est. Building(s)/Facility(ies) Value on Campus: N/A

Airport Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	3.0	0.0	2.0	2.0	24%	7
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	2.0	0.0	2.0	2.0	37%	4
Severe Heat / Extended Drought	2.0	2.0	1.0	2.0	0.0	2.0	2.0	33%	6
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	2.0	3.0	3.0	0.0	2.0	2.0	67%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	8
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	2.0	0.0	2.0	2.0	37%	4
AVERAGE SCORE	1.45	1.45	1.73	1.73	0.27	1.45	1.45	22%	

RISK = PROBABILITY * SEVERITY

0.22 0.48 0.45

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 81 Est. Building(s)/Facility(ies) Value on Campus: N/A

Westpointe Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	1.0	2.0	2.0	0.0	2.0	2.0	33%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	2.0	0.0	2.0	2.0	22%	6
High Winds < F3 (fujita scale 40-157mph)	2.0	1.0	3.0	1.0	0.0	2.0	2.0	33%	4
Severe Heat / Extended Drought	1.0	2.0	1.0	1.0	0.0	2.0	2.0	15%	8
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	3.0	2.0	3.0	3.0	2.0	2.0	2.0	78%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	7
Wild Fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	10
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	1.0	0.0	2.0	2.0	33%	4
AVERAGE SCORE	1.36	1.36	1.73	1.36	0.45	1.45	1.45	20%	

RISK = PROBABILITY * SEVERITY		
0.20	0.45	0.43

NATURAL EVENTS

Vulnerability/Impact Analysis: Est. Max Headcount During Any Part of the Term (Peak Time): 130 Est. Building(s)/Facility(ies) Value on Campus: $50,000,000.

Jordan Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	1.0	2.0	2.0	0.0	2.0	2.0	33%	5
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	2.0	0.0	2.0	2.0	22%	6
High Winds < F3 (fujita scale 40-157mph)	3.0	1.0	3.0	1.0	0.0	2.0	2.0	50%	2
Severe Heat / Extended Drought	1.0	1.0	1.0	1.0	0.0	2.0	2.0	13%	9
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	2.0	1.0	3.0	3.0	0.0	2.0	2.0	41%	3
Flood (heavy rain, snow melt, dam inundation), External Pipe Break (large JVWD waterline)	1.0	1.0	2.0	3.0	0.0	2.0	2.0	19%	8
Wild Fire	1.0	2.0	2.0	3.0	0.0	2.0	2.0	20%	7
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	1.0	0.0	2.0	2.0	33%	5
AVERAGE SCORE	1.45	1.36	1.91	1.73	0.27	1.64	1.64	23%	

RISK = PROBABILITY * SEVERITY		
0.23	0.48	0.47

NATURAL EVENTS

Vulnerability/Impact Analysis:
Est. Max Headcount During Any Part of the Term (Peak Time): 777 Est. Building(s)/Facility(ies) Value on Campus: $50,511,00.

Miller Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	3.0	2.0	2.0	3.0	0.0	2.0	2.0	61%	3
Tornado >F3 (fujita scale 158-206mph)	1.0	2.0	3.0	3.0	0.0	2.0	2.0	22%	7
High Winds < F3 (fujita scale 40-157mph)	3.0	1.0	2.0	2.0	0.0	2.0	2.0	50%	4
Severe Heat / Extended Drought	2.0	1.0	1.0	1.0	0.0	2.0	2.0	26%	6
Earthquake > 5.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	83%	1
Liquefaction	3.0	2.0	3.0	3.0	0.0	2.0	2.0	67%	2
Flood (heavy rain, snow melt, dam inundation)	1.0	1.0	2.0	2.0	0.0	2.0	2.0	17%	9
Wild Fire	1.0	1.0	2.0	3.0	0.0	2.0	2.0	19%	8
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	2.0	2.0	2.0	1.0	0.0	2.0	2.0	33%	5
AVERAGE SCORE	1.73	1.36	1.82	1.91	0.18	1.64	1.64	27%	

RISK =	PROBABILITY *	SEVERITY
0.27	0.58	0.47

NATURAL EVENTS

Vulnerability/Impact Analysis:
Est. Max Headcount During Any Part of the Term (Peak Time): 166 Est. Building(s)/Facility(ies) Value on Campus: $58,298,000.

Herriman Campus

EVENT	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	x Factor	INTERNAL PREPAREDNESS	EXTERNAL RESPONSE	RISK	RANK
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	The unknown, expressed level of trepidation	Plans, Training, Education, Equipment...	Community Readiness	Relative threat*	Highest to Lowest
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low	0 = N/A 1 = High 2 = Moderate 3 = Low	0 - 100%	1= Highest Concern
Winter Storm (blizzard, big hail, ice rain, low temp)	2.0	1.0	2.0	2.0	0.0	2.0	2.0	33%	4
Tornado >F3 (fujita scale 158-206mph)	1.0	3.0	3.0	2.0	0.0	2.0	2.0	22%	5
High Winds < F3 (fujita scale 40-157mph)	3.0	1.0	3.0	1.0	0.0	2.0	2.0	50%	2
Severe Heat / Extended Drought	1.0	1.0	1.0	1.0	0.0	2.0	2.0	13%	9
Earthquake > 5.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	89%	1
Liquefaction	1.0	1.0	3.0	3.0	0.0	2.0	2.0	20%	6
Flood (heavy rain, snow melt, dam inundation), External Pipe Break (large JVWD waterline)	1.0	1.0	2.0	3.0	0.0	2.0	2.0	19%	7
Wild Fire	2.0	2.0	3.0	3.0	0.0	2.0	2.0	44%	3
Landslide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Avalanche	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%	11
Lightning Thunderstorm > T3 (10-20 within 5 minutes)	1.0	2.0	2.0	1.0	0.0	2.0	2.0	17%	8
AVERAGE SCORE	1.36	1.36	2.00	1.73	0.27	1.64	1.64	22%	

RISK =	PROBABILITY *	SEVERITY
0.22	0.45	0.48

NATURAL EVENTS

Vulnerability/Impact Analysis:
Est. Max Headcount During Any Part of the Term (Peak Time): 150 Est. Building(s)/Facility(ies) Value on Campus: N/A

Legal and Regulatory Capabilities

The assessment of the college's legal and regulatory capabilities is presented in the Legal and Regulatory Capability Table below. The assessment of the college's fiscal capabilities is presented in the Fiscal Capability Table below. The assessment of the college's administrative and technical capabilities is presented in the Administrative and Technical Capability Table below.

Hazard Mitigation Planning efforts are led by Emergency Management and supported by Facilities, Public Safety, and other departments.

TABLE: LEGAL AND REGULATORY CAPABILITY			
	Local Authority Exists to Develop and Implement/ Enforce?	The Codes Ordinances & Requirements Currently Exists?	Comments
Codes, Ordinances, & Requirements			
Building Code Development and Enforcement	No	No	
Zonings Ordinance(s)	No	No	
Subdivision Ordinances	No	No	
Stormwater Management Program	No	No	
Floodplain Ordinances	No	No	
Post Disaster Recovery Program and Ordinances	No	No	
Real Estate Disclosure Ordinances	No	No	
Growth Management	No	No	
Site Plan Review Requirements	No	No	
Public Health and Safety Program Requirements	No	No	
Environmental Protection Program Requirements	No	No	
Planning Documents			
General or Comprehensive Plan	No	No	
Capital Improvement Plan	No	No	
Habitat Conservation Plan	No	No	
Economic Development Plan	No	No	

Disaster Planning Documents			
Comprehensive Emergency Management Plan/ Local Emergency Operations Plan	Yes	No	
Post Disaster Recovery Plan	No	No	
Continuity of Operations Plan	Yes	No	
Specialized Hazard Plan(s) (e.g. Heavy Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan, etc.): Insert the name of the Plan(s) in the comments section.	Yes	No	Emergency Operations Plan with the following Annexes: Annex A: Terms and Defin. Annex B: COOP and Recovery Annex C: Emergency Notification and Call Down Lists Annex D: Directories, Maps and Support Information Annex E: Emergency Support Functions Annex F: Support Appendices: • Responder Safety • Human Caused/Violent Incident • Campus/Campus Site Evacuation • Building Lockdown Procedure • College Closure • Pandemic or Infectious Disease Plan • Natural Hazards • Technological Hazards

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	No
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	No
Incur Debt through General Obligation Bonds	No
Incur Debt through Special Tax Bonds	No
Incur Debt through Private Activity Bonds	No
Withhold Public Expenditures in Hazard-Prone Areas	No
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No
Other	No

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management in your jurisdiction?	No
Who is your jurisdiction's floodplain administrator? (department/position)	N/A
Are any certified floodplain managers on staff in your jurisdiction?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	N/A
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	N/A

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	Classification	Date Classified
Community Rating System (CRS)	No		
Public Protection/ISO	No		
NWS StormReady	No	No	

Mitigation Strategies and Actions

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions - New actions identified during this 2019 update process
- Ongoing Mitigation Actions - Ongoing actions with no definitive end or that are still in progress. During the 2019 update, these "ongoing" mitigation actions and projects were modified and/or amended, as needed.
- Completed Mitigation Actions - An archive of all identified and completed projects, including completed actions since 2014

Mitigation Table - New Actions

Note: The identification and inclusion of mitigation actions in this annex do not obligate Salt Lake Community College to implement these actions. Many factors, such as funding and the need for extensive analyses, will ultimately determine whether these projects are implemented.

Action	Year Initiated	Goal/Objective	Hazard(s)	Agency Lead	Benefit	Cost	Funding Source	Priority	Timeframe
Seismic Retrofitting and Upgrades of Vulnerable Buildings and Facilities Campus/Buildings of Priority: South City Campus, particularly the Grand Theatre, the Stairwells, and the older original South High School part of the building. Redwood Campus, Construction Trades Building due to age and need for retrofit. Redwood Campus Heat	2019	Goal 1. Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2. Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	Earthquake	Facilities Services and Public Safety	High	High	PDM, HMGP, Internal Funds	High	Ongoing

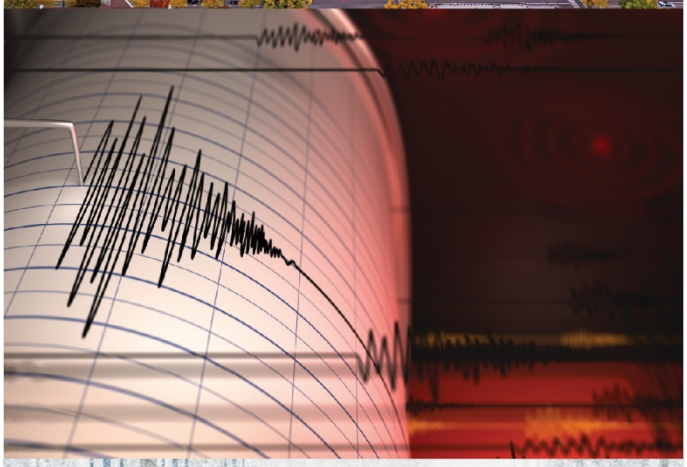
Plant additional retrofitting. Redwood Campus, Technology Building, need engineer to evaluate for need of retrofit and protection of Office of Information Technology Equipment and Office Areas. Redwood Campus, Canal Bank re-enforcement and upgrade of traffic Bridge due to age.									
Hand Sanitizing Stations and N95 Masks	2019	Goal 1. Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Public Health	Emergency Management and Health and Safety	Medium	Low	Internal Funds	Medium	Ongoing

Stop the Bleed Kits	2019	Goal 1. Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster.	Civil Disturbance, Terrorism/Active Threat	Emergency Management	High	Low	Internal Funds/Grants	High	Ongoing
Security Hardening Assessment and Hardening of Campus Assets	2019	Goal 1. Protect the lives, health, and safety of the citizens of Salt Lake County before, during, and after a disaster. Goal 2. Protect and eliminate and/or reduce damages and disruptions to critical facilities, structures, and infrastructure during disasters.	All Hazards	Public Safety	High	Medium	Internal Funds, Grants	High	Ongoing
Enhance interoperable communications between campuses. Make investments in key communications infrastructure and equipment to ensure redundant and effective communications.	2019	Goal 1. Enhance and protect the communication and warning/notification systems in the County. Goal 2. Advocate, support, and promote the continued coordination and integration of disaster planning efforts throughout the county.	All Hazards	Public Safety	High	Medium	Internal Funds, Grants	High	Ongoing

Mitigation Table - Ongoing Actions

Not applicable since Salt Lake Community College was not part of the 2014 plan.









THE UNIVERSITY OF UTAH®

Hazard Mitigation Plan
Annex 2021

An Annex of the
2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan

Annex: **University of Utah**



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Hazard Mitigation Plan Point of Contact

TABLE: POINTS OF CONTACT	
Primary Point of Contact	**Alternate Point of Contact**
Name: Stuart Moffatt, CEM **Title:** Interim Director, Emergency Management **Department:** University Safety **Address:** 1735 E South Campus Dr. Salt Lake City, UT 84112 **Office Phone:** 801-213-1090 **Cell Phone:** 801-707-3188 **Email Address:** stuart.moffatt@utah.edu **Website:** emergency.utah.edu	**Name:** Bob Simonton **Title:** Director, Design & Construction **Department:** Planning, Design & Construction **Address:** 1795 E. South Campus Dr. Rm 201 Salt Lake City, UT 84112 **Office Phone:** 801-585-7154 **Email Address:** bob.simonton@utah.edu

Plan Process

The University of Utah agreed to participate in the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan (MJ-HMP). This MJ-HMP consists of two parts. **Volume 1** contains the general Salt Lake County overview including hazard history, previous mitigation strategies, and the new mitigation strategies for the next five-year period. **Volume 2** contains the Individual Jurisdictional annexes with their respective hazard histories and previous mitigation strategies that have been newly initiated, still exist from prior years, or have been completed. New mitigation strategies have been designed based on the changing requirements of each jurisdiction moving forward for the next five-year period.

This annex is part of Volume 2 of the County MJ-HMP. Stuart Moffatt, Interim Director for Emergency Management, represented the university at stakeholder mitigation planning meetings during the original update of the County MJ-HMP in 2019. A monthly stakeholder Hazard Mitigation meeting was held on the 2nd Monday of each month. Meetings started in May 2019 and went through December 2019.

Additional meetings with university representatives were held in the summer of 2021 to review hazards and their associated risks, determine new mitigation actions, and provide a status to the previous mitigation actions identified in the 2009 University of Utah Mitigation Plan. The major meetings and activities are depicted in the table below. Phone calls, emails, and data requests also took place.

TABLE: STAKEHOLDER MEETINGS AND OUTREACH	
Activity	**Participants**
Hazard and Risks Meeting | June 10, 2021	• Bob Simonton, Director, Design & Construction • Stuart Moffatt, Interim Director of Emergency Management
New Mitigation Actions Meeting | June 30, 2021	• Bob Simonton, Director, Design & Construction

	• Stuart Moffatt, Interim Director of Emergency Management
Plan Review Meeting and Draft Review Request | July 19-20, 2021	• Bob Simonton, Director, Design & Construction • Stuart Moffatt, Interim Director of Emergency Management • Mark Kendall, Project Coordinator • Frederick A. Monette, Executive Director of EHS • Philip Chaffee, Senior Director of Emergency Management at University of Utah Health • David Quinlivan, Director, Utilities and Energy, Facilities Management • Jason Hinojosa, Acting Chief of Police, University of Utah • Michael D. Brehm, Associate Director, Environmental Management & Code Compliance, EHS • Derrek Hanson, Deputy Director, Red Butte Garden and Arboretum • James Stubbs, Associate Director, EHS • Mary Handy, EHS

This annex serves as the foundations for a more complete and standalone University of Utah Hazard Mitigation Plan update, which was halted due to COVID-19. Additional university stakeholders will be invited to participate in the full update of the standalone plan. Specifically, the Situation, Triage and Assessment Team (STAT) will serve a key role in the update and is comprised of an expert team of selected senior administration, directors, and department heads (and delegates) from 14 core organizations with oversight and specialties across the entire spectrum of campus operations.

Public Outreach and Input: In accordance with best practices as outlined in CPG 101 and the Local Hazard Mitigation Guide, this public-private effort engaged the whole community as part of its public outreach strategy, reaching citizens and key stakeholders across all jurisdictions in Salt Lake County via a combination of in-person and virtual methods. Elements of virtual public outreach included the 2019 Salt Lake County Preparedness Survey (http://prepare.community/slc), and social media engagement through mediums like Twitter and Nextdoor.

The 2019 survey included 31 questions and concluded with mitigation and preparedness resources for the public. The survey was shared electronically with the option of a hard copy survey upon request. 556 total residents participated. 428 residents completed the entire 31-question survey. As part of the update to the University of Utah Annex, the planning team reviewed the public input from Salt Lake City residents (which represented 14.1% of total respondents).

University Profile

The following is a summary of key information about the university and its history:

Date Founded: The University of Utah was founded February 28, 1850. The University of Utah is the state's public flagship institution and top-tier research university. The university is classified by the Carnegie Foundation among the 131 research universities with the "highest research activity" in the nation and is a member of the Association of American Universities (AAU).

Current Population: The University of Utah is mostly a commuter campus. The living/learning community within Housing & Residential Education and the student housing at University Student Apartments provide residential spaces opportunities for approximately 6,200 students and family members. The rest of the student population, plus all of the faculty and staff, reside off-campus, commuting by various means of transportation. This may include walking, taking advantage of mass transit (bus or light rail), riding a bicycle, motorcycle, or driving a vehicle. There is only moderate use of carpools. Increasing numbers of individuals are taking advantage of more economical ways to commute, especially as fuel prices and parking costs on campus are on the increase.

Estimates suggest that during a normal work and school day with no special events, up to 50,000 individuals spend time on campus (excluding Research Park but including patient care and visitor traffic to the hospitals located on campus). The vast majority of this group of individuals adjourns from the campus by 6 p.m. every day. In the evenings during the workweek, the total number of individuals at the hospitals remains relatively constant, while the academic community shrinks to less than 20% of its daytime load. The University of Utah supports a fairly intensive nighttime and summer academic schedule. While the research community also decreases in campus population at times, it is quite common for research laboratories to have one or more occupants overnight and on weekends.

The University of Utah is one of the largest employers in the State of Utah. On the average, there are approximately 3,000 faculty and over 20,000 staff (excluding students) at this institution as of 2020.

The University Guest House, a small university-owned hotel located in the Housing & Residential Education area, is open every day of the year. During the summer months, the student life area and residences are heavily and frequently populated by individuals (often of high school age or younger) participating in specialized "summer camps" conducted at, though not necessarily by, the University of Utah. The university encourages such activities, in part, as an effort to reach out to potential future students.

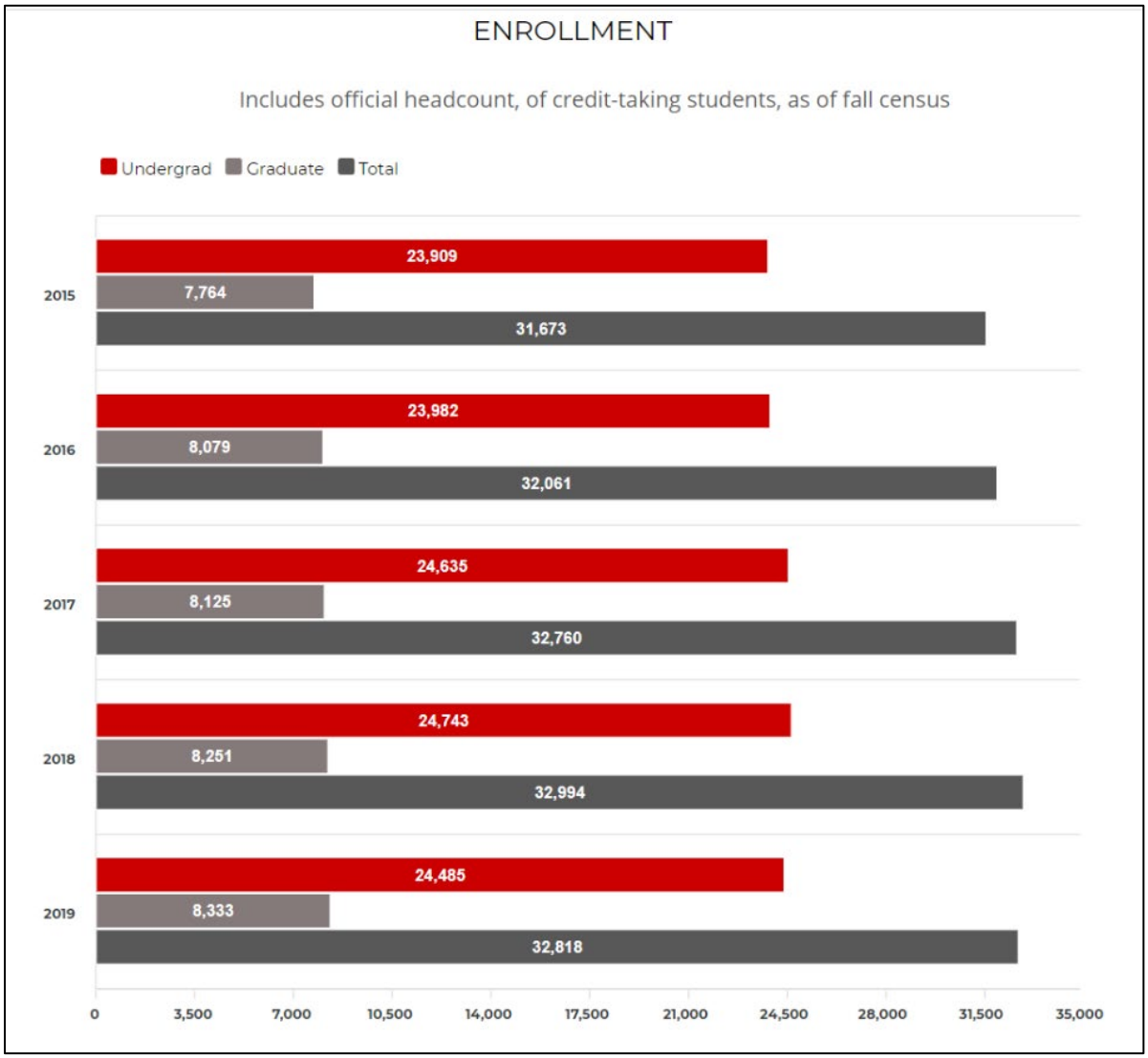
Demographics specific to students rolls out as follows:

TABLE: UNIVERSITY DEMOGRAPHICS FALL 2020				
	Headcount	**% Female**	**% Full-time**	**% Resident**
Undergraduate	24,643	48	76	82
Graduate	8,404	49	79	68
Total	33,047	48	77	78

In a typical year, there is representation from each of the counties in Utah, every state in the United States, and at least 100 different countries.

Enrollment Growth Trends: Over the past five years, enrollment trends have remained consistent, with modest growth.

TABLE: ENROLLMENT TRENDS



Location and Description: The main campus of the University of Utah is located on the fringe of the western foothills of the Wasatch Mountains. Using world geographical coordinates, the approximate center of the campus is located at latitude: 40.7649 and longitude: - 111.8460. The western edge of the campus is positioned approximately 4,600 feet above sea level. This area, the oldest portion of the university on the east side of University Street, is populated with university programs and facilities. A mix of privately-owned residences (single and multiple dwelling) and other activities exist on the west side of the same street. Approximately 1.2 miles east of this line is the eastern edge of the campus, rising to an average of 5,050 feet above sea level. The resulting 400-foot east-to-west drop provides a setting for rapid run-off of rain and melting snow

and surprising variations in the depths of accumulating snow across the campus. As might be expected, the composition of soils also varies greatly as one travels from east to west, ranging from silty sand to solid bedrock. The shoreline of historical Lake Bonneville at approximately 5,160 feet had a significant impact on the composition of soils and rocks found in this area.

The northeastern tip of campus hosts the highly urbanized Health Sciences neighborhood of the university. The southeast corner of the main campus is less developed and is mostly sporting parking lots and a central boiler/chiller plant. One of the main facilities along South Campus Drive is the Huntsman Center, a 40-year-old special events/basketball arena with an occupancy of approximately 15,000 individuals. It defines the southern edge of the main campus and is known as Hempstead Road as it heads toward Heritage Commons. The relatively small piece of real estate east of Wasatch and south of Hempstead Road comprises a military installation, fully controlled by the Department of Defense. Despite their proximity, there is very little interaction between the Stephen A. Douglas Military Reserve (a.k.a. Fort Douglas) and the University of Utah. A recently installed security fence around the Reserve emphasizes the nature of this relationship. It is important to recall that most of the land currently associated with the University of Utah was, at some point in history, part of this military installation. Existing legislation will cause the rest of this military real estate to transfer to the university once the Pentagon decides to "surplus" this property. At this time, there is no publicly-known timeline for such an event.

The only aboveground body of water on or near the campus is Red Butte Creek, which separates the Fort Douglas area from Research Park. This stream handles the run-off (rainfall as well as snowmelt) from the watershed associated with Red Butte Canyon, which opens further to the east by only a half mile. Red Butte Reservoir, which is managed by Salt Lake County, controls the otherwise natural flow of water from this watershed. Records indicate that this creek, at one time, had at least one other fork. Located further north, this minor stream was allegedly filled with trash and other fill in the 19th century by soldiers housed at Fort Douglas. There have been suggestions that the recently demolished dorms located along the historical path of this stream occasionally suffered from unusual amounts of groundwater—perhaps still following its underground path.

The Reserve is located between the university-controlled "Heritage Commons at Historical Fort Douglas" and the University Research Park, which is an independent corporation affiliated with the University of Utah. Title to the land was granted to the university in October 1968, with actual access to the land being available after July 1, 1970. Private developers and/or corporations own and control the majority of the buildings on land leased from the University Research Park Foundation. Most of the currently existing buildings will transfer to university ownership at a contractually agreed upon, pre-determined time during the next half century. Some already have. The Research Park area falls under the jurisdiction of Salt Lake City, along with its applicable building codes (not always consistent with codes followed by the university and the state on their facilities), planning and zoning restrictions, and law enforcement.

South of Research Park is "This is the Place" State Park with its many appurtenant structures. Across the street from this park is the Hogle Zoo. Both these sites are very popular with residents, students, and visitors. Both operate under the governance of boards that are independent of each other, the university and Salt Lake City. Both entities do routinely benefit from tax revenues collected by Salt Lake County.

To the south of Research Park and west of the "This is the Place" State Park, one finds University Student Apartments (a.k.a. USA). Previously known as "Married Student Housing," this community of apartments owned by the university provides a home to approximately 1000 university students and their families, one third of which date back to the 1950s era. The majority

was constructed during the 1960s when seismic design was still in its infancy. This area is currently undergoing redevelopment.

Municipal Salt Lake City surrounds the campus (including Research Park and USA) on three sides with mostly residential communities, along with a few commercial properties that thrive directly west of the campus. These businesses provide services and fast food to students, faculty, and staff from the university. The Church of Jesus Christ of Latter-Day Saints owns a wedge of property along the southern edge of the main campus, where it provides opportunities for religiously-focused education to university students along with other related activities. A Veterans Administration Medical Center is also located south of the main campus.

Climate: The climate of the Salt Lake City area is typically characterized as semi-arid. Under the Köppen climate classification, Salt Lake City, of which the University of Utah is located, has a dry-summer continental climate (DSA), a relatively rare form of the continental climate where a region experiences dry summers and wet winters. The area experiences four distinct seasons. Both summer and winter are long, with hot, dry summers and cold, snowy winters. Spring is the wettest season, while summer is very dry.

The nearby Great Salt Lake is a significant contributor to precipitation in the area. The lake effect can help enhance rain from summer thunderstorms and produces lake-effect snow approximately 6 to 8 times per year, some of which can drop excessive snowfalls. It is estimated that about 10% of the annual precipitation in the Salt Lake City area can be attributed to the lake effect.

Salt Lake City features large variations in temperatures between seasons. During summer, there is an average of 56 days per year with temperatures of at least 90°F (32.2°C), 23 days of at least 95°F (35°C), and five days of 100°F (37.8°C). However, the average daytime July humidity is only 22%. Winters are quite cold but rarely frigid. While there is an average of 127 days that drop to or below freezing and 26 days with high temperatures that fail to rise above freezing, the city only averages 2.3 days at or below 0°F (−17.8°C). The record high temperature is 107°F (42°C), which occurred first on July 26, 1960, again on July 13, 2002, and more recently on June 15, 2021. The record low is −30°F (−34°C), which occurred on February 9, 1933.

During mid-winter, strong areas of high pressure often situate themselves over the Great Basin, leading to strong temperature inversions. This causes air stagnation and thick smog in the valley from several days to weeks at a time and can result in the worst air pollution levels in the U.S., reducing air quality to unhealthy levels.

Brief History: The University of Utah was founded February 28, 1850 in downtown Salt Lake City. After having been closed down for a period due to lack of funding, it reopened at its current location late in the 19th century.

The area known today as Presidents' Circle was the original center of the campus. Buildings still located in this area were constructed early in the 20th century. Many other buildings dating back to those early years had already been eliminated or replaced before World War II (WWII). As might be expected, these buildings are almost entirely un-reinforced masonry. Approximately a dozen of those original buildings are still in use on the main campus, including several WWII wood-frame vintage barrack-type buildings whose ownership was transferred to the university at various times after WWII.

The GI Bill (also known as the Servicemen's Readjustment Act of 1944, PL345) had a radical impact on the nature and availability of higher education. In anticipation of the end of WWII, the

federal government offered the opportunity for a continued education to the veterans who would soon be coming home. With them came the realistic probability that unemployment rates could be dangerously high. At the University of Utah, this strategy resulted in a land transfer from the military, as it began to downsize Fort Douglas, which until this time, had possession of most of the real estate east of the original campus. The eastern boundary of the campus, previously located at approximately 1500 East, moved uphill through fields previously used for cavalry drills and artillery practice into the foothills to the east of the campus. Ownership of the Fort Douglas affiliated golf course (once touted as a top PGA course) was also transferred to the university at this time. As an intended result of the GI Bill, the first major building boom occurred shortly after the acquisition of this additional land. This was the first significant expansion of space in nearly 50 years. Buildings such as the Student Union, Orson Spencer Hall, and Ballif Hall were among the first buildings to be constructed during this period. State funding for new buildings flowed relatively freely during this period.

One of the first significant buildings to be constructed on the extreme eastern edge of campus was the University Hospital (Bldg. 521), which would adopt all activities and programs associated with the old county hospital, then located on the north-east corner of State Street and 21st South, in Salt Lake City. By the early 1980s, Bldg. 521 became the dedicated home of the School of Medicine as patient care facilities mostly moved into the then-new University Hospital (Bldg. 525).

As the number of students grew, so did the physical campus, mostly along the corridor that might today be considered the north-south axis of the main campus. This growth continued at an astounding rate through the 1960s into the 70s, when it temporarily slowed down. Another building cycle took off in the 1980s, and still continues today, seemingly growing more rapidly than ever. One notable change in planning and construction is that more of the funding for new construction comes from non-state sources than had historically been the case. Another change is that the state has become more willing to fund needed building renovations and upgrades.

In 1991, the university gained ownership of an additional plot of land, approximately 55 acres, as more Fort Douglas real estate was re-appropriated. Along with that land came the ownership and stewardship over several dozen historical buildings that are mostly residential in nature. Since many of these units were constructed in the 19th century, they came with accountability for their continued existence that is closely monitored by the Secretary of the Interior and the Utah State Historical Preservation Office. An additional 12 acres was transferred in 2000 in time for the university to proceed with construction of the final phases of its new living/learning center, a student residential community designed to double as the Athletes Village during the 2002 Olympic Winter Games.

The University of Utah (first known as the University of Deseret) began its existence as a “normal” school with a heavy focus on developing teachers. As time progressed, medical education as well as law, engineering, behavioral sciences, and numerous other academic curricula sprouted up across the academic horizon of the university. Today, there are 18 colleges accepting students at the university.

For the last 50 years, there has been an increasing emphasis on intense research—in many different arenas. Today, the University of Utah is a Research I institution, placing it among the top 50 research institutions in the country. It is renowned for its research activities in human genetics and cancer, as well as computer and information technology, engineering, biology, physics, and other related fields. All indications are that, even as the university strives to attract and retain a broader base of new students, the amount of research occurring on this campus will continue to increase, bringing with it the need for sustenance and construction of appropriate spaces.

Governing Body Format: Prior to 1969, the University of Utah was overseen by the Utah Board of Regents. An Institutional Council governed the university from 1969 to 1991, when the first Board of Trustees was established.

Today, The University of Utah is governed by a 10-member Board of Trustees, eight of whom are appointed by the governor of the state of Utah with consent of the Utah Senate. The president of the University of Utah Alumni Association and the president of the Associated Students of the University of Utah serve as ex officio board members. The eight appointed board members serve four-year terms, with four terms expiring on June 30 of odd-numbered years. The two ex officio board members serve for the terms of their respective offices. The board elects one of its members to serve as chair and another member to serve as vice chair; the term of these offices is two years, pending the selection and qualification of successors.

The board's responsibilities include consulting with the Utah Board of Higher Education on the appointment of the president of the university; overseeing the university president's enumerated and delegated powers; and other duties, responsibilities, and functions as delegated and authorized by the Utah Board of Higher Education or through rules and regulations of the university. Its duties include acting on behalf of the university in facilitating communication between the university and the community; assisting in the planning, implementation and execution of fund raising and development projects aimed at supplementing university appropriations; and perpetuating and strengthening alumni and community identification with the university's traditions and goals. The board also approves all candidates for earned degrees and diplomas granted by the university.

The board operates several committees, including an executive committee, audit committee, and honors committee that, in consultation with the university's president, makes recommendations for honorary degrees, portraits, and other honors bestowed by the university. The board may form other ad hoc committees as needed to carry out its business.

Development Trends: Campus land use and development trends fall under the responsibility of the Campus Master Plan. As mitigation planning will be considered an integral component of the overall development trends and land use of campus grounds, we refer to the current plan at https://pdc.utah.edu/planning/master-plans/. Major improvements are currently occurring at University Village housing and Research Park. A number of buildings, such as the former law building, Social & Behavioral Sciences Tower, and George Thomas Building, have been seismically updated and renovated, and others are undergoing similar improvements.

Of special note, the southeast corner of the main campus is less developed and is mostly sporting parking lots and a central boiler/chiller plant. The university's intent is to prohibit any further development or improvement above this eastern boundary, even though it owns a substantial amount of this property. The university has shown its commitment to this intent through the formation of the Heritage Preserve, prohibiting any further development. Property owners and managers (Forest Service, Central Utah Water Conservation District, Bureau of Land Management, and Salt Lake City) were involved in the development of this strategy, as were entities that hold easements and right-of-way privileges through or above the Preserve (Chevron Oil, Questar, Rocky Mountain Power, Salt Lake City Public Utilities).

Unique Considerations: The university is a large research institution with a renowned medical campus and countless research activities, beyond its base mission of providing highly ranked undergraduate and graduate level educational opportunities to over 30,000 individuals.

Its urban setting provides an environment that invites a large and mobile population to the campus.

Its mission and location combine to create an environment that carries with it the potential risk of catastrophic disaster from natural, as well as certain human-caused, biological, and technological events.

Capability Assessment

The university has a designated Emergency Manager. Hazard Mitigation Planning efforts are led by the Emergency Manager and Planning, Design, and Construction.

The assessment of the university's legal and regulatory capabilities is presented in the *Legal and Regulatory Capability* table below. The assessment of the university's fiscal capabilities is presented in the *Fiscal Capability* table below. The assessment of the university's administrative and technical capabilities is presented in the *Administrative and Technical Capability* table below. Information on the community's National Flood Insurance Program (NFIP) compliance is presented in the *National Flood Insurance Program Compliance* table below. Classifications under various community mitigation programs are presented in the *Community Classifications* table below.

TABLE: LEGAL AND REGULATORY CAPABILITY					
	University Authority Exists to Develop and Implement/ Enforce?	**A University-Specific Code, Ordinance, and/or Requirement Currently Exists?**	**Rely on the County's Codes, Ordinances, & Requirements**	**State Mandated**	**Comments**
Codes, Ordinances, & Requirements					
Building Code Development and Enforcement	Yes	Yes	-	Yes	
Zonings Ordinance(s)	N/A	N/A	-	N/A	
Subdivision Ordinance(s)	N/A	N/A	-	N/A	
Stormwater Management Program	Yes	Yes	-	Yes	Stormwater master plan is in the works. The University EHS has, for many years, managed its own MS4 permit for the

					main campus.
Floodplain Ordinance(s)	N/A	N/A	-	N/A	
Post Disaster Recovery Program and Ordinance(s)		N/A	-	N/A	
Real Estate Disclosure Ordinance(s)	N/A	N/A	-	N/A	
Growth Management	N/A	N/A	-	N/A	
Site Plan Review Requirements	Yes	Yes	-	N/A	Per the State of Utah
Planning Documents					
General or Comprehensive Plan	N/A	N/A	-	N/A	Campus Master Plan
Capital Improvement Plan	Yes	Yes	-	N/A	
Economic Development Plan	N/A	N/A	-	N/A	
Disaster Planning Documents					
Comprehensive Emergency Management Plan/Local Emergency Operations Plan	Yes	Yes	-	N/A	
Post-Disaster Recovery Plan	Yes	Yes	-	N/A	IT has a disaster recovery plan
Continuity of Operations Plan	Yes	N/A	-	N/A	COOP begun but will be further developed in 2021-2022
Specialized Hazard Plan(s) (e.g., Heavy Snow/Winter Storm Plan, Fire Management Plan, Extreme Temperature Plan): Insert the name of Plan(s) in the comments section	Yes	N/A	-	N/A	EOP has hazard-specific annexes

TABLE: FISCAL CAPABILITY	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	N/A
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	N/A
User Fees for Water, Sewer, Gas, or Electric Service	N/A
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
Incur Debt through Private Activity Bonds	N/A
Withhold Public Expenditures in Hazard-Prone Areas	N/A
State/Federal Sponsored Grant Programs	Yes

Development Impact Fees for Homebuyers or Developers	N/A
Other	

TABLE: ADMINISTRATIVE AND TECHNICAL CAPABILITY			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	
Planners or engineers with an understanding of natural hazards	Yes	Full Time	
Personnel skilled or trained in GIS applications	Yes	Full Time	
Emergency manager	Yes	Full Time	
Grant writers	Yes	Full Time	

TABLE: NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE	
What department is responsible for floodplain management at the University?	The university consults and partner with SLCO who performs O&M on valley tributaries
Who is the University's floodplain administrator? (department/position)	N/A
Are any certified floodplain managers on staff?	N/A
Does the University have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within the University? (If no, please state why)	Need to be reassessed.
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	N/A

TABLE: COMMUNITY CLASSIFICATIONS			
	Participating?	**Classification**	**Date Classified**
Community Rating System (CRS)	N/A	N/A	N/A
Public Protection/ISO	N/A	N/A	N/A
NWS StormReady	N/A	N/A	N/A

University-Specific Natural Hazard Event History

The *Natural Hazard Events* table lists all past occurrences of natural hazards within the university. Repetitive flood loss records are as follows:

- Number of FEMA-Identified Repetitive Loss Properties: 0
- Number of FEMA-Identified Severe Repetitive Loss Properties: 0
- Number of Repetitive Flood Loss/Severe Repetitive Loss Properties That Have Been Mitigated: 0

The University of Utah does not participate in the National Flood Insurance Program.

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA data with additions from the university representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
Wildfire	On September 14, 2020, there was a wildfire burning near the University of Utah in Salt Lake City that threatened structures and forced evacuations close to campus. The fire was named “Connecticut Fire."		9/14/2020	
Storm Event	On September 9, 2020, Utah declares state of emergency in the Salt Lake City area. The storm leveled thousands of trees, cut the power to more than 170,000 homes and businesses, and winds gusted with hurricane force winds. University experienced significant tree and building damage.	DR-4578	9/9/2020	
Civil Unrest	Civil Unrest—On July 9, 2020, Gov. Gary Herbert of Utah declared a state of emergency in response to protests in Salt Lake City that erupted after legal authorities announced a fatal police shooting of a 22-year-old man back in May as justified.		7/9/2020	

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA data with additions from the university representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
	Large spontaneous gatherings occurred on the campus.			
Earthquake	On March 18, 2020, a 5.7 magnitude earthquake struck Salt Lake County in the town of Magna which is located 15 miles from the University of Utah. The quake caused up to 55,000 people to experience a blackout. CIKR/Damage Assessments occurred on the university. Browning building was closed for a few days.	DR-4548	3/18/2020	
Flooding	On September 30, 2019, a boiler room flooded in a residential housing building at the University of Utah. Students were temporarily moved out the campus building.	-	9/30/2019	
Winter storm	Campus closed due to winter storm.		2/2020	
Thunderstorm Wind	The Salt Lake City International Airport ASOS recorded a peak gust of 68 mph.	-	6/13/2019	
Thunderstorm Wind		-	5/6/2019	
Heavy Snow	2 inches of snow	-	4/6/2019	
Heavy Snow	12 inches of snow	-	3/28/2019	
Heavy Snow	8 inches of snow	-	3/13/2019	
Heavy Snow	14 inches of snow	-	2/3/2019	
Winter Storm	5.9 inches of snow	-	12/1/2018	
Hail	1 inch in diameter	-		
Fatal Shooting	University of Utah student-athlete Lauren McCluskey was fatally shot outside her dorm.		10/22/2018	
Thunderstorm Wind	A maximum wind gust of 58 mph was recorded at the Salt	-	6/18/2018	

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA data with additions from the university representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
	Lake City International Airport Centerfield wind sensor.			
Power Outage and Flooding	The University of Utah closed the Business Classroom Building (BUC) following flooding (pipe burst in the basement) and a power outage. Classes had to be rescheduled and relocated.		1/9/2018	
Fatal Shooting	ChenWei Guo, an international student from China, was fatally shot. The University of Utah campus was put on lockdown as officers responded to the incident.		10/30/2017	
Flood		-	9/15/2017	$15,000 property damage
Lightning	2 injured		7/26/2017	
Flash Flood		-	7/26/2017	$8,750,000 property damage
High Wind		-	6/12/2017	$40,000 property damage
High Wind		-	4/13/2017	$50,000 property damage
Heavy Rain		-	3/23/2017	$20,000 property damage
Winter Storm	8 inches of snow	-	1/20/2017	
Winter Storm	8.6 inches of snow	-	12/23/2016	
Thunderstorm Wind	67 mph wind gust was recorded by the SLC Airport Wind 3 sensor at Salt Lake City International Airport.	-	12/16/2016	
Thunderstorm Wind	64 mph winds	-	5/6/2016	
High Wind	In Salt Lake City, scaffolding collapsed on an assisted living center being built; no one was injured, but debris from the incident covered the road and forced the closure of the northbound lanes of Foothill Drive and Parleys Way during the morning commute. At Salt Lake City International Airport, winds	-	2/17/2016	$200,000 property damage

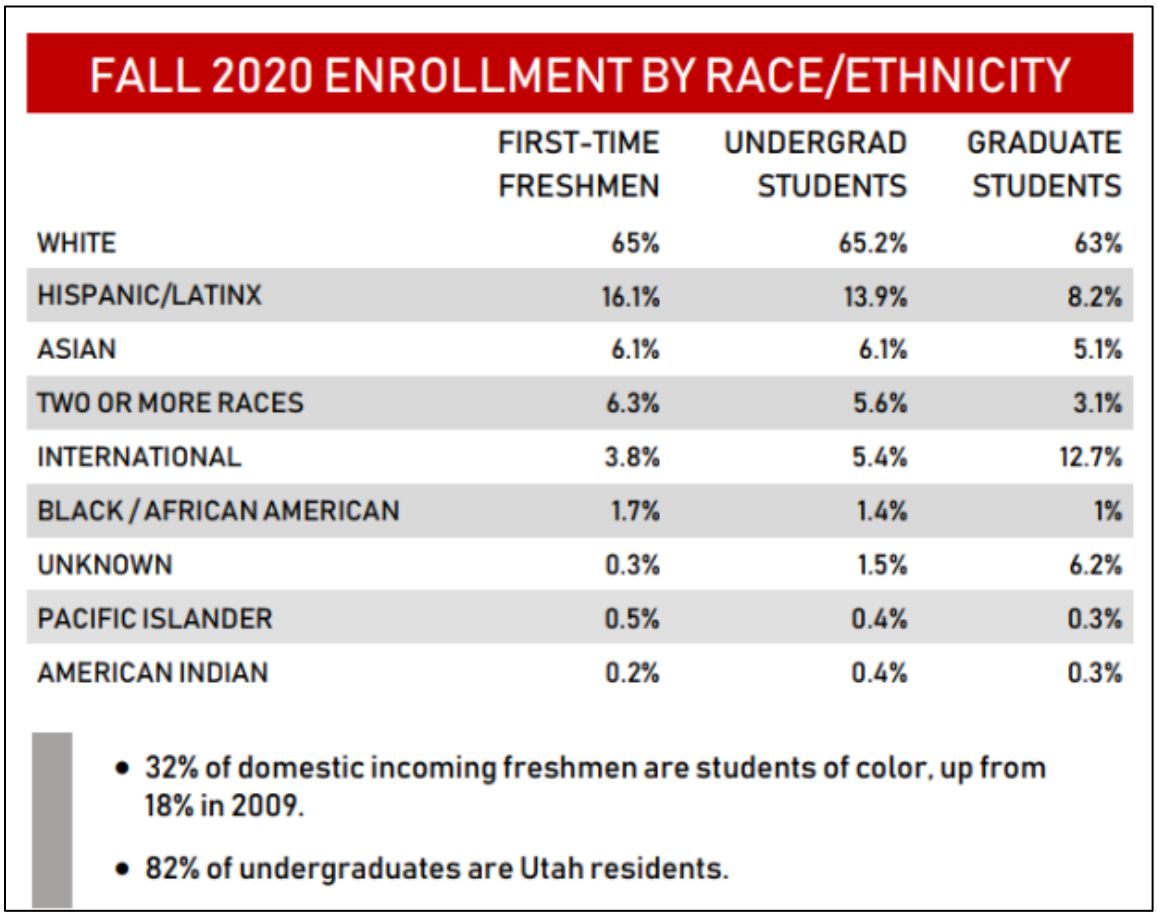
TABLE: RECENT NATURAL HAZARD EVENTS (NOAA data with additions from the university representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
	caused some flight delays, and seven flights were diverted to other cities. Power outages were common across the area due to downed trees and power lines.			
Flash Flood	Heavy rain brought road, parking lot, and basement flooding to the Sugarhouse and Foothill areas of Salt Lake City.	-	10/2/2015	$100,000 property damage
High Wind	63 mph winds	-	8/7/2015	
High Wind	Microburst	-	6/3/2015	
Thunderstorm Wind		-	5/6/2016	
High Wind	A semi-trailer was overturned on Interstate 215 in Salt Lake City, and several large trees were uprooted across the Salt Lake Valley. Winds also caused damage to many fences and yards across the area, including displacing sheds and knocking over at least one cinder block wall. Power outages occurred.	-	4/15/2015	$150,000 property damage
Wildfire		-	4/15/2015	$50,000 property damage
High Wind	Winds caused power outages across the area, with over 4,000 customers in Salt Lake City temporarily losing power.	-	12/30/2014	$30,000 property damage
Winter Storm	6 inches of snow	-	12/28/2014	
Winter Storm	5-7 inches of snow	-	12/25/2014	
High Wind		-	11/1/2014	$75,000 property damage
Thunderstorm Wind	62 mph winds	-	9/26/2014	
High Wind		-	8/12/2014	$50,000 property damage
High Wind		-	6/12/2014	$1,000 property damage
High Wind		-	4/22/2014	$500,000 property damage

TABLE: RECENT NATURAL HAZARD EVENTS (NOAA data with additions from the university representatives)				
Type of Event	**Description**	**FEMA Disaster Number (if applicable)**	**Date**	**Preliminary Damage Assessment/Narrative**
Winter Storm		-	12/19/2013	$40,000 property damage
Winter Storm		-	1/10/2013	
Winter Storm	9 inches of snow in Salt Lake City	-	3/1/2012	
High Wind	59 mph winds	-	2/25/2012	
High Wind		-	12/1/2011	$250,000 in property damage
High-temperature water line accident	Twelve men were sent to the hospital after being scalded while working on a pipeline. The pipe involved had been closed since July 2009 and crews were working to insulate an open-ended portion of the pipe when the tunnel they were working in filled with searing steam.		11/1/2010	
High Wind	Damage from this thunderstorm included large trees knocked down in the Avenues neighborhood of Salt Lake City	-	8/22/2010	$200,000 in property damages
Oil Spill	The Red Butte Creek oil spill was caused by a rupture in a medium crude oil pipeline. A half inch diameter hole in the pipeline was caused by an electrical surge.		6/11/2010	

Community Data to Utilize to Enhance Whole Community Resilience

In order to prepare mitigation efforts that consider the whole community, university-specific nuances must be understood, and key factors are highlighted on the subsequent chart.

IMAGE: ENROLLMENT BY RACE/ETHNICITY



FALL 2020 ENROLLMENT BY RACE/ETHNICITY

	FIRST-TIME FRESHMEN	UNDERGRAD STUDENTS	GRADUATE STUDENTS
WHITE	65%	65.2%	63%
HISPANIC/LATINX	16.1%	13.9%	8.2%
ASIAN	6.1%	6.1%	5.1%
TWO OR MORE RACES	6.3%	5.6%	3.1%
INTERNATIONAL	3.8%	5.4%	12.7%
BLACK / AFRICAN AMERICAN	1.7%	1.4%	1%
UNKNOWN	0.3%	1.5%	6.2%
PACIFIC ISLANDER	0.5%	0.4%	0.3%
AMERICAN INDIAN	0.2%	0.4%	0.3%

- 32% of domestic incoming freshmen are students of color, up from 18% in 2009.
- 82% of undergraduates are Utah residents.

University-Specific Hazard Analysis

Hazards that represent a county-wide risk are addressed in the Risk Assessment section of the 2019 Salt Lake County Multi-Jurisdictional Hazard Mitigation Plan Update. This section only addresses the hazards and their associated impacts that are **relevant** and **unique** to the University of Utah.

A disaster can occur at any time within the University of Utah. Rather than attempt to prepare for every potential disaster, the intent of the university is to identify the most likely situations and concentrate efforts and resources on the education, preparation, and mitigation for emergencies and disasters with a higher likelihood of occurrence. Numerous natural hazards exist on campus and surrounding communities. Active fault zones pose the threat of earthquakes. The hazards identified for the University of Utah in this section are as follows:

- Earthquakes
- Flooding and inundation
- Dam failure
- Pandemics
- Severe weather conditions
- Landslides
- Terrorism and acts of violence

- Wildfires
- Hazardous materials and laboratory accidents

Earthquake

TABLE: SUMMARY OF RISK FACTORS	
Period of occurrence:	~ 1000–1200-year recurrence interval
Probability of event(s):	Low
Warning time:	None
Major contributor(s):	Geologic stress
Risk of injury?	High
Potential for facilities shutdown?	High
Percent of affected properties that may be destroyed or suffer major damage:	Damage state probabilities from HAZUS aggregate losses report (1000-year event): • Structural—10% none, 20% damage, 30% moderate, 20% damage, 20% complete. • Non-structural drift—12% none, 19% slight, 35% moderate, 12% extensive, 20% complete. • Non-structural acceleration—25% none, 30% slight, 20% moderate, 10% extensive, 15% complete.

Notable Buildings From a Casualties Perspective

There were over 250 buildings studied in the HAZUS Advanced Engineering Building Module (AEBM) analysis in the previous plan. It is important to understand that the HAZUS Earthquake Model in AEBM is the best guesstimate available without performing expensive site-specific engineering studies on each building. As such, any potential losses (either casualty or economic) should be used as planning guidelines only and not for a strict benefit-cost analysis or authoritative prioritization. The buildings listed below are only a subset and a representation of all buildings in the study. A more thorough and complete HAZUS analysis will be completed later in 2022.

As life safety is our primary goal, we itemize below a number of buildings with significant casualties. In doing so, we caution over-emphasis on the number of potential casualties as this is directly correlated to the number of occupants. While we maximized occupants in order to portray a “worst case” scenario, our large assembly spaces (Huntsman, Kingsbury, Pioneer Theatre) are not as frequently used as our smaller spaces, thus the order of the buildings below must be seen from that perspective.

TABLE: BUILDING SEISMIC SUMMARY				
HAZUS Complete Damage State	**# of Bldgs**	**Total Gross Square Feet (GSF)**	**Current Replacement Value (CRV)**	**% GSF**
77.52%–100%	84	3,260,679	$704,999,060	19%

52.39%–77.51%	51	2,359,033	$463,321,749	14%
20.01%–52.38%	14	1,210,638	$273,637,346	7%
5.44%–20%	10	846,639	$111,779,050	5%
3.81%–5.43	9	1,025,696	$285,852,972	6%
0.2%–3.8%	67	7,541,249	$1,897,736,555	44%
Missing information from ROVER study	28	1,046,805	$155,482,149	6%
Total	263	17,290,739	$3,892,808,881	100%

TABLE: BUILDINGS OF CONCERN (CASUALTIES DUE TO EARTHQUAKE)

ID	Name	Occupant Estimate	Potential Casualties (all levels)	Comments
90	Jon M. Huntsman Center	15,000	995 (81 potential deaths)	
4	Kingsbury Hall	1,913	241 (16 potential deaths)	
521	School of Medicine	3,282	174 (14 potential deaths)	Scheduled to be demolished in two years
93	HPER South Natatorium	1,000	96 (9 potential deaths)	
53	A. Ray Olpin Union	737	73 (7 potential deaths)	
91	HPER East	1,500	97 (6 potential deaths)	
85	Henry Eyring Building	773	57 (5 potential deaths)	
66	Pioneer Memorial Theatre	932	64 (4 potential deaths)	

Notable Buildings From an Economic Loss Perspective

Economic loss within a building is another perspective from which to view potential impacts. When analyzed in AEBM, the following buildings had the greatest potential for economic loss in part because of buildings' function in science, medicine, or engineering. However, other buildings had high economic loss because the construction materials in the building contributed to overall frailty.

TABLE: BUILDINGS OF CONCERN (ECONOMIC LOSS IN $1000s DUE TO EARTHQUAKE)

ID	Name	Building Value	Potential Economic Loss	Comments
64	Merrill Engineering	$106,156	$82,947	
521	School of Medicine	$98,957	$51,850	Scheduled to be demolished in two years
525	University Hospital	$174,610	$36,522	
85	Henry Eyring Building	$61,902	$35,942	
53	A. Ray Olpin Union Building	$46,488	$31,183	
90	Jon M. Huntsman Center	$51,372	$27,547	
84	Biology Building	$32,976	$20,445	

Notable Buildings From a Complete Damage State Perspective

The HAZUS Earthquake methodology uses five damage states (none, slight, moderate, extensive, complete) to describe potential impacts to a building. These damage states are applied to two general categories (structural and non-structural building elements). The buildings below ranked high on the complete damage state potential due to a combination of their construction materials, an inference of building codes and standards based on the year of construction, and their overall seismic design level.

TABLE: BUILDINGS OF CONCERN (COMPLETE DAMAGE STATE POTENTIAL)		
ID	**Name**	**Complete Damage State**
6	William Stewart Building *(scheduled for renovation)*	59.75%
53	A. Ray Olpin Union Building	58.50%
38	Art Building	58.50%
37	Architecture Building	58.50%
93	HPER South—Natatorium	56.67%
66	Pioneer Memorial Theater	56.49%
4	Kingsbury Hall	59.75%

Notable Buildings From a Mission Critical Perspective

A third perspective from which to understand high-level impacts is that of mission critical buildings. The following table ranks mission critical buildings that also score high on fatalities and economic loss.

TABLE: EARTHQUAKE LOSS (1000s) IN SELECTED MISSION CRITICAL BUILDINGS					
ID	**Name**	**Mission Crit. ***	**Deaths**	**Economic Loss**	**Comments**
521	School of Medicine **	3	14	$62,137	Scheduled to be demolished in two years
525	University Hospital **	3	4	$36,559	
1	John R. Park Building	3	2	$14,728	
86	Marriot Library **	3	1	$124,144	
853	Health Profession Education Building	2	1	$5,906	
4	J.T. Kingsbury Hall	1	16	$7,976	
38	Art Building	1	3	$8,607	
26	Social Work Building	1	3	$6,336	
8	Alfred C. Emery Building	1	3	$4,280	

** Mission critical legend: 3 = uninterruptible, 2 = urgent restoration, 1 = restoration as possible*
*** These buildings are presently under review with Facilities Management. In the case of the Marriott Library, a structural retrofit has been completed to significantly higher seismic codes.*

TABLE: BUILDINGS OF CONCERN THAT HAVE BEEN MITIGATED				
ID	**Name**	**Occupant Estimate**	**Potential Casualties (all levels)**	**Comments**
54	Orson Spencer Hall	1,391	88 (6 potential deaths) **No longer presents a risk.*	Gardner Commons replaced the Orson Spencer Hall and no longer presents a major seismic risk.
5	George Thomas Building	500	50 (5 potential deaths) **No longer presents a risk.*	Now the Crocker Science Building and is now more resilient.
25	Social & Behavioral Sciences Tower	24,323	16,437 (14 Potential Deaths) **No longer presents a risk.*	Seismic retrofit is completed. Pre-cast panels still need to be completed.

Summary of Earthquake Building Analysis

A number of high-level observations may be made—academic and hospital facilities with poor structures are already being considered for mitigation via the Campus Master Plan. The remaining buildings of concern address high occupancy spaces in athletics, arts, science, and engineering. Work has already been completed (Marriott Library, Crocker Science Building, Gardner Commons). Other facilities are in the planning phase or are currently undergoing retrofit or replacement, such as the University Student Apartments.

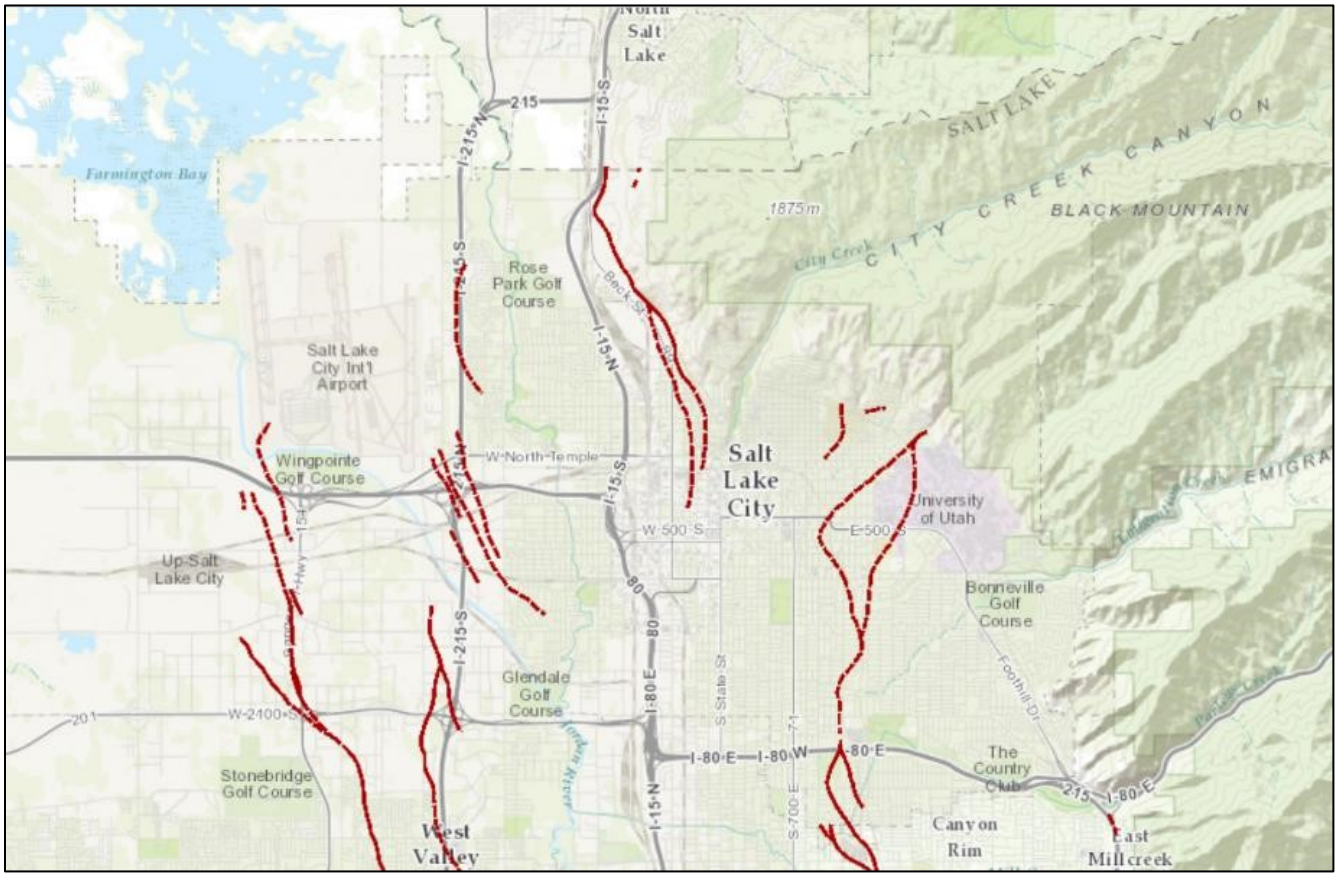
Hazard Profile Data

When a sudden release of energy stored in deep bedrock occurs, the trembling and ground shaking that occur is called an earthquake. These energy releases are found along fault lines—cracks deep in the bedrock that give way if tension or compression forces acting on them are too great. Some earthquakes are undetectable by the human senses, while others can shake the ground violently for 10 to 30 seconds with repetitive aftershocks that may continue for hours and even days. Most injuries and deaths from earthquakes are a result of buildings or their components breaking apart under the stress of ground motion.

Background and Local Conditions

The Wasatch Fault is a complex of fault segments known as one of the most active in the world and is part of the Intermountain Seismic Belt (ISB). The fault is considered a normal fault because the slip is mostly vertical (the valley slips down, and the mountain moves up). The University of Utah straddles the Salt Lake segment of the Wasatch fault. Quaternary maps from the United States Geological Survey (USGS) show that a portion of the Salt Lake segment bisects campus roughly from the southwest to the northeast.

IMAGE: FAULT SEGMENTS



Historical Frequency and Probability of Occurrence

Determining the frequency, or recurrence interval, of potential earthquakes is a difficult science. Studies show that at least 19 significant earthquakes have occurred on the Wasatch fault during the past 6,000 years. Best estimates put the recurrence interval for the Salt Lake segment around 1,200 years with the last one occurring about 1,200 years ago (*The Wasatch Fault, Public Information Series #40, Utah Geological Society*).

While this estimate is not a definite predictor, it is an indicator that the area has earthquake potential. It should be noted that on March 18, 2020, a 5.7 magnitude earthquake struck Salt Lake County in the town of Magna, which is located 15 miles from the University of Utah. The quake caused up to 55,000 people to experience a blackout. Damage assessments were conducted on the university. The Browning Building was closed for a few days.

Severity

Earthquakes measure magnitude for a number of variables, including duration; energy waves on the surface or below the ground; the length of the fault; or the rigidity of the earth. Despite the differences in magnitude types, it is understood that larger magnitude earthquakes produce more damaging results.

The most recent State of Utah Mitigation Plan estimates the largest probable earthquake as a magnitude 7.0–7.5 that would most likely occur on the Wasatch Fault. Based on this prediction, the university used an advanced analytical modeling software application—HAZUS-MH (Hazards U.S.—Multi-Hazards) in order to estimate loss of life and property. During the last update, the team elected to use this application and its accompanying Advanced Engineering Building Module (AEBM) to model loss probabilities from an M7.0 earthquake. A more comprehensive study will be conducted again in 2022.

Historical Losses and Impacts

The last significant seismic event along the Salt Lake segment of the Wasatch fault occurred long before recorded civilization appeared in the area. There is no known record, and, therefore, no reliable historical data, that quantifies losses and impacts. For this reason, we need to depend on the estimates made by the HAZUS-MH models, which have proven themselves reliable in post-earthquake analysis for modern-day events in other locations.

Designated Hazard Areas

Because of the large geographic area impacted by an earthquake, the entire university campus is considered to be a hazard area for earthquake risk. Within our community, however, some structures are more at risk than others. Chief among them are un-reinforced masonry buildings and tall buildings built to sub-standard seismic codes.

We have identified and mapped over 250 facilities from our AEBM analysis with their potential damage states and estimated casualty numbers. Propelled by our sensitivity to security concerns, these maps remain confidential but are readily available to campus administrators responsible for emergency planning and management and long-range capital planning activities to aid in their decision-making processes.

Flooding

TABLE: SUMMARY OF RISK FACTORS (100-YEAR FLOOD)	
Period of occurrence:	None
Probability of event(s):	None
Warning time:	Not applicable
Major contributor(s):	Not applicable
Risk of injury?	None
Potential for facilities shutdown?	None
Percent of affected properties that may be destroyed or suffer major damage:	0%

Hazard Profile Data

The USGS indicates: “The term ‘100-year storm’ is used to define a rainfall event that statistically has a 1% chance of occurring. In other words, over the course of 1 million years, these events would be expected to occur 10,000 times. But, just because it rained 10 inches in one day last year doesn't mean it can't rain 10 inches in one day again this year.”

TABLE: FLOOD RECURRENCE INTERVALS AND PROBABILITIES OF OCCURRENCES		
Recurrence Interval (in years)	**Probability of Occurrence in Any Given Year**	**Percent Chance of Occurrence in Any Given Year**
100	1 in 100	1%
50	1 in 50	2%
25	1 in 25	4%
10	1 in 10	10%
5	1 in 5	20%
2	1 in 2	50%

Source: https://www.usgs.gov/centers/nj-water/science/floods-recurrence-intervals-and-100-year-floods?qt-science_center_objects=0#qt-science_center_objects

Encountering a "100-year storm" on one day does nothing to change chances of seeing the same amount of precipitation the very next day. In fact, some experts are of the opinion that these severe storms are becoming more frequent. The phenomenon of climate change is at least partially responsible for this increased frequency.

Background and Local Conditions

Most frequently triggered by a combination of heavy winters and subsequent snowmelt, compounded by heavy spring precipitation, some floods have impacted businesses and residences throughout the state during the last century.

One of the most significant and devastating events wiped out the small town of Thistle, which was a community nestled in Spanish Fork Canyon, southwest of Provo. In April 1983, an enormous landslide blocked a normally quiet stream in Spanish Fork Canyon, eventually inundating dozens of homes upstream from the blockage. There were no casualties resulting from this event. The loss of property was total and devastating for this small community, estimated at over $200 million. Thistle never recovered.

In 2005, the Santa Clara River rampaged through southwestern Utah, downstream from Gunlock Reservoir. The event was allegedly the result of a lack of maintenance of the streambed with a combination of an unusually substantive amount of snowmelt and thunderstorms. The waters damaged several homes, totally destroying at least seven. Also damaged were farmland, several golf courses, utility distribution systems, and essential paved infrastructure. The governor of the state of Utah declared this zone a disaster area, enabling the involvement of FEMA.

There have been reports of casualties as a result of flooding in Utah. In 1984, a person was killed near Clearcreek, a small Utah mining town. There was also a fatality indirectly caused by the Santa Clara flood, described above. However, neither of those fatalities could be attributed to a “flash flood” situation and were apparently the result of an unfortunate personal choice.

In more mature urban areas, such as Salt Lake City, storm sewers have been in place for many years. These were originally designed to handle the infrequent, yet occasional, heavy rainstorms and also runoff generated by melting snow within the community and in the watershed located in the foothills above the city. As Salt Lake became more urbanized in the early twentieth century, creeks that flowed across the surface of the valley were forced into underground culverts and conduits. While these methods of conveyance aged and quite possibly afterwards forgotten as

critical infrastructure, the risk to surrounding structures increased. It is interesting to note that some of these streams are now being brought back to the surface.

In 1983, Salt Lake City and other communities along the Wasatch Front were impacted by notable flooding events. Salt Lake City was forced to turn State Street into a temporary river, safely guiding excess runoff to additional conduits. Since then, Salt Lake City has invested heavily in updating the design and the condition of its storm sewer system. This has an indirect impact on the University of Utah, since all of its storm sewer collection systems feed into Salt Lake City's system.

Historical Frequency and Probability of Occurrence

There are no reported incidents of flooding directly caused by severe weather conditions on the campus of the University of Utah. The probability of occurrence for such an event is therefore considered to be at or near zero.

In the spring of 1983, Red Butte Creek briefly overflowed its banks in the area of the greenhouses, resulting from a heavy and sudden spring run-off. However, there was no reportable damage as a result of this event, and it is the only recorded occurrence of such an event in this area during the last fifty years. Recent modifications and improvements in the Red Butte area, both at the dam and at the Red Butte Gardens, are expected to preclude a recurrence.

Severity

The severity of damage due to a 100-year flood would be minimal and would affect very few university buildings along Red Butte Creek.

Historical Losses and Impacts

There have been no losses associated with flooding caused by severe weather conditions at the University of Utah.

Designated Hazard Areas

The structures immediately adjacent to Red Butte Creek are the only ones that could potentially be impacted due to flooding.

In the university's best judgment, there is no cause to implement any pre-disaster mitigation actions designed to mitigate the impact of flooding due to natural causes, given the extremely low likelihood of occurrence and the minimal impacts even if/when it does happen. Instead, the university can prepare by identifying the most effective preparation and response strategies developed by those entities directly in the potential path of such floods.

IMAGE: 100-YEAR FLOOD

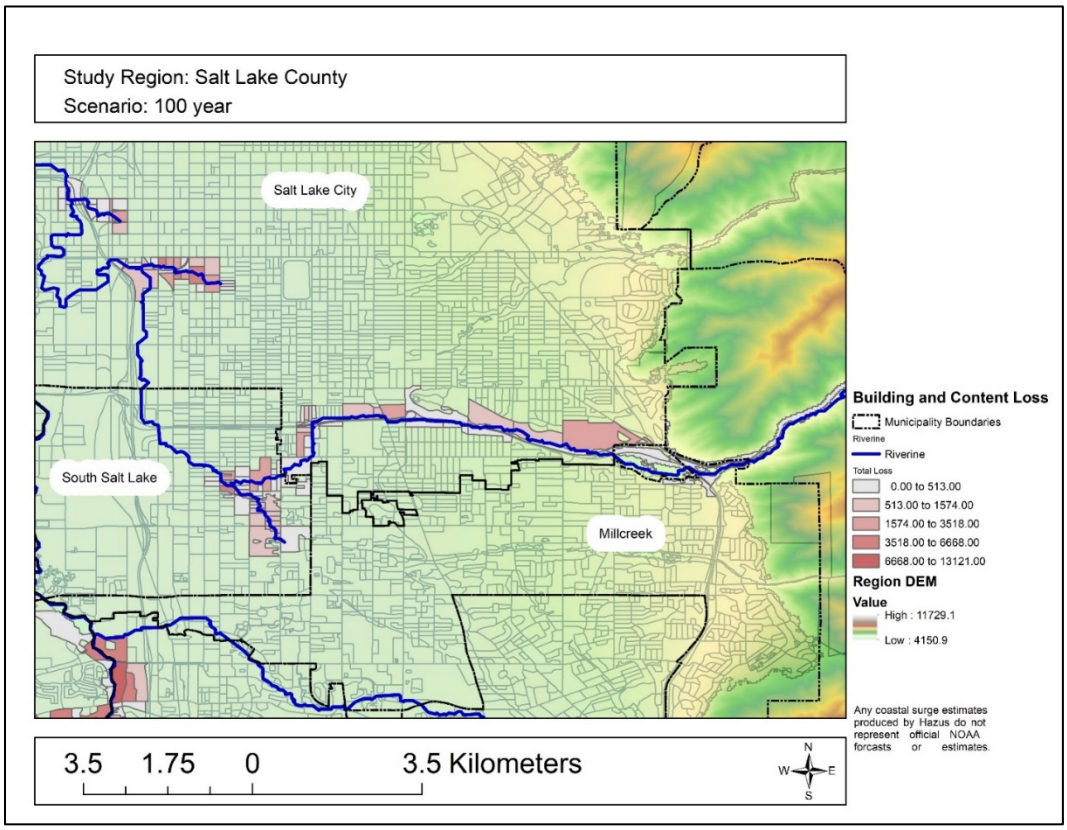
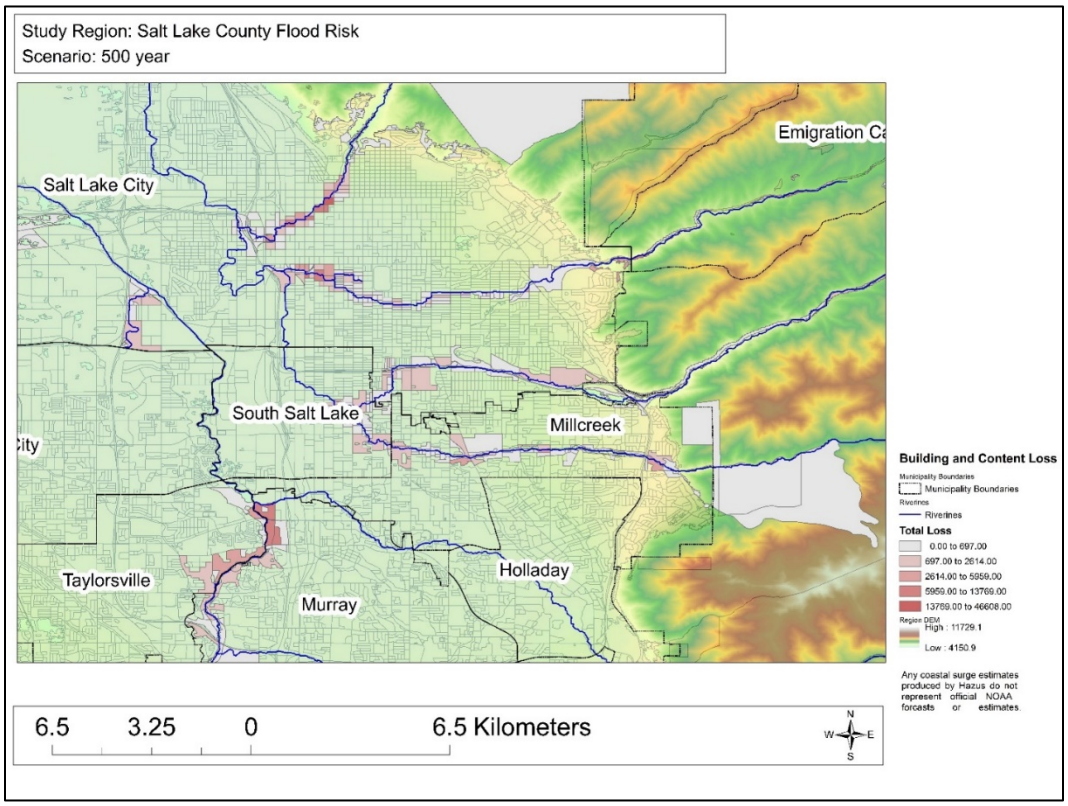


IMAGE: 500-YEAR FLOOD



Buildings at Risk for 100-Year Flood Damage

Listed by building number, name, daytime occupancy, exposure, and potential loss in thousands of dollars. ***It should be noted that University Village is currently undergoing significant redevelopment through construction. As a best practice, new buildings should be constructed to ensure impacts from dam and flood inundation are mitigated.***

TABLE: BUILDINGS AT RISK FOR 100-YEAR FLOOD DAMAGE				
No.	**Name**	**Occup.**	**Exposure**	**Potential Loss (1%)**
323	Greenhouse	0	Unknown	Unknown
327	PPO Greenhouse	0	Unknown	Unknown
329	East Greenhouse & Office	1	Unknown	Unknown
665	Fort Douglas 665	10	$415,000	$4,150
666	Fort Douglas 666	10	$8,395,000	$83,950
720	Student Apts Maintenance	0	$1,627,000	$16,270
727	*Univer Village West 200B**	8	$1,639,000	$16,390
728	*Univer Village West 200C**	8	$1,639,000	$16,390
750	*Univer Village West 800A**	63	$3,713,000	$37,130
751	*Univer Village West 800B**	69	$3,713,000	$37,130
752	*Univer Village West 800C**	68	$3,713,000	$37,130
753	*Univer Village West 900A**	67	$3,713,000	$37,130
754	*Univer Village West 900B**	67	$3,713,000	$37,130
755	*Univer Village West 900C**	58	$3,713,000	$37,130

840	School of Dentistry	Unknown	$36,787,861	$367,878.61
841	Dentistry Parking Garage	N/A	Unknown	Unknown
851	UU Orthopedic Center	286	$436,891,000	$4,368,910
853	Health Professions Education	226	$10,088,000	$100,880
855	480 Wakara Way		Unknown	Unknown
858	420 Wakara Way	91	$165,000	$1,650
863	390 Wakara Way		Unknown	Unknown
865	295 Chipeta Way	545	$673,000	$6,730
	Total	**1510**	**$520,597,861**	**$5,205,978.61**

Note: Insufficient data prevented a quantitative 100-year flood analysis for these structures. A potential loss of 1% of building exposure was determined to be the most appropriate estimate.
** University Village is currently undergoing significant redevelopment through construction. As a best practice, buildings should be replaced to ensure impacts from dam and flood inundation are mitigated.*

Dam Failure

TABLE: SUMMARY OF RISK FACTORS		
	Day-to-Day	**Catastrophic**
Period of occurrence:	Potentially annually	Unknown
Probability of event(s):	Low	Low
Warning time:	Hours	None
Major contributor(s):	Spring runoff, heavy precipitation	Earthquake, terrorism
Risk of injury?	Low	Low
Potential for facilities shutdown?	Low	Low
Percent of affected properties that may be destroyed or suffer major damage:	0%	<10%

Hazard Profile Data

Dam failure can be caused by a variety of influences, ranging from earthquakes to excessive precipitation, poor design and/or maintenance, and of course, terrorism.

The State Engineer's office has the responsibility for monitoring dam safety of all non-federal dams in Utah. (The performance of federal dams is monitored in accordance with the Safety of Dams Act, which encompasses two separate programs: the Safety Evaluation of Existing Dams (SEED) program, and the Safety of Dams (SOD) program.)

Background and Local Conditions

The State Pre-Disaster Mitigation Plan (2004) indicates that of the 900+ dams that fall under the jurisdiction of the state, more than 20% were assigned a high hazard rating.

In 1989, the Quail Creek Dam ruptured. Located near St. George in southwestern Utah's rural areas, this event sent a giant wave of water and mud down the Virgin River, flooding an estimated 30 homes, numerous apartment dwellings, and nine businesses located adjacent to the Virgin. This is the only major reported incident of a dam inundation.

Red Butte Dam, which is east of the University of Utah's campus, has imposed a perception of risk since it was constructed 75 years ago. According to Central Utah Water Conservation District (CUWCD) reports, Red Butte Dam was in fact at some risk until recently. There is no recorded history of failure, damage, or leakage reported by any of the agencies with an interest in the dam. An infusion of federal funds recently renovated the dam, spillway, and monitoring systems so it is no longer considered a risk.

Historical Frequency and Probability of Occurrence

There is no history of dam failure or subsequent incidents of dam inundation associated with the Red Butte Dam, which is located east of and above the University of Utah, between the date of its original construction and 2020. (For further information refer to http://waterrights.utah.gov/.)

Severity

Dam inundation studies conducted by the Department of Defense (1986) with focus on Red Butte Dam concluded that there is a slight risk of flooding associated with potential dam failure and subsequent inundation, especially as it pertains to properties to the west of Foothill Boulevard. In this general area, the natural grade is less steep than it is further east. University Student Apartments, located to the south of the Red Butte Creek and west of Foothill Drive, are exposed to the possibility that structures closest to the channel may experience some flooding and suffer minimal damage. This could be particularly true for some of the basement level apartments.

Current maps, available at the State Engineer's office, indicate that flooding as the result of dam inundation holds the potential of impacting several university-owned structures east of Foothill and south of Red Butte Creek in the area between Wakara and Red Butte Creek. Resulting flooding could impact facilities such as the new Orthopedics Hospital and the Williams building at ground level or below, primarily on the northeast corner of each.

This type of flood could potentially minimally affect the student apartments at Sage Point and some of the assets in the Red Butte Gardens. The amount of impact will be directly related to the amount of water in storage at Red Butte reservoir at the time, along with coincidental prevailing weather conditions.

Although there is a minor risk of limited damage to property, there is no anticipation that there will be any fatalities associated with this type of event.

Historical Losses and Impacts

Since there have not been any reports of events of this nature, there are no records of any losses or other impacts associated with dam inundations.

According to the university's best judgment, the lack of significant threat from this source does not warrant implementation of any pre-disaster mitigation actions, particularly since the completion of the restoration of the Red Butte Dam.

Managers of entities located in the hazard zone should feel encouraged to prepare for this type of event (however unlikely) through the identification of effective preparation, notification, and response and business resumption strategies.

Designated Hazard Areas

The designated hazard areas are limited to zones on both sides of Red Butte Creek, from the mouth of the Red Butte Canyon to Sunnyside Drive.

The following table displays buildings at risk for dam inundation damage, listed by building number, name, daytime occupancy, exposure, and potential loss in thousands of dollars.

TABLE: BUILDINGS AT RISK FOR DAM INUNDATION DAMAGE				
No.	**Name**	**Occup.**	**Exposure**	**Potential Loss (1%)**
323	Greenhouse	0	Unknown	Unknown
327	PPO Greenhouse	0	Unknown	Unknown
329	East Greenhouse & Office	1	Unknown	Unknown
665	Fort Douglas 665	10	$415,000	$4,150
666	Fort Douglas 666	10	$8,395,000	$83,950
720	Student Apts Maintenance	0	$1,627,000	$16,270
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855	480 Wakara Way		unknown	Unknown
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863	390 Wakara Way		Unknown	Unknown
865	295 Chipeta Way	545	$673,000	$6,730
	Total	**1577**	**$520,597,861**	**$5,205,978.61**

Note: Insufficient data prevented a quantitative dam inundation analysis for these structures. A potential loss of 1% of building exposure was determined to be the most appropriate estimate. A probable scenario for dam inundation would be during or after an earthquake event, so it is anticipated that losses for these buildings due to ground motion would be of greater concern.

** University Village is currently undergoing significant redevelopment through construction. New buildings should be constructed to ensure impacts from dam and flood inundation are mitigated.*

Pandemic (Public Health Emergencies)

TABLE: SUMMARY OF RISK FACTORS	
Period of occurrence:	30 years
Probability of event(s):	High (at 30-year window)
Warning time:	1 month
Major contributor(s):	Migratory birds, hygiene, travel
Risk of illness?	High
Potential for facilities shutdown?	High
Percent of affected properties that may be destroyed or suffer major damage:	Low or none

Hazard Profile Data

A pandemic is a global disease outbreak. A flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity and for which there is no vaccine. The disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time, as demonstrated by the recent COVID-19 outbreak.

A pandemic may come and go in waves, each of which can last for six to eight weeks. An especially severe influenza pandemic (or similar outbreak, such as COVID-19) could lead to high levels of illness, death, social disruption, and economic loss. Everyday life would be disrupted as many people in many places become seriously ill at the same time. Impacts can range from school and business closings to the interruption of basic services, such as public transportation and food delivery.

A substantial percentage of the world's population will require some form of medical care. Health care facilities can be overwhelmed, creating a shortage of hospital staff, beds, ventilators, and other supplies. Surge capacity at non-traditional sites, such as schools, may need to be created to cope with demand.

The need for a vaccine is likely to outstrip supply, and the supply of antiviral drugs is also likely to be inadequate early in a pandemic. Difficult decisions will need to be made regarding who gets antiviral drugs and vaccines.

Background and Local Conditions

The 1918 influenza pandemic occurred in three waves in the United States throughout 1918 and 1919. The first cases in Utah undoubtedly appeared in the military camp at Fort Douglas. Public health officials reacted by passing laws requiring citizens to wear masks. Spitting, a common practice, was condemned, and those who spit in public were fined.

Quarantines were imposed. In Ogden City, no one was allowed in or out of the city without a note from a doctor. Elsewhere, church meetings, funerals, private parties, and all public gatherings were cancelled or limited. For instance, when Joseph F. Smith, president of the Church of Jesus Christ of Latter-Day Saints, died on November 19th, the service was limited to only a few family members. At other times, this type of event would have attracted thousands of mourners.

The University of Utah has complex exposures to balance in the day-to-day business of treating patients, conducting research, and educating students. Residence life, fraternities and sororities, students on internship programs, and laboratory environments represent a small cross-section of these unique risks. The complexity of the problem is increased by the large number of students who commute to the campus on a daily basis and by the large number of visitors (10,000 to 20,000 per day) who come to the campus on a typical business day.

Historical Frequency and Probability of Occurrence

It is impossible to predict with any degree of accuracy when the next influenza pandemic will occur or how severe it will be. Wherever and whenever a pandemic starts, everyone around the world is at risk. Countries such as the United States might delay arrival of the virus through measures such as border closures and travel restrictions but will not be able to stop or prevent its eventual transmission as demonstrated by the recent COVID-19 incident.

Health professionals are concerned that the continued spread of a highly pathogenic avian H5N1 virus across eastern Asia and other countries represents a significant threat to human health. The H5N1 virus has raised concerns about a potential human pandemic because:

- It is especially virulent (the relative ability of a pathogen to cause disease).
- It is being spread by migratory birds.
- It can be transmitted from birds to mammals and in some limited circumstances to humans.
- Like other influenza viruses, it continues to evolve.

Since 2003, a growing number of human H5N1 cases have been reported in Asia, Europe, and Africa. More than half of the people infected with the H5N1 virus have died. It is believed that most of these cases were caused by exposure to infected poultry. There has been no sustained human-to-human transmission of the disease, but the continued concern is that H5N1 will evolve into a virus capable of human-to-human transmission.

Death rates are determined by four factors: the number of people who become infected, the virulence of the virus, the underlying characteristics and vulnerability of affected populations, and the availability and effectiveness of preventive measures.

Severity

Pandemic Death Toll Since 1900 (Center for Disease Control):

- 1918–1919: U.S (675,000+), Worldwide (50,000,000)
- 1957–1958: U.S (70,000+), Worldwide (1,000,000–2,000,000)
- 1968–1969: U.S (34,000+), Worldwide (700,000+)
- 2020–Present: U.S (to be determined), Worldwide (to be determined)

Historical Losses and Impacts

History suggests that pandemics have probably happened during at least the last four centuries. Since 1900, five major pandemics and several "pandemic threats" have occurred.

1918: Spanish Flu

The Spanish Influenza pandemic is the catastrophe against which all modern pandemics are measured. It is estimated that approximately 20% to 40% of the worldwide population became ill and that over 50 million people died. Between September 1918 and April 1919, approximately 675,000 deaths from the flu occurred in the U.S. alone. Many people died from the disease very quickly. Some people who felt well in the morning became sick by noon and were dead by nightfall. Those who did not succumb to the disease within the first few days often died of complications from the flu (such as pneumonia) caused by bacteria.

One of the most unusual aspects of the Spanish flu was its ability to kill young adults. The reasons for this remain uncertain. With the Spanish flu, mortality rates were high among healthy adults and the usual high-risk groups. The attack and mortality rates were highest among adults 20 to 50 years old.

1957: Asian Flu

In February 1957, the Asian influenza pandemic was first identified in the Far East. Immunity to this strain was rare in people less than 65 years of age, and a pandemic was predicted. In preparation, vaccine production began in late May 1957, and health officials increased surveillance for flu outbreaks.

Unlike the virus that caused the 1918 pandemic, the 1957 pandemic virus was quickly identified due to advances in scientific technology. The vaccine was available in limited supply by August 1957. The virus came to the U.S. quietly, with a series of small outbreaks over the summer of 1957. When U.S. children went back to school in the fall, they spread the disease in classrooms and brought it home to their families. Infection rates were highest among school children, young adults, and pregnant women in October 1957. Most influenza-and pneumonia-related deaths occurred between September 1957 and March 1958. The elderly had the highest rates of death.

By December 1957, the worst seemed to be over. However, during January and February 1958, there was another wave of illness among the elderly. This is an example of the potential "second wave" of infections that can develop during a pandemic. The disease infects one group of people first, infections appear to decrease, and then infections increase in a different part of the population. Although the Asian flu pandemic was not as devastating as the Spanish flu, about 69,800 people in the U.S. died.

1968: Hong Kong Flu

In early 1968, the Hong Kong influenza pandemic was first detected in Hong Kong. The first cases in the U.S. were detected as early as September of that year, but illness did not become widespread in the U.S. until December. Deaths from this virus peaked in December 1968 and January 1969. Those over the age of 65 were most likely to die. The same virus returned in 1970 and 1972. The number of deaths between September 1968 and March 1969 for this pandemic was 33,800, making it the mildest pandemic in the 20th century.

There could be several reasons why fewer people in the U.S. died due to this virus. First, the Hong Kong flu virus was similar in some ways to the Asian flu virus that circulated between 1957 and 1968. Earlier infections by the Asian flu virus might have provided some immunity against the Hong Kong flu virus that may have helped to reduce the severity of illness during the Hong Kong pandemic. Second, instead of peaking in September or October, like the influenza had in the previous two pandemics, this pandemic did not gain momentum until near the school holidays in December. Since children were at home and did not infect one another at school, the rate of

influenza illness among school children and their families declined.Third, improved medical care and antibiotics that are more effective for secondary bacterial infections were available for those who became ill.

1976: Swine Flu Threat

When a novel virus was first identified at Fort Dix, it was labeled the “killer flu.” Experts were extremely concerned because the virus might have been related to the Spanish flu virus of 1918. The concern that a major pandemic could sweep across the world led to a mass vaccination campaign in the United States. In fact, the virus—later named "swine flu"—never moved outside the Fort Dix area.

Research on the virus later showed that if it had spread, it would probably have been much less deadly than the Spanish flu.

1977: Russian Flu Threat

In May 1977, influenza A/H1N1 viruses isolated in northern China, spread rapidly, and caused epidemic disease in children and young adults (< 23 years) worldwide. The 1977 virus was similar to other A/H1N1 viruses that had circulated prior to 1957. (In 1957, the new A/H2N2 viruses replaced the A/H1N1 virus). Because of the timing of the appearance of these viruses, persons born before 1957 were likely to have been exposed to A/H1N1 viruses and to have developed immunity against A/H1N1 viruses. Therefore, when the A/H1N1 reappeared in 1977, many people over the age of 23 had some protection against the virus, and it was primarily younger people who became ill from A/H1N1 infections. By January 1978, the virus had spread around the world, including the United States. Because illness occurred primarily in children, this event was not considered a true pandemic. Vaccines containing this virus were not produced in time for the 1977–78 season, but the virus was incorporated into the 1978–79 version of the vaccine.

1997: Avian Flu Threat

This pandemic "threat" occurred in 1997 and 1999. In 1997,at least a few hundred people became infected with the avian A/H5N1 flu virus in Hong Kong and 18 people were hospitalized. Six of the hospitalized persons died. This virus was different because it moved directly from chickens to people, rather than having been altered by infecting pigs as an intermediate host. In addition, many of the most severe illnesses occurred in young adults similar to illnesses caused by the 1918 Spanish flu virus. To prevent the spread of this virus, all chickens (approximately 1.5 million) in Hong Kong were slaughtered. The avian flu did not easily spread from one person to another, and after the poultry slaughter, no new human infections were found.

In 1999, another novel avian flu virus—A/H9N2—was found that caused illnesses in two children in Hong Kong. Although both of these viruses have not gone on to start pandemics, their continued presence in birds, their ability to infect humans, and the ability of influenza viruses to change and become more transmissible among people is an ongoing concern.

2009: H1N1

Influenza-associated hospitalizations have been a reportable condition in Utah since 2005, and surveillance for influenza hospitalizations has been a valuable tool for identifying and tracking the population impact of serious influenza illness. During the 2009 influenza A (H1N1) pandemic, Utah public health officials used comparisons with hospitalization data from three previous influenza seasons to rapidly assess the impact of 2009 H1N1 and enable public health authorities to target persons at greatest risk for severe illness. The state reported 1,327 2009 H1N1 hospitalizations, compared with an average of 435 seasonal influenza hospitalizations during three previous influenza seasons, and 25.5% of 2009 H1N1 hospitalizations resulted in severe

illness (intensive-care unit [ICU] admission or death), compared with 14.0% of seasonal influenza hospitalizations. In addition, 2009 H1N1 disproportionately affected racial/ethnic minorities, pregnant women, and residents of Salt Lake County (the state's most densely populated county). During the four-month "spring wave" of the H1N1 pandemic, a greater percentage of hospitalizations (30.9%) resulted in severe illness than during the nine-month "fall wave" (23.0%).

2020: COVID-19

The global public health emergency caused by the coronavirus unfolded rapidly and dramatically. The virus, which causes the COVID-19 disease, emerged in Wuhan, China, in late 2019. Since then, it spread to more than 200 countries and territories, including the state of Utah in the spring of 2020. COVID-19 is a new virus in humans causing respiratory illness, which can be spread from person-to-person, and people can be asymptomatic. Genetic variants of SARS-CoV-2 have been emerging and circulating around the world throughout the COVID-19 pandemic and have been associated with changes to receptor binding, reduced neutralization by antibodies generated against previous infection or vaccination, reduced efficacy of treatments, potential diagnostic impact, or predicted increase in transmissibility or disease severity.

COVID-19 impacted the entire Salt Lake County region, and the first case was identified in March of 2020. In an effort to limit the spread of the virus, public health directors and some local governments issued stay-at-home orders requiring residents to halt many nonessential activities. Many states issued statewide stay-at-home orders in March and April. Since early spring of 2020, limited PPE was available for health care and emergency services agencies. Public health capabilities were challenged to keep pace with the community transmission as restrictions were relaxed. Every public health and medical organization, long-term care facility, business, and residents in Utah have been impacted. A few considerations specific to this region include but are not limited to delay of medical care due to the pandemic overwhelming hospital systems and people being fearful of seeking care; increased reporting and evidence of the negative impacts on residents' mental health and well-being; the need for increased public information and education to garner greater confidence in the COVID-19 vaccine; and mass vaccination efforts, especially ensuring priority and at-risk groups receive the vaccine and ensuring an equitable process.

The global pandemic required the state to address the need for extensive regional situational awareness and coordinated planning; increased coordination across all disciplines, including the philanthropic, business, and school community at an unprecedented scale; public information and warning; reopening strategies; public health orders; resource support; addressing essential staff limitations/shortages across key health and medical sectors during various phases of the pandemic; limited public health laboratory testing early in the pandemic; contact tracing and investigation; fatality management; medical countermeasure dispensing and administration, specifically vaccine planning and distribution; medical surge; ongoing resupply of PPE; and community and economic recovery. With multiple waves/phases of the global pandemic, periods of additional surge are to be expected.

Designated Hazard Areas

There is no designated hazard area for this type of hazard at the University of Utah.

Severe Weather

Summary of Risk Factors

TABLE: SUMMARY OF RISK FACTORS				
	Lightning	**High Winds**	**Extreme Temperatures**	**Heavy Snow**
Period of occurrence:	Annually	Annually	Annually	Annually
Probability of event(s):	Moderate	Moderate	Low	Moderate
Warning time:	None	Hours	Days	Days
Major contributor(s):	Thunderstorms	Rapid change in air pressure	Climate change	High winds and precipitation
Risk of injury?	Moderate	Low	Low	Moderate
Potential for facilities shutdown?	Low	Low	Moderate	Moderate
Percent of affected properties that may be destroyed or suffer major damage:	<1%	<1%	<1%	<1%

Hazard Profile Data

Because of the relative low number and effect on campus of severe weather events, hazard profile data for severe weather events found in this strategy correlates with that found in the Salt Lake County Multi-Jurisdictional Mitigation Plan.

- **Lightning** is the discharge of electricity induced as negative and positive charges build up in a cloud system during the development of a thunderstorm. Some forms of this discharge are directed toward the ground and may hit buildings, trees, and people.

- **High winds**, including localized events called downbursts, may occur during a thunderstorm or at other times of rapid changes in air pressure. High winds may down trees or power lines. Microbursts can also have significant impact on property.

- **Extreme temperatures** include both hot and cold temperatures much greater than seasonal expectations. With Utah's desert climate, we are susceptible to both forms of extreme temperature. Effects can be felt among all populations, particularly the very young or very old or those with chronic health conditions. Temperatures can vary by 30 to 40 degrees in a single 24-hour period.

- **Severe winter storms** may bring heavy snow, ice, strong winds, and freezing rain. Winter storms can prevent people from traveling to and from work or school, leading to temporary shutdowns. Structural damage, power outages, and people slipping on snow or ice are also risk factors.

- **Air quality** issues are a concern in the Salt Lake City area, and the region has some of the worst air quality in the nation. The Wasatch Front experiences high levels of particulate pollution in winter and of ozone in the summer. Those are the seasons when weather is conducive to the formation of those contaminants.

Background and Local Conditions

- **Lightning** strikes in the Salt Lake County since 1950 have injured 41 people out of 139 statewide. There is no data available indicating that any strikes have occurred on campus, although institutional memory indicates that such an event has never been reported.

- **High winds** on campus are of little difference compared with elsewhere in the county. The campus' proximity to the foothills does tend to amplify our exposure to high winds, although typically not significantly and infrequently.

- Our large student population who are outdoors and mobile throughout the day exacerbates the impact of **extreme temperatures** on campus.

- **Heavy snow** is a common occurrence during winters along the Wasatch Front. Easterly winds crossing Utah collide with the mountains (an orthographic barrier) causing precipitation to be dropped on the East Benches, including most of campus.

- In the winter months, inversions, combined with the region's unique topography, contribute to **air quality** issues. An inversion occurs when normal atmospheric conditions in the winter become inverted. Normally cool air resides above while warm air resides below, so when an inversion occurs, the inversion traps a dense layer of cold air under warm air. This switch in the layers means that the warm layer traps pollutants in the cold air, closest to the valley floor. In addition to elevated ozone levels in the summer months, wildfire smoke also contributes to bad air quality during the summer.

Historical Frequency and Probability of Occurrence

- **Lightning**—While probability is high, there is no reported data for the number of lightning strikes on campus.

- **High winds** may occur annually in the spring and fall. No known data for the number of microbursts on campus is available.

- **Extreme temperatures**—Most recent history records report that electrical systems in 2004 were challenged to keep up with demand associated with cooling loads. The main source of heat for the campus' buildings, the HTHW Plants, relies on natural gas purchased and delivered on an uninterruptible rate schedule. They both have a back-up fuel should natural gas delivery be interrupted for other reasons. There has not been a major interruption in natural gas delivery for several decades.

- **Heavy snow** is a possibility during every winter, with extremely heavy snowfall having occurred every few years. Recent history records show severe winter storms in 1964, 1984, 1988, 1993, 2019, and 2020.

- **Air Quality** – Seasonal fluctuations play a significant role in Salt Lake City air pollution annually. Temperature inversions in the winter trap polluted air. As a result of this weather effect, winter months can experience more than five times the PM2.5 concentration as in summer months. Wildfires in the West, which have been occurring with greater frequency, also contribute to low air quality in the summer months.

Severity

- **Lightning**—The Office of Risk Management at the University of Utah has a record of a small number of lightning strikes over the last 50 years. There is no history of any personal injuries resulting directly from lightning strikes.

- **High winds**—There are many and fairly frequent instances of winds with high velocity crossing the campus, primarily and most commonly out of the canyons to the east of the campus. In 1993, and several winters in following years, winds in excess of 100 mph were reported at campus monitoring stations.

- **Extreme temperatures**—Particularly in the summer months, the demand for electric power may exceed supply. This is not so much a result of the university's distribution system in the majority of cases as it is availability of the commodity in Rocky Mountain Power's distribution system. Such was the case most recently in 2004. There has not been an extended curtailment of natural gas supply to the central heating plants for the campus in the last two decades.

  In 2017, the university broke ground on several new cutting-edge buildings—totaling nearly 800,000 square feet—transforming the campus. During expansion planning, the university realized that their existing chilled water plant did not have the capacity to meet the loads of these new buildings scheduled to come online. The Planning, Design, and Construction team studied how best to meet this new cooling load—either by adding new chillers at a cost of nearly $40 million or by significantly decreasing the cooling load in existing buildings. The team determined that they could reduce the load in the existing buildings for less than $25 million, which would also result in ongoing energy savings.

- **Heavy snow**—In the last 45–50 years, the university has only had to shut down for business a few times. Anecdotes indicate that the *total* for such closures is no more than six full days, with the maximum single event lasting no more than one to two days.

- **Air Quality** – Despite long-term reductions in particle pollution and ozone of recent decades, air quality in Salt Lake City remains among the worst in the United States. The last three years, moreover, have seen increases in unhealthy ozone days and annual PM2.5 levels. In 2021, because of wildfire-related smoke conditions, northern Utah ranked among the worst air quality on the planet.

Historical Losses and Impacts

- **Lightning**—There have been some reported instances of damage to on-campus electronics and communications as a result of lightning strikes. The electric distribution system serving the main campus has also experienced some strikes and damage. No personal injuries have been reported. Additionally, the current NCAA policy requires that

"play" for outdoor athletic activities on campus be suspended if there is lightning within 8 miles of a stadium. It requires a 30-minute delay. The "Return-to-Play" clock will restart if a lightning strike occurs within the 8- mile radius. The implications of a major weather and/or lightning delay at a University of Utah football game could be significant.

- **High winds**—While no reports of personal casualties exist in the files of Risk Management at the university, there have been reports of damage to some facilities (primarily the air supported structure over the football training field) and to numerous trees. The cost for replacing the air structure was in excess of $300,000. There is no traceable dollar loss associated with any tree damage since there is no insurance coverage for such events. Similar situations have existed, on occasion, with temporary power or heat outages during some winters when isolated buildings may have been briefly at risk of or actually having endured minor damage from "freezing," typically as the result of human error or negligence. Fortunately, this has never become a serious issue—primarily as a result of redundancies built into many of the university's facilities, supported by a 24/7 emergency response plan by its maintenance and operations divisions.

- **Extreme temperatures**—While no casualties have been directly reported as a result of electric "brown-outs," there have been reports of temporary illness, reduction of productivity, and ability to teach/learn.

- There have also been *unsubstantiated* reports, such as in 2020, of research projects having been severely impacted by power outages, including those triggered by either wind or extreme temperatures.

- **Heavy snow**—There have been a handful of occasions when the administration elected to allow personnel to come into campus later than normal or to send non-essential staff home before normal end-of-business time—mostly with the intent of helping the surrounding community manage traffic while allowing its own crews to remove snow and ice from essential roadways and pedestrian areas. There are filed reports of slip and fall accidents almost every year in spite of the university's excellent track record in managing its snow and ice removal programs.

- **Air Quality** – Fine particulate matter may be associated with increased rates of respiratory and cardiovascular diseases, stroke, cancer and autoimmune disorders, as well as shorter life spans. In certain instances, low air quality may result in the cancellation of campus events, such as athletic practices and games.

Designated Hazard Areas

- **Lightning**—None
- **High winds**—None
- **Extreme temperatures**—None
- **Heavy snow**—None, although the east side of campus is more vulnerable than the western half.
- **Air Quality** - None

Landslide

TABLE: SUMMARY OF RISK FACTORS	
Period of occurrence:	Frequent for small events
Probability of event(s):	Low to moderate susceptibility near campus
Warning time:	Little
Major contributor(s):	Gravity, precipitation, earthquakes
Risk of injury?	Low to medium
Potential for facilities shutdown?	Partial
Percent of affected properties that may be destroyed or suffer major damage:	Less than 5%, but in area of hospitals

Hazard Profile Data

Landslides are mass movement events that include rock fall, slope failure, and debris flow. While gravity is the primary factor in landslides they are usually triggered by an increase in precipitation or erosion. As a slope is loaded with precipitation, the added weight can exceed the natural strength of the rocks and soils and cause a mass movement. Curiously, we often favor building expensive homes near rivers whose banks may erode, or at the precipice of cliffs or on sides of mountains whose slopes may fail. When a mass movement of rocks, trees, and enormous amounts of soil occurs, there is little we can do to prevent homes and properties from being destroyed.

Background and Local Conditions

The Wasatch Range provides an ideal environment for frequent landslides. The Utah Geological Society reports that three common types of landslides in Utah are (1) debris flow, (2) slides, and (3) rock fall.

The University of Utah is nestled against lower, older foothills of the Wasatch front. Because of their age, these foothills have been previously eroded by wind and rain and are now—from a general, coarse perspective—mostly “smooth” and do not exhibit a tendency to slide. In general, slopes on the foothills behind the Health Sciences (or East), campus are not as steep, erosion is not as evident, and the accumulation of precipitation is not as severe as other areas along the same range beyond the borders of campus. There are some small areas along the Shoreline trail, east of the campus, where portions of the hillside are undercut both by natural and human causes. This condition has helped foster the university’s determined need for the Heritage Preserve Plan.

The hospitals and the many research institutes and laboratories located in the northeast quadrant of the University of Utah have been built on or into the foothills. While structural engineers are confident with the design and construction of these facilities, it is understood that if the base of the slope is undercut in any fashion, the natural strength of the slope is weakened and therefore more susceptible to landslide. Further construction in this area should pay particular attention to slope stability.

Historical Frequency and Probability of Occurrence

Landslides may occur as primary events or secondary events following an earthquake. The largest landslide to date (both for Utah and the U.S.) was the Thistle Landslide of April 1983 in central Utah. A thousand feet in width, a mile long and almost 200 feet thick, this gigantic slump buried the town of Thistle and dammed the Spanish Fork River, causing the formation of Thistle Lake.

A major event like Thistle is not a high frequency event, but Utah does see frequent smaller landslides each year. The City Creek Canyon landslide occurred only three miles west of campus but in an area with much steeper slopes and more housing.

The latest Landslide Susceptibility Map (2007) from the Utah Geological Society demonstrates that the foothills adjacent to campus have low to moderate susceptibility, based on slope angles from five to seven degrees (low) and from seven to 18 degrees (moderate). The map is available at https://ugspub.nr.utah.gov/publications/maps/m-228/m-228.pdf.

Severity

The Thistle landslide was severe, causing the destruction of an entire community and the mandatory relocation of its population. Northern Utah landslides have been less destructive overall but severe for the residents affected. In general, steeper slopes provide for more severe consequences for rockfall, and wet unstable soils provide for more severe consequences for debris flow. With moderate slopes and dry soils in the foothills near campus, we expect our severity to be low for a non-earthquake induced landslide. Further studies are justified to determine severity of a local landslide following an earthquake.

Historical Losses and Impacts

The Thistle event was the costliest single landslide in U.S. history. Some estimates have been placed at over $200 million. Social and economic impact was staggering for both the town and the state. A more conservative estimate of losses and impacts can be seen in the City Creek Canyon event in 2006: four homes were directly threatened, and protection efforts for one house exceeded $300,000.00. There are other locations along the Wasatch Front that are currently being closely watched by experts as some ground shifting has already been experienced in those areas.

Designated Hazard Areas

There are no formal areas within the campus boundaries designated as landslide hazard areas. However, prudence indicates that attention should be paid to construction in the section of the campus abutting the foothills. Currently, there is a strip of low sloping land approximately 500 feet wide behind and above the Health Sciences campus before the foothills present a much steeper slope. This area could be considered a buffer zone to mitigate the effects of a mass earth movement toward university property. Such is the premise of the Heritage Preserve.

Terrorism and Acts of Violence

TABLE: SUMMARY OF RISK FACTORS	
Period of occurrence:	Random
Probability of event(s):	Believed to be low, currently
Warning time:	Very short, though sometimes threats precede violence.
Major contributor(s):	Unpopular policies, research practices
Risk of injury?	High
Potential for facilities shutdown?	High
Percent of affected properties that may be destroyed or suffer major damage:	<1%

Hazard Profile Data

The FBI defines terrorism as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof in furtherance of political or social objectives. Domestic terrorism is the unlawful use or threat of use of force or violence by a group or individual based and operating entirely within the United States. International terrorism is that unlawful use of force or violence committed by a group or individual having some connection to a foreign power or whose activities transcend national boundaries.

At its core, terrorism seeks to gain recognition, coerce, intimidate, and/or provoke. Tactics include any weapon or device that is intended or has the capability to cause death or serious bodily injury to a significant number of people through the release, dissemination, or impact of toxic or poisonous chemicals or their precursors; a disease organism or radiation source; any explosive, incendiary or poison gas, bomb, grenade, or rocket with a propellant charge of more than four ounces, or a missile having an explosive or incendiary charge of more than one quarter ounce, or mine or device similar to the above; poison gas; any weapon that is designed to release radiation or radioactivity; or any weapon involving a disease organism.

Terrorist goals appear to be increased body counts of their perceived enemies, creation of public anxiety, and undermined confidence in government. To further complicate planning efforts, international terrorists often opt for martyrdom rather than survival.

The FBI further defines potential threat element(s) (PTE) as any individual or any group of individuals regarding whom there are allegations or information indicating the possibility of the unlawful use of force or violence. When such information is viable it will provide cause for investigation. An analysis of motivations provides insight into the specific sites at the university in which a PTE might have an interest. Any such sites that exist at the University of Utah are considered by experts to be low risk when contrasted with similar or other sites at other institutions elsewhere in the United States.

Background and Local Conditions

There have been no international terrorist attacks on or in Utah.

Historical Frequency and Probability of Occurrence

In the past 20 years, there have been three major successful terrorism attacks in the US: 1993 World Trade Center, 2001 World Trade Center, and Pentagon. None have occurred in Utah.

Severity

Potentially high.

Historic Losses and Impacts

None.

Designated Hazard Areas

None.

Acts of Violence

TABLE: SUMMARY OF RISK FACTORS	
Period of occurrence:	Random
Probability of event(s):	Low to moderate
Warning time:	Short—though suicide threats are sometimes made prior to acts of violence.
Major contributor(s):	Among the general behavioral commonalities, difficulty coping with significant losses or personal failures (mostly perceived failures), access to and prior use of weapons prior to the attack, and a history of suicide attempts or suicidal thoughts
Risk of injury?	Moderate
Potential for facilities shutdown?	Moderate
Percent of affected properties that may be destroyed or suffer major damage:	Low

Hazard Profile Data

Violence between strangers, among acquaintances, and in relationships is present on college and university campuses as in society. In light of institutional commitments to education, development, and personal safety of individuals, acts of violence on campus are particularly damaging. Persons and institutions are harmed, sometimes in irreparable ways. Assault, rape, abuse, harassment, and other behaviors inappropriate in civilized society and in a learning environment are included in this category.

There are a number of unique factors that contribute to persons becoming victims of acts of violence: youthful indiscretion and lack of judgment are present; freedom of expression frequently means freedom to experiment behaviorally; the very open physical environment; the more people present, the greater the opportunity for impersonal experiences and increases in a sense of insignificance; small campuses may experience rumor mills and pressure cooker intensity.

There are a number of unique factors that contribute to persons becoming victims of acts of violence:

- Youthful indiscretion and lack of judgment
- Freedom of expression manifesting as freedom to experiment behaviorally
- Open physical environment
- Increased opportunity for impersonal experiences and sense of insignificance among large university population
- Rumor mills and pressure cooker intensity on small campuses

Background and Local Conditions

The University of Utah has had some acts of violence reported during the last sixty years. There have been several suicides, sexual assaults, rapes, and other violent assaults. The two most recent events are as follows:

- On October 22, 2018, University of Utah student-athlete Lauren McCluskey was fatally shot outside her dorm.
- On October 30, 2017, ChenWei Guo, an international student from China, was fatally shot. The University of Utah campus was put on lockdown as officers responded to the incident.

The most common type of event is related to burglary, both automotive and through intrusion into office spaces. There have also been several reports of armed robbery in recent years but none resulting in personal injury.

Historical Frequency and Probability of Occurrence

According to the university, the following statistics are provided in the Annual Security and Fire Safety report.

CRIMINAL OFFENSES ON AND OFF CAMPUS

Clery Act Crime Statistics

***Residence Hall numbers are included in the On-Campus report*

Criminal Offenses	2017								2018								2019							
	On-Campus		Off-Campus		St. George GC	Sandy Center	Unfounded	Total	On-Campus		Off-Campus		St. George GC	Sandy Center	Unfounded	Total	On-Campus		Off-Campus		St. George GC	Sandy Center	Unfounded	Total
	On-Campus	Residence Hall	Public Property	Non-Campus					On-Campus	Residence Hall	Public Property	Non-Campus					On-Campus	Residence Hall	Public Property	Non-Campus				
Murder/Non-negligent Manslaughter	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Negligent Manslaughter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sex Offenses																								
Rape	11	9	0	4	0	0	4	15	11	7	0	1	0	0	0	12	17	9	0	3	0	0	1	20
Fondling	14	2	0	3	0	0	0	17	30	3	1	0	0	0	1	31	18	6	0	1	0	0	0	19
Incest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Statutory Rape	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Robbery	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Aggravated Assault	5	1	2	1	0	0	0	8	4	0	0	0	0	0	0	4	5	0	1	0	0	0	0	6
Burglary	23	5	0	5	0	0	0	28	40	16	0	0	0	0	0	40	21	4	0	0	0	0	0	21
Motor Vehicle Theft	34	0	1	5	0	0	0	40	13	0	0	0	0	0	0	13	18	0	0	0	0	0	0	18
Arson	1	0	0	0	0	0	0	1	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
VAWA OFFENSES																								
Domestic Violence	23	6	2	1	0	0	0	26	20	6	4	0	0	0	0	24	18	7	1	0	0	0	0	19
Dating Violence	0	0	0	1	0	0	0	1	3	0	0	0	0	0	0	3	8	5	0	0	0	0	0	8
Stalking	17	2	0	1	0	0	0	18	30	8	0	0	0	0	0	30	62	9	0	0	0	0	0	62
ARRESTS																								
Weapons	6	0	1	1	0	0	0	8	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
Drugs	44	4	1	11	0	0	0	56	58	6	0	0	0	0	0	58	47	6	0	0	0	0	0	47
Alcohol	3	0	0	6	0	0	0	9	5	5	0	0	0	0	0	5	5	0	0	0	0	0	0	5

Source: https://safety.utah.edu/

Severity

Burglary offenses lead the list of University of Utah violence hazards.

Historical Losses and Impacts

The University of Utah crime statistics are collected and maintained by University Police.

Designated Hazard Areas

None.

Wildfire (Fire Hazard)

TABLE: SUMMARY OF RISK FACTORS		
	Day-to-Day	**Catastrophic**
Period of occurrence:	Potentially annually	Low
Probability of event(s):	Moderate to low	Low
Warning time:	Hours	Hours
Major contributor(s):	Wet spring followed by a dry, hot summer; people; lightning	Wet spring followed by a dry, hot summer; people; lightning
Risk of injury?	None	Low
Potential for facilities shutdown?	None	Low
Percent of affected properties that may be destroyed or suffer major damage:	0%	<5%

Hazard Profile Data

Lightning is the culprit for causing the majority of wildfires in the western United States. In fact, the majority of the wildfires occurring in Utah are the result of lightning strikes.

Utah is generally considered to be in a very dry and arid climate. The types of vegetation found in much of the state, with the exception of developed and urban areas, provide an unfortunately very hospitable site for potential wildfires.

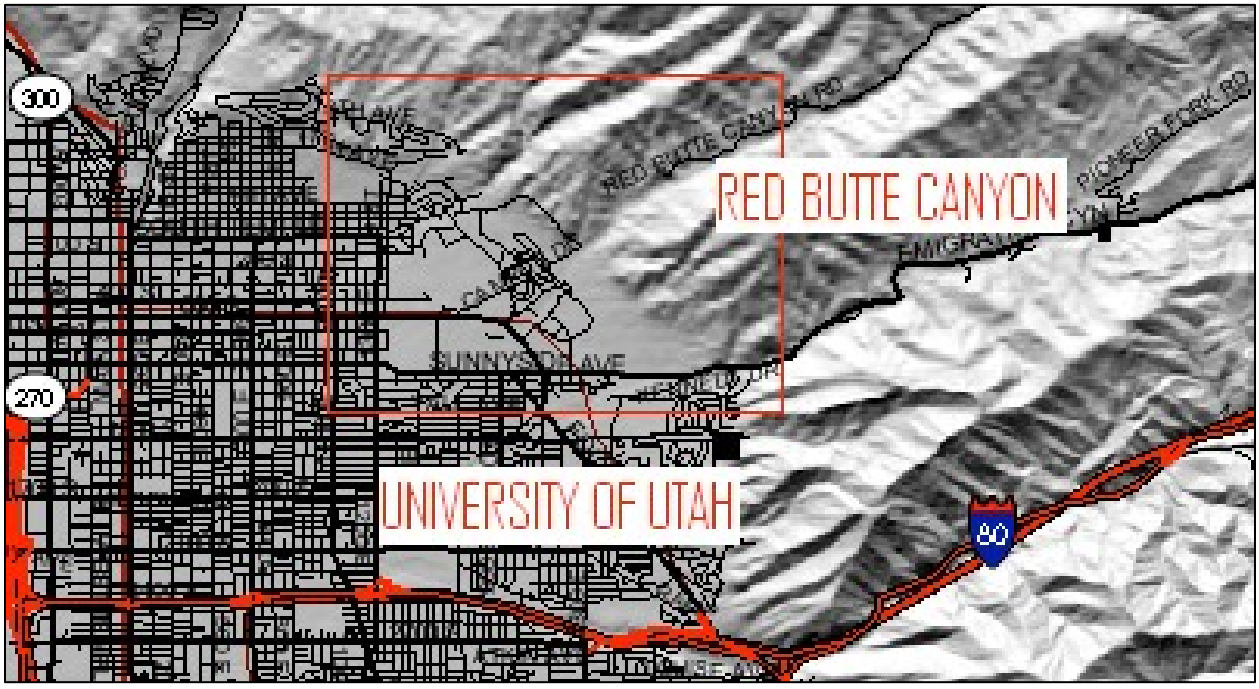
The Wasatch Front is a prime example of a classic wildland interface zone. The University of Utah's main campus is located in this zone, classified as the Classic Interface Area under the Urban-Wildland classification. In this zone, structures are in close proximity to wildland vegetation. This is true for the entire eastern margin of the campus at the University of Utah. Each spring the vegetation in this area evolves into ready fuel for wildfires, only waiting for something (or someone) to ignite it.

Background and Local Conditions

The University of Utah is located on the northeast bench of the Salt Lake Valley against the foothills of the Wasatch Mountains. These foothills are extensively vegetated with native grasses and other types of plants that change from relatively lush and green to dry and brown. In a typical year, this drying out occurs as early as late May or June.

The map below shows the proximity of the University of Utah to the adjacent foothills. The campus appears as the triangular-shaped light gray area, above or north of the street labeled as "Sunnyside Ave."

IMAGE: WILDFIRE VULNERABILITY



After winters with below average precipitation, the risk of wildfires evolves much earlier in the year. Conversely, an exceptionally wet winter will stimulate additional and thicker growth of vegetation. Even though fire season may then start later in the season, an untimely wildfire could be more severe as it takes advantage of the additional fuel.

Historical Frequency and Probability of Occurrence

The School Land Trust in Utah owns approximately 3.3 million acres of mostly undeveloped property across the state. The University of Utah is a substantial stakeholder in this trust. Some properties have been minimally impacted by fires in those remote areas but without any serious threat being posed on the university's people or assets and without any reports of casualties or loss of assets. No reports have been recorded relating to any significant events impacting lands or assets controlled by the University of Utah.

Individuals associated with the campus in the past may remember the 1960s fire on the hillside around the Block U. Several decades ago, the hillsides and ridges several miles up Emigration Canyon were in flames, threatening homes in the canyons as the fires raced south toward Parleys Canyon. That fire did not constitute a threat to any asset or individual associated with the University of Utah.

During the last two decades, two fires occurred in Red Butte Canyon on U.S. Forest Service property. Both of these fires were contained relatively quickly through the efficient response of firefighters, and neither presented an immediate threat to university property or personnel, although at least one caused a great deal of anxiety on the part of staff at Red Butte Gardens. However, prevailing winds at the time reversed themselves on a timely basis, driving the flames and smoke back uphill and away from the Gardens' assets.

It is a matter of interest to recognize that none of the fires close to the university were caused by lightning—each one was reported as resulting from human activity.

In 2006, there was a small fire reported in the area of the Lime Kilns (located north of and away from the main campus in a predominantly residential area). It was not considered a wildfire, as it was mostly confined to some debris and vegetation within the kilns themselves. Allegedly, careless individuals hosting a clandestine party at the site ignited it.

Officials at the University of Utah are sensitive to the reality that the campus is bordered on its eastern edge by dry grasses and other vegetation, and that at any time during every summer a wildfire could occur in this neighborhood. This potential is further emphasized by the frequent and high use of the Bonneville Shoreline Trail by thousands of individuals during the course of the year, whether on foot or on bike. The university routinely enforces its posted policy prohibiting the unauthorized use of motorized vehicles on its section of the trail and subordinate trails.

These trails provide open access to anyone wanting to use them, including during the July 4th celebrations. Although discouraged, it is not unusual for families to spend considerable time on the trail during the late evening of July 4th, watching the official fireworks displays around the valley and occasionally setting off some of their own (legal or otherwise). Risk is omnipresent.

Severity

There have been no reports of wildfires directly impacting assets or populations associated with the University of Utah. Therefore, the potential severity of such events is considered to be extremely minimal. However, Building 590 on the university's campus, which is located at the mouth of Red Butte Canyon, contains a significant volume of hazardous and flammable materials that require regular secure management and fire protection. Although unlikely, if a fire broke out within this building, the consequences could be severe for the surrounding area.

Historical Losses and Impacts

The University's Office of Risk Management has reported no losses due to wildfire. Unfortunately, we were not able to locate any modeling tools to guide us in calculating structural damage or casualties as a result of wildfires. Given the university's fortunate history with wildfires, however, it is prudent to presume that any damage will be minimal, with no deaths or other casualties resulting from any such event. Reasonable precautions and communication channels are in place to help assure these continued successes.

Designated Hazard Areas

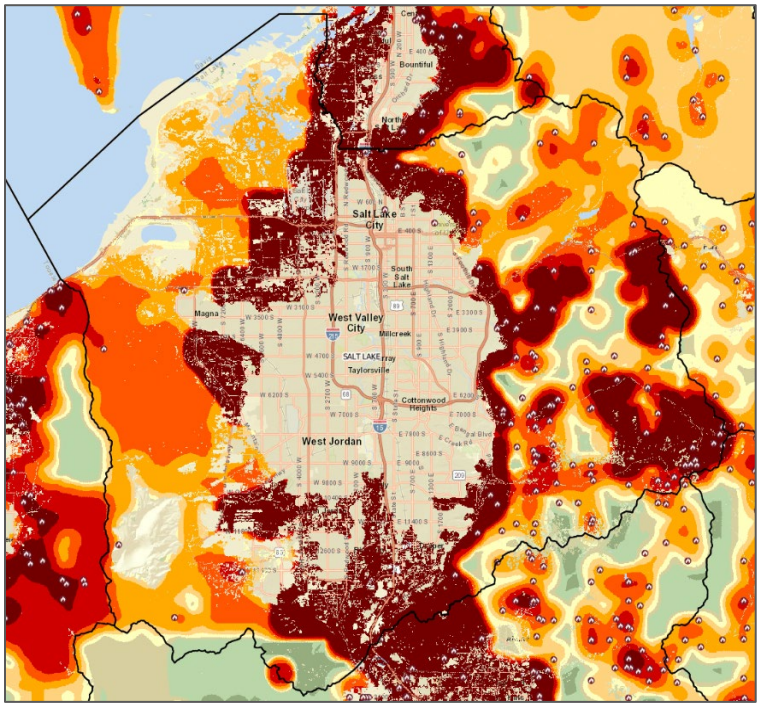
The recognized hazard area extends along the eastern edge of the University of Utah, beginning at Tomahawk Drive to the north and terminating near This is the Place State Park to the south. University facilities such as the Regulated Waste Facility and properties at the Red Butte Gardens

are certainly close to where the action could be but benefit from effective incorporation of firefighting systems and dedicated management plans.

To eradicate any threat to its buildings, programs, and people, the university requires adequate safe zones between its buildings and the natural terrain. During the design and construction of all new facilities in this area, all pertinent fire codes are met or exceeded. This applies to the growing Huntsman Cancer complex as well as the new Utah Museum of Natural History (UMNH) facility. University planners who are aware of the wildfire risk in this area were deeply involved in causing the design of this building and the layout of its site to be as "wildfire proof" as possible.

The university insists on assuring that firefighters will have reasonable access to any corner of every structure and that they will be able to pull adequate water from firefighting systems.

IMAGE: HISTORICAL AND PROBABLE WILDFIRE IGNITION POINTS



Source: West Wide Wildfire Risk Assessment

Hazardous Materials and Laboratory Accidents

TABLE: SUMMARY OF RISK FACTORS		
	Day-to-Day	**Catastrophic**
Period of occurrence:	Potentially daily	Low
Probability of event(s):	Moderate	Low
Warning time:	Minutes/hours	Minutes/hours
Major contributor(s):	Research and storage	Research and storage
Risk of injury?	Low to moderate	Low to moderate
Potential for facilities shutdown?	Low to moderate	Low to moderate

Percent of affected properties that may be destroyed or suffer major damage:	20%	20%

Hazard Profile Data

Hazardous materials are substances that can cause injury, death, chronic health impacts, property damage, and environmental damage if released or misused. Hazardous materials may include industrial chemicals, laboratory chemicals, hazardous waste (byproducts of the use of one or more hazardous chemicals), cleaning products, fertilizers, gasoline, other fuel oils, and radiological materials.

In recent years, serious accidents, including a preventable fatality, have occurred in other universities' laboratories. These incidents emphasize the importance of compliance with safety programs, policies, and practices in academic labs, as identified in a recent laboratory safety audit conducted in 2019.

Background and Local Conditions

The university utilizes hazardous materials in a number of locations and for a variety of purposes and are routinely stored in various campus facilities. This includes research-oriented use in laboratory environments, teaching aids in laboratory environments (such as a chemistry laboratory), building systems (HVAC, etc.), and maintenance operations (paints, solvents, fuels, etc.).

Building 590, located at the mouth of Red Butte Canyon, contains a significant volume of hazardous materials that require regular secure management and fire protection.

Between 2016 and 2019, the university spent $20 million on safety measures, including fume hoods, emergency eye washes and showers, chemical storage solutions, and fire alarm system upgrades.

Historical Frequency and Probability of Occurrence

Many research laboratories, teaching laboratories, and maintenance groups at the university regularly work with hazardous materials. The university maintains an Environmental Health and Safety Office, which is an advisory and service-oriented organization charged with promoting occupational/environmental health and safety programs and support to University of Utah operations. Although safety and emphasis on laboratory safety has increased significantly in recent years on campus, especially in light of a recent laboratory safety audit conducted in 2019, accidents may still occur.

Although no reported fatalities have occurred in recent years, chemical burns and injuries due to lab-related accidents have happened.

Severity

Incidents can result in minor injuries but can also be severe and even fatal, as demonstrated in a UCLA-related lab accident in 2008. Property damage may also occur.

Additionally, if a fire broke out within Building 590 or the hazardous materials held there were compromised in some way, the consequences could be severe for the surrounding area.

Designated Hazard Areas

All facilities utilizing and storing hazardous materials are at risk.

Hazard Risk Ranking

TABLE: HAZARD RISK RANKING			
Hazard Event	**Probability Factor**	**Sum of Weighted Impact Factors**	**Total (Probability x Impact)**
Earthquake	2	30	60
Severe Winter Weather	3	19	57
Severe Weather	3	15	45
Wildfire	2	22	44
Public Health Epidemic/Pandemic	2	21	42
Hazardous Materials Incident *(includes laboratory-related incidents)*	3	13	39
Flooding	2	19	38
Cyber Attack	2	18	36
Drought	2	14	28
Civil Disturbance	2	13	26
Dam Failure	1	26	26
Terrorism and Acts of Violence	1	25	25
Tornado	1	11	11
Landslide and Slope Failure	1	9	9
Radon	2	3	6
Avalanche	1	0	0

*To access full probability and impact scores, please click this link to download the Excel file.



SLC2019HMP-U.ofUtah(1.0).xlsx

Goals

In addition to supporting Salt Lake County's established goals in the Multi-Jurisdictional Hazard Mitigation Plan, the university has established its own goals, which are below:

Preserve life safety.

- Reduce the risk of catastrophic failure in occupied spaces.
- Minimize secondary hazards in occupied spaces.
- Protect critical response facilities.

Protect university assets and investments.

- Reduce the risk of catastrophic failure in high value spaces.
- Minimize secondary hazards to high value assets.
- Protect the greater environment.

Ensure continuity of mission critical functions.

- Reduce the risk of catastrophic failure to critical infrastructure.
- Minimize disruption to critical support functions.
- Protect business resumption capabilities.

Mitigation Strategies and Actions

2021 Mitigation Strategies Progress & Summary

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the university will accomplish the overall purpose, or mission, of the planning process. In this section, mitigation actions/projects were updated/amended, identified, evaluated, and prioritized. This section is organized as follows:

- New Mitigation Actions—New actions identified during this 2021 update process.
- Ongoing Mitigation Actions—Ongoing actions with no definitive end or that are still in progress. During the 2021 update, these "ongoing" mitigation actions and projects were modified and/or amended as needed.
- Completed Mitigation Actions—An archive of all identified and completed projects, including completed actions since 2009.

Mitigation Table—New Actions

TABLE: NEW MITIGATION ACTION 1 Mitigation Project: Demolish the Medical Research and Education Building (MREB), constructed in 1949, and the School of Medicine (SOM) building, constructed in 1961.							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	High	2025	$40,600,000	High
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**	
Goals: 1, 2, 6		Earthquake	Reduced direct property damage, including buildings, contents, and the building's lifeline services connecting to adjacent facilities. Reduced direct "business" interruption loss, including campus operations, class sessions, and research activities.		High	Campus funds, grants	
Action/Implementation Plan and Project Description:							
Both buildings were constructed long before current, modern seismic requirements were in place. They have been evaluated for seismic retrofit and determined to be cost-prohibitive to upgrade. Plans are in place to vacate both buildings, but no funding has been identified to demolish them.							

TABLE: NEW MITIGATION ACTION 2 **Mitigation Project: Seismically retrofit the 13-story, 92,924 sq. ft. Social and Behavioral Science Building, constructed in 1971, which houses the College of Social and Behavioral Sciences.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2018	University of Utah	University of Utah	N/A	High	2024	$6,710,000	High
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**	
Goals: 1, 2, 6		Earthquake	Reduced direct property damage, including buildings, contents, and the building's lifeline services connecting to adjacent facilities. Reduced direct "business" interruption loss, including campus operations, class sessions, and research activities.	High		Grants, state, and campus funds	
Action/Implementation Plan and Project Description:							
This work will continue a previous project that corrected a weak story and added shear walls at levels 1 through 4. This project will re-anchor 86 deficient precast concrete exterior panel connections (levels 5 through 13). When completed, the project will have eliminated hazards related to falling exterior pre-cast concrete cladding during a seismic event by correcting weak anchor points at 86 precast panels at floors 5 through 13.							

TABLE: NEW MITIGATION ACTION 3 **Mitigation Project: Seismically remediate the Life Sciences building, which includes the original 4-story 1918 building and 1939 addition with no isolation joint between the two buildings. The work will include repairing numerous connection deficiencies.**

Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	High	2023	$7,627,366	Medium

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
Goals: 1, 2, 6	Earthquake	Reduced direct property damage, including buildings, contents, and the building's lifeline services connecting to adjacent facilities. Reduced direct "business" interruption loss, including campus operations, class sessions, and research activities.	High	Grants, state, and university funds

Action/Implementation Plan and Project Description:

For the 36,868 sq. ft. Life Sciences Building, the seismic mitigation work will include: 1. Install new concrete shear walls. 2. Install steel chord reinforcing at the perimeter of each floor. 3. Strengthen the unreinforced masonry piers. 4. Install roof shear wall sheathing. 5. Strengthen the roof diaphragm. 6. Repair damaged concrete joists. 7. Remove unreinforced masonry chimney. 8. Repair spalling concrete panels. 9. Verify if additional beam and girder supports are required.

TABLE: NEW MITIGATION ACTION 4
Mitigation Project: Seismically retrofit the 58,205 sq. ft. William Browning Building, constructed in 1971, which houses the College of Mines and Earth Sciences.

Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2020	University of Utah	University of Utah	N/A	High	2024	$4,800,000	High

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
Goals: 1, 2, 4, 6	Earthquake	Reduced direct property damage, including buildings, contents, and the building's lifeline services connecting to adjacent facilities. Reduced direct "business" interruption loss, including campus operations, class sessions, and research activities.	High	Grants, state, and university funds
Action/Implementation Plan and Project Description:				
The structural issues include many deficient wall piers at the lower levels, including 5 out of 12 shear walls on level 1, 11 out of 20 shear walls on level 2, and 1 out of 20 shear walls on level 3. The seismic upgrade includes applying reinforced shotcrete to shear walls, which have been determined to be inadequate. Use composite fiber wrap as confinement reinforcement where appropriate.				

TABLE: NEW MITIGATION ACTION 5 **Mitigation Project: Enhance security at critical public safety and technology infrastructure sites. Develop and implement a CIKR Security/Hardening Program.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	Medium	Ongoing	Medium	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**	
Goals: 1, 2, 3		All hazards	High	High		General funds	
Action/Implementation Plan and Project Description:							

TABLE: NEW MITIGATION ACTION 6 **Mitigation Project: Support Disaster Recovery Program by developing and updating key plans, strategies, and recovery protocols.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	High	Ongoing	Medium	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**	
Goals: 1, 2, 5		All hazards	Medium		High	BRIC, HMGP, capital improvement budgets, bonds, state funds	
Action/Implementation Plan and Project Description:							

TABLE: NEW MITIGATION ACTION 7 **Mitigation Project: Retrofit critical facilities, infrastructure, and buildings that are mission critical to the university in order to withstand earthquakes and other geologic hazards.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	High	Ongoing	High	High
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)		**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**	
Goals: 1, 2, 5		Earthquake	High		High	BRIC, HMGP, capital improvement budgets, bonds, state funds	
Action/Implementation Plan and Project Description:							

TABLE: NEW MITIGATION ACTION 8 **Mitigation Project: Installing shutoff valves and emergency connector hoses where water mains cross fault lines.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	High	Ongoing	High	High
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**	
Goals: 1, 2, 5		Earthquake	High	High		BRIC, HMGP, capital improvement budgets	
Action/Implementation Plan and Project Description:							

TABLE: NEW MITIGATION ACTION 9 **Mitigation Project: Assess high-pressure pipelines to ensure they meet seismic standards. Conduct upgrades, as needed.**							
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost**	**Cost Analysis** (Low, Medium, High)
2021	University of Utah	University of Utah	N/A	Medium	Long-term	High	High
Applicable Goal(s)		**Hazard(s) Mitigated**	**Benefits** (Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**	
Goals: 1, 2, 3, 5		Earthquake	High	High		Campus funds, HMA grants	
Action/Implementation Plan and Project Description:							

Mitigation Table—Ongoing Actions

TABLE: ONGOING MITIGATION ACTION 1 Mitigation Project: Assign responsibility for leading mitigation planning efforts on campus.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Administrative Services; Associate Vice President, Facilities; Director, Space Planning and Management; Executive Director, Environmental Health and Safety	High	Stage 1; Short-term; Less than 1 year	Enterprise	Low No additional cost involved; utilize existing staff.
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments; protect critical response facilities.		All hazards	A clear, campus-wide identification of the champion for mitigation planning.	High		Campus funds	
Action/Implementation Plan and Project Description:							
2021 Status: The full update of the plan will take place in 2021.							

TABLE: ONGOING MITIGATION ACTION 2 Mitigation Project: Revisit and update the mitigation plan at least once every five years as a component of the campus' master planning process.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority**	**Timeline/Projected Completion Date**	**Level**	**Cost Analysis**

				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)		(Low, Medium, High)
Ongoing	2009	University of Utah	Administrative Services; Associate Vice President, Facilities; Executive Director, Environmental Health and Safety	High	Stage 3; Long-term; Every 5 years	Enterprise	Low Some additional cost involved if outside consultants are used to update the entire campus master plan or if additional staff resources are required.

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments.	All hazards	A previously established and well-accepted process will have a strong integration with pre-disaster mitigation planning activities.	High	E&G

Action/Implementation Plan and Project Description:

Update includes new data like buildings, populations, and economic factors. Maintain status with BRIC funding opportunities. Keep senior administrators aware of PDM priorities.

2021 Status: The full update of the plan will take place in 2021.

TABLE: ONGOING MITIGATION ACTION 3
Mitigation Project: Design and make available training programs designed to educate campus constituents on comprehensive emergency management.

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)

Ongoing	2009	University of Utah	Administrative Services; Emergency Management Director; Executive Director, Environmental Health and Safety	High	Stage 2; Long-term	Enterprise	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments.	All hazards	Increased awareness by all university constituents of risks, threats, challenges, and opportunities associated with the various types of disasters—thereby reducing individual and institutional vulnerabilities. Individual mitigation actions items have a greater likelihood of success. Administrators will have greater comprehension of benefits of implementing mitigation actions at the enterprise level.	High	E&G

Action/Implementation Plan and Project Description:
2021 Status: Ongoing

TABLE: ONGOING MITIGATION ACTION 4 Mitigation Project: Ensure that the capital improvement prioritization process includes seismic upgrades.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Senior Vice President, Academic Affairs; Administrative Services; Associate Vice President, Facilities	High	Stage 2, 4; Long-term	Enterprise	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments; protect critical response facilities.	All hazards	Opportunity to build upon and strengthen existing successful funding processes. Builds relationship between BRIC, capital improvement, and master planning. Ultimate result is safer buildings.	High	E&G

Action/Implementation Plan and Project Description:
2021 Status: Ongoing and progress has been made as indicated in this annex.

TABLE: ONGOING MITIGATION ACTION 5 Mitigation Project: Conduct a department-wide risk assessment to identify falling hazards, potential hazardous material spills, and other hazards that would impact rapid evacuation.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority**	**Timeline/Projected Completion Date**	**Level**	**Cost Analysis**

				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)		(Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Senior Vice President, Academic Affairs; Executive Director, Environmental Health and Safety; Emergency Management Director	High	Stage 1; Short-term	Departmental	Low Departments need to reassign existing resources to plan and schedule risk assessments; learn how to conduct risk assessments. No additional cost; utilize existing staff.

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments.	All hazards	Involvement of internal staff will create an awareness of the risks. Trigger remedial activities on the parts of those who will benefit the most. Establish baseline future risk assessments, future behavior to remove obstructions. Create “don't do that again” policy statements.	High	N/A

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update.

TABLE: ONGOING MITIGATION ACTION 6 Mitigation Project: Identify high value assets at risk of loss and move them to safety.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Senior Vice President, Academic Affairs; Executive Director, Environmental Health and Safety; Manager, Risk, and Insurance Management	High	Stage 1; Short-term	Departmental	Low No additional cost; utilize existing staff.
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments.		All hazards	Avoid loss of assets, records, and research. Reduce insurance costs and payouts.	High		N/A	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 7 Mitigation Project: Evolve the mitigation efforts in the department into a comprehensive emergency management committee to coordinate efforts college-wide during 2010.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Senior	High	Stage 1; Short-term	Departmental	Low

			Vice President, Academic Affairs; Executive Director, Environmental Health and Safety; Emergency Management Director				No additional cost; utilize existing staff.

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments.	All hazards	Create an awareness of opportunities for mitigation at the department/college level. Contribute to an institution level effort.	High	N/A

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update.

TABLE: ONGOING MITIGATION ACTION 8
Mitigation Project: Appoint a mitigation coordinator in each department to review mitigation actions affecting contents of specific buildings. ("Contents" refers to furnishings and personal items, etc.)

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors	High	Stage 1; Short-term	Departmental	Medium Large organizations may have to find financial resources to hire an additional FTE.

							Departments may be able to use existing staff or share resources among departments.

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets and investments; protect critical response facilities.	All hazards	Assure that related activities identified at the college/department level are in fact implemented. Modify behavior. Reduces or eliminates risk of loss or casualties.	High	E&G

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update.

TABLE: ONGOING MITIGATION ACTION 9
Mitigation Project: Conduct a non-structural risk assessment of departmental spaces in 2009–2010. Identify high-profile filing cabinets and other freestanding shelves to bolt to walls; identify fixed-shelves over workstations; identify other heavy or valuable objects above shoulder-height.

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors	High	Stage 1; Short-term	Departmental	Low Utilize existing staff; no additional cost.

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**

Preserve life safety; protect university assets and investments.	All hazards	Will result in an action list for mitigation actions to be funded and implemented at the local level.	High	E&G
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing, and will be further assessed in the 2021 update.				

TABLE: ONGOING MITIGATION ACTION 10 **Mitigation Project: From departmental risk assessments, prioritize mitigation actions and implement them as resources and policies permit where the department will obtain the "biggest bang for your buck."**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors	High	Stage 1; Ongoing	Departmental	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments		All hazards	Reduce exposure to loss of assets and casualties. Assure completion of mitigation actions in a sequence most beneficial to the department and the institution.	High		E&G, CF&R, G, and Dv.	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 11 Mitigation Project: Discourage individuals from bringing personal items into workspaces that they do not wish to have damaged or lost.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Executive Director, Environmental Health and Safety; Manager, Risk Management	Medium	Stage 4; Ongoing	Departmental	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Protect university assets and investments	All hazards	Eliminate loss of personal property (from hazard or theft) not covered by the institution's insurance policies. Aids in rapid evacuation if people are not "rescuing" personal effects.	High	E&G

Action/Implementation Plan and Project Description:
2021 Status: Ongoing

TABLE: ONGOING MITIGATION ACTION 12 Mitigation Project: Direct faculty and staff (especially essential personnel) to create a personal emergency kit.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority**	**Timeline/Projected Completion Date**	**Level**	**Cost Analysis** (Low, Medium, High)

				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)		
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Emergency Management Director; Risk Management	High	Stage 4; Short-term	Departmental	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety.	All hazards	Essential personnel will be able to respond in emergency situations. Encourages self-sufficiency for non-essential personnel during and after disasters.	High	E&G

Action/Implementation Plan and Project Description:

2021 Status: Ongoing

TABLE: ONGOING MITIGATION ACTION 13 **Mitigation Project: Evaluate the location of essential functions with regard to earthquake survivability during 2010–2011.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Vice President Administration in consultation with the President's Cabinet; Deans, Chairs, Directors;	High	Stage 2, 5; Short-term	Enterprise	Low

			Associate Vice President, Facilities				
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments		Earthquake	Protect the lives of essential personnel. Assure the uninterrupted capability of essential functions.	High		N/A	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing							

TABLE: ONGOING MITIGATION ACTION 14 **Mitigation Project: Identify all buildings with unrestrained mechanical equipment, etc., on rooftops; place each on a funding-needed list for mitigation.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Associate Vice President, Facilities	High	Stage 2, 5; Short-term	Enterprise	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments.		Earthquake	Develop funding strategies for mitigation.	High		N/A	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 15 **Mitigation Project: Identify at-risk utility lifelines to mission critical buildings.**

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Associate Vice President, Facilities	Medium	Stage 2, 3; Long-term	Enterprise	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Protect university assets and investments.	Earthquake	Permits facilities staff to develop funding strategies for replacement of at-risk systems.	High	N/A

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update. Some progress has been made as indicated in the annex.

TABLE: ONGOING MITIGATION ACTION 16
Mitigation Project: Prohibit the installation of shelves over workspaces.

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Executive Director, Environmental Health; Manager, Risk Management; Director, Plant Operations	High	Stage 1; Short-term, Ongoing	Departmental	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect	Earthquake	Reducing injury due to falling hazard.	High	N/A

university assets and investments.		Implementation of this policy at the department level will allow deans/directors to avoid new installations.		
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing, and will be further assessed in the 2021 update.				

TABLE: ONGOING MITIGATION ACTION 17 Mitigation Project: Host earthquake awareness training for departmental faculty and staff during 2009–2010.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Emergency Management Director; Vice President, Student Affairs	High	Stage 3; Short-term	Departmental	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments.		Earthquake	Familiarize university stakeholders with risks associated with seismic events in their specific locations. Train them with actions to take during and after an event. Reduce risk of injury or loss of assets.	High		N/A	
Action/Implementation Plan and Project Description:							

2021 Status: Ongoing, and future opportunities to educate will be considered.

TABLE: ONGOING MITIGATION ACTION 18 Mitigation Project: Inventory hazardous materials in laboratories using the new campus web-based chemical inventory tool.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Executive Director, Environmental Health	High	Stage 4; Short-term, Ongoing	Departmental	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Preserve life safety; protect university assets and investments.		Earthquake	Support implementation lab-specific mitigation actions. Identify EHS programs to protect workers and environment. Reduce risk of injury or loss of assets.	High		N/A	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 19 Mitigation Project: Read the "Putting Down Roots in Earthquake Country" brochure (Utah version) during 2009–2010.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority**	**Timeline/Projected Completion Date**	**Level**	**Cost Analysis** (Low, Medium, High)

				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)		
Ongoing	2009	University of Utah	Deans, Chairs, Directors, Administrators; Individuals	High	Stage 1; Short-term	Individual	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect university assets andinvestments.	Earthquake	Familiarize university stakeholders with risks associated with seismic events. Help prepare them for potential events.	High	N/A

Action/Implementation Plan and Project Description:

2021 Status: Ongoing

TABLE: ONGOING MITIGATION ACTION 20
Mitigation Project: Examine your individual workspace, including common areas, and take action to move heavy objects from high shelves, bolt cabinets to walls, and make sure evacuation routes are not blocked.

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors, Administrators; Individuals	High	Stage 3; Ongoing	Individual	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Preserve life safety; protect	Earthquake	Promotes individual responsibility.	High	E&G, CF&R, CI, G, Dv

university assets andinvestments.		Reduce risk of injury due to falling hazards. Reduce need to replace items on shelves and in cabinets.		
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing, and will be further assessed in the 2021 update.				

TABLE: ONGOING MITIGATION ACTION 21 Mitigation Project: Develop a wildfire prevention and response plan.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Executive Director, Environmental Health and Safety	Medium	Stage 5; Ongoing	Enterprise	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Wildfire	Reduce risk of out-of-control wildfires in the foothills.	High		E&G	
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 22 Mitigation Project: Develop and/or review design guidelines and construction practices for the wildfire-urban interface, including opportunities to prohibit or limit new construction in those zones.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)

Ongoing	2009	University of Utah	Executive Director, Environmental Health and Safety; Associate Vice President, Facilities	Medium	Stage 5; Ongoing	Enterprise	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Protect university assets and investments.	Wildfire	Reduce risk of damage to valuable university assets.	High	

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update.

TABLE: ONGOING MITIGATION ACTION 23
Mitigation Project: Evaluate the cost-benefit ratio of implementing a signage program aimed at reducing the risk of wildfires as a result of smoking, fireworks, open fires, etc., in at-risk areas.

Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Executive Director, Environmental Health and Safety; Associate Vice President, Facilities	Medium	Stage 4; Ongoing	Enterprise	Medium

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Protect university assets and investments.	Wildfire	An effective analysis will help the university determine the most beneficial course of action.	High	CI, E&G, G, Dv

Action/Implementation Plan and Project Description:

2021 Status: Ongoing, and will be further assessed in the 2021 update.

TABLE: ONGOING MITIGATION ACTION 24 Mitigation Project: Become aware of undeveloped and grassy areas surrounding the university that are locations for urban wildfires, and don't start fires in these areas.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Emergency Management Director; Individuals	Low	Stage 1; Ongoing	Individual	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Wildfire	An informed and educated population will exercise greater care while recreating in the foothills.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 25 Mitigation Project: Report fire hazards you observe to University Police.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Individuals	Low	Stage 1; Ongoing	Individual	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Wildfire	Reduced potential for fires to start.	High			

		The campus population will realize that the consequences of inaction are greater than the cost of action.		
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing				

TABLE: ONGOING MITIGATION ACTION 26 **Mitigation Project: Provide flood-plain estimates to managers of buildings along Red Butte Creek.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Executive Director, Environmental Health and Safety; Director, Plant Operations	Low	Stage 3; Ongoing	Enterprise	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Flooding and Inundation	University building managers have better decision-making tools.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 27 **Mitigation Project: Review the Red Butte Creek/Red Butte Dam management plans during 2009–2010 for possible action items.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)

Ongoing	2009	University of Utah	Associate Vice President, Facilities; Executive Director, Environmental Health and Safety; Director, Plant Operations	Low	Stage 4; Ongoing	Enterprise	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Flooding and Inundation	Integration with mitigation plans from other agencies (e.g., Central Utah Water Conservation District).	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will be further assessed in the 2021 update.							

TABLE: ONGOING MITIGATION ACTION 28 Mitigation Project: Know where floods are likely and don't store irreplaceable items where they can be damaged—especially in basements.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors, Administrators; Individuals	Medium	Stage 1; Ongoing	Individual	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect university assets and investments.		Flooding and Inundation	Increased awareness for occupants of buildings along creek.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing							

TABLE: ONGOING MITIGATION ACTION 29 Mitigation Project: Develop a pandemic annex to the university emergency operations plan.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Sr. Vice Presidents, Health Sciences/Academics; Associate Vice President, Facilities Management; Executive Director, Environmental Health and Safety	High	Stage 4; Short-term	Enterprise	Medium
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect life safety		Pandemic	Continuity of operations	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and in progress based on lessons learned during COVID-19							

TABLE: ONGOING MITIGATION ACTION 30 Mitigation Project: Define which functions in the department are essential—cross-train at least two individuals to perform each function. Create checklists to help with cross-training.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; HR	High	Stage 1; Short-term	Departmental	Medium
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	

Protect life safety; protect university assets and investments.	Pandemic		High	
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing				

TABLE: ONGOING MITIGATION ACTION 31 **Mitigation Project: Read the Center for Disease Control handout on Pandemic Preparedness during 2009–2010.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Individuals	High	Stage 1; Short-term	Individual	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect life safety; protect university assets and investments.		Pandemic	Better personal decisions that will support continuity of operations. Minimizing use of sick leave. Reduce health insurance payouts.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing, and will consider new materials based on lessons learned during COVID-19							

TABLE: ONGOING MITIGATION ACTION 32 **Mitigation Project: Develop an active shooter annex to the university emergency operations plan.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)

Ongoing	2009	University of Utah	Vice President, Administration; Chief, University Police; Executive Director, Environmental Health and Safety	High	Stage 4; Short-term	Enterprise	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect life safety; protect university assets and investments.		Human-Caused Events	A streamlined response and communication plan. Reduced risk of injury or death. Reduced risk of insurance payouts or litigation.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing. Progress has been made regarding policies, procedures, training, etc.							

TABLE: ONGOING MITIGATION ACTION 33 Mitigation Project: Develop/review your department plan for reporting security concerns within the department.							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors	High	Stage 4; Short-term	Departmental	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect life safety; protect university assets and investments.		Human-Caused Events	Create awareness of security concerns. Improved tool to help resolve security concerns.	High			

		Identify potential funding needs to resolve issues.		
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing, and will be further assessed in the 2021 update.				

TABLE: ONGOING MITIGATION ACTION 34 **Mitigation Project: Watch the university-produced Active Shooter video at least once during 2009–2010.**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Deans, Chairs, Directors; Individuals	High	Stage 1; Short-term	Individual	Low
Goal		**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source**	
Protect life safety; protect university assets and investments.		Human-Caused Events	Increased sense of safety and security for university.	High			
Action/Implementation Plan and Project Description:							
2021 Status: Ongoing							

TABLE: ONGOING MITIGATION ACTION 35 **Mitigation Project: Participate in training related to emergency preparedness and response (e.g., Red Cross, U of U, faith-based community).**							
Status	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Timeline/Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Level**	**Cost Analysis** (Low, Medium, High)
Ongoing	2009	University of Utah	Emergency Management Director; Individuals	High	Stage 3; Short-term	Individual	Low

Goal	**Hazard(s) Mitigated**	**Benefits** (Description of Loss Avoided)	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source**
Protect life safety; protect university assets and investments.	Human-Caused Events	Increased sense of safety and security for university.	High	
Action/Implementation Plan and Project Description:				
2021 Status: Ongoing				

Mitigation Table—Completed and Removed Actions

TABLE: COMPLETED/REMOVED MITIGATION ACTIONS			
Category	**Action**	**Status**	**Comments**
Earthquake	Orson Spencer Hall	Complete	Gardner Commons replaced the Orson Spencer Hall and no longer presents a major seismic risk.
Earthquake	George Thomas Building	Complete	Now the Crocker Science Building and is now more resilient.
Earthquake	Social & Behavioral Sciences Tower	Complete	Seismic retrofit is completed. Pre-cast panels still need to be completed.
Flooding	University Village	Underway	University Village is currently undergoing significant redevelopment with construction currently underway. Buildings should be replaced to ensure impacts from dam and flood inundation are mitigated.