Box Elder County
Utah

RESOLUTION NO. 15-08

A RESOLUTION OF BOX ELDER COUNTY ADOPTING THE 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION

WHEREAS *the Box Elder County Commission* recognizes the threat that natural hazards pose to people and property within *Box Elder County;* and

WHEREAS *Box Elder County* has participated in the creation of a multi-hazard mitigation plan, hereby known as the 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in *Box Elder County* from the impacts of future hazards and disasters; and

WHEREAS adoption by *the Box Elder County Commission* demonstrates their commitment to hazard mitigation and achieving the goals outlined in the 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION; and

WHEREAS adoption of the 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION by *the Box Elder County Commission* hereby replaces the 2009 "PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION, UTAH" rendering said 2009 plan null and void.

NOW THEREFORE, BE IT RESOLVED BY *Box Elder County, Utah*, THAT:

The Box Elder County Commission adopts the 2015 PRE-DISASTER MITIGATION PLAN: BEAR RIVER REGION attached hereto as Exhibit "A".

This resolution shall be effective on the date it is adopted.

DATED this 16th day of September, 2015.

Stan Summers, Chairman
Box Elder County Commission

ATTEST:

COUNTY CLERK STATE SEAL OF UTAH

Marla Young, Clerk
Box Elder County

Att #5

PRE-DISASTER MITIGATION PLAN

BEAR RIVER REGION, UTAH


FEMA News Photo


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Utah

BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years


FEMA News Photo

BEAR RIVER ASSOCIATION OF GOVERNMENTS

August 2015

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INTRODUCTION & PLAN PURPOSE

The three northernmost Utah counties that make up the Bear River Region are vulnerable to natural, technological, and human caused hazards that have the possibility of causing serious threat to the health, welfare, and security of our citizens. The cost of response and recovery from potential disasters, both in terms of potential loss of life or property, can be lessened when attention is turned to mitigating their impacts before they occur or re-occur.

This plan attempts to identify the region's hazards, understand our vulnerabilities and craft solutions that can significantly reduce threat to life and property. The plan is based on the premise that hazard mitigation works! With increased attention to managing natural hazards, communities can do much to reduce threats to existing citizens and avoid creating new problems in the future. In addition, many solutions can be implemented at minimal cost.

This is not an emergency response or management plan. Certainly, the plan can be used to identify weaknesses and refocus emergency response planning, which is an important mitigation strategy. However, the focus of this plan is to support better decision making directed toward avoiding future risks, and the implementation of activities or projects that will eliminate or reduce the risk for those that may already have exposure to a natural hazard threat.

How The Plan Is Organized

Section 1 introduces the plan, outlines the plan including scope, purpose, and goals, lists participating communities, and includes commentary on changes in the plan from earlier versions. Section 2 documents the planning process, public involvement, and summarizes information on natural hazards in the Bear River Region. Section 3 gives a general regional background including basic demographic, economic, and physiographic characteristics.

Section 4 is the Bear River Regional Risk Assessment. Because of the uniformity of the hazard risk throughout the region and the similarity of vulnerabilities, severe weather, drought, agricultural hazards, radon, and problem soils were analyzed at the regional level. This section also includes commentary regarding implications of the potential effects of natural hazards on future development. Section 5, 6, and 7 includes natural hazard risk assessments for cities, towns, and the unincorporated county areas for Box Elder, Cache, and Rich Counties, respectively. Section 8 documents local community planning and technical capability to implement mitigation strategies, and Section 9 discusses plan implementation, funding, and public involvement.

How The Plan Should Be Used

First, the plan should be used to help local elected and appointed officials plan, design, and implement programs and projects that will help reduce their community's vulnerability to natural hazards. Second, the plan should be used to facilitate inter-jurisdictional coordination and collaboration related to natural hazard mitigation planning and implementation. Third, the plan should be used to develop or provide guidance for local emergency planning. Finally, if adopted, the plan will bring communities in compliance with the Disaster Mitigation Act of 2000, qualifying jurisdictions to apply for funding for pre-disaster mitigation projects and for receiving federal aid in the event of a presidentially declared disaster.

What Is Hazard Mitigation?

Hazard mitigation is defined as any cost-effective action(s) that has the effect of reducing, limiting, or preventing vulnerability of people, property, and the environment, to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life and property, fall into three categories. First, are those that keep the hazard away from people, property, and structures. Second, are those that keep people, property, and structures away from the hazard. Third, are those that do not address the hazard at all but rather reduce the impact of the hazard on the victims, such as insurance. This mitigation plan has strategies that fall into all three categories.

Hazard mitigation measures must be practical, cost effective, and environmentally and politically

acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the value of anticipated damages. However, some projects may require financial commitments from local jurisdictions without any measurable monetary reward or benefit, although it may save lives and priceless community assets. Some initial financial investments for projects which lessen risk to local residents and property, may also pay economic dividends later on if legal issues arise.

However, the primary focus of hazard mitigation actions must be on capital investment decisions, and based on vulnerability. Capital investments, whether for homes, roads, public utilities, pipelines, power plants, or public works greatly determine the nature and degree of hazard vulnerability for a community. Once a capital facility is in place, very few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons that zoning and other ordinances - which manage development in high vulnerability areas along with building codes and guidelines, are often the most useful mitigation approaches a city can implement.

In general, mitigation measures are the most neglected programs within emergency management. Since the priority to implement mitigation activities is generally low in comparison to perceived threat, implementation may be a timely and highly involved process. Mitigation success may 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 eliminating long-term risks to people and property from hazards and their effects. Preparedness for all hazards includes response and recovery plans, training, development, management of resources, and the need to mitigate each jurisdictional hazard.

This multi-jurisdictional plan evaluates the potential impacts, risks and vulnerabilities associated with natural hazards for jurisdictions in the Bear River Region. The plan supports, identifies, describes, and documents potential mitigation projects for municipalities and the unincorporated areas in each county. The suggested actions and plan implementation contained in this document for local governments may reduce the impact severity of future disasters. Only through coordinated partnerships with emergency managers, political entities, public works officials, community planners, the general public, and other individuals working to implement this program will the goals of the plan be accomplished.

For most of the State of Utah, the planning services of the Utah Association of Governments (AOG's) have been utilized to develop the mitigation plans for all jurisdictions in the state. However, some individual jurisdictions have recently completed the plan on their own. For this plan update, Box Elder, Cache, and Rich County emergency managers requested assistance from BRAG to update the plan for the entire region.

The seven Utah Associations of Governments are comprised of the following regional entities:

1. Bear River Association of Governments
2. Wasatch Front Regional Council
3. Mountainland Association of Governments
4. Six County Association of Governments
5. Southeast Utah Association of Local Governments
6. Five County Association of Governments
7. Uintah Basin Association of Governments

Plan Purpose

This Pre-Disaster Mitigation Plan is meant to provide information regarding threats to life and property associated with natural hazards to local and State governments as well as interested agencies and the general public. The intent of this document can be summarized into several over arching goals which:

- Fulfil Federal, State, and local hazard mitigation planning requirements
- Promote pre- and post-disaster mitigation measures, short and long-range strategies

that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the State are exposed.

- Eliminate or minimize conditions which would have an undesirable impact on our citizens, local infrastructure, economy, environment, and the well-being of local, county, and state governments.

Plan Scope

The Bear River Association of Governments (providing regional planning assistance to Cache, Rich, and Box Elder Counties) will submit a current updated plan to the Utah Division of Emergency Services. Future monitoring, evaluating, updating and implementing will take place as new incidents occur and/or every five years. The hazard mitigation plans and strategies will also be included in local planning efforts and plans.

Overall Goals

Coordinate with participating local governments to develop a regional planning process that will meet Local Mitigation Plan Review Tool provided by FEMA. Additional goals include planning to meet expectations set by the State and addressing the concerns of local jurisdictions.

Local Goals

The goals below form the basis for the development of the PDM Plan and are shown from highest to lowest priority. They are:

1. Protection of life before, during, and after the occurrence of a disaster.
2. Protection of emergency response capabilities (critical infrastructure).
3. Improved communication and warning systems.
4. Integration of appropriate emergency medical services and use medical facilities during a natural disaster event.
5. Identification of critical facilities and community infrastructure.
6. Government collaboration across jurisdictional boundaries during natural hazard events.
7. Protection of developed property, homes and businesses, industry, educational opportunities, and the cultural fabric of a community, by combining hazard loss reduction strategies with a community's environmental, cultural/historical, social, and economic needs.
8. Protection of natural resources and the environment when considering mitigation measures.

Regional Goals

1. Eliminate or reduce the long-term risk to human life and property by identifying natural hazards.
2. Aid both the private and public sectors in understanding the risks they may be exposed to from identified hazards, and work with local governments and partners to find mitigation strategies that reduce those risks.
3. Decrease liability for local governments by educating elected officials and staff on natural hazard mitigation and issues.
4. Minimize the impacts of natural hazard risks when they cannot be avoided.
5. Mitigate the impacts of damage as a result of identifying hazards.
6. Implement mitigation strategies in a way that minimizes negative environmental impacts.
7. Provide a basis for funding projects which are outlined as hazard mitigation strategies.
8. Maintain and improve a regional platform to enable communities to take advantage of shared goals, resources, and other available resources.

Prioritization of Mitigation Strategies

A guiding factor in prioritizing mitigation strategies was the principle that mitigation should provide the greatest amount of good to the greatest number of people, after considering funding, staffing, and other resource constraints.

Recurrence intervals, past events, and damage estimates compiled during the assessment of vulnerability in this plan were also considered for priority and time line values. While there was not a technical cost-benefit analysis for determining mitigation strategies during this planning process, the above criteria were considered for prioritization.

ADOPTION & UPDATING THE PLAN

Participating Jurisdictions

Table 1: Participating Jurisdictions in the Bear River Region

RICH COUNTY	CACHE COUNTY
Garden City	Amalga
Laketown	Clarkston
Randolph	Cornish Town
Woodruff	Hyde Park City
BOX ELDER COUNTY	Hyrum City
Bear River City	Lewiston City
Brigham City	Logan City
Corinne City	Mendon City
Deweyville	Millville City
Elwood	Newton
Fielding	Nibley
Garland City	North Logan City
Honeyville City	Paradise
Howell	Providence City
Mantua	Richmond City
Perry City	River Heights City
Plymouth	Smithfield City
Portage	Trenton
Snowville	Wellsville City
Tremonton City	
Willard City	

Local Adoption of The Plan

On June 1, 2015, the Draft Pre-Disaster Mitigation Plan was put on the BRAG website, located at *www.brag.utah.gov*. A hard copy of the plan was also available at the BRAG office for viewing. After a 30-day public comment period, comments from communities, the public, county working groups, as well as the Utah Division of Emergency Services were integrated into the plan. The draft plan was then sent to FEMA Region VIII for review. After revisions to the draft plan were completed, letters were sent to each jurisdiction explaining the benefits of adopting a FEMA-approved plan and encouraging all 42 jurisdictions in the Bear River Region to adopt the plan. Blank promulgation forms were sent to chief elected officials, and communities were asked to adopt the plan, and send the completed promulgation forms to BRAG for inclusion as an appendix in the plan. The final plan was also made available in its entirety by section on the BRAG website found at *www.brag.utah.gov*. Individual links for each community section were made available.

Plan Updates & Changes

During the 2014-2015 planning process, it was determined that some aspects of the plan should be updated as needed and some should remain as they were in the 2009 version, with minor edits as needed. Background information, such as hazard definitions, the purpose for the plan, scope, goals, local adoption, and other sections remained relatively the same in both plans. However, some changes in this version were necessary, such as general document layout, the planning process, economic and demographic information updates, risk assessment methods and data, mitigation strategy updates, and the community capability assessments. Following are some of the changes that were made to these sections.

Document layout and organization has been altered to create a user friendly and accessible document. Some charts, tables, data, and other information was moved to the appendix to create a more user friendly layout. County risk assessments were renamed to provide a community emphasis, such as “Box Elder County – Community Risk Assessments” to give a sense of ownership for communities and to make the plan easier to navigate. Also, the term “Annex” was removed to avoid confusion and sections were renamed “Box Elder County Hazard Mapping,” for example, to

simplify sections.

The planning process was altered slightly as well. The first group that met about the plan was comprised of emergency managers, planners, and others involved in emergency planning in the region. BRAG staff sought input for, and built county working groups based on, meeting input and references from those initial contacts. The working groups were also added to as needed depending on what existing working group members thought was necessary. BRAG staff invited all jurisdictions in the region to send representatives as part of the working group, and invited State and Federal Agencies with land management responsibilities in the Bear River Region. Any other suggestions for members were integrated into the working group as needed. The use of surveys was employed similarly to the 2009 plan, and letters and e-mails were sent regularly throughout the process to each community inviting representatives to meetings, and giving many opportunities for community involvement. BRAG staff also made many phone calls to communities to solicit information critical to the plan.

Understandably, economic and demographic data was updated in the plan, as was historical data and natural hazard event data. New sources were sought where data was limited in the 2009 version, such as historical landslide data, historical wildfire data, and earthquake epicentre data.

New risk assessment methods and up-to-date GIS data was also used in this plan in an attempt to reflect current conditions (See Appendix C). New landslide susceptibility, geological faults, wildfire, dam failure, and floodplain data was utilized. Steep slopes were added to address some problem soil areas. The overlay analysis methodology from 2009 proved to be useful for this analysis, although parcel data and any available new hazards data was used. Model Builder in ArcGIS was used to make the analyses uniform for the entire region where possible. Rich County still had incomplete parcel data, and it is anticipated it will be incomplete for some time. However, updated recorders data was linked to the GIS layers to create a more accurate data set where it existed.

A new wildfire hazard data set was also used for this plan update. Data from the West Wide Wildfire Risk Assessment, completed in 2013 by the Oregon Department of Forestry, was utilized to provide a more accurate risk assessment region-wide.

Mitigation strategies were also updated through interaction with participating communities. Some strategies from 2009 were completed, those that were still applicable were carried over into this plan, and new strategies were created by local governments to better address mitigation issues.

Some communities in the region have either grown and added new employees or now have greater data and GIS capabilities. These capabilities were documented at the end of this document as well, with the realization that some communities will continue to have needs for hazard mitigation planning assistance from BRAG and other State and Federal agencies in the future. BRAG staff will continue to be a resource for those communities.

MITIGATION STRATEGIES IMPLEMENTED FROM 2009-2015

- **North Logan** - Earthquake training (Utah Shakeout). Working with canal companies. Wildfire planning. Geotechnical Requirements. Using flood areas as recreational opportunities.
- **Logan** - Improvements were made to 600 W bridge to prevent overtopping road during floods. Additional water storage still ongoing for the next 5 years.
- **Richmond** - Incorporated the bulk of the strategies used in the 2009 program, but did make some minor changes. Worked with irrigation company to minimize flooding.
- **Trenton** – Earthquake, landslide, and wildfire planning.
- **River Heights** - Sponsored a seminar on the dangers of radon gas, and several residents have installed fan driven ventilation systems.
- **Millville** - Regulating building in wildfire prone areas. Earthquake hazards planning

and ordinance work.

- **Smithfield** - Identified the floodplain running through the city, and have taken steps through the cities ordinance and general plan to minimize the effects of flooding. Smithfield works through LDS stakes with emergency preparedness.
- **Tremonton** - Wildfire protection: Cooperative Wildfire Protection Plan (CWPP) was established Feb 28, 2013 involving residents of Tremonton, Garland, and Box Elder County (unincorporated). Resulting from this agreement and in cooperation with FFSL, US Dept. of Agriculture, Box Elder County, Tremonton, and Garland Fire Departments, a fire break was created above affected homes to protect both residential areas and grazing land.
- **Garland** - Holding table top trainings once a month. These table tops have been covering waterlines, communication, health of others.
- **Brigham City** - Work with the Utah Division of Water Rights and other groups to utilize Emergency Action Plans on a local level. Develop or update an environmental safety zone - with identified hazard areas, disclosure/education, hazard maps. Wildfire Defense Program. Perform seismic upgrades to existing Brigham City Library to meet current building codes. Protect 36" Penstock water line coming from Mantua to Brigham City by burying it. Trim trees to keep limbs clear of electrical power system. Reconcile current development with soon to be adopted FEMA floodplain maps for Box Elder County for NFIP communities. For non-NFIP communities, talk with Utah ESHS about the benefits of NFIP.

OTHER CHANGES FROM 2009-2015

One of the most substantial changes to this updated plan is the document layout and organization. Most of the large charts and extraneous background information was consolidated and put in the appendix.

In this version of the plan, individual community sections were created to make the document more accessible to local community leaders, staff, and emergency managers/planners on the local, state, and federal levels.

A more robust risk analysis was also completed for this plan update. Better GIS data was used where available, including a wildfire risk data set created by Oregon State University in 2013. Updated parcel and US Census data was also utilized, as well as updated geologic hazards data from the Utah Geological Survey. Potential loss analyses were also more comprehensive, and included new data sets such as:

- Natural gas line data (Questar Gas)
- Agricultural amenities
- Recreational amenities
- Natural amenities
- More comprehensive list of Critical Facilities

BRAG staff also tried to make the meetings for the update process more interesting and appealing to elected officials and others. Six natural hazards specialists from state and federal agencies were invited to give presentations at the three county mitigation strategy meetings held. They presented realistic and feasible ideas for mitigating the effects of wildfire, flood, landslides, geologic hazards, and severe weather. Elected officials and staff were invited to ask questions and learn from these specialists.

SECTION 2: PLANNING PROCESS

BEAR RIVER REGION PDM PLANNING PROCESS

This mitigation plan is the result of a comprehensive and coordinated planning process. Beyond the involvement of the general public, a great deal of effort focused on coordinating and obtaining input from the 42 jurisdictions in the Bear River tri-county region. All 42 jurisdictions in the Bear River Region were invited to participate in the planning process, as well as any interested special service districts; none of which notified us of their desire to participate. Those communities that were not able to attend working group meetings participated in other ways such as filling out surveys or through personal communications such as telephone or e-mail.

How The Plan Was Produced and Project Staff

Professional planning staff at Bear River Association of Governments (BRAG) was responsible for coordinating the planning process and producing this document.

Zac Covington, Sr. Regional Planner with BRAG, served as the primary contact with the State during the update process. He worked with project contacts, worked with all county Emergency Managers to form working groups and schedule meetings, oversaw the plan update process, the document, plan adoption, working with elected officials and community staff, and other related tasks. Landon Profaizer, Regional Planner at BRAG, was responsible for GIS analyses and processes/mapping, provided critical input on potential loss methodology, wrote several sections of the plan, helped formulate the planning process, and created the template for this document. Planning Interns Stephanie Tomlin, Bryan Wilson, and Zach Maughan provided valuable assistance with meetings, surveys, spreadsheet management, data entry/calculations, survey administration and processing, and other duties as needed.

The update process was overseen by BRAG's fifteen-member Governing Board who served as the Hazard Mitigation Steering Committee (see membership lists at the end of this section). In

Table 2: 2015 PDMP Meetings

REGIONAL AND COUNTY-WIDE MEETINGS - BRAG 2015 PDMP UPDATE			
Meeting	**Date**	**Location**	**Invitees**
Regional Kick-off Mtg.	6/18/14	Cache County Sheriff's Office, Logan	Elected officials, staff, state and federal agencies, transit providers, emergency managers, planners, chambers of commerce,
Rich County Risk Assessment Mtg.	8/26/14	Garden City Offices	Rich County Working Group
Box Elder County Risk Assessment Mtg.	9/18/14	Tremonton City Offices	Box Elder County Working Group
Cache County Risk Assessment Mtg.	10/7/14	Cache County Sheriff's Office, Logan	Cache County Working Group
Box Elder County Migitation Strategies Mtg.	12/17/14	Box Elder County Sheriff's Complex, Brigham City	Box Elder County Working Group
Cache County Mitigation Strategies Mtg.	12/17/14	Riverwoods Conference Center, Logan	Cache County Working Group
Rich County Mitigation Strategies Mtg.	12/17/14	Bear Lake Pizza, Garden City	Rich County Working Group
Regional Pre-Adoption Meeting	5/28/15	Cache County Sheriff's Office, Logan	Elected officials, staff, state and federal agencies, transit providers, emergency managers, planners, chambers of commerce,
LOCAL COMMUNITY AND OTHER MEETINGS - BRAG 2015 PDMP UPDATE			
Meeting	**Date**	**Location**	**Attendees**
Portage General Plan Update Mtg.	1/7/15	Portage Town Offices	Portage Planning and Zoning Commission and BRAG Staff
Bear River Mitigation Strategies Mtg.	4/15/15	Bear River Town Offices	Mayor and BRAG Staff
Cache County Mitigation Strategies Mtg.	4/9/15	Cache County Sheriff's Office, Logan	Cache Emergency Manager and BRAG Staff
Wellsville Mitigation Strategies Mtg.	4/22/15	Wellsville City Offices	Wellsville City Manager and BRAG Staff
Richmond Risk Assessment Mtg.	10/20/14	BRAG Offices	Richmond City Manager and BRAG Staff
Box Elder County Mayors Association Mtg.	4/15/15	Honeyville Town Offices	Mayors for Honeyville, Fielding, Elwood, Brigham City, Bear River City, Tremonton, Deweyville, Association Secretary, and BRAG Staff
Rich County Commission Mtg.	10/1/14	Rich County Commission Chambers, Randolph	Rich County Commissioners, Bear Lake Regional Commission Executive Director, BRAG Staff, County Clerk, public/others.
Portage Mitigation Strategies Mtg.	4/30/15	Portage Town Offices	City Council Member and BRAG Staff
Laketown Mitigation Strategies Mtg.	4/28/15	Laketown Town Offices	Town Clerk and BRAG Staff
Randolph Mitigation Strategies Mtg.	4/28/15	Randolph Town Offices	Mayor, Town Clerk, and BRAG Staff
Honeyville Mitigation Strategies Mtg.	4/27/15	BRAG Offices	Mayor and BRAG Staff
Brigham City Mitigation Strategies Mtg.	5/12/15	Brigham City Offices	Mayor, City Adminstrator, Emergency Manager, and BRAG Staff
Snowville Mitigation Strategies Mtg.	5/11/15	Snowville Town Offices	Town Clerk and BRAG Staff
North Logan Mitigation Strategies Mtg.	5/13/15	North Logan City Offices	City Planner and BRAG Staff
Nibley Mitigation Strategies Mtg.	5/11/15	Nibley City Offices	City Manager, Public Works Director, and BRAG Staff

* Please see Appendix I for detailed agenda's and attendance lists.

addition, County working groups were created to provide guidance, input, and technical assistance throughout the planning process.

These teams were primarily comprised of emergency management personnel, public works staff, county and city/town planners, federal and state agencies, citizens, and others representing jurisdictions in the Bear River Region.

Meetings Summary

Below is a table showing all of the regional and county-wide meetings for this plan update, as well as local risk assessment and mitigation meetings:

Planning Meetings and Public Outreach

A regional Kick-off meeting was held on June 18, 2014. This meeting was intended to introduce everyone to the planning process, provide a project timetable, explain requirements for the plan, and to outline responsibilities for attendees, elected officials, emergency management staff, state and federal agencies, and others.

Those attending were chosen because of their past and present involvement in emergency and City/County emergency and general planning and/or management.

Newspaper articles were published by several regional newspapers, which described the planning process and gave contact information for BRAG staff. These newspapers included the Herald Journal, Box Elder News Journal, The Leader–Garland Times, The Uinta County Herald, and The News Examiner in the Bear Lake area. The first notification involved a regional public service announcement to inform people of the planning process and how to become involved. See **Appendix F** for newspaper announcements.

Letters and e-mails were also sent to each jurisdiction in the region, notifying them of the plan update process and inviting them to participate.

The next step in the planning process was to identify individuals to serve on county-wide working groups. County working groups helped determine where hazard risks were identified (in addition to current GIS data), gave input on existing critical facilities and infrastructure, explored mitigation strategies, and determined issues and needs to be addressed by this plan update (see attendance lists in **Appendix I** for dates, locations, and attendance for regional and county-wide meetings). Mayors, Emergency Managers, public works, State and Federal government agencies, local Chambers of Commerce, planners, and other interested citizens were invited to be a member of the working group for each County. The public, through public service announcements, were also invited to participate.

The first county working group meetings were dedicated to risk assessment. Attendees discussed known hazards in their county or municipality, severity of the hazards, history of past hazard events, hazard mapping details, and resources of local knowledge regarding the hazards. In-house Geographic Information Systems (GIS) mapping was utilized by BRAG staff for creating maps of known natural hazards, critical facilities, and local infrastructure. Surveys were also passed out to attendees to fill out during the meeting. For those not able to attend, surveys were mailed to each jurisdiction. Included were questions regarding current know natural hazards, previous disaster events, National Flood Insurance Program participation, and other questions related to risk assessment.

It was important that jurisdictions were encouraged to help lead the process for writing the plan, which they would be adopting and implementing, as much as possible. The public and other organizations had ample opportunity to be more involved as desired through newspaper announcements, and word of mouth. As always, while the newspapers reach the vast majority of organizations and the general public in the Bear River Region, it may be advantageous to reach out to others more directly during the next plan update. Other organizations could be invited to be more involved in the next update process are special service districts (including school districts and conservation districts), canal and utility companies, the Utah Department of Transportation (UDOT), Utah Transit Authority,

and others.

After hazard types and locations were determined for each jurisdiction, county mitigation strategies meetings were held. Six natural hazards specialists gave presentations on the most probably future hazard events in the region, including earthquake, landslide, flood, wildfire, and extreme weather. These specialists shared local and regional examples of destructive natural hazard events, and gave recommendations on what types of mitigation strategies would be appropriate for those particular hazards. Attendees were also provided with FEMA's Mitigation Ideas booklet, lists of mitigation strategies from 2009 as a reference for strategy updates, and a mitigation strategies survey. This survey provided an opportunity for communities to document which strategies they wanted to include in the plan.

The final meeting was a regional Draft Plan Presentation and Pre-Adoption Meeting held on Thursday, May 28th in Logan, Utah. At this meeting, the draft plan was presented, and adoption of the plan was discussed. A public comment period began on June 1, 2015 ending on July 1st, and was announced in local newspapers region-wide.

A summary of plan findings was also presented to the BRAG Governing Board on Wednesday, May 27, 2015.

Draft Review

After the draft plan was completed and presented at a regional pre-adoption meeting, a link for the plan was placed on the BRAG website at www.brag.utah.gov. A digital copy was also sent to the Utah Division of Emergency Management (Utah DEM) with a completed crosswalk for a pre-draft review. At the same time, public notices were published in local newspapers announcing a 30-day public comment period and the plan's location on the BRAG website. Communities and working group members were also sent letters notifying them of the comment period and location of the draft plan online.

After all the necessary changes were made to the draft plan, and after the public comment period, the plan was sent to FEMA for review. After FEMA revisions were made, those sections of the plan that were updated were sent back to FEMA for final approval. Copies of the plan were then sent to each community and County in the region, with an example promulgation form. Copies of signed promulgation forms from each participating jurisdiction in the region were then sent to Utah DEM, and, in turn, sent to FEMA.

Hazard Identification

Hazards were identified and evaluated for inclusion in this plan based on historical review of past events, synthesis of existing reports, data and hazard mapping analysis, and input from local level emergency management personnel, planners, and other community officials. Consideration for inclusion was based on the likelihood of a hazard's occurrence, location of the occurrence and the potential impact of the event in terms of its effect on human life and property (See Table 3 below).

This list on the left side of the table includes those natural hazards that were analyzed utilizing Geographic Information Systems (GIS).

Table 3: Natural Hazards in the Bear River Region

NATURAL HAZARDS IN THE BEAR RIVER REGION	
Natural Hazards Analyzed Utilizing GIS (GIS Data Available)	**Other Natural Hazards Included in the Plan**
Dam Failure	**Avalanche**
Faults	**Tornado**
Wildfire	**Tsunami**
Flood	**Volcanic**
Liquefaction	**Radon**
Landslide	**Severe Weather**
Slope	**Drought**
Poorly Drained Soils	**Agricultural**

However, there are several other hazards that were discussed during the planning process in less detail due to a lack of data or a lack of historical evidence showing substantial risk to the jurisdictions in the region. Some hazards were also not discussed in detail in this plan because they are not natural hazards, which are what this plan mainly focuses on, with the understanding that those non-natural hazards should still be planned for by jurisdictions. The previous table is a comprehensive list of all the hazards discussed with local stakeholders throughout this process, including those that were analyzed using GIS.

Summary of Risk Assessment Methodology

(See **Appendix C** for more detailed information)

Assessing Hazard Impacts

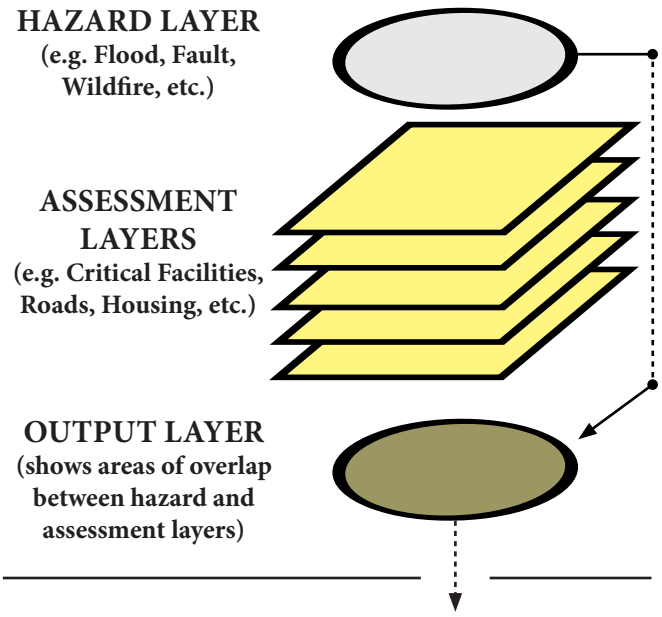
HAZARD LAYERS INCLUDED IN ANALYSIS	
Dam Failure	Faults
FEMA Flood Zone	Landslides
Liquefaction	Poorly Drained Soils*
Steep Slopes**	Wildfire

ASSESSMENT LAYER CATEGORIES	
Agriculture	Critical Facilities
Environment/Recreation	Infrastructure
Population	
See Appendix G for a complete list of risk assessment layers and data sources used in the analysis.	

The risk assessment analysis for this plan was completed using Geographic Information Systems (GIS) software developed by Environmental System Research Institute (ESRI). Spatial layers were obtained from a number of sources throughout the planning process that include the Utah Automated Geographic Reference Center (AGRC), subject matter experts at workshops or meetings, and various local municipal or county planners or technical specialists. Once all the necessary hazard and assessment layers were obtained, ArcGIS Modelbuilder was used to organize and process the necessary spatial tools to identify resources that may be impacted by future hazard events.

The first step in the modelling process includes the acquisition and preparation of all available hazard layers. Once hazard layers are identified and organized by county, assessment layers are organized by category and added to the model to identify areas of overlap with each of the hazard layers. When the model is complete and processed, the resulting layers reveal all potential spatial or geographic threats to persons, property, or resources in the entire region that were included in the analysis.

SAMPLE MODEL FOR ASSESSING THE



Using the area (acres) or distance (miles) of impacted assessment layers, loss estimates were generated to identify the potential losses to life, property, or resources in the event of a natural hazard event.

After all the output layers are generated, and all layers and features affected by hazards are identified, everything is then clipped to each jurisdiction in the region, and loss estimate tables are generated using the area or distance measurements of affected features for each community.

Estimating Losses From Natural Hazards

With the output layers organized by community, the planning team uses layer information, along with other data sources to develop risk and value/loss tables for each of the five assessment layer categories that include:

- Population
- Critical Facilities
- Infrastructure
- Environmental/Recreational
- Agriculture

Population

The population table includes risk to people, as well as value and loss estimates for commercial and residential structures. In order to identify potentially impacted structures, Assessor/ GIS tables are filtered to extract Residential vs. Commercial parcels in the region. Structures are then assessed for their overlap or intersection with potential hazards through the modelling process previously described. Following this step, BRAG then used the land and structure Current Market Values associated with the Assessor file to assign loss estimates to structures threatened by hazards. BRAG also developed a Potential Revenue Loss column to identify economic impacts to businesses in the event of a natural hazard. These figures are based on average sales, receipts, or value of shipments of firms with or without paid employees per firm ($688,717 per firm). This information is derived from US Census Bureau and surveys of local/regional business owners.

With residential structures identified from the modelling process, BRAG then assigned population values to all threatened homes. These figures were derived from the 2013 American Community Survey using the average persons per household density estimate that varied slightly by county.

Critical Facilities

Critical facilities are identified from multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input. Hazard layers are overlaid onto all critical facilities layers in the modelling process to show spatial intersection or overlap, and are then summarized in the associated community risk assessment table. Features assessed for hazard risk in this category include:

- Emergency Services/Law Enforcement
- Schools/Public Facilities
- Health Care Facilities
- Places of Worship
- Infrastructure (Bridges, Broadband Anchors, Dams)

Infrastructure

This category includes layers from a combination of local, state, and private entities. Infrastructure layers are first overlaid by hazard layers in the risk assessment model. The overlapping areas are then clipped out and a distance measurement is calculated for all the affected portions of linear infrastructure. Once the affected infrastructure sections are summarized, cost estimates for repair or replacement are then applied to assess the economic impact of each hazard type. Cost estimates are from a variety of sources including prior planning documents or studies, utility providers, and county public works personnel. Features assessed in the infrastructure category include:

- Railroad Lines
- Natural Gas Lines
- Electrical Power Lines
- Roads
- Canals

Environmental/Recreational

This category includes several environmental and recreational layers from multiple data sources including: Utah AGRC, US Fish and Wildlife Service, US Forest Service, US Geological Survey, Utah Division of Water Resources, and public and

community leader input.

All layers were loaded in the risk assessment model and overlaid by hazards. With areas at risk identified, BRAG calculated the area or length of impacted features and summarized the results in the community risk assessment table. Features included in the Environmental/Recreational category are:

Environmental

- Wetlands
- Riparian Areas
- Lakes
- Streams

Recreational

- Parks
- Trails
- Outdoor Amenities

Agriculture

The final risk assessment category includes features associated with agricultural land and/or the historic and cultural resources associated with the history of farming in the region. Data sources for agricultural layers include: Utah Division of Water Resources, Natural Resource Conservation Service (SSURGO), Utah AGRC, and BRAG.

All layers were loaded in the risk assessment model and overlaid by hazards. The model identified areas of land either under current agricultural production or with soils that are assessed by NRCS as Prime Agricultural Land, or Land of Statewide Agricultural Importance that are potentially threatened by hazards. BRAG calculated the area and number of affected features and summarized the results in the community risk assessment table. Features included in the Agriculture category include:

- Agriculture Production (producing lands)
- Farmland (soils suitable for agriculture)
- Grazing Lands
- Century Farms
- Historic Barns

Incorporation of Existing Plans, Studies, Reports, and Technical Information

While there have been many documents produced locally and regional in regards to hazards and reducing loss of life and property, most are emergency response and/or management, and do not specifically apply to pre-disaster mitigation. Federal, State, and local government documents have been written for many of the jurisdictions in the region. FEMA and the Utah Division of Emergency Management have both produced

Table 4: Potential Loss Categories

BEAR RIVER REGION PDMP POTENTIAL LOSS CATEGORIES					
RESIDENTS AND PROPERTY	Residents at Risk	Residential Units at Risk		Commercial Units at Risk	
CRITICAL FACILITIES	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
INFRASTRUCTURE	Railroad Lines	Natural Gas Lines	Electrical Power lines	Roads	Canals
AGRICULTURAL AMENITIES	Agriculture Production	Farm Land	Grazing	Century Farms	Historic Barns
ENVIRONMENTAL AND RECREATIONAL AMENITIES	Wetland/ riparian	Lakes	Streams	Parks	Trails/Amenities

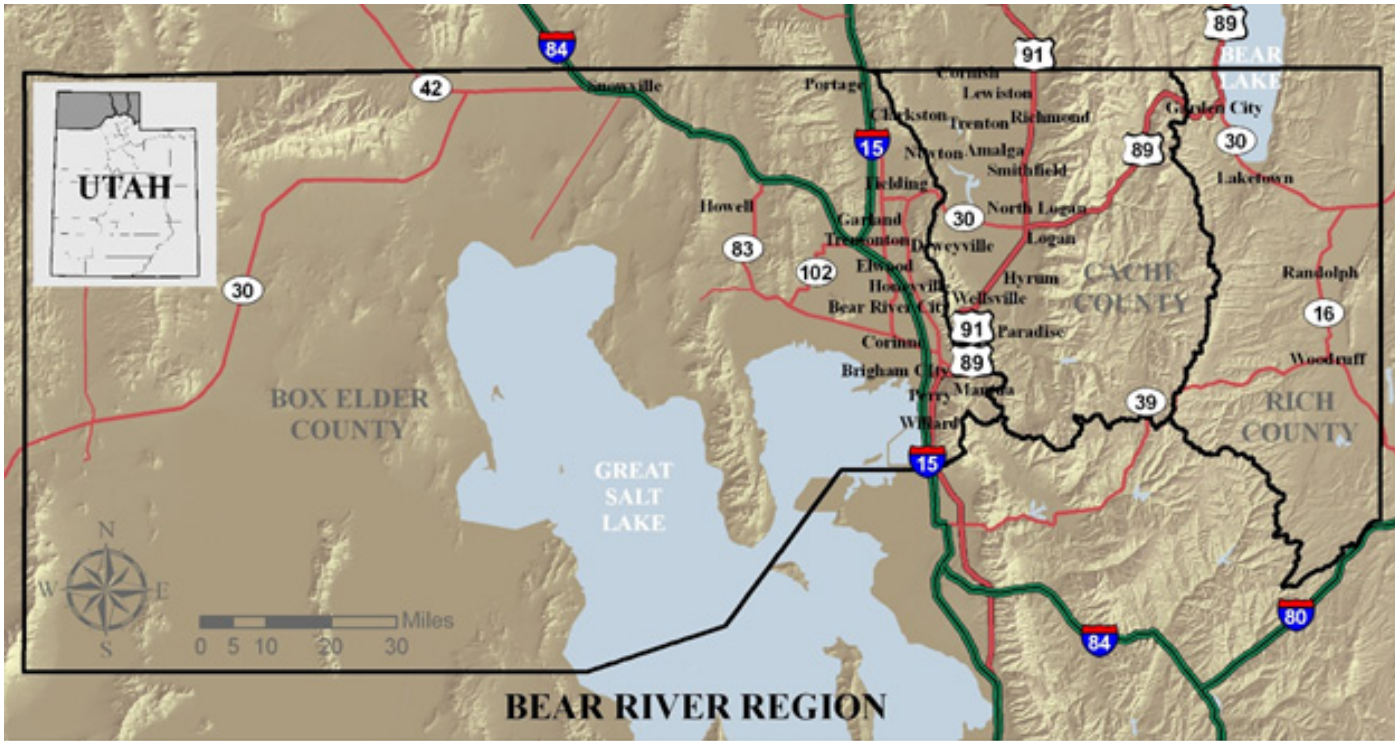
some excellent documents which can be used as a resource for natural hazards planning and pre-disaster mitigation. Many local governments address natural hazards on some level in their General Plan or in local land use ordinances. Some of the more recent documents incorporated as part of the planning process and used for general background information are as follows:

- State of Utah Division of Emergency Management. State of Utah Hazard Mitigation Plan, 2014
- Utah Governor's Office of Management and Budget. Utah 2012 Baseline Report
- US Army Corps of Engineers, Sacramento District, Flood Hazard Identification Study for the Bear River District, 2003
- Utah Geological Survey, Guidelines for Evaluating Surface-Fault Rupture Hazards in Utah, 2003
- Utah Natural Hazards Handbook, 2008
- Floodplain Management in Utah; Quick Guide, 2003
- Southeastern Utah Association of Local Governments. Natural Hazards: Pre-Disaster Mitigation Plan for the Southeastern Region of Utah, 2013
- Box Elder County. Hansel Valley floodplain resident letters, maps, and photos, 2014
- FEMA. G 318 Local Mitigation Planning Workshop Student Manual. 2014.
- Public Safety Canada. All Hazards Risk Assessment Methodology Guidelines, 2012 - 2013.
- State of Utah, Division of Forestry, Fire and State Lands. Catastrophic Wildfire Reduction Strategy. 2012/2013
- Utah Floodplain and Stormwater Management Association. Floods: What You Should Know When Living in Utah, 2013.
- FEMA. Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, 2013.
- Envision Utah. Envision Cache Valley, 2009.
- Envision Utah. Bear Lake Valley Blueprint, 2011.

SECTION 3: REGIONAL SETTING, BACKGROUND INFORMATION, & DEMOGRAPHIC SUMMARY

PHYSIOGRAPHIC BACKGROUND

Utah's three most northern counties of Box Elder, Cache and Rich comprise the Bear River Region. The region is spread over 7,900 square miles and borders three states; Nevada, Idaho, and Wyoming. Several important regional connections exist between all three counties and the bordering Idaho counties (Franklin, Oneida, and Bear Lake) to the north. Shared geographic, geological, natural, and social-cultural connections are important when considering natural hazards, pre-disaster mitigation, and emergency response and communications planning. Efforts should be coordinated between counties as much as possible to protect the public from natural hazard risks.



Box Elder County comprises 5,594 square miles and is bordered on the east by the Wellsville Mountains, Cache County, and Weber County. The Great Salt Lake and the salt flats can be found extending into the county from the south end. The county borders Nevada to the west and Idaho to the north. Several small ranching communities also occupy this county. The western geography is mainly rolling ranch land and small rural communities, while the eastern side connects to the populated Wasatch Front. The largest fresh water feature is the Bear River that flows from Cache County, out of Cutler Dam, and eventually deposits its waters into the Great Salt Lake. Fifty-five to 60 percent of the Great Salt Lake and its wetlands are found within Box Elder County, and the lake itself covers 8-20 percent of the county, depending on yearly precipitation totals (Box Elder County Comprehensive Wetlands Management Plan, 1999).

Cache County covers approximately 1,174 square miles and is bordered by the Wellsville Mountains on the west and the Bear River Range on the east. Approximately 239,000 acres are cropland and pasture land, 280,000 acres are range and woodland, and nearly 230,000 acres are part of the Cache National Forest (Cache County Resource Assessment, 2011). The northern edge of the county connects to Franklin County, Idaho, and both counties are traditionally termed "Cache Valley." Prominent streams include the Little Bear, Blacksmith Fork, and the Logan Rivers to the south, and the Bear and Cub Rivers in the north. The western, low lying portion of county is composed of the Cutler Marsh. The 10,000 square acre wetland area signifies the confluence of the county's southern and eastern rivers and streams with the Bear River from the north prior to its passage through Cutler Dam. Porcupine, Cutler, Newton and Hyrum Reservoirs are all irrigation-

based reservoirs in the county. The "bench" is an elongated plateau that surrounds the valley; formed by fluctuating shorelines of ancient Lake Bonneville.

Rich County comprises 1,022 square miles and is bordered on the west and south by the Bear River and Monte Cristo Ranges and on the east by the Crawford Mountain Range and the rolling desert highlands of southwestern Wyoming. To the north are the uplands and the mountain ranges of southeastern Idaho. Bear Lake is the largest water body in the county that extends 20 miles in length and 8 miles in width. Forty-four percent of Rich County is administered by federal and state agencies.

Climate

Elevations in the region vary from 4,200 to 9,979 feet, which is the elevation of the region's highest peak, Naomi Peak in Cache County. Annual precipitation ranges from 9 inches to over 40 inches. The high mountain valleys experience long cold winters and short cool summers. The Bear River Region experiences everything from rainstorms, snow, sleet, hail, high winds, and cold temperatures, to hot summer days and drought. During winter months, valley's experience fog and colder temperatures in low elevations and regular winds and increasing snow pack at higher elevations. During the summer months, temperatures can remain above 100° F for weeks, and drought can be problematic for farmers and ranchers.

Rich County has some of the most severe winters in the state. An early settler, J. Golden Kimball, described the climate as "nine months of winter and three months of late fall." Woodruff is one of the coldest towns in the state, with their lowest yearly temperature of -50° F in 1899.

Geology

The region is home to the Wellsville Mountain Range and the Bear River Range. Notable physiographic features of the region include: the Crawford Mountain, Bear Lake Plateau, Goose Creek/Raft River Mountains, Curlew Valley, Hansel Mountains-Blue Springs Hills, Great Salt Lake Desert, Lakeside Section and the Clarkston Mountain/Junction Hills (Stokes, 1988).

The Wellsville Range is east of Brigham City and is known for its long, upward-faulted ridge of Precambrian metamorphic rocks covered by Paleozoic aged sedimentary rocks.

The Paleozoic section of the rock sequence is quite consistent throughout this area with sandstone on bottom, shale, and finally limestone or dolomite. Most of the rocks are of marine or near shore deposits from the ancient Lake Bonneville. The Wasatch Fault is evident in the western edge of the Wellsville Mountain Range with the eastern portion lifted thousands of feet than the western edge. The Eastern portion is comprised of mainly Pennsylvanian and Permian aged rocks. Cache Valley is a dropped portion between the East Cache Fault and the Bear River Range. The Cache Valley was once an arm of Lake Bonneville. Logan Canyon is made up of Paleozoic ant Tertiary rocks with the same sequence as mentioned above. The Bear River Range is situated on the east of the western extent of the Middle Rocky Mountain Physiographic Province. The Overthrust Belt Geologic Province is what uplifted these mountains about 50 million years ago. The Intermountain Seismic Belt is a result of the Overthrust Belt. "The Intermountain Seismic Belt forms a boundary between the Basin and Range and the Middle Rocky Mountain Physiographic provinces" (Mabey, 1999). The older Paleozoic and Mesozoic rocks are visible above the younger Tertiary and Quaternary aged sedimentary rocks because of the many visible faults in this zone. One can see these geological formations from the Bear River Range to the east are part of the Great Basin Physiographic province, which consists of mainly Quaternary age surface deposits such as alluvium, terrace deposits, sand dunes, and lake bed sediments.

Rich County is home to portions of both the Bear Lake and Bear River Valleys. Bear Lake Valley is considered to be an east tilted half graben, with faults on either side of the valley (Covington, 2008).

The soil morphology in this region is characterized by deep to very deep well drained

soils. Down cutting from the Bear River and its tributaries have resulted in massive erosion. Soils on old lake bottoms in the middle of Cache and Salt Lake valleys are nearly level, moderately well to poorly drained, very deep, and derived from lacustrine and alluvial deposits (Department of Landscape Architecture and Environmental Planning USU, 2001).

Environmental and Recreational Amenities

The Bear River Region has much to offer as far as environmental and recreational amenities. Located in Northern Utah, many of the jurisdictions within the three counties are settled around the Rocky Mountain Region. Agriculture and grazing play a large role in Rich, Cache, and Box Elder counties.

In the region, there are many public and state parks that offer a variety of environmental and recreational amenities. There are various opportunities for recreation that are found in this region: reservoirs, fishing, hiking trails, camping and picnic areas, hunting, wildlife watching, etc.

Modern society places increasing emphasis on the availability of good quality recreational amenities, which are seen as beneficial to the physical and mental health and quality of life of the population. The provision of recreational facilities has also been shown to reduce crime and vandalism, positively effect community economics, and contribute to the development of stable communities.

Within the Region there are many reservoirs that provide outdoor recreation. Notable is Bear Lake State Park in Rich County. It is the largest freshwater lake in the region, spanning 8 miles wide and 20 miles long. There are many summer resorts situated around its shores. Boating, water sports, and fishing are a few of many activities enjoyed at this lake. Hyrum State Park as well as Willard Bay State Park offer many recreational activities. A majority of the reservoirs in the region also offer day use picnic areas as well as some campgrounds and facilities.

Several of the most notable environmental amenities in the region are the Bear River Migratory Bird Refuge just north of Willard Bay. In Cache County in the blacksmith fork canyon there is a wildlife preserve area for elk at Hardware Ranch. Cutler marsh in Cache Valley is also a large contributor to wildlife habitats and unique Rocky Mountain ecosystems. These amenities as well as others found in the region provide wonderful opportunities for wildlife viewing.

Along the Logan Canyon Scenic Byway in Cache County, there are countless outdoor recreational opportunities. Popular hiking trails include the Wind Caves, the Logan River Trail, and many others. There are also 3 fishing dams, many rock climbing areas,13 campgrounds, and may day use areas along the way.

Fishing is also a popular past-time, with the Logan River located just east of Logan, and the Blacksmith Fork River located east of Hyrum, which are known for their year round fly fishing for trout and whitefish. Bear Lake also has five indigenous fish species, including the Bear Lake strain of the Bonneville Cutthroat Trout and Bonneville Cisco. There are also large Mackinaw Salmon populations in the lake.

REGIONAL DEMOGRAPHIC SUMMARY

Population Growth and Community Development

The total population for the Bear River Region (Box Elder, Cache, and Rich Counties combined) is approximately 169,991. The regions population grew by 9% between 2009 to 2013 (US Census Bureau, 2013).

Box Elder County had an estimated growth rate of 1.8% for the period of 2009 to 2013 (1,358 additional residents for a total of 50,864 people in 2013). Elwood city had the largest percent of growth in the county population overall with a 16% increase, adding 145 residents. Garland City grew at a rate of 15% adding 316 new residents to the county. Perry City also had an increase of 15% and makes up the county's largest population growth with 581 new residents. The rest of the municipalities grew at a rate under 15%. (US Census Bureau, 2013).

Many of the jurisdictions in Box Elder County may continue to experience high future growth rates, due to their proximity to Weber County.

This portion of the Wasatch Front affords views of the Great Salt Lake, prominent mountain ranges, and parallels Interstate 15. As development from North Ogden and Pleasant View continues to move to the north, southern Box Elder County communities will most likely be utilized by nearby communities to provide housing for those who work along the Wasatch Front.

Cache County grew at an estimated rate of 1.4% from 2009 to 2013 (5,099 people added for a total of 116,909 people in 2013). Astonishingly, Nibley City had a 28% growth in the same period with 1,333 new people, which was the highest growth percentage in the region. North Logan City grew at a rate of 14%, while River Heights grew 8%. All other municipalities in the county grew at a rate lower than 8%. (US Census Bureau Estimates, 2013). One other factor to consider regarding population growth in Cache County is the presence of Utah State University, which currently has an enrolment of 27,662 part and full-time students, with around 13,383 attending school on the Logan, Utah Campus (USU, 2014). Many of these students are not technically considered residents of Cache County or Logan City, since tax and other information most likely remains in their home town.

Cache County is also the only county in the Bear River Region with a Metropolitan Planning Organization (MPO). These MPO's are required for any metropolitan area with more than 50,000 people, in order for jurisdictions to be eligible for federal assistance. The CMPO is responsible for transportation planning in the communities of Smithfield, Hyde Park, North Logan, Logan, River Heights, Providence, Millville, and parts of Nibley and the unincorporated areas of the county.

Rich County had the largest growth between the three counties at an estimated average growth rate of 5.9% from 2009 to 2013, adding 160 residents. Considering the amount of second homes that came to the county during that time, this number seems low. Rich County is home to Bear Lake, a large freshwater body which attracts visitors and cabin/second home development along the western edge of the lake. Laketown had the most growth at 36%, adding 68 residents, and Garden City grew 23% with 108 residents. Woodruff and Randolph both were reported as having slight population loss (US Census Bureau, 2013).

Considerations for Rich County population growth in the future should include the impact of cabin and second home development, and the possibility of homes becoming permanent residences. The US Census Bureau requires 9 months of residency for people to be considered residents of a jurisdiction. Many of the homes in the Bear Lake area are only used for weeks or several months in the summer. Second home and seasonal home ownership in Rich County is estimated to be around 75%. Infrastructure needs and services are still required by the municipalities or by the county for these residences.

Community and Economic Development Profile

Box Elder County

Box Elder County experienced substantial economic issues in for several years following the Great Recession in 2008. This included job loss, business closures, and other issues. The county was considered an economically distressed area by the US Economic Development Administration (EDA) based on per-capita income levels. However, over the past several years the county has slowly recovered. According to the Department of Workforce Services, 2013 ended well with job growth at 4.5%. Unemployment was at 5.1% at the end of 2013, but has been steadily declining. with new jobs totalling 723. Mining grew most significantly by 45.9% from 2012 to 2013. Manufacturing still makes up the majority of the non-farm employment industry, with trade, transportation, and industry coming in second (Utah Department of Workforce Services, 2015). Agricultural production is still a key economic driver in Box Elder County.

Box Elder County per capita personal income in 2013 was $32,461, compared to the national per capita personal income for the same year of 44,765 (BRAG CEDS, 2013). Residents below poverty line accounted for 8.8% of the population in the county in 2013 (US Census Bureau, 2013). As of March, 2015, unemployment in the county was only 3.6%, compared with the national unemployment rate of 5.5% for the same month

(Utah Department of Workforce Services, 2015 and US Bureau of Labor Statistics, 2015).

Most of the residential development in Box Elder County occurred in Perry, Brigham City, and Tremonton. All other communities experienced growth except for Mantua, Fielding, and Snowville. In the unincorporated areas of the county such as the south Willard area, development also increased, which may lead to increased need for sewer and other types of critical infrastructure. Industrial growth is occurring in west Brigham City, Bear River City, and Corinne. West of Corinne is an existing Agricultural Industrial Park, and the new Proctor and Gamble facility is being built west of Bear River City, with sewer and water provided by Brigham City.

Cache County

Cache County's largest employer is Utah State University at 7,000-10,000 employees, which contributes to government being the largest industry in non-farm employment in the county. Cache School District is second, with 2,000-3,000 employees. While the county's workforce has underemployment and low wage issues, the general economy has been stable, with 881 jobs created in 2012-2013. Education, Health, and Social Services was the industry with the highest number of new jobs, while the Financial Activities sector grew the most by percentage at 12%. New employment was positive but modest at 1.7%, and unemployment was at 3.6% during the same period (Utah Department of Workforce Services, 2013). Logan City has a fairly high number of residents living below the poverty level at about 28.3% in 2013 (US Census Bureau, 2013).

Cache County's per capita personal income in 2013 was $31,149. In 2013, 16.6% of the population was below the poverty line. The unemployment rate averaged only 2.7% for March of 2015 (Utah Department of Workforce Services, 2015).

New development in Cache County has increased dramatically in areas such as Nibley, Providence, North Logan, and Mendon. Logan has also grown substantially over the past few years, particularly on the west side of the city. Commercial growth has also been steady with new businesses near 1400 North in Logan.

Rich County

Rich County has the lowest unemployment rate in the region at 3.5%, which is steadily declining. Government is the largest employment sector, while Leisure and Hospitality is close behind. The Professional and Business Services sector grew the most by percentage at 136.9% in 2012, adding 27 new jobs to the economy. Leisure and Hospitality grew by 29 jobs at 22.3%. Agriculture, specifically cattle ranching, is a substantial economic staple in Rich County. While the local school district and other types of government jobs account for the largest employers in the area, the next largest employer is Deseret Land and Livestock, owned by The Church of Jesus Christ of Latter-day Saints, employs around 20-50 people (Utah Department. of Workforce Services, 2013).

Rich County has many economic opportunities in the area of recreation and tourism sector due to Bear Lake, a large freshwater lake on the Utah/Idaho border referred to as The Caribbean of the Rockies. However, incomes based on seasonal tourism in the region have not provided a stable economic situation for residents. Income in the winter months is difficult to attain when part-time residents leave the cold winters of the area. Of all the residences in Rich County, around 75% of all homes are seasonally occupied.

Mining and manufacturing tends to give higher wages in the county. Rich county wages increased by 20% between 2009 and 2013, and per capita personal income in Rich County for 2013 was 38,030. About 7% of county residents were below the poverty line in 2013 (BRAG CEDS, 2015). Unemployment in March of 2015 was at 3% (Utah Department of Workforce Services, 2015).

Residential development in Rich County has mainly been in the form of second homes and seasonal cabins. Garden City is the only municipality that has seen recent growth in the county. Several other large developments are being planned in the area, and could prove to increase

Table 5: NFIP Participation

National Flood Insurance Program (NFIP) Participation and Flood Data/Status						
	Community Name	**CID**	**Date of Entry**	**Current Effective Map**	**Online FIRM?**	**GIS Data Available****
BOX ELDER COUNTY	Bear River, City of	490194#	9/29/2010	9/29/2010	Y	Y
	Box Elder County *	490005#	09/01/87 (R)	09/01/87 (L)	Y	Y
	Brigham City, City of	490006#	08/17/81 (R)	8/17/1981	Y	Y
	Corinne, City of	490197#	07/15/80 (R)	07/15/80 (M)	Y	Y
	Deweyville	***NOT PARTICIPATING***				
	Elwood	***NOT PARTICIPATING***				
	Fielding	***NOT PARTICIPATING***				
	Garland, City of	490207#	9/29/2010	9/30/2011	Y	Y
	Honeyville, City of	490008#	07/29/80 (R)	07/29/80 (M)	Y	Y
	Howell	***NOT PARTICIPATING***				
	Mantua, Town of	490009#	07/08/80 (R)	07/08/80 (M)	Y	Y
	Perry City, City of	490010#	05/20/80 (R)	05/20/80 (M)	Y	Y
	Plymouth	***NOT PARTICIPATING***				
	Portage	***NOT PARTICIPATING***				
	Snowville	***NOT PARTICIPATING***				
	Tremonton, City of	490220#	9/29/2010	6/24/2011	Y	Y
	Willard, City of	490011	07/01/87 (R)	07/01/87 (L)	Y	Y
CACHE COUNTY	*Amalga*	***NOT PARTICIPATING***				
	Cache County*	490012#	02/01/87 (R)	02/01/87 (L)	Y	Y
	Clarkston, Town of	490014#	08/19/80 (R)	08/19/80 (M)	Y	Y
	Cornish	***NOT PARTICIPATING***				
	Hyde Park, Town of	490016#	07/29/80 (R)	07/29/80 (M)	Y	Y
	Hyrum, City of	490017#	04/08/80 (R)	04/08/80 (M)	Y	Y
	Lewiston, City of	490018#	07/29/80 (R)	07/29/80 (M)	Y	Y
	Logan, City of	490019#	09/28/84 (R)	9/28/1984	Y	Y
	Mendon, City of	490020 #	07/22/80 (R)	07/22/80 (M)	Y	Y
	Millville, Town of	490021	03/13/85 (E)	10/22/1976	Y	N
	Newton, Town of	490022#	07/22/80 (R)	07/22/80 (M)	Y	Y
	Nibley, Town of	490023	08/05/86 (R)	08/05/86 (M)	Y	N
	North Logan, City of	490024#	03/18/86 (R)	03/18/86 (M)	Y	Y
	Paradise, Town of	490025#	5/24/2011	12/7/2011	Y	Y
	Providence, City of	490226	02/02/84 (R)	(NSFHA)	N	N
	Richmond, City of	490027#	08/12/80 (R)	08/12/80 (M)	Y	Y
	River Heights, City of	490240#	5/24/2011	5/24/2011	Y	Y
	Smithfield, City of	490029#	03/18/86 (R)	03/18/86 (M)	Y	Y
	Trenton	***NOT PARTICIPATING***				
	Wellsville, City of	490031#	07/29/80 (R)	07/29/80 (M)	Y	Y
RICH COUNTY	*Garden City*	***NO INFORMATION AVAILABLE***				
	Laketown, Town of	490099	07/15/85 (R)	(NSFHA)	N	N
	Randolph	***NO INFORMATION AVAILABLE***				
	Rich County	490234	2011		N	N
	Woodruff, Town of	490101#	07/22/80 (R)	07/22/80 (M)	Y	N

Source: Federal Emergency Management Agency (FEMA) National Flood Insurance Program, 2015

* Unincorporated areas only

**(GIS) Geographic Information Systems (Mapping and geographic analysis software)

(E) Emergency Program or (R) Regular Program

(NSFHA) No Special Flood Hazard Area

NFIP PARTICIPATION & BUILDING CODE REPORTS

National Flood Insurance Program Participation

The National Flood Insurance Program was created in 1968 by the Federal Emergency Management Agency (FEMA) to provide homeowners living in the 100-year floodplain an opportunity to purchase flood insurance for their home. In order for individuals to be eligible to purchase flood insurance, their community needs to be a member of the National Flood Insurance Program (NFIP). It is fairly simple to join the NFIP with help from the State Floodplain Manager. There is also limited funding for flood mitigation projects for communities that are members of the NFIP. There are 30 jurisdictions out of 42 in the Bear River Region participating in the NFIP (See Table 4 above for details).

Those communities listed in Table 4 above comply with the minimum standards required by FEMA to be considered participating jurisdictions.

Building Code Effectiveness Grading Reports (BCEGS)

The Building Code Effectiveness Grading Report was implemented in 1995 to evaluate current building codes in a particular community and to determine how well the community enforces its building codes. This program assigns each municipality a grade of one to ten, with one showing excellent commitment to building code enforcement. The concept of the Building Code Effectiveness Grading Reports is that communities with effective, well-enforced building codes should sustain less damage in the event of a natural disaster, and insurance rates can be adjusted accordingly. More information on what determines a community's score can be found at: http://www.isomitigation.com/bcegs/0000/bcegs0003.html.

Building Code Effectiveness Grading Report (BCEGS) Scores for the Bear River Region (2008)		
Jurisdiction Name	**Score**	**Date**
Box Elder County	RES 04 COM 04	2001
Brigham City	RES 03 COM 03	2001
Tremonton	RES 05 COM 05	2000
Willard	RES 05 COM 05	1998
Cache County	RES 03 COM 03	2001
Hyde Park	RES 03 COM 03	2001
Logan City	RES 03 COM 03	1999
North Logan	RES 03 COM 03	1999
Smithfield	RES 04 COM 04	2000
Garden City	RES 99 COM 07	1998

Source: ISO (Insurance Services Office), 2008.

99 is used for jurisdictions which are either unclassified or do not meet the minimum criteria of the BCEGS program. This would include departments which do not do plan review, inspections, have legally adopted codes or have declined to participate in the ISO program.

Table 6: BCEGS Scores - Bear River Region

SECTION 4: REGIONAL RISK ASSESSMENT & MITIGATION STRATEGIES

REGIONAL NATURAL HAZARDS

- **Drought**
- **Severe Weather**
- **Agricultural Hazards**
- **Radon**
- **Problematic Soils**
- **Avalanche**
- **Tornado**
- **Tsunami**
- **Volcanic Activity**

Background

Each of the hazards listed in Table 3 are addressed at some level in this plan. However, drought, severe weather, radon, problematic soils, avalanche, tornado, tsunami, and volcanic risks are very difficult to analyze due to lack of data or the inability to predict destructive events in particular locations. All potential hazards were discussed in county working group meetings. Although geographic data is lacking, the more prevalent regional hazards, such as drought, severe weather, radon, and problematic soils were addressed in the mitigation strategies lists for the entire region. All 42 jurisdictions are susceptible on some level to those hazards and can mitigate effects from those hazards in similar ways.

However, avalanches, tornados, tsunamis, and volcanic activity are limited to smaller geographic areas, physiographic or climatic variation, or have not produced predictable or, in some cases, significant damage. For example, while tornados have caused substantial damage in various parts of Utah, there has not been any reoccurrence of events which merit a reliable prediction on where future events could occur. Communities were allowed, and encouraged, to include mitigation strategies for any and all hazards they felt required mitigation on some level.

Risk Assessment and Mitigation Strategy Surveys were sent to each chief elected official for all jurisdictions in the Bear River Region. Among other questions, the surveys requested local input on the following:

- NFIP status
- Existing natural hazards
- Natural hazard events since November 2009
- List of maps, documents, or plans related to natural hazards planning
- Current zoning and ordinances related to natural hazards
- Future developments that could be affected by natural hazards
- Mitigation strategies completed since 2009
- New mitigation strategies

(See **Appendix D** for detailed survey responses).

History of Regional Natural Hazards in the Bear River Region

Residents and communities in the Bear River Region have knowingly been effected by drought and severe weather since modern settlers came to the area in the mid-1800's. Native American's and early explorers were also well award of the variation in the climate and temperature in the area and planned accordingly. One of the most famous sayings about the weather in the Rocky Mountains is, "If you don't like the weather, just wait 5-minutes!" Long-time residents of the area have experienced the variation which exists and many residents plan accordingly.

However, for others, mitigating the effects of severe weather and drought can be difficult. Educational activities and public awareness campaigns seem to help, but can always be improved. Local communities and other organizations train for emergencies and events on a regular basis.

Other natural hazards, such as avalanche, tornado, tsunami, and volcanic activity are rare, but can be mitigated on some level. Local building codes and ordinances keep most residents and structures safe, but events can be sporadic and variable.

Agricultural hazards, as addressed in this plan, relate mostly to insect infestation. The most prevalent of these is grasshopper and cricket infestation, but bark beetles, ticks, mosquitos, and termites have also been identified by the Utah Department of Agriculture and Food as threats (2015). See **Appendix J** for the statewide cricket and grasshopper infestation map and information.

The threats of Radon have not been very well known by residents and local governments until recent years. Thanks to educational activities promoted by the Bear River Health Department and others, knowledge of Radon has become more prevalent. However, while Radon levels can be relatively high in the region, they cannot be detected for each individual home or other structure unless individual tests are done following construction (See **Appendix L** for Radon risk maps and information).

Problematic soils are prevalent in the region. Hazards can not be fully determined until a local engineering and/or geotechnical study has been performed on site. Most of the larger local communities require studies to determine risk and most, it not all, local communities require contractors to utilize the International Building Code (IBC) which helps mitigate most effects. While most city engineers and other staff are familiar with the hazards problematic soils can incur, more can be done to prevent structure damage and threats to life and property.

(See **Appendix K** for regional historic severe weather events and losses to life and property)

Regional Natural Hazard Profiles

Table 7: Drought Hazard Profile

Frequency	Frequent
Severity	Severe mostly for agricultural producers
Location	Un-irrigated areas are most impacted
Seasonal Pattern	Water supply dependent on winter snowfall. Summer is when impact is realized.
Duration	As many as 10 years
Speed of Onset	Incremental with impact increasing
Probability of Future Occurrences	High

Table 8: Agricultural Hazard Profile

Frequency	Sporadic
Severity	Severe mostly for agricultural producers and gardeners
Location	Everywhere
Seasonal Pattern	Spring & early summer
Duration	Months
Speed of Onset	Days
Probability of Future Occurrences	High

Table 9: Severe Weather

Frequency	Frequent
Severity	Severe for communities, residents, and agricultural producers
Location	Everywhere (Some areas have more inherent risk due to geographic conditions)
Seasonal Pattern	Summer severe thunderstorms/hail & wind, late spring freezing, and heavy winter storms
Duration	Days/weeks
Speed of Onset	Immediate
Probability of Future Occurrences	High

Table 10: Radon Hazard Profile

Frequency	Persistent
Severity	Potentially Severe
Location	Everywhere
Seasonal Pattern	All, higher in winter months
Duration	Always
Speed of Onset	Years for detrimental effects
Probability of Future Occurrences	High

Table 11: Problematic Soils Hazard Profile

Frequency	Always
Severity	Potentially Severe
Location	Varies
Seasonal Pattern	Spring/high soil saturation/following wildfire damage
Duration	Persistent
Speed of Onset	Varies but potentially hours or days
Probability of Future Occurrences	High

Vulnerability and Potential Losses

People have been living with knowledge of current regional natural hazards since settlers first came to the area. Cold, snowy winters, hot dry summers, and other sporadic severe weather events are a part of life in the Rocky Mountains. Over the past decades, science has provided beneficial data related to soils and hazards from various soil types.

Radon and problematic soils data has helped local communities understand risks and studies have provided critical information on how to mitigate their effects. While engineering and technical studies can provide information on what types of soils are evident in particular areas, it is difficult to give precise predictions. However, through education and updated local building and development regulations, most severe problems can be avoided.

Implications for Future Growth and Development

The urbanization of eastern Box Elder County, eastern Cache Valley, and near Bear Lake in Rich County, will put new demands on agricultural water rights. As development moves in on agricultural lands, water is often needed for new residential and commercial structures. In terms of competition for limited water resources, agricultural uses often lose out to those increasing urban demands. This problem is likely to get worse for agricultural users and can become particularly severe during drought periods.

In general, as population increases in the Bear River Region, risk to residents, infrastructure, and property will likely increase for all regional hazards. The more people that live in an area, the more people will likely exposed to potential hazards by utilizing more resources, and spreading out across the landscape. In short, as more people move into the region, more people are likely to be affected by currently existing natural hazards.

Regional Hazard Mitigation Strategies

(See following pages)

BEAR RIVER REGION - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Bear River Region	All	Protect current residents and property	County-wide emergency preparedness fair	N/A	High	2017	Counties, BRAG	Box Elder, Cache, and Rich Counties and BRAG	Minimal	BRAG, Counties, Be Ready Utah, Utah DESHS, local communities, Utah FSSL, GOPB, LEPC's, local HAM radio groups, UGS, NRCS (snow), National Weather Service, LDS Bishops Storehouse, Food Bank
Bear River Region	Severe Weather	Protect current residents and property	Public education/training including 3-5 day power outage survival emergency response (CERT), emergency shelter locations, emergency kits, backup utilities, livestock issues, and interoperable emergency communications planning.	N/A	High	2017	Counties, Utah ESHS, BRAG, Cities, FEMA	Box Elder, Cache, and Rich Counties and BRAG	$50,000	Counties, Utah ESHS, BRAG, Cities, FEMA, NOAA
Bear River Region	Agricultural	Protect current residents and property	Encourage crop diversity, weed and pest management, and coordination with local, State, and Federal agencies on agricultural land management and production.	N/A	Medium	2018	Utah Department of Agriculture and Food, USDA, USU Extension, USFS, BLM,	Box Elder, Cache, and Rich Counties	Minimal	Utah Department of Agriculture and Food, USDA, USU Extension, USFS, BLM,
Bear River Region	Agricultural	Protect current residents and property	Work with various agencies to plan for and mitigate economic losses associated with stock loss due to disease.	N/A	Medium	2018	Utah Department of Agriculture and Food, USDA, USU Extension	Box Elder, Cache, and Rich Counties	minimal	Utah Department of Agriculture and Food, USDA, USU Extension, US Food and Drug Administration, Center for Disease Contro
Bear River Region	Agricultural	Protect current residents and property	Prepare an Emergency Services Function for County Emergency Operations Plans	N/A	Medium	2017	Local	Box Elder, Cache, and Rich Counties	Minimal	Local
Bear River Region	Agricultural	Protect current residents and property	Educate residents on crop insurance program, alternative planting and CRP programs, value of agriculture, pest control, crop diversity, urban tree planting guidelines, etc	N/A	Medium	2017	State, Local, USDA	Box Elder, Cache, and Rich Counties	Minimal	State, Local, USDA
Bear River Region	Drought	Protect current residents and property	Promote water wise landscaping practices and land use ordinances.	N/A	High	2016	Counties, Municipalities, BRAG	All jurisdictions	minimal	Counties, Municipalities, BRAG, USU Extension, NRCS, Utah League of Cities and Towns, GOPB
Bear River Region	Drought	Protect current residents and property	Study feasibility of increasing current water storage capabilities.	N/A	Low	2017	Utah ESHS, BRAG	All jurisdictions	Minimal	Utah ESHS, BRAG
Bear River Region	Drought	Protect current residents and property	Encourage water conservation techniques for all land uses.	N/A	High	2018	Utah DEQ, USDA, Utah Agriculture and Food, Utah APA	All jurisdictions	minimal	Utah DEQ, USDA, Utah Agriculture and Food, Utah APA
Bear River Region	Radon	Protect current residents and property	Provide educational materials to owners of new homes and/or all residents in the local communities	N/A	High	2016	Local	All jurisdictions	Minimal	Bear River Health Department
Bear River Region	Problematic Soils	Protect current residents and property	Review and update local land use ordinances to require soils testing before new construction on suspected instable soil types.	N/A	High	2017	Local	All jurisdictions	Minimal	Utah Geological Survey, Utah APA

BEAR RIVER REGION - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Bear River Region	All	Protect future residents and property	County-wide emergency preparedness fair	N/A	High	2017	Counties, BRAG	Box Elder, Cache, and Rich Counties and BRAG	Minimal	BRAG, Counties, Be Ready Utah, Utah DESHS, local communities, Utah FSSL, GOPB, LEPC's, local HAM radio groups, UGS, NRCS (snow), National Weather Service, LDS Bishops Storehouse, Food Bank
Bear River Region	Severe Weather	Protect future residents and property	Discuss planning needs on the county and city levels to coordinate lan use regulations regarding Severe Weather events and response. This would be intended to prevent damages from extreme weather trigger events and incorporate severe weather into current response plans.	N/A	Medium	2017	Counties, Municipalities, BRAG	All jurisdictions	Minimal	Counties, Municipalities, BRAG, Utah ESHS, Army Corp., Be Ready Utah, FSSL, LEPC, NOAA, NRCS
Bear River Region	Agricultural	Protect future residents and property	Encourage crop diversity, weed and pest management, and coordination with local, State, and Federal agencies on agricultural land management and production.	N/A	Medium	2018	Utah Department of Agriculture and Food, USDA, USU Extension, USFS, BLM,	Box Elder, Cache, and Rich Counties	Minimal	Utah Department of Agriculture and Food, USDA, USU Extension, USFS, BLM,
Bear River Region	Agricultural	Protect future residents and property	Work with various agencies to plan for and mitigate economic losses associated with stock loss due to disease.	N/A	Medium	2018	Utah Department of Agriculture and Food, USDA, USU Extension	Box Elder, Cache, and Rich Counties	minimal	Utah Department of Agriculture and Food, USDA, USU Extension, US Food and Drug Administration, Center for Disease Contro
Bear River Region	Agricultural	Protect future residents and property	Educate residents on crop insurance program, alternative planting and CRP programs, value of agriculture, pest control, crop diversity, urban tree planting guidelines, etc	N/A	Medium	2017	State, Local, USDA	Box Elder, Cache, and Rich Counties	Minimal	State, Local, USDA
Bear River Region	Drought	Protect future residents and property	Discuss purchasing agricultural water rights for culinary water on a county and local leve	N/A	High	2018	County, Local	All jurisdictions	Minimal	County, Local
Bear River Region	Drought	Protect future residents and property	Study feasibility of increasing current water storage capabilities	N/A	Low	2017	Utah ESHS, BRAG	All jurisdictions	Minimal	Utah ESHS, BRAG
Bear River Region	Drought	Protect future residents and property	Encourage water conservation techniques for all land uses.	N/A	High	2018	Utah DEQ, USDA, Utah Agriculture and Food, Utah APA	All jurisdictions	minimal	Utah DEQ, USDA, Utah Agriculture and Food, Utah APA
Bear River Region	Radon	Protect future residents and property	Provide educational materials to owners of new homes and/or all residents in the local communities	N/A	High	2016	Local	All jurisdictions	Minimal	Bear River Health Department
Bear River Region	Problematic Soils	Protect future residents and property	Review and update local land use ordinances to require soils testing before new construction on suspected instable soil types.	N/A	High	2017	Local	All jurisdictions	Minimal	Utah Geological Survey, Utah APA

SECTION 5: BOX ELDER COUNTY RISK ASSESSMENT & COMMUNITY SECTIONS

History and Background of Natural Hazards in Box Elder County

Flooding

Areas in Box Elder County have experienced significant impacts related to flooding in recent recorded history. Box Elder County has several large rivers and smaller tributaries that are susceptible to flooding. The Bear River is the largest river in the county. Cutler Reservoir lies mostly in Cache County, while just across the county line in Box Elder County, there is a hydroelectric dam called Cutler Dam. The existence of this dam does provide some meaningful flood control for downstream portions of the Bear River in Box Elder County. Other major rivers are the Malad River and Box Elder Creek. A number of small intermittent streams are located in some of the canyons of the Wellsville and Wasatch Mountains. Each of these streams can pose a threat in terms of flooding.

In addition a number of canals are located in the county that under certain conditions may fail or overflow and result in flooding. Also, flooding can also take place concurrently with some landslide events, particularly sediment/mud/debris flows. Flood water is rarely clean and clear, and much of the damage from flooding can be in the form of debris.

Most flooding in Box Elder County is attributed to snow melt rates in surrounding watersheds that are in excess of the capacity of the drainage systems or unusually heavy storm events that temporarily overwhelmed drainage capacity (or a combination of the both). Some limited flooding is the result of rising groundwater levels. In terms of property damage and disruption of community life, Brigham City, along with the Willard/Perry area, has been among the communities in the county most impacted by flooding. The floods of August 1923 in Willard were some of the most destructive in the state's recorded history. A significant portion of Willard was inundated by flood water and associated mud and debris flows. Four dwellings were destroyed and two women died when their homes were demolished (see cover photos).

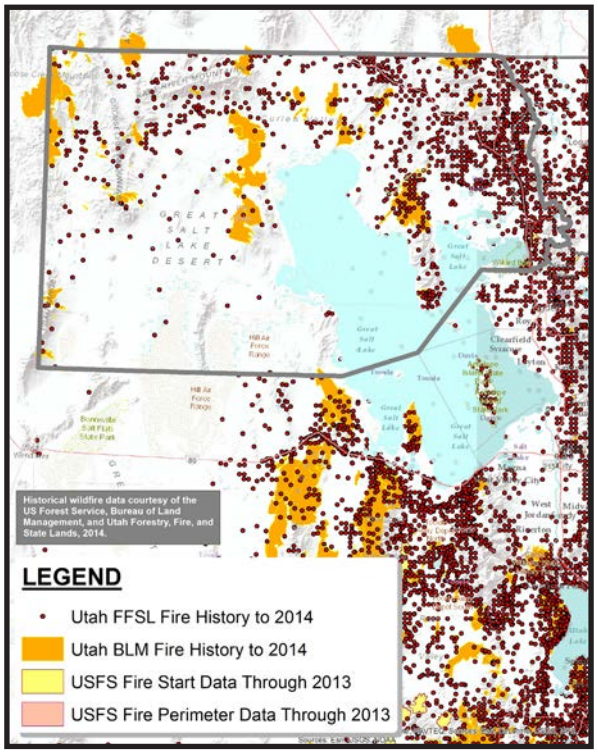
In the mid-1980's large portions of Box Elder County were negatively impacted by the rise in the level of the Great Salt Lake. A significant amount of high value wetlands and agricultural land surrounding the lake were flooded by the rise of the briny water, including the Bear River Bird Refuge. Although their immediate value was reduced by a natural dry cycle that resulted in the lake level dropping, the State of Utah installed large pumps on the lake to moderate the rise of the lake by moving the water to the west desert. These pumps can return to operation if needed.

Wildfires

The vast geographic majority of Box Elder County has minimal threat to life and property from wildfire. However, the most populated areas are at the most risk from wildfire. Much of the development in the county is at the base of the Willard and Wellsville Mountain Ranges. These steep slopes are dry and vulnerable to wildfire, which poses great risk to residents along the benches. Most of western Box Elder County consists of dry land vegetation types which are vulnerable to wildfire. While threats to life and property are not as high in these areas, grazing vegetation loss and wildlife habitat can suffer tremendously.

Major fires in Box Elder County include the "Wildcat", "Fort Ranch", "Thiokol", "Pilot Peak", "Dry Canyon", "Morris Ranch", and "West Hills" fires. In 1992 a large fire burned uncontained for over a week in the mountains above Perry City. There have also been several fires along the east slopes above Brigham City as well. In 2002 there was also a large wildfire in the Promontory area. In August, 2006, there was a wild fire near the Brigham City/Perry border that burned approximately 100 acres. The following graphic illustrates the number, general size, and general location of wildfires in Box Elder County from 1973 to 2008.

Below is a map showing historical wildfire locations in Box Elder County:



Landslides/Steep Slopes

Most of the landslide risk in Box Elder County is in Willard, Honeyville, and Perry. Unincorporated areas on the east foothills north of Brigham City and in south Willard are also in high landslide susceptibility areas. Willard and Honeyville could be substantially at risk if landslide events occurred. Most of the developed areas in these two municipalities are in what the Utah Geological Survey has designated as high landslide susceptibility areas in a 2007 data set. Floods and high water content in soils can also potentially increase damages caused by landslides, and communities should be aware of future potential risks.

Landslide events in Box Elder County have been known to damage homes, roads, and even take lives.

Debris flows associated with the 1923 flooding of Willard City were very destructive and destroyed a number of homes and buildings. Main Street Willard was covered in a thick layer of mud, rocks and debris. The force was strong enough to move large boulders.

In 1949 a five mile stretch of US 89 between South Willard and Utah Hot Springs was covered with mud, rocks and boulders.

In late May 1983 a large landslide occurred on the face of the mountain north of Willard near Facer Creek. Also in 1983-84 Three Mile Canyon near Perry City experienced a mud slide. As a result over $1 Million was spent constructing a detention basin and overflow facilities.

Recent rock falls have also occurred north of Mantua along Highway 89-91, and near Honeyville.

The Perry to south Willard area along the base of the Willard Mountains has had ongoing problems with debris flows, landslides and flash flooding. A number of debris basins have been constructed as well as other debris flow management structures. Portions of the Ogden-Brigham Canal susceptible to debris flow blockage have been placed in culverts to avoid flooding.

Earthquakes

The most populated portions of Box Elder County are located on the Intermountain Seismic Belt and the northern most segment of the Wasatch Fault. Earthquakes are common in Box Elder County, although no major earthquake resulting in significant property damage has occurred since early European settlement. Geologic evidence establishes the possibility of a major earthquake in Box Elder County.

Much of the populated corridor in Box Elder County is located near the Wasatch Fault. According to Hecker (1992), the Wasatch Fault Zone is the longest and most active normal fault in Utah. The Wasatch Fault extends from south of Malad, Idaho to western Sanpete County in Utah, much along the populated Wasatch Front. Ten distinct segments have been identified along the fault.

Based on geologic evidence of the last 6000 years, of all the studied segments of the Wasatch Fault, the Brigham City segment is the most overdue for seismic release. This segment exists along much of the populated areas of the eastern side of the county. Evidence suggests that it has been at least 3,000 years since a significant release has occurred on the Brigham City fault segment.

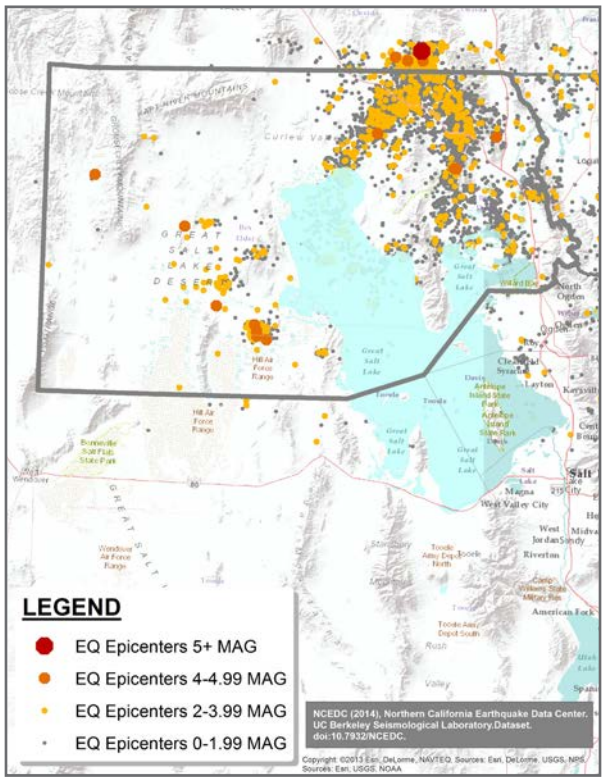
All the other studied segments of the fault indicate faulting in the last 3000 years which suggests these segments have had release of seismic energy (Hecker, 1992).

While a geological fault may not be very wide physically, damage around the fault can be detrimental. This is often referred to as the "damage zone (Susanne Janecke, personal communication, 9/25/08)." This damage zone is now thought to be much larger than recognized previously. While geologists used to recommend a general fault buffer of fifty feet on either side of the fault, they now recognize a much larger damage zone. According to the Utah Geological Survey, up thrown sides of well defined quaternary faults require planning for a 250 foot damage zone; while down thrown sides of well defined faults require planning for a 500 foot damage zone. For those faults not well defined, a general 1,000 foot damage zone should be considered (Richard Giraud, personal communication, 10/6/08; Christopher Duross, personal communication, 10/30/08; Christensen et al., 2003). Because of data inaccuracies in geologic fault data, a standard 1,000 foot damage zone was analyzed for all quaternary faults in the region.

One very important aspect of earthquake damage which is often overlooked is liquefaction. Liquefaction generally occurs when certain soil types when saturated with water can liquefy during an earthquake, moving, tilting, and destroying buildings. Whole foundations can be lifted and moved by the saturated soils. Eastern Box Elder County is largely covered by moderate-high to high liquefaction potential; especially in the lower elevation areas.

The 1934 Hansel Valley Earthquake (6.54 magnitude) is widely regarded as the state's largest earthquake in modern recorded history. Four aftershock earthquakes occurred ranging from 4.8 to 6.1 magnitudes. The epicenter was in a largely unpopulated portion of the county and little or no property damage occurred. This earthquake resulted in surface fault rupture. In 1909 a 6.0 magnitude earthquake also occurred in the Hansel Valley. More recently, an earthquake of 3.9 magnitude occurred near Tremonton on September 1, 2007. This earthquake damaged a historic structure in Tremonton which had to be demolished.

Below is a map of historical earthquake locations in Box Elder County:



Dam Failure

There are 295 active dams located in Box Elder County. Most of these dams are small detention ponds or livestock watering facilities and most pose a minimal threat to human safety or property.

Of the 295 active dams, most are designated as "low hazard" by the State of Utah Division of Water Rights. As defined by state statue, low hazard dams are those dams which, if they fail, would cause minimal threat to human life, and economic losses would be minor or limited from damage sustained.

A total of 8 dams have been designated as "moderate hazard" by the State of Utah in Box Elder County. Moderate Hazard dams which, if they fail, have a low probability of causing loss of human life, but would cause appreciable property damage including damage to public utilities.

The State of Utah has rated 5 dams in Box Elder County as "high hazard" which means that, if they fail, have a high probability of causing loss of human life or extensive economic loss, including damage to critical public utilities.

Dam failure inundation maps and emergency action plans for each of the high risk dams can be found on the Utah Division of Water Right's website at: http://waterrights.utah.gov/cgi-bin/damview.exe?Startup.

High Hazard Dams

Blue Creek Dam

The Blue Creek Dam is located one mile north of the town of Howell and has a hazard rating of high. The inundation area flows southward along blue creek, then just west of the development in Howell before ending at the Great Salt Lake basin.

Mantua Dam

The Mantua reservoir and dam have a high hazard rating. The inundation area covers the entire western side of the dam including significant amounts of the town of Mantua. Within the town, multiple homes and structures are at risk. The inundation continues westward down Box Elder Creek filling the canyon bottom and covering highway 89/91, eventually leading through the center of Brigham City. Once again, significant numbers of people, homes and businesses are within the potential inundation area.

Three Mile Creek (debris and detention basin)

Three Mile Creek detention basin is located about 0.5 miles southwest of the city of Perry. The inundation area flows westward from the dam towards the Great Salt Lake basin. Several structures as well as a section of highway 89/91 lie within the inundation area.

Cutler Dam

Cutler Dam and reservoir lie in extreme western Cache County and about four miles northeast of Fielding in Box Elder County. This facility has a hazard rating of high. The inundation area follows the Bear River flood plain first in southwestern direction and then south past Deweyville, Elwood, Honeyville, Bear River City, and finally Corrine City before ending at the Great Salt Lake. Since the inundation area remains, for the most part, within the flood plain, threats to the population and homes appear to be minimal.

A.V. Watkins Dam

A.V. Watkins Dam, otherwise known as the Willard Bay dam, runs along the southeast corner of the bay. No state data is available. See the following comments regarding safety issues for this dam.

While there are only four dams that are designated as high risk, as noted previously, every dam in the county that had inundation GIS data was analyzed. Potential losses were determined for every community in an inundation area.

No significant dam failures have occurred in Box Elder County. However, A.V. Watkins Dam, on the east side of Willard Bay, did have some leakage occurring in November of 2006. A cement-bentonite wall was placed inside the dam to correct the problem. No damages below the dam were reported, but the repairs cost approximately $17.4 million (http://www.usbr.gov/uc/feature/avwatkins/index.html).

Natural Hazard Profiles

Table 12: Box Elder County Flood Hazard Profile

Frequency	Some flooding occurs nearly every year in Box Elder County
Severity	Moderate
Location	Generally along rivers, streams, ravines, and canals.
Seasonal Pattern	Spring flooding as a result of snowmelt. Mid-late summer cloudburst events.
Duration	A few hours or up to three weeks for snowmelt flooding
Speed of Onset	1-6 hours
Probability of Future Occurrences	High-for delineated flood plains there is a 1% chance of flooding in any given year.

Table 13: Box Elder County Wildfire Hazard Profile

Frequency	Annually to some extent
Severity	Severe
Location	Dispersed throughout the whole county
Seasonal Pattern	Generally the worst from early July to mid September (depends on drought conditions)
Duration	A few hours to two weeks
Speed of Onset	1-6 hours
Probability of Future Occurrences	Very High (Since 1973, there has been an average of more than two wildfires per year that burned 1,000 acres or more)

Table 14: Box Elder County Landslide/Steep Slopes Hazard Profile

Frequency	Annually to some extent
Severity	Severe
Location	Dispersed throughout the whole county, but mostly in the mountains on the east and northwest ends of the county.
Seasonal Pattern	Generally the worst from early July to mid September (depends on drought conditions)
Duration	A few hours to two weeks
Speed of Onset	1-6 hours
Probability of Future Occurrences	Very High

Table 15: Box Elder County Earthquake Hazard Profile

Frequency	Low magnitude events occur frequently. Larger magnitude events are rare (although not necessarily on geologic time).
Severity	Potentially Catastrophic
Location	Entire County with highest frequency north of the Great Salt Lake. Surface fault ruptures are likely to occur in fault zones and liquefaction would impact most of the populated county.
Seasonal Pattern	None
Duration	A few minutes with potential aftershocks
Speed of Onset	No warning
Probability of Future Occurrences	Based on 1962-2001 data, there is a 35.9% chance every year of an earthquake of 4.0 magnitude or greater.

Table 16: Box Elder County Dam Failure Hazard Profile

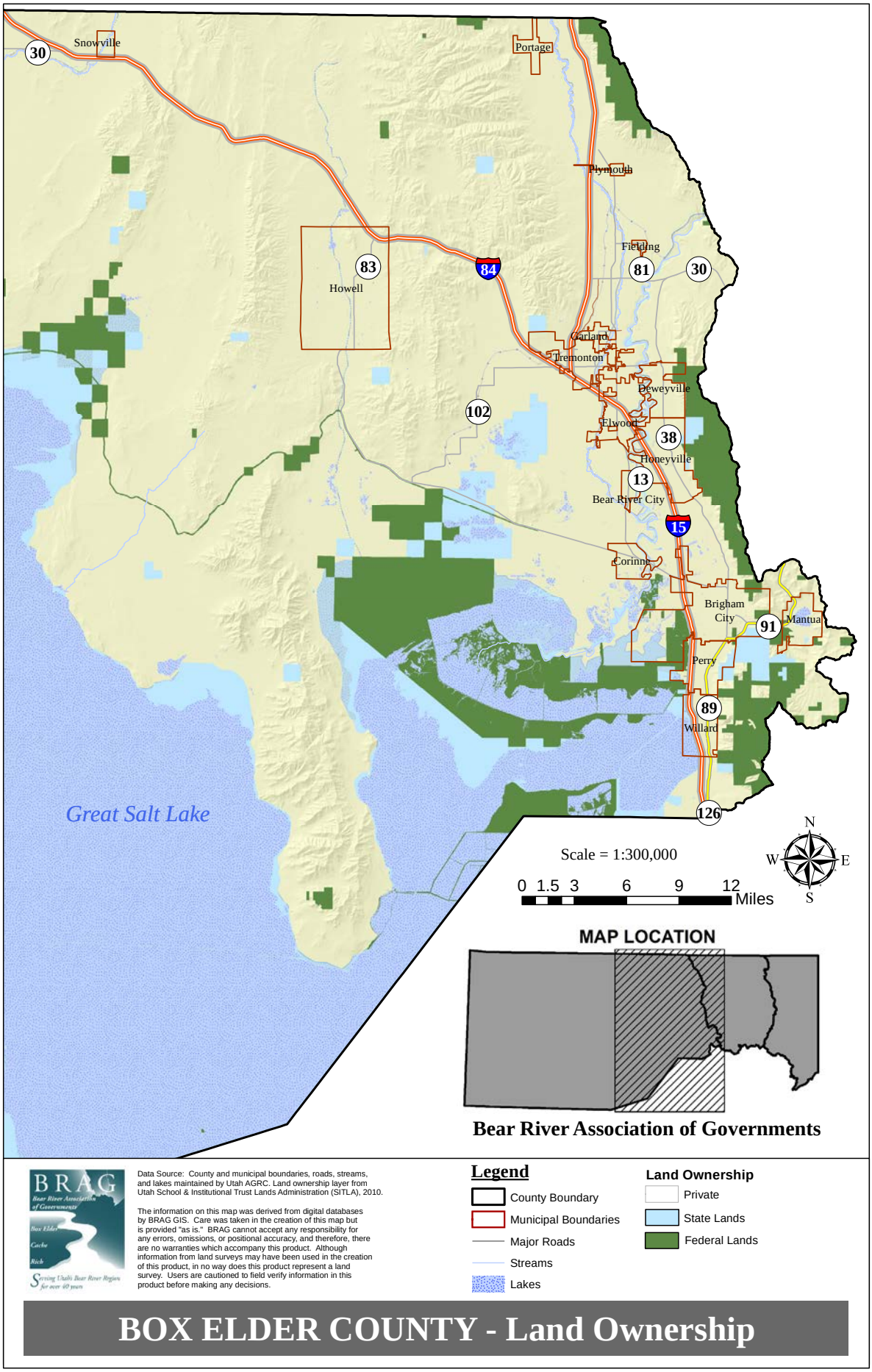
Frequency	Rare
Severity	Potentially Catastrophic
Location	Areas downstream of failed dam.
Seasonal Pattern	Anytime. Highest risk in spring during snowmelt.
Duration	A few hours
Speed of Onset	No warning
Probability of Future Occurrences	Low

Repetitive Loss Properties

There are no repetitive loss properties in Box Elder County (FEMA, 2015).

COUNTY-WIDE NATURAL HAZARD MAPS

(Please see pages 5-43 to 5-51)


Snowville
Portage
Plymouth
Fielding
Howell
Garland
Tremonton
Deweyville
Elwood
Honeyville
Bear River City
Corinne
Brigham City
Mantua
Perry
Willard
Great Salt Lake
30
83
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102
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Scale = 1:300,000
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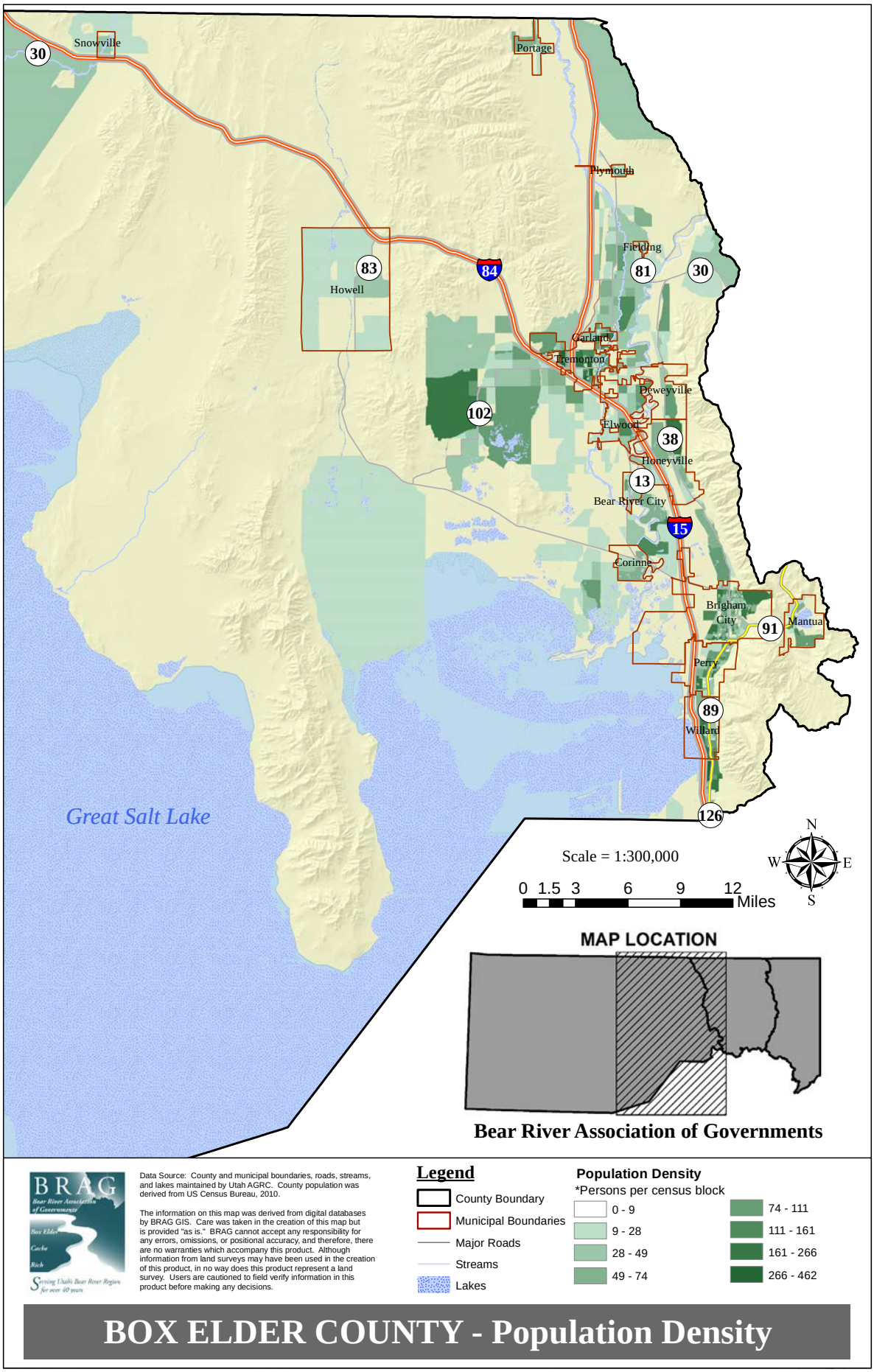
MAP LOCATION
Bear River Association of Governments
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Land ownership layer from Utah School & Institutional Trust Lands Administration (SITLA), 2010.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Land Ownership
Private
State Lands
Federal Lands
BOX ELDER COUNTY - Land Ownership


Snowville
Portage
Plymouth
Fielding
Howell
Garland
Tremonton
Deweyville
Elwood
Honeyville
Bear River City
Corinne
Brigham City
Mantua
Perry
Willard
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83
84
81
30
102
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15
91
89
126
Great Salt Lake
Scale = 1:300,000
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Miles
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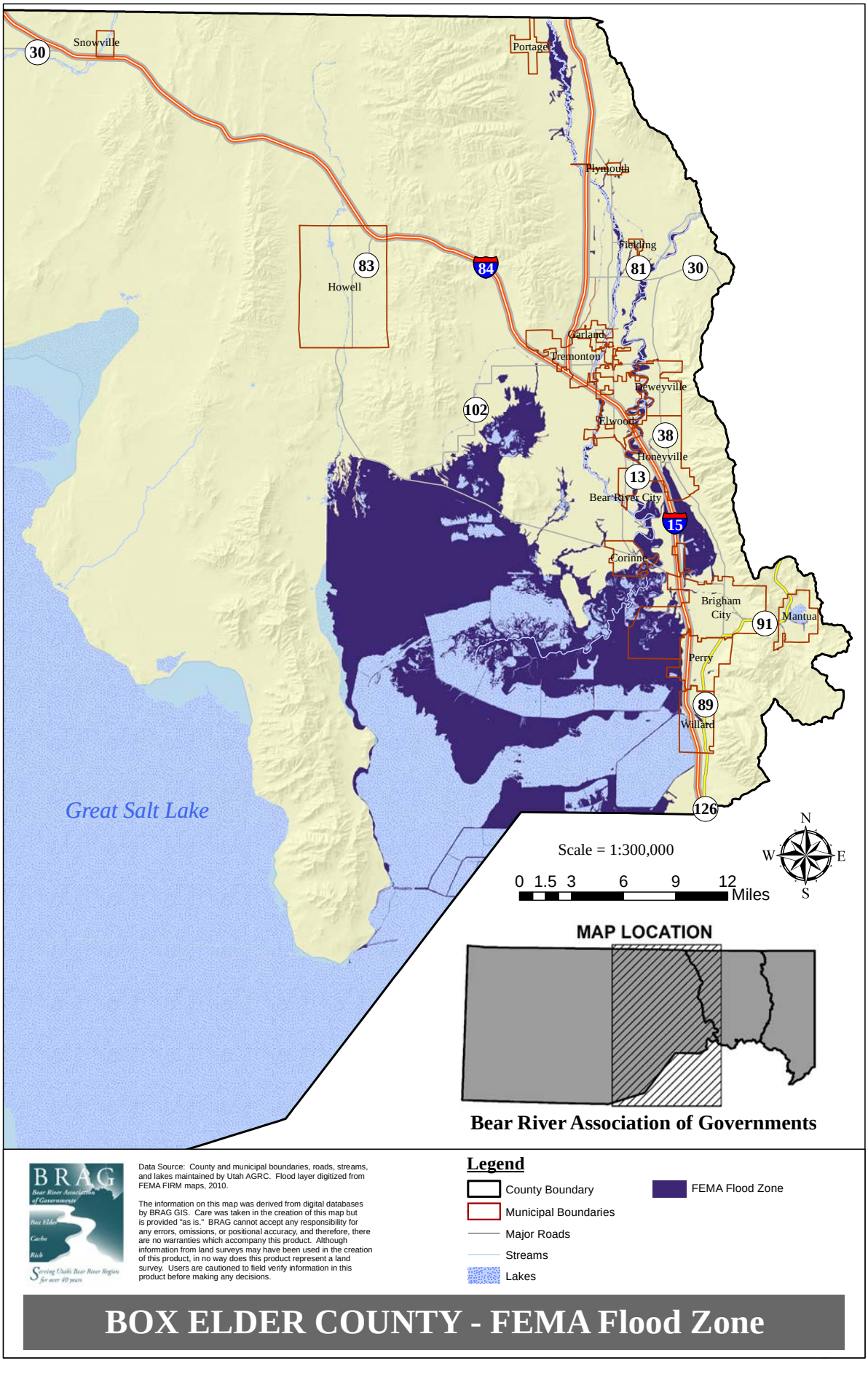
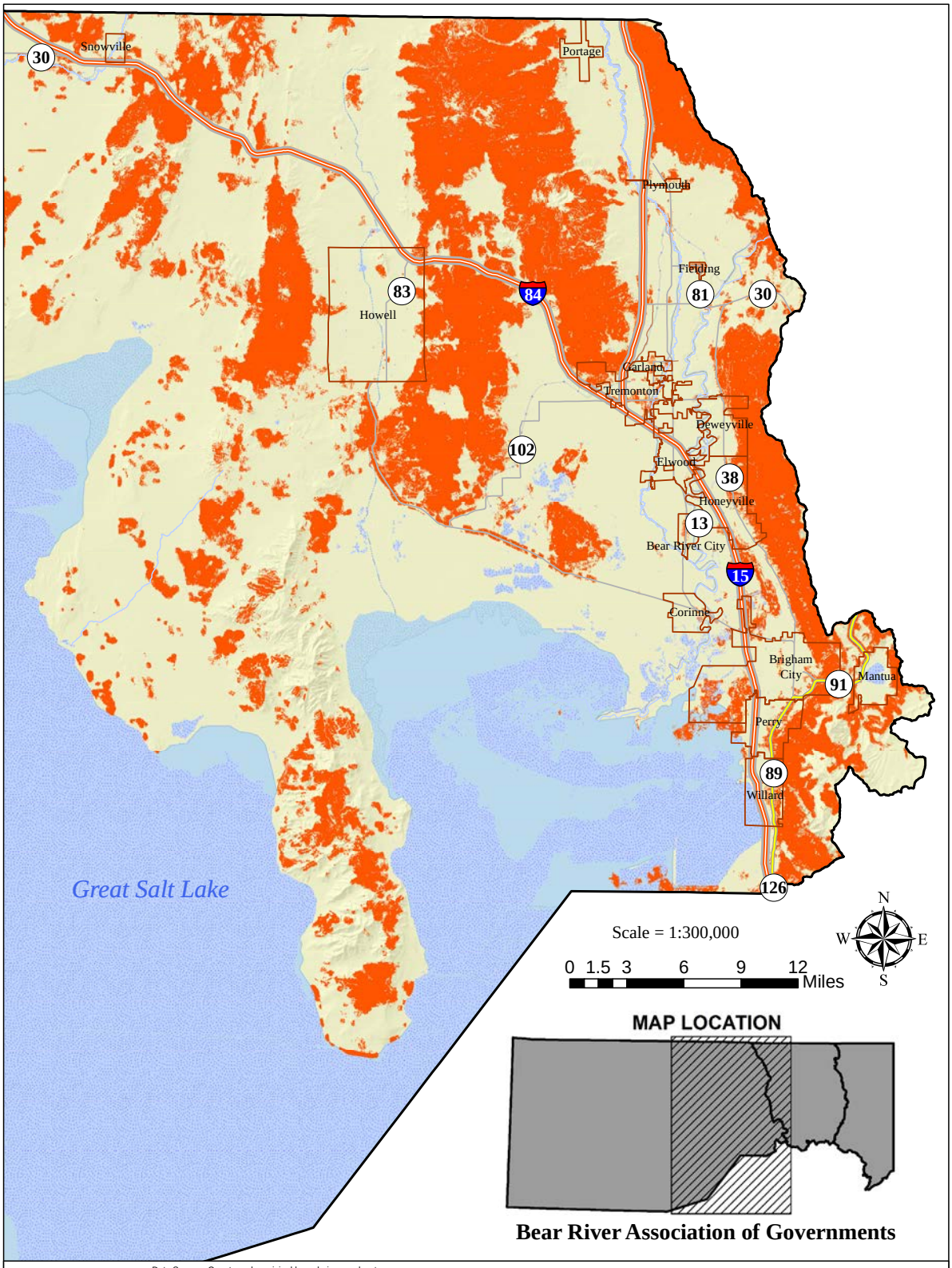
MAP LOCATION
Bear River Association of Governments
BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. County population was derived from US Census Bureau, 2010.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Population Density
*Persons per census block
0 - 9
9 - 28
28 - 49
49 - 74
74 - 111
111 - 161
161 - 266
266 - 462
BOX ELDER COUNTY - Population Density



BOX ELDER COUNTY - FEMA Flood Zone


Snowville
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Fielding
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Tremonton
Deweyville
Elwood
Honeyville
Bear River City
Corinne
Brigham City
Mantua
Perry
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Great Salt Lake
Scale = 1:300,000
0 1.5 3 6 9 12
Miles
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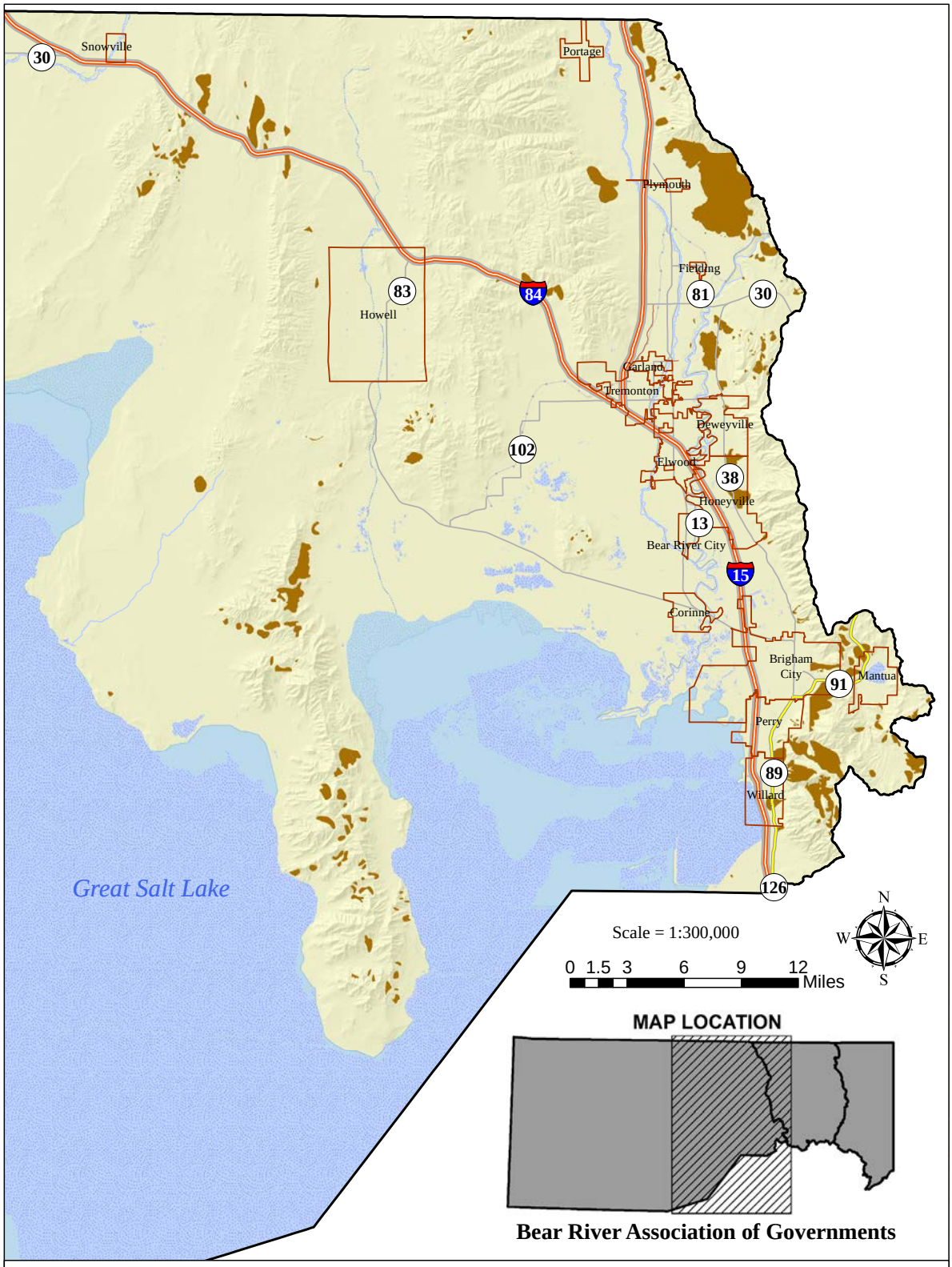
MAP LOCATION
Bear River Association of Governments
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Fire hazard data from the Oregon Department of Forestry study "West Wide Wildfire Risk Assessment, 2013". Combines moderate to high wildfire risk based on the Fire Risk Index (FRI).
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Fire Risk
Moderate to High
BOX ELDER COUNTY - Wildfire Hazard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Scale = 1:300,000
0 1.5 3 6 9 12
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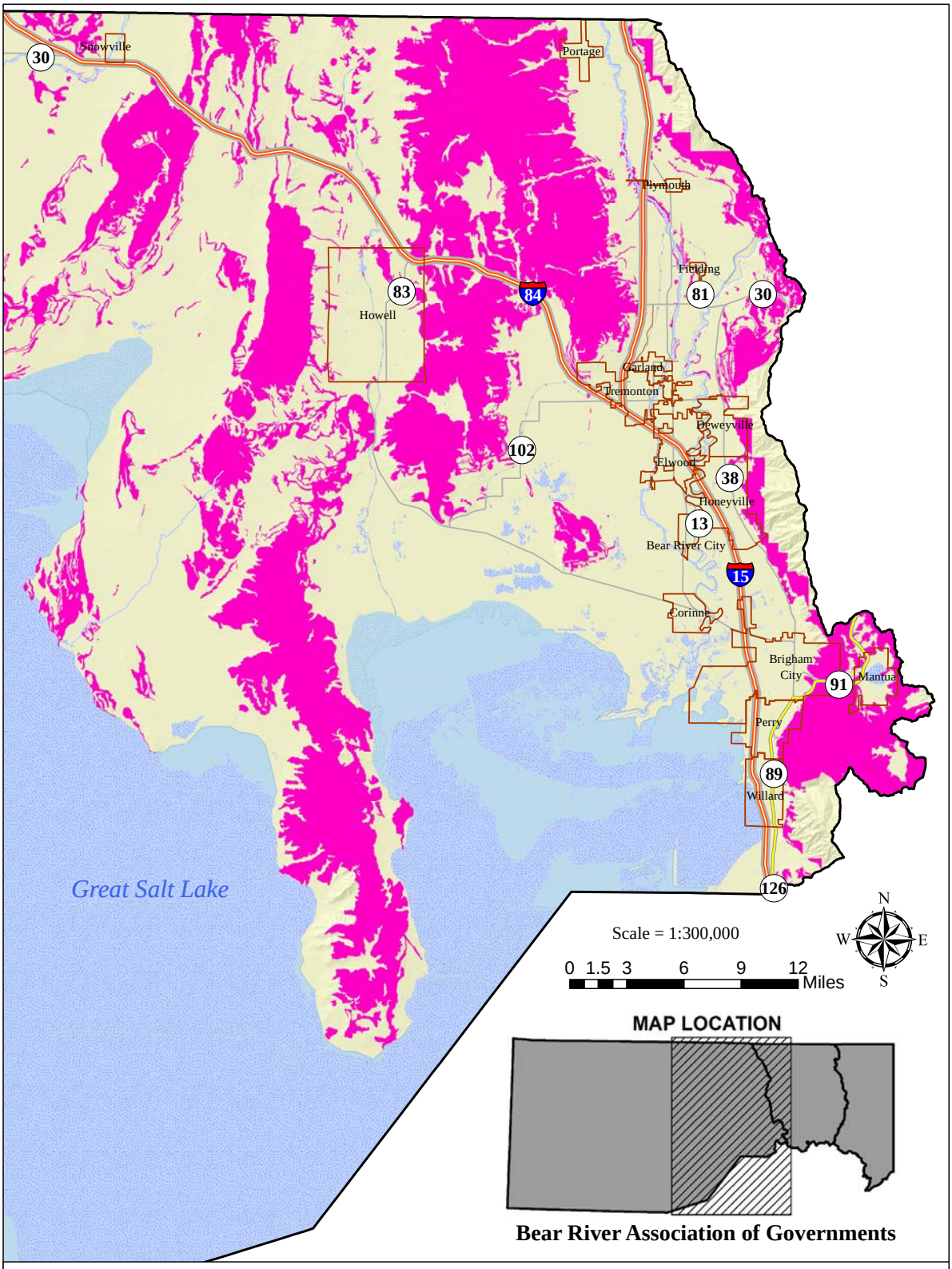
MAP LOCATION
Bear River Association of Governments
BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Data obtained from the Utah Geological Survey showing landslide deposits, landslide scarps, and debris-flow travel paths, 2010.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Landslides
Deposits, scarps, and debris-flow travel paths
BOX ELDER COUNTY - Landslides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Great Salt Lake
Scale = 1:300,000
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Miles
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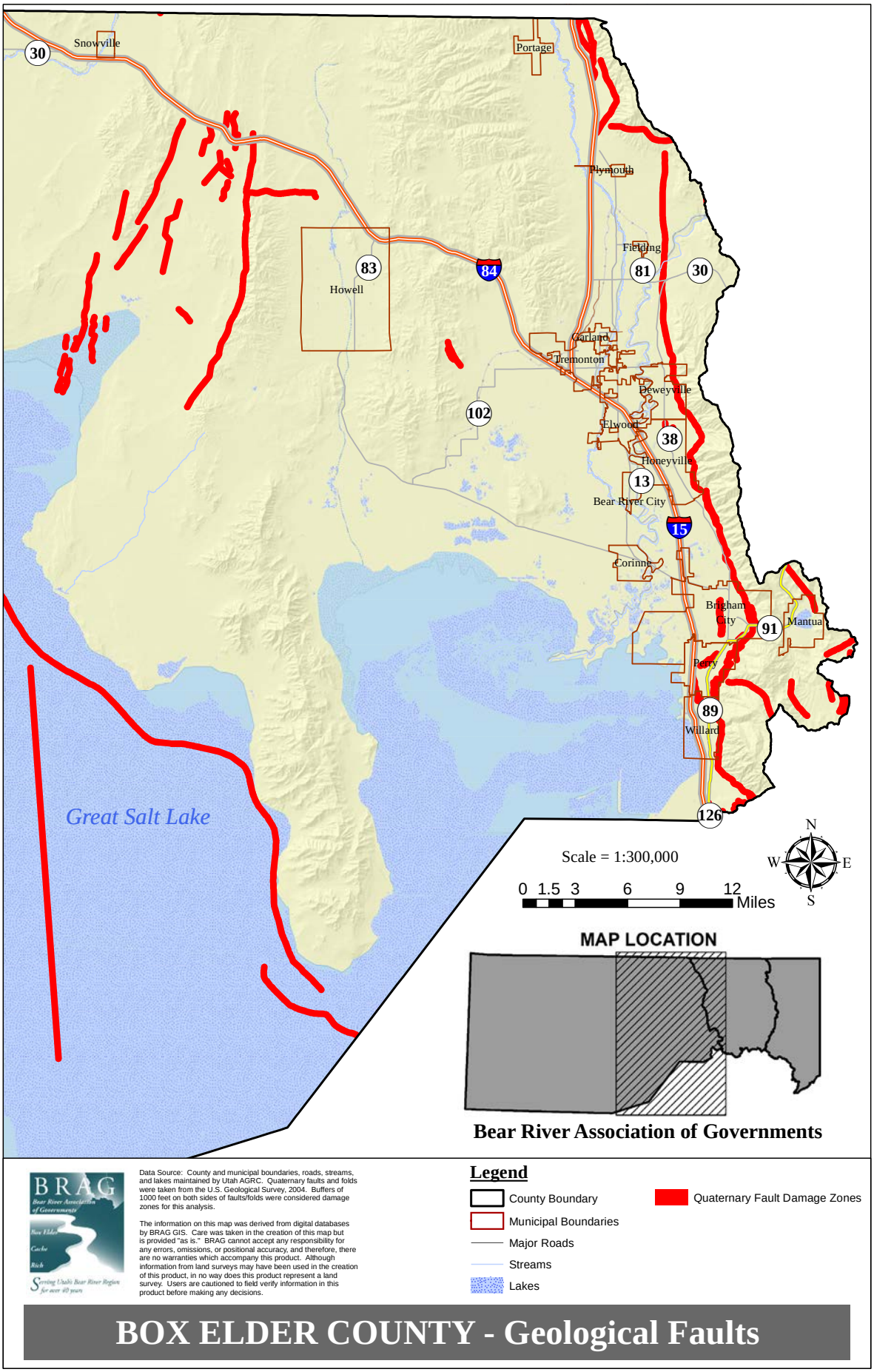
MAP LOCATION
Bear River Association of Governments
BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Steep slopes derived from NRCS SSURGO Soils Database 2013 - 20% slope and higher.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Steep Slopes
20% slope and higher
BOX ELDER COUNTY - Steep Slopes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Bear River City
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Brigham City
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Scale = 1:300,000
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Miles
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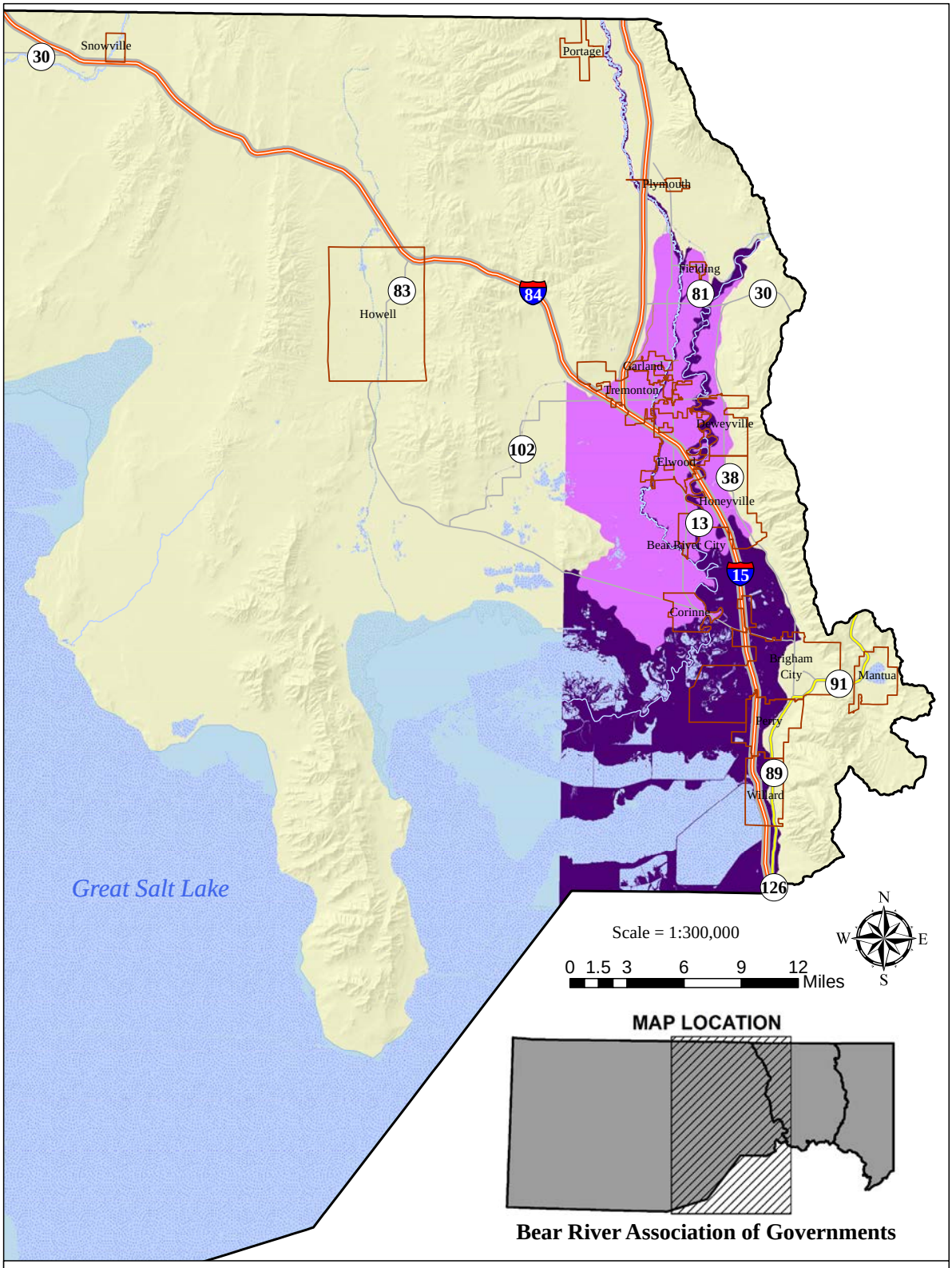
MAP LOCATION
Bear River Association of Governments
BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Quaternary faults and folds were taken from the U.S. Geological Survey, 2004. Buffers of 1000 feet on both sides of faults/folds were considered damage zones for this analysis.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Quaternary Fault Damage Zones
BOX ELDER COUNTY - Geological Faults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Scale = 1:300,000
0 1.5 3 6 9 12
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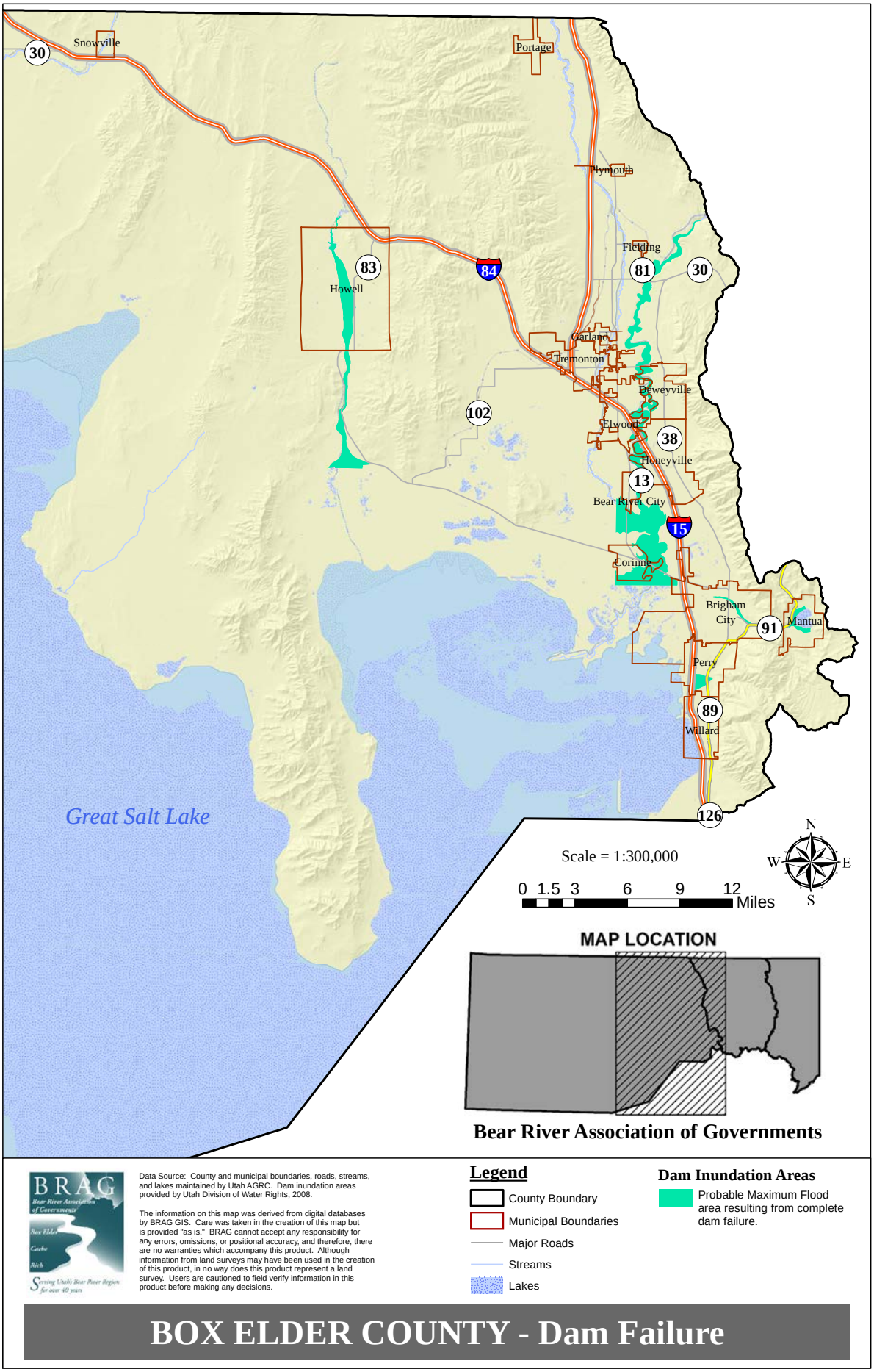
MAP LOCATION
Bear River Association of Governments
BRAG
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Liquefaction potential was digitized and published by the Utah AGRC, 2001.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Liquefaction Potential
Moderate to High
High
BOX ELDER COUNTY - Liquefaction Potential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Bear River City
Corinne
Brigham City
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Great Salt Lake
Scale = 1:300,000
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Miles
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MAP LOCATION
Bear River Association of Governments
BRAG
Bear River Association of Governments
Box Elder
Cache
Rich
Serving Utah's Bear River Region for over 40 years
Data Source: County and municipal boundaries, roads, streams, and lakes maintained by Utah AGRC. Dam inundation areas provided by Utah Division of Water Rights, 2008.
The information on this map was derived from digital databases by BRAG GIS. Care was taken in the creation of this map but is provided "as is." BRAG cannot accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. Although information from land surveys may have been used in the creation of this product, in no way does this product represent a land survey. Users are cautioned to field verify information in this product before making any decisions.
Legend
County Boundary
Municipal Boundaries
Major Roads
Streams
Lakes
Dam Inundation Areas
Probable Maximum Flood area resulting from complete dam failure.
BOX ELDER COUNTY - Dam Failure

COMMUNITY SECTIONS: NATURAL HAZARDS, POTENTIAL LOSSES, AND MITIGATION STRATEGIES

BEAR RIVER

Analysis of hazard risk involving the community of Bear River revealed that there is potential risk resulting from **dam failure, flood, liquefaction, and wildfire**. These hazards have varying potential to impact life, property, infrastructure, agriculture, and recreational features within municipal boundaries. Currently, liquefaction and wildfire hazards have the greatest potential to impact the community based on potential loss values. Other natural hazard types not mentioned were found to have no potential impacts to Bear River City. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 17: Bear River Potential Loss Figures

Natural Hazards

Dam failure. Bear River's risk of dam failure involves the eastern portion of town that is adjacent to the Bear River and is situated downstream of Cutler Dam. Structures and amenities in these areas could experience damage if Cutler Dam were to fail. Currently, no other areas in Bear River appear to be at risk from dam failure.

Flood. The Bear River and Malad River pose threats for flooding within the community. Areas to the south and east within the jurisdiction have the greatest risk potential, with structures and features adjacent to the Bear and Malad rivers having risk. Bear River participates in NFIP, joining the program in 2010.

Liquefaction. The City of Bear River currently has moderate-high and high potential risk involving liquefaction. Areas of highest risk are located near the Bear and Malad rivers where a higher level of ground saturation may be present. Other areas of moderate-high risk are associated with the community's relatively

Bear River, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	16	5	973,974	2	729,171	2,414,610
Faults	0	0	0	0	0	0
Wildfire	754	241	34,455,401	13	1,303,229	15,694,965
Flood	13	4	1,083,452	2	729,171	2,414,610
Liquefaction	889	284	42,981,405	18	1,627,727	21,731,490
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Bear River, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0.24	126,000	0.13	195,000
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0	2.55	1,338,750	0.82	1,230,000
Flood	0	0	0	0	0	0	0.07	36,750	0.06	90,000
Liquefaction	0	0	0	0	0	0	12.49	6,557,250	2.1	3,150,000
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Bear River, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					1 bridge
Faults					
Wildfire					
Flood					1 bridge
Liquefaction		Century School		1 place of worship	1 bridge, 2 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Bear River, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	182.36	142.45	0	0	0
Faults	0	0	0	0	0
Wildfire	47.93	249.6	0	0	0
Flood	142.83	121.49	0	0	0
Liquefaction	664.07	943.97	0	0	0
Landslide	0	0	0	0	0
Slope	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Bear River, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	91.77	2.4	2.61	0	0	0
Faults	0	0	0	0	0	0
Wildfire	26.1	0.22	1.37	7.91	0	0
Flood	86.23	0.42	2.38	0	0	0
Liquefaction	102.89	2.4	5.83	11.57	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

low elevation within the surrounding landscape.

Wildfire. Bear River has some areas with moderate-high risk potential to wildfires. Most of these areas appear to be urban forested areas within the City's center. Areas adjacent to Highway 13 appear to be most at risk.

Future Development

No concerns involving potential future development within Bear River City were reported by city representatives.

Hazard Mitigation Strategies

Table 18: Bear River City Mitigation Strategies

BEAR RIVER CITY - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Bear River City	Wildfire	Protect current residents and property	Work with county fire marshal to evaluate wildfire risks.	N/A	Low	2017	N/A	Bear River City and Box Elder County	Minimal	County Fire District
Bear River City	Flooding	Protect current residents and property	Review detailed ordinance of development in flood plain	Same	Low	2016	N/A	Bear River City	Minimal	Fema, State Public Safety, Brag
Bear River City	Dam Failure	Protect current residents and property	Coordinate with county emergency response for potential evacuation or bridge damage.	N/A	Medium	2016	N/A	Bear River City and Box Elder County	Minimal	County, City
Bear River City	Landslides	Protect current residents and property	Review ordinance to ensure risk areas are minimized for development.	N/A	Low	2017	N/A	Bear River City	Minimal	Utah Geo Survey, City, BRAG
Bear River City	Earthquake / Liquefaction	Protect current residents and property	Education for Planning commission and council regarding liquefaction, including loss of critical infrastructure.	N/A	Medium	2015	N/A	Bear River City, UGS	Minimal	Utah Geo Survey, BRAG
BEAR RIVER CITY - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Bear River City	Wildfire	Protect future residents and property	Review land use ordinance to ensure identified risk areas are minimized	N/A	Low	2017	N/A	Bear River City	Minimal	City, County, BRAG
Bear River City	Flooding	Protect future residents and property	Ensure proper ordinance for development in flood plain	Same	Medium	2015	N/A	Bear River City, Utah DEM	Minimal	City, FEMA, State Safety, BRAG
Bear River City	Dam Failure	Protect future residents and property	Work with county to set up local emergency response facility, fire station, first responder.	N/A	Medium	2016	FEMA,PDM,CDGB,BRAG	Bear River City	TBD	State Emergency Service, County Brag
Bear River City	Landslides	Protect current residents and property	Review ordinance to ensure risk areas are minimized for development.	N/A	Low	2017	N/A	Bear River City, UGS	Minimal	Utah Geo Survey, City, BRAG
Bear River City	Earthquake Liquefaction	Protect future residents and property	Review general plan to include liquefaction and problem soils.	N/A	Low	2016	State, Local	Bear River City, UGS	Minimal	City, Local, BRAG

BOX ELDER COUNTY (UNINCORPORATED)

Analysis of hazard risk involving the community of the unincorporated portions of Box Elder County revealed that there is potential risk resulting from **dam failure, faults, flood, liquefaction, landslides, steep slopes, and wildfire**. These hazards have varying potential to impact life, property, infrastructure, agriculture, and recreational features within municipal boundaries. Currently, liquefaction, floods, and wildfire hazards have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Other natural hazard types not mentioned were found to have no potential impacts to the unincorporated portions of Box Elder County. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Dam failure. Box Elder County's risk of dam failure involves the eastern portion of the county near incorporated municipalities. Blue Creek Dam located near Howell places a portion of the county directly south of Howell at risk to dam failure. A small segment of Sardine canyon between Mantua and Brigham City is at risk of inundation. Life, property, and various amenities located in these areas could experience damage. Additionally, portions of the county that run adjacent the Bear River below Cutler Dam also are at risk of dam failure, however most inundation areas are located within the current flood plain for the Bear River and thus are less threatening to large portions of the population. Currently, no other areas in the County appear to be at risk from dam failure.

Faults. There are fault damage zones in Box Elder County with potential to affect structures. Areas associated most greatly with fault damage zones are development areas and structures in the unincorporated

Table 19: Box Elder County Potential Loss Tables

Box Elder County, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	457	146	33,674,494	38	66,226,779	45,877,590
Faults	457	146	51,231,780	39	10,076,449	47,084,895
Wildfire	2,989	955	212,421,483	245	262,273,017	295,789,725
Flood	742	237	77,182,222	99	62,117,305	119,523,195
Liquefaction	5,841	1,866	405,039,019	334	329,074,937	403,239,870
Landslide	238	76	15,829,986	37	23,986,882	44,670,285
Slope	1,027	328	79,203,894	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

[Figures also include Hansel Valley special flood hazard area potential losses]

Box Elder County, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	1.18	1,770,000	5.88	8,232,000	1.23	156,210	33.78	17,734,500	5.2	2,730,000
Faults	4.71	7,065,000	10.6	14,840,000	16.62	2,110,740	92.71	48,672,750	7.12	3,738,000
Wildfire	28.49	42,735,000	20.84	29,176,000	87.84	11,155,680	1335	701,043,000	37.05	19,451,250
Flood	7.71	11,565,000	9.22	12,908,000	12.99	1,649,730	176.9	92,851,500	80.69	42,362,250
Liquefaction	68.55	102,825,000	49.21	68,894,000	83.85	10,648,950	745.9	391,613,250	181.4	95,214,000
Landslide	2.42	3,630,000	6.52	9,128,000	10.38	1,318,260	197.4	103,614,000	4.89	2,567,250
Slope	0	0	14.26	19,964,000	31.42	3,990,340	951.9	499,737,000	7.95	4,173,750
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.
[Figures also include Hansel Valley special flood hazard area potential losses]

Box Elder County, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					7 bridges, 3 dams
Faults					3 bridges, 1 broadband anchor, 5 dams
Wildfire					
Flood					25 bridges, 18 dams
Liquefaction		1 airport, Box Elder Landfill		4 places of worship	90 bridges, 3 broadband anchors, 38 dams
Landslide					5 dams
Slope				1 place of worship	2 bridges, 41 dams
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.
[Figures also include Hansel Valley special flood hazard area potential losses]

Box Elder County, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	8,379.93	7,116.64	566.98	0.00	2.00
Faults	6,317.64	9,776.15	15,843.21	2.00	1.00
Wildfire	28,594.41	140,946.15	312,117.40	3.00	5.00
Flood	30,008.77	8,409.24	7,422.51	1.00	2.00
Liquefaction	76,714.07	42,413.92	167.27	12.00	7.00
Landslide	6,477.99	5,755.49	29,257.88	2.00	1.00
Slope	17,764.71	0.00	303,759.79	1.00	1.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.
[Figures also include Hansel Valley special flood hazard area potential losses]

Box Elder County, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	4,227.95	352.48	99.50	0.00	0.91	0.00
Faults	13,617.25	21,911.36	178.80	0.00	18.91	1.00
Wildfire	10,521.70	510.76	2,752.93	0.00	42.73	2.00
Flood	330,539.12	159,281.61	1,242.14	0.00	0.55	1.00
Liquefaction	123,285.79	72,075.48	713.61	0.00	0.00	0.00
Landslide	263.14	24.87	357.28	0.00	15.25	3.00
Slope	243.80	171.59	2,122.75	0.00	58.48	2.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00	0.00

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.
[Figures also include Hansel Valley special flood hazard area potential losses]

areas along the eastern portion of the county. These areas overlap portions of the Brigham City Segment of the Wasatch Fault and could impact a variety of residential and commercial units on the areas east of Portage stretching south to Willard.

Flood. Substantial portions of Box Elder County are at risk to flooding, however risk to flooding impacts is lessened due to large portions of the flood plain existing in the uninhabited areas bordering Great Salt Lake. Structures near the Bear River Bay of the Great Salt Lake are at risk. Areas of greatest concern lie within the FEMA flood plains of the Bear and Malad Rivers in the eastern portion of the county. In particular, a large area stretching from Bear River City and Honeyville south to Brigham City and Corrine has potential to flood. Intermittent streams and drainages in the county also pose risk to structures in the region. Another area of concern is that of Hansel Valley where there exists a special flood hazard area.

Liquefaction. Areas of Box Elder County's unincorporated lands have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to liquefaction exist in the lower elevation areas on the eastern side of the county. Areas of moderate-high liquefaction risk from areas just north and west of Fielding south to areas south and west of Corrine. Some area of high risk exist within these areas, especially areas adjacent to the Bear and Malad Rivers. Other areas of high risk include areas and structures situated between Honeyville, Bear River City, Corrine, and Brigham City, as well as portions of the Bear River Bay as it enters into the Great Salt Lake.

Landslides. Isolated pockets of Box Elder County's unincorporated areas could suffer potential losses to landslides. Populations, structures, and amenities that are most likely to be impacted include eastern portions of the county in proximity to the Wellsville Mountains, other portions of the Wasatch Mountain Range, and other mountainous areas throughout the county. Landslides have the potential to impact life, property, critical facilities, infrastructure, and environmental, recreational and agricultural features in the jurisdiction.

Steep Slopes. Box Elder County has risk associated with steep slopes within its unincorporated areas. Areas of greatest concern have slopes of over 20%, which are commonly found in areas directly adjacent to mountainous areas of the Wellsville and Wasatch Mountain Ranges, as well as other ranges found to the west. Areas bordering streams and rivers also appear to have an increased exposure to risk. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction.

Wildfire. Box Elder County is susceptible to moderate-high risk of wildfire throughout large portions of its unincorporated areas. Moderate-high risk is most closely associated with development and amenities adjacent to mountainous areas, including portions of the Wasatch Mountains, the Wellsville Mountains, and other ranges in the region. Additionally, some areas at lower elevations are also at risk due to their proximity to adjacent jurisdictions and their urban forests or the presence of grassy and shrubby vegetation types. Wildfires have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction.

Future Development

Future development is anticipated along portions of the Bear River. This development could face moderate to high risk involving flooding, dam failure, liquefaction, and wildfire. Developments in areas that overlap with hazards increase exposure to in terms of human life, property, infrastructure, and environmental, recreational and agricultural amenities.

Hazard Mitigation Strategies

Table 20: Box Elder County Mitigation Strategies

BOX ELDER COUNTY - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Box Elder County	Dam Failure	Protect current residents and property	Warning system needed for Boy Scout camp below Cutler Dam	N/A	Medium	2016	PacifiCorp	Box Elder County, Bureau of Reclamation, Utah Dam Safety	N/A	Private
Box Elder County	Earthquake	Protect current residents and property	Retrofit the County Court House	N/A	Medium	2017	Mitigation grant	Box Elder County	$1.5 Million	N/A
Box Elder County	Flood	Protect current residents and property	Need to reconcile with recently adopted flood plain maps	N/A	Medium	2016	N/A	Box Elder County, Utah DEM	Minimal	Planning and Zoning
Box Elder County	Landslide	Protect current residents and property	Identify landslide areas and educate the property owners.	N/A	Medium	2017	N/A	Box Elder County, UGS	Minimal	Planning and Zoning
BOX ELDER COUNTY- COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Box Elder County	Dam Failure	Protect future residents and property	Make sure new building permit holders are notified of current procedure, update city watch notification system (pending)	N/A	Medium	2016	None	Box Elder County, Bureau of Reclamation, Utah Dam Safety	Minimal	Planning and Zoning
Box Elder County	Earthquake	Protect future residents and property	Identify hazardous areas and notify	N/A	Medium	2016	N/A	Box Elder County	Minimal	Planning and Zoning
Box Elder County	Flood	Protect future residents and property	Need to reconcile with recently adopted flood plain maps	N/A	Medium	2016	N/A	Box Elder County, Utah DEM	Minimal	Planning and Zoning
Box Elder County	Landslide	Protect future residents and property	Prevent building in landslide areas through planning commission	N/A	Medium	2017	N/A	Box Elder County, UGS	Minimal	Planning and Zoning

BRIGHAM CITY

Analysis of hazard risk involving the community of Brigham City revealed that there is potential risk resulting from **dam failure, faults, flood, liquefaction, landslides, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, infrastructure, agriculture, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction and fault damage have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Other natural hazard types not mentioned were found to have no potential impacts to Brigham City. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Dam failure. Brigham City has risk to dam failure involving Mantua Reservoir. Areas at risk include the mouth of Sardine Canyon and along Box Elder Creek. Life, structures and amenities in these areas could be effected in the case of a dam failure event.

Faults. Brigham City has potentially the greatest risk of fault damage in Box Elder County due to its large number of population located within the fault damage zone. The eastern portions of the city, especially areas of the foothills and bench, lie along portions of the Northern Wasatch Fault, which historically is the most overdue for activity in the region. Human life, structures, and other amenities in the fault zone could suffer catastrophic damage in the event of a large earthquake.

Table 21: Brigham City Potential Loss Figures

Brigham City, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	873	279	45,421,393	14	2,714,950	16,902,270
Faults	5,296	1,692	241,231,151	50	22,317,078	60,365,250
Wildfire	776	248	54,575,507	106	100,830,048	127,974,330
Flood	288	92	14,770,407	11	17,457,674	13,280,355
Liquefaction	1,750	559	107,591,100	138	105,642,781	166,608,090
Landslide	222	71	16,199,172	1	254,800	1,207,305
Slope	210	67	16,419,123	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Brigham City, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0.87	1,305,000	0.08	112,000	0.57	72,390	11.69	6,137,250	8.34	12,510,000
Faults	7.04	10,560,000	5.78	8,092,000	2.06	261,620	58.9	30,922,500	5.27	7,905,000
Wildfire	5.31	7,965,000	3.29	4,606,000	4.41	560,070	28.28	14,847,000	11.6	17,400,000
Flood	0.08	120,000	0.39	546,000	4.9	622,300	13.32	6,993,000	6.06	9,090,000
Liquefaction	22.24	33,360,000	5.82	8,148,000	14.24	1,808,480	263.3	138,237,750	24.32	36,480,000
Landslide	0	0	0.77	1,078,000	0	0	7.35	3,858,750	1.28	1,920,000
Slope	0	0	2.86	4,004,000	0.81	102,870	21.05	11,051,250	4.4	6,600,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Brigham City, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure				1 place of worship	1 bridge, 1 dam
Faults	Brigham City Ambulance, Brigham City Emergency Services	Triumph Center for Youth, Facility, Box Elder High, Young Intermediate school	7 health care facilities	6 places of worship	1 bridge, 1 dam, 11 broadband anchors
Wildfire					
Flood	Fish and Wildlife Service Office of Law Enforcement				4 bridges, 1 broadband anchor, 1 dam
Liquefaction	5 law enforcement offices, 1 EMS station, 1 Fire Station, 1 correctional facility	18 schools, 1 airport, 7 public facilities	20 healthcare facilities	22 places of worship	14 bridges, 53 broadband anchors, 6 dams
Landslide					
Slope					2 bridges, 1 dam
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Brigham City, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Acres	# of Miles
Dam Failure	79.11	246.85	0.00	0.00	0.00
Faults	80.12	771.01	0.00	1.00	0.00
Wildfire	288.06	381.62	0.00	0.00	0.00
Flood	438.39	255.29	0.00	0.00	0.00
Liquefaction	3,539.76	2,062.91	0.00	0.00	0.00
Landslide	0.00	1.56	0.00	0.00	0.00
Slope	0.00	1.66	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Brigham City, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	6.42	3.62	6.12	16.77	0.30	2.00
Faults	6.72	4.65	5.21	54.95	5.41	3.00
Wildfire	2,976.77	185.71	29.52	52.44	8.52	2.00
Flood	6,258.58	450.97	42.86	16.78	0.06	2.00
Liquefaction	7,165.79	489.91	4.87	0.00	0.00	0.00
Landslide	0.00	0.00	2.62	3.80	0.00	0.00
Slope	0.40	0.71	9.24	0.00	10.07	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00	0.00

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Flood. Portions of Brigham City are at risk to flooding. Areas most susceptible to flooding are in areas of the city to the west of Interstate 15. These areas are influenced by the Bear River as it enters the Bear River Bay of the Great Salt Lake. Other areas of concerns with the city include areas adjacent to Box Elder Creek, as well as structures in proximity to the portion of the Ogden-Brigham (Pineview) Canal and the Perry Canal. Intermittent streams and drainages in the city also pose risk to structures within jurisdictional boundaries. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Following fault damage, liquefaction poses the greatest risk to human life and property in Brigham City. Areas of Brigham City have high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to liquefaction exist in the lower elevation areas on the eastern side of the city. Areas of high risk exist approximately 2 miles east of Interstate 15 and west of the I-15. Liquefaction occurring in these areas poses a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Landslides. Isolated portions of Brigham City could suffer potential losses to landslides. Populations, structures, and amenities that are most likely to be impacted include eastern portions of the county in proximity to the Wellsville Mountains, other portions of the Wasatch Mountain Range, and other mountainous areas throughout the county. Landslides have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction.

Steep Slopes. Brigham City has risk associated with steep slopes within its jurisdictional boundaries. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Over 200 people and 67 structures are estimated to be at risk from steep slopes.

Wildfire. Brigham City is susceptible to moderate-high risk of wildfire in portions of the city. Moderate-high risk is most closely associated with development and amenities adjacent to mountainous areas, including portions of the Wasatch Mountains, the Wellsville Mountains, and other ranges in the region. Additionally, some areas at lower elevations are also at risk due to their proximity to urban forests, such as the city center, or the areas of grassy and shrubby vegetation types, such as west of I-15 and the northwest portion of the jurisdiction that borders I-15. Wildfires have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction.

Future Development

Future development is anticipated in areas of the valley floor, as well as in areas of higher elevation that border more mountainous areas of the Wasatch and Wellsville mountain ranges. Higher elevation developments could face moderate to high risk wildfire as it is considered to be in the wildland-urban interface zone of wildfire risk. Future development in the valley floors could be impacted by liquefaction in the case of an earthquake. Additionally, if such development occurs in the far western portion of the jurisdiction, it could be at risk to flood damage. Developments in areas that overlap with hazards increase exposure to in terms of human life, property, infrastructure, and environmental, recreational and agricultural amenities.

Hazard Mitigation Strategies

Table 22: Brigham City Mitigation Strategies

BRIGHAM CITY - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Brigham City	Earthquake	Protect current residents and property	Seismic upgrade of Brigham City Chamber of Commerce Building	N/A	High	2017	Brigham City, FEMA Grants, Historical Preservation	Brigham City and Chamber of Commerce	$350,000	UGS, County
Brigham City	Earthquake	Protect current residents and property	Complete seismic upgrade to Brigham City Hall	N/A	High	2018	Brigham City, Grants	Brigham City	$400,000	UGS, County
Brigham City	Dam Failure	Protect current residents and property	Work with local, state, and county governments to determine risk and potential response tactics to prevent loss and damage.	N/A	Medium	2017	Brigham City	Brigham City and Bureau of Reclamation/State Dam Safety	Minimal	Utah DEM, FEMA, BRAG
Brigham City	Landslide	Protect current residents and property	Determine areas of risk and educate officials and the public on risk areas, especially related to water sources and power failure. Also could affect electrical power generatior	N/A	Medium	2017	Brigham City	Brigham City	Minimal	Utah DEM, UGS, USGS
Brigham City	Slope	Protect current residents and property	Determine slope percentages representing greatest risk to residents and property.	N/A	Medium	2017	Brigham City, UGS, USGS	Brigham City, UGS	Minimal	Utah DEM, UGS, USGS
Brigham City	Wildfire	Protect current residents and property	Work with Utah FFSL on exploring potential WUI and/or CWPP plan for eastern benches.	N/A	Medium	2018	Brigham City, Utah FFSL	Brigham City, Utah FFSL	Minimal	Utah FFSL, County
Brigham City	Flood	Protect current residents and property	Work with state agencies and BRAG to review current flood hazard areas and update. Replace culverts to allow more water storage in Mantua Reservoir. Work with property owners and city staff to keep Box Elder channel free of debris.	Work with state floodplain manager to make sure city is compliant with NFIP and make changes as necessary.	Medium	2017	BRAG	Brigham City, BRAG	Minimal	BRAG, FEMA
Brigham City	Anything causing Power Failure	Protect current residents and property	Generator backup at the City Hall/ EOC	N/A	High	2016	Brigham City, Grants	Brigham City	$200,000	State DEM, FEMA, BRAG
Brigham City	Anything causing Power Failure	Protect current residents and property	Generator Backup of Varous Major Culinary Water Wells	N/A	High	2016	Brigham City, FEMA Grants	Brigham City	$400,000	State DEM, FEMA, BRAG

BRIGHAM CITY - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Brigham City	Earthquake	Protect future residents and property	Seismic upgrade of Brigham City Chamber of Commerce Building	N/A	High	2017	Brigham City, FEMA Grants, Historical Preservation	Brigham City and Chamber of Commerce	$350,000	UGS, County
Brigham City	Earthquake	Protect future residents and property	Complete seismic upgrade to Brigham City Hall	N/A	High	2018	Brigham City, Grants	Brigham City	$400,000	UGS, County
Brigham City	Dam Failure	Protect future residents and property	Educate local officials and the public on potential risks from dam failure.	N/A	Medium	2017	Brigham City	Brigham City and Bureau of Reclamation/State Dam Safety	Minimal	Utah DEM, FEMA, BRAG
Brigham City	Landslide	Protect future residents and property	Determine areas of risk and educate officials and the public on risk areas, especially related to water sources and power failure. Also could affect electrical power generatior	N/A	Medium	2017	Brigham City	Brigham City, UGS	Minimal	Utah DEM, UGS, USGS
Brigham City	Slope	Protect future residents and property	Review current ordinances and mapping to determine ways to better protect future residences and property	N/A	Medium	2017	Brigham City, UGS, USGS	Brigham City	Minimal	Utah DEM, UGS, USGS
Brigham City	Wildfire	Protect future residents and property	Review current ordinances and mapping to determine ways to better protect future residences and property	N/A	Medium	2018	Brigham City, Utah FFSL	Brigham City	Minimal	Utah FFSL, County
Brigham City	Flood	Protect future residents and property	Work with FEMA, State DEM, and others to explore updating the floodplain ordinance to better protect future structures and property. Protect flood channels from future growth to mitigate damage to residents and property.	Work with state floodplain manager to make sure city is compliant with NFIP and make changes as necessary.	Medium	2017	BRAG	Brigham City, BRAG, Utah DEM	Minimal	BRAG, FEMA
Brigham City	Anything causing Power Failure	Protect future residents and property	Generator backup at the City Hall/ EOC	N/A	High	2016	Brigham City, Grants	Brigham City	$200,000	State DEM, FEMA, BRAG
Brigham City	Anything causing Power Failure	Protect future residents and property	Generator Backup of Varouis Major Culinary Water Wells	N/A	High	2016	Brigham City, FEMA Grants	Brigham City	$400,000	State DEM, FEMA, BRAG

CORRINE

Analysis of hazard risk involving the community of Corrine revealed that there is potential risk resulting from **dam failure, flood, liquefaction, and wildfire**. These hazards have varying potential to impact human life, property, infrastructure, agriculture, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction, as well as dam failure, and wildfire have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts floods appear to have less potential for impacts. Other natural hazard types not mentioned were found to have no potential impacts to Corrine. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 23: Corinne Potential Loss Figures

Natural Hazards

Dam failure. Corrine has risk to dam failure involving Cutler Reservoir and would be heavily impacted in such an event. Areas most at risk include portions of the eastern and southern parts of the community, as these areas are in close proximity to the Bear River. Substantial risk to human life, structures and amenities in these areas could be effected in the case of a dam failure event.

Flood. Portions of Corrine City are at risk to flooding. Corrine participates in NFIP. Areas most susceptible to flooding are southern portion of the community. These areas are influenced by the Bear River as it enters the Bear River Bay of the Great Salt Lake. There is also some potential flood hazard in the Mill Run areas to the north. Portions of the Bear River flood plain also border most the city except its western

Corrine, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	326	104	1,838,200	12	13,272,120	14,487,660
Faults	0	0	0	0	0	0
Wildfire	294	94	12,287,864	11	1,319,900	13,280,355
Flood	81	26	1,127,852	10	3,174,986	12,073,050
Liquefaction	754	241	31,594,000	47	51,185,874	56,743,335
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Corrine, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0.82	1,230,000	0	0	0	0	5.45	2,861,250	0.09	135,000
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0.89	1,335,000	0	0	0	0	1.02	535,500	0	0
Flood	0.03	45,000	0	0	0	0	2.16	1,134,000	0	0
Liquefaction	2.9	4,350,000	0	0	0	0	18.3	9,607,500	1.24	1,860,000
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Corrine, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					1 dam
Faults					
Wildfire					
Flood					1 dam
Liquefaction	Corrine Fire Department	Corinne Early Learning Center, 1 public facility		1 place of worship	3 broadband anchors, 2 dams
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Corrine, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	697.64	52.13	0.00	0.00	0.00
Faults	0.00	0.00	0.00	0.00	0.00
Wildfire	43.65	4.91	0.00	0.00	0.00
Flood	535.64	92.92	0.00	0.00	0.00
Liquefaction	1,820.66	169.32	0.00	0.00	0.00
Landslide	0.00	0.00	0.00	0.00	0.00
Slope	0.00	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Corrine, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	481.89	65.68	7.73	0	0	0
Faults	0	0	0	0	0	0
Wildfire	19.6	6.02	0.12	0	0	0
Flood	470.77	65.09	7.25	0	0	0
Liquefaction	500.04	65.68	10.69	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

edge. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Corrine City have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas on the western edge of the jurisdiction that border the Bear River, and in areas along the south portion of the jurisdiction. Areas of moderate-high liquefaction risk exist throughout the rest of the community. Liquefaction has the greatest potential to Corrine with nearly 750 people at risk and nearly 300 structures.

Wildfire. Corrine is susceptible to moderate-high risk of wildfire in small portions of the city. Moderate-high risk is most closely associated with development and amenities near the Bear River in areas of grassy and shrubby vegetation types. Wildfires have the potential to impact over 300 people in the City, as well as over 100 structures.

Future Development

No concerns involving potential future development within Corrine were reported by city representatives.

Hazard Mitigation Strategies

Table 24: Corinne Mitigation Strategies

**Corinne did not provide mitigation strategies for this plan update.*

DEWEYVILLE

Analysis of hazard risk involving the community of Deweyville revealed that there is potential risk resulting from **dam failure, faults, flood, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction, as well as wildfire have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from dam failures, faults, floods, landslides, and steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Deweyville. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 25: Deweyville Potential Loss Figures

Deweyville, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	3	1	436,825	3	726,520	3,621,915
Faults	9	3	1,247,574	0	0	0
Wildfire	203	65	9,680,432	5	674,945	6,036,525
Flood	3	1	436,825	3	726,520	3,621,915
Liquefaction	391	125	20,259,886	14	1,325,320	16,902,270
Landslide	59	19	3,011,439	3	166,850	3,621,915
Slope	63	20	3,755,313	1	35,955	1,207,305
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Natural Hazards

Dam failure. Deweyville's risk of dam failure involves the western portions of the jurisdiction that border the Bear River. If Cutler Dam were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the Bear River could suffer serious impacts. Currently, there appears to be little development in this area, so widespread impacts appear limited.

Faults. Deweyville has risk of fault damage in along a portion the northern portion of the Wasatch Fault. The eastern portions of the town, especially areas of the foothills and bench, lie along portions of the fault, which historically is the most overdue for activity in the region. Human life, structures, and other amenities in the fault zone could suffer damage in the event of a large earthquake, however, widespread damage from faulting is not likely due to the lower amount of development in this portion of the jurisdiction.

Flood. Portions of Deweyville are at risk to flooding. Deweyville does not participate in NFIP,

Deweyville, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0.14	73,500	0	0
Faults	0	0	0	0	2.85	361,950	4.25	2,231,250	0.15	225,000
Wildfire	0.07	105,000	0	0	4.26	541,020	7.15	3,753,750	1.09	1,635,000
Flood	0	0	0	0	0	0	0.07	36,750	0	0
Liquefaction	4.06	6,090,000	0	0	9.25	1,174,750	21.89	11,492,250	3.19	4,785,000
Landslide	0	0	0	0	0	0	1.13	593,250	0.13	195,000
Slope	0	0	0	0	0.91	115,570	3.27	1,716,750	0.75	1,125,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Deweyville, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					
Liquefaction					1 place of worship
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Deweyville, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	231.11	248.00	0.00	0.00	0.00
Faults	1.00	6.94	0.00	0.00	0.00
Wildfire	22.83	63.76	0.00	3.00	0.00
Flood	191.59	187.60	0.00	0.00	0.00
Liquefaction	1,794.75	1,926.69	0.00	1.00	0.00
Landslide	52.43	73.37	0.00	1.00	0.00
Slope	1.18	0.00	0.00	1.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Deweyville, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	333.1	0.37	3.5	0	0	0
Faults	0	0	2.55	0	3.24	0
Wildfire	10.93	0.13	6.16	0	3.29	0
Flood	338.15	0.37	3.41	0	0	0
Liquefaction	422.46	3.34	8.96	0	0	0
Landslide	0	0	0.14	0	0.13	0
Slope	0	0	3.48	0	1.69	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

likely because its risk of flooding is less than other communities in the region. Areas most susceptible to flooding are western portions of the community that fall with the Bear River's flood plain. Additionally, there is some risk of flood from drainages exiting the Wellsville Mountains on the eastern portion of the city. Floods resulting in these areas pose a threat to human life, structures, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Deweyville Town have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas on the western edge of the jurisdiction that border the Bear River. Areas of moderate-high liquefaction risk exist throughout the rest of the community in lower elevation area below the benches and hilly areas. Liquefaction has the greatest potential to impact human life and structures with nearly 400 people at risk and nearly 140 structures.

Landslides. Isolated portions of Deweyville could suffer potential losses to landslides. Populations, structures, infrastructure, amenities and lands that are most likely to be impacted include eastern portions of the town in proximity to the Wellsville Mountains, as well as some area along the banks of the Bear River. Landslides have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Nearly 60 people and 20 structures are estimated to be at risk within the jurisdiction.

Steep Slopes. Deweyville has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in areas directly adjacent to mountainous areas of the Wellsville Mountain Range. Areas bordering streams and rivers also appear to have an increased exposure to risk. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Nearly 60 people and 20 structures are estimated to be at risk within the jurisdiction.

Wildfire. Deweyville is susceptible to moderate-high risk of wildfire in eastern portions of the city such as the benches and hilly areas adjacent to the Wellsville Mountains. Wildfires have the potential to impact over 200 people in the City, as well as nearly 70 structures.

Future Development

No concerns involving potential future development within Deweyville were reported by city representatives.

Hazard Mitigation Strategies

**Deweyville Town did not provide mitigation strategies for this plan update.*

ELWOOD

Analysis of hazard risk involving the community of Elwood revealed that there is potential risk resulting from **dam failure, flood, liquefaction, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction, as well as wildfire have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from dam failures, faults, floods, landslides, and slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Elwood. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 26: Elwood Town Potential Loss Figures

Natural Hazards

Dam failure. Elwood's risk of dam failure involves the eastern portions of the jurisdiction that border the Bear River. If Cutler Dam were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the Bear River could suffer serious impacts. Currently, there appears to be little development in this area, so widespread impacts appear limited.

Flood. Portions of Elwood are at risk to flooding. Elwood does not participate in NFIP, yet its risk of flooding poses risk for several aspects of the town and its population. Areas most susceptible to flooding are western portions of the community that fall with the Malad River's flood plain, as well as eastern portions of the town that fall within or border portions of the Bear River flood plain. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Elwood, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	13	4	946,472	6	1,277,720	7,243,830
Faults	0	0	0	0	0	0
Wildfire	56	18	3,876,186	5	1,325,890	6,036,525
Flood	88	28	5,503,744	13	2,840,260	15,694,965
Liquefaction	1,042	333	69,326,487	40	10,227,080	48,292,200
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Elwood, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	1.65	866,250	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0	0	0	0.24	360,000
Flood	0	0	0	0	0	0	2.34	1,228,500	0.7	1,050,000
Liquefaction	3.23	4,845,000	5.55	7,770,000	0	0	36	18,900,000	14.75	22,125,000
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Elwood, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					4 bridges
Liquefaction				1 place of worship	14 bridges, 1 dam
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Elwood, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	174.15	157.28	0.00	0.00	0.00
Faults	0.00	0.00	0.00	0.00	0.00
Wildfire	21.67	33.00	0.00	0.00	0.00
Flood	304.86	178.59	0.00	0.00	0.00
Liquefaction	4,186.75	4,694.65	0.00	3.00	0.00
Landslide	0.00	0.00	0.00	0.00	0.00
Slope	0.00	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Elwood, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	185.84	0.76	1.39	0	0	0
Faults	0	0	0	0	0	0
Wildfire	26.13	0	0.58	0	0	0
Flood	265.08	9.79	5.46	0	0	0
Liquefaction	361.56	11.78	20.03	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Liquefaction. Areas of Elwood Town have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas on the eastern edge of the jurisdiction that border the Bear River. Areas of moderate-high liquefaction risk exist throughout the rest of the community. Liquefaction has the greatest potential to impact human life and structures with over 1000 people at risk and nearly 340 structures.

Wildfire. Elwood is susceptible to moderate-high risk of wildfire in small portions of the town with steeper slopes and grassy and shrubby vegetation types. These areas are found primarily near the Bear and Malad Rivers. Wildfires have the potential to impact over 50 people in the town, as well as over 20 structures.

Future Development

No concerns involving potential future development within Elwood were reported by city representatives.

Hazard Mitigation Strategies

Table 27: Elwood Town Mitigation Strategies

ELWOOD - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Elwood	Dam Failure	Protect current residents and property	Work with the Utah Division of Water Rights and other groups to utilize Emergency Action Plans on a local level.	N/A	Low	2020	Utah Division of Water Rights, Local	Elwood and Utah Division of Water Rights	Minimal	Utah Division of Water Rights, Local
Elwood	Flood	Protect current residents and property	Using subdivision and Development regulations to regulate development in Potential flood risk areas.	N/A	High	2020	State, FEMA	Elwood	N/A	N/A
Elwood	Earthquake	Protect current residents and property	Develop or update an environmental safety zone - with identified hazard areas, disclosure/education, hazard maps	N/A	Medium	2020	State, Local	Elwood and UGS	Minimal	State, Local
Elwood	Liquefaction	Protect current residents and property	Educate current residents and businesses regarding steps to prepare old structures.	N/A	High	2020	State, Local	Elwood and UGS	Minimal	Federal, State, Local Training
ELWOOD - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Elwood	Dam Failure	Protect current residents and property	Work with the Utah Division of Water Rights and other groups to utilize Emergency Action Plans on a local level.	N/A	Low	2020	Utah Division of Water Rights, Local	Elwood and Utah Division of Water Rights	Minimal	Utah Division of Water Rights, Local
Elwood	Flood	Protect future residents and property	Update town ordinance with durable surface drainage project.	Surface drainage project	High	2020	State, Fema	Elwood	$10,000,000	State, Fema, Local
Elwood	Earthquake	Protect future residents and property	Develop and identify hazard zones	N/A	Medium	2020	State, Local	Elwood and UGS	Minimal	State, Local
Elwood	Liquefaction	Protect future residents and property	Tools in place for building codes	N/A	High	2020	State, Local	Elwood and UGS	Minimal	Federal, State, Local

FIELDING

Analysis of hazard risk involving the community of Fielding revealed that there is potential risk resulting from **liquefaction, steep slopes and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction, as well as wildfire have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Fielding. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Liquefaction. Areas of Fielding have moderate-high risk of liquefaction in the event of an earthquake. Areas of moderate-high liquefaction risk exist throughout the rest of the community. Liquefaction has the greatest potential to impact human life and structures with over 400 people at risk and nearly 140 structures.

Steep Slopes. Fielding has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in hilly areas and areas bordering streams and rivers. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. An estimated 16 people and 7 structures are at risk within the jurisdiction.

Table 28: Fielding Potential Loss Figures

Fielding, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Earthquakes	0	0	0	0	0	0
Wildfire	391	125	16,302,576	10	258,492	12,073,050
Flood	0	0	0	0	0	0
Liquefaction	426	136	17,853,623	11	415,256	13,280,355
Landslide	0	0	0	0	0	0
Slope	16	5	760,486	2	4,800	2,414,610
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Fielding, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Earthquakes	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0	1.66	871,500	0	0
Flood	0	0	0	0	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0	5.71	2,997,750	0	0
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0.11	57,750	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Fielding, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					
Liquefaction	Fielding Fire Department & EMS	Fielding School		1 place of worship	4 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Fielding, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0	0	0	0	0
Faults	0	0	0	0	0
Wildfire	31.58	111.91	0	1	0
Flood	0	0	0	0	0
Liquefaction	112.68	263.08	0	1	0
Landslide	0	0	0	0	0
Slope	2.98	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Fielding, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Earthquakes	0	0	0	0	0	0
Wildfire	0.68	0	0	0	0	0
Flood	0	0	0	0	0	0
Liquefaction	0.95	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Wildfire. Fielding is susceptible to moderate-high risk of wildfire in small portions of the town. Moderate-high risk is most closely associated with development and amenities near areas of greater slopes with grassy and shrubby vegetation types. Wildfires have the potential to impact over 390 people in the town, as well as over 130 structures.

Future Development

No concerns involving potential future development within Fielding were reported by city representatives.

Hazard Mitigation Strategies

**Fielding Town did not provide mitigation strategies for this plan update.*

GARLAND

Analysis of hazard risk involving the community of Garland revealed that there is potential risk resulting from **flood, liquefaction, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, earthquakes resulting in liquefaction, as well as wildfire have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from flooding appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Garland. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Flood. Portions of Garland are at risk to flooding. Garland does participate in NFIP as of September, 2010. Areas most susceptible to flooding are eastern portions of the community that fall with the Malad River's flood plain. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Garland have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas that border the Bear River. Areas of moderate-high liquefaction risk exist throughout the rest of the community. Liquefaction has the greatest potential to impact human life and structures with over 2200 people at risk and over 750 structures.

Table 29: Garland City Potential Loss Figures

Garland, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	964	308	38,154,327	32	3,137,358	38,633,760
Flood	9	3	800,621	1	59,300	1,207,305
Liquefaction	2,235	714	86,721,168	62	11,757,423	74,852,910
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Garland, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0.56	840,000	0	0	0	0	3	1,575,000	0.13	195,000
Flood	0.045	67,500	0	0	0	0	0.24	126,000	0	0
Liquefaction	3.62	5,430,000	0.33	462,000	0	0	16.49	8,657,250	0.93	1,395,000
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Garland, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency	Schools/Public	Health Care	Places of	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					2 bridges
Liquefaction	Garland Fire Station, Garland Police Department	5 schools	1 healthcare facility	4 places of worship	3 bridges, 7 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Garland, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0	0	0	0	0
Faults	0	0	0	0	0
Wildfire	24.59	128.41	0	0	0
Flood	28.69	0	0	0	0
Liquefaction	600.13	1029.47	0	1	0
Landslide	0	0	0	0	0
Slope	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Garland, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	1.54	0	0.44	0	0	0
Flood	12.59	0	1.37	0	0	0
Liquefaction	16.2	0	2.3	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Wildfire. Garland is susceptible to moderate-high risk of wildfire in small portions of the city. Moderate-high risk is most closely associated with development and amenities near steeper slopes along the Malad River or areas of grassy and shrubby vegetation types, as well as urban forested areas. Wildfires have the potential to impact over 950 people in the town, as well as 340 structures.

Future Development

No concerns involving potential future development within Garland were reported by city representatives.

Hazard Mitigation Strategies

Table 30: Garland City Mitigation Strategies

GARLAND - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Garland	Flood	Protect current residents and property	Work with state, local, and other agencies to determine local flood risk and ways to prevent damage to homes and businesses.	Work with state floodplain manager regarding NFIP compliance and improvements.	High	2015	City	Garland and Utah DEM	Minimal	Utah DEM, FEMA, BRAG
Garland	Liquefaction	Protect current residents and property	Education and outreach to officials and residents.	N/A	Medium	2016	City	Garland and UGS	Minimal	Utah DEM, UGS, USGS, BRAG
Garland	Wildfire	Protect current residents and property	Meet with other surrounding jurisdictions to improve emergency response and coordination.	N/A	Medium	2016	Utah FFSL, City	Garland, Box Elder County	Minimal	Utah DEM, Utah FFSL, BRAG
Garland	Dam Failure	Protect current residents and property	Work with various government agencies to determine risk to residents.	N/A	Low	2017	Utah DEM, FEMA, BRAG	Garland, Bureau of Reclamation, Utah Dam Safety	Minimal	Utah DEM, FEMA, BRAG

GARLAND - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Garland	Flood	Protect future residents and property	Work with state, local, and other agencies to determine local flood risk and ways to prevent damage to homes and businesses.	Work with state floodplain manager regarding NFIP compliance and improvements.	High	2015-2016	N/A	Garland, Utah DEM	$55	N/A
Garland	Liquefaction	Protect future residents and property	Education and outreach to officials and residents.	N/A	Medium	2016	City	Garland and UGS	Minimal	Utah DEM, UGS, USGS, BRAG
Garland	Wildfire	Protect future residents and property	Work with Utah FFSL and others to explore the possibility of working on a WUI plan with other neighboring communities.	N/A	Medium	2016	Utah FFSL, City	Garland, Utah FFSL	Minimal	Utah DEM, Utah FFSL, BRAG
Garland	Dam Failure	Protect future residents and property	Work with Utate Dam Failure to find ways to minimize risk to future structures and residents.	N/A	Low	2017	Utah DEM, FEMA, BRAG	Garland, Bureau of Reclamation, Utah Dam Safety	Minimal	Utah DEM, FEMA, BRAG

HONEYVILLE

Analysis of hazard risk involving the community of Honeyville revealed that there is potential risk resulting from **dam failure, faults, flood, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, wildfire, earthquakes resulting in liquefaction, as well as landslides have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from dam failures, faults, floods, and steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Honeyville. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Dam failure. Honeyville's risk of dam failure involves the western portions of the jurisdiction that border the Bear River. If Cutler Dam were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the Bear River could suffer serious impacts. Currently, there appears to be little development in this area, so widespread impacts appear limited.

Faults. Honeyville has risk of fault damage in along a portion the northern portion of the Wasatch Fault. The eastern portions of the town, especially areas of the foothills and bench, lie along portions of the fault, which historically is the most overdue for activity in the region. Human life, structures, and other amenities in the fault zone could suffer significant damage in the event of a large earthquake, with nearly 140 people at risk and 50 structures.

Flood. Portions of Honeyville are at risk to

Table 31: Honeyville Potential Loss Figures

Honeyville, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	28	9	2,984,952	3	2,453,149	3,621,915
Faults	141	45	9,801,341	4	1,315,608	4,829,220
Wildfire	1,005	321	54,768,811	38	6,540,412	45,877,590
Flood	69	22	5,974,607	3	2,216,839	3,621,915
Liquefaction	645	206	45,599,874	19	5,395,556	22,938,795
Landslide	723	231	36,405,119	24	1,651,234	28,975,320
Slope	97	31	7,323,317	7	1,684,308	8,451,135
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Honeyville, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0.22	308,000	0.6	76,200	1.46	766,500	0.08	120,000
Faults	0.85	1,275,000	0	0	1.3	165,100	3.61	1,895,250	1.52	2,280,000
Wildfire	0.71	1,065,000	0	0	9.24	1,173,480	14.4	7,560,000	4.3	6,450,000
Flood	0.58	870,000	0.45	630,000	1.44	182,880	4.72	2,478,000	3.61	5,415,000
Liquefaction	6.76	10,140,000	3.47	4,858,000	14.36	1,823,720	49.15	25,803,750	7.9	11,850,000
Landslide	0.17	255,000	0.04	56,000	2.74	347,980	9.65	5,066,250	1.92	2,880,000
Slope	0.12	180,000	0	0	3.79	481,330	3.29	1,727,250	2.65	3,975,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Honeyville, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					1 bridge
Faults					
Wildfire					
Flood					2 bridges
Liquefaction	BE Central Fire, Honeyville Fire Department	Head Start Honeyville		2 places of worship	4 bridges, 2 dams, 3 broadband anchors
Landslide	Box Elder Central Fire District, Honeyville Fire Department, Honeyville Ambulance Services, Honeyville Ambulance			1 place of worship	3 broadband anchors
Slope					1 dam
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Honeyville, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	794.93	253.27	0.00	0.00	0.00
Faults	438.96	5.93	3.29	1.00	0.00
Wildfire	1,463.80	335.44	1.83	1.00	0.00
Flood	1,555.25	1,089.04	31.39	0.00	0.00
Liquefaction	8,124.37	1,204.65	31.83	1.00	0.00
Landslide	618.67	3.33	0.09	0.00	0.00
Slope	86.77	14.87	2.42	1.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Honeyville, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	253.27	0.00	4.57	0.00	0.00	0.00
Faults	5.93	3.29	2.78	0.00	0.00	1.00
Wildfire	335.44	1.83	11.61	0.00	1.73	5.00
Flood	1,089.04	31.39	14.51	0.00	0.00	0.00
Liquefaction	1,204.65	31.83	19.88	0.00	0.00	0.00
Landslide	3.33	0.09	2.65	0.00	0.29	4.00
Slope	14.87	2.42	5.56	0.00	0.96	4.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00	0.00

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

flooding. Honeyville does participate in NFIP. Areas most susceptible to flooding are eastern portions of the community bordering the Wellsville Mountains, local areas canals, Salt Creek, and portions of the Bear River Flood Plain. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Honeyville have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas in the southern portion of the jurisdiction near Salt Creek as well as near portions of the Bear River along the western edge of the jurisdiction. Areas of moderate-high liquefaction risk exist throughout the rest of the community, except the higher elevation areas on the east side of the jurisdiction. Liquefaction has the 3rd greatest potential to impact human life and structures with over 640 people at risk and nearly 220 structures.

Landslides. Isolated portions of Honeyville could suffer potential losses to landslides. Populations, structures, infrastructure, amenities and lands that are most likely to be impacted include eastern portions of the town in adjacent to portions of Highway 38, as well as some area along the banks of the Bear River. Landslides have the potential to impact life, property, critical facilities, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Landslides have the 2nd greatest potential to impact human life and structures with over 720 people and nearly 250 structures at risk, including emergency response facilities.

Steep Slopes. Honeyville has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in areas directly adjacent to mountainous areas of the Wellsville Mountain Range. Areas bordering streams, rivers, and drainages also appear to have an increased exposure to risk. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Ninety-seven people and 38 structures are estimated to be at risk within the jurisdiction.

Wildfire. Honeyville is susceptible to moderate-high risk of wildfire in eastern portions of the city such as the benches and hilly areas adjacent to the Wellsville Mountains, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to impact the greatest number of people in the town, with possibly over 1000 people and 350 structures at risk.

Future Development

No concerns involving potential future development within Honeyville were reported by city representatives.

Hazard Mitigation Strategies

Table 32: Honeyville Mitigation Strategies

HONEYVILLE - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Honeyville	Earthquake / Fault / Liquefaction	Protect current residents and property	Work with local officials and neighboring communities to determine local earthquake risk to residents.	N/A	Medium	2017	City	Honeyville, UGS	Minimal	State, County, BRAG
Honeyville	Flood	Protect current residents and property	Determine risk to local residents from flood prone areas east of town.	Work with State floodplain manager to be compliant with NFIP.	Medium	2017	City	Honeyville, Utah DEM	Minimal	Utah DEM, FEMA, BRAG
Honeyville	Slope	Protect current residents and property	Work with state and local agencies to determine local risk to high slope areas and risk to residents.	N/A	Medium	2017	City	Honeyville, UGS	Minimal	UGS, USGS, BRAG
Honeyville	Wildfire	Protect current residents and property	Work with Utah FFSL to discuss possibility of WUI plan.	N/A	High	2017	State, County	Honeyville, Utah FFSL	$100,000	Utah FSSL, Local
Honeyville	Dam Failure	Protect current residents and property	Educate citizens on possibility of dam failure and train emergency response.	N/A	Low	2017	City	Honeyville, Bureau of Reclamation, Utah Dam Safety	Minimal	State, County
Honeyville	Dam Failure	Protect current residents and property	Educate citizens on possibility of dam failure and train emergency response.	N/A	Low	2017	City	Honeyville, Bureau of Reclamation, Utah Dam Safety	Minimal	State, County
Honeyville	Landslide	Protect current residents and property	Education and work with UGS to update hazard mapping.	N/A	Medium	2017	City, Utah UGS	Honeyville, UGS	Minimal	BRAG, Utah UGS, Engineering Firms
HONEYVILLE - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Honeyville	Earthquake / Liquefaction/ Fault	Protect future residents and property	Education and review future faults/ liquefaction- review ordinances to see if there area ways to better protect future homes from earthquake damage.	N/A	Medium	2017	City	Honeyville, UGS	Minimal	State, County, BRAG
Honeyville	Flood	Protect future residents and property	Review current ordinances to see if more can be done to protect future residents and property.	Work with State floodplain manager to be compliant with NFIP.	Medium	2018	City	Honeyville, Utah DEM	Minimal	Utah DEM, FEMA, BRAG
Honeyville	Slope	Protect future residents and property	Explore possiblity of more strict sensitive lands ordinance which includes steep slope areas.	N/A	Medium	2019	City	Honeyville, UGS	Minimal	UGS, USGS, BRAG
Honeyville	Wildfire	Protect future residents and property	Education and Improve on Emergency Response staff and equipment	N/A	High	2017	State, County	Honeyville, Utah FFSL	$100,000	Utah FSSL, Local
Honeyville	Dam Failure	Protect future residents and property	Educate residents on conservation in hazard areas. Ordinance revisions	N/A	Low	2017	City	Honeyville, Bureau of Reclamation, Utah Dam Safety	Minimal	State, County
Honeyville	Dam Failure	Protect future residents and property	Educate residents on conservation in hazard areas. Ordinance revisions	N/A	Low	2017	City	Honeyville, Bureau of Reclamation, Utah Dam Safety	Minimal	State, County
Honeyville	Landslide	Protect future residents and property	Education and update hazard mapping	N/A	Medium	2017	City, Utah UGS	Honeyville, UGS	Minimal	BRAG, Utah UGS, Engineering Firms

HOWELL

Analysis of hazard risk involving the community of Howell revealed that there is potential risk resulting from **dam failure, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, dam failure has the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from steep slopes and wildfire appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Howell. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 33: Howell Town Potential Loss Figures

Natural Hazards

Dam failure. Howell's risk of dam failure involves portions of the jurisdiction that border the Blue Creek drainage below Blue Creek Dam. This area is located in the center of jurisdiction. If Blue Creek Dam were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the Bear River could suffer serious impacts. Dam failure is likely to cause the greatest loss of human life in the community of all natural disasters. Currently, there appears to be enough development in this area to impact nearly 50 people and 22 structures.

Slopes. Howell has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in hilly and mountainous areas and areas bordering drainages, streams and rivers. Steep slopes have the

Howell, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	50	16	1,290,248	6	439,837	7,243,830
Faults	0	0	0	0	0	0
Wildfire	16	5	636,934	8	553,035	9,658,440
Flood	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	16	5	670,841	4	418,103	4,829,220
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Howell, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0.2	280,000	0	0	3.22	1,690,500	0.88	1,320,000
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0.2	280,000	0	0	2.33	1,223,250	0	0
Flood	0	0	0	0	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0	0	0	0	0
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	4.57	2,399,250	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Howell, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					1 dam
Faults					
Wildfire					
Flood					
Liquefaction					
Landslide					
Slope					2 bridges
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Howell, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns	
	Agricultural	Farming	Grazing	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	1,768.60	198.95	0.00	0.00	0.00
Faults	0.00	0.00	0.00	0.00	0.00
Wildfire	735.45	322.24	0.00	0.00	0.00
Flood	0.00	0.00	0.00	0.00	0.00
Liquefaction	0.00	0.00	0.00	0.00	0.00
Landslide	0.00	0.00	0.00	0.00	0.00
Slope	471.40	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Howell, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	837.98	133.91	16.56	0	0	0
Faults	0	0	0	0	0	0
Wildfire	25.88	0.26	5.94	0	0	0
Flood	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	14.35	9.04	10.15	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. An estimated 16 people and 9 structures are at risk within the jurisdiction.

Wildfire. Howell is susceptible to moderate-high risk of wildfire in isolated portions of the town, such as the benches and hilly areas adjacent to the mountainous areas and areas with steeper slopes or grassy and shrubby vegetation. Wildfires have the potential to impact an estimated 16 people in the town, as well as nearly 13 structures.

Future Development

No concerns involving potential future development within Howell were reported by community representatives.

Hazard Mitigation Strategies

Table 34: Howell Mitigation Strategies

HOWELL - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Howell	Wildfire	Protect current residents and property	Install fire hydrant on south end to fill water trucks	N/A	Medium	2017	Howell Town	Howell	$2,500	Howell Town Water Fund
Howell	Flood-Dam Failure	Protect current residents and property	Follow up on information received from test holes	N/A	Medium	2017	Local	Howell	Minimal	Bureau of Reclamation, Blue Creek Irrigation Co.
Howell	Earthquake	Protect current residents and property	Identify structures requiring retrofit	N/A	Medium	2017	State or Federal	Howell, UGS	$50,000	DHS, FEMA, BRAG

HOWELL - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Howell	Wildfire	Protect future residents and property	Install fire hydrant on south end to fill water trucks	N/A	Medium	2017	Howell Town	Howell	$2,500	Howell Town
Howell	Flood-Dam Failure	Protect future residents and property	Follow up on information received from test holes	Follow up on information received from test holes	Medium	2017	Local, County	Howell	N/A	Bureau of Reclamation, Blue Creek Irrigation Co.
Howell	Earthquake	Protect future residents and property	Incorporate Emergency Plan	N/A	Medium	2017	County	Howell, UGS	Minimal	County

MANTUA

Analysis of hazard risk involving the community of Mantua revealed that there is potential risk resulting from **dam failure, faults, floods, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, dam failure and floods create the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from steep slopes, wildfire, and landslides appear to have less potential for impacts, yet still pose risks to human life. Liquefaction and faults also pose a degree of risk, however, these risks are substantially less as human life is not as greatly in jeopardy. Other natural hazard types not mentioned were found to have no potential impacts to Mantua. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Dam failure. Mantua's risk of dam failure involves the portions of the jurisdiction located below Mantua Reservoir. If Mantua Reservoir were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the dam could suffer serious impacts. Dam failure is the greatest risk to human life and structures in the community with potential to impact over 200 residents and nearly 80 structures.

Faults. Mantua has risk of fault damage in along eastern portions of the town. Widespread damage from faulting is not likely due to the lower amount of development in this portion of the jurisdiction. No threats to life or structures are currently expected within the jurisdiction.

Flood. Portions of Mantua are at risk to flooding. Mantua does participate in NFIP as areas within the jurisdiction have substantial risk to impacts. Areas most susceptible to flooding are portions of the community bordering Mantua Reservoir, as well as por-

Table 35: Mantua Potential Loss Figures

Mantua, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	219	70	10,666,853	11	434,808	13,280,355
Faults	0	0	0	0	0	0
Wildfire	50	16	2,854,704	5	108,242	6,036,525
Flood	97	31	4,222,315	7	242,907	8,451,135
Liquefaction	0	0	0	0	0	0
Landslide	13	4	761,773	3	57,177	3,621,915
Slope	41	13	2,137,038	6	218,422	7,243,830
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Mantua, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	4.33	2,273,250	0.12	180,000
Faults	0	0	0	0	0	0	0.16	84,000	0	0
Wildfire	0	0	0	0	0	0	1.37	719,250	0.08	120,000
Flood	0	0	0	0	0	0	1.48	777,000	0.05	75,000
Liquefaction	0	0	0	0	0	0	20.74	10,888,500	0	0
Landslide	0	0	0.26	364,000	0	0	1.49	782,250	0	0
Slope	0	0	0	0	0	0	2.83	1,485,750	0.4	600,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Mantua, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure	Mantua Police Dept.				1 bridge, 1 broadband anchor, 1 dam
Faults					
Wildfire					
Flood					1 bridge, 2 dams
Liquefaction	Mantua Police Dept., Mantua Fire Dept.			1 place of worship	1 bridge, 3 broadband anchors, 3 dams
Landslide					
Slope					1 bridge
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Mantua, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	177.84	284.36	0	0	0
Faults	99.53	0.86	0	0	0
Wildfire	15.9	23.69		0	0
Flood	16.14	59.82	0	1	
Liquefaction	0	0	0	0	0
Landslide	18.9	26.9		0	0
Slope	17.08	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Mantua, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	#of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	77.12	18.79	2.43	0	0	0
Faults	0	0	0.65	0	0	0
Wildfire	2.11	0	1.98	0	0	0
Flood	531.8	518.58	5.3	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0.41	0	1.1	0	0	0
Slope	4.75	2.91	3.22	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

tions of the Big Creek drainage below the reservoir and areas of Box Elder Creek. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Mantua have risk of liquefaction in the event of an earthquake. Liquefaction does not appear to pose a great risk to human life in the jurisdiction. However there is some risk to critical facilities, as well as some infrastructure.

Landslides. Isolated portions of Mantua could suffer potential losses to landslides. Populations, structures, infrastructure, amenities and lands that are most likely to be impacted include western and northern portions of the town west of Highway 89/91. Landslides have the potential to impact life, structures, infrastructure, environmental, and agricultural features in the jurisdiction. Landslides have potential to impact human life and structures with an estimated 13 people and 7 structures at risk.

Steep Slopes. Mantua has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in hilly and mountainous areas, and areas bordering drainages, streams and rivers. Steep slopes have the potential to impact life, property, infrastructure, and other features in the jurisdiction. An estimated 41 people and 19 structures are at risk within the jurisdiction.

Wildfire. Mantua is susceptible to moderate-high risk of wildfire in isolated portions of the town, such as the benches and hilly areas adjacent to the mountainous areas and areas with steeper slopes or grassy and shrubby vegetation. Wildfires have the potential to impact an estimated 50 people in the town, as well as nearly 20 structures.

Future Development

No concerns involving potential future development within Mantua were reported by community representatives.

Hazard Mitigation Strategies

Table 36: Mantua Town Mitigation Strategies

MANTUA - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Mantua	Dam Failure	Protect current residents and property	Work with Utah Dam Safety and other groups to utilize Emergency Action Plans on a local level.	N/A	Low	2016	Utah Division of Water Rights, Local	Mantua, Utah Dam Safety	Minimal	Utah Division of Water Rights, Local
Mantua	Wildfire	Protect current residents and property	Map and assess vulnerability to wildfire. Talk with Utah FSSL about writing a community wildfire protection plan and encourage fire wise ordinances and buildings.	N/A	Low	2016	Utah FSSL, Local	Mantua, Utah FFSL	Minimal	Utah FSSL, Local
Mantua	Flood	Protect current residents and property	Reconcile current development with soon to be adopted FEMA floodplain maps for Box Elder County for NFIP communities. For non-NFIP communities, talk with Utah ESHS about the benefits of NFIP.	Investigate benefits of NFIP compliance vs. Non compliance for town and residents.	High	2015-2016	FEMA, Local	Mantua, Utah DEM	Minimal	FEMA, Utah ESHS
Mantua	Landslide	Protect current residents and property	Develop or update an environmental safety zone - with identified hazard areas, disclosure/education, hazard maps	N/A	Low	2016	State, Local	Mantua, UGS	Minimal	State, Local
Mantua	Earthquake	Protect current residents and property	Map and assess community vulnerability to seismic hazards.	N/A	Low	2015	State, Local	Mantua, UGS	Minimal	State, Local

MANTUA - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Mantua	Dam Failure	Protect future residents and property	Review current town ordinance to determine if changes are required to prevent the endangerment of future structures.	N/A	Low	2016	Utah Division of Water Rights, Local	Mantua, Utah Dam Safety	Minimal	Utah Division of Water Rights, Local
Mantua	Wildfire	Protect future residents and property	Reduce the risk through land use planning within the land use management code.	N/A	Low	2016	Utah FSSL, Local	Mantua, Utah FFSL	Minimal	Utah FSSL, Local
Mantua	Flood	Protect future residents and property	Review flood plain maps for Box Elder County, determine if areas within town limits are affected. Consider what if any action should be taken. Identify flood plain in town emergency preparedness plan, with actions to be taken.	N/A	High	2015-2016	FEMA, Local	Mantua, Utah DEM	Minimal	FEMA, Utah ESHS
Mantua	Landslide	Protect future residents and property	Manage development in landslide hazard areas.	N/A	Low	2016	State, Local	Mantua, UGS	Minimal	State, Local
Mantua	Earthquake	Protect future residents and property	Incorporate earthquake mitigation into local planning. Protect critical facilities and infrastructure to reduce potential damage to critical facilities and infrastructures.	N/A	Low	2015	State	Mantua, UGS	Minimal	State

PERRY

Analysis of hazard risk involving the community of Perry revealed that there is potential risk resulting from **dam failure, faults, flood, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, wildfire, earthquakes resulting in liquefaction and fault damage, and dam failure have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from floods, landslides, and steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Perry. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 37: Perry City Potential Loss Figures

Natural Hazards

Dam failure. Perry's risk of dam failure involves the portions of the jurisdiction located below the Three Mile Creek Dam, which is a retention basin for Perry Canyon. If the dam were to become breached, populations, structures, infrastructure, lands, and amenities adjacent the dam could suffer serious impacts. Dam failure is the 4th greatest risk to human life and structures in the community with potential to impact over 500 residents and nearly 200 structures.

Faults. Perry has risk of fault damage in along a portion the northern portion of the Wasatch Fault. The eastern portions of the town, especially areas of the foothills and bench, lie along portions of the fault, which historically is the most overdue for activity in the region. Human life, structures, and other amenities in the fault zone could suffer damage in the event of a large earthquake. Damage in the fault zone could result in the 3rd greatest risk to human life with over

Perry, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	582	186	39,335,240	8	1,427,234	9,658,440
Faults	930	297	68,546,347	25	9,512,139	30,182,625
Wildfire	3,230	1,032	228,609,539	58	32,732,408	70,023,690
Flood	25	8	1,678,900	1	665,000	1,207,305
Liquefaction	736	235	53,730,878	25	19,393,095	30,182,625
Landslide	38	12	1,912,842	3	133,635	3,621,915
Slope	72	23	9,146,313	4	2,607,700	4,829,220
Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Perry, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	4.67	2,451,750	0	0
Faults	1.82	2,730,000	1.19	1,666,000	3.45	438,150	15.95	8,373,750	2.5	3,750,000
Wildfire	0.07	105,000	0	0	2.6	330,200	15.77	8,279,250	3.05	4,575,000
Flood	0	0	0	0	0.58	73,660	0.74	388,500	0.53	795,000
Liquefaction	3.73	5,595,000	0	0	4.03	511,810	58.31	30,612,750	0.53	795,000
Landslide	0	0	0	0	0.64	81,280	1.95	1,023,750	0.73	1,095,000
Slope	0	0	0	0	2.35	298,450	5.26	2,761,500	1.68	2,520,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Perry, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure	EMS Perry, Perry Police Dept.			1 place of worship	1 broadband anchor
Faults		Three Mile Creek School			2 bridges, 1 broadband anchor
Wildfire					
Flood					1 dam
Liquefaction	Perry Police Dept., EMS Perry	2 schools	3 healthcare facilities		3 bridges, 4 dams, 4 broadband anchors
Landslide					
Slope					1 dam
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Perry, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# Farms	# of Barns
Dam Failure	260.76	361.20	0.00	1	0.00
Faults	688.80	839.69	0.00	0.00	0.00
Wildfire	454.51	644.24	0.00	0.00	0.00
Flood	111.47	93.41	0.00	0.00	0.00
Liquefaction	1,866.73	1,835.40	0.00	0.00	0.00
Landslide	73.36	45.18	0.00	0.00	0.00
Slope	27.96	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Perry, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	3.44	0	1.09	0	0	0
Faults	22.77	4.31	5.24	0	3.89	9
Wildfire	151.07	1.39	6.42	0	3.95	8
Flood	415.65	60.33	2.76	0	0.59	3
Liquefaction	757.52	66.75	8.88	0	0	0
Landslide	0	0.12	0.97	0	0.86	7
Slope	0.05	0.09	3.29	0	3.7	9
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

900 people at risk. Additionally, over 325 structures are at risk.

Flood. Portions of Perry are at risk to flooding. Perry does participate in NFIP as areas within the jurisdiction have substantial risk to impacts. Areas most susceptible to flooding are portions of the community west of I-15. Eastern drainages originating in the Wasatch Mountains also pose risk, such as Three Mile Creek and Black Slough drainages. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Perry have high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas to the west of Highway 89. Liquefaction has the 3rd greatest potential to impact human life and structures with over 700 people at risk and nearly 250 structures.

Landslides. Isolated portions of Perry could suffer potential losses to landslides. Populations, structures, infrastructure, amenities and lands that are most likely to be impacted include eastern portions of the town in adjacent to portions of Highway 89, as well as some area along the Wasatch Front Mountain Range. Landslides have the potential to impact life, structures, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Landslides have the potential to impact human life and structures with an estimated 38 people and nearly 15 structures at risk.

Steep Slopes. Perry has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in areas directly adjacent to mountainous areas of the Wasatch Mountain Range. Areas bordering streams, rivers, and drainages also appear to have an increased exposure to risk. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Seventy-two people and 27 structures are estimated to be at risk within the jurisdiction.

Wildfire. Perry is susceptible to moderate-high risk of wildfire primarily in eastern portions of the city such as the benches and hilly areas adjacent to the Wasatch Mountains, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to impact the greatest number of people in the town, with possibly over 3,200 people and 1,075 structures at risk.

Future Development

Concerns involving new development exist for development along the east side of the city on the bench and hillsides. These areas appear to be at risk to a variety of natural hazards, such as wildfire, earthquake faulting, landslides, and steep slope failures. New developments located at the base of drainages originating in the Wasatch Mountain are also at risk to flood damage during server weather events. Any new development located below the Perry Retention Basin for Three Mile Creek would also be a risk to dam inundation.

Hazard Mitigation Strategies

Table 38: Perry City Mitigation Strategies

PERRY - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Perry	Dam Failure	Protect current residents and property	Work with the Utah Dam Safety and other groups to utilize Emergency Action Plans on a local level.	N/A	Low	2016	Utah Division of Water Rights, Local	Perry, Utah Dam Safety	Minimal	Utah Division of Water Rights, Local
Perry	Drought	Protect current residents and property	Develop process to work with county and state on regular basis to evaluate water levels and inform citizens.	N/A	Low	2017	Local	Perry, Box Elder County, Utah Climate Center	Minimal	Local, County, State
Perry	Flood	Protect current residents and property	Make sure that Perry City understands state of emergency and how to get county and state involved.	N/A	Low	2016	Local	Perry, Utah DEM	Minimal	Local
Perry	Landslide	Protect current residents and property	Develop a process when building permit is applied for and inform or handout safety zone map to all who apply.	N/A	Low	2017	Local	Perry, UGS	Minimal	Local
Perry	Severe Weather	Protect current residents and property	Develop and understand emergency protocols locally and when to declare state of emergency.	N/A	Low	2017	Local	Perry	Minimal	Local
Perry	Steep Slopes	Protect current residents and property	Work with state and other groups to utilize emergency action plans at local level.	N/A	Low	2017	State, Local	Perry, UGS	Minimal	State, Local
Perry	Earthquake	Protect current residents and property	Develop or update an environmental safety zone - with identified hazard areas, disclosure/education, hazard maps	N/A	Low	2017	State, Local	Perry, UGS	Minimal	State, Local

PERRY - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Perry	Dam Failure	Protect future residents and property	Review city ordinances and update city maps containing flood plains.	N/A	Low	2016	Local	Perry, Utah Dam Safety	Minimal	Local
Perry	Drought	Protect future residents and property	Develop handout to give to residents based on goal #1	N/A	Low	2017	Local	Perry, Box Elder County, Utah Climate Center	Minimal	Local
Perry	Flood	Protect future residents and property	Review city ordinances and update city maps with flood plains.	N/A	Low	2016	Local	Perry, Utah DEM	Minimal	Local
Perry	Landslide	Protect future residents and property	Develop or update an environmental safety zone with identified hazardous areas disclosure and education maps.	N/A	Low	2017	State, Local	Perry, UGS	Minimal	State, Local
Perry	Severe Weather	Protect future residents and property	Incorporate weather reporting into city webpage.	N/A	Low	2017	Local	Perry	Minimal	Local
Perry	Steep Slopes	Protect future residents and property	Review city ordinances and update city plans and maps.	N/A	Low	2017	Local	Perry, UGS	Minimal	Local
Perry	Earthquake	Protect future residents and property	Identify any structure that would be unsafe or needing an update.	N/A	Low	2017	State, Local	Perry, UGS	Minimal	State, Local

PLYMOUTH

Analysis of hazard risk involving the community of Plymouth revealed that there is potential risk resulting from **flood, liquefaction, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, wildfire has the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from floods, liquefaction and steep slopes appear to pose no risks to human life, yet still pose risks to other features and amenities in the community. Other natural hazard types not mentioned were found to have no potential impacts to Plymouth. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 39: Plymouth Potential Loss Figures

Natural Hazards

Flood. Portions of Plymouth are at risk to flooding. Plymouth does not participate in NFIP. Areas within the jurisdiction do not appear to have large risk to impacts, except for one commercial building and some agricultural production land. Areas most susceptible to flooding appear to be the result of adjacent water sources that are currently serviced in the town by piped drains. Should these drains or infrastructure fail, the town could see flooding occur at a greater level.

Liquefaction. Areas of Plymouth have risk of liquefaction in the event of an earthquake. Liquefaction has low risk to impact human life and structures, with most risk associated with small portions of infrastructure, agricultural lands, and environmental features.

Steep Slopes. Plymouth has risk associated with steep slopes within its boundaries. Areas of great-

Plymouth, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	113	36	4,678,671	7	20,337,429	8,451,135
Flood	0	0	0	1	43,765	1,207,305
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Plymouth, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0.01	15,000	0	0	0	0	0.39	204,750	0	0
Flood	0	0	0	0	0	0	0	0	0	0
Liquefaction	0.02	30,000	0	0	0	0	4.87	2,556,750	0	0
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Plymouth, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					
Liquefaction	Plymouth Fire and EMS Station				3 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Plymouth, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0	0	0	0	0
Faults	0	0	0	0	0
Wildfire	26.45	21.41	0	0	0
Flood	1.66	0.03	0	0	0
Liquefaction	2	0	0	0	0
Landslide	0	0	0	0	0
Slope	1.68	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Plymouth, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	0	0	0.02	0	0	0
Flood	0	0	0.07	0	0	0
Liquefaction	0	0	0.07	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0.03	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

est concern have slopes of over 20%, which are commonly found in hilly and mountainous areas, and areas bordering drainages, streams and rivers. Steep slopes have the potential to impact some environmental features and agricultural lands in the jurisdiction. No risk to life or structures is estimated.

Wildfire. Plymouth is susceptible to moderate-high risk of wildfire in northern and eastern portions of the town, such as the hilly areas adjacent to more mountainous areas surrounding the jurisdiction. Some lower lying grassy and shrubby areas in the town are also at risk. Wildfires have the potential to impact the greatest number of people in the town, with possibly over 110 people and 40 structures at risk.

Future Development

No concerns involving potential future development within Plymouth were reported by community representatives.

Hazard Mitigation Strategies

Table 40: Plymouth Town Mitigation Strategies

PLYMOUTH - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Plymouth	Flood	Protect future residents and property	Learn about the NFIP program and consider joining so residents can purchase flood insurance.	N/A	Low	2015	Public Safety Budget	Plymouth, Utah DEM	N/A	Area CERT
Plymouth	Earthquake	Protect future residents and property	Educate home owners on safety techniques to follow during and after an earthquake through our CERT.	N/A	Low	2015	Public Safety Budget	Plymouth, Box Elder County	$100	Area CERT
Plymouth	Wildfire	Protect future residents and property	Fire Marshal to show elected officials potential threats and educate the residents.	N/A	Low	2015	N/A	Plymouth, Box Elder County	N/A	Box Elder County Fire Marshal
Plymouth	Landslides	Protect future residents and property	Pinpoint vulnerable areas and educate the elected officials and the residents.	N/A	Low	2015	Public Safety Budget	Plymouth, UGS	$100	Area CERT
Plymouth	Steep Slopes	Protect future residents and property	Pinpoint vulnerable areas and educate the elected officials and the residents.	N/A	Low	2015	Public Safety Budget	Plymouth, UGS	$100	Area CERT

PLYMOUTH - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Plymouth	Flood	Protect future residents and property	Learn about the NFIP program and consider joining so residents can purchase flood insurance.	N/A	Low	2015	Public Safety Budget	Plymouth, Utah DEM	N/A	Area CERT
Plymouth	Earthquake	Protect future residents and property	Educate home owners on safety techniques to follow during and after an earthquake through our CERT.	N/A	Low	2015	Public Safety Budget	Plymouth, Box Elder County	$100	Area CERT
Plymouth	Wildfire	Protect future residents and property	Fire Marshal to show elected officials potential threats and educate the residents.	N/A	Low	2015	N/A	Plymouth, Box Elder County	N/A	Box Elder County Fire Marshal
Plymouth	Landslides	Protect future residents and property	Pinpoint vulnerable areas and educate the elected officials and the residents.	N/A	Low	2015	Public Safety Budget	Plymouth, UGS	$100	Area CERT
Plymouth	Steep Slopes	Protect future residents and property	Pinpoint vulnerable areas and educate the elected officials and the residents.	N/A	Low	2015	Public Safety Budget	Plymouth, UGS	$100	Area CERT

PORTAGE

Analysis of hazard risk involving the community of Portage revealed that there is potential risk resulting from **flood, liquefaction, and wildfire**. These hazards have varying potential to impact critical facilities, infrastructure, agriculture, and environmental features within municipal boundaries. Currently, wildfire has the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from floods, liquefaction and steep slopes appear to pose no risks to human life, yet still pose risks to other features and amenities in the community. Other natural hazard types not mentioned were found to have no potential impacts to Plymouth. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Natural Hazards

Flood. Portions of Plymouth are at risk to flooding. Plymouth does not participate in NFIP. Areas within the jurisdiction do not appear to have large risk to impacts, except for one commercial building and some agricultural production land. Areas most susceptible to flooding appear to be the result of adjacent water sources that are currently serviced in the town by piped drains. Should these drains or infrastructure fail, the town could see flooding occur at a greater level.

Liquefaction. Areas of Portage have high risk of liquefaction in the event of an earthquake. The limited areas are susceptible to high risk liquefaction along the eastern edge of the jurisdiction that border the Malad River. Liquefaction has the greatest potential to impact critical facilities, as well as infrastructure within the jurisdiction.

Table 41: Portage Potential Loss Figures

Portage, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0
Flood	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Portage, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power Lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0	0.09	47,250	0	0
Flood	0	0	0	0	0	0	0.13	68,250	0	0
Liquefaction	0.55	825,000	0	0	0	0	9.25	4,856,250	0	0
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Portage, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					
Liquefaction	Portage Fire and Rescue (EMS)			1 place of worship	2 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Portage, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0	0	0	0	0
Faults	0	0	0	0	0
Wildfire	3.7	2.22	0	0	0
Flood	40.06	0	0	0	0
Liquefaction	2.41	0	0	0	0
Landslide	0	0	0	0	0
Slope	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Portage, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0
Flood	8.21	0	0	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Wildfire. Portage is susceptible to moderate-high risk of wildfire in western portions of the city such as the benches and hilly areas adjacent to mountainous regions, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to some infrastructure and agricultural lands in the jurisdiction, but are predicted to pose a risk to human life or structures within the town.

Future Development

Concerns involving new development exist for development in a canyon to the south of the town center. These areas appear to be at risk to a variety of natural hazards, such as wildfire, and steep slope failures, and flooding. New developments located at the base of drainages could also be at risk to flood damage during server weather events.

Hazard Mitigation Strategies

Table 42: Portage Town Mitigation Strategies

PORTAGE - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Portage	Earthquake	Protect current residents and property	Review and update natural hazard and earthquake plan	N/A	Low	2017	N/A	Portage, UGS	Minimal	BRAG, LOCAL, STATE, COUNTY
Portage	Wildfire	Protect current residents and property	Purchase new fire engine	N/A	High	2015	FEMA, State, CDBG	Portage, Utah DEM	$315,000	FEMA, State, BRAG
Portage	Steep Slopes	Protect current residents and property	current mapping and hazards	N/A	Medium	2017	N/A	Portage, UGS	N/A	BRAG, County
Portage	Urban Fire and Public Health	Protect current residents and property	take down old homes in town that are uninhabitable	N/A	Medium	2016	State, Federal	Portage, Utah DEM	$20,000	State
PORTAGE - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Portage	Earthquake	Protect future residents and property	Review and update natural hazard and earthquake plan	N/A	Low	2017	N/A	Portage, UGS	Minimal	BRAG, LOCAL, STATE, COUNTY
Portage	Wildfire	Protect future residents and property	Update ordinances to limit amount of hay in town	N/A	High	2016	N/A	Portage, Utah DEM	Minimal	County, State, Land use ordinance
Portage	Steep Slopes	Protect future residents and property	Update Ordinances	N/A	Medium	2017	N/A	Portage, UGS	Minimal	BRAG, State
Portage	Urban Fire and Public Health	Protect future residents and property	take down old homes in town that are uninhabitable	N/A	Medium	2016	State, Federal	Portage, Utah DEM	$20,000	State

SNOWVILLE

Analysis of hazard risk involving the community of Portage revealed that there is potential risk resulting from **wildfire**. Wildfire has varying potential to impact human life, infrastructure, agriculture, and environmental features within municipal boundaries. Currently, wildfire has the greatest potential to impact human life, property, and various community amenities based on potential loss values. Other natural hazard types not mentioned were found to have no potential impacts to Snowville. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 43: Snowville Town Potential Loss Figures

Natural Hazards

Wildfire. Snowville is susceptible to moderate-high risk of wildfire in eastern and southern portions of the city such as the benches and hilly areas adjacent to mountainous regions, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to impact the greatest number of people in the town, with nearly 70 people and 35 structures at risk.

Future Development

No concerns involving potential future development within Snowville were reported by community representatives.

Snowville, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	69	22	1,636,062	17	2,746,329	20,524,185
Flood	0	0	0	0	0	0
Liquefaction	0		0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Snowville, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	0	0	0	0	0	0	0.46	241,500	0	0
Flood	0	0	0	0	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0	0	0	0	0
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.

[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).

[3] Based on estimates from Logan Light and Power, 2015.

[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.

[5] Based recent Cache County and regional project cost estimates, 2015.

Snowville, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency Services/Law Enforcement	Schools/Public Facilities	Health Care Facilities	Places of Worship	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood					
Liquefaction					
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Snowville, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0	0	0	0	0
Faults	0	0	0	0	0
Wildfire	73.11	117.87	0	0	0
Flood	0	0	0	0	0
Liquefaction	0	0	0	0	0
Landslide	0	0	0	0	0
Slope	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Snowville, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ Riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	0.45	0	0.9	0	0	0
Flood	0	0	0	0	0	0
Liquefaction	0	0	0	0	0	0
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

Hazard Mitigation Strategies

Table 44: Snowville Town Mitigation Strategies

SNOWVILLE - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Snowville	Wildfire	Protect current residents and property	Work with FFSL to determine fire risks.	N/A	High	2017	FFSL	Snowville, Utah FFSL	Minimal	FFSL, BRAG, EM
Snowville	Severe Weather	Protect current residents and property	working with rocky mountain power to improve resiliency of power and infrastructure. And also get a number of oxygen and other needs requiring power.	N/A	High	2015	Local	Snowville, Rocky Mountain Power	Minimal	Rocky Mountain Power
Snowville	Earthquake	Protect current residents and property	Work with state and local to assess risks retrofitting town hall. Also education and awareness.	N/A	Medium	2018	Utah Geological survey, Utah EM, BRAG,	Snowville, UGS, Utah DEM	Minimal	Utah Geological Survey, Utah EM, BRAG
Snowville	Dam Failure	Protect current residents and property	Assess the risk; education for residents	N/A	Low	2019	BRAG, Local	Snowville, Bureau of Reclamation, Utah Dam Safety	Minimal	State of Idaho and Utah, BRAG
Snowville	Drought	Protect current residents and property	Educate citizens for water and food preservation. Work toward implementing water conservation plan.	N/A	Medium	2017	Rural Water, Brag, Local, State	Snowville, Utah Climate Center, NOAA	Minimal	Rural Water, BRAG
SNOWVILLE - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Snowville	Wildfire	Protect future residents and property	Work with FFSL to determine fire risks.	N/A	High	2017	FFSL	Snowville, Utah FFSL	Minimal	FFSL, BRAG, EM
Snowville	Severe Weather	Protect future residents and property	working with rocky mountain power to improve resiliency of power and infrastructure. And also get a number of oxygen and other needs requiring power.	N/A	High	2015	Local	Snowville, Rocky Mountain Power	Minimal	Rocky Mountain Power
Snowville	Earthquake	Protect future residents and property	Work with state and local to assess risks retrofitting town hall. Also education and awareness.	N/A	Medium	2018	Utah Geological survey, Utah EM, BRAG,	Snowville, UGS, Utah DEM	Minimal	Utah Geological Survey, Utah EM, BRAG
Snowville	Dam Failure	Protect future residents and property	Assess the risk; education for residents	N/A	Low	2019	BRAG, Local	Snowville, Bureau of Reclamation, Utah Dam Safety	Minimal	State of Idaho and Utah, BRAG
Snowville	Drought	Protect future residents and property	Water development, develop secondary water source.	N/A	Medium	2017	USDA, Rural Water, BRAG, Local	Snowville, Utah Climate Center, NOAA, Bear River Water Conservation District	N/A	USDA, Rural Water, BRAG, Local

TREMONTON

Analysis of hazard risk involving the community of Tremonton revealed that there is potential risk resulting from **floods, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, wildfire and earthquakes resulting in liquefaction have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from floods, landslides, and steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Tremonton. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 45: Tremonton Potential Loss Figures

Natural Hazards

Flood. Portions of Tremonton appear at risk to flooding. Tremonton began NFIP participation in 2010. Areas within the jurisdiction associated most closely with risk include the flood plain of the Malad River, which meanders through town. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmental, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Tremonton have moderate-high and high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas on the eastern portion of the jurisdiction that border the Malad River. Areas of moderate-high liquefaction risk exist throughout the rest of the community except the far western portion. Liquefaction has the greatest potential to impact human life and structures with

Tremonton, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	2,542	812	122,330,061	173	110,773,788	208,863,765
Flood	44	14	3,094,709	12	3,707,359	14,487,660
Liquefaction	6,482	2,071	300,699,052	260	184,647,520	313,899,300
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Tremonton, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0	0	0	0	0	0	0	0	0	0
Wildfire	1.7	2,550,000	0	0	1.1	139,700	15.55	8,163,750	1.87	2,805,000
Flood	0	0	0	0	0	0	0.25	131,250	0	0
Liquefaction	5.05	7,575,000	4.83	6,762,000	1.51	191,770	59.08	31,017,000	9.75	14,625,000
Landslide	0	0	0	0	0	0	0	0	0	0
Slope	0	0	0	0	0.37	46,990	0.31	162,750	0	0
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Tremonton, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency	Schools/Public	Health Care	Places of	Infrastructure
Dam Failure					
Faults					
Wildfire					
Flood		2 public facilities			2 bridges
Liquefaction	Tremonton Fire Dept. & EMS, Tremonton Police Dept.	3 schools, 6 public facilities	7 healthcare facilities	8 places of worship	24 bridges, 13 broadband anchors
Landslide					
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Tremonton, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0.00	0.00	0.00	0.00	0.00
Faults	0.00	0.00	0.00	0.00	0.00
Wildfire	200.79	714.66	0.00	0.00	1.00
Flood	47.50	1.33	0.00	0.00	0.00
Liquefaction	0.00	0.00	0.00	1.00	2.00
Landslide	1,768.28	3,476.52	0.00	0.00	0.00
Slope	0.00	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Tremonton, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0	0	0	0	0	0
Faults	0	0	0	0	0	0
Wildfire	28.05	0	2.68	13.71	0	3
Flood	41.46	0	2.24	12.58	0	3
Liquefaction	78.45	0	12.11	38.28	0	3
Landslide	0	0	0	0	0	0
Slope	0	0	0	0	0	0
Poorly Drained Soils	0	0	0	0	0	0

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

over 6,400 people at risk and over 300 structures.

Landslides. Isolated portions of Tremonton could suffer potential losses to landslides. Agricultural lands are estimated to be at risk in portions of the town. No risk to life or structures is estimated.

Steep Slopes. Tremonton has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in hilly and mountainous areas, and areas bordering drainages, streams and rivers. Steep slopes have the potential to impact some infrastructure in the jurisdiction, but potential losses are estimated to be minimal.

Wildfire. Tremonton is susceptible to moderate-high risk of wildfire in western portions of the city, such as the benches and hilly areas adjacent to mountainous regions, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to impact the 2nd greatest number of people in the town, with possibly over 2,500 people and nearly 1,000 structures at risk.

Future Development

Concerns involving future development exist for earthquakes throughout the city, due to its high potential for liquefaction. Future development could potentially occur in areas along the Malad River flood plain, which would increase the exposure of human life, structures, and other amenities to flooding. Future development is likely to also continue in the northwest portion of town. Development in these areas could be more susceptible to wildfire risk.

Hazard Mitigation Strategies

Table 46: Tremonton City Mitigation Strategies

TREMONTON - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Tremonton	Wild land Urban Interface	Protect current residents and property	Continue education and project manpower assistance for defensible space in homes located within the CWPP.	N/A	High	2015	Annual FD wages budget	Tremonton City, Utah FFSL	$2,000	TFD wild land equipment and personnel
Tremonton	Earthquake	Protect current residents and property	Public awareness safety fair for earthquake dangers and recommended practices.	N/A	Medium	2016, 2019	EM budget	Tremonton, UGS	$500 (building rental)	ACH Intermediate School, local and regional vendors, local and state expert presenters.
Tremonton	Earthquake	Protect current residents and property	Public awareness campaign for earthquake preparedness (EM website, CERT Training, local preparedness presentations, booth at hospital and other safety fairs).	N/A	High	2020 the annually	EM wages and budget	Tremonton, UGS	varied	County preparedness kit, internet resources
Tremonton	Wildfire	Protect future residents and property	Monitor fire break status	N/A	Medium	2020 and annually	EM budgets	Tremonton, Utah FFSL	Varies	N/A
Tremonton	Flood	Protect current residents and property	Update ordinances as needed for NFIP compliance	planning and zoning update	Medium	2020 and annually	N/A	Tremonton, Utah DEM	N/A	N/A

TREMONTON - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Tremonton	Wild land Urban Interface	Protect future residents and property	Provide annual education for new residents on wildfire issues, invite residents to participate in CWPP projects.	N/A	Medium	2020	EM wages and expense budget	Tremonton City, Utah FFSL	minimal outside of EM budget	City buildings (public meetings)
Tremonton	Earthquake	Protect future residents and property	Update building codes for earthquake protection	N/A	High	2020 and annually	inspector budget	Tremonton, UGS	varies	N/A
Tremonton	Earthquake	Protect future residents and property	Public awareness campaign for earthquake preparedness (EM website, CERT Training, local preparedness presentations, booth at hospital and other safety fairs).	N/A	High	2020 and annually	EM wages and budget	Tremonton, UGS, Box Elder County	varied	County preparedness kit, internet resources
Tremonton	Wildfire	Protect future residents and property	Monitor fire break status	N/A	Medium	2020 and annually	EM budgets	Tremonton, Utah FFSL	Varies	N/A
Tremonton	Flood	Protect future residents and property	Update ordinances as needed for NFIP compliance	planning and zoning update	Medium	2020 and annually	N/A	Tremonton, Utah DEM	N/A	N/A

WILLARD

Analysis of hazard risk involving the community of Willard revealed that there is potential risk resulting from **faults, floods, liquefaction, landslide, steep slopes, and wildfire**. These hazards have varying potential to impact human life, property, critical facilities, infrastructure, agriculture, environmental, and recreational features within municipal boundaries. Currently, wildfires, earthquakes resulting in liquefaction and fault zone damage, as well as landslides have the greatest potential to impact human life, property, and various community amenities based on potential loss values. Potential impacts from floods, and steep slopes appear to have less potential for impacts, yet still pose risks. Other natural hazard types not mentioned were found to have no potential impacts to Willard. See the following tables for more detailed descriptions of potential losses associated with each natural hazard associated with jurisdictional elements.

Table 47: Willard City Potential Loss Figures

Natural Hazards

Faults. Willard has risk of fault damage in along a section of the northern portion of the Wasatch Fault. The eastern portions of the town, especially areas of the foothills and bench, lie along portions of the fault, which historically is the most overdue for activity in the region. Human life, structures, and other amenities in the fault zone could suffer damage in the event of a large earthquake. Damage from faulting is likely to impact an estimated 47 people and nearly 30 structures.

Flood. Portions of Willard appear at risk to flooding. Willard is an NFIP participant. Areas within the jurisdiction associated most closely with risk include areas adjacent to Facer, Willard, Cook, Holmes, and Pearsons Canyons, and portions of the town near Willard Bay Reservoir. Willard Creek meanders through town from east to west and poses the greatest risk of flooding within the city. Floods resulting in these areas pose a threat to human life, structures, critical facilities, infrastructure, and other environmen-

Willard, UT, Residential & Commercial Development at Risk						
Hazard Type	~Residents at Risk*	Residential Units at Risk		Commercial Units at Risk		
		# Units	$ Value**	# Units	$ Value**	$ Potential Revenue Loss***
Dam Failure	0	0	0	0	0	0
Faults	47	15	6,108,935	11	5,217,838	13,280,355
Wildfire	1,687	539	100,825,948	37	9,254,891	44,670,285
Flood	91	29	8,117,945	6	1,118,593	7,243,830
Liquefaction	485	155	39,688,959	28	9,559,454	33,804,540
Landslide	876	280	44,887,987	16	1,081,105	19,316,880
Slope	13	4	1,414,597	1	149,458	1,207,305
Poorly Drained Soils	0	0	0	0	0	0

* Based on average persons per owner household for Box Elder County from 2013 American Community Survey, which is 3.13.

** Current Market Value per parcel. Numbers were derived from Box Elder County parcels data provided by Box Elder County GIS personnel.

*** Based on average sales, receipts, or value of shipments of firms with or without paid employees, per firm ($1,207,305). Derived from 2007 Survey of Business Owners for Box Elder County, US Census Bureau.

Willard, UT, Infrastructure at Risk										
Hazard Type	Infrastructure at Risk									
	Railroad Lines		Natural Gas Lines		Electrical Power lines		Roads		Canals	
	# of Miles	$ Value[1]	# of Miles	$ Value[2]	# of Miles	$ Value[3]	# of Miles	$ Value[4]	# of Miles	$ Value[5]
Dam Failure	0	0	0	0	0	0	0	0	0	0
Faults	0.47	705,000	1.55	2,170,000	2.13	270,510	7.88	4,137,000	2.37	3,555,000
Wildfire	2	3,000,000	0	0	3.55	450,850	11	5,775,000	2.3	3,450,000
Flood	0.15	225,000	0	0	0.21	26,670	1.67	876,750	0.26	390,000
Liquefaction	4.96	7,440,000	0	0	6.88	873,760	43.61	22,895,250	0.29	435,000
Landslide	0	0	0.15	210,000	0.5	63,500	7.28	3,822,000	0.55	825,000
Slope	0	0	0	0	0.94	119,380	1.82	955,500	1.14	1,710,000
Poorly Drained Soils	0	0	0	0	0	0	0	0	0	0

[1] Based on figures from 2009 Pre-Disaster Mitigation Plan for Bear River Region, Utah.
[2] Based on average replacement cost estimates for gas lines ranging from 2-inches-20 inches in diameter. These cost are based solely on labor and material costs, and may vary based on time, scope, and site specific variations (Questar, May 2015).
[3] Based on estimates from Logan Light and Power, 2015.
[4] Based on estimates derived from an average 28' wide, 4" thick asphalt county road with gravel subgrade replacement. Cache County, 2015.
[5] Based recent Cache County and regional project cost estimates, 2015.

Willard, UT, Critical Facilities at Risk					
Hazard Type	Critical Facilities Types				
	Emergency	Schools/Public	Health Care	Places of	Infrastructure
Dam Failure					
Faults					3 dams
Wildfire					
Flood					1 dam
Liquefaction	Willard Police Department, Willard Fire and First Responders,	Willard School, Willard Bay State Park Rangers		1 place of worship	2 bridges, 5 dams, 7 broadband anchors
Landslide	Willard City Fire Department and First Responders, Willard Police Dept.	Willard School			6 broadband anchors
Slope					
Poorly Drained Soils					

Note: Critical facilities were identified using multiple data sources including: Utah AGRC, UDOT, Utah Division of Water Resources, and public and community leader input.

Willard, UT, Agricultural Features at Risk					
Hazard Type	Lands at Risk			Farms & Barns****	
	Agriculture Production*	Farm Land**	Grazing***	Century Farms	Historic Barns
	# of Acres			# of Farms	# of Barns
Dam Failure	0.00	0.00	0.00	0.00	0.00
Faults	401.12	506.64	0.00	0.00	0.00
Wildfire	213.70	518.12	0.00	0.00	0.00
Flood	161.40	91.60	0.00	0.00	0.00
Liquefaction	1,471.23	1,542.88	0.00	0.00	0.00
Landslide	94.55	199.82	0.00	0.00	0.00
Slope	1.64	0.00	0.00	0.00	0.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00

* Lands that are currently associated with agricultural activities involving water related land use, as described in the 2007 Utah Division of Water Resources, *Water Related Land Use* dataset.
**Lands that are suitable for farming purposes based on soil type and composition, as describe in the 2013 Natural Resource Conservation Service, SSURGO datasets.
*** Lands currently associated with grazing allotments identified as part of the Grazing Improvement Program (Utah AGRC, 2012)
**** Based on data compiled by the Bear River Association of Governments.

Willard, UT, Environmental & Recreational Features at Risk						
Hazard Type	Environmental Features at Risk			Recreational Features at Risk		
	Wetland/ riparian	Lakes	Streams	Parks	Trails	Amenities
	# of Acres		# of Miles	# of Acres	# of Miles	# of Amenities
Dam Failure	0.00	0.00	0.00	0.00	0.00	0.00
Faults	73.13	6.14	2.93	0.00	2.11	2.00
Wildfire	80.57	9.67	3.74	13.71	2.03	2.00
Flood	1,138.41	947.89	1.80	12.58	0.00	0.00
Liquefaction	1,362.76	974.41	1.03	38.28	0.00	0.00
Landslide	0.00	0.56	0.84	0.00	0.52	2.00
Slope	0.00	0.00	1.71	0.00	1.55	2.00
Poorly Drained Soils	0.00	0.00	0.00	0.00	0.00	0.00

Note: Total acres of land, miles of streams and trails, and amenities were identified using multiple data sources including: Utah AGRC, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Division of Water Resources, and public and community leader input.

tal, recreational, and agricultural amenities and lands within city limits.

Liquefaction. Areas of Willard have areas of high risk of liquefaction in the event of an earthquake. The majority of areas susceptible to high risk liquefaction exist in the lower elevation areas to the west of Highway 89. Liquefaction has the 3rd greatest potential to impact human life and structures with over 480 people at risk and nearly 175 structures.

Landslides. Isolated portions of Willard could suffer potential losses to landslides. Populations, structures, infrastructure, amenities and lands that are most likely to be impacted include portions of the town adjacent to portions of Highway 89, as well as some areas along the Wasatch Front Mountains. Landslides have the potential to impact life, property, critical facilities, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Landslides have the 2nd greatest potential to impact human life and structures with over 870 people and nearly 300 structures at risk, include emergency response facilities.

Steep Slopes. Willard has risk associated with steep slopes within its boundaries. Areas of greatest concern have slopes of over 20%, which are commonly found in areas directly adjacent to mountainous areas of the Wasatch Mountain Range. Areas bordering streams, rivers, and drainages also appear to have some increased exposure to risk. Steep slopes have the potential to impact life, property, infrastructure, and environmental, recreational and agricultural features in the jurisdiction. Thirteen people and 5 structures are estimated to be at risk within the jurisdiction.

Wildfire. Willard is susceptible to moderate-high risk of wildfire in eastern portions of the city such as the benches and hilly areas adjacent to the Wasatch Mountains, as well as some lower lying grassy and shrubby areas in the town. Wildfires have the potential to impact the greatest number of people in the town, with possibly over 1650 people and 550 structures at risk.

Future Development

Future development is expected on the southern portion of Willard in areas both to the east and west of Highway 89, with an expected 150 units on the east side of the highway, and an expected 200+ units on the west of the highway. Future development on the east side of Highway 89 may be exposed to greater risk involving wildfire, earthquake faulting, steep slopes, and landslides. In the case of extreme weather events, flooding may also occur if canyons experience large volumes of rain or snowfall. Development to the west of the Highway 89 may be exposed to greater risk involving liquefaction and landslides, as well as some risk to flooding in the case of severe weather. Care should be taken during the construction of these developments to ensure risks to hazards are mitigated prior to areas becoming populated.

Hazard Mitigation Strategies

Table 48: Willard City Mitigation Strategies

WILLARD - COMMUNITY MITIGATION STRATEGIES										
Protecting Current Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Willard	Flood	Protect current residents and property	Flood control district to protect and identify areas of high flood plain.	N/A	High	2015	Property Tax	Willard, Willard Flood Control Board, Utah DEM	$6,000	DWQ, Dam Safety
Willard	Wildfire	Protect current residents and property	Certify our Fire Dept. in wild lands fire fighting	N/A	High	2015	$500 per member city budget and grants	Willard, Utah FFSL	$500 per member	Grants
Willard	Landslide	Protect current residents and property	Work with city engineer and flood control to identify areas of high risk.	N/A	High	2016	N/A	Willard, UGS	$5,000	N/A
Willard	Earthquake	Protect current residents and property	CERT Training program for residence	N/A	High	2015	Participant fee	Willard	$600	Utah State Govt
Willard	Steep Slopes	Protect current residents and property	Identify areas with Engineer and classify as sensitive zones	N/A	Medium	2016	City Budget	Willard, UGS	$200	City Budget

WILLARD - COMMUNITY MITIGATION STRATEGIES										
Protecting Future Residents and Property										
Jurisdiction	**Hazard**	**Goal**	**Action**	**Action (For NFIP Compliance, if Applicable)**	**Priority (High, Medium, Low)**	**Time-frame (Year)**	**Potential Funding Sources**	**Responsible Entity**	**Estimated Cost**	**Resources**
Willard	Flood	Protect future residents and property	Keep Willard flood control running and included in future development.	N/A	High	2016	Future property taxes and building permit fees	Willard, Willard Flood Control Board, Utah DEM	$10,000	Property tax
Willard	Wildfire	Protect future residents and property	Annual wild lands firefighting training for new fire fighters	N/A	High	2016	Grants	Willard, Utah FFSL	$500 per member	County of Box Elder and State of Utah
Willard	Landslide	Protect future residents and property	Once high risk areas are identified put them in the sensitivity zone for protection from development.	N/A	High	2016	City budget	Willard, UGS	$200	City budget
Willard	Earthquake	Protect future residents and property	Ongoing CERT Training scheduled semi annually	N/A	High	2015 and for next 5 years	Participant fee	Willard	$600	State Emergency Fund
Willard	Steep Slopes	Protect future residents and property	Discourage development of sensitive zones by ordinance	N/A	High	2016	City Budget	Willard, UGS	$200	City budget

SECTION 8: COMMUNITY CAPABILITY ASSESSMENT

INTRODUCTION

What follows is a description of the organizational, technical and political capacity of the Bear River Region to implement hazard mitigation strategies and goals. A plan will do nothing to improve hazard mitigation efforts in the region without sufficient implementation capacity and capability; particularly local level capacity (town, city and county government). The purpose of this section is to identify where capacity to implement this plan is lacking for jurisdictions in the region.

LOCAL ORGANIZATIONAL AND TECHNICAL CAPABILITY

Only a handful of communities in the Bear River region have full time professional staff of any kind. In many cases a limited tax base means that hiring full-time professional staff in the smaller cities and towns is financially unobtainable. Often these smaller communities rely on local volunteers or elected and appointed officials to perform many of the tasks normally handled by professional staff.

Table 108: State and Regional Hazard Mitigation Resources

State and Regional Hazard Mitigation Resources - Bear River Region	
Agency/Group	**Description**
Utah Division of Emergency Services and Homeland Security	Training, technical assistance and funding.
Utah League of Cities and Towns	Training, technical assistance and planning assistance
Utah Chapter American Planning Association	Local land use planning resource.
Utah Geological Survey	Technical assistance, plan review
Bear River Association of Governments	Technical assistance, plan review, GIS, and Community Development Block Grants.
Bear River Health Department	Emergency preparedness and response. Homeland security planning.
Cache Chapter of the American Red Cross	Training, emergency preparedness and response.
Utah Association of Conservation Districts	Technical assistance and planning assistance.
Utah Division of Forestry, Fire, and State Lands	Technical assistance and funding resources. Community Wildfire Protection Plan writing assistance.

It's not uncommon to have volunteer city council members or planning commissioners assigned the task of emergency management, grant writing, or long range planning. Professional staff at BRAG and each of the three counties help provide some technical and planning assistance to these smaller communities. This regional assistance is often limited by staffing capacity and funding. As funding allows, some communities are able to contract for professional services from private consultants.

Only Logan City, Brigham City, and Utah State University have staff that is, for the most part, dedicated full-time to emergency management related tasks. While Box Elder, Cache and Rich Counties have emergency managers, all of these individuals have other responsibilities in addition to core emergency management functions.

POLICY AND PROGRAM CAPABILITY

Most jurisdictions in the Bear River Region have an adopted General Plan as required by state code. Although many communities have recently updated their General Plan, some are very outdated and have not been revised in years. Generally speaking, if these plans address natural hazards at all, most often flooding and geological hazards are addressed generally. However, there are several communities in the region currently making efforts to improve the natural hazard aspects of their plan.

All of the thirty-nine municipalities have an adopted zoning ordinance as well as each county in the region. Again, these ordinances are often outdated and are not consistent with the jurisdiction's General Plan.

Table 109: Local Community Capability

Local Level Hazard Mitigation Capability - Bear River Region		
Jurisdiction	**Professional Staffing (e.g. Emergency Manager, City Manager, Engineer, Planner)**	**Technical Capacity (In House)**
BOX ELDER COUNTY	County Emergency Management Coordinator (has other duties part-time), County Planners, Public Works, Building Inspector	GIS capability and staffing
Bear River City	Volunteer\contracted consultant	None
Brigham City	Full time EM, CED Director, ED Director, Planner, Public Works	GIS capability and staffing
Corinne City	Part-time City Manager	None
Deweyville Town	Volunteer\contracted consultant	None
Elwood Town	Volunteer\contracted consultant	None
Fielding Town	Volunteer\contracted consultant	None
Garland City	Part-time Emergency Manager	None
Honeyville City	Volunteer\contracted consultant	None
Howell Town	Volunteer\contracted consultant	None
Mantua Town	Volunteer\contracted consultant	None
Perry City	Full-time City Administrator	None
Plymouth Town	Volunteer\contracted consultant	None
Portage Town	Volunteer\contracted consultant	None
Snowville Town	Volunteer\contracted consultant	None
Tremonton City	City Manager, City Engineer, part-time Emergency Preparedness Coordinator	CAD capability
Willard City	Planner	Some GIS capability
CACHE COUNTY	County Emergency Manager, County CED Director, Planners, Public Works, Building Inspector	GIS capability and staffing
Amalga Town	Volunteer\contracted consultant	None
Clarkston Town	Volunteer\contracted consultant	None
Cornish Town	Volunteer\contracted consultant	None
Hyde Park City	Volunteer Emergency Manager	Some GIS capability
Hyrum City	Zoning Administrator\City Manager, City Engineer, Emergency Manager (p/t?)	Some GIS capability
Lewiston City	Volunteer\contracted consultant	Some GIS capability
Logan City	Emergency Manager, CED Director, Planner(s), City Engineers, & Public Works.	GIS capability with customized application to Emergency Management.
Mendon City	Volunteer\contracted consultant	None
Millville City	Volunteer Planner	limited
Newton Town	Volunteer\contracted consultant	None
Nibley City	City Manager, Public Works, and Planner	None
North Logan City	City Manager, Engineer, Public Works, and Planner	GIS capability and staffing
Paradise Town	Volunteer\contracted consultant	None
Providence City	City Administrator and Public Works	None
Richmond City	Part-time City Manager	None
River Heights City	Volunteer\contracted consultant	None
Smithfield City	City Manager and Public Works	Some GIS capability
Trenton Town	Volunteer\contracted consultant	None
Wellsville City	City Manager	None
RICH COUNTY	Countywide Planner (Bear Lake Regional Commission), Part-time Emergency Manager, Building Inspector	GIS capability
Garden City	Volunteer\contracted consultant	GIS capability
Laketown	Volunteer\contracted consultant	None
Randolph City	Volunteer\contracted consultant	None
Woodruff Town	Volunteer\contracted consultant	None

Most zoning ordinances do not address natural hazards even if they are mentioned in the General Plan. A few communities have a "sensitive area" or "hazard area" overlay zone, but they are very basic, often mentioning a brief requirement for geotechnical reports or other studies. All communities issue building permits and enforce local building codes. This service is usually contracted for with the county.

Many of the smaller communities lack emergency response plans.

JURISDICTIONAL CAPABILITY TO EXPAND POLICIES AND PROGRAMS

Each jurisdiction in the Bear River Region is authorized by state law to regulate land use activities and plan for future growth in their respective community. By law, cities, towns, and counties are required to address land use, transportation, and affordable housing in their community General Plan. Especially in recent years, communities have been much more proactive with updating their plans to include more detail and more fully comply with state codes and ordinances, and to protect them from liability should a natural hazard event occur.

However, many of the smaller cities and towns do not have adequate funding, staffing, or financial resources to update their local General Plan every 3-5 years per state and other recommendations. In fact, some communities have not updated their General Plans since they were created in the late 1970's and early 1980's. These smaller jurisdictions often do not have the resources to expand on or improve existing policies and programs as professionally, extensively, or as timely, as the larger jurisdictions do. There are some resources which can help, although they are limited. BRAG, the counties, and the state are all existing resources, but each has limited funding, staffing, or resources to provide assistance.

Those communities that have full-time staff are much more likely to have adequate capacity to apply for funding or update the General Plan and other plans/documents in house (See Table 109).

Authority

Federal: Public Law 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 PL 93-288 was amended by the Stafford Act, several additional provisions were also added that provide for the availability of significant mitigation measures in the aftermath of a Presidentially declared disaster. Civil Preparedness Guide 1-3, Chapter 6- Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

The Disaster Mitigation Act of 2000 was signed into Law on October 30, 2000. Section 322 defines mitigation planning requirements for state, local, and tribal governments. Under Section 322 States are eligible for an increase in the Federal share of hazard mitigation (HMGP), if they submit for approval a mitigation plan, which is a summary of local and/or regional mitigation plans, that identifies natural hazards, risks, vulnerabilities, and describes actions to mitigate the hazards, risks and vulnerabilities in that plan.

State: The State of Utah derives its authority under the Emergency Management Act of 1981 (Utah Code 53-2, 63-5) as well as the Governor's Emergency Operations Directive and Executive Order of the Governor 11.

Associations of Governments: The Associations of Governments have been duly constituted under the authority of Title XI, Chapter 13, Utah Code Annotated, 1953, as amended (The Inter-local Cooperation Act) and pursuant to Section 3 of the Executive Order of the Governor of the State of Utah, dated May 27, 1970, with the authority to conduct planning studies and to provide services to its constituent jurisdictions.

Local: Utah Code, Title 17, Chapter 27 is the County Land Use Development and Management Act that grants authority to counties. Utah Code, Title 10 Chapter 9 grants similar authority to municipalities.

SECTION 9 - PLAN MAINTENANCE, IMPLEMENTATION, FUNDING & PUBLIC INVOLVEMENT

PLAN MAINTANENCE PROCEDURE

Monitoring, Evaluating and Updating the Plan

Periodic monitoring and reporting of the Plan is required to ensure that the goals and objectives for the Bear River Region are kept current and that local mitigation efforts are being carried out. The following procedures for plan maintenance are similar to the procedures in the 2009 version of this plan. Due to staff turnover, the annual reporting procedures from the 2009 plan were not carried out, and there was no need to revise or update the plan before this 5-year update process. However, we feel that these procedures, with a few minor modifications from the 2009 plan, are the most efficient way to maintain the plan. BRAG staff is committed to follow the procedures outlined below in order to help community's better implement the plan on a local level. Reporting annually on the plan is also a great reminder of the need to implement community mitigation strategies over the next five years.

Annual Reporting Procedures

The Plan shall be reviewed annually, as required by the BRAG Governing Board, or as situations dictate such as following a disaster declaration. The second quarter of each year the BRAG Community and Economic Development Department Staff will review the plan and ensure the following:

1. The Executive Director and the Governing Board will receive an annual report and/or presentation on the implementation status of the Plan.
2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the Plan.
3. The report will recommend, as appropriate, any required changes or amendments to the Plan.

If the BRAG Governing Board determines that a modification of the Plan is warranted, the Board may initiate a plan amendment.

Revisions and Updates

Periodic revisions and updates of the Plan are required to ensure that the goals and objectives for the Bear River Region are kept current. More importantly, revisions may be necessary to ensure the Plan is in full compliance with Federal regulations and State statutes. This portion of the Plan outlines the procedures for completing such revisions and updates.

Five (5) Year Plan Review

Contingent on funding, every five years the plan will be reviewed and a complete update will be initiated. All information in the plan will be evaluated for completeness and accuracy based on new information, methods, or data sources. New property development activities will be added to the plan and evaluated for impacts. New or improved sources of hazard related data will also be included.

The goals, objectives, and mitigation strategies will be readdressed and amended as necessary based on new information, additional experience, and the implementation progress of the plan. The approach to this plan update effort will be essentially the same as used for the original plan development.

Plan Amendments

Plan amendments will be considered by the BRAG Governing Board during the plan's annual review to take place the second quarter of each year. All affected local jurisdictions (Cities, Towns and Counties) will be required to hold a public hearing and adopt the recommended amendment by resolution prior to final plan modification by the BRAG Governing Board.

IMPLEMENTATION THROUGH EXISTING PROGRAMS

Integration with Local Planning

This plan is only useful to the extent its recommendations and mitigation strategies are integrated into local level decision making, programs, regulations, and resource allocation priorities. In the preparation of this plan it soon

became very evident that for most elected and appointed officials in the Bear River Region there is a strong desire to improve the jurisdiction's handling of natural hazard related issues. For many cities and towns, particularly the smaller ones, lack of motivation is not the issue. Finding the personnel, time, and financial resources is always a concern for smaller communities.

There are many different avenues for the local implementation of this plan by Bear River jurisdictions. The most direct application for local jurisdictions is to create or update a natural hazards zone or overlay in the local General Plans, zoning, and land use ordinances. Regulating land uses in natural hazard areas can effectively reduce losses of life and property. Updating these documents can be time consuming, but communities should be updating their General Plan about every five years at a minimum anyway. This regular update process is a great opportunity for communities to review their sections of the Bear River Region's Pre-Disaster Mitigation Plan (PDMP), identify risks documented in the plan, and to update their local General Plan, zoning, and ordinances accordingly. BRAG staff is very willing to give planning and zoning assistance to communities, help with GIS analysis, and provide contacts for natural hazards and community planning.

According to Utah law, there are only three elements that jurisdictions are required to address in their General Plan; transportation, affordable housing (only for incorporated cities with over 1,000 people), and land use. While these three elements are the only required sections for the plan, jurisdictions are given authority to do much more in protecting the public's health, safety, and welfare. This is also true regarding development and geologic hazards.

In 2008, the Utah Land Use Development and Management Act was amended to more specifically grant jurisdictions authority to regulate development in floodplains and geologic hazard areas. It reads, "A municipality may enact an ordinance regulating land use and development in a flood plain or potential geologic hazard area to protect life and prevent the substantial loss of real property or substantial damage to real property (LUDMA, 10-9a-505. Zoning districts, Amended by Chapter 326, 2008 General Session)." The same is true for counties.

The responsibility and authority to regulate development in natural hazard areas lies with the County, City, or Town. The State of Utah does not regulate most development, and while the Utah Geological Survey and others offer assistance to Counties/communities, they do not have authority to regulate. Public health, safety, and welfare can be protected most effectively as communities exercise the authority given them and use the resources available to them to plan development responsibly near hazard areas.

Many local emergency response plans are written in a national response framework, which is an all hazards approach to emergency response. These plans are outlined in a way that simplifies emergency response based on NIMS (National Incident Management System) principles. It focuses on partnerships, preparedness, tiered response, etc., but does not particularly focus on specific natural hazards. As such, it's difficult to implement natural hazards planning directly into these documents. However, local emergency management officials train for emergency response to all types of natural hazards. This plan can serve as a reference to them providing historical hazard events, points of contact, general geographic locations of hazards, and potential losses per jurisdiction per hazard. Also, continued involvement in several follow-up Pre-Disaster Mitigation planning meetings will provide useful forums for discussion and collaboration among various organizations and levels of government.

Public works departments can also implement the information from this plan. As communities view the natural hazards data and mapping in this plan, they can accordingly identify where infrastructure could be damaged in the event of a natural disaster or where weak sections are in the various systems. Data sets for the various hazards identified in this plan are continually being updated and refined. The Utah Geological Survey and others can provide zoning and ordinance assistance for geological hazard areas, and can provide the most up-to-date data and mapping.

As far as Flood Mitigation Plans, those

communities that do have a plan can update it referencing the data and statistics in this plan. Potential losses and the general number of structures in FEMA floodplains can be very beneficial in those plan updates. However, the best resource for updating floodplain planning efforts is the Utah Division of Homeland Security and Emergency Services. The State Floodplain Manager has the necessary training and resources to assist communities in this respect. Likewise, for wildfire protection, the Utah Division of Forestry, Fire, and State Lands can provide assistance to communities which can help them become eligible for funding. For general pre-disaster mitigation funding and project assistance, the Utah Division of Homeland Security and Emergency Services hazard mitigation planning staff can provide the most up-to-date knowledge and experience.

Another local application of the Bear River Region's PDMP is the community Capital Improvements List. As communities realize which hazards exist in their area, they can plan accordingly to apply for funding for emergency response equipment or new infrastructure and buildings that help protect the health and safety of residents. This list can include building retrofits, new structures, machinery or equipment, vehicles, utility lines, and other projects in the community. A Utah Permanent Community Impact Fund Board (CIB) fund allows for communities to take out low interest loans, sometimes with a percentage of the total funding including a grant, to fund these projects. Likewise, the US Department of Housing and Urban Development (HUD) administers Community Development Block Grants (CDBG) that could also be used for the purchase of these CIB projects on a competitive basis. These funds are administered for the Bear River Region by BRAG. One other funding source for these types of projects is the USDA Rural Development low interest loans.

Perhaps the most direct way communities in the Bear River Region can implement this plan into current planning mechanisms is by completing the mitigation strategies for their respective community found in this plan. These strategies were written by communities and County working groups to find ways to decrease potential losses to life and property. As communities strive to improve natural hazards planning within their jurisdictional boundaries, they will more effectively protect the public's health, safety, and welfare by implementing these mitigation strategies.

BRAG does not have the legal standing or the regulatory authority to require Cities, Towns, or Counties to make plan, ordinance, or policy changes. At best, BRAG can encourage, educate, and suggest changes to local codes, plans, regulations, and policies. Given this, it is suggested in this plan that BRAG's ongoing implementation effort would be most useful if focused on building local capacity, educating local officials on what is at stake (both in terms of funding eligibility and concern for citizenry), and providing the sustained technical assistance that is so crucial for the successful implementation of any long-term mitigation strategies.

Specifically, BRAG proposes to help move the implementation phase forward by (contingent on funding):

1. Establishing, coordinating, and hosting follow-up hazard mitigation meetings annually or biannually.
2. Presenting to local governments on the benefits of natural hazards planning, hazard mitigation project options, and funding opportunities.
3. Providing on-going technical assistance to Counties, Cities, and Towns by request.

POTENTIAL FUNDING SOURCES

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. The Bear River jurisdictions will continue to seek outside funding assistance for mitigation projects for both the pre- and post-disaster environment. This portion of the Plan identifies the primary Federal and State grant programs for Bear River jurisdictions to consider, and also briefly discusses local and non-governmental funding sources.

Federal

There are several federal grant programs that have been identified as funding sources, specifically targeting hazard mitigation projects:

Below are some federal pre-disaster mitigation funding sources:

Title: Pre-Disaster Mitigation Program
Agency: Federal Emergency Management Agency
Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Pre-Disaster Mitigation (PDM) program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for "small and impoverished communities", who will be eligible for 90% Federal share/10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities: State and local hazard mitigation planning, technical assistance (e.g. risk assessments, project development), mitigation projects, acquisition or relocation of vulnerable properties, hazard retrofits, minor structural hazard control or protection projects, community outreach, and education (up to 10% of State allocation).

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency
The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistant Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost-share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency
FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency
FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.
Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:
*Roads, bridges & culverts
*Draining & irrigation channels
*Schools, city halls & other buildings
*Water, power & sanitary systems
*Airports & parks
Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:
*Universities and other schools
*Hospitals & clinics
*Volunteer fire & ambulance
*Power cooperatives & other utilities
*Custodial care & retirement facilities
*Museums & community centers

Title: Emergency Management Performance Grant
Agency: Federal Emergency Management Agency
By authorizing the Robert T. Stafford Disaster Relief and Emergency Assistance Act and Section 662 of the Post Katrina Emergency Management Reform Act of 2006, Congress approved the creation of a national program to provide a funding mechanism. Title VI of the Stafford Act authorizes FEMA to make grants for the purpose of providing a system of emergency preparedness for the protection of life and property in the United States from hazards and to vest responsibility for emergency preparedness jointly in the federal government and the states and their political subdivisions. The Federal Government, through the EMPG Program, provides necessary direction, coordination, and guidance, and provides necessary assistance, as authorized in this title, to support a comprehensive all hazards emergency preparedness system.

The funding is administered through the state based upon a 50% Federal share and 50% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination.

FEMA provides EMPG assistance to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities: management and administration, planning, organization costs, equipment, training, conducting exercises, construction and renovation projects, and maintenance and sustainment activities and projects.

Title: SBA Disaster Assistance Program
Agency: US Small Business Administration
The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants
Agency: US Department of Housing and Urban Development
The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income households. The CDBG program also provides grants for post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation, or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

Title: Community Assistance
Agency: US Bureau of Land Management
This funding can be used on private land adjacent to BLM lands. In addition, through the CWPP process the community can recommend fuels treatment project to the BLM on their jurisdictional area.

Title: State Fire Assistance-Healthy Forests Restoration Act (HFRA)
Agency: US Forest Service
The Healthy Forests Restoration Act allows communities to identify/recommend fuel mitigation projects on public lands. This in turn allows federal agencies to plan, process, and implement projects on these lands in an expedited manner.

Title: Stevens
Agency: US Forest Service
The Stevens grant is funding for projects that include a portion of Forest Service land and there must be a prescribed fire component.

Title: Secure Rural Schools and Community Self Determination Act
Agency: US Forest Service (money is funneled through the State Department of Treasury then to the Counties.
This act was amended and reauthorized for fiscal year 2008-2011, and was signed by the President on October 3, 2008. This authorizes the use of Title III monies for the development of Community Wildfire Protection Plans. The Utah Division of Forestry, Fire, and State Lands has technical experts who can assist with the development of these plans.

Title: Disaster Assistance and Relief Act
Agency: (no agency other than Congress)
This funding can be used to implement "shovel or chainsaw" ready projects. These project areas must be adjacent to Forest Service lands. A community must have an approved Community Wildfire Protection Plan to be eligible for these funds.

Local

Local governments depend upon local property taxes as one of their primary sources of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

Non-Governmental

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts, and other non-profit organizations.

CONTINUED PUBLIC INVOLVEMENT

During interim periods between the five year re-write, efforts will be continued to encourage and facilitate public involvement and input. The plan will be available for the public electronically on the BRAG website (http://www.brag.utah.gov). A hardcopy will also be available at the BRAG office in Logan, Utah. Comments will always be received whether orally, written, or by e-mail.

In addition to the public comment period for the draft version of the plan, including the proper public notices in local newspapers, a press release of the final plan will help to educate the public. This should involve education on the need for preparing for and mitigating against the effects of natural hazards and the purpose and usefulness of the final adopted plan.

As implementation of the mitigation strategies continues in each local jurisdiction, the primary means of public involvement will be the jurisdiction's own public comment and hearing process. State law as it applies to municipalities and counties requires this as a minimum for many of the proposed implementation measures. BRAG encourages Counties, Cities, and Towns to go beyond the minimal requirements of receiving public input, and to engage stakeholders.

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