

2012

City of North Salt Lake



Emergency Operations Plan

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Policy Statement

The city of North Salt Lake Emergency Operations Plan identifies both natural and man-made hazards that may impact city residents. It details the response and recovery procedures that public officials should follow in the event of a disaster. Furthermore, guidance is given regarding the public shelters that will be available to city residents should the need arise.

City leaders will ensure that department heads are familiar with this plan as outlined. Local civic and religious leaders are also invited to become acquainted with this document to assist them in the formulation of their own plans to compliment and work in partnership with the City. As public officials we strongly encourage families to have multiple contingency plans, depending on the circumstances, of where to gather or meet in the event of a disaster.

The execution of this plan will be under the direction of the North Salt Lake City Mayor, Mayor Pro-tem, the City Manager, or the City's Emergency Manager. As the situation evolves they will be responsible for ALL resources, disaster response, and recovery efforts. If necessary they will call upon county and state resources to provide additional assistance. City leaders will be authorized to direct an evacuation due to an impending disaster or other emergency situation.

Preface

This plan represents a concerted effort to formulate standard operating procedures for handling emergencies within the City of North Salt Lake or as called upon by neighboring cities.

The major objectives of the plan are:

1. Provide a brief and current analysis of both natural and man-made hazards.
2. Give detailed instruction to and coordinate with city officials and department heads regarding preparation for, response during, and recovery after the fact.
3. Provide for the survival of the city population, evacuees, and relocates in the event of a disaster. This plan is designed to be used in conjunction with other emergency response plans that may exist in Davis County, but does not replace or supersede county or state plans when the situation demands.
4. Act independently or work in partnership with county and state officials as needed through emergency operations command posts. This plan will subordinate to the Davis County or State of Utah plans and/or officials in any situation that may occur within the city limits.
5. Citizens need not be alarmed, but clearly know and understand that the City of North Salt Lake Emergency Operations Plan is designed to aid and assist all citizens with planning, preparing, evaluating, and recovering should a disaster occur. Furthermore, the city will seek to operate expeditiously in rapidly deploying emergency response and disaster aid to ALL those in need weather in person or in property.

Authority

The Mayor of North Salt Lake City, Mayor Pro-Tem, City Manager, or the City Emergency Manager, separately or together can and will activate this plan and will have the authority to direct the evacuation of the city population.

In the event that none of the above can be reached, any other city official first on the scene or present at the EOC (emergency operation command), will act as the authority until the correct leadership can be provided.

Plan Development and Maintenance

This plan should be reviewed annually and updated as necessary. Each department and/or agency is responsible for reviewing and updating all areas of responsibilities assigned to them as needed; based on experience in emergencies, deficiencies identified through drills and exercises, and changes in government structure and emergency organizations.

Particular emphasis should be placed on changes to personnel, addresses, phone numbers, and changes in resources and available of said resources. Updating should be done so by submission of a replacement page through the proper chain of command. The master plan will be maintained and kept by the City Emergency Manager. On occasion he/she may call upon department heads to discuss, review, and coordinate city resources. A volunteer group made up of qualified local citizens (Uniting Neighbors) should also participate and advise throughout this planning, development, and revision stage.

Hazard Analysis

BACKGROUND:

The City of North Salt Lake is located in northern Utah near the southern portion of Davis County; its neighbors consist of Salt Lake City to the south, Bountiful to the north, and Woods Cross to the northwest. The Rocky Mountains are due east and the Great Salt Lake is due west. The county seat is Farmington. The county consists of 15 small to medium sized cities. A major interstate (I-15) runs north and south through the county. The city consists of 8.2 square miles. (Wikipedia, 2011) As of 2010, North Salt Lake's population was 14,021 people. Since 2000, it has had a population growth of 60.20 percent. (Sperling's Best Places, 2011) A major military installation, Hill Air Force Base, is located in the northern area of Davis County.

SOIL:

The soils in North Salt Lake are well drained and of moderate slope, except near the mountains. West of the interstate, the land is flat, and except near the areas of the Great Salt Lake soils are capable of good productivity.

The soils are best suited for agriculture, those which are well drained and fairly level, are best suited for urban development. Soils in extreme western part of the city/county limits among the shores of the Great Salt Lake are unsuitable for agricultural or urban development because of the high alkali content or water table. (Department of Agriculture, 2011)

CLIMATE & TERRAIN:

North Salt Lake has a dry desert climate with cold winters and hot summers. Heavy snowfall during the winter is common due to lake effect snow. (Wikipedia, 2011) Winter storms can produce several inches of snow resulting in power outages, impassable roadways, and structural damage. East blowing winds often bring the smell of the lake close to home. Property damage may also be caused due to high canyon winds, wind speed may be in excess of 50 mph.

The elevation is 4,337 feet as it appears on the *Salt Lake City North* U.S. Geological Survey Map. (UT Hometown Locator , 2011) The mountain bench to the east rises to roughly 5200 feet above sea level and borders the US forest service lands (Wasatch National Forest).

CLIMATE HAZARDS:

During recent years, natural hazards researchers have begun to study the unique problems of managing climate sensitive areas. Some time near 1982, a climate change occurred over Northern Utah which resulted in wetter than normal conditions that led to two spring seasons of severe snowmelt flooding, landslides, mudslides, and a marked increase of the level of the Great Salt Lake. From 1983 to 1986 the level grew to 4210 feet above sea level. Since that time a pumping project was initiated and levels have dropped back below the 4200 feet mark. (Wikipedia, 2011)

HAZARDOUS MATERIAL SPILLS & TRANSPORTATION ACCIDENTS:

Most hazardous materials spills are likely to be the result of a transportation incident. Since I-15 is a major north/south corridor through the city of North Salt Lake and Davis County, along with the rail lines, a potential threat to life and property exists. Any accident could cause the spilling of fuels which may produce fumes or vapors and thereby affect the residents of the city.

North Salt Lake and its neighboring cities are home to several oil and gas refineries which produce and process chemicals that are potentially dangerous should an accident occur. Trucks and rail cars are commonly used in transportation of these goods and are at risk also.

FIRES:

Fires can occur in almost any area of the city. These fires may occur in two types; industrial and forest fires.

The oil refineries present the greatest risk to the west side residents as several storage tanks are located within city limits. Any problems at these facilities could result in smoke, explosions, and/or atmospheric pollutions. Significant problems could shut down all north and south freeway traffic.

Hill Air Force Base, home to weapons systems and bombs present further challenges which city officials are tasked to monitor. If an incident occurs, HAFB disaster plan calls for immediate communication with all local municipalities. (Dept of Air Force, 2011)

A forest fire is more likely to occur during the hot summer months than any other time of the year. No matter the cause weather related lightning strikes or man-made causes the results would be the same. Many homes located on the bench are at extreme risk unless each home owner creates a defensible space to limit the damage to property and possibly persons.

FALLEN AIRCRAFT:

Most of the air traffic from Hill Air Force Base and Salt Lake International airport crosses the city (and country) boundaries during take-off and landing patterns. Crashes could occur and result in fires, extensive property damage, and the loss of life. Both airport landing facilities are a sufficient distance from residential areas thereby limiting any collateral damage. Should a crash occur near the city limits, or even outside of the populated areas, city emergency resources will likely be deployed and possibly be the first on scene.

POWER OUTAGES:

Major power outages have occurred in the past and will likely continue to occur in the future. Major oil refineries, cold storage food supply facilities, and other industrial related business could cripple the economic impact on the city if power is not restored within a reasonable amount of time. Power losses to homes for an extended period of time, depending on the weather conditions could also become serious in nature. The elderly and infirm should be tended to immediately to prevent loss of life.

FLOODING:

Run-off from melting snow and flash flooding has historically caused major problems in Davis County and could do the same to the City of North Salt Lake. Flood studies have been conducted for all major communities in Davis County; information is available through the State of Utah, Emergency Management Office, State Building Room 1110 in Salt Lake City, Utah. (State of Utah, 2011)

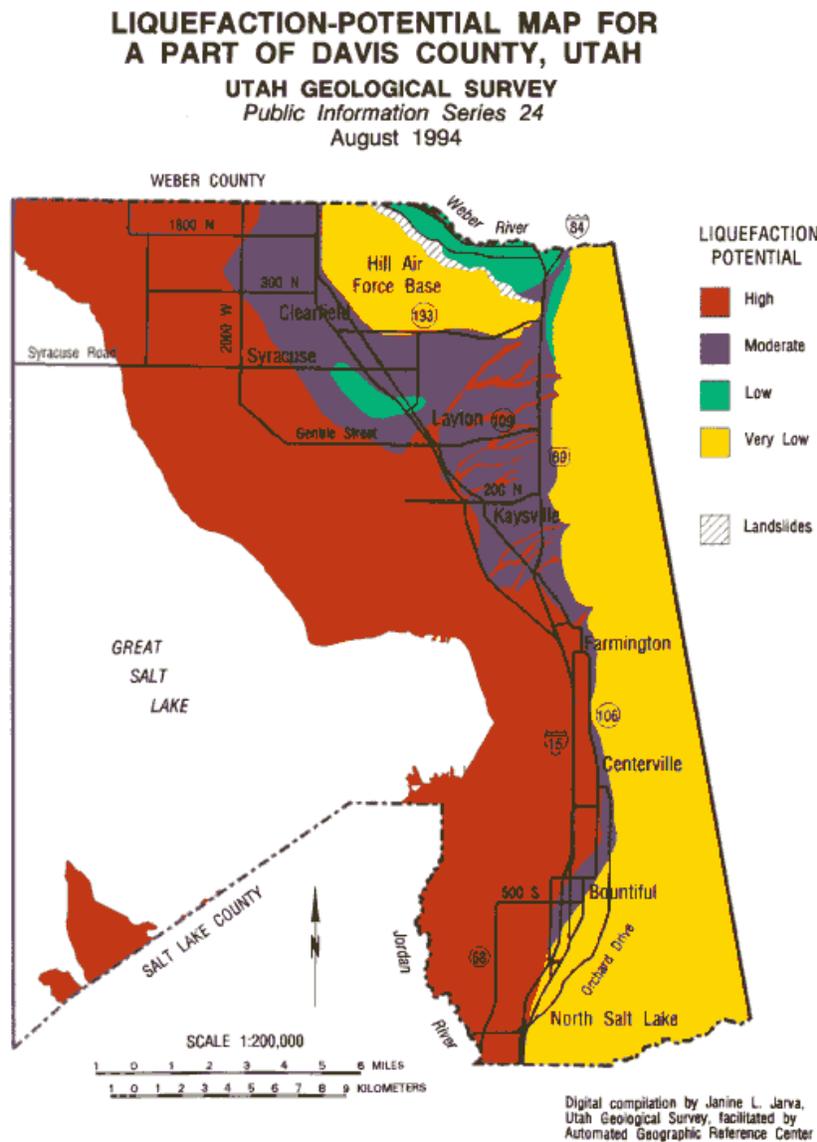
A rise in water levels to the Great Salt Lake from heavy snowfall during the winter months could result in serious property damage to residents on the western edge of the city limits.

EARTHQUAKES:

Davis County contains the highest density of faults in the state of Utah, yet no major quake has been recorded with its epicenter in the county. The main fault follows the base of the Wasatch Range at or near the National Forest boundary. Housing developments along the eastern areas of the city are astride the main fault or on one of the identified branches, and are subject to damage by shaking. The entire county would be affected by a major earthquake centered within Davis County or to the south in Salt Lake County. (See Exhibit B) (The Wasatch Fault, 2011)

The principle hazards resulting from earthquake activity may be divided into two categories: The first hazard results in displacements of ground on opposite sides of the fault, with severe

consequences to structures built across the ruptured ground surface. Secondly, in addition to the displacements along fault lines, earthquakes cause ground shaking over wide areas, with the greatest intensity of shaking generally nearest the source of the earthquake. Such ground movement can cause the structural failure, which could lead to the collapse of multiple buildings.



This map is for general reference only and was modified from Anderson, L.R., Keaton, J.R., Aubry, Kevin, and Ellis, S.J., 1994. Liquefaction potential map for Davis County, Utah. Utah Geological Survey Contract Report 94-2, 50 p., scale 1:48,000.

Figure 1: Liquefaction-Potential Map

LIQUEFACTION:

Low lying areas of the city near the Great Salt Lake where the water table is near the surface would be susceptible to liquefaction in addition to shaking. (See Exhibit C) Liquefaction is a loss of strength in some saturated granular soil, resulting in what would appear to be quicksand; which can then lead to slope failure or substantial settlement of structures. (Utah Department of Natural Resources, 2011)

SLOPE FAILURE:

Earthquake ground shaking will lead to failure of slopes which are stable under quasi-static conditions. These slope failures occur because the earthquake causes an additional load over and above the slope. Along the Wasatch Front there are several landslide scarps of slides which probably occurred during strong earthquakes over time.

ROCKFALL:

In those areas in the east portion of the city where large boulders exist at or near the surface may become displaced and roll downward into buildings and homes, this hazard is substantially compounded by earthquake ground movement. Severe damage to properties and persons would be likely with the amount of new development in the last 10 years.

LANDSLIDES:

Many landslides are associated with rising ground-water levels due to rainfall, snowmelt, and landscape irrigation. Therefore, landslides typically move more during the spring, although debris flows associated with intense thunderstorm rainfall are common in the summer. (Utah Department of Natural Resources, 2011)

Recently the city has been experiencing a considerable amount of movement to the lower east bench in an area known as Springhill. This ever changing and developing challenge has presented extreme dangers to homeowners who have seen their homes literally destroyed in just a matter of months.

The Utah Geological Survey (UGS) has been monitoring conditions at the Springhill landslide in North Salt Lake, Davis County since 1998. (Utah Department of Natural Resources, 2011)

Background:

In the late 1990s, residents in the Springhill area of North Salt Lake, Davis County began noticing cracking and other distress related to relatively minor movement of the landslide. By 1998, a house at 160 Springhill Drive that straddled the northern boundary of the landslide was severely damaged and condemned. Relatively severe distress also occurred to several houses along Valley View Drive (formerly 350 E) and Springhill Circle.

Little movement or damage occurred during a dry period between 1999 and 2004, but the rate of movement accelerated during the 2005 wet year. Since 2005, the amount of movement each year has increased, except in 2007 (a dry year), resulting in an increased amount of damage and

distress, particularly to houses in the upper and lower parts of the landslide and to Springhill Drive. (Utah Department of Natural Resources, 2011)

Description:

The Springhill landslide is about 720 feet long and about 290 feet wide where it is crossed by Springhill Drive. The local relief (change in elevation) is about 150 feet and the average slope of the landslide is approximately 21 percent (the ground rises 21 feet over a distance of 100 feet).

The depth of the landslide varies along its length. Along the north edge of Springhill Circle, the landslide is about 48 feet deep and likely deeper than 70 feet beneath Springhill Drive. The landslide is shallower along its southern edge, and in the head and toe. (Utah Department of Natural Resources, 2011)

Landslide Movement:

Description	Location	Measurement Method	Measurement Period	Total Movement (in.)	Estimated Error (in.)
Ground deformation across main scarp zone	Upslope of Springhill Circle	Steel tape and survey stakes	August 22, 2011 - January 4, 2012	0.1 to 0.24	±0.1
Ground deformation across toe	Lot 157 Valley View Drive	Steel tape and survey stakes	August 22, 2011 - January 4, 2012	0.5	±0.4
Movement monitoring	Entire landslide and surrounding area	Static survey-grade GNSS	August 1, 2011 - January 4, 2012	1.4	±0.4

Figure 2: Summary of recent landslide movement and ground deformation measurements

The Springhill landslide moved very slowly since August 22, 2011, but the rate of movement (the speed at which the landslide moved) was not constant. The landslide has shown little overall movement since our last update on November 30, 2011.

Measurements taken on January 4, 2012 indicate that the main scarp (uppermost part of the slide) is currently moving at approximately 0.0 to 0.1 inches per week, a decrease in the rate of movement compared to the last reporting date (November 30, 2011). Movement of the toe (lowermost part of the slide) since the last reporting date (November 30, 2011) has shown little movement.

Total measured ground deformation (the amount that the ground stretches or shortens as landslide movement occurs) since August 22, 2011 is about 0.1 to 0.25 inches across the main

scarp. The table below summarizes the total measured ground deformation and movement from August 22, 2011 through early 2012.

Small movement rates were observed from August 22, 2011 to January 4, 2012. A significant rate reduction since spring and summer 2011 has been observed. With a decrease in precipitation since spring and summer, little rate increases are anticipated for the winter months.



Figure 3: Map of Springhill Landslide Movement

Future Landslide Movement:

Based on continual movement since the beginning of 2010, with normal to above average precipitation, the UGS anticipates near continuous movement in 2011.

Based on landslide movement since 2005, the total annual movement amount may gradually increase (as it has since 2005), likely exceeding a foot or more each year (landslide movement in 2009 exceeded 12.5 inches). However, during extremely dry years, such as 2007, movement may be slow or even suspend, and a prolonged dry period, such as a multi-year drought, may cause the landslide to become dormant (no movement for over a year).

However, because of the uncertainty in predicting the weather and water infiltration in future years, residents should prepare for future movement of the landslide, particularly given that significant damaging movement occurred in 2008, a year with near normal precipitation. (Utah Department of Natural Resources, 2011)

Landslide Emergency Response Checklist:

Day to Day Operating Procedures:

City officials will continue to monitor the area and consult with residents on a regular basis to ensure their safety and well-being while judiciously managing cities resources and interests. City officials will be in regular contact with the Department of Natural Resources with the State of Utah to receive geological updates regarding the earth's movement. It is the cities primary responsibility to maintain order and control at all times.

Change in Circumstance:

Should the State Geological Survey through its quarterly monitoring and survey note significant change in the conditions city leaders will immediately notify and advise citizens as to their well being and safety. These conditions may be caused by but not limited to; heavy rain or snow fall thereby causing heavy run-off. City officials will council and advise residents to be cautious during the peak summer sprinkling times.

Should at any time the city building inspector, third party inspector, or public official as appointed by the Mayor deem any of the 24 said properties absolutely unsafe or unlivable; then the city may by power of Emanate Domain exercise its authority in protecting the well being of it citizens from life threatening harm. (Wikipedia.org, 2011)

Emergency Response to Life or Property:

Immediate steps to be taken or initiated by city leaders:

1. Establish order under police authority
2. Seek to maintain safety of residents under the direction of fire officials.
3. Establish a mobile incident command post as necessary.
 - a. Seek to establish proper chain of command:

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- i. Mayor, City Manager, or City Emergency Manager
 - b. Coordinate with police and fire authority to determine if search and rescue teams are needed.
 - c. Alert medical personal, ambulance companies, EMT's, and hospitals as to the immediate and possible needs.
 - d. Contact Public Works Department to shut down all affected services; water, electricity, and gas.
 - e. Contact dispatch to place reverse 911 calls to alert residents of pending danger.
 - f. Maintain traffic and crowd control to minimizing potential collateral losses.
 - g. Evacuate surrounding areas as needed.
 - h. Open public shelters as needed; schools and churches.
 - i. Activate City EOC-Emergency Operations Center as necessary.
 4. Contact Davis County officials for assistance as needed.
 5. Notify the State of Utah if additional resources are needed.
 6. Be in contact with the news outlets to inform the community.

Recovery Efforts:

1. Take immediate review of situation in the disaster area and the surrounding areas.
 - a. Especially - Valley View Drive and Cynthia Way for movement that may have caused challenges with public services and to ensure safety of the residents.
2. Advise the City Council as to the situation, seek to maintain unity under the Mayor's leadership and his advisory team.
 - a. City Manager
 - b. City Emergency Manager
 - c. Public Works Director
 - d. Chief of Police
 - e. Battalion Commander
3. Make an effort to reach out to local religious leaders to help coordinate aid distribution as necessary; including but not limited to available resources which are:
 - a. Food, water, and shelter
 - b. Ensure that families are together if at all possible.
4. Contact local humanitarian organizations for additional assistance as needed.
5. Alert school district officials.
6. Begin clean up and rebuilding.

Bibliography

- Department of Agriculture. (2011). *Soil Survey Information - Utah NRCS*. Retrieved April 25, 2011, from <http://www.ut.nrcs.usda.gov>: <http://www.ut.nrcs.usda.gov/technical/soils/soilsruveyinfo.html>
- Dept of Air Force. (2011). *Hill Air Force Base - Factsheet*. Retrieved April 25, 2011, from <http://www.hill.af.mil>: http://www.hill.af.mil/library/factsheets/factsheet_print.asp?fsID=6745&page=1
- FEMA. (2011). *FEMA Federal Emergency Management Agency*. Retrieved April 25, 2011, from <http://www.fema.gov>: <http://www.fema.gov/emergency/nims/AboutNIMS.shtm>
- Sperling's Best Places. (2011). *Best places to live-North Salt Lake, UT*. Retrieved April 25, 2011, from <http://www.bestplaces.net>: http://www.bestplaces.net/city/utah/north_salt_lake
- State of Utah. (2011). *Utah Dept of Public Safety*. Retrieved April 25, 2011, from <http://publicsafety.utah.gov>: <http://publicsafety.utah.gov/homelandsecurity/>
- The Wasatch Fault. (2011). *Publication 40*. Retrieved April 25, 2011, from <http://geology.utah.gov>: <http://geology.utah.gov/online/pdf/pi-40.pdf>
- UT Hometown Locator . (2011). *North Salt Lake-Community Profile*. Retrieved April 25, 2011, from <http://utah.hometownlocator.com>: <http://utah.hometownlocator.com/ut/davis/north-salt-lake.cfm>
- Utah Department of Natural Resources. (2011). *Landslides, Debris flows, & Rockslides*. Retrieved April 25, 2011, from <http://geology.utah.gov>: <http://geology.utah.gov/utahgeo/hazards/landslide/index.htm>
- Utah Department of Natural Resources. (2011). *Liquefaction - Utah Geological Survey*. Retrieved April 25, 2011, from <http://geology.utah.gov>: <http://geology.utah.gov/utahgeo/hazards/liquefy.htm#liquemaps>
- Utah Department of Natural Resources. (2011). *Springhill Landslide, North Salt Lake*. Retrieved April 25, 2011, from <http://geology.utah.gov>: <http://geology.utah.gov/utahgeo/hazards/landslide/springhill/index.htm>
- Wikipedia. (2011). *Great Salt Lake - Wikipedia*. Retrieved April 25, 2011, from <http://en.wikipedia.org>: http://en.wikipedia.org/wiki/Great_Salt_Lake
- Wikipedia. (2011). *North Salt Lake, UT - Wikipedia*. Retrieved April 25, 2011, from <http://en.wikipedia.org>: http://en.wikipedia.org/wiki/North_Salt_Lake,_Utah
- Wikipedia.org. (2011). *Eminent Domain - Wikipedia*. Retrieved April 25, 2011, from <http://en.wikipedia.org>: http://en.wikipedia.org/wiki/Eminent_domain