

Natural Hazards

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The Emigration Township covers a unique combination of geologic conditions and topography. Development should be limited to the areas presenting the lowest long-term risk to residents and property. Areas of highest risk typically include one of the following factors: steep hillsides, adverse geology, problem soils, or stream considerations. Areas identified as either low or moderate hazard require review and appropriate site development and design guidelines.

Development-related geologic hazards should also be evaluated during application review. Such hazards might include disturbance of soil and rock creating slope stability problems, including erosion and changes in drainage patterns caused by road cuts, extension of utility lines, and other development disturbance. An overriding policy is the protection and enhancement of the natural environment.

Unfortunately, the adverse impacts of geologic and man-made hazards have already been demonstrated in areas of the Emigration Canyon Township. These potentially hazardous conditions continue to exist, and as development continues throughout the township, hazardous situations are more apt to develop. The Plan recognizes the importance of the natural environment and has incorporated the following goals, objectives and policies into each element of the Plan and into the regulations for each land use category and the total implementation structure for all ordinances.

Geologic Setting

The Emigration Canyon Township is located along the western flank of the central Wasatch Mountain Range within the Middle Rocky Mountain physiographic province. The bedrock underlying the township has been folded into a northeast-southwest trending syncline (or a broad U-shape). Rocks within the Emigration Canyon Syncline range in age from

Pennsylvanian to Cretaceous. The northeastern portion of the syncline has been covered by the Tertiary-age Wasatch Formation.

Bedrock units found across the township have a range of physical properties and some can pose severe development constraints because of instability,

moisture sensitivity, shrink/swell potential, or poor percolation characteristics.

Topography and Slope Stability

The Canyon is located in the Wasatch Mountains, an area of high relief. Elevations range from about 5,100 feet near the mouth of Canyon to 8,954 feet at the summit of Lookout Peak along the northern boundary of the township. Given the topography, slope stability hazards pose perhaps the greatest risk of the geologic hazards. Both landslides and debris flows have occurred in Emigration Canyon Township. Much of the township contains areas where slopes exceed 30 percent. The Foothills and Canyons Overlay Zone is restrictive of development on slopes greater than 30%. Health Department Regulations do not allow leach fields on

The protection of environment, property, and life must be considered in the planning and development review process. All three factors need to be examined in selecting areas for development.

slopes over 25%. Many residential lots in Emigration Canyon were platted in the early decades of the Century without regard to topography and unfortunately some of these lots have slopes too severe for safe development.

Soil-Related Hazards

Soil characteristics are important factors in determining development potential and the limitations for a site. This is especially important in areas where septic systems and drainfields are present or proposed. Characteristics to be considered are slope, percolation rates, drainage patterns, depth to water table, texture, presence of shrinking or swelling clays, erosion potential, alkali content and bearing capacity. (Soil characteristics are listed in Appendix C, page 103.)

The Emigration Canyon Township area has several soil types. Figure 8, page 61, shows soils according to their development suitability. As shown, a substantial amount of the township is identified with "moderate" constraints for development. In areas where soils pose "moderate" constraints, development should occur only with careful planning and engineering.

The locations having "severe" soil constraints can be developed only with special engineering design to mitigate problems and make development feasible. In instances where soils prove to be impervious, no mitigation is possible. Impervious soils will not allow a leach field system. Soils with high erosion potential identified near the significant water features are also a major reason for the "severe" rating. Highly erodible soils are easily disturbed soils, having characteristics that can cause destruction of aquatic life and increase the risk of flooding.

Hydrology and Flooding

Emigration Creek and its tributaries are the principal drainages carrying runoff through the Canyon. The area contains a number of locations along these streams that are considered subject to special stream considerations and setback requirements.

Floodways and the 100-year flood plain are defined by the Federal Emergency Management Agency. The report, "Flood Insurance Study, Salt Lake County, Utah, Unincorporated Areas," has been applied and adopted as part of the Salt Lake County Zoning Ordinance, Chapter 19.74 as a guide to development.

In most areas, the creeks have well defined channels that in the past have experienced some flooding. Sediment collecting in the stream channels has caused significant damage from flooding problems along adjacent properties. There are some smaller drainages that flow continuously and some intermittently throughout the year, with potential high flows during the spring run-off period. Hydrologic features are shown in Figure 9, page 63.

Wetlands

Under the U.S. Clean Water Act of 1977, wetlands are defined as "those areas that are inundated by groundwater or surface water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for saturated soil conditions." The U.S. Army Corp of Engineers has been given the responsibility for wetlands management, study and protection.

Jurisdictional wetlands have been delineated along Emigration Creek and there may be isolated wetland areas along tributary drainages.

These wetlands, though small in size, are important in the urban fabric because they provide sanctuary for various forms of plant and animal life and ecological balance of an area. As development increases, further investigation of these areas in their natural state becomes more important. Development in wetland areas is sometimes undesirable because of increased construction costs and potential for flooding of basements. However, development is possible with proper site considerations and mitigation measures. Federal laws require no net loss of wetlands. No net loss of wetlands means that if a designated wetland is eliminated, another wetland site must be acquired and preserved to replace the site that is lost.

Soil characteristics are important factors in determining what kind of development is appropriate for a site.

Seismic Hazards

Earthquake-related hazards pose a significant risk to all the residents of Salt Lake County. There is about a 20 percent chance of a large earthquake occurring sometime during the next 50 years along the Wasatch Front. Even more-frequently occurring moderate earthquakes can cause significant damage. Therefore, seismic hazards must be considered in all land use planning. Salt Lake County has adopted by ordinance, a Natural Hazards Area overlay zone. This information can be found in the Natural Hazards Ordinance, Chapter 19.75. No known active faults are in Emigration Canyon Township. Seismic hazards in the Emigration Canyon Township stem primarily from the seismic waves that are generated during large earthquakes.

Ground Shaking

The Emigration Canyon Township is located near the center of the Intermountain Seismic Belt (ISB), a broad area of seismicity extending from near Las Vegas, Nevada north into Yellowstone National Park and Montana. Within the ISB there are many active faults, including the nearby Wasatch Fault. This very visible fault is capable of generating large-magnitude earthquakes. Earthquake seismic waves radiate outward in all directions from the epicenter, and damaging waves from large earthquakes are capable of traveling long distances. Strong ground motion from earthquakes poses risks to buildings, slopes and retaining structures.

The most effective method of dealing with the ground shaking hazard is to design buildings to withstand the expected ground accelerations. All construction must comply with current Uniform Building Code requirements.

Soil Liquefaction

Soil liquefaction is a seismic hazard associated with the ground shaking that accompanies large earthquakes. Liquefaction occurs when loosely compacted fine-grained ground water saturated

sands and silts are strongly shaken. During liquefaction, sediment particles lose their grain-to-grain contacts and "float" in the groundwater. The liquefied sediments temporarily behave like quicksand. Earthquake induced liquefaction can result in ground failure and loss of soil bearing strength beneath a structure. This can lead to serious structural damage and loss of life should the structure collapse.

The area of the Emigration Canyon Township was not included in the liquefaction special study area map completed for the valley portion of Salt Lake County. However, given the nature of sediments found in the canyons the liquefaction potential in the Emigration Township is typically considered to be very low and no special considerations would be required for residential subdivisions. However, development of special occupancy structures would require that the liquefaction analysis be addressed.

Surface Fault Rupture

Surface fault rupture presents a severe hazard to buildings or other structures (buried utility lines, roads, etc.) placed over active faults. A fault is considered active if it has ruptured the ground surface at least once in the past 10,000 years. The Salt Lake Segment of the Wasatch Fault is considered active, having ruptured the surface in several major earthquakes within the past 10,000 years.

The most effective method of dealing with the hazard from surface fault rupture is simple avoidance. Because fault rupture tends to reoccur along existing fault traces from past earthquakes, structures should be placed a safe distance from the nearest fault to prevent structural damage, possible injury or loss of life.

No active faults have been mapped within the Emigration Canyon Township. The nearest active fault is the Salt Lake segment of the Wasatch Fault, located about 2½ miles west of the mouth of Emigration Canyon.

There is about a 20 percent chance of a large earthquake occurring sometime during the next 50 years along the Wasatch Front, and even more-frequently occurring moderate earthquakes can cause damage.

Goals

General

1. Reduce the risk to life and property from the impacts of natural and development-related geologic hazards.
2. Minimize soil erosion from grading and excavation associated with land-use activities.
3. Reduce the risk to life and property from flooding.
4. Guide compatibility between development and site to better balance geologic hazards, aesthetics, and land use.
5. Ensure that development meets ordinance requirements (such as the Foothills and Canyons Overlay Zone).

Objectives

Geologic Setting

1. Fit development to the existing terrain, to prevent or reduce all adverse impacts in hazardous areas.
2. Ensure that land use activities do not increase the risk from geologic hazards, and ensure that grading and excavation disturbances associated with development do not accelerate erosion.

Topography and Slope Stability

1. Protect life and property by prohibiting development on slopes greater than 30%.
2. Encourage slope stability analyses to be conducted as part of any development review process, including assessment of debris flow hazards, where relevant.

Soil-Related Hazards

1. Restrict development where soil conditions might pose problems to foundations or could impact subsurface water quality.

Hydrology and Flooding

1. Protect life and property from the increased risk of flooding through application of stream setbacks specified in the Foothills and Canyons Overlay Zone, FEMA flood zone requires and careful review of development along streams and at the mouths of drainages.

Wetlands

1. Encourage the identification and protection of wetland areas within the Canyon by requiring an investigation of impacts prior to development near or surrounding water facilities.

Seismic Hazards

1. Prevent loss of life and property associated with the seismic hazards in the region by designing buildings in compliance with current Uniform Building Code Seismic Zone 3 requirements.

SEE BEDROCK MAP

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SEE SLOPE MAP

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SEE SOILS MAP

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SEE HYDROLOGY MAP

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