GEOLOGIC HAZARDS OF CEDAR VALLEY, IRON COUNTY, UTAH

by Tyler R. Knudsen

SPECIAL STUDY 177
UTAH GEOLOGICAL SURVEY
UTAH DEPARTMENT OF NATURAL RESOURCES
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Cover Photo: *Despite mitigation efforts (black and yellow geosynthetic materials), a landslide threatens a home in the Cedar Highlands subdivision near Cedar City. Photo taken June 24, 2010.*

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Mapping available at https://maps.geology.utah.gov/hazards.

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SUMMARY

Cedar Valley in eastern Iron County, Utah, has experienced substantial population growth since the 1990s. Continued growth is expected for the foreseeable future. As urbanization expands into areas less suited for development, geologic hazards become increasingly important in the planning, design, and construction of new facilities and infrastructure. To provide local administrators, geotechnical consultants, and the public with necessary geologic-hazard information for future development, the Utah Geological Survey (UGS) used available geologic, geologic-hazard, hydrologic, soil, and geotechnical information to identify where geologic hazards may exist. This mapping also indicates where site-specific geotechnical/geologic-hazard investigations are necessary to protect health, welfare, and safety in the Cedar City, Cedar City NW, Enoch, and Kanarraville 7.5-minute quadrangles, which cover most of Cedar Valley. This mapping can be viewed on the Utah Geologic Hazards Portal (https://maps.geology.utah.gov/hazards) and is included as an ArcGIS geodatabase with this report. Collapsible soil (soil prone to collapse when saturated) and flooding have been the costliest geologic hazards affecting Cedar Valley. Earth fissures (ground cracks), which are related to groundwater-level decline in the Cedar Valley aquifer, have impacted new development in Enoch City and will be of growing concern until groundwater levels in the Cedar Valley aquifer are stabilized. Radon gas is a hazard in the study area. Geologically sourced radon gas is the primary source of indoor radon accumulation and has led to thousands of deaths in Utah, making it the most lethal geologic hazard in the state (Lund et al., 2020). Additional mapped hazards include landslide, rockfall, expansive soil and rock, corrosive soil and rock, soluble soil and rock, piping and erosion, shallow bedrock, shallow groundwater, liquefaction, and wind-blown sand.

SCOPE AND LIMITATIONS

The Utah Geologic Hazards Portal (https://maps.geology.utah.gov/hazards) provides comprehensive geologic hazard information and data from the UGS and other sources. Geologic-hazard mapping is a multidisciplinary, dynamic process that uses a variety of available data to create an integrated product intended for multiple uses. UGS geologic-hazard mapping incorporates data and methods from a variety of scientific disciplines, including geology, engineering geology, geotechnical engineering, geomorphology, imagery analysis, GIS analyses, and geologic reconnaissance and field mapping. Geologic-hazard mapping is designed as an aid for general planning to indicate where detailed, site-specific geotechnical/geologic-hazard investigations are recommended. The maps should not be enlarged for use at scales greater than 1:24,000. Summary reports generated by the report generator tool in the Geologic Hazards Portal are not a substitute for site-specific geologic hazards and geotechnical engineering investigations conducted by qualified, Utah-licensed Professional Geologists and Professional Engineers. Due to map scale and limited geotechnical data, the special-study area boundaries shown on the maps are considered approximate and subject to change as additional information becomes available. Furthermore, small, unrecognized areas of hazard may exist in the study area, but their identification was precluded by limitations of data availability or map scale.

UGS Circular 128 (Bowman and Lund, 2020) provides recommendations for appropriate, minimum investigation techniques, standards, and report content for surface-fault rupture, landslide, debris flow, geologic radon, and rockfall hazards. Bowman and Lund (2020) also suggest an approach to implementing geologic-hazard ordinances in Utah that can be used at the municipality or county level.

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Bowman, S.D., and Lund, W.R., editors, 2020, Guidelines for investigating geologic hazards and preparing engineering-geology reports, with a suggested approach to geologic-hazard ordinances in Utah, second edition: Utah Geological Survey Circular 128, 170 p., 5 appendices, https://doi.org/10.34191/C-128.

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