UTAH GEOLOGICAL SURVEY
a division of
Utah Department of Natural Resources

PLATE 3

FLOOD-HAZARD MAP FOR THE ST. GEORGE–HURRICANE METROPOLITAN AREA

by

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TRUE NORTH / MAGNETIC NORTH 14°
Approximate mean declination, 2007

UTAH
Map Location

Basemap consists of National Agricultural Imagery Program natural color aerial photography.

Universal Transverse Mercator Projection, zone 12.
North American Datum 1983.

Scale 1:24,000

1 0.5 0 1 2 Miles

1 0.5 0 1 2 Kilometers

SYMBOLS

- Municipality boundary
- Interstate Highway
- State Highway
- Major local surface street
- Other road

EXPLANATION

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) ZONES

AE — Zone AE: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Flood event determined by detailed methods. Mandatory flood insurance purchase requirements and flood-plain management standards apply.

A — Zone A: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Flood event generally determined using approximate methodologies. Mandatory flood insurance purchase requirements and flood-plain management standards apply.

AO — Zone AO: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes.

0.2-percent-annual-chance (or 500-year) flood plain

EROSION HAZARD ZONES

Erosion-hazard zones: these zones are independent of FIRMs 100-year flood zones, and are intended to prevent damage from erosion during flooding, "whether or not the property is located in a FIRMs 100-year flood zone" (CH2MHILL, 1997). Erosion-hazard zones were delineated by JE Fuller/Hydrology & Geomorphology, Inc, (2005, 2007a, 2007b) and are based chiefly on a geomorphic analysis of river behavior over time, and are determined through a combination of air photo interpretation, field observations, geology and soils mapping, and consideration of the location and design of structures in active stream channels including bridges, water diversion dams, and channel stabilization structures. Alternating yellow and black bar indicates the erosion-hazard zone study limit.

FLOOD-HAZARD CATEGORIES BASED ON GEOLOGIC DEPOSITS MAPPED BY THE UTAH GEOLOGICAL SURVEY

Hazard Category	Geologic Units[1]	Description	Hazard Type	Comments
Very High (VH)	Qal_1, Qaf_1, Qafy, Qa, Qa/Qafo	Active flood plains and low terraces along perennial streams, and active alluvial fans.	Riverine flood, flash flood, debris flow	Chiefly the Virgin and Santa Clara Rivers, Fort Pearce Wash, and active alluvial fans at the base of the Hurricane Cliffs.
High (H)	Qal_1, Qac, Qaec	Stream channels, flood plains, and low terraces along ephemeral streams.	Flash flood, debris flow	Normally dry streams with comparatively small drainage basins subject to flooding during infrequent cloudburst storms.
Medium (M)	Qap , Qc, Qca, Qat_2	Active pediment surfaces, higher stream terrace surfaces, and sloping depositional surfaces flanking upland areas.	Chiefly sheetflood, possible flash flood and debris flow	Active depositional surfaces on the flanks and at the base of upland areas subject to flooding during infrequent cloudburst storms.
Low (L)	Qae, Qaes, Qea	Valley bottoms receiving active deposition and minor ephemeral drainages.	Sheetflood, minor flash flood	Valley bottoms subject to infrequent flooding from adjacent upland areas during cloudburst storms.

[1]Refer to UGS 1:24,000-scale geologic maps (see SOURCES OF DATA and REFERENCES in accompanying text) for a description of map units.

DISCUSSION

Flooding is the overflow of water onto lands that are normally dry, and is the most prevalent and destructive (on an annual basis) geologic hazard affecting the St. George – Hurricane metropolitan area. Damage from flooding includes inundation of land and property, erosion, deposition of sediment and debris, and the force of the water itself, which can damage property. The high flood hazard in the study area results from the complex interaction of the area's rugged topography and seasonal weather patterns that deliver moisture to southwestern Utah. Three types of floods typically occur in the study area: riverine (stream) floods, flash floods/debris flows, and sheetfloods. All three types of floods are associated with natural climatic fluctuations and may, under certain circumstances, occur in combination with each other. The risk from flooding can be significantly increased by human activities such as placing structures and constrictions in flood plains or erosion-hazard zones, developing urban areas without adequate flood and erosion control, and poor watershed management practices, such as overgrazing or allowing indiscriminate off-road vehicle traffic. Additionally, portions of the study area are subject to inundation in the event of an unintentional release of water from an engineered water-retention or conveyance structure.

For additional information about the flood hazard in the St. George – Hurricane metropolitan area, refer to the Flood-Hazard text document in this report.

USING THIS MAP

The Flood-Hazard Map shows drainages covered by FIRMs, other flood-prone areas identified using geologic data, and erosion-hazard zones along the Virgin and Santa Clara Rivers and Fort Pearce Wash. The map provides a basis for requiring site-specific studies and identifies areas where FIRMs can be consulted to determine the availability of federally subsidized flood insurance. Site-specific studies can resolve uncertainties inherent in generalized hazard mapping and help ensure safety by identifying the need for flood-resistant design. However, because intense cloudburst storms may create a potential for flash floods and possible debris flows, and sheetfloods anywhere in the study area, even locations outside of identified flood-prone areas could be subject to periodic flooding. This map also shows where existing developments lie in flood-prone areas where flood-resistant-design measures should be considered. An evaluation of flood-mitigation measures already in place and their likely effectiveness is beyond the scope of this study.

Through the National Flood Insurance Program (NFIP), FEMA makes federally subsidized flood insurance available to qualified individuals residing in participating communities. Many mortgage lenders require NFIP insurance before loaning money for home purchase or construction within a FIRM 100-year flood zone. Flood insurance rate maps are legal documents that govern the administration of the NFIP. Homeowners who suspect that they live within a FIRM 100-year flood zone, or individuals contemplating purchasing a home within a flood-prone area, should consult the corresponding FIRM directly and strongly consider purchasing NFIP insurance. Individuals who own their homes may elect to purchase NFIP insurance on a voluntary basis.

MAP LIMITATIONS

The Flood-Hazard Map is based on limited geological, geotechnical, and hydrological data; site-specific studies are required to produce more detailed flood-hazard information. The map also depends on the quality of those data, which varies throughout the study area. The mapped boundaries of the flood-hazard categories are approximate and subject to change with additional information. The flood hazard at any particular site may be different than shown because of geological and hydrological variations within a map unit, gradational and approximate map-unit boundaries, and the generalized map scale. Small, localized areas of higher or lower flood hazard may exist within any given hazard area, but their identification is precluded because of limitations of map scale. The map is not intended for use at scales other than the published scale, and is designed for use in general planning to indicate the need for site-specific studies.

HAZARD REDUCTION

Early recognition and avoidance of areas subject to flooding are the most effective means of flood-hazard reduction. However, avoidance may not always be a viable or cost-effective hazard-reduction option, especially for existing developments, and other techniques are available to reduce potential flood damage. These may include, but are not limited to, source-area stabilization, engineered protective structures, flood and debris-flow warning systems, and floodproofing. Some of these techniques can be expensive and their cost versus benefit ratio should be carefully evaluated. With regard to sheetflooding, a properly sized and integrated system of street and storm drains is usually adequate to mitigate this hazard. If hazard-reduction techniques are not implemented, risk may be accepted, but an informed decision is only possible if the flood potential and consequences are clearly understood and disclosed. If the risk is significant but acceptable, the individual houses may be insured, either through NFIP, if eligible, or by a private insurance provider so damaged items covered by insurance can be repaired if flood damage occurs.

Flooding studies are recommended in all hazard categories reported in the adjacent table. The first consideration in stream-flow-flooding- and debris-flow-hazard reduction is proper identification of hazard areas through detailed mapping, and qualitative assessment of the hazard (Giraud, 2004, 2005). The stream-flow-flooding-hazard assessment should determine the active flooding area, the frequency of past events, and the potential inundation and flow depths. A debris-flow-hazard assessment should determine active depositional areas, the frequency and volume of past events, and sediment burial depths. The level of detail for a hazard assessment depends on several factors including the type, nature, and location of the proposed development; the geology and physical characteristics of the drainage basin, channel, and alluvial fan; the history of previous flooding and debris-flow events; the level of risk acceptable to property owners and land-use regulators; and proposed risk-reduction measures.

Where development is proposed in areas identified on the Flood-Hazard Map as having a potential flood hazard, a site-specific study should be performed early in the project design phase. A site-specific investigation can establish whether a flood and/or debris flow hazard is present at a site and provide appropriate design recommendations.