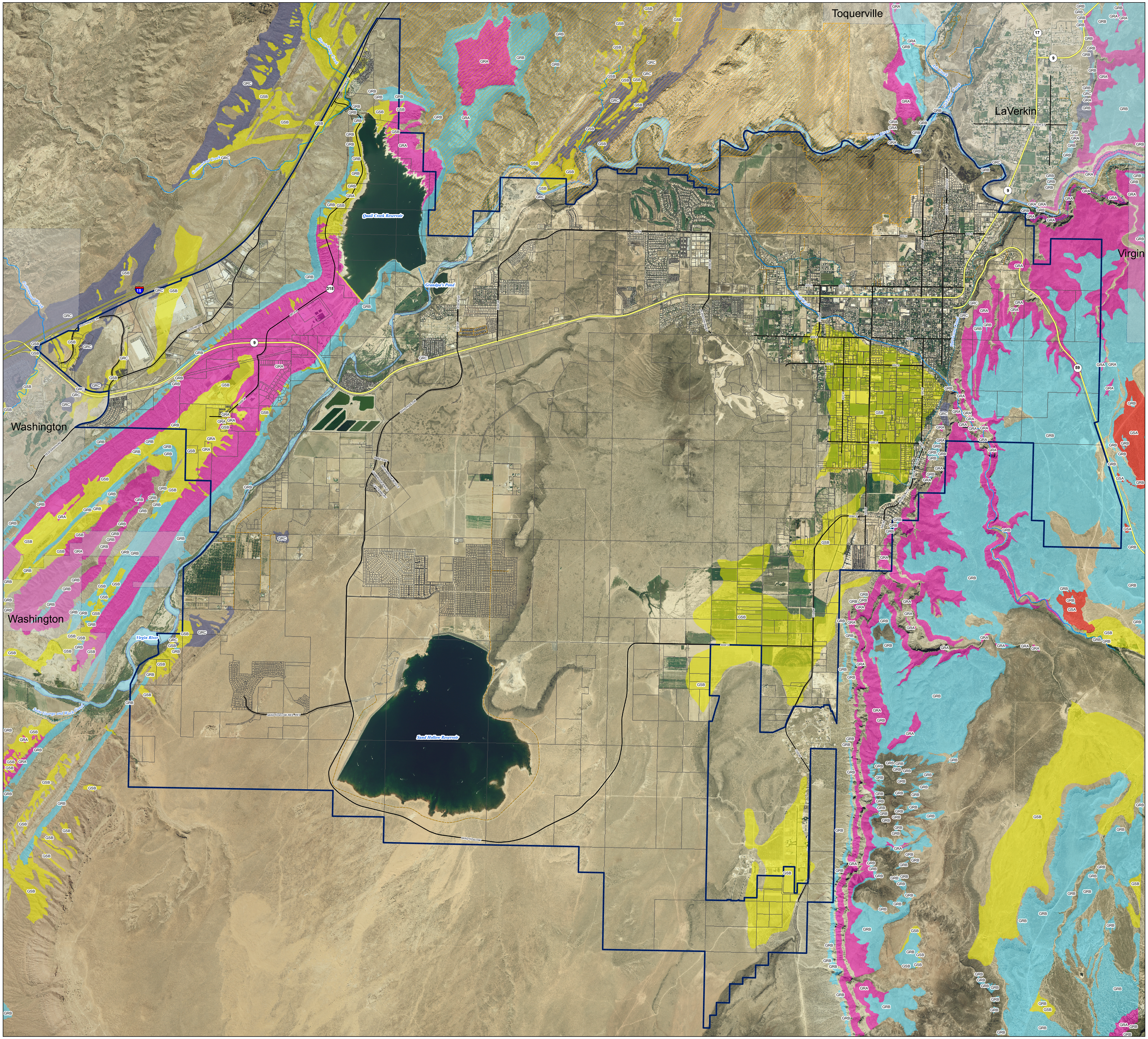
Adverse Construction Condition
Gypsiferous Soil and Rock



Utah Geological Survey Special Study 127
Geologic Hazards and
Adverse Construction Conditions

St. George-Hurricane Metropolitan Area
Washington County, Utah, 2008

City of Hurricane
147 N 870 W
Hurricane, UT 84737
GIS

N

1 inch = 2,000 feet

0 950 1,900 3,800 5,700 7,600 Feet

Projection/Datum: Utah State Plane Zone South (FIPS 4303) NAD83

Publication Date: May, 2009

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Description

Gypsum-bearing soil and rock are subject to dissolution of the gypsum ($CaSO_4 \cdot 2H_2O$), which causes a loss of internal structure and volume. Where the percentage of gypsum is 10 percent or more, dissolution can result in localized land subsidence and sinkhole formation (Mulvey, 1992; Muckel, 2004; Santi, 2005). Dissolution of gypsum may lead to foundation problems and may affect roads, dikes, underground utilities, and other infrastructure. Another common gypsum-related foundation problem is locally termed “water rock,” which is a strongly indurated gypsum and calcium carbonate layer in the shallow subsurface in unconsolidated deposits. The layer commonly forms at the top of the water table and creates a local confining layer. Breaching the layer during construction may result in artesian ground-water flow that can flood excavations and require an extensive drainage system. “Water rock” has been encountered in construction areas east of Middleton Black Ridge and in the vicinity of Dixie State College (David Black; Black, Miller, and Associates, personal communication, 1995, as reported in Higgins and Willis, 1995; Gary Christenson, UGS, verbal communication, 2000). Gypsum dissolution can be greatly accelerated by application of water, such as that provided by reservoirs (figure 4); septic-tank drain fields; street, roof, or parking lot runoff; and irrigation (Martinez and others, 1998). Gypsum is also a weak material with low bearing strength and is not well suited as a foundation material for heavy structures. Additionally, when gypsum weathers it forms dilute sulfuric acid and sulfate, which can react with certain types of cement, corroding and weakening unprotected concrete. Type V sulfate-resistant cement is typically required in such areas.

Using This Map

The Gypsiferous-Soil- and Rock-Susceptibility Map shows the location of known and suspected gypsiferous soil and rock in the St. George–Hurricane metropolitan area. The map is intended for general planning purposes to indicate where gypsiferous soil and rock conditions may exist and special studies may be required. Regarding special studies, the UGS recommends performing a site-specific geotechnical foundation/geologic-hazards study for all development at all locations in the study area. Site-specific studies can resolve uncertainties inherent in generalized mapping and help ensure safety by identifying the need for special foundation designs or mitigation techniques. The presence and severity of gypsiferous soil and rock along with other geologic hazards and adverse construction conditions should be addressed in these investigations. If gypsiferous soil or rock is present at a site, appropriate design recommendations should be provided.

See section 7, "Problem Soil and Rock", "Gypsiferous Soil and Rock", in the full report for more detailed information.

Classification:
For a detailed explanation of the contents of this map, contact the Hurricane Planning Department for a copy of Special Study 127

Gypsiferous Soil and Rock

Gypsiferous Soil and Rock

- GSA - Gypsiferous silt and clay,visible at surface
- GSB - Gypsum-bearing soils, concealed
- GRA - Bedrock units with abundant gypsum
- GRB - Bedrock units with moderate gypsum
- GRC - Bedrock units with gypsum, undifferentiated

Legend

- Hurricane City Limits
- Creek
- Canal
- Major Streets
- Dirt St.
- State Highway
- I-15
- Ramp
- RCDR Babylon Section
- Parcels
- Virgin River

Map Sources:

Parcels, Hurricane GIS Dept. Modified from Washington County GIS data downloaded Feb., 2009.

Streets, Hurricane City GIS Dept. Modified from Washington County GIS data downloaded Feb., 2009.

Aerial, USDA, National Agriculture Imagery Program (NAIP) 2006. Distributed by the Utah AGRC and reprojected to Utah State Plane, South (FIPS 4303), NAD 83 (CONUS), Survey Feet from the original. SID source file.