UTAH GEOLOGICAL SURVEY
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PLATE 12

WIND-BLOWN-SAND-SUSCEPTIBILITY MAP FOR THE ST. GEORGE–HURRICANE METROPOLITAN AREA

by

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14°
MAGNETIC NORTH
TRUE NORTH
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

0.5 0 1 Miles

1 0.5 0 1 Kilometers

SYMBOLS

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

EXPLANATION

WBS_{SI} High: Modern sand-dune or sheet-sand deposits, either active or stabilized by natural vegetation. These active wind-blown deposits or reactivated formerly stabilized deposits are highly susceptible to wind erosion and transport. The moving sand may form deposits that can surround houses and bury fields and transportation corridors.

WBS_{SM} Moderate: Mixed-unit geologic deposits for which wind was the dominant transport mechanism. These units contain a high percentage of size-sorted sand, but also contain up to 30 percent fines incorporated into the deposit due to water or gravity transport. These units are generally stable in their natural state, but may destabilize if disturbed.

WBS_L Low: Mixed-unit geologic deposits which contain a wind-blown component, but for which the wind was not the dominant transport mechanism. Water and/or gravity transport predominate in these deposits, and they may contain in excess of 30 percent fines and thin horizons of fine- to medium-grained gravel. These units are generally stable in their natural state, but may destabilize locally if disturbed by construction. Also included in this category are older (Pleistocene) wind-blown and mixed-unit geologic deposits that have developed thick, indurated calcium carbonate (caliche) horizons over time that help to further stabilize the deposits, but which may become destabilized if disturbed.

Geologic Deposits With a Significant Wind-Blown Sand Component

Type of Deposit	Map Units[1]	Wind-Blown-Sand-Susceptibility Category
Modern Eolian Deposits	Qed, Qes, Qe|Qmsy, Qes/Qaf_y, Qes/Qafo	WBS_{SI}
Young, Dominantly Eolian Mixed Units	Qea, Qea$_y$, Qec	WBS_{SM}
Minor Eolian Mixed Units	Qae, Qaec, Qaeg, Qaeo	WBS_L
Older Eolian or Dominantly Eolian Mixed Units	Qeo, Qeoa, QTeca, Qecl, Qea$_o$, Qea$_p$, Qec/Qb, Qec/Qbcp, Qec/Qbd, Qec/Qbg, Qec/Qbge, Qec/Qbl, Qec/Qbr, Qec/Qbrv, Qec/Qbs$_y$, Qec/Qbs$_p$	WBS_L

[1]Refer to UGS 1:24,000-scale geologic maps (see SOURCES OF DATA and REFERENCES sections in accompanying text) for unit descriptions.

DISCUSSION

Unless stabilized by natural vegetation or by artificial means, loose sand will move in response to high-velocity and long-duration wind. Wind transport winnows the sand, producing a well-sorted deposit that typically consists of subrounded to rounded sand grains with diameters ranging from very fine to coarse sand (0.1 to 1.0 mm). Depending on topography, wind characteristics, and sand availability, blowing sand may accumulate in dunes or sand sheets, both of which may cover large areas. Several sandstone formations crop out extensively within the St. George – Hurricane metropolitan area. The sand released as these formations weather is in effect "fossil" dune sand that has the same size, sorting, and grain-shape characteristics of sand comprising modern sand dunes and sand sheets. If development encroaches into areas with sandy soil formed derived from these formations and disturbs the natural vegetative cover, wind-blown sand may migrate across roads and bury structures. High winds can move fines by both saltation and suspension and can produce sand and dust storms that reduce visibility to near zero and sandblast vehicles and structures. Because wind-blown sand rarely if ever causes rapid, catastrophic property damage or is a threat to life safety, for purposes of this study, wind-blown sand is considered an adverse construction condition and not geologic hazard.

For additional information about wind-blown sand in the St. George – Hurricane metropolitan area, refer to the Problem-Soil-and-Rock text document in this report.

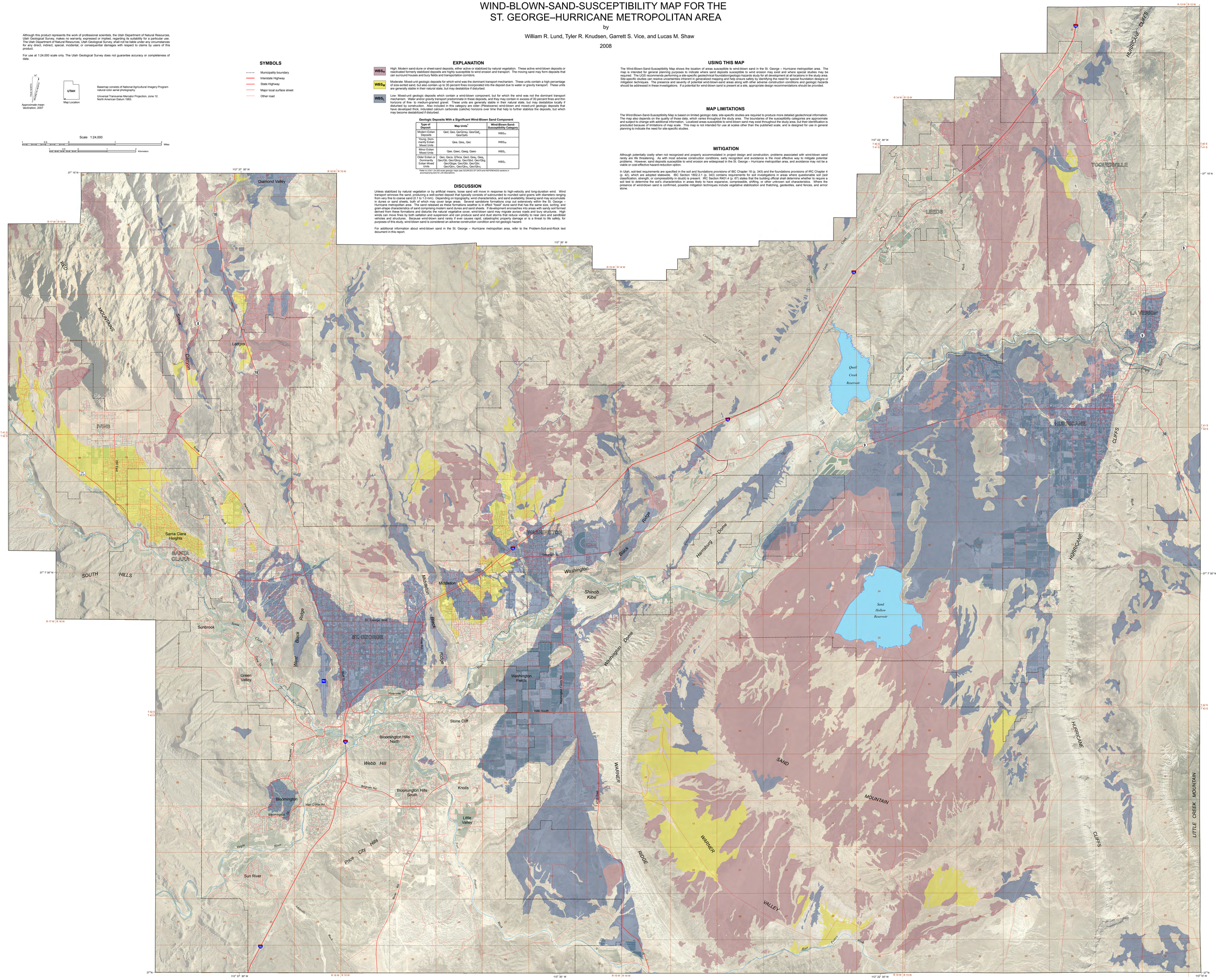
USING THIS MAP

The Wind-Blown-Sand-Susceptibility Map shows the location of areas susceptible to wind-blown sand in the St. George – Hurricane metropolitan area. The map is intended for general planning purposes to indicate where sand deposits susceptible to wind erosion may exist and where special studies may be required. 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 potential wind-blown-sand areas along with other adverse construction conditions and geologic hazards should be addressed in these investigations. If a potential for wind-blown sand is present at a site, appropriate design recommendations should be provided.

MAP LIMITATIONS

The Wind-Blown-Sand-Susceptibility Map is based on limited geologic data; site-specific studies are required to produce more detailed geotechnical information. The map also depends on the quality of those data, which varies throughout the study area. The boundaries of the susceptibility categories are approximate and subject to change with additional information. Localized areas susceptible to wind-blown sand may exist throughout the study area, but their identification is precluded because of limitations of map scale. This 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.

MITIGATION

Although potentially costly when not recognized and properly accommodated in project design and construction, problems associated with wind-blown sand rarely are life threatening. As with most adverse construction conditions, early recognition and avoidance is the most effective way to mitigate potential problems. However, sand deposits susceptible to wind erosion are widespread in the St. George – Hurricane metropolitan area, and avoidance may not be a viable or cost-effective hazard-reduction option.

In Utah, soil-test requirements are specified in the soil and foundations provisions of IBC Chapter 18 (p. 343) and the foundations provisions of IRC Chapter 4 (p. 42), which are adopted statewide. IBC Section 1802.2.1 (p. 343) contains requirements for soil investigations in areas where questionable soil (soil classification, strength, or compressibility in doubt) is present. IRC Section R401.4 (p. 67) states that the building official shall determine whether to require a soil test to determine the soil's characteristics in areas likely to have expansive, compressible, shifting, or other unknown soil characteristics. Where the presence of wind-blown sand is confirmed, possible mitigation techniques include vegetative stabilization and thatching, geotextiles, sand fences, and armor stone.