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Engineering geological and geotechnical mapping undertaken by Council for Geoscience for regional land-use planning in South Africa

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The provision of housing for growing communities in South Africa remains a top priority for the South African Government. Rapid urbanization escalates demand for best suitable land for development in close proximity to urban centers. As a result, the identification of geologically and geotechnically suitable land in terms of cost effectiveness, environmental sustainability and risk free is one of the key issues in which the Council for Geoscience (CGS) plays a major and pivotal role.

CGS adopted a geotechnical classification system which was developed by Zawada [2]. It is based on the land facet approach which is a sub part of a land system approach whereby an assumption is made that an area of terrain with the same host lithology and land form will provide similar soil profiles and therefore similar geotechnical properties [1]. The system consists of a total of 13 geotechnical factors (Table 1), which are identified and evaluated in terms of their severity. It is designed to produce engineering geological maps delineating the distribution and severity of key geotechnical parameters.

Table 1: Ranking of Geotechnical Factors, and Classification into Critical or Subcritical Factors.

Rank	Mapped geotechnical factor
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Status
1
2
3
4
5
6

1
2
3
4
5
6
7

Inundation (flooding)

Sinkhole formation

Slope instability

Active, expansive or swelling soil

Excavatibility of ground

Collapsing or settling of soil

Inundation (flooding)
Sinkhole formation
Slope instability
Active, expansive or swelling soil
Excavatibility of ground
Collapsing or settling of soil
Subsidence

Critical factors

8

9

10

11

12

8
9
10
11
12
13

Erodible soil

Dispersive soil

Acidic soil

Poorly consolidated soil

Shallow water table

Erodible soil
Dispersive soil
Acidic soil
Poorly consolidated soil
Shallow water table
Permeability of soil

Subcritical factors

Financial costs and environmental implication are two major factors that are considered when planning the development of an area. Thus, these 13 geotechnical factors are further classified into financial costs and environmental implications.

An overview of the methodology, compilation of map and explanation, completed and in-progress 1:50 000 scale map sheets is presented. Modifications to make the classification system or map legend to be more user-friendly and simple to read are suggested.

References:

- [1] STIFF, J.S. (1994). Terrain Evaluation for Urban Development. Proceedings of 4th Terrain Evaluation and Data Storage Symposium, 3-5 August 1994, Midrand, South Africa
- [2] ZAWADA. P.K. (2003). SADC Working Group on Engineering Geological Mapping: status report April 2002–March 2003. 2003-0121

