

**The implementation of a geo-environmental decision support  
System for development on dolomite**

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## **Abstract**

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Due to the inherent hazardous characteristics associated with dolomite and development on dolomite, quantification of the stability attributes related to dolomite is essential. In large parts of South Africa, development on dolomite is inevitable due to the location thereof. The purpose of this study is to define an implementation framework for decision-making with regards to development on dolomite.

The decision-making process is based on a dolomite stability investigation conducted by AGES North West (AGES, 2012) within Sarafina, Ikageng. The results from this study are interpreted by means of a decision support system that is based on the geo-environmental setting of the study area and the geotechnical properties related to the subsurface profile. This includes but is not limited to:

Geo-environmental site conditions:

- Drainage
- Topography
- Geophysical conditions
- Regional geological conditions
- Local geological conditions
- Regional groundwater conditions
- Local groundwater conditions

Geotechnical stability of the dolomite based on the hazard characterisation and evaluation procedures:

- Percussion drilling data
- Receptacle development
- Mobilisation agencies
- Potential surface manifestation development space
- Nature and mobilisation potential of the blanketing layer
- The bedrock morphology

These parameters are all inter-related and affect each other in various ways. During the study the importance of site specific observations and interpretations are emphasized.

**Key Words**

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Dolomite; Decision Support System; Dolomite Stability Investigation; Hazard Characterization; Dolomite Risk Management; Geo-environment.

## **Opsomming**

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Weens die inherente gevaarlike en skadelike eienskappe wat geassosieer word met dolomiet en ontwikkeling op dolomiet, is kwantifisering van die stabiliteits-eienskappe wat daarmee gepaardgaan noodsaaklik. In groot dele van Suid-Afrika is ontwikkeling op dolomiet onvermydelik weens die voorkoms daarvan. Die doel van hierdie studie is om 'n implementeringsraamwerk vir besluitneming met betrekking tot ontwikkeling op dolomiet te definieer.

Die besluitnemings proses is gebaseer op 'n dolomiet stabiliteits ondersoek wat uitgevoer is deur AGES Noordwes (AGES, 2012) te Sarafina, Ikageng, Noordwes Provinsie. Die resultate van hierdie studie is geïnterpreteer deur middel van 'n besluitnemings ondersteuning stelsel (decision support system) wat gebaseer is op die geo-omgewings agtergrond van die studie area en die geotegniese eienskappe wat verband hou met die ondergrondse geologiese profiel. Dit sluit die volgende in, maar is nie beperk daartoe nie:

Geo-omgewings eienskappe van die terrein:

- Dreinerings
- Topografie
- Geofisiese eienskappe
- Regionale geologiese toestande
- Plaaslike geologiese toestande
- Regionale grondwater eienskappe
- Plaaslike grondwater eienskappe

Geotegniese stabiliteit van die dolomiet, gebaseer op die risiko karakterisering (hazard characterisation) en evaluering:

- Lugdruk boor data
- Holte vorming
- Mobiliserings entiteite
- Potensiële oppervlak ontwikkeling grootte van versakking
- Aard en mobiliseringspotensiaal van die materiaal in die deklaag
- Die rotsbodem morfologie

Hierdie parameters is almal onderling verbind en beïnvloed mekaar op verskillende maniere. Tydens die studie is die belangrikheid van die spesifieke terrein waarnemings en interpretasies beklemtoon.

### **Sleutel Woorde**

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Dolomiet; Besluitnemings Ondersteunings Sisteem; Dolomiet Stabiliteits Onderzoek; Dolomiet Risiko Bestuur; Geo-omgewing.

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## List of Acronyms

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Acronym	Definition
CGS	Council for Geoscience
DRMS	Dolomite Risk Management Strategy
DSI	Dolomite Stability Investigation
DSS	Decision Support System
EDSS	Environmental Decision Support System
kPa	Kilo Pascal
Gwld	Ground water level drawdown
m	Meter
Ma	Mega Annum – Million years
Mamsl	Mean annual meters above sea level
Mbgl	Meters below ground level
OWL	Original Water Level

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