Dolomite Guideline

A short guide to available documents on procedures for developing dolomitic land

public works

Department:
Public Works
REPUBLIC OF SOUTH AFRICA

water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Council for Geoscience

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Section 1:
INTRODUCTION

This booklet aims to give a short and clear summary of the available guideline documents dealing with development on karst dolomite land in South Africa. "Karst" refers to the typical landforms and processes in areas that are underlain by dolomite (calcium/magnesium carbonate) rock. These rocks can dissolve in the presence of water combined with carbon dioxide. This is a slow process that happens naturally as part of the weathering process. If the solution process has been carrying on for many millions of years, landforms, erosion features and subsurface solution cavities and cave systems form a special environment that is referred to as karst. In some places large openings can form underground as dolomite rock weathers and dissolves. If the ground collapses down into the opening, a sinkhole is formed. Sinkholes vary in size from a few centimetres deep to many metres. Sinkholes are a serious concern for the planning of roads, buildings and other infrastructure, and special water precautionary and construction techniques such as underground concrete pillars or "piles" sometimes have to be used in these areas (this can be seen where the Gautrain route crosses the dolomite near Centurion in Gauteng). In South Africa the dolomite bedrock areas are typical karst environments. These are not the only karst areas in South Africa, but are the most important due to the history of sinkholes and surface subsidence occurring in the densely populated Gauteng Province as well as areas surrounding the West Rand Gold mining area.

Large sinkhole in the dolomite rocks near Krugersdorp.

The Department of Water Affairs has developed a detailed guideline for the Assessment, Planning and Management of groundwater in those parts of South Africa underlain by dolomite rocks. The Council for Geoscience and the Department of Public Works have also produced documents on dolomite areas, but focusing more on the development of dolomitic land for residential and other purposes. These documents acknowledge that groundwater management is an important part of reducing the risk of ground instability in these areas.

This booklet is intended as a short and non-technical summary or guideline that describes the role of each of these documents to municipal officials, developers and interested members of the public. The development of this booklet is part of the Department of Water

Affairs' Dolomite Project (P14/14/5/2/2). It has been developed jointly by Water Geosciences Consulting, the University of Pretoria, the Department of Water Affairs, the Department of Public Works, and the Council for Geoscience. A series of detailed maps covering the dolomite groundwater compartments will shortly be available from the Department of Water Affairs

DEFINING DOLOMITE

The mineral

Dolomite is a single mineral consisting of the chemical combination of calcium and magnesium carbonate ($CaMg(CO_3)_2$).

Dolomite the mineral (left) and the rock (right)

The rock

In South Africa the word 'Dolomite', where it denotes the rock type, has substituted the word 'Dolomitic Limestone'. Dolomitic Limestone, as a natural rock, consists of the mineral dolomite ($CaMg(CO_3)_2$) mixed with calcite (calcium carbonate, $CaCO_3$) and magnesite (magnesium carbonate, $MgCO_3$). Portions of the rock may be richer or poorer in either of the latter minerals. Dolomite is a sedimentary rock type. The dolomite rock in the Gauteng area formed around 300 million years ago.

Distribution of dolomitic land in South Africa

About a fifth of the densely populated areas in Gauteng Province, some parts of the North West Province, and most of the gold-mining districts in the Far West Rand are underlain by dolomite.

In Gauteng, the dolomite formations comprise the Malmani Subgroup of the Chuniespoort Group of the Transvaal Supergroup, which is 2700 million years old. The Subgroup is subdivided into various formations of which some are chert-poor and some are chert-rich. The dolomitic formations are, in places, overlain by a relatively thin cover of younger rocks of the Pretoria Group, Transvaal Supergroup, and/or the Karoo Supergroup, and/or mantled by unconsolidated material of Cenozoic age (60 million years old).

WHY DOLOMITE IS PROBLEMATIC WITH REGARDS TO DEVELOPMENT

Rain water (H_2O) takes up carbon dioxide (CO_2) in the atmosphere and soil to form a weak carbonic acid (H_2CO_3). The weakly-acidic groundwater circulating along tension fractures, faults and joints in the dolomitic succession causes leaching of the carbonate

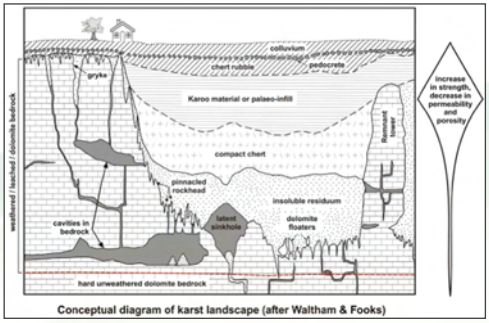
minerals. The carbonates are removed in the form of bicarbonates by groundwater. This leaching is most pronounced in the first few tens of metres within bedrock or below the water table. This has resulted in a vertically zoned succession of residual products, which in turn are generally overlain by geologically younger formations and soils. This vertical succession and particularly the lateral variation thereof, is the key to understanding the prevailing stability, or instability, of sites in dolomitic areas.

Hard competent dolomitic bedrock is succeeded vertically by slightly leached jointed bedrock and thereafter, through a sudden, dramatic transition, to totally leached, and incompetent, insoluble residual material consisting of mainly manganese oxides, chert and iron oxides that reflect the original insoluble matrix structure.

Depending upon the local subsurface structure this very incompetent, porous and permeable horizon may in certain locations be up to several tens of metres thick but is generally less than ten metres thick.

With the passage of geological time, concurrently with the downward progression of the intense leaching of the dolomitic bedrock, compaction by the mass of the overlying materials has resulted in a progressive densification of these incompetent materials. Ultimately, subsurface fluids may have cemented these older materials to form dense compacted horizons.

Consequently, the vertical succession of the residual products of leaching reflects an upward increase in competency and a decrease in porosity and permeability. This process results in an inverse succession of overburden quality with depth as depicted in the diagram below:



Conceptual diagram of karst landscape (after Waltham & Fooks)

Given sufficient time and the correct triggering mechanisms, instability may occur naturally but it can be greatly increased by human activities. The primary triggering mechanisms in such instances include the ingress of water from leaking water-bearing services, poorly managed surface water drainage and groundwater level drawdown.

Topography and drainage, the natural thickness and origin of the transported soils and residuum, the nature and topography of the underlying strata, the depth and expected fluctuations of the water table, and the presence of structural features such as faults, fractures and dykes are all factors which influence the risk of subsidence taking place.

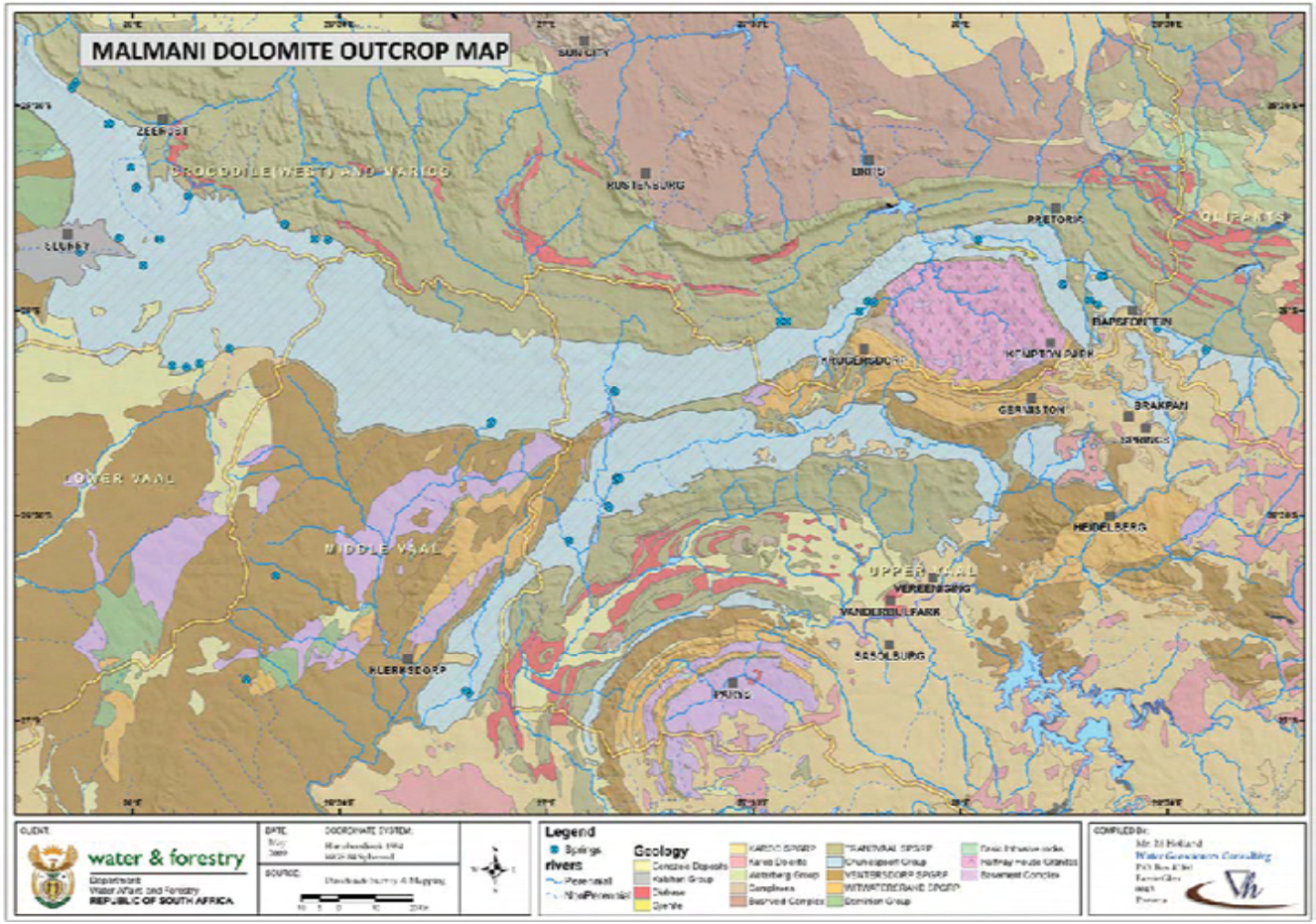
Dolines, or compaction subsidences, are fairly shallow, enclosed depressions. These are mainly, but not exclusively, associated with the action of artificial lowering of the groundwater level (dewatering). The periphery of the doline is characterised by the presence of tension cracks within a zone of shear.

Introduction to groundwater in dolomites, and role of groundwater in ground instability

Dolomite rocks make up some of South Africa's best aquifers. This is because they often support boreholes and springs which yield a lot of good-quality groundwater. There are frequently large fissures and openings in the rock, through which lots of groundwater can move quickly. These openings are caused by groundwater naturally dissolving away the dolomite rock, which usually happens very slowly. This is also the reason that caves (for example the Sudwala Caves) are often found in dolomites.

Doline in Laudium, Pretoria

Although sinkholes and dolines can form naturally, some human activities may increase the risk of these events occurring. For example, water leaks at the surface (from a broken pipe for instance) can erode the soil cover into cavities in the dolomite bedrock which can then result in a sinkhole appearing on surface. Excessive pumping of groundwater lowers the underground water level (water table), which can also raise the risk of sinkholes and ground instability. Allowing the water table to fluctuate (move up and down) outside of its natural range also leads to more rock being dissolved, and can increase the risk of sinkholes. The maintenance of the original groundwater conditions within an aquifer can therefore be critical to dolomite stability. For these reasons, groundwater management in dolomite areas which are prone to sinkhole risk is important. It is not just a case of managing the water resource for its own sake – groundwater management decisions can affect the stability of the ground and the safety of buildings as well.



Map of the Malmani Dolomite outcrop

What is dolomitic land?
Dolomitic land is land that is underlain by dolomite rocks, which can become weathered or "karstified". See the introductory section of this booklet for more information.

Why is the Department of Water Affairs (DWA) involved with a booklet about building on dolomitic land?
The stability of dolomitic land can depend partly on the groundwater conditions beneath the land surface. DWA is the government department concerned with managing South Africa's water resources, and provides information to developers and others on groundwater conditions.

Sinkhole in dolomite

What's so special about building on dolomitic land?
Dolomitic land can be unstable, and may even be dangerous. Specialist building techniques may be necessary, and certain types of development may not be safe. See the introductory section of this booklet for more information.

Who controls development on dolomitic land?
Various organisations have a role in controlling development on dolomitic land, and permission from more than one may well be necessary before development can begin.

Why are there so many documents relating to development on dolomitic land?
Several organisations, including the Council for Geoscience, the National Home Buidlers Registration Council, the Department of Public Works and others have an interest in development on dolomitic land. Some of these organisations are legally obliged to be involved with new development on dolomitic land. Over the years a number of documents have been published which deal with such developments.

What is the Council for Geoscience (CGS)?
The CGS is South Africa's premier geoscience organisation, and is legally mandated to develop and publish geoscience knowledge products and to render geoscience related services to the South African public and industry.

For more information see their website at:
http://www.geoscience.org.za/

Who are the National Home Builders Registration Council (NHBRC)?

The NHBRC is a statutory council which aims to protect and provide assistance to housing consumers, provide assistance to home builders and to Provincial housing Departments and Local Authorities, to educate home builders, and other housing related matters.

For more information see their website at:

http://www.nhbrc.org.za/about/about.asp

Does SABS have standards for development on dolomitic land?

The South African Bureau of Standards (SABS) is the organisation responsible for the development and publication of standards for goods and services in South Africa. SABS is due to release a document (known as SANS 1936) in the next few months that will cover development on dolomitic land. It is important that this document is consulted by anyone interested in the technical issues relating to development on land underlain by dolomite rocks.

Section 3:

A GUIDELINE FOR THE ASSESSMENT, PLANNING AND MANAGEMENT OF GROUNDWATER RESOURCES WITHIN DOLOMITIC AREAS IN SOUTH AFRICA: Department of Water Affairs (2006)

The Department of Water Affairs (DWA) have published a guide for managing groundwater in dolomitic areas. The guide is called "A Guideline for the Assessment, Planning and Management of Groundwater Resources within Dolomitic Areas in South Africa". It was published in August 2006, and can be downloaded free from the internet at: http://www.dwaf.gov.za/Documents/Other/Water%20Resources/DolomiteGuideAug06.asp

What it's about

The DWA Guideline is divided into three sections. The first section gives an overview of the Guideline, describes some of the main principles of modern groundwater management in South Africa, and describes the main environmental laws. This section also outlines the main areas of dolomite aquifer in South Africa.

The second section goes into more detail about managing dolomite groundwater. The different role players (e.g. water boards, hydrogeologists and water managers) and institutions are described. The three main steps leading to good groundwater management are outlined.

These are:

- Assessment – this means a process of gathering information on the groundwater. How much is there? What is its quality? How much can boreholes yield? By the end of this stage, the water planner will have a good "conceptual model" of how the groundwater exists and what it does.
- Planning – once information about the groundwater has been gathered, the groundwater resource can be matched with water requirements. The planner will take into account the limitations and characteristics of the aquifers which have been deduced from the assessment stage. The water resource planner now has a much clearer idea of his or her options.
- Management – groundwater needs to be used "sustainably" – which means that the water use should match the ability of the resource to deliver a consistent supply without harming other users or causing ground instability problems. Typically, a strategy and a management plan are needed. These take into account what is known about the resource and also the demand.

The components of successful aquifer management

Management decisions often require more data, and for this reason further assessment can be required. Assessment, planning and management should therefore be seen as an interlinked process, in which each step depends on but also informs the previous step.

These three steps can also be implemented at different scales – for example, national level groundwater assessment might be quite general and broad, but a local scale assessment would need to go into a lot more detail.

The final section of the DWA Guideline gives a series of step-by-step procedures for carrying out assessment, planning and management. This section includes checklists, forms and other material which is useful to the water planner.

Who it's for?

The DWA Guideline is aimed at water planners, managers and service providers. It will also be of interest to engineers, hydrologists and hydrogeologists who are involved with water supplies, as well as planners involved with building developments on dolomite who are concerned about the influence of groundwater on land stability.

How to use it?

The Guideline is around 300 pages long, but luckily there is no need to read it from beginning to end! The user can open it at the section needed for the specific information required. Different users may need different types of information from the Guide. The first section of the Guideline contains an executive summary and outlines the contents, and should be referred to first.

Further information:

Information about the Guideline and about DWA's groundwater policies can be found at:
http://www.dwaf.gov.za/groundwater/default.asp

DWA also operates a toll-free call centre (0800 200 200).

A second Guideline, based on the dolomite guideline but covering all aquifers (not just dolomite) was published in March 2008. This is called "A Guideline for the Assessment, Planning and Management of Groundwater Resources in South Africa".

It can be downloaded at:

http://www.dwaf.gov.za/Documents/Other/Water%20Resources/GroundwaterPlanGuideMar08.asp

Section 4:

GUIDELINE FOR ENGINEERING GEOLOGICAL CHARACTERISATION AND DEVELOPMENT OF DOLOMITIC LAND:

Council for Geoscience and the South African Institute of Engineering and Environmental Geologists (2003)

This pocket-sized yellow booklet was developed by the South African Institute of Engineering and Environmental Geologists and the Council for Geoscience, and was published in 2003 by the Council for Geoscience (CGS). The Geotechnical Division of the South African Institution of Civil Engineers has also endorsed this booklet. It forms part of the CGS' mandate to provide geoscientific knowledge and information to the State and to the public.

The booklet is a guide to the engineering geological characterisation of dolomite with appropriate types of residential development on different risk zones. It provides guidelines and information for all those involved with such developments. The booklet is short (less than 70 pages) and concise.

What it's about?

The guideline begins with an introduction to development on dolomitic land, and an overview of dolomite occurrence in South Africa. The reasons for ground instability are explained, and important features such as sinkholes and dolines are described. The guideline then describes the legal procedures which must be followed in order to develop dolomitic land for residential use.

These include registration and enrolment with the National Home Builder's Registration Council (NHBRC), and the steps which must be followed before work can start (including the submission of a competent person's report to the CGS for review). Site investigation and characterisation procedures are then discussed, starting with an assessment of existing data, and continuing into methods such as geophysical surveys and exploratory drilling. These methods lead on to the characterisation of the site, after which the most appropriate development type can be selected. A discussion of risk and risk zonation then follows, together with recommended principles for development.

Appropriate foundation designs, and the implementation of precautionary measures such as the prevention of water infiltration, either natural or from leaking services is summarised.

The final section is a more detailed summary and discussion of risk management strategies, including the development of a risk management plan. Maintenance of infrastructure and the monitoring of the ground surface movements and groundwater depth and fluctuations are important parts of a risk management strategy.

The booklet ends with a reference list, and appendices outlining Precautionary Measures, a Risk Classification system with appropriate development types for each Risk Class, and Minimum Reporting Requirements for dolomite investigations.

Who's it for?

The guideline is designed to be used by anyone who is involved with residential development on dolomitic land, such as builders, property developers, municipal officials and ground sta-

bility experts. It will also be useful to those concerned with other types of development on dolomites (such as industrial or agricultural developments), since many of the principles are transferable. The part on stability investigations and risk characterisation is specifically aimed at the engineering geologist or geotechnical engineer who will execute a site investigation on dolomitic land for residential development.

How to use it?

The guideline can be read through easily, and provides basic information on many issues that are relevant to dolomite developments. The guideline is not intended as a substitute for expert advice (for example from a ground stability expert), but it does provide an outline of what steps are required, and in what order. In summary, the guideline describes:

- the geological nature of dolomite rock in South Africa,
- the process of sinkhole formation and their size classification
- the NHBRC enrolment process
- the necessary requirements for typical dolomite stability investigations
- risk assessment
- the selection of appropriate development types
- suitable foundation types appropriate to the expected sinkhole size in order to prevent loss of support
- the importance of preparing well thought out, tailor made risk management

Further information

The guideline can be purchased from the Council for Geoscience in Pretoria, either in person at their head office in Silverton, Pretoria, or by contacting Mrs Thelma Swart at:
The Publications Shop,
Council for Geoscience,
Private Bag X112,
Pretoria 0001,
Republic of South Africa

thelmas@geoscience.org.za

Tel: (012) 841 1911
The ISBN number is 919908-45-5, and the cost is R 90.00

The National Home Builder's Registration Council (NHBRC) website is at http://www.nhbrc.org/

The Council for Geoscience is at http://www.geoscience.org.za/

Section 5:

CONSULTANTS GUIDE: APPROACH TO SITES ON DOLOMITE LAND: Council for Geoscience (2007)

The Council for Geoscience (CGS) recently produced their guidelines for consultants entitled "Approach to sites on dolomite land, November 2007". These guidelines are to be read in conjunction with the "Guideline for engineering geological characterisation and development of dolomite land" produced in conjunction with the South African Institute of Engineering Geologists (SAIEG) in 2003.

The more recent document does not replace the earlier one rather it adds to it and provides functional information on how the CGS entertains submissions made to it in terms of local and provincial authorities and NHBRC requirements.

Ever increasing demands for more intense use of dolomitic land, which unfortunately is susceptible to sinkhole formation, results in more people inhabiting and infrastructure being erected on such land. The purpose of these guidelines from the CGS is to provide a standard for

a) dolomite stability risk investigations and assessment and
b) recognition of appropriate development of this type of risk surface.

What it's about

The CGS Guideline is divided into a number of sections:

» The initial sections give a brief overview of legal responsibilities and obligations for practicioners, local authorities and the role of the CGS in development on land underlain by dolomite.
» The middle chapters cover minimum investigative and reporting requirements for dolomite stability investigations.
» The later chapters cover appropriate development types including development densities and specific matters relating to types of development. The information service provided by the Council's Dolomite Databank which supplies positions of existing boreholes and reports is also described.
» Also described is the process of enrolment with the National Homebuilders Registration Council (NHBRC) who require that the CGS review the proposed development and co-sign their B4 form.

Who it's for

The CGS Guideline is aimed at engineering geologists, geotechnical engineers, planners, municipal authorities, etc.

As this is a developing science new techniques and approaches are continually developing and this latest guideline attempts to provide the latest approaches to these matters.

How to use it

The 2007 Guideline is around 32 pages long, is a handy guide, and also available in digital form from the CGS. Different users may need different types of information from the Guide such as the recommended number of drill holes per hectare for an investigation or the development densities.

Further information

The contact details of the Council for Geoscience's Dolomite Stability Unit are:

Greg Heath (Manager, Dolomite Stability)
Tel: 012 841 1165 Fax: 012 841 1148
Email: gheath@geoscience.org.za
Tharina Oosthuizen
Tel: 012 841 1160
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Judith Grobler (Administrator)
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Important Note

Both the 2004 Guideline for engineering-geological characterisation and the 2007 Consultants guide will more than likely be surpassed by proposed guidelines of the South African Bureau of Standards (SABS) during mid 2009.

These standards will be known as:

- **SANS 10400-B:** The Application of the National Building Regulations, Structural Design
- **SANS 1936 -1:** General Principles and Requirements
- **SANS 1936-2:** Geotechnical Investigations and Determinations
- **SANS 1936-3:** Design and construction of buildings, structures and infrastructure
- **SANS 1936-4:** Risk Management
- **SANS 633:** Profiling, percussion borehole and core logging in Southern Africa
- **SANS 644:** Geotechnical investigations for township development
- **SANS 2001:** Part BE3 Construction works: repair of

Section 6:

THE DEPARTMENT OF PUBLIC WORKS GUIDELINE (2004): Department of Public Works

The Department of Public Works (DPW) has published a consultant's guide for the appropriate development of infrastructure on dolomite. This guideline document was published in August 2004 and can be downloaded free from the internet at:
http://www.publicworks.gov.za

What it's about

The DPW Guideline is a document informing principle agents and other consultants of the minimum requirements set by the Department when services and infrastructure are upgraded, extended, or where new development takes place on dolomite. The aim is to ensure that development of infrastructure on dolomite is executed in a safe and sustainable manner.

The first section gives a brief overview of the situation encountered on land underlain by dolomite bedrock. The distribution of dolomite land, negative consequences of inappropriate development and general risk classes are covered.

The following sections cover the requirements of the DPW for development of sites on dolomite including the dolomite risk assessment procedure and site selection with emphasis on the geotechnical investigation procedures and general approach when designing infrastructure on dolomite land.

The document covers the following in detail:

- Risk assessment – this process involves the gathering of data during a desk study, field investigations and risk zonation into the appropriate risk classes, as prescribed by the Council For Geoscience and South African Institute of Engineering Geologists (2003).
- Water precautionary measures – the water precautionary measures are listed as minimum standards for each of the risk classes, including low risk, medium risk and high risk areas. The typical infrastructure addressed are stormwater, sewer, foundations, swimming pools, subsurface wet services, roads, plumbing, surface drainage and boreholes for water abstraction.
- Documentation – examples of tender documents, with specifications and general conditions of contract and schedule of quantities are included.

The guideline document is well illustrated with maps and plates depicting the occurrence of dolomite and different types of sinkholes and also contains a number of appendices with details on the dolomite stability investigation procedures, scope of work for the engineering site investigation and the typical site layout plans required.

Particular specifications for compaction, blasting, sinkhole repair, exploratory drilling, subsurface grouting and demolishing of structures are listed.

This document also serves as to guide the DPW in the awarding of tenders to contractors with tables on previous experience and available plant that should be included in the tender documents. A very useful list of all local authorities and towns located on dolomite land is also provided.

Who it's for

The DPW Guideline is aimed at engineers consulting to the Department as well as other consultants such as engineering geologists. The content is aligned with the DPW's Centralised Dolomite Risk Management Strategy for infrastructure on dolomite that ensures a responsible development implementation strategy. It may also serve as a comprehensive information document to planners and the general public, highlighting good practice in infrastructure development on dolomite land.

How to use it

The Guideline is around 200 pages long and the comprehensive table of contents directs the user to the appropriate sections, drawings and standard documents.

The necessary documentation and information that will be needed by the different competent persons involved in infrastructure development are appended to the main text part.

Further information

Information about the Guideline and about PWD's infrastructure policies, standards and tender documentation can be found at: http://www.publicworks.gov.za/consultants-doc/

This guideline should ideally be read with the Guideline for engineering-geological characterisation published jointly by the Council for Geoscience and SAIEG (2003). This guideline sets out the procedures pertaining to risk assessment on dolomite land.

Section 7:

GEOTECHNICAL SITE INVESTIGATIONS FOR HOUSING DEVELOPMENTS: National Department of Housing

The National Department of Housing in collaboration with the National Home Builders Registration Council (NHBRC) has published a series of Generic Specification Documents aimed at the subsidised housing sector in South Africa (e.g. low-cost township developments).

These Specification documents are particularly aimed at implementation of National Housing Programmes arising from Chapter 3 of Part 3 of the National Housing Code.

One of these Specification documents, Geotechnical Site Investigations for Housing Developments (Generic Specification GSFH-2), contains information about development on dolomitic land and the associated groundwater considerations.

All of the Specifications can be downloaded free from the NHBRC website at: http://www.nhbrc.org.za/subsidy/TechDocs.asp

What it's about

The Scope of the GSFH-2 Specification states that the document "contains requirements applicable to three phases of Geotechnical Site Investigations in townships, which may be underlain by dolomites or undermined land, where unoccupied land or undeveloped parcels of land are to be utilised for housing development purposes".

The GSFH-2 Specification describes in detail the three different phases of geotechnical investigation that are needed for township developments. These can be summarised as follows:

Aerial photograph of a sinkhole. (Garfield Krige, 2004)

1. The Preliminary Investigation includes the gathering of all relevant information and data.
2. The Phase 1 investigation is commissioned by the developer and involves site stability investigations, often including drilling and geophysics. The investigation would include determining a Site Class Designation for the site, which takes into consideration the soil properties and makes recommendations for construction methods.
3. The Phase 2 investigation is carried out when the township services (e.g. water pipes) are being installed, and is aimed at gathering additional information that becomes available, and updating if necessary the Site Class Designation.

The minimum requirements for each stage of investigation are described, together with the necessary reporting requirements. Issues such as the minimum number of boreholes that need to be drilled for a particular site, the data that must be collected during drilling, and the

correct way to conduct a gravity survey, are addressed.

The document includes details of what is meant by a "competent person" - who must take charge of the investigations. Also included are a list of references, a list of definitions (e.g. what is meant by a "collapsible soil"), and three annexures.

The annexures are as follows:

1. Schedule of generic subsidy variations for site and founding conditions
2. Earthworks classifications for service trenches
3. Summary of Buttrick, van Schalkwyk, Kleywegt and Watermeyer's Method for dolomite land hazard and risk assessment in South Africa

Who it's for

The GSFH-2 Specification will be useful to planners, regulators and officials involved with the development of townships on potentially unstable land, particularly where these individuals are involved with implementing Chapter 3 of Part 3 of the National Housing Code. It will also be of interest to builders, developers, technical specialists and others who are involved with such developments.

How to use it

The GSFH-2 Specification is 27 pages long, and has a two page executive summary. A detailed table of contents directs the reader to the appropriate section. For anyone who is seriously involved with the township developments covered by the Specification, it should be read in conjunction with the other Specifications aimed at other aspects of these developments.

Further information

Can be obtained from the National Home Builders Registration Council (NHBRC) at http://www.nhbrc.org.za/default.asp .

The NHBRC Head Office can also be contacted on the following toll-free phone number: 0800 200 824

Section 8:

CONCLUSIONS

This booklet aims to provide the reader who is not an expert on dolomite ground stability with information about the different guidelines or documents available which apply to development or building on dolomitic land.

The names and contact details of several organisations with considerable expertise in dolomitic land are also provided, such as the Council for Geoscience and the National Home Builder's Registration Council.

At the time of writing (May 2009), the new South African Standards Document 1936 covering development on dolomitic land is not yet available from the South African Bureau of Standards (SABS).

However it is due in the next few months, and readers are advised to consult the SANS 1936 Guideline when available. It is expected that the SANS Document will be divided into the following four sections:

1. General Principles and Requirements
2. Geotechnical Investigations and Determinations
3. Design and Construction of Buildings and Structures
4. Risk Management

All future construction on dolomites will need to follow the requirements of the SANS 1936 document.

Housing development on dolomite near Randfontein

Department Of Water Affairs

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