

## 7 The development of a Dolomite Risk Management Strategy

### 7.1 Process towards a Dolomite Risk Management Strategy

It is possible to compile a DRMS for the Tlokwe City Council if the following aspects are included in an integrated approach:

- Geo-environmental conditions (geology, geotechnical parameters, geohydrology)
- Land use and development
- The legal and institutional framework
- Social awareness and interaction
- The development of a management system

A DRMS refers to a set of standards with which all construction and development should comply. Such standards are meant to reduce risk and is developed using a systems approach by including geological, pedological, hydrological, geohydrological, planning, engineering and social processes, procedures and methodologies.

A DRMS is a process by which **scientific, planning, engineering and social processes, procedures and measures** are compiled and implemented in order to manage an environmental hazard, such as dolomitic land. By this process, policies and procedures are set in place to reduce the likelihood of events (sinkholes and subsidences) occurring on dolomitic land.

Dolomite risk management may take place at three levels. The principles are the same at all levels, with only some of the specifics that may differ. These levels are (SANS, 2011):

- a) Local authority level;
- b) Bulk service provider, utility organisation and government department level;
- c) Individual development level.

The Geoscience Amendment Act (16 of 2010) came into operation in 1 July 2012. This act

confirms the necessity of a DRMS for local authorities, as was discussed in detail in chapter 3 (Legislative Framework).

The following requirements and standards have been outlined in the Geoscience Amendment Act (16 of 2010), in which all state authorities have various situations that demand a strategy with different components:

- a) All state authorities that are directly considering **new development of infrastructure** of their own on dolomitic land;
- b) All state authorities that **have existing developments or infrastructure** of their own on dolomitic land;
- c) All state authorities that **grant permission to develop** on dolomitic land under their jurisdiction;
- d) All state authorities with **decision making power** by virtue of their jurisdiction through applicable legislation;
- e) All mining companies that operate on dolomitic land.

No matter at what level the DRMS is to be implemented, the following responsibilities must be clearly outlined in the DRMS:

- a) The persons who are responsible to identify, observe critically or record any incident or situation, which occurs in a particular place during a particular interval of time, that might impact upon the management of risk;
- b) The persons who are responsible to initiate, recommend or suggest risk mitigation measures;
- c) The persons who are responsible to initiate action to mitigate risk;
- d) Direct, supervise or control activities associated with the treatment of risks until the level of risk define acceptable;
- e) Check, record progress or verify the implementation of risk mitigation measures; and
- f) Communicate and consult internally and externally regarding an identified source of

potential harm or a situation with a potential to cause loss, as appropriate.

Table7-1 represents the various components that need to be implemented in compiling a DRMS.

**Table 7-1: DRMS implementation**

Component of Dolomite Risk Management Strategy	Entity responsible for compiling a Dolomite Risk Management Strategy							
	State Authority						Bulk service provider	Private Development
	New development	Existing development	Permission granting	Decision making power	Mining: Existing mine	Mining: New mine		
Dolomite Geotechnical Stability Investigation	X	X	X		X	X	X	X
Dolomite Risk Management Plan	X	X	X		X	X	X	X
Implementation Plan	X	X			X		X	X
Development Sensitivity Assessment		X			X			
Infrastructure and foundation assessment		X			X			
Land use assessment				X			X	
Preliminary development assessment		X			X			

According to the Geoscience Amendment Act (16 of 2010), such a strategy must be updated and resubmitted to the Council for Geoscience every five years after first submission, or as agreed with the Council for Geoscience.

Without information, the risk related to dolomite cannot be managed. The absence of detailed adequate information within the study area motivated a pro-active phased approach with regards to risk management.

The following four processes are proposed as part of the strategic planning for the implementation of a DRMS as illustrated in Figure 7-1.

**The basic process:** This sequence of actions includes the dolomite assessment and basic investigation, development of the knowledge base, compiling of the database and related spatial interpretations and GIS development. It concluded with a technical report, GIS database and a concept framework for the DRMS.

**The research process:** This sequence of actions includes research work on the character of

the dolomite in order to quantify risks (geological investigations, geotechnical investigations, geophysical investigations, drilling, data interpretation and reporting). This includes the adjustment and updating of the DRMS based on research outcome as well as the application thereof within the socio-economic and urban structural framework of the affected area.

**The management and monitor process:** This sequence of actions includes the management of the defined risks through a comprehensive management and monitor process with the close interaction with all authorities as core focus.

**Mitigation, management and monitor process:** This sequence of actions involves the implementation of identified mitigation measures; where after management and monitoring of the risk follow as part of Phase C.

The **basic process** was completed as part of the basic research conducted in this document.

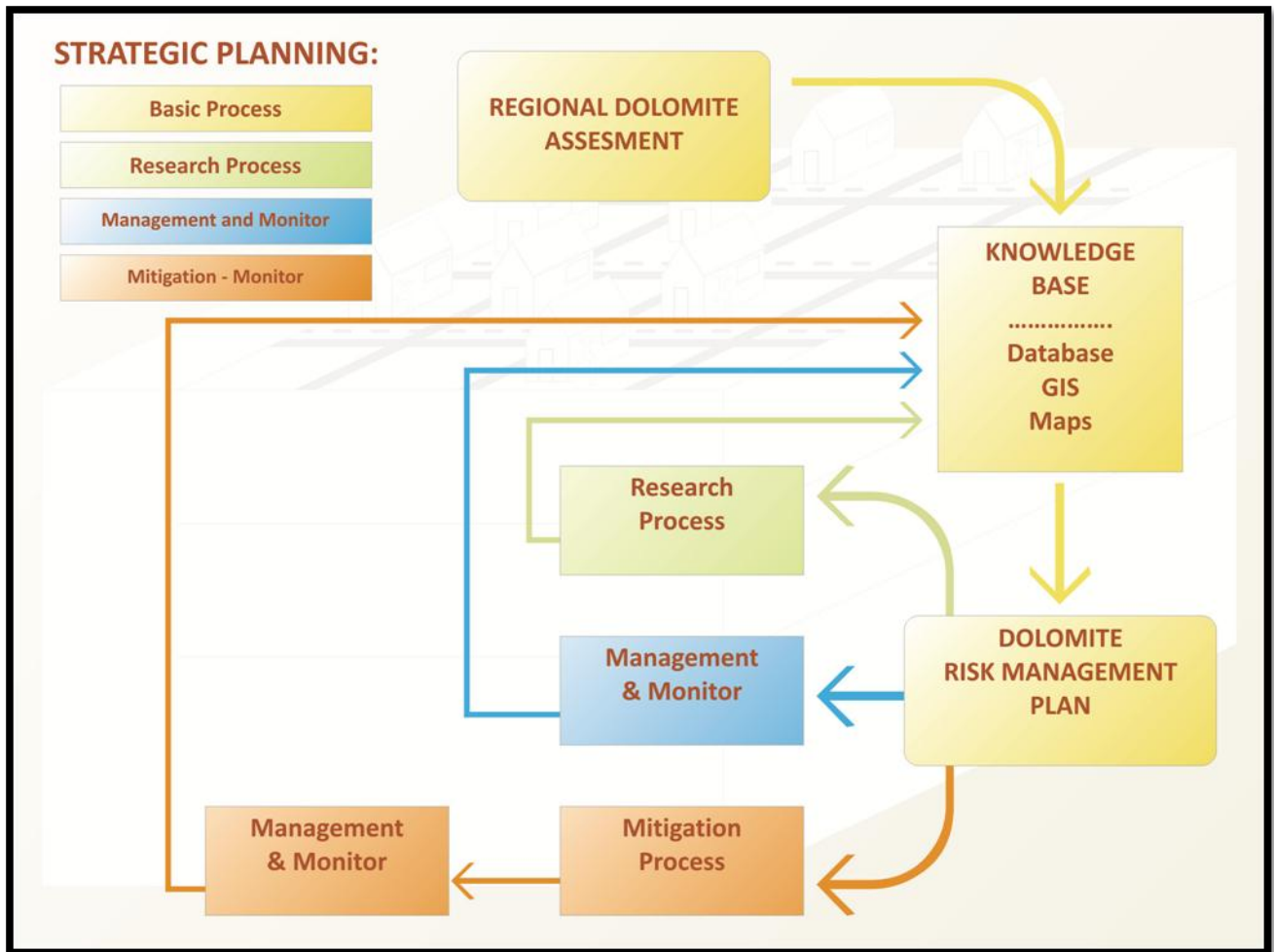


Figure 7-1: Schematic illustration of the Dolomite Risk Management Strategy.

## 7.2 Important further research

Without information, the risk related to dolomite cannot be managed. The absence of detailed adequate information within the study area motivated the need for further research. This research is prioritised based on the risk assessment. A precautionary approach is recommended and the section below describes actions for further research as well as important interim mitigation measures.

The following **research** activities are essential:

- Regional groundwater investigation to determine the possible effect of nearby mining and farming activities, and to establish a groundwater monitoring programme.

- Detailed integrated surface water – ground water model within the local study area in order to characterise the complex interaction between the surface water and groundwater regimes in areas underlain by dolomite.
- Detailed dolomite stability investigations on existing town establishments underlain by dolomite (Focus Areas 1 to 6 and 14) (Figure 6-5).
- Further detailed geotechnical investigations on new town establishments on dolomite (Focus Areas 10 to 12) (Figure 6-5).
- Initial geotechnical investigations on new town establishment in order to confirm the absence of dolomite and to determine the suitability for future housing developments (Focus Areas 7 to 9 and 13) (Figure 6-5).
- Regional dolomite investigation in the bigger Tlokwe local municipal area in order to determine the extent of dolomite (Focus Areas 15 and 16) (Figure 6-5).

### 7.3 *Immediate and urgent interim mitigation measures*

A number of issues were identified during the first phase of the investigation. As the City Council is aware of the risk and need to act positively in order to reduce the risk, the following actions were recommended as an **interim measure** during the research process:

- Appointment of an ad-hoc committee to address any ad-hoc issues.
- Integration and interaction with neighbouring authorities in order to align DRMS's.
- Social awareness and training campaign to inform the affected parties as well as the general public of the risks involved and the process going forward, and train ward councillors in more detail.
- Assessment and rehabilitation of existing sinkholes and damaged bulk water infrastructure.
- Implementation of a monthly groundwater level monitoring programme.
- Consultation with the Department of Water Affairs as well as the Department of

Minerals and Energy through the Mooirivier Forum and personal communication to the Blue Scorpions to inform them of the risk associated with groundwater abstraction in Potchefstroom.

- Drafting of by-laws.
- Assessment of ad-hoc building plan and land use applications and feedback on the outcome thereof to applicants.
- Appointment of a legal advisor to advice on ad-hoc legal implications.
- Appointment of engineers to assess the status of existing infrastructure and to measure the compliance against current standards for infrastructure in dolomite.
- The establishment of a centralised help and information desk to receive, record and attend to any incidents or requests during research.
- Several workshops with different departments within the City Council were held to inform every one of the process, findings and the way forward. These included the infrastructure, housing and planning as well as disaster management departments.

#### *7.4 Towards a Dolomite Risk Management Strategy*

It is imperative for the Tlokwe City Council to develop a Dolomite Risk Management Strategy. This strategy will be compiled upon the completion of all necessary research activities. It is important to note that this strategy should be reviewed by an independent competent person or the Council for Geoscience every 5 years.

The final DRMS should be compliant to the SANS 1936-4 guideline documents (2011) (still in draft format by the date of writing). This document stipulates general requirements for risk management, requirements for the preparation of a provisional DRMS and specific requirements for local authorities, specific requirements for new developments as well as interconnected complexes. A copy of the relevant information from this document is included as Appendix I.