
CHAPTER FOUR



MINIMISING KARST HAZARDS IN WANNEROO

4.1 INTRODUCTION

Following the Gracetown tragedy in 1996, local councils have focused on coastal cliff collapse, employing geotechnical consultants, signing coastal hazard zones and producing brochures on shore safety. Attention to inland karst hazards has not been given much attention as no major incident has occurred resulting in loss of life. However, the hazards associated with the inland rural karst belt have the potential to be great unless preventative measures are implemented in order to reduce economic, social and environmental disruption.

4.2 MINIMISING INLAND KARST HAZARDS

Local governments place a crucial role in tackling the environmental and engineering impacts of karst. Monitoring and mitigation opportunities are available as the majority of local governments control land use including subdivision, planning and land development (Devilbiss, 1995).

There are several preventative measures that can be implemented to reduce the hazards associated with karst in Wanneroo. These measures are discussed below.

4.2.1 *Education*

Public and community education is one of the greatest measures that can be implemented to reduce the risk of karst hazards. If landowners are educated about karst terrains, more caution would be given to development and land use practises.

At present, there is a lack of community education or acknowledgement of karst hazards. Whilst visiting the landowners that developed holes on their properties, it seemed that the attitude to the hole formation incidents were “it just happened and we don’t know why”.

It is important that emergency services are also educated about karst terrains. The fire brigade and State Emergency Services were unaware of the abundance of caves in the Wanneroo Area. If an emergency situation was to occur at night, they would be put at great risk as personal injury could occur due to lack of knowledge regarding karst features and locations.

It would be beneficial to educate the community through community presentations and school visits. The availability of information in the form of pamphlets or posters is equally important. An example of this type of pamphlet is the ‘Karst Hazards’

brochure produced by Geoscience Australia (Appendix 3). However, a more localised educational pamphlet, directed at Wanneroo, would directly benefit the community.

This pamphlet should inform the community about the hazards in Wanneroo, identifying karst hazards and provide information about how the community can minimise the risk of karst hazards. This would educate landowners on land use practices and what to do if a hazard occurred. It would also provide local contact details.

4.2.2 Geotechnical Reports

There have been no geotechnical reports documenting the stability of the rural karst limestone. If geotechnical consultants were employed to inspect and assess the hazards, recommendation would be made regarding community safety as well ways to reduce risk to the local council. All geotechnical reports completed for the Wanneroo Council have currently focused on coastal limestone hazards, not inland.

4.2.3 Warning signs, fences and barriers

Within Wanneroo, there are no warning signs, fences or barriers warning people to be careful when walking in the rural karst belt. Preventative signs such as “Keep Out” or “No Entry” are absent and informative signs such as “Caves and holes occur on this property. Be careful!” do not exist.

Signs and barriers inform people of the dangers and hazards associated with entering an area. However, they do not guarantee that these warnings will be observed. Signs within the rural karst belt should not be used to deny public access but should aid and alert people of the dangers associated with karst. For example, a sign at the entrance of Emerald Estate would inform people that this area is highly cavernous.

Protective barriers or fences should be placed around caves on private property. For example, a cave on Tintara has a well covering (Figure 4.1). This reduces the risk of falling into a cave and ensures that the cave remains protected. The council should make sure that caves on public land are marked, signed or fenced. For example, the cave alongside Bernard Rd South should have a fence or a sign marking the cave in order to alert drivers not to stop in this area.



Figure 4.1 Cave with well covering on Tintara. This ensures that the cave is not damaged or covered up and provides access into the cave for explorers.

4.2.4 Development and subdivision of land

When developing land within karstic terrains two questions must be asked: Firstly, will the proposed land use trigger sinkhole formation? And, Will in-filled sinkholes remain passive through the anticipated lifetime of the proposed land use? (Wilson *et al.*, 1995)

When subdividing land within the rural karst zone of Wanneroo, increased hazards may occur due to heightened development and infrastructure. It is important that geotechnical surveys are completed before planning and subdivision approval. Roads should not cover up caves, nor should houses. Karst features should be identified before developing land in order to prevent and minimise personal and infrastructure damage.

4.2.5 Karst hazard database

A karst feature and hazard database would benefit the local council as well as the emergency services as location of caves and hazards would be documented. Prior to this report, the Wanneroo council was unaware of the holes that developed on private property. There is no reporting or recording system of karst hazards implemented by the council.

A database would not only be useful for preventing current hazards. It would also aid town planners in the future as land use changes may occur. Knowing the location of

caves or other karst features would also aid the council in determining if subdivision plans or development will be approved.

Setting up a page on the City of Wanneroo website for reporting sinkholes or hazards would aid in collating information about local incidents.

4.2.6 Cave protection

Caves have been scientifically and culturally recognised as integral components of the national ecosystem. Planned economic development as well deliberate vandalism has contributed to cave degradation (Jasinska and Knott, 1990).

Damage to caves should be considered and prevented when developing land. This would not only reduce the risk of structural failure but would protect the caves for the local and speleological communities.

Koala Cave contains the only koala fossils in Perth. This cave is both culturally and scientifically significant and it provides one of the only insights that koalas used to be part of the natural ecosystem in Perth. They are currently extinct. The proposed road alignment of Alkimos Drive covers this cave. By respecting the significance of this cave and others in the area, their protection would not preserve the cave but it would reduce the potential hazards of road collapse.