CHAPTER THREE



REVIEW OF KARST HAZARDS IN WANNEROO

3.1 INTRODUCTION

Wanneroo Rd marks the western boundary of the karst belt, mapped out by Gozzard, 1982a,b & c. The karst belt extends from Yanchep National Park to the south of Flynn Drive. This area is predominantly rural comprising of hobby farms and national parks. The study area has been limited to the eastern side of Wanneroo Rd between Bernard St and Flynn Dr. Examples of hazards in Yanchep National Park have also been included as they exemplify potential hazards that could occur within the Wanneroo rural karst zone.

Detailed mapping by Lex Bastian revealed a karst hazard zone in the Carabooda region (Figure 3.1), (Bastian, 2003). Due to development pressures, the subdivision of land in this zone is highly sought out and no formal documentation process for karst hazards has been implemented. Consequently, there is an absence of published knowledge of karst hazards within this region. The following case studies, documented by Lex Bastian, will provide an insight to the hazards associated with development in karstic areas.

3.2 HOLES/COVER COLLAPSE SINKHOLES

3.2.1 Case Study 1 - Tintara

On the 22nd November 1999, a 3m x 2m hole developed on Tintara - a property on the eastern side of Wanneroo Rd. The sprinkler system was left on for hours and during this time, the hose detached from the sprinkler, saturating the top half meter of soil. Below this zone the soil was dry. The hole developed in the middle of a grassy area (Bastian, 2003). For this to have happened, a pre-existing cavity must have been present, in-filled with soil. The excess water concentrated within a small area, washing and draining the soil down the cavity. Limestone boulders and soil were used by the owner o fill up the hole.

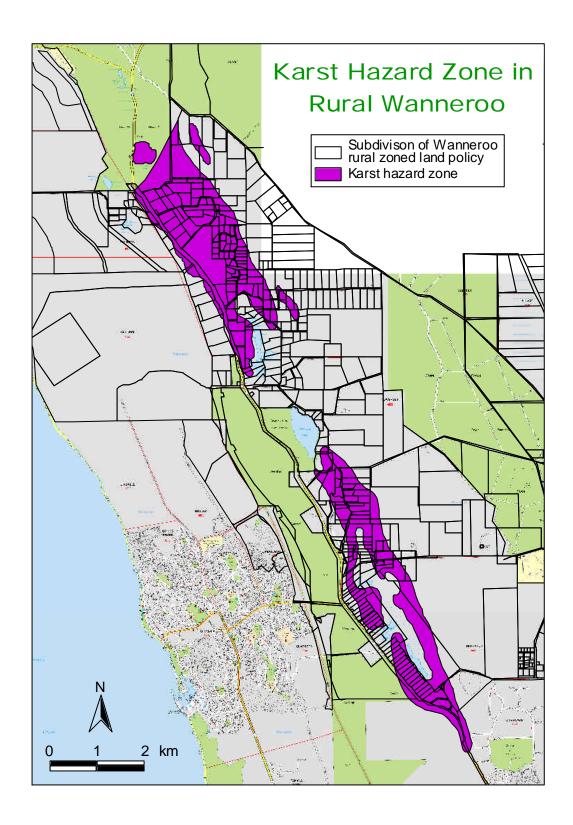


Figure 3.1 Karst Hazard Zone in rural Wanneroo. (Mapped by Lex Bastian).

3.2.2 Case Study 2 – Trian St

On the 4th January 1999, a 6.3 m deep hole developed next to a shed entrance on a property in Trian St (Figure 3.2). This hole was 2 m in diameter and formed when a water pipe burst, flooding the area. The area was flooded overnight and in the morning the hole was observed (Bastian, 2003). The hole formed in a similar way to Case Study 1 and was filled up by the owner with limestone blocks and soil, leaving a slight depression.

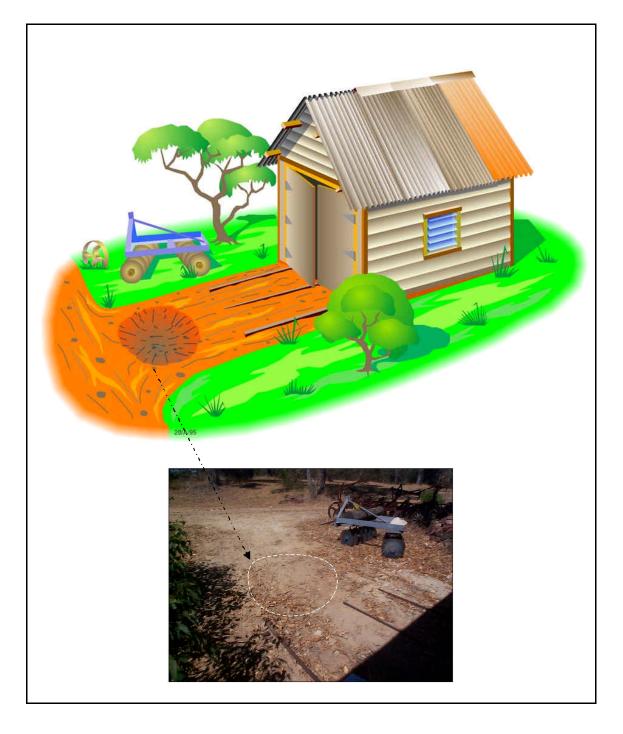


Figure 3.2 Photo and schematic picture of the hole on the Trian St property. The white circle marks a slight depression where the hole formed.

3.2.3 Case Study 3 - Yanchep National Park

A sandy road leads to the workshop compound at Yanchep National Park off Yanchep Beach Rd. Within the workshop area, a bitumen road is present; allowing trucks access to the workshop. In July 1997, a hole 4m deep and one meter in diameter, opened up in the road within the workshop compound (Figure 3.3), (Bastian, 2003). Unlike Case Study 1 and 2, this hole did not form from water saturation. A pre-existing cavity must have been present and it can be surmised that the soil had poor soil structure due to the bitumen covering. Vibrations from vehicles entering and leaving the workshop most likely loosened the soil, allowing it to move down the cavity until all soil had piped down and left the road above the hole unsupported. Eventually, the unsupported road gave way, leaving a hole.

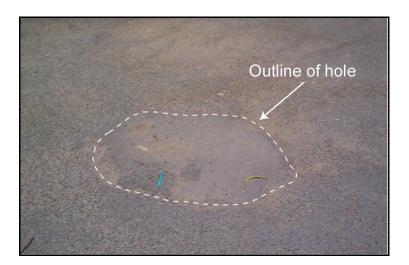


Figure 3.3 Photo of where the hole in the Yanchep workshop compound was.

3.3 ROCK FALL

2.3.1 Case Study 1 - Cabaret Cave

On the 9th June 1995, a major rock fall occurred at Cabaret Cave, Yanchep National Park (Bastian, 2003). This site was undergoing construction at the time, but no-one was injured as the rock fall occurred overnight. Tree roots gradually wedged the rock apart causing limestone boulders up to 2.5m in diameter, to tumble down the rock face (Figure 3.4).



Figure 3.4 Rock fall at Cabaret Cave in Yanchep National Park

3.4 EXPOSED CAVES

Over the last decade, Lex Bastian has mapped out most of the caves within the Wanneroo Local Government Area (LGA). There are approximately 750 caves within this region, ranging in size from the large show caves at Yanchep National Park to small caves around 1m in height and depth (Bastian, 2003).

Caves occur on both private and state property in the Wanneroo area. Usually, large caves do not pose a hazard as their locations are obvious to the eye. However, smaller caves can be hidden by shrubs, grass or other human made objects which can increase the hazard as most are not marked or fenced.

3.4.1 Case Study 1 – Tintara

The Tintara property, has exemplified many karst features including fissures, holes and caves. Most of the caves are fissure type, resembling a chimney straight into the ground. Two caves in Tintara were covered up by a broken sheet of asbestos with shrub and grass growing over the top (Figure 3.5a). This is a hazard as the caves are partially concealed and not fenced or signed. Moreover, the current cover would probably not support the weight of an adult person (Figure 3.5b).