4 Study area

4.1 Historical background

The establishment of Potchefstroom was determined to a great extent by the geology and geohydrology next to the Mooi River. In 1938, Potchefstroom was established on the banks of the Mooi River. But the problem with its initial location was that the formation on which it was established was hard and shallow, and therefore the rain water could not infiltrate into the ground (Badenhorst *et al.*, 1939). This was enhanced by the wad originating from the dolomite. They therefore decided to move downstream until they were on ground that could be better utilised for agriculture. This is then how Potchefstroom was established in 1841 (Badenhorst *et al.*, 1939).

According to Jansen van Rensburg (2006), human settlement in Potchefstroom occurred simultaneously between blacks, coloureds and whites. These developments started before Potchefstroom was introduced as both a town and as the first headquarter of the Zuid-Afrikaansche Republiek (ZAR) in 1838.

The first rural development in the Potchefstroom area was named Makweteng or Willem Klopperville. This development was in the current Mieder Park area, on the eastern side of Walter Sisulu Avenue. It was an integrated settlement with both coloureds and blacks living in the same area.

The separation of Makweteng into Ikageng and Promosa was due to regulations in connection with segregation incorporated into the national legislation in the mid 1900's (the Native Urban Areas Act 25 of 1945). In 1948 the National Party came to power and began putting these policies into practice. The decentralisation from Makweteng to Ikageng started in 1958 and was completed 5 years later in 1963. Residents whom have built their own houses were compensated for these improvements upon the relocation. Decentralisation to Promosa and Mohadin started in 1965, under the Group Areas Act of 1950, and was completed in 1969 (Jenkins, 1971).

Classical geotechnical mechanics began as early as 1773, with Charles Coulomb's introduction of mechanics to soil problems (Oliveira, 2004). But it was not up until

1965, 2 years after the completion of Ikageng, that an ordinance was passed by the Transvaal Province (25 of 1965) in which certain regulations in connection with township proclamations were established. The ordinance came into force on the 1st January, 1965. This ordinance was the first of its kind in South Africa, and can therefore be seen as the first guideline for development on dolomitic areas. In terms of clause 24(b), it became necessary for township developers to report on the suitability of the site with regard to soil and the presence of dolomite rocks (Wagener, 1984).

Roelofsz (1981) reports that the first application for a township on dolomite, which was affected by Transvaal Provincial Ordinance 25 of 1965, was lodged in 1968. The township was then proclaimed with certain restrictions in 1972.

The National Home Builders Registration Council (NHBRC) was established in terms of the Housing Consumer Protection Measures Act (95 of 1998). The NHBRC is mainly established to protect the interest of housing consumers, and to regulate the home building industry, and thus to protect the consumers against such problem as development on dolomite (National Home Builders Registration Council, 1999).

It is therefore evident that the development of the Ikageng area was started before the dangers associated with development on dolomite was fully understood.

The irregular shape of the town layout in Potchefstroom indicates that the location of dolomite was considered in the past. However, the goalposts shifted in recent years as the risk associated with dolomite became more evident. Where surface or near-surface dolomite was considered a hazard in the past, the definition of dolomitic land now entails an overburden of up to 100 m.

In most historical cases, dolomite risk management is conducted in a reactive approach. The aim of Tlokwe City Council is to manage the risk pro-actively as far as possible.

4.2 Area under investigation

Regionally there are two dolomitic arches within the Tlokwe City Council as indicated in Figure 4-1. The largest arch stretches roughly between Stilfontein in the South East and Carletonville in the North East, with the second one extending from

Skandinawië Drift in the south to Lindeques Drift in the east. Potchefstroom is located on the northern dolomitic arch underlying specifically the area to the west of Potchefstroom. This dolomite is part of the Transvaal Supergroup and specifically the Malmani Subgroup, predominantly the Eccles Formation (AGES, 2010a).

The local study area is located in this small portion of the dolomite in Ikageng west of Potchefstroom, with the boundaries being roughly the N12 towards Klerksdorp in the south, the R53 towards Ventersdorp in the east, the Eleazer road in the north and the Highveld National Park in the west (Figure 4-2). Several extensions of Ikageng have developed in the area, interspersed with vacant areas.

This study area was delineated as a focussed study area due to the following reasons:

1. The area is underlain by dolomite;
2. The area has existing old high density residential development;
3. The people living in the area is expected to be relatively vulnerable to disasters;
4. The geohydrological boundaries are a safe distance from the residential developments for a first phase investigation;
5. The area therefore has the highest expected or perceived risk; and
6. A more regional study is to be conducted at a later stage.

Figure 4-2 visually represents the project area on a local scale.

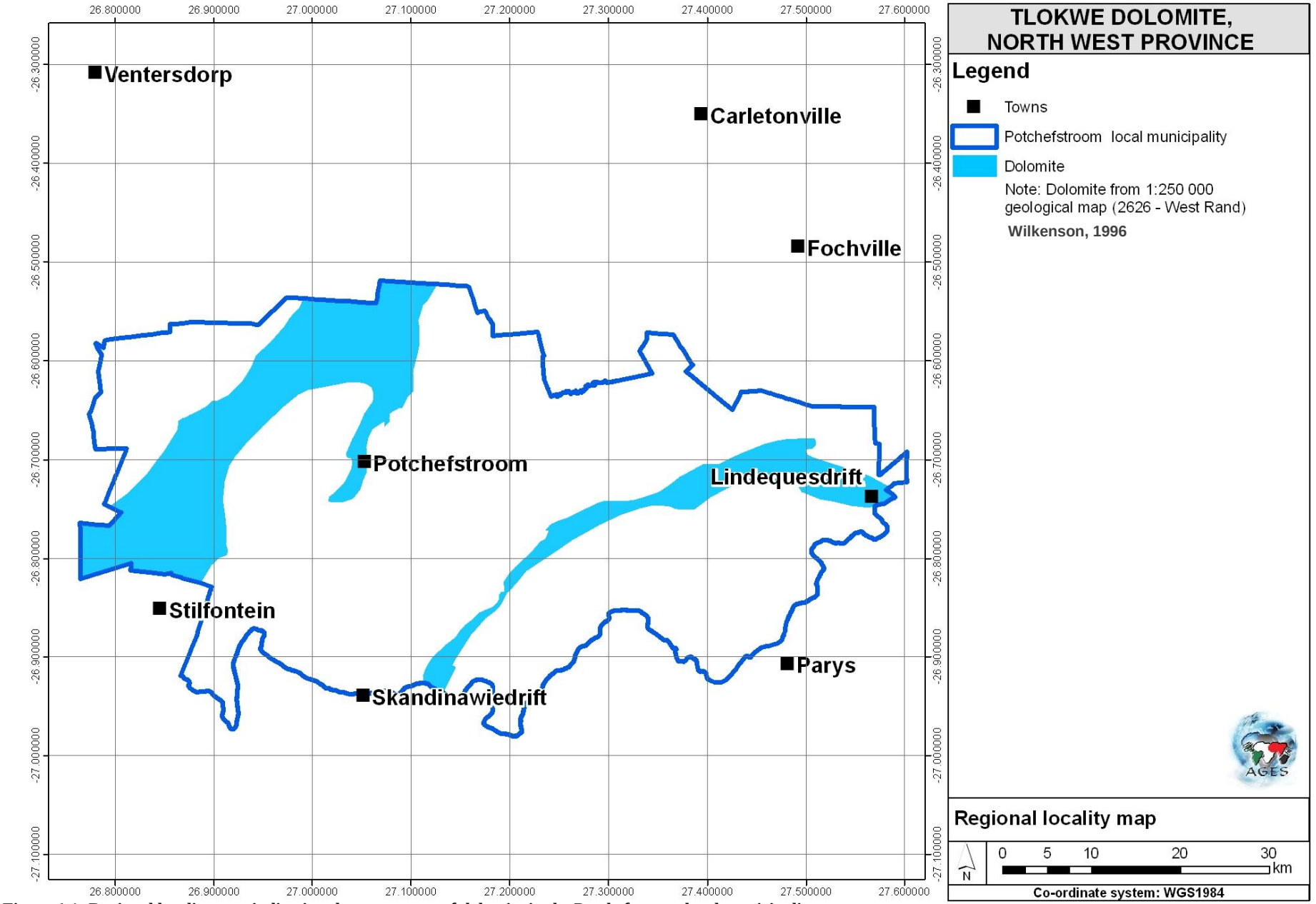

Figure 4-1: Regional locality map indicating the occurrence of dolomite in the Potchefstroom local municipality

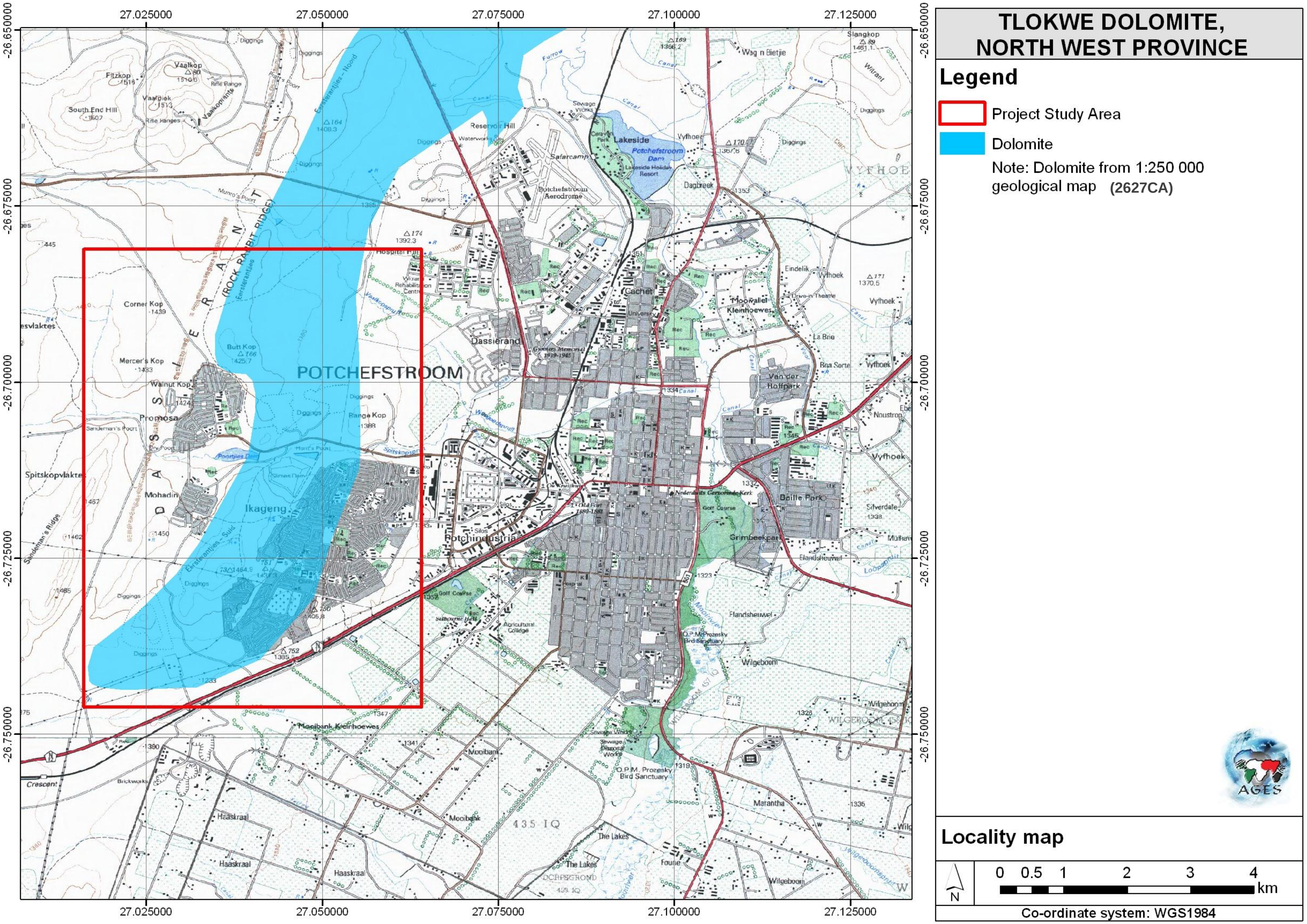

Figure 4-2: Locality map indicating the occurrence of dolomite in the project study area

4.3 Factors to be researched

There are, in general, two main factors that contribute to the risk with regards to development on dolomite that need to be researched in order to develop a Dolomite Risk Management Strategy (DRMS):

1. The first factor is related to the **physical environment**, such as
    a. geology,
    b. geohydrology and
    c. engineering geology.

Scientific understanding is essential to assigning meaningful risks to both property and environment, and key for formulating effective land- and water-resource management strategies (Tihansky, 1999).

2. The **anthropogenic environment** is the second factor. This includes
    a. existing infrastructure and development,
    b. land use planning and
    c. the social structure within the study area.

If development on dolomite did not take place, there would be a significantly lower risk. However, in the Tlokwe City Council, this is not the case and therefore plays a significant role in the assessment of the risk.

It is necessary to have a clear understanding of these contributing factors in order to be able to develop a DRMS. These factors will be considered and discussed in more detail in the following section.