ABSTRACT OF THE VRYHEID BROCHURE

KwaZulu-Natal has traditionally been considered a well-watered province with adequate surface water. Prior to 1980, groundwater was rarely considered an important natural resource and this resulted in neglect of its evaluation and management.
The severe droughts of 1982-83 and again of 1991-93 changed the perspective, water restrictions were imposed, and attention was diverted to groundwater as a possible alternative source of water. The most recent drought in 1995-96 expedited the drilling of 993 boreholes in rural areas of KwaZulu-Natal which were deemed to be in a critical water supply situation.

The KwaZulu-Natal Hydrogeological Characterisation and Mapping Project has been the only formal large-scale hydrogeological investigation carried out in KwaZulu-Natal.
The basis of the hydrogeological map is the underlying lithology, as it is primarily the nature of the rocks that dictates the occurrence of groundwater. Therefore rocks with similar lithological characteristics have been grouped together. The lithology map was further subdivide or grouped into areas, which were delineated on the basis of geological structure, recharge and topography. In the end the map produced is only as good as the data that it is generated from.

For the purpose of the 1:500 000 map series aquifers are divided into four types:
Intergranular Aquifer: a water saturated unconsolidated sediment such as sand and gravel, where water is stored in the intergranular pores and can be transmitted to borehole and springs.

- **Fractured Aquifer**: associated with hard rocks, where water occurs in fractures, faults, joints or fissures.
- **Karstic Aquifer**: associated with carbonate rocks such as limestone and dolomite. Groundwater is stored and transmitted through fractures, solution cavities and channels.
- **Intergranular and Fractured Aquifer:** water occurs in both the upper decomposed rock zone and the fractured but fresh rock formation below. These zones are in hydraulic contact. Weathering of crystalline rock can lead to the formation of this aquifer type.
- **Aquifers of the Karstic** type do not occur within the Vryheid map area.

The most noticeable feature on the map sheet is the Maputuland Coastal Plain, which is found along the northeastern seaboard.
Rainfall is strongly orographically related, with the elevated portions of the area experiencing greater rainfall than the more low-lying areas, except along the coast.
The major river occurring on the map is the Tugela River which passes through the southern part of the map area. This river, with its major tributaries, the Mooi and Bushmans Rivers, has its source in the Drakensberg escarpment beyond the western margin of the map.
Groundwater quality in the region covered by the Vryheid hydrogeological map sheet is variable, but it is in general good, with electrical conductivity values (EC) of less than 100 mS/m being present in most areas. Poorer quality, more saline, groundwaters are generally associated with those portions of the map area that have a relatively lower rainfall (Lebombo Group, parts of the Karoo Supergroup sedimentary rocks), such as between Ulundi and Emapangeni.

The average yield of springs, which are widespread in the higher rainfall interior portions of the map area, is 0.05l/s. One exceptional spring in Pongola Supergroup rocks adjoining the Swaziland border post at Mahamba, southeast of Piet Retief, has a yield of 7, 5 l/s. In recent years, a program of spring protection has been implemented in a number of rural areas which involves effectively covering and sealing the spring source and piping the groundwater under gravity to a storage tank down slope from where the water is tapped as required.
A number of true thermal springs, which have year-round groundwater temperature in excess of 25 º C, occur in the map area. The Shushu thermal spring in the bed of the Tugela River, northeast of Kranskop, with a temperature of 53º is the third warmest spring in the country after Brandvlei near Worcester in the Western Cape, 64º C, and Tshipise in the Northern Province, 57º C.

The use of groundwater is constrained by the low yields (median 0, 6 l/s) of boreholes drilled into secondary 'hard rock' aquifers, which underlie the majority of the map area. At present, the indications from aquifer recharge calculations, undertaken as part of the KwaZulu-Natal Hydrogeological Characterisation and Mapping Project are that the overall groundwater resource potential is about 39 000 m3/km2/yr.
The main restraint on the utilisation of the resource, however, is the low groundwater yield of boreholes as a result of the generally unfavorable storativity and transmissivity characteristics of the fractured 'hard rock' aquifers which cover the greater portion of the map area. As a result, numerous boreholes are required to give limited amounts of water with resulting considerable costs for this type of water supply development.
It is recommended that long-term monitoring of groundwater level behaviour and quality be done in representative or significant locations, to confirm the recharge situation in relation to rainfall variation and borehole depth.