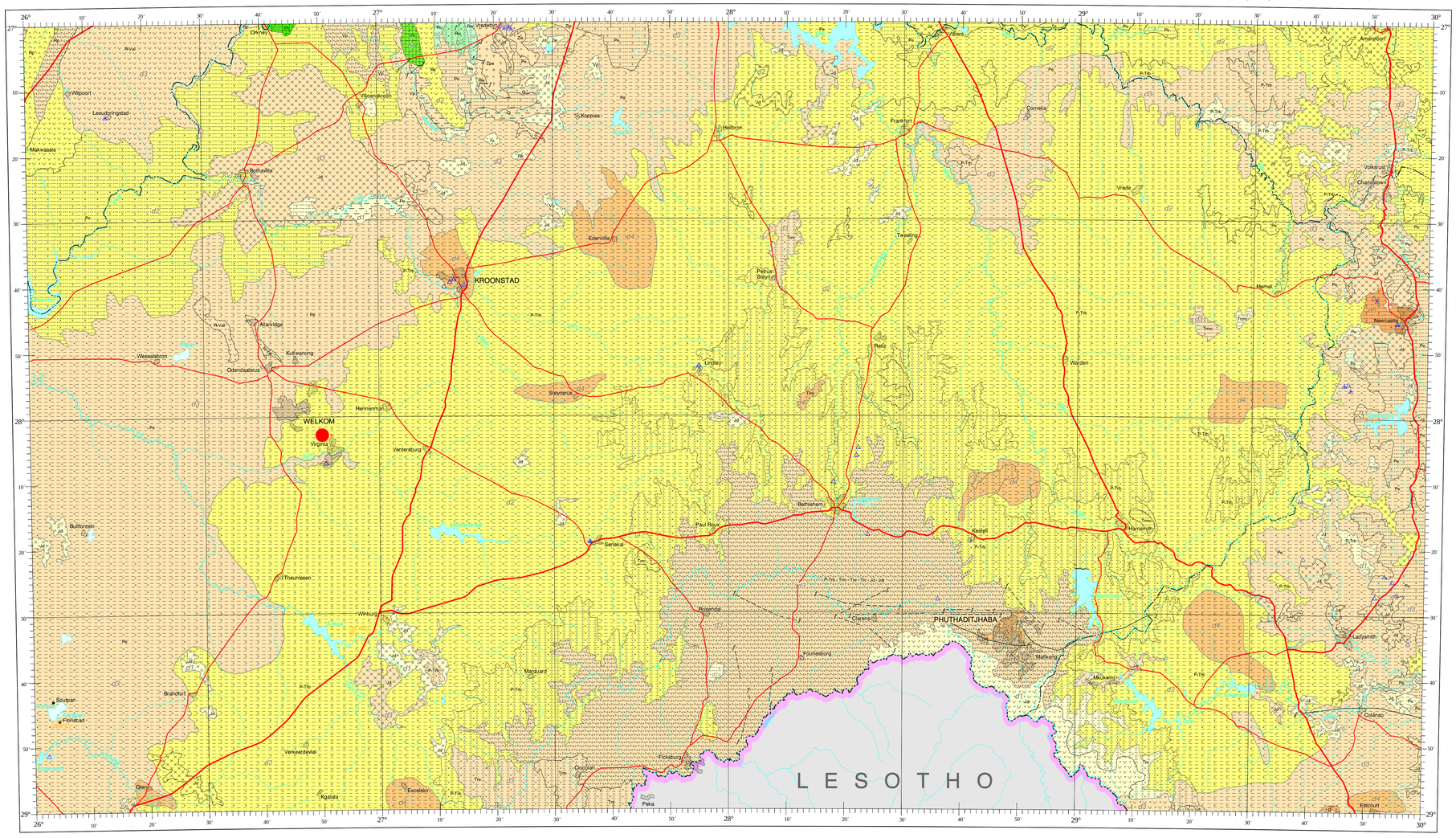
Sheet 2726

1:500 000 Hydrogeological map series of the Republic of South Africa



KROONSTAD

2000

10 0 10 20 30 40 50 60 km

Lambert's conformal conic projection, Standard parallels 26 ° 40' & 33 ° 20' , Central meridian 28 °, Spheroid Clarke 1880.

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This map was approved by the Director-General of the Department of Water Affairs and Forestry.

The groundwater occurrence, groundwater quality and borehole distribution maps, and schematic cross-sections were compiled by E. Baran, Department of Water Affairs and Forestry. The lithology was adapted by E. Baran from the 1:1 000 000 scale published Geological map,1984. Permission from the Council for Geoscience to make use of their information is gratefully acknowledged. Borehole data were obtained from the National Groundwater Data Base (NGDB). Precipitation and elevation data were obtained from the Computing Centre for Water Research, University of Natal, and compiled by H. Mullin. Information on roads, rivers, towns, international and provincial boundaries were obtained from the Chief Directorate: Surveys and Mapping, Department of Land Affairs and edited by the Department of Water Affairs and Forestry. Acknowledgement is accorded to Steffen, Robertson & Kirsten and VSA Earth Science Consultants for collecting and collating groundwater related information for the "Kwazulu-Natal Hydrogeological Mapping Project" from 1992 to 1995, which has been used in the compilation of this map. The above mentioned project was co-ordinated by Dr. R.R. Maud of Environ Maud & Partners.

Principal groundwater occurrence

Borehole yield class (median l/s)
(excluding dry boreholes)

Aquifer type	0.0 - 0.1	0.1 - 0.5	0.5 - 2.0	2.0 - 5.0	> 5.0
Intergranular	*	*	*	*	*
Fractured	*	b2	b3	*	*
Karst	*	*	*	c4	c5
Intergranular and fractured	d1	d2	d3	d4	d5

Borehole yield boundary

Note: Groundwater occurrence depicts the aquifer type(s) with the highest borehole yield, and does not always correlate with surface lithology.

Surface lithology

- Alluvium (clay, sand, gravel)
- Mafic intrusive rocks (dolerite)
- Predominantly argillaceous rocks (shale, mudstone and subordinate siltstone)
- Predominantly arenaceous rocks (sandstone)
- Argillaceous and arenaceous rocks (approximately equal proportions)
- Predominantly carbonate rocks (dolomite)
- Acid intrusive rocks (various granitoids)
- Mafic / intermediate extrusive rocks (basalt and andesite)
- Acid extrusive rocks (quartz-porphyry)
- Undifferentiated rocks and various lithologies
- Lithological / stratigraphical boundary
- Fault
- Inferred fault
- Dolerite / diabase intruded

Large scale groundwater abstraction

- >10 million m³/a
- Mining

- Thermomineral spring(°C)
- One or more groundwater level recorders
- One or more groundwater level monitoring points
- Primary drainage region boundary
- Primary perennial river
- Secondary perennial river
- Non-perennial river
- Dam
- Pan
- Vlei
- City / town area
- Town
- National road
- Main road; Inset map: National road
- Inset map: Main road
- International boundary
- Provincial boundary
- Not applicable to this map

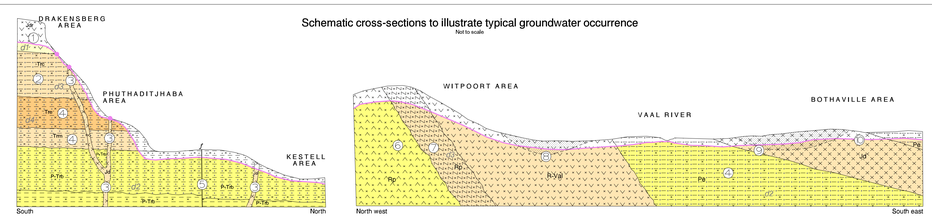
Chronostratigraphy

1	2	3	4	5	6
1.8	PHANEROZOIC	Cenozoic	Quaternary	Q	Alluvium (Q)
			Tertiary	T	
65		Mesozoic	Cretaceous	K	
142			Jurassic	J	Dolerite (Jd); Drakensberg G. (Jdr)
205			Triassic	Tr	Clarens F. (Trc); Elliot F. (Tre); Molteno F. (Trm); Undifferentiated Karoo Rocks (Trmc)
248			Permian	P	Beaufort G. (P-Trb); Ecca G. (Pe)
290		Palaeozoic	Carboniferous	C	
354			Devonian	D	
417			Silurian	S	
443			Ordovician	O	
495			Cambrian	€	
545	PROTEROZOIC	Namibian		N	
900		Mokolian		M	
2050		Vaalian		V	Pretoria G.(Vp); Chuniespoort G.(Vh)
2650		Randian		R	Allanridge F.(R-Val); Platberg G. (Rp); Klipriviersberg G. (Rk); Central Rand G. (Rc); West Rand G. (Rw)
3100	ARCHAEOZOIC	Swazian		Z	Inlandsee Gneiss (Zis); Parys Granite (Zpa)

1 = 1Billion years before present (Council for Geoscience, 1997)
2 = Proterozoic
3 = Eratem (Era)
4 = System (Period)
5 = Series (Epoch)
6 = Complex (C), Suite (S), Group (G), Formation (F) (with symbol)

Schematic cross-sections to illustrate typical groundwater occurrence

Not to scale



1. Due to high and often dissected topography, the lavas of the Drakensberg Group (Jdr) offer relatively little scope for groundwater development
2. The sandstone of the Clarens Formation (Trc) is massive and dense, and is largely deprived of permeability, thus offering at best only moderate groundwater potential, especially in the absence of dolerite intrusions. A few rare instances of this unit having intergranular aquifer properties, have been reported elsewhere
3. Jointed and fractured contact zones between sedimentary rocks and intrusive dolerite dykes can be targeted for groundwater development. Good groundwater strikes have also been obtained by drilling into narrowish dolerite dykes, rather than engaging contact zones
4. Generally limited quantities of groundwater occur in joints and on bedding planes of the Ecca and Beaufort Groups (Pe, P-Trb), and of the Molteno and Elliot Formations (Trm, Tre) in localities devoid of dolerite intrusions
5. Occasional faults can be targeted for groundwater development
6. Weathering and occasional joints and fractures in the quartz-porphyry of the Makwassie Formation (Platberg Group - Rp) can be targeted for groundwater development. The groundwater potential of this unit is generally poor
7. Fractures and joints in the conglomerate and shale of the Kameeldoorns Formation (Platberg Group - Rp) can be used for groundwater development
8. Groundwater occurs in both the weathered and transitional jointed zones between weathered and solid crystalline rocks, such as the Inlandsee granite-gneiss (Zis), andesite of the Allanridge Formation (R-Val) and Karoo dolerite sills (Jd)
9. Groundwater can be developed by penetrating dolerite sills, thus targeting jointed / fractured contact zones between dolerite bodies and underlying sedimentary rocks
10. An unsuccessful borehole can be anticipated in localities where weathering is absent in dolerite bodies, and where the solid dolerite is too thick to penetrate and the depths of the lower contact precludes existence of water-bearing joints

- Weathered zone
- Groundwater level
- Spring

Note: For additional information concerning groundwater occurrence refer to accompanying brochure.

This general hydrogeological map is part of the 1:500 000 Hydrogeological map series of the Republic of South Africa.

This map is not to be used for the purpose of local borehole siting. Simplified lithology may be considered as guidelines only. Further geological information can be obtained from the Council for Geoscience. The map series is produced with ArcInfo software.

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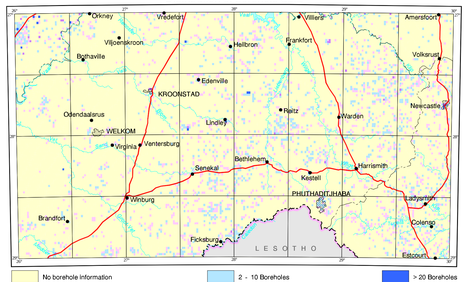
Distribution of borehole data



- No borehole information
- 1 Borehole
- 2 - 10 Boreholes
- 11 - 20 Boreholes
- > 20 Boreholes

Borehole data points per 1 minute grid

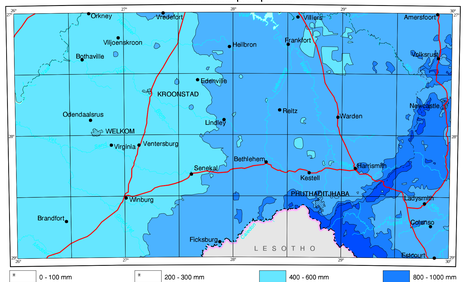
1 : 2 000 000

Elevation above sea level

- sea level - 200 m
- 200 - 400 m
- 400 - 800 m
- 800 - 1200 m
- 1200 - 1600 m
- 1600 - 2000 m
- 2000 - 2500 m
- > 2500 m

1 : 2 000 000

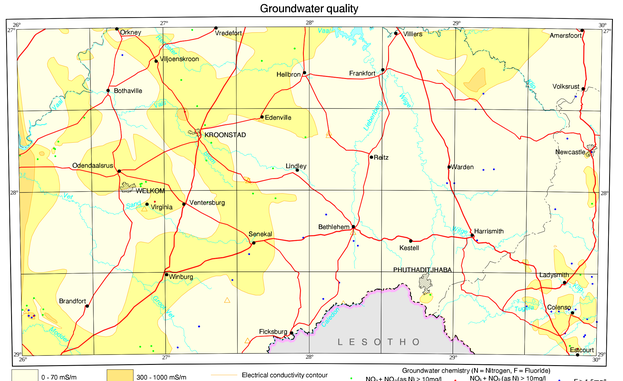
Mean annual precipitation



- 0 - 100 mm
- 100 - 200 mm
- 200 - 300 mm
- 300 - 400 mm
- 400 - 600 mm
- 600 - 800 mm
- 800 - 1000 mm
- > 1000 mm

1 : 2 000 000

Groundwater quality



- 0 - 70 mS/m
- 70 - 300 mS/m
- 300 - 1000 mS/m
- > 1000 mS/m
- Electrical conductivity contour
- Groundwater quality monitoring point

Groundwater chemistry (N = Nitrogen, F = Fluoride)
- $NO_3 + NO_2$(as N) > 10mg/l
- $NO_3 + NO_2$(as N) > 10mg/l & F > 1.5 mg/l
- F > 1.5mg/l

Note: For additional information concerning groundwater chemistry refer to accompanying brochure.

1 : 1 500 000

Provincial boundaries
Feb 1996

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