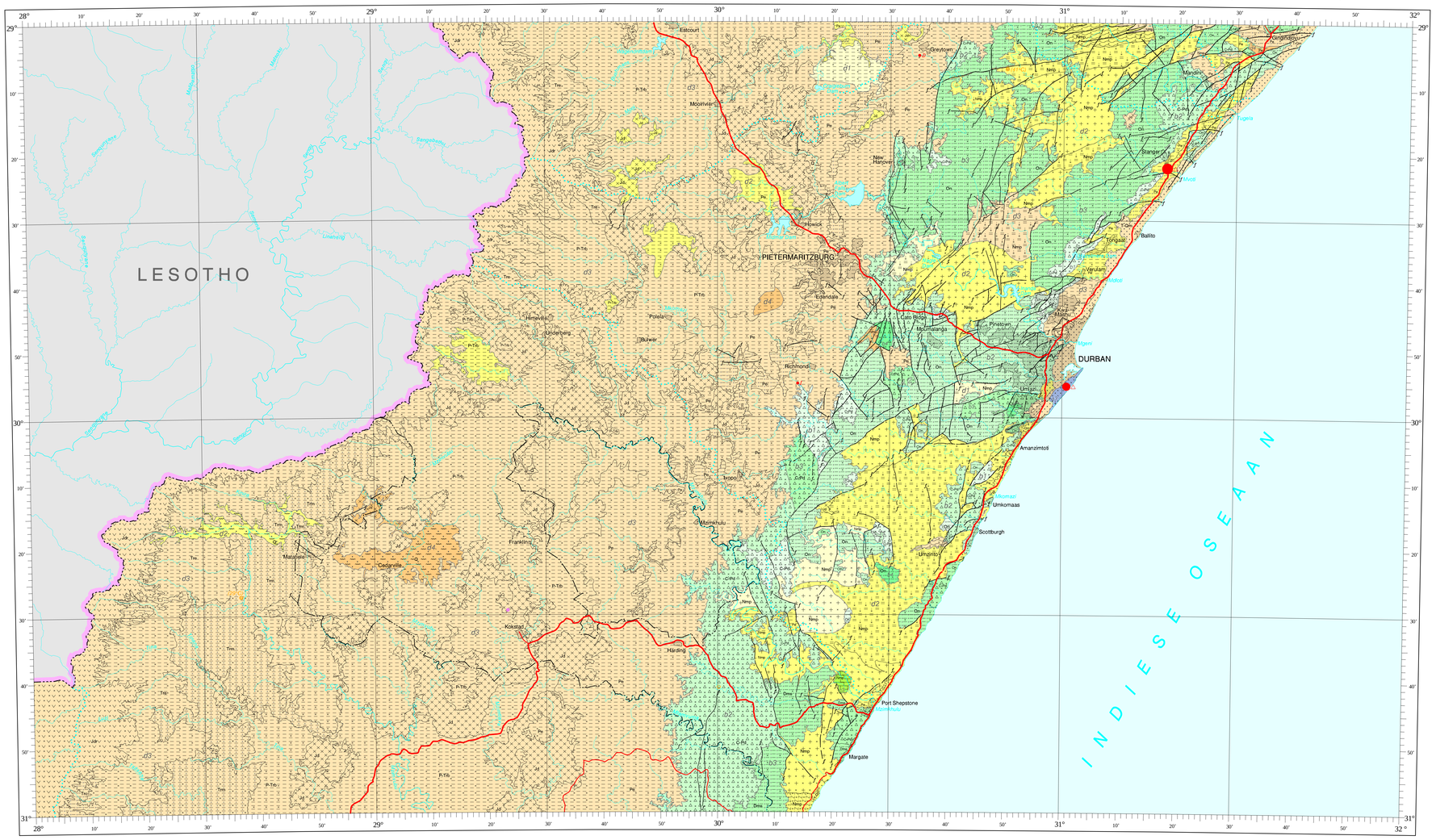
Sheet
Kaart 2928

1:500 000

Hydrogeological map series of the Republic of South Africa
Hidrogeologiese kaartreeks van die Republiek van Suid-Afrika



DURBAN

First Edition 1998 Eerste Uitgawe

10 0 10 20 30 40 50 60 km

Lambert's conformal conic projection, Standard parallels 24°40' & 33°20', Central meridian 30°, Spheroid Clark 1880.
Lambert se konforme koniese projeksie, Standaardparallelle 24°40' & 33°20', Sentrale meridiaan 30°, Sferoïed Clark 1880.

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

Hierdie kaart is goedgekeur deur die Direkteur-Generaal van die Departement van Waterwese en Bosbou.

The groundwater occurrence and groundwater quality maps, and the conceptual illustration of groundwater occurrence were compiled by G. King. The lithology was adapted by G. King from the 1:250 000 scale published Geological map series. Permission from the Council for Geoscience to make use of their information is gratefully acknowledged. E.Maritz was responsible for the compilation of the borehole distribution map. 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. Data of roads, rivers, towns, the coastline, international and provincial boundary were obtained from the Chief Directorate: Surveys and Land Information, Department of Land Affairs and edited by the Department of Water Affairs and Forestry. Acknowledgment is accorded to: E. Martinelli & Associates; Groundwater Consulting Services; Davies Lynn & Partners; Groundwater Development Services and Steffen Robertson & Kirsten, for collecting and collating groundwater related information for the "Kwazulu-Natal Hydrogeological Mapping Project" from 1992 to 1995, much of which has been used in the compilation of this map. This project was co-ordinated by Dr. R.R. Maud of Drennan, Maud & Partners.

Die grondwatervoorkoms- en grondwaterkwaliteitskaart, en die konseptuele illustrasie van grondwatervoorkomste is deur G. King saamgestel. Die litologie is deur G. King vanaf die 1:250 000 skaal gepubliseerde Geologiese kaartreeks aangepas. Toestemming van die Raad vir Geowetenskap vir die gebruik van hulle inligting word met dank erken. E. Maritz was verantwoordelik vir die samestelling van die boorgatverspreidingskaart. Boorgatdata is verkry vanaf die Nasionale Grondwaterdatabank (NGDB). Die reenstag- en hoogtedata is verkry vanaf die Rekenaarsentrum vir Waternavorsing, Universiteit van Natal, en saamgestel deur H. Mullin. Inligting van paaie, riviere, dorpe, die kustlyn, internasionale- en provinsiale grens is verkry vanaf die Hoofdirektoraat: Opmetings en Grondinligting, Departement van Grondsake en gerediteer deur die Departement van Waterwese en Bosbou. Erkenning word verleen aan: E. Martinelli & Associates; Groundwater Consulting Services; Davies Lynn & Partners; Groundwater Development Services en Steffen Robertson & Kirsten, vir die insameling en verwerking van grondwaterverwante inligting vir die "Kwazulu-Natal Hydrogeological Mapping Project" van 1992 tot 1995, waarvan ruim gebruik gemaak is vir die samestelling van hierdie kaart. Hierdie projek is geko-ordineer deur Dr. R.R. Maud van Drennan, Maud & Partners.

Principal groundwater occurrence / Hoof grondwatervoorkomste

Borehole yield class (median litsec) / Boorgatleweringsklas (mediaan l/sek)
(excluding dry boreholes) / (droë boorgate uitgesluit)

	0.0 - 0.1	0.1 - 0.5	0.5 - 2.0	2.0 - 5.0	> 5.0
Intergranular Tuseenkorreleig	*	*	a3	*	*
Fractured Genaat	b1	b2	b3	b4	*
Karst Karst	*	*	c3	*	*
Intergranular and fractured Tuseenkorreleig en genaat	d1	d2	d3	d4	*

Borehole yield boundary — Boorgatleweringsgrens

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

Nota: Grondwatervoorkomste weerspie?l die waterdraertipe(s) met die hoogste boorgatlewering wat nie noodwendig ooreenstem met die oppervlakliitologie nie.

Surface lithology / Oppervlaklitologie

- Alluvium (clay, sand, gravel and boulders) / Alluvium (klei, sand, gruis en rotstene)
- Undifferentiated coastal deposits (unconsolidated to semi-consolidated sediments including sand, calcarenite, conglomerate, clay and silcrete) / Ongedifferensieerde kusafsettings (ongekonsolideerde tot naal-gekonsolideerde sedimente waaronder sand, kalkareniet, konglomeraat, klei en silkreet)
- Predominantly argillaceous rocks (shale, carbonaceous shale, mudstone and siltstone) / Oorwegend argillitiese gesteentes (skalie, koolstofhoudende skalie, modderstesen en silkstesen)
- Predominantly arenaceous rocks (sandstone, feldspathic sandstone, arkose, sandstone becoming quartzitic in places) / Oorwegend arenitiese gesteentes (sandsteen, feldspatiese sandsteen, arkose, sandsteen-wordend-kwartsities plek-plek)
- Argillaceous and arenaceous rocks (approximately equal proportions) / Argillitiese en arenitiese gesteentes (benaderd gelyk verdeel)
- Predominantly diamictite (tillite) / Oorwegend diamiktiet (tilliet)
- Mafic intrusive rocks (dolerite) / Mafiese intrusiewe gesteentes (doleriet)
- Acid/intermediate/alkaline intrusive rocks (various granitoids) / Suur/intermed?ra/alkaliese intrusiewe gesteentes (verskele graniitiese rotse)
- Mafic extrusive rocks (basalt) / Mafiese ekstusiewe gesteentes (basalt)
- Predominantly meta-argillaceous rocks (phyllite, metapelite, schist, serpentinite and amphibolite) / Oorwegend meta-argillitiese gesteentes (filliet, metapeliet, skis, sepentiniet en amfibooliet)
- Predominantly meta-arenaceous rocks (quartzite, gneiss, migmatite and granulite) / Oorwegend meta-arenitiese gesteentes (kwartsiet, gneis, migmatiet en granuliet)
- Predominantly calcareous rocks (calcite, dolomite marble) / Oorwegend kalkhoudende gesteentes (kalsiet en dolomiet marmer)
- Undifferentiated rocks and various mixed lithologies / Ongedifferensieerde gesteentes en verskeie gemengde litologie?
- Lithological / stratigraphical boundary / Litologiese / stratigrafiese grens
- Fault / Verskuiwing
- Dolerite intruded / Doleriet ge?ntrudeerde

Large scale groundwater abstraction / Grootskaalse grondwateronttrekking

- 5 - 10 million m³/a / miljoen m³/j
- 2 - 5 million m³/a / miljoen m³/j
- 0.1 - 1 million m³/a / miljoen m³/j

- Irrigation / Besproeiing
- Domestic / Huishoudelik
- Industrial / Industrieel

- Spring (minor springs (< 1l/s) are wide spread and not shown on this map) / Fontein (kleiner fonteine (< 1l/s) is wyd verspreid en word nie op hierdie kaart aangetoon nie)
- Gaseous spring (CO_2) / Gasagtige fontein (CO_2)
- Thermal spring (°C) / Warmbron (°C)
- Primary drainage region boundary / Prim?re dreineringsgebiedsgrens
- Perennial / primary river / Standhoudende / prim?re rivier
- Secondary river / coastline / Sekond?re rivier / kustlyn
- Dam / Dam
- City / town area / Stads- / dorpsgebied
- Inset map: Town / Insetkaart: Dorp
- National road / Nasionale pad
- Main road; Inset map: National road / Hoofpad; Insetkaart: Nasionale pad
- Inset map: Main road / Insetkaart: Hoofpad
- International boundary / Internasionale grens
- Provincial boundary / Provinsiale grens
- Not applicable to this map / Nie van toepassing op hierdie kaart nie

Chronostratigraphy / Chronostratigrafie

1	2	3	4	5	6
1,8	CENOZOIC / SENOSOIKUM	Cenozoic Senoisoikum	Quaternary Kwartêr	Q	Alluvium (Q)
			Tertiary Tersiêr	T	Maputaland G. (T-Qm)
65	MESOZOIC / MESOSOIKUM	Mesozoic Mesoisoikum	Cretaceous Kryt	K	
142			Jurassic Jura	J	Dolerite / Doleriet (Jd); Drakensberg F. (Jdr)
205			Triassic Trias	Tr	Clarens F. (Trs); Elliot F. (Tre); Molteno F. (Trm)
248	PHANEROZOIC / FANEROSOIKUM	Palaeozoic Paleoisoikum	Permian Perm	P	Beaufort G. (P-Trb)
290					Ecca G. (Pe)
354			Carboniferous Karboon	C	Dwyka G. (C-Pd)
417			Devonian Devoon	D	Msikaba F. (Dms)
443			Silurian Siluur	S	
495			Ordovician Ordovisium	O	Natal G. (ON)
			Cambrian Kambrium	Є	
545	PROTEROZOIC / PROTEROSOIKUM	Namibian Namibium		N	Natal Metamorphic Province / Natal Metamorfiese Provinsie (Nmp)
900		Mokolian Mokolium		M	
2050		Vaalian Vaalium		V	
2650		Randian Randium		R	
3100	ARCHAEOZOIC / ARGEOSOIKUM	Swazian Swazium		Z	

1 = Million years before present (Council for Geoscience, 1997)
2 = Erratum (Kort)
3 = Eratem (Era)
4 = System (Period)
5 = Symbol
6 = Complex (C), Suite (S), Group (G), Formation (F) (with symbol)

Profile: Conceptual illustration of groundwater occurrence / Profiel: Konseptuele illustrasie van grondwatervoorkomste

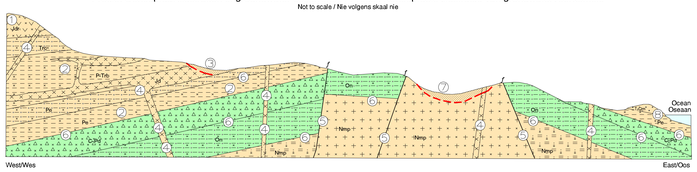
Not to scale / Nie volgens skaal nie

PREDOMINANTLY FRACTURED / OORWEGEND GENAAT:
-shallow weathering at surface / vlak verwering by oppervlak
-usually the fractured zones are saturated / die genate sones is gewoonlik versadig

PREDOMINANTLY INTERGRANULAR AND FRACTURED / OORWEGEND TUSSENKORRELRIG EN GENAAT:
-deep weathering of crystalline rocks imparting intergranular properties to the weathered zones
diep verwering van kristallyngesteentes verleen tussenkorrelrige eienskappe aan die verweerde sones
-weathered and underlying fractured zones are saturated / verweerde en onderliggende genate sones is versadig

Groundwater occurs in:
Grondwater kom voor in:

1. Weathered basaltic lava flows, fractures and dolerite contacts / Verweerde basaltiese lawa-vloeie, nate en doleriekontakte
2. Dolerite dyke and sill contacts with argillaceous rock / Doleriegang- en -plaatkontakte met argillitiese rotse
3. Fractures which are recharged through overlying weathered dolerite / Breuke wat aangevul word deur oordekkende verweerde doleriet
4. Dolerite dyke contacts with competent rock type such as crystalline rock, sandstone and diamictite / Dolerietgangkontakte met kompetente rotse soos kristallyngesteentes, sandsteen en diamiktiet
5. Faults and associated fracture zones / Verskuiwings en verwante naatsones
6. Contacts between lithologies or at unconformities / Kontakte tussen litologie? of op diskordansies
7. The weathered zones of basement rocks and the underlying fractures which are recharged through the weathered zones / Die verweerde sones van vloergesteentes en die onderliggende breuke wat deur die verweerde sones aangevul word
8. Fractures and bedrock contacts which are recharged through overlying saturated sands / Breuke en bodemkontakte wat aangevul word deur oordekkende sand



Weathered zone: Predominantly decomposed / Verweerde sone: Hoofsaaklik ontbind

Inferred extent of weathered zone / Afgeleide omvang van verweerde sone

NOTE:
Natural springs commonly occur in areas of high relief where any of the above geological structures are exposed at the surface.

NOTA:
Natuurlike fonteine kom algemeen voor in hooglêgende gebiede waar sommige van die bogenoemde geologiese strukture dagsoom.

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

Nota:
Vir bykomende inligting aangaande grondwatervoorkomste raadpleeg meegaande broisjure.

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.

Digital data, copies of this map and accompanying brochure are obtainable from:

Directorate:Geohydrology
Department of Water Affairs and Forestry
Private Bag X313
Pretoria
0001

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Hierdie algemene hidrogeologiese kaart is deel van die 1:500 000 Hidrogeologiese kaartreeks van die Republiek van Suid-Afrika.

Hierdie kaart moet nie gebruik word vir plaaslike boorgataanwysings nie. Vereenvoudigde litologie kan slegs as rigtyne beskou word. Verdere geologiese inligting kan vanaf die Raad vir Geowetenskap verkry word. Die kaartreeks is vervaardig met ArcInfo programmatuur.

Digitale data, kopie? van die kaart en meegaande broisjure kan verkry word vanaf:

Direksoraat:Geohidrologie
Departement van Waterwese en Bosbou
Privaatsak X313
Pretoria
0001

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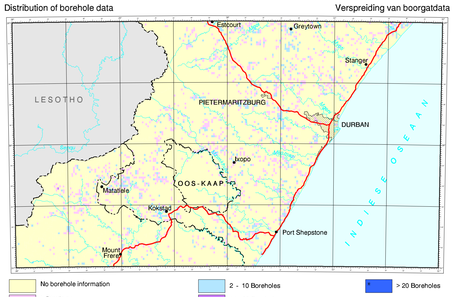
Kaapstad

Staatseiteursreg 1999

Distribution of borehole data / Verspreiding van boorgatdata

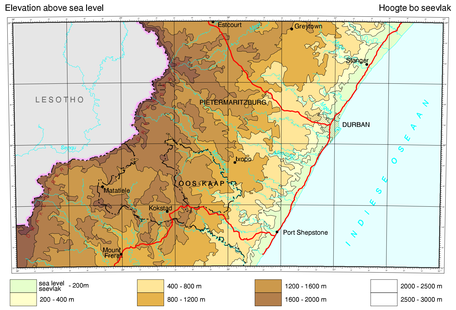


- No borehole information
- 1 Borehole
- 2 - 10 Boreholes
- 11 - 20 Boreholes
- > 20 Boreholes

Borehole data points per 1 minute grid / Boorgatdatapunte per 1 minuut ruitnet

1 : 2 000 000

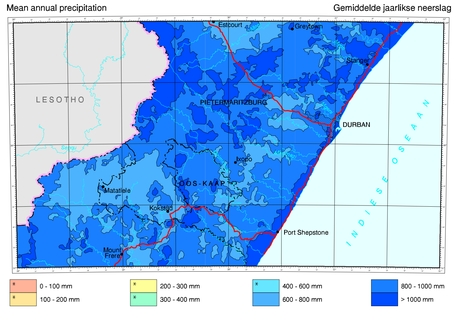
Elevation above sea level / Hoogte bo seevlak



- sea level / seevlak
- 200 - 400 m
- 400 - 800 m
- 800 - 1200 m
- 1200 - 1600 m
- 1600 - 2000 m
- 2000 - 2500 m
- 2500 - 3000 m

1 : 2 000 000

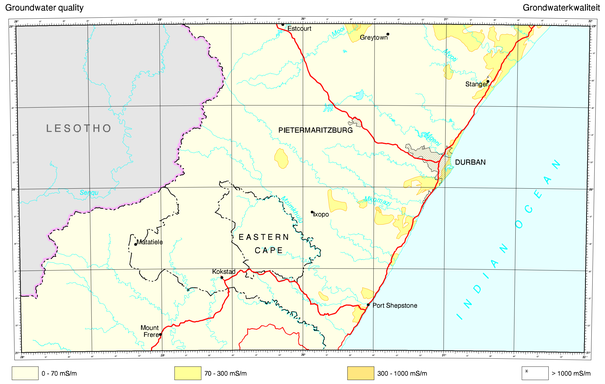
Mean annual precipitation / Gemiddelde jaarlikse neerslag



- 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 / Grondwaterkwaliteit



- 0 - 70 mS/m
- 70 - 300 mS/m
- 300 - 1000 mS/m
- > 1000 mS/m

Electrical conductivity contour / Elektriese geleidingsvermo?kontoer

1 : 1 500 000

Provincial boundaries
Feb 1996

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