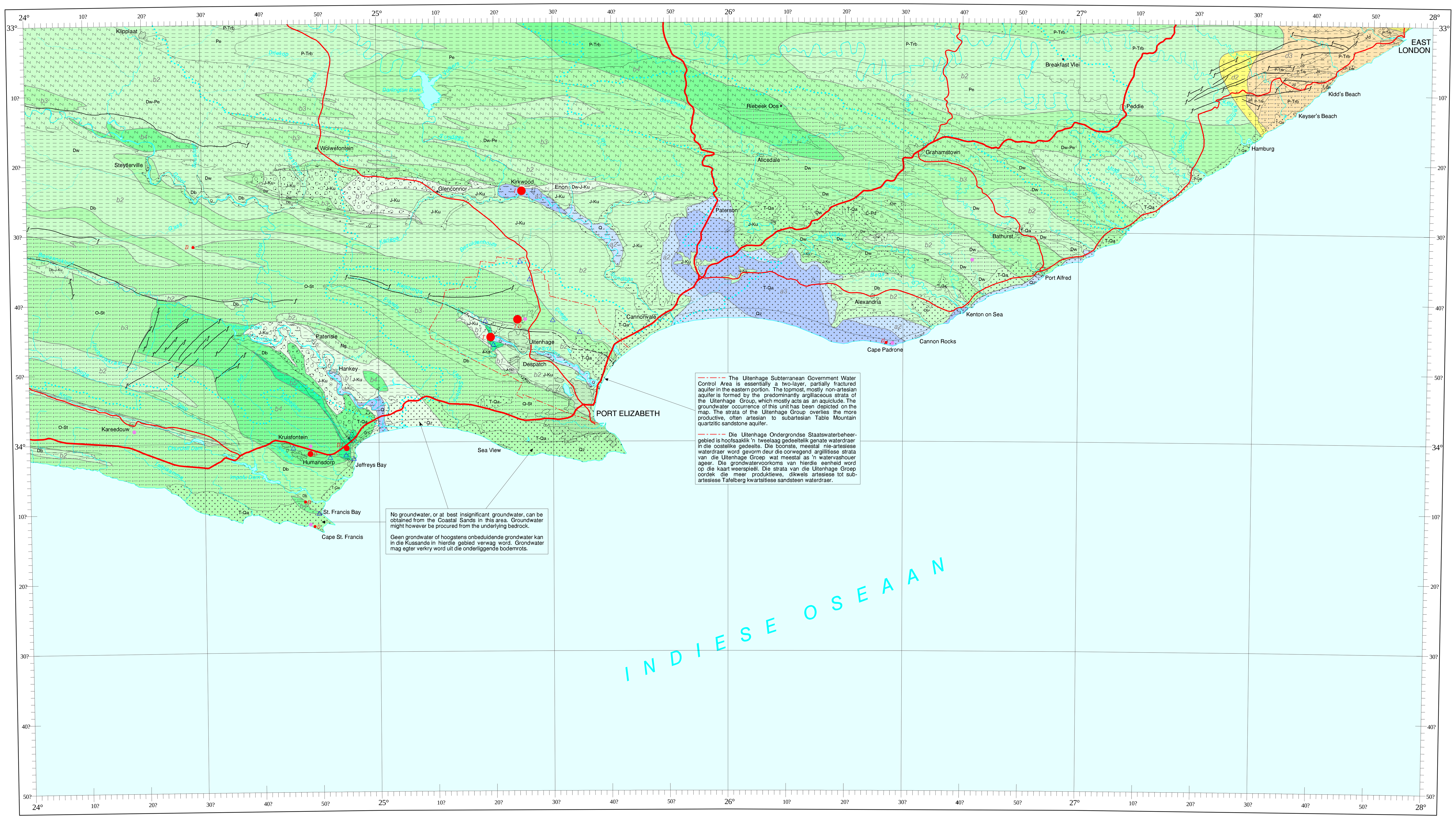
Sheet
Kaart 3324

1:500 000

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



PORT ELIZABETH

First Edition **1998** Eerste Uitgawe

10 0 10 20 30 40 50 60 km

Lambert?s conformal conic projection. Standard parallels 26°40? & 33°20?. Central meridian 26°.
Lambert se konforme koniese projeksie. Standaard parallelle 26°40? & 33°20. Sentrale meridiaan 26°.

P.S. Meyer - Map Author / Kaartskrywer
E. Louw - GIS Specialist / GIS Spesialis
E.B. Le Roux - Cartographer / Kartograaf

Assisted by / Bygestaan deur:
Mapping Management Team / Kaartbestuurspan:
P. Seward, P.S. Meyer, H. Mullin, F. Jonck, A.E. Conley and J. Baron
Editorial Board / Redigeerraad:
E. Braune, W.R.G. Orpen, Z.M. Dziembowski and F. Coetsee (Consultant / Konsultant)

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, were compiled by P.S. Meyer. The lithology was adapted by P.S. Meyer 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. J. Baron was responsible for the compilation of the borehole distribution map. Borehole data were obtained from the National Groundwater Data Base (NGDB) and the former Ciskei Department of Agriculture and Forestry data base. 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 and the coastline were obtained from the Chief Directorate : Surveys and Land Information, Department of Land Affairs and edited by the Department of Water Affairs and Forestry. Acknowledgement is accorded to : Steffen, Robertson & Kirsten (SRK) for supplying groundwater data from the former Ciskei.

Die grondwatervoorkoms- en grondwaterkwaliteitskaart, en die konseptuele illustrasie is deur P.S. Meyer, saamgestel. Die litologie is deur P.S. Meyer 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. J. Baron was verantwoordelik vir die samestelling van die boorgatverspreidingskaart. Boorgatdata is verkry vanaf die Nasionale Grondwaterdatabank (NGDB) en die voormalige Ciskeise Departement van Landbou en Bosbou databank. Die neerslag- en hoogtedata is verkry vanaf die Rekenaarsentrum vir Waternavorsing, Universiteit van Natal, en is saamgestel deur H. Mullin. Inligting van paaie, riviere, dorpe en die kuslyn is verkry vanaf die Hoofdirektoraat : Opmetings- en Grondinligting, Departement van Grondsake en geredigeer deur die Departement van Waterwese en Bosbou. Erkenning word verleen aan : Steffen, Robertson & Kirsten (SRK) vir die beskikbaarstelling van grondwaterdata van die voormalige Ciskei.

Principal groundwater occurrence / Hoof grondwatervoorkomste

Borehole yield class (median l/sec) / 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 / Tussenkorrelrig	*	a2	a3	*	*
Fractured / Genaat	b1	b2	b3	b4	b5
Karst / Karst	*	*	*	*	*
Intergranular and fractured / Tussenkorrelrig en genaat	*	d2	d3	*	*

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 weerspieël die waterdraertipe(s) met die hoogste boorgatlewering wat nie noodwendig ooreenstem met die oppervlaklitologie nie.

Surface lithology / Oppervlaklitologie

- Alluvium (clay, sand, gravel and boulders) / Alluvium (klei, sand, gruis en rolstene)
- Undifferentiated palaeo-coastal deposits (unconsolidated to semiconsolidated sediments including sand, calcrete, calcarenite, aeolianite, conglomerate, clay, silcrete and limestone) / Ongedifferensieërde paleo-kusafsettings (ongekonsolideerde tot halfgekonsolideerde sedimente waaronder sand, kalkreet, kalkareniet, eolianiet, konglomeraat, klei, silkreet en kalksteen)
- Predominantly argillaceous rocks (shale, carbonaceous shale, claystone, mudstone and siltstone) / Oorwegend argillitiese gesteentes (skalie, koolstofhoudende skalie, kleisteen, moddersteen en sliksteen)
- Predominantly diamictite (tillite) / Oorwegend diamiktiet (tilliet)
- Predominantly arenaceous rocks (sandstone, feldspathic sandstone, arkose, sandstone becoming quartzitic in places) / Oorwegend arenitiese gesteentes (sandsteen, feldspatiese sandsteen, arkose, sandsteen-wordend-kwartsities plek-plek)
- Predominantly rudaceous rocks (conglomerate and grit) / Oorwegend ruditiese gesteentes (konglomeraat en grintsteen)
- Mafic intrusive rocks (dolerite) / Mafiese intrusiewe gesteentes (doleriet)
- Undifferentiated rock and various mixed lithologies (Ng, Db, Dw, C-Pd, Pe, J-Ku) / Ongedifferensieerde gesteentes en verskeie gemengde litologieë (Ng, Db, Dw, C-Pd, Pe, J-Ku)
- Lithological / stratigraphical boundary / Litologiese / stratigrafiese grens
- Fault / Verskuiwing
- Inferred fault / Afgeleide verskuiwing
- Dolerite intruded / Doleriet geïntrudeerde

Large scale groundwater abstraction / Grootskaalse grondwateronttrekking

- 2 - 5 million m³/a / miljoen m³/j
- 1 - 2 million m³/a / miljoen m³/j
- 0.1 - 1 million m³/a / miljoen m³/j
- I Irrigation / Besproeiing
- D Domestic / Huishoudelik

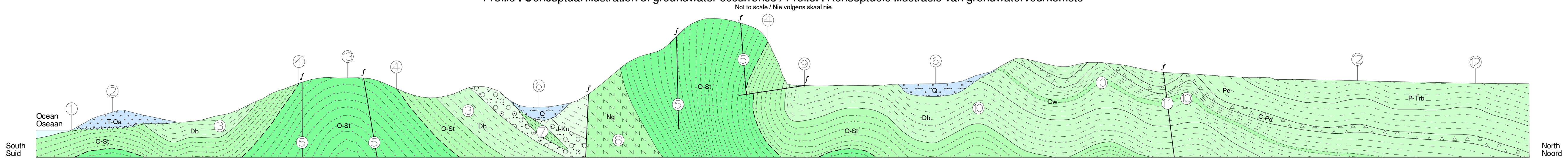
Chronostratigraphy / Chronostratigrafie

1	2	3	4	5	6
1.8	PHANEROZOIC / FANEROSO?KUM	Cenozoic / Senosoïkum	Quaternary / Kwartêr	Q	Alluvium (Q); Unnamed Coastal Sands (Qz) / Ongenoemde Kussande (Qz)
65			Tertiary / Tersiêr	T	Algoa G. (T-Qa)
142		Mesozoic / Mesosoïkum	Cretaceous / Kryt	K	
205			Jurassic / Jura	J	Uitenhage G. (J-Ku); Dolerite / Doleriet (Jd)
248			Triassic / Trias	Tr	
290		Palaeozoic / Paleosoïkum	Permian / Perm	P	Beaufort G. (P-Trb); Ecca G. (Pe)
354			Carboniferous / Karboon	C	Dwyka G. (C-Pd)
417			Devonian / Devoon	D	Witteberg G. (Dw); Bokkeveld G. (Db)
443			Silurian / Siluur	S	
495			Ordovician / Ordovisium	O	Table Mountain G. / Tafelberg G. (O-St)
545			Cambrian / Kambrium	Є	
900	PROTEROZOIC / PROTEROSO?KUM	Namibian / Namibium		N	Gamtoos G. (Ng)
2050		Mokolian / Mokolium		M	
2650		Vaalian / Vaalium		V	
3100	ARCHAEOZOIC / ARGEOSO?KUM	Randian / Randium		R	
		Swazian / Swazium		Z	

1 = Million years before present / Miljoen jaar voor huidige (Council for Geoscience, 1997 / Raad vir Geowetenskap, 1997)
2 = Eonothem (Eon) / Eonoteem (Eon)
3 = Erathem (Era) / Erateem (Era)
4 = System (Period) / Sisteem (Periode)
5 = Symbol / Simbool
6 = Complex (C), Suite (S), Group (G), Formation (F) (with symbol) / Kompleks (C), Suite (S), Groep (G), Formasie (F) (met simbool)

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

Not to scale / Nie volgens skaal nie



1. Springs issuing from the basal Alexandria conglomerate ( ), occur sporadically along the coast / Fonteine wat uit die basale Alexandria konglomeraat ( ) ontspring, kom sporadies langs die kus voor
2. Groundwater can be obtained from the discontinuous basal Alexandria conglomerate of the Algoa Group / Grondwater kan in die nie-deurlopende basale Alexandria konglomeraat van die Algoa Groep ontgin word
3. Joint structures in subordinate sandstone lithozones, interbedded in largely incompetent Bokkeveld Group shales can be utilised for groundwater development / Naatstrukture in ondergeskikte sandsteenlitosones wat tussengelaagd in die inkompetente skalies van die Bokkeveld Groep voorkom, kan gebruik word vir grondwaterontwikkeling
4. Numerous springs in the Table Mountain Group issue due to the presence of groundwater-impeding shale layers such as the shale of the Cedarberg Formation/ Talle fonteine in die Tafelberg Groep ontspring danksy die aanwesigheid van grondwater-syferdigte lae soos die skalie van die Sederberg Formasie
5. The competent quartzitic sandstones of the Table Mountain Group contain numerous faults, other fractures and joints, which can be targeted for groundwater development / Die kompetente kwartsitiese sandstene van die Tafelberg Groep bevat talryke verskuiwings, breuke en nate wat aangewend kan word vir grondwaterontwikkeling
6. Regardless of the groundwater exploitation potential of alluvium, it also often acts as a storage and recharge medium to underlying jointed hard rocks / Ongeag die grondwaterontginningspotensiaal van alluvium, dien dit ook dikwels as 'n bergings- en aanvullingsmedium vir onderliggende genate harde rotse
7. Interbedded, often porous sandstone lenses in conglomerate and shale beds of the Uitenhage Group, do possess groundwater development potential / Tussengelaagde, dikwels poreuse sandsteenlense in konglomeraat- en skalielae van die Uitenhage Groep, beskik wel oor grondwaterontwikkelingspotensiaal
8. Grit, limestone, joint and fault structures in the Gamtoos Group can be aimed at for groundwater development / Grintsteen, kalksteen, naat- en verskuiwingstrukture in die Gamtoos Groep, kan aangewend word vir grondwaterontwikkeling
9. Overfolding and thrust faulting are common and often impede the movement and development of groundwater / Oorplooiing en stootverskuiwings kom algemeen voor en is dikwels belemmerend vir die beweging en ontwikkeling van grondwater
10. Subordinate sandstone lithozones in anticlines, backed by favourable recharge conditions, can be used to obtain groundwater in the largely argillaceous beds of the Bokkeveld, Witteberg, Ecca and Beaufort Groups / Ondergeskikte sandsteenlitosones in antiklines, gesteun deur gunstige aanvullingstoestande, kan gebruik word vir grondwaterontginning in die oorwegend argillitiese lae van die Bokkeveld, Witteberg, Ecca en Beaufort Groepe
11. Numerous smaller faults occurring in the Bokkeveld, Witteberg, Ecca and Beaufort Groups possess groundwater potential / Talle kleiner verskuiwings wat waterdraend is kom in die Bokkeveld, Witteberg, Ecca en Beaufort Groepe voor
12. Folding gradually diminishes northwards and fold structures consequently play a less important role in the occurrence of groundwater / Plooiing neem geleidelik noordwaarts af en plooistrukture speel gevolglik 'n minder belangrike rol in die voorkoms van grondwater
13. Joints and fractures on crests of anticlines can be targeted for groundwater development / Nate en breuke op kruine van antiklines kan aangewend word vir grondwaterontwikkeling

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

Nota: Vir bykomende inligting aangaande grondwatervoorkomste raadpleeg meegaande brosjure.

- Spring / Fontein
- Waterlevel recorder / Watervlakregistreerder
- Subterranean Government Water Control Area / Ondergrondse Staatswaterbeheergebied
- Primary drainage region boundary / Primêre dreineringsgebiedsgrens
- Perennial / primary river / Standhoudende / primêre rivier
- Secondary river / coastline / Sekondêre rivier / kuslyn
- Non-perennial river / Nie-standhoudende rivier
- Dam / Dam
- City / town area / Stads- / dorpsgebied
- Town / Dorp
- National road / Nasionale pad
- Main road; Inset map: National road / Hoofpad; Insetkaart: Nasionale pad
- Inset map: Main road / Insetkaart: Hoofpad
- * Not applicable to this map / Nie van toepassing op hierdie kaart nie

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 Arc/Info 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

Published by:
Department of Water Affairs and Forestry

Printed by:
Associated Printing
Cape Town

State copyright 1998

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 riglyne beskou word. Verdere geologiese inligting kan vanaf die Raad vir Geowetenskap verkry word. Die kaartreeks is vervaardig met Arc/Info programmatuur.

Digitale data, kopieë van die kaart en meegaande brosjure kan verkry word vanaf:

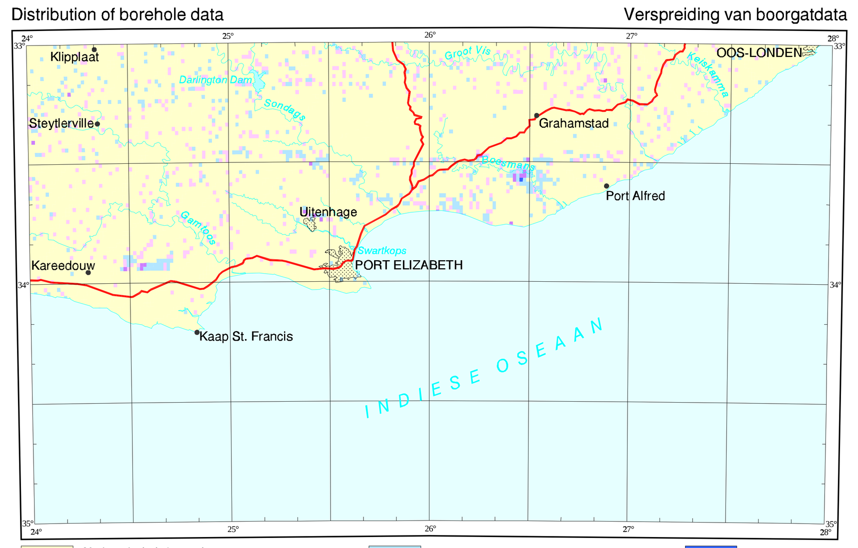
Direktoraat: Geohidrologie
Departement van Waterwese en Bosbou
Privaatsak X313
Pretoria
0001

Gepubliseer deur:
Departement van Waterwese en Bosbou

Gedruk deur:
Associated Printing
Kaapstad

Staatsouteursreg 1998

Distribution of borehole data / Verspreiding van boorgatdata



- No borehole information / Geen boorgatinligting
- 1 Borehole / Boorgat
- 2 - 10 Boreholes / Boorgate
- 11 - 20 Boreholes / Boorgate
- > 20 Boreholes / Boorgate

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

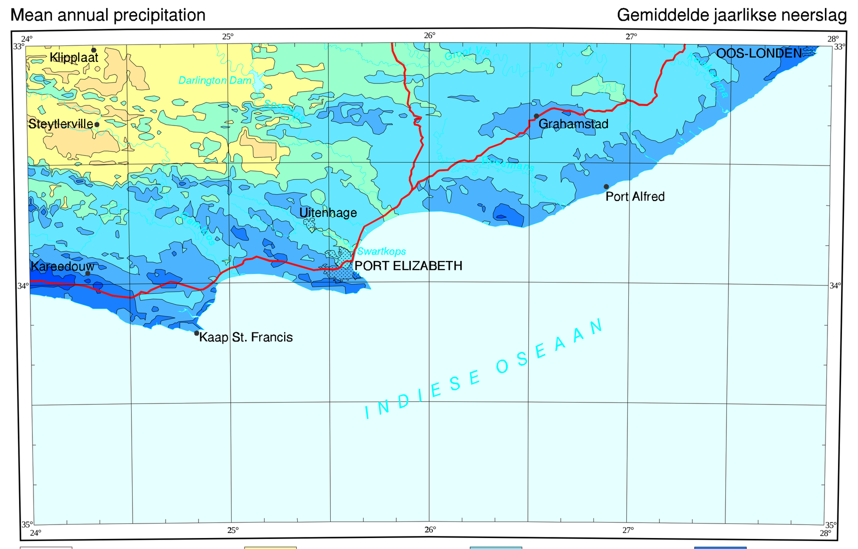
1:2 000 000

Elevation above sea level / Hoogte bo seevlak

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

1:2 000 000

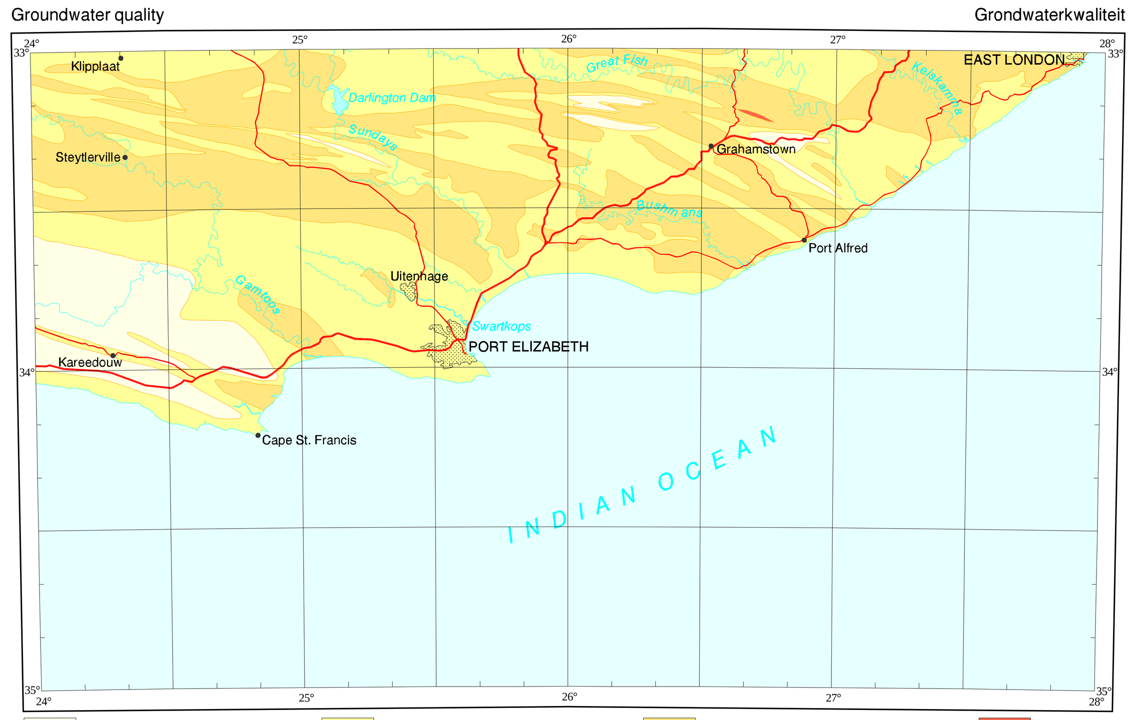
Mean annual precipitation / Gemiddelde jaarlikse neerslag



- 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

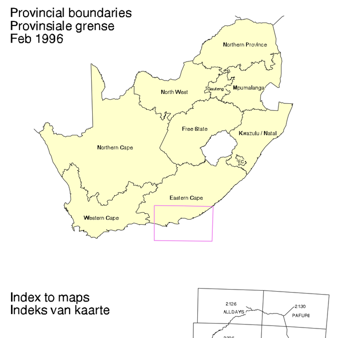


- 0 - 70 mS/m
- 70 - 300 mS/m
- 300 - 1000 mS/m
- > 1000 mS/m

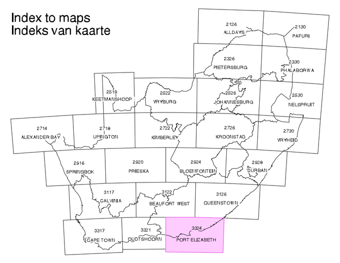
Electrical conductivity contour —— Elektriese geleidingsvermoëkontoer

1:1 500 000

Provincial boundaries
Provinsiale grense
Feb 1996



Index to maps
Indeks van kaarte



PORT ELIZABETH 3324