THE PRE-KALAHARI

GEOLOGICAL MAP OF

THE REPUBLIC OF BOTSWANA

1997

GEOLOGICAL SURVEY DEPARTMENT, LOBATSE

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GEOLOGY COMPILED BY R.M. KEY, PhD.

Geophysical Information

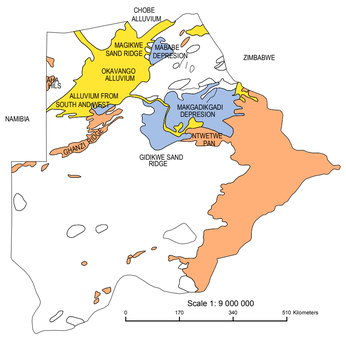
provided by D.I. Koosimile and H. Koketso

Anglo American Corporation Botswana, De Beers Exploration Botswana, Debswana Botswana Diamond Company, Kalahari Exploration, MPH, Trillion Botswana, Water Resources Botswana, Water Surveys Botswana and Wellfields Botswana provided data from their respective mineral exploration programmes.

The geological map of Western Ngamiland is based on a Compagnie Géné rale de Géophysique draft geological interpretation map of their 1996/1997 aeromagnetic survey of Western Ngamiland.

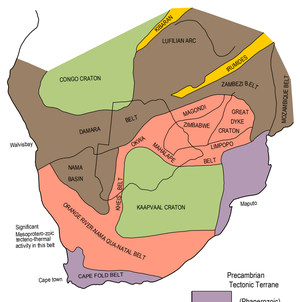
Scale 1:1 500 000

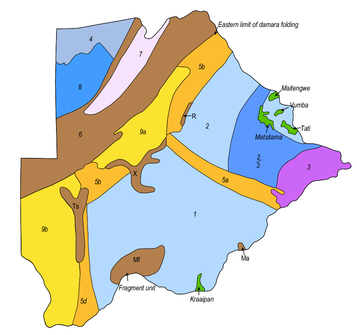
0 40 80 120 160 200 Kilometers



The post-Karoo deposits of the Kalahari Desert area of Botswana.

Key	
Pre-Kalahari Group outcrops	Alab or sief crests
Alluvium	Transverse dune fields
Lacustrine deposits	Distribution limit of most of the major calcrete rimmed pans
Major shoreline and ridges	Major area with calcrete at outcrop or





Major Pre-Karoo tectonic terranes and major mafic-complexes

Okwa Belt		*Weakly deformed Neoproterozoic rocks on? Paleoproterozoic crust*	Plate Boundary Zone between Limpopo Belt and Zimbabwe craton		
Nosop- Nosjane Basin			*Limpopo Belt **		
Passarge Basin		*Neoproterozoic Damara Orogenesis of Neoproterozoic & Mesoproterozoic rocks*	Zimbabwe Craton	*Archaean Terranes*	
Kihabe complex			Kaapvaal Craton	*with exposed greenstones*	
Kwando complex			The Limpopo Belt has undergone severe Palaeoproterozoic re-working		
Ghanzi-Chobe Belt			**Major Mafic Complexes**		
Kheis Belt		*Palaeoproterozoic Eburnian Terranes*	Rakops	?	
Gweta Belt			Xade	?	
Mahalapye Belt			Tshane	?	
? Congo craton			Molopo Farms	Palaeoproterozoic	
			Modipe	Archaeam	

TOPOGRAPHICAL LEGEND

- International boundary
- City
- Town or large Village
- Small village
- Main road
- Secondary road
- Railway
- River

OTHER GEOLOGICAL INFORMATION

- Fault
- Dyke
- Infered fault
- Mine
- Shear
- Shear zone
- Thrust, tooth on upper plate

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Published by the Director with the authority of the Ministry of Mineral Energy and Water Resources

Topography based on the information supplied by the Department of Surveys and Mapping, Gaborone

Copies of this map are obtainable from the Director of Department of Geological Survey, Private Bag 14, Lobatse Republic of Botswana

Tropic of Capricon

LEGEND

Kvd	Undifferentiated intrusive and/or extrusive Karoo dolerite/basalt		Karoo volcanics		
Kv	Flood basalt, variably amygdaloidal with minor siliciclastic sedimentary interbeds and lenses		Karoo volcanics	Upper karoo	Jurassic (c180 Ma)
KL	Orange, red or white sandstone, locally calcareous with reddish siltstone increasingly common downwards		Lebung Group	Supegroup	Triassic to Jurassic
KB	Pale grey, non-carbonaceous siltstone, mudstone and thin limestone		Beaufort Group	Lower Karoo Supegroup	Permian to Lower Triassic
KE	Interbedded coal, carbonaceous siltstone and mudstone and white poorly cemented arkosic sandstone and rare tonstein		Ecca Group		
KD	Assorted glacial deposits including diamictite, very thinly laminated siltstone (varvite) and sandstone		Dwayka Group		Carboniferous to Early Permian
DN	Breccio-conglomerate, variably calcareous sandstone and siltstone		Nama Group		Neoproterozoic & or cambrian
OK	Felsite, quartzite, siltstone, volcaniclastic sedimentary rock, arkosic sandstone, mudstone, limestone		Okwa Group		Neoproterozoic &/or cambrian
Pg	Dolomitic limestone, ironstone, chert, sandstone, quartzite, conglomerate	Shoshong Formation	Palapye Group	Palapye Group	Palaeoproterozoic
Pl	Varicoloured, micaceous siltstone and shale	Lotsane Formation			
Pt	Reddish sandstone, quartzite, conglomerate, ironstone, shale and siltstone	Tswapong Formation			
Pm	Shale, siltstone and limestone	Moeng Formation			
Ps	Reddish, locally manganiferous sandstone, quatzite, conglomirate, andesitic lava and tuff, shale	Selika Formation			
Wu	Reddish, siliciclastic sedimentary rocks, mostly sandstone and conglomerate		Undifferentited Waterberg Group		
Wt	Sandstone	Twee River Sandstone Formation	Waterberg Group		
Wp	Arkosic sandstone and quartzite	Palla Sandstone Formation			
Wr	Reddish-purple to pink, weakly calcareous shale, siltstone and fine-grained sandstone	Ramotlabaki Siltstone Formation			Palaeoproterozoic
Ws	Reddish arkosic sandstone, quartzite, greywacke, siltstone, conglomerate and shale	Masama Sandstone Formation			
Wl	Reddish siltstone with thin mudstone and shale	Lokgalo Sandstone Formation			
Wm	Reddish sandstone and conglomerate	Mannyelanong Hills Formation			
OT	Reddish sandstone, conglomerate and micaceous siltstone with minor shale and breccia		Otse Group		
Tb Tu Tv	Interbedded reddish quartzite, shale variably manganiferous and carbonaceous siltstone with chert, limestone, ironstone, andesitic volcanics (Tv) and breccia (Tb)			Upper Transvaal Supergroup	
Ti Tl	Basal quartzite (Black Reef Quartzite), dolomitic limestone, chert, minor limestone, ironstone (Ti), variably carbonaceous siltstone and shale			LowerTransvaal Supergroup	Neoarchaen & Palaeoproterozoic
Lu	Rhyolitic volcanics, breccio-conglomerate, siltstone, mudstone and shale	Nnywane & Mogobane Formation	Lobatse Group		Neoarchaean (c 2781 Ma)
Lk	Homogeneous felsite	Kanye Formation			

METAMORPHIC ROCKS (ALTERED EXTRUSIVE ROCKS AS WELL AS METAMORPHIC ROCKS OF UNCERTAIN ORIGIN).

md	Metadolerite	Various ages			Precambrian
WC	Granitic gneiss, granite, amphibole-gneiss, migmatite and metadolerite		Kwando Complex		?<550 Ma)?
OA	Dolomitic marble and chert	Aha Hills formation			? Neoproterozoic
RB	Amphibolite, magnetite-schist and granitic gneiss		Roibok Group		? Neoproterozoic
DZu	Weakly metamorphosed purple-red to greenish grey, siliciclastic sedimentary rocks		Undifferentiated Ghanzi Group		Neoproterozoic
DZm	Weakly metamorphosed purple-red arkosic sandstone, limestone and siltstone	Mamuno Formation	Ghanzi Group		
DZd	Weakly metamorphosed, greenish-grey arkosic sandstone and siltstone, mudstone and rhythmite with Cu-Ag	D'kar Formation			
DZn	Weakly metamorphosed, purple arkosic sandstone	Ngwako Pan Formation			
DZc	Metamorphosed calcareous sandstone and siltstone	Chinamba Hills Formation			
CH	Igneous and meta-igneous rocks		Chihabadum Complex		? Neoproterozoic

KKg	Paragneiss?		Konaka group		
KK	Dolomitic marble and poorly exposed granitic gneiss				? Neoproterozoic
Sks SK	Metamorphosed rhyolitic and basaltic volcanics and volcanidastic sedimentary rocks (SKs)	Kgwebe Formation	Sinclair Group		
Sg	Metamorphosed rhyolitic volcanic S and volcanistic sedimentary rocks with chert	Goha Hills Formation			Goha Hills Formation
TS	Ferruginous and micaceous quartzite, quartz-mica-schist, metamorphosed conglomerate, minor shale, phyllite, sandstone and ironstone (i)		Tsodilo Hills Group		? Palaeoproterozoic
XAn XA	Assorted metasedimentary (siliciclastic and carbonate) rocks including prominent ironstones (i). Areas with negative magnetic signature(XAn) shown to highlight structure		Xaudum Group		? Palaeoproterozoic
QM	Granitic gneiss		Quangwadum Group		? Palaeoproterozoic
OS	White to reddish quartzite with minor shale and ironstone (i)		Olifants hoek Group		Palaeoproterozoic
OC	Porphyritic felsite, granite, granitic gneiss, microgranite and metadolerite		Okwa Complex		Palaeoproterozoic (c2000 Ma)
GM	Metamorphosed arkosic sandstone, limestone, shale, mudstone, ironstone		Mabuasehube Group	Griqualand West Supergroup	Palaeoproterozoic
g	Banded, quartzofelpathic gneiss				Archaean
h	Amphibolite				Archaean
i	Ironstone				
m	Undifferentiated metasedimentary rock				Archaean
r	Meta-felsic volcanic rock				Archaean
v	Undifferentiated greenschist facies metavolcanic rock				Archaean
*G	Porphyritic, locally gneissic granite		(includes: Seoka Adamellite*Gs)		Archaean
'G	Gneissic granite				Archaean
X	Undifferentiated migmatite		(includes: Mahalapye Migmatite, Xm)		Archaean & Palaeoproterozoic
	Meta -ultramafic rock				Archaean
mE	Meta-gabbro				Archaean
mA	Meta-anorthositic rock				Archaean
Xg	Unexposed metamorphic rocks of uncertain lithology				Precambrian

UNMETAMORPHOSED INTRUSIVE ROCKS

⁘	Kimberlite and related explosive intrusive rocks		Various ages from Precambrian to Cretaceous
D	Dolirite dyke		Various ages mostly Jurassics (Late karoo)
	Dolerite sheet and stock		
G	Granitic dyke		Various ages
H	Diorite (H Mænzonite)	(includes:Gaborone Granite Complex Hk: kubung complexes Hu)	?Archaean
E	Gabbro	(includes: Modipe Gabbro Eu)	Various ages from Archaean (Pre-2781 Ma-Modipe Gabbro) to Jurassic (Late Karoo
F	Felsite		Archaean & Palaeoproterozoic
G	Granite	(includes: Gaborone Granite GG: Mmathethe Granite GA: Timbale Granite Gr Mahalapye Granite GM: Kubu island Granite Gk)	Archaean & Palaeoproterozoic
N	Norite		Precambrian
Sy	Syenite	(includes: Segwagwa Complex Syw Semarule Syenite Sys)	Archaean & Palaeoproterozoic
U	Undifferentiated Ultrabasic	(includes: Lower, Molopo Farms Complex Um)	Archaean & Palaeoproterozoic