

**Palaeontological Heritage component of FibreCo Telecommunications, basic
assessment for the proposed fibre optic data cable project:
Route 4: George to Port Elizabeth**

DEA REFERENCE: 12/12/20/2160

Prepared for: SRK Consulting

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Background

SRK Consulting Pty (Ltd) (“SRK”) has been appointed by FibreCo Telecommunications (“FibreCo”), to undertake a BAR in terms of the National Environmental Management Act (NEMA), (Act No. 107 of 1998) as amended in 2010 for the construction and operation of an optic fibre data cable and associated infrastructure linking certain cities and towns in South Africa. The authorisation of the BA study will be managed by the Department of Environmental Affairs (DEA).

This BA (DEA reference 12/12/20/2160) deals with the section of the route linking George and Port Elizabeth. Separate BA’s are being undertaken for other sections of the route in South Africa. The FibreCo data cable is anticipated to follow national/ provincial road servitudes. Exact details regarding road cutting and river crossings have not yet been finalized.

Rob Gess consulting was contracted on 17th March 2011 to conduct a phase one Palaeontological Impact Assessment for this and five other routes. A drive through examination of this entire route was conducted together with a desktop assessment.

Geology and Palaeontology

The Geology of this route includes ancient pre-Gondwanan sediments of the Kaaimans Group, associated with the break up of Rodinia between 700 and 600 million years ago; granite intruded into these sediments around 550 million years ago; Agulhas Sea Gondwanan sediments, of the Table Mountain Group and lowermost Bokkeveld Group (Cape Supergroup), deposited between 500 and 400 million years ago; Late Jurassic and early to mid Cretaceous sediments of the Enon and Kirkwood Formation deposited between about 150 and 120 million years ago; as well as a range of Tertiary deposits dating to the last 30 million years.

The **Kaaimans Group**, situated near Natures Valley consists of a number of subunits, the Sandkraal Formation, Skaapkop Formation, Soetkraal Formation and Victoria Bay Formation. These units were deposited as sediments in a shallow sea that opened between the Kaapvaal Craton (consisting of most of southern Africa) and the Falklands Plateau situated to the south, approximately 700 million years ago. These sediments were extensively metamorphosed approximately 600 million years ago due to compression resulting from the closure of this Sea and its compaction between continental landmasses. Resultant crustal thickening led to the formation of Granite magma which intruded these metamorphosed sediments between 600 and 500 million years ago. Former shaly units have been transformed into schists, destroying any possible traces of past life. The sandier, well layered Sandkraal Formation alone has the potential to preserve evidence of past life. Records of metazoan life from such ancient rocks are, however, extremely rare and generally microscopic. As yet no fossils have been found in this unit.

Most of this route is situated over strata of the **Cape Supergroup**. More specifically the **Table Mountain Group** and lower portions of the **Bokkeveld Group** are represented. These rocks represent sediments deposited in the Agulhas Sea, which had opened to the south of the current southern African landmass in response to early rifting between Africa and South America.

The Table Mountain Group constitutes the first of three subdivisions of the Cape Supergroup. It comprises quartzitic sandstones derived from coarse sands deposited within the Agulhas Sea, and along its coastal plane. It was deposited during the Ordovician, Silurian and earliest Devonian Periods, approximately 500-400 million years ago. Between the mountains and the Sea, from the current positions of Port Elizabeth to George, a broad wave cut platform was developed about 30 million years ago during the Miocene. The result of this is that there is very little outcrop of less resistant (and generally more fossiliferous) strata along this route. Palaeontologically significant outcrops are generally restricted to river valleys that have subsequently carved deep gorges into this coastal plain.

The route is dominated by underlying strata of the Peninsular Formation, a sandy unit from which rare trace fossils have been recorded in the Western Cape, but which has, as yet, provided no palaeontological material in the Eastern Cape. Sandy units within the Table Mountain Group are generally of low palaeontological sensitivity.

More importantly, shale and mudstone interbeds within the Table Mountain Group are known to contain rare records of early Agulhas Sea life. Significantly the Soom and Disa shales of the Cederberg Formation provide an extremely valuable record of latest Ordovician life. The Soom shale exhibits soft tissue preservation, and has yielded specimens of primitive jawless fish, eurypterids, trilobites, orthocone nautiloids, brachiopods and molluscs. A brachiopod dominated invertebrate fauna has also been recorded from the somewhat sandier overlying Disa Formation. In addition to brachiopods this fauna includes trilobites, bryozoans, crinoids, tentaculitids and crustaceans. Due to poor outcrop, fossil faunas of this unit have not yet been uncovered in the Eastern Cape.

The Baviaanskloof Formation, uppermost unit of the Table Mountain Group has been recorded, particularly within the Klein Karoo, to contain concentrated lenses of invertebrate fossils which help to establish an earliest Devonian age for this Formation. They provide very early examples of the cold water marine Malvinokaffric invertebrate faunas that characterised the near polar Agulhas Sea during deposition of the Bokkeveld Group and its equivalents in south eastern South America. The Baviaanskloof Formation fossil record is dominated by brachiopods, but also includes the remains of trilobites, bivalves, gastropods and tentaculitids. Some burrow fills are also known.

Extremely important new outcrops of fossiliferous material within the Baviaanskloof Formation have recently been discovered during PIA survey work in the Eastern Cape. These include invertebrate bearing beds containing remains of bivalves, brachiopods, trilobites, tentaculitids and echinoderms, trace fossils, as well as South Africa's oldest plant fossil locality. South Africa's previously oldest plant fossil, *Dutoitia pulchra* (Hoeg, 1930), collected within this study area from the Blaaukrantz River Pass, may well be of the same age.

The Bokkeveld Group, constituting the middle subdivision of the Cape Supergroup conformably overlies the Table Mountain Group. Bokkeveld strata consist largely of shales and thin interbedded sandstones derived from marine continental slope muds of early to mid Devonian (+/- 400 - 370 myo) age – which were deposited within the basin of the Agulhas Sea.

A roughly east-west trending syncline, bounded in the north and south by rocks of the Peninsular Formation of the Table Mountain Group, extends from near Jeffreys Bay to Plettenberg Bay. Progressively younger formations of the Table Mountain Group outcrop towards the centre of the syncline, in which shales of the Ceres Subgroup of the Bokkeveld Group are exposed.

Shales of the Ceres Group also underlie the route north of Jeffreys Bay and west of Humansdorp, but these are deeply weathered and present no outcrop.

Lower Bokkeveld Group strata have yielded abundant fossil evidence of a range of early to mid Devonian deep water invertebrate faunas comprised of diverse brachiopods, molluscs, echinoderms and trilobites. In addition a few very localised but exciting fish fossils have been described. Trace fossils are also known.

Only two areas of palaeontological sensitivity were identified along this route. These are the gorges of the Blaaukrantz and Kleinbos rivers, in which the route crosses upper Table Mountain Group and lower Bokkeveld Group shales exposed within the centre of the east-west trending syncline. It is not yet clear how the cable will cross these deep gorges, but SANRAL has indicated that it will not be willing to allow the cable to be attached to the bridges. It seems highly likely that, in the case of the Blaaukrantz River gorge, the cable line will need to be routed along the old Blaaukrantz River Pass, somewhat to the north of the main route. This route is of high palaeontological sensitivity as it, unusually, provides good outcrops of mudstones and shales of the upper Table Mountain group. These include the type locality of *Dutoitia pulchra*, South Africa's oldest described plant fossil.

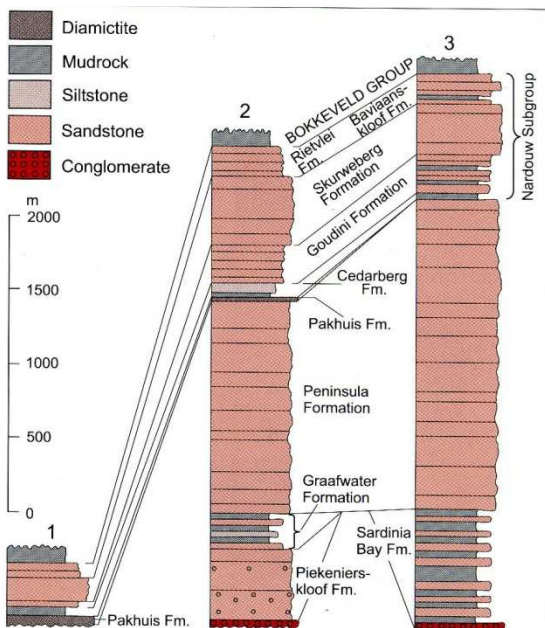


Fig. 1. Stratigraphy of the Table Mountain Group, 3 represents the Eastern Cape (Johnson *et al.*, 1999)

Late Jurassic and Early to Mid Cretaceous sediments of the **Enon** and **Kirkwood Formations (Uitenhage Group)** were deposited in small basins that formed along the southern margin of South Africa due to stretching and tearing associated with the final breakup of Gondwana. Although the Enon Formation, consisting of pebbly conglomerates deposited in high energy terrestrial environments, is very poor in fossil content, much of what we know of Cretaceous vertebrate life comes from evidence preserved within riverine deposits of the Kirkwood Formation. These include the remains of a number of Dinosaur taxa, principally from the Algoa Basin. Outcrops of the Kirkwood Formation along this route are extremely restricted. There are no outcrops along the route in the immediate vicinity of Port Elizabeth, and occurrences on the east side of the Gamtoos River do not impinge on the road reserve. Outcrops near Plettenberg Bay are insignificant. Better exposures are apparent where the route circumscribes the Knysna Lagoon, however these are very weathered and unlikely to be palaeontologically significant.

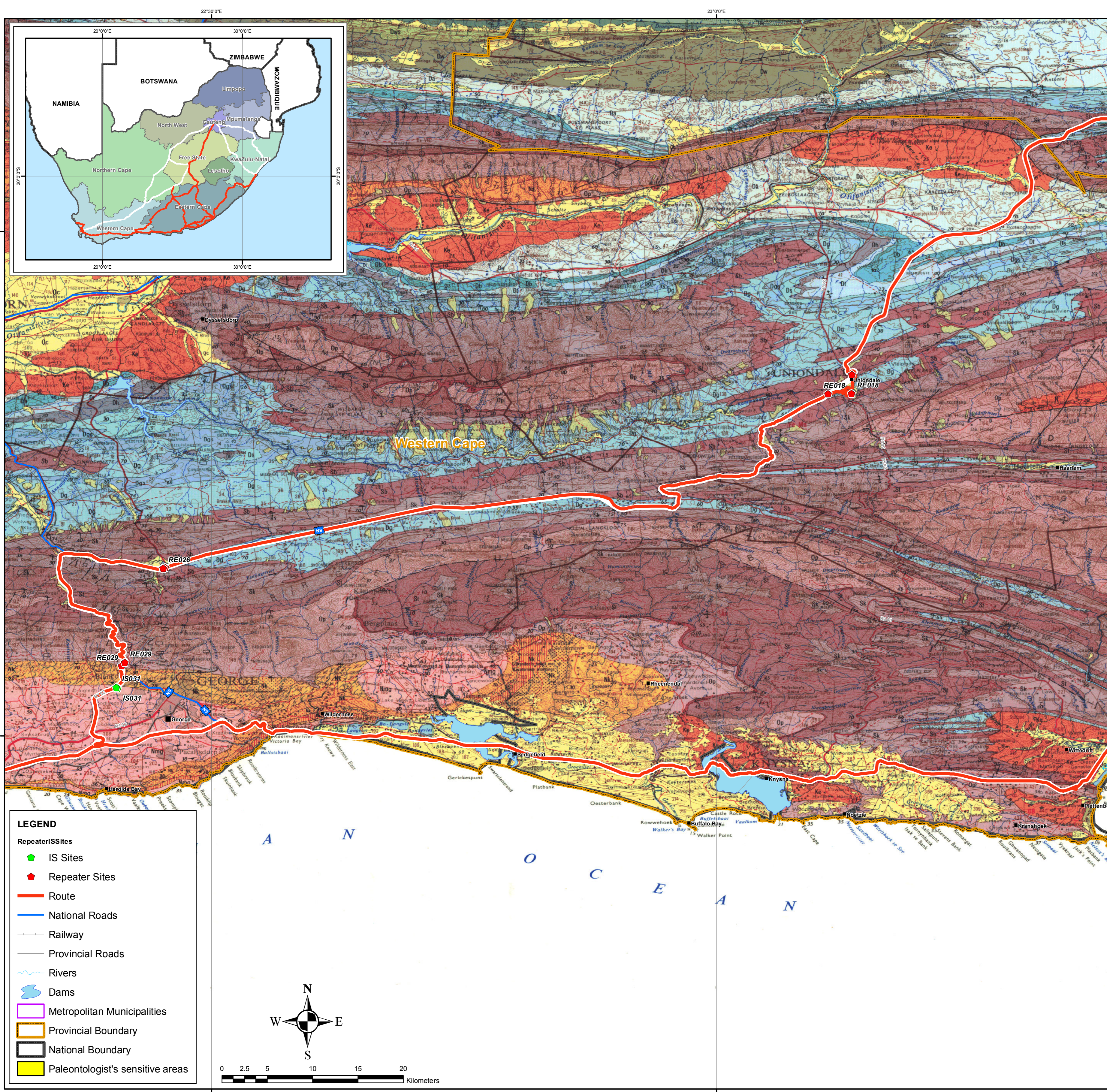
In the vicinity of Port Elizabeth much of the bedrock is covered by partially consolidated sand dunes of the **Nanaga Formation**, which are unfossiliferous. Other Tertiary deposits such as the **Wankoe Formation** between Plettenberg Bay and Natures Valley, and the lime rich **Bluewater Bay Formation** east of Jeffreys Bay are also not considered to be palaeontologically sensitive.

Conclusion and Recommendations

Very little palaeontological material is likely to be impacted by this development. This is largely the result of deep weathering and marine erosion of strata during the Miocene, which have removed most topography and limited outcrops. Extensive covers of unfossiliferous Tertiary material further mask the ancient bedrock.

Only two areas of palaeontological sensitivity were identified along this route. These are the gorges of the Blaaukrantz and Kleinbos rivers, in which the route crosses upper Table Mountain Group and lower Bokkeveld Group shales exposed within the centre of an east-west trending syncline. As SANRAL is unwilling to allow the cable to be attached to the bridges, it seems highly likely that, in the case of the Blaaukrantz River gorge, the cable line will need to be routed along the old Blaaukrantz River Pass, somewhat to the north of the main route. This route is of high palaeontological sensitivity as it, unusually, provides good outcrops of mudstones and shales of the upper Table Mountain group. These include the type locality of *Dutoitia pulchra*, South Africa's oldest described plant fossil.

It is recommended that cutting of a route through the Blaaukrantz River and Kleinbos River gorges is monitored by a qualified palaeontologist.



GEOLOGICAL LEGEND				GEOLOGIESE LEGENDE					
GROUP	SUBGROUP	FORMATION	MEMBER	SEDIMENTARY COLUMN/SEDIMENTÊRE KOLOM	LITHOLOGY				
CAPE SUPERGROUP	TABLE MOUNTAIN/TABIEBERG			Andean sand	Andean sand				
				Waarstrand	Waarstrand				
				Alluvial valley deposits	Alluviale vallei-afsettings				
				Alluvial slope deposits	Alluviale oewerwalafsettings				
				Fixed dunes and dune rock	Gevestigde duine en duingesteente				
				Talus, debris and alluvial fan	Talus, puin en poenwaier				
				Calcrete and hardpan	Kalkroet en hardepan				
				Intermediate and low-level terrace gravel	Intermediaire en lae-terrasgrus				
				Marine and estuarine terrace gravel and sand, partly calcareous	Maritieme en estuariese terrasgrus en sand, gedeeltelik kalkhoudend				
				High-level terrace boulders, gravel, siltstone and ferricrete	Hoëterrasblikke, gruis, siltsteen en ferriekraai				
				Conglomerate, sandstone, siltstone, clay	Konglomeeraal, sandsteen, siltsteen, klei				
				Mudstone (red in places), sandstone ("Poirijie sandstone" at base)	Modersteens (rooi plek-plek rooi), sandsteen ("Poirijiesandsteen" aan basis)				
				Modersteens (pink-plek rooi), sandsteen ("Poirijiesandsteen" aan basis)	Modersteens (rooi plek-plek rooi), sandsteen				
				Shale with isolated thin sandstone bands	Skalie met enkele dun sandsteenbande				
				Shale with isolated thin sandstone bands	Skalie met enkele dun sandsteenbande				
SUPERGROUP KAAP	WITTEBERG			Mottled grey sandstone, shale	Mottelde grys sandsteen, skalie				
				Arenaceous shale with subordinate sandstone. Thickness increases westward (indicated as follows where necessitated by scale ----)	Arenaceous shale with subordinate sandstone. Thickness increases westward (indicated as follows where necessitated by scale ----)				
				Greenish grey shale (Prince Albert), white-weathering black shale with chert (Whitehill), rhythmically-bedded grey shale, thin bedded (Collingham)	Groenig-grys skalie (Prins Albert), witverwonderde swart skalie met chert (Whitehill), ritmiespelgde grys skalie, dun tuffalies (Collingham)				
				Tuffalies (Collingham)	Tuffalies (Collingham)				
				Siltstone, subordinate shale	Siltsteens, ondergeskiede skalie				
				Shale with quartzitic sandstone and siltstone (Forsikraai Formation) (indicated as follows where necessitated by scale ----)	Skalie met kwartsitiese sandsteen en siltsteens (Formasie Forsikraai) (as volg aangedui waar deur skaal genoodsaak ----)				
				Quartzitic sandstone	Kwartsitiese sandsteen				
				Arenaceous shale, siltstone, sandstone	Arenaceous shale, siltsteens, sandsteens				
				Sandstone, siltstone, sandstone	Sandsteens, siltsteens, sandsteens				
				Siltstone, shale, arenaceous shale	Siltsteens, skalie, arenaceous shale				
				Siltstone, sandstone, shale	Siltsteens, sandsteens, skalie				
				Shale siltstone, arenaceous shale	Skalie, siltsteens, arenaceous shale				
				Shale, siltstone, arenaceous shale	Skalie, siltsteens, arenaceous shale				
				Shale, siltstone, arenaceous shale	Skalie, siltsteens, arenaceous shale				
				SUPERGROUP KAAP	BOEKVELD			Shale, siltstone, arenaceous shale	Skalie, siltsteens, arenaceous shale
Sandstone (indicated as follows where necessitated by scale ----)	Sandsteens (as volg aangedui waar deur skaal genoodsaak ----)								
Shale, siltstone and thin subordinate sandstone beds	Skalie, siltsteens en dun ondergeskiede sandsteens								
Shale, siltstone and thin subordinate sandstone beds	Skalie, siltsteens en dun ondergeskiede sandsteens								
Feldspathic sandstone, graywacke (indicated as follows where necessitated by scale ----)	Feldspatiese sandsteens, grywacke (as volg aangedui waar deur skaal genoodsaak ----)								
Veldspatiese sandsteens, grywacke (as volg aangedui waar deur skaal genoodsaak ----)	Veldspatiese sandsteens, grywacke (as volg aangedui waar deur skaal genoodsaak ----)								
Shale, siltstone	Skalie, siltsteens								
Feldspathic sandstone	Feldspatiese sandsteens								
Whitish-weathering quartz sandstone, medium to coarse grained, quartzitic, feldspathic near top, profusely cross-bedded, subordinate shale	Witlig-verwonderde kwartsandsteens, middel- tot grofkorrelig, kwartsities, veldspatiese naby bokant, sterk kruisgelaaag, ondergeskiede skalie								
Brownish-weathering sandstone, fine to coarse grained, shale	Bruiwrig-verwonderde sandsteens, fyn- tot grofkorrelig; skalie								
Shale, arenaceous shale	Skalie, arenaceous shale								
Shale, sandstone, shale	Skalie, sandsteens, skalie								
Whitish-weathering quartz sandstone, medium to coarse grained, quartzitic and massive	Witlig-verwonderde kwartsandsteens, middel- tot grofkorrelig, kwartsities en massief								
SUPERGROUP KAAP	KAMOO							Grit, wacke, subarkose, konglomeeraal	Gruis, wacke, subarkose, konglomeeraal
								Conglomerate, wacke, shale	Konglomeeraal, wacke, skalie
				Fine-grained wacke, shale	Fynkorrelige wacke, skalie				
				Fine-grained wacke, shale	Fynkorrelige wacke, skalie				
				Coarse-bedded wacke, subarkose	Kruisgelaaide wacke, subarkose				
				Coarse-bedded wacke, subarkose	Kruisgelaaide wacke, subarkose				
				Quartz pebble and polymictic conglomerate	Kwartspebblies- en polymiktiese konglomeeraal				
				Quartz pebble and polymictic conglomerate	Kwartspebblies- en polymiktiese konglomeeraal				
				Grit, arenite, fine-grained wacke, shale, limestone lenses	Gruis, areniet, fynkorrelige wacke, skalie, kalksteenslensies				
				Grit, arenite, fine-grained wacke, shale, limestone lenses	Gruis, areniet, fynkorrelige wacke, skalie, kalksteenslensies				
				Limestone, siltstone, shale	Kalksteens, siltsteens, skalie				
				Limestone, shale, wacke, subarkose	Kalksteens, skalie, wacke, subarkose				
				Limestone, shale, wacke, subarkose	Kalksteens, skalie, wacke, subarkose				
				Limestone, shale, wacke, subarkose	Kalksteens, skalie, wacke, subarkose				
				SUPERGROUP KAAP	KAMOO			Phyllite, feldspathic grit, quartzite	Phyllite, veldspatiese griststeens, kwartsiet
Fine-grained quartzite	Fynkorrelige kwartsiet								
Fine-grained quartzite	Fynkorrelige kwartsiet								
Phyllite, schist, hornstone, quartzite	Phyllite, skis, horingssteens, kwartsiet								
Phyllite, schist, hornstone, quartzite	Phyllite, skis, horingssteens, kwartsiet								
Gritty quartzite, phyllite, schist	Gruisige kwartsiet, phyllite, skis								
Gritty quartzite, phyllite, schist	Gruisige kwartsiet, phyllite, skis								
Quartz schist	Kwartsiet skis								
Quartz schist	Kwartsiet skis								
Andalusite schist, hornfels, mica schist	Andalusiet skis, horingsfels, mikaskis								
Andalusite schist, hornfels, mica schist	Andalusiet skis, horingsfels, mikaskis								
Quartz schist	Kwartsiet skis								
Quartz schist	Kwartsiet skis								
Quartz schist	Kwartsiet skis								

REV	DR	CH	DATE	REVISIONS	REFERENCE DRAWINGS	NOTES	Datum: HH94	TITLE: FIBRE OPTIC DATA PROJECT, SOUTH AFRICA ROUTE 4 - GEORGE TO PORT ELIZABETH GEOLOGY	DESIGNED	MNEM	00 00 2009	MNEM	DATE	CHECKED
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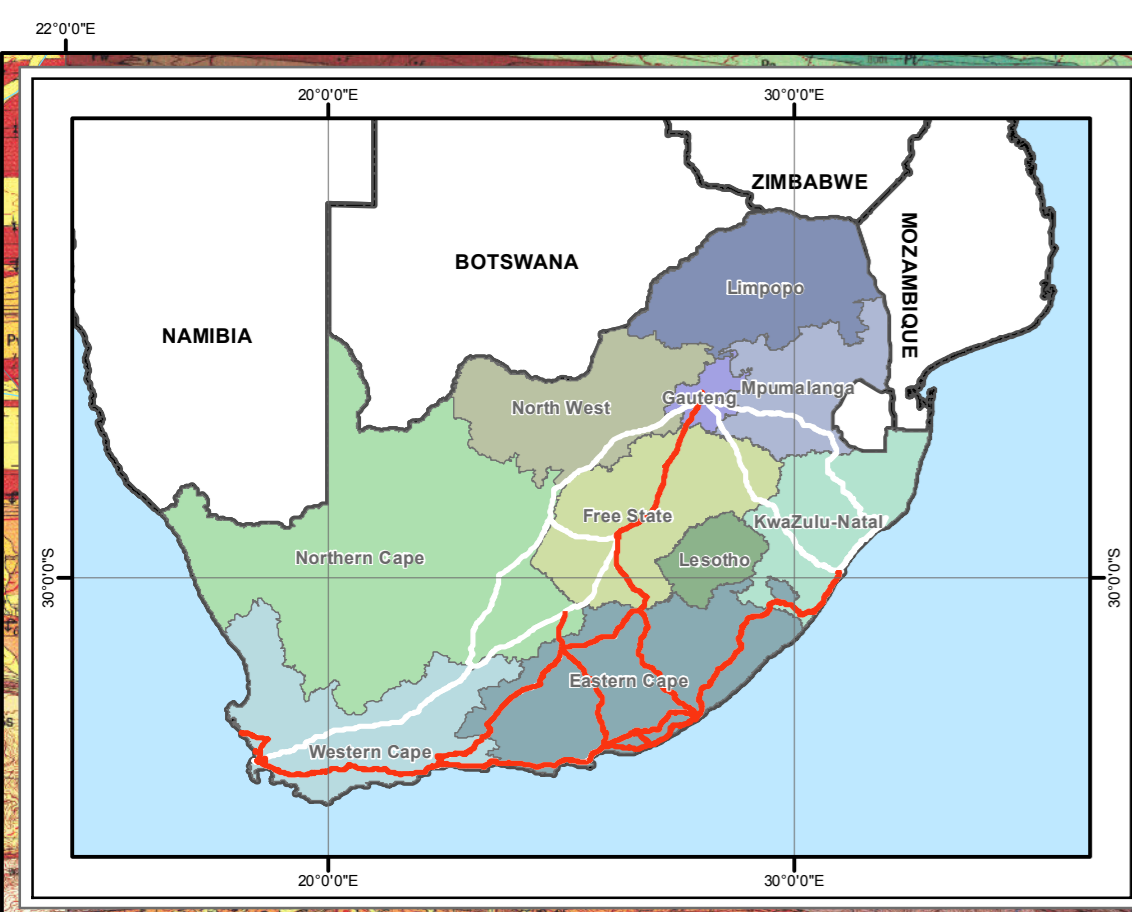
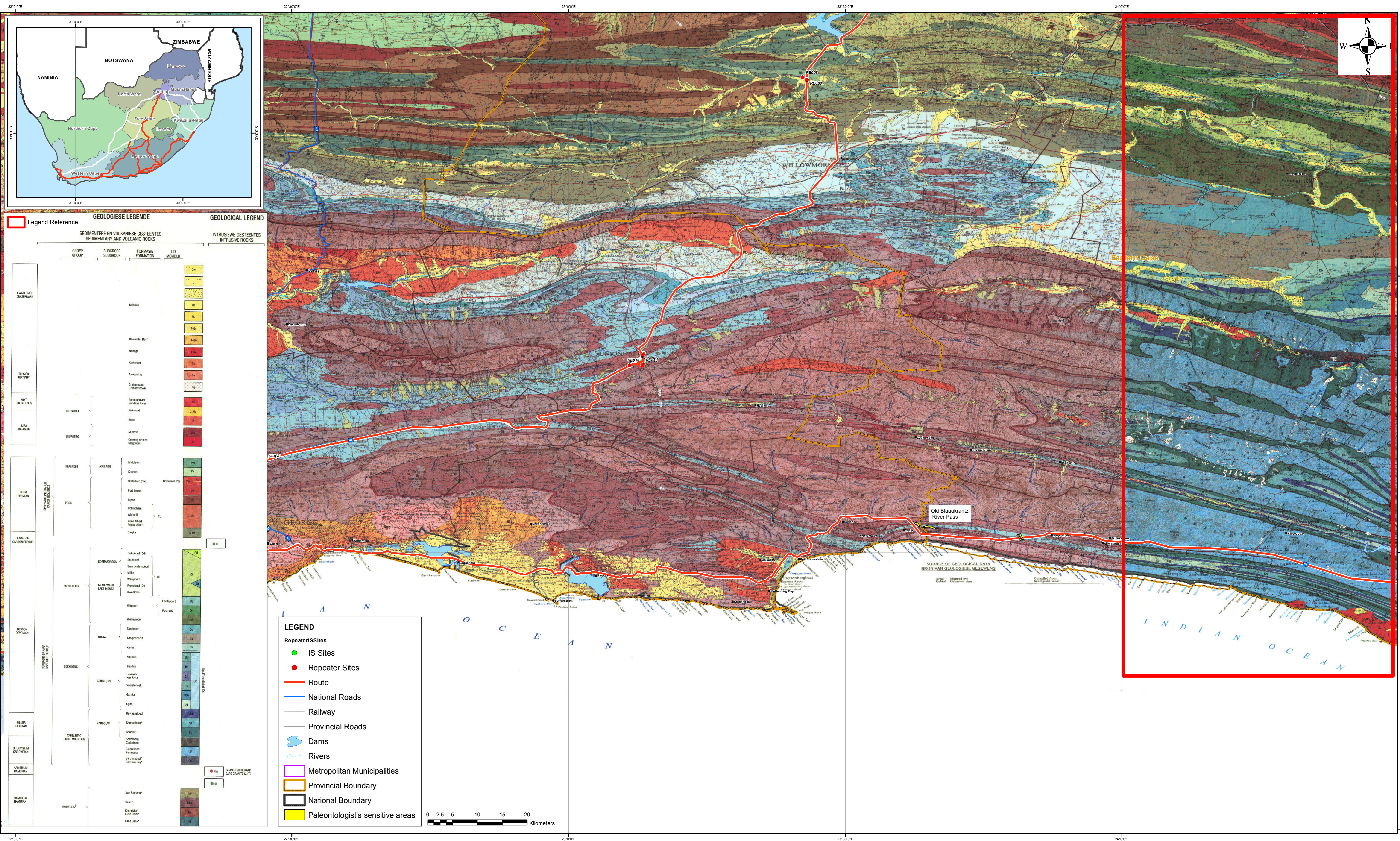
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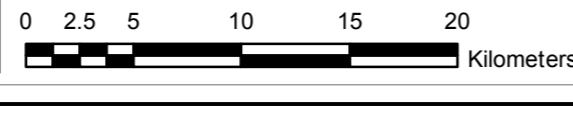


Legend Reference

GEOLOGIESE LEGENDE SEDIMENTÊRE EN VULKANIESE GESTEENTES SEDIMENTARY AND VOLCANIC ROCKS				GEOLOGICAL LEGEND INTRUSIEWE GESTEENTES INTRUSIVE ROCKS			
GROEP GROUP	SUBGROEP SUBGROUP	FORMASIE FORMATION	LID MEMBER	GROEP GROUP	SUBGROEP SUBGROUP	FORMASIE FORMATION	LID MEMBER
KARBOONIFERE CARBONIFEROUS	UTERANGE	Silwisa	Si	INTRUSIEWE INTRUSIVE	GROEN GREEN	Walden	W
		Bloemfontein	B			Walden	W
		Nevins	N			Walden	W
		Kleinfontein	K			Walden	W
		Albanië	A			Walden	W
		Deonhous	D			Walden	W
		Deonhous	D			Walden	W
		Sandkopsrivier	S			Walden	W
		Sandkopsrivier	S			Walden	W
		Kirwood	K			Walden	W
JOHANNESBURG	SUURBERG	Esos	E	ROOIBERG RED	ROOIBERG RED	Esos	E
		Mosses	M			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
		Deonhous	D			Esos	E
PERM PERMIAN	HELFORT	Walden	W	KARBOONIFERE CARBONIFEROUS	KARBOONIFERE CARBONIFEROUS	Walden	W
		Koppie	K			Walden	W
		Walden (P)	W			Walden	W
		Fort Brown	F			Walden	W
		Ripon	R			Walden	W
		Collingham	C			Walden	W
		Whitell	W			Walden	W
		Peter Albert	P			Walden	W
		Peter Albert	P			Walden	W
		Dwyka	D			Walden	W
KARBOONIFERE CARBONIFEROUS	WITTEBERG	Dikwoud (D)	D	PERM PERMIAN	PERM PERMIAN	Dikwoud (D)	D
		Schoof	S			Schoof	S
		Swaenepoort	Sw			Schoof	S
		Wit	W			Schoof	S
		Witpoort	Wp			Schoof	S
		Fortsoed (F)	F			Schoof	S
		Kuisebuis	K			Schoof	S
		Witpoort	Wp			Schoof	S
		Witpoort	Wp			Schoof	S
		Witpoort	Wp			Schoof	S
ORDOON ORDOVICIAN	RIVA	Sandfontein	S	KARBOONIFERE CARBONIFEROUS	KARBOONIFERE CARBONIFEROUS	Sandfontein	S
		Abelkop	A			Sandfontein	S
		Kopie	K			Sandfontein	S
		Doelbos	D			Sandfontein	S
		Tro-Tro	T			Sandfontein	S
		Heveler	H			Sandfontein	S
		Heveler	H			Sandfontein	S
		Voorsteek	V			Sandfontein	S
		Gurba	G			Sandfontein	S
		Egty	E			Sandfontein	S
ORDOON ORDOVICIAN	NOROON	Sarweberg	S	KARBOONIFERE CARBONIFEROUS	KARBOONIFERE CARBONIFEROUS	Sarweberg	S
		Graaf	G			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
		Deonhous	D			Sarweberg	S
ORDOON ORDOVICIAN	TAFELBERG TABLE MOUNTAIN	Graaf	G	KARBOONIFERE CARBONIFEROUS	KARBOONIFERE CARBONIFEROUS	Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
		Deonhous	D			Graaf	G
ORDOON ORDOVICIAN	LIMPOPO	Van Saksen	V	KARBOONIFERE CARBONIFEROUS	KARBOONIFERE CARBONIFEROUS	Van Saksen	V
		Kaap	K			Van Saksen	V
		Kaap	K			Van Saksen	V
		Kaap	K			Van Saksen	V
		Kaap	K			Van Saksen	V
		Kaap	K			Van Saksen	V
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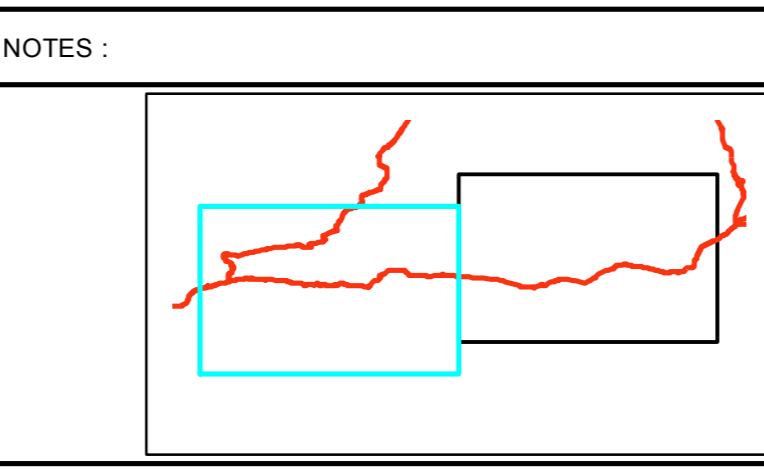
LEGEND

- IS Sites
- Repeater Sites
- Route
- National Roads
- Railway
- Provincial Roads
- Dams
- Rivers
- Metropolitan Municipalities
- Provincial Boundary
- National Boundary
- Paleontologist's sensitive areas



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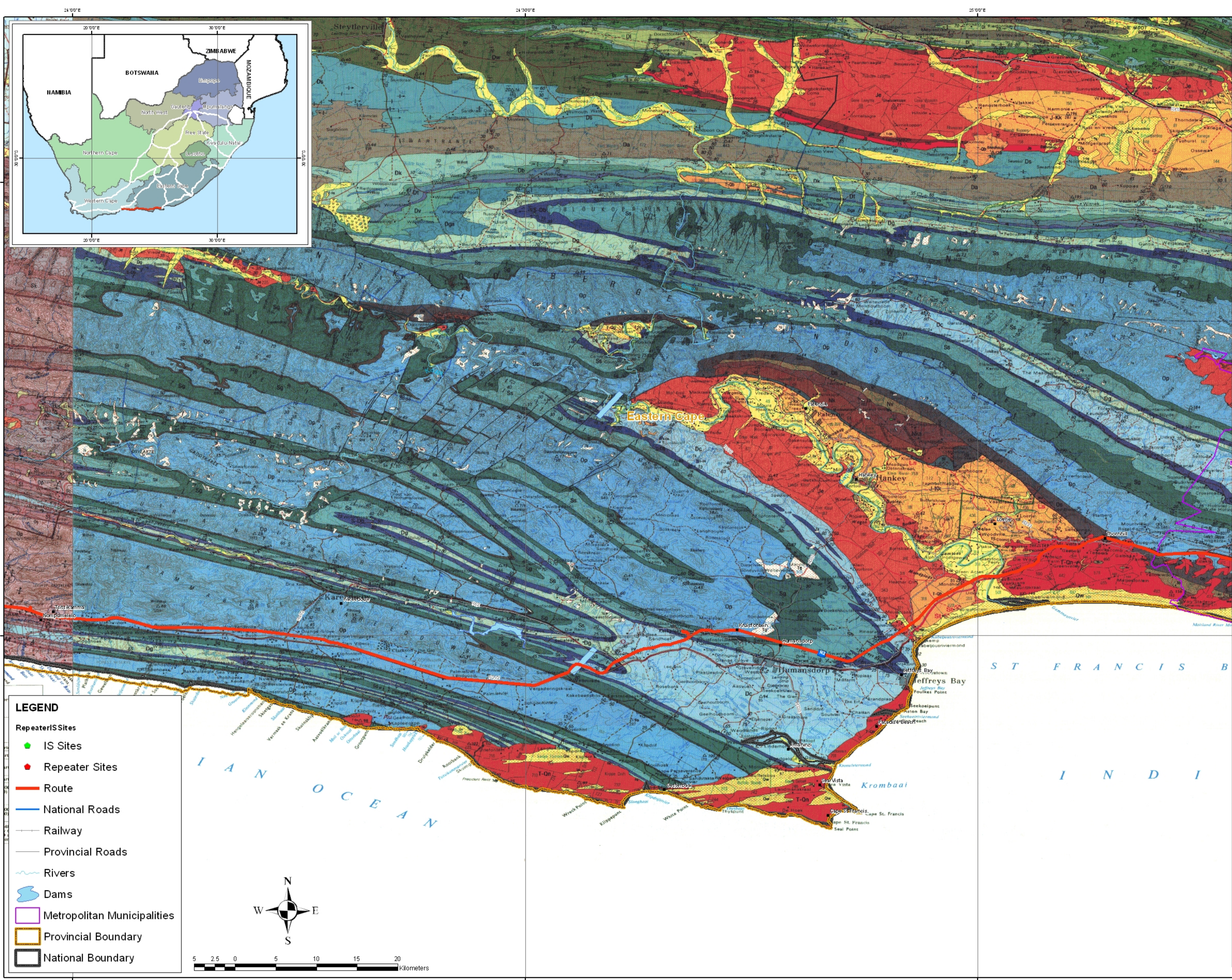
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TITLE: FIBRE OPTIC DATA PROJECT,
SOUTH AFRICA
ROUTE 4 -
GEORGE TO PORT ELIZABETH
GEOLOGY

CLIENT

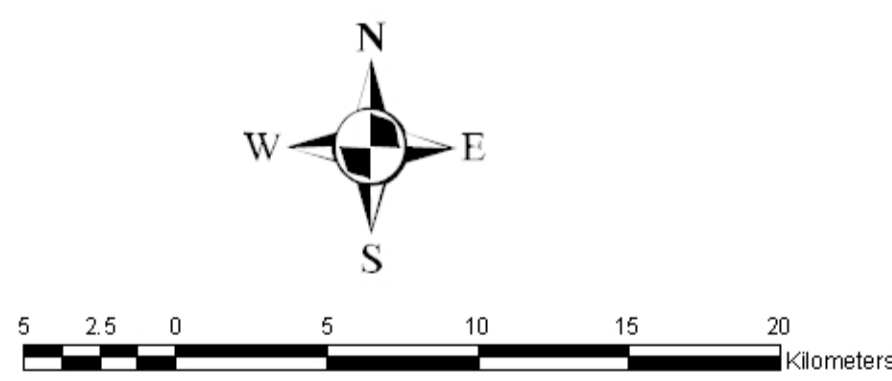
DESIGNED	MNEM	DATE	CHECKED
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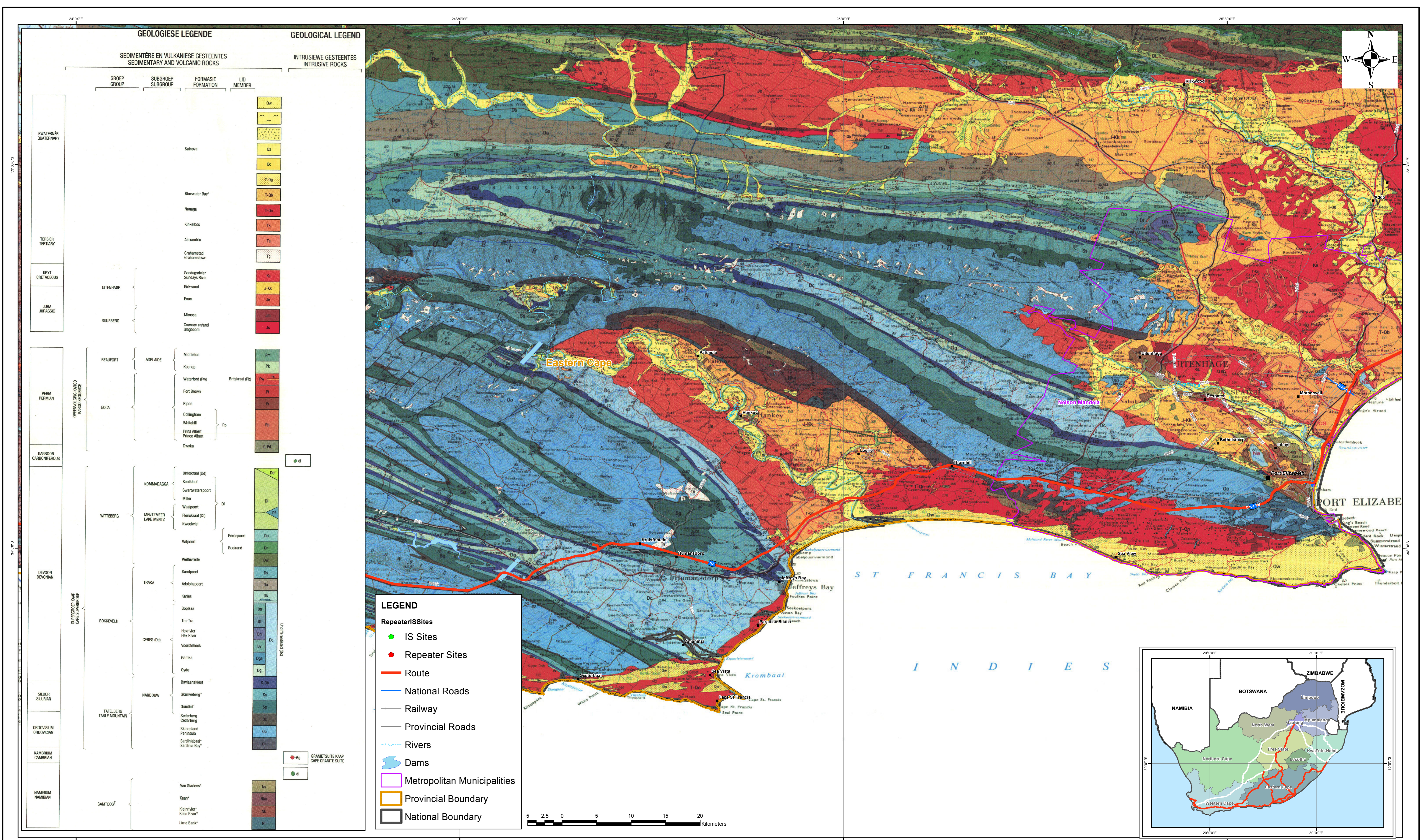
GEOLOGIESE LEGENDE				GEOLOGICAL LEGEND		
SEDIMENTÊRE EN VULKANIESE GESTEENTES SEDIMENTARY AND VOLCANIC ROCKS				INTRUSIEWE GESTEENTES INTRUSIVE ROCKS		
GRÖEP GROUP	SUBGRÖEP SUBGROUP	FORMASIE FORMATION	LID MEMBER			
KONTINÊRE QUATERNARY		Saliwa	Dw			
			Qc			
			Qs			
			T-Ob			
			T-Gb			
			T-Ob			
			T-Gb			
			T-Ob			
			T-Gb			
			T-Ob			
TERSEER TERTIARY		Alesandria	Ta			
			Ta			
			Ta			
			Ta			
			Ta			
KRYE CRETACEOUS	UTENHAGE	Kirkwood	Kk			
			J-Kk			
JURA JURASSIC	SALIBERG	Mince	Ju			
			Ju			
PEEM PERMIAN	BEAUFORT	ADELAGE	Middelen			
			Koosop			
			Waterford (Pw)		Breakfast (Pb)	
			Fort Brown			
			Ripon			
	ECCA		Pp	Callingham		
				Wolfsdijl		
				Prins Albert		
				Prins Albert		
				Daylia		
KARBOON CARBONIFEROUS	KAMMADAGGA	Dikkersdal (Dd)	Dd			
			Saankloof			
			Smartwagterpoort			
			Miller			
			Wagpoort			
	WITTEBERG	MENTZMEER LAKE MENTZ	Pietertjie	Florensdal (Df)		
				Arwantsel		
				Witpoort		
				Witwaters		
				Sandpoort		
DEVONIAN	TRAKA	Rooiberg	Adelheidspoort			
			Karés			
			Doplas			
			Tri-Tri			
			Heerivier			
BOKKEVELD	CERES (Dc)	Dc	Hex River			
			Voortstaalk			
			Gemka			
			Oylia			
			Dc			
SILURIAN	NARDOLW	Skurwagter	Bentanskloof			
			Skurwagter			
			Gedens			
			Sedertberg			
			Oldenberg			
ORDOVICIAN	TARLEBERG TARLE MOUNTAIN	Dc	Suierland			
			Fransdijl			
			Sardisbaai			
			Sardisbaai			
			Sardisbaai			
KAMBRILUM CAMBRIAN	NARDOLW	Skurwagter	Van Suiders			
			Kuier			
			Koedivier			
			Klein River			
			Linne River			
NAMIBIË NAMIBIAN	GAMTOOS	GAMTOOS	Nv			
			Nv			
			Nv			
			Nv			
			Nv			

LEGEND

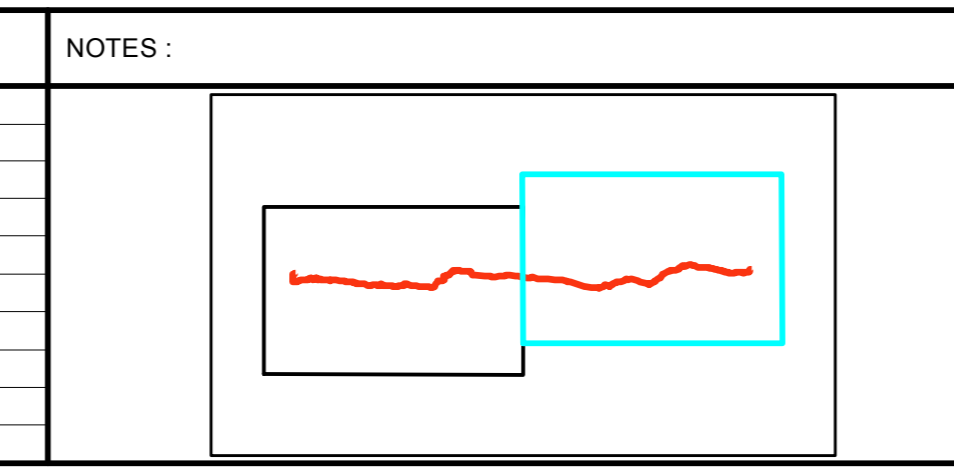
- Repeater Sites
- IS Sites
- Repeater Sites
- Route
- National Roads
- Railway
- Provincial Roads
- Rivers
- Dams
- Metropolitan Municipalities
- Provincial Boundary
- National Boundary



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