PALAEONTOLOGICAL FIELD ASSESSMENT OF THE PROPOSED SWAZILAND-MOZAMBIQUE BORDER PATROL ROAD AND MOZAMBIQUE BARRIER STRUCTURE

Prepared for:

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05 February 2018

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EXECUTIVE SUMMARY

Royal Haskoning DHV has appointed Banzai Environmental (Pty) Ltd to undertake a Palaeontological Impact Assessment (Phase 1) assessing the palaeontological impact of the proposed Swaziland-Mozambique Border Patrol Road and Mozambique Barrier Structure. According to the National Heritage Resources Act (Act No 25 of 1999, Section 38), a palaeontological impact assessment is required to detect the presence of fossil material within the proposed development footprint and to evaluate the impact of the construction and operation of the barrier on the palaeontological resources.

The proposed project and base camp is underlain by various sedimentary rocks of which the **Quaternary** and the **Undifferentiated Karoo** has a **high Palaeontological sensitivity** and **the Zululand Group** which has a **very high palaeontological sensitivity**. The various intrusive rocks have an igneous origin and is thus unfossiliferous and has a zero palaeontological sensitivity. As part of the Palaeontological Impact Assessment, a field-survey of the development footprint was conducted in February 2018 to assess the potential risk to palaeontological material in the proposed footprint of the development. A physical field-survey of the proposed development and camping site was conducted on foot and by vehicle and during this field survey, **no fossiliferous outcrops** were found in the development footprint. For this reason, a **low palaeontological sensitivity** is allocated to the development footprint. Although fossils are uncommon and only occur periodically a solitary fossil may be of scientific value as many fossil taxa are known from a single fossil. The recording of fossils will expand our knowledge of the Palaeontological Heritage of the development area.

The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the proposed development will be of a low significance in palaeontological terms. It is therefore considered that the proposed Swaziland-Mozambique Border Patrol Road and Mozambique Barrier Structure is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the unlikely event that fossil remains are uncovered during any phase of construction, either on the surface or unearthed by new excavations and vegetation clearance, the ECO in charge of these developments ought to be alerted immediately. These discoveries should be protected (preferably *in situ*) and the ECO must report to SAHRA so that suitable mitigation (collection and recording) can be carry out by a professional paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies proposed by SAHRA.

1 Contents

2 INTRODUCTION

The National Department of Public Works has appointed **Royal Haskoning DHV** to undertake the design of the border control structure and to obtain environmental authorisations for the proposed Mozambique barrier structure as well as the Swaziland-Mozambique Border Patrol Road.

The Mozambique **Border Barrier** extends in two sections from the eastern boundary of the iSimangaliso Wetland Park west to the eastern boundary of the Tembe Elephant Reserve (excluding Tembe Elephant Reserve) (Fig. 1). The second section is a narrow section between Tembe and the eastern Bounday of the Ndumo Game Reserve.

The **Border Patrol Infrastructure** consists of two main components – **a border patrol road and the international fence**, of which both will be upgraded. This component is the longest section and extends westward from Kosi Bay (Indian Ocean), west along the KZN-Mozambique border and the entire length of the Mpumalanga-Swaziland Border to the point in the Lowveld where the Mpumalanga Swaziland Border ends (a total length of approximately 529 km).

In sections of the 529 km the existing road will be upgraded to a 5 m wide gravel road, in other areas the road is absent and in these sections a new 5m-wide road will be developed. Due to topographic limitations, the road will not always follow the international border. Along certain areas of the border, where no road is planned, a 2 m wide footpath will be developed to permit border patrols.

The fence is generally in place along the entire border, although there are certain sections where no fence is proposed and instead beacons are proposed. These are in areas where the boundary is formed by a river or where the terrain is extremely mountainous. Two important examples is the KZN-Mozambique border within the Ndumu Game Reserve where the international border is the Usuthu River, and the highly mountainous section of the international border in the vicinity of the Somgimvelo Game Reserve.

The **Royal Haskoning DHV** Route Determination team are still busy with the conceptual design, and a corridor of 50 m from the existing fence position will be assessed during the EIA process. This corridor ought to be sufficient to cater for any minor route realignments.

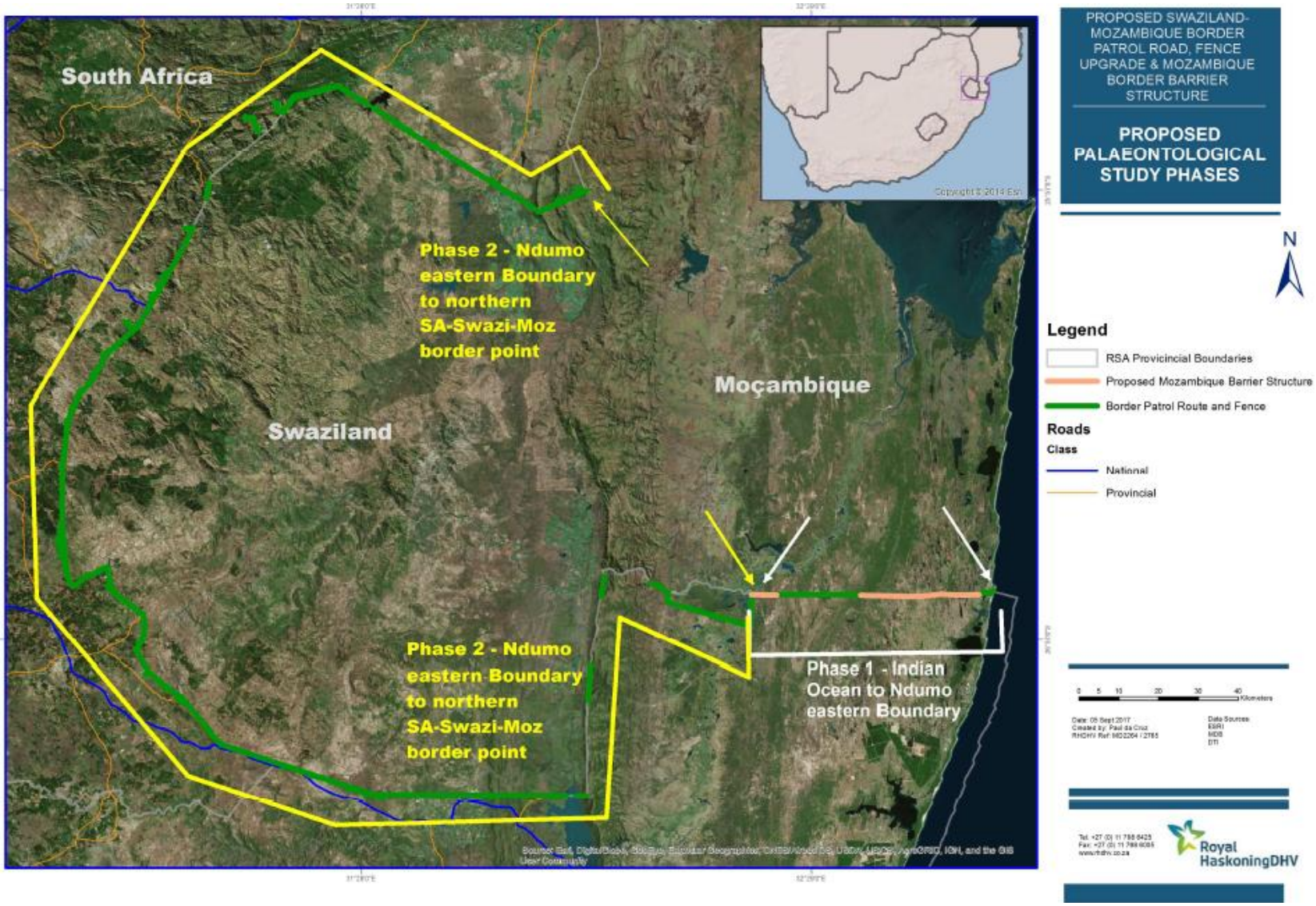


Figure 1. Locality map of the planned construction of the proposed Swaziland-Mozambique Border Patrol Road and Mozambique Barrier Structure. (Map provided by Royal Haskoning DHV).

1 LEGISLATION

NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**". Palaeontological heritage is unique and non-renewable and is protected by the above mentioned Act. Palaeontological resources may not be unearthed, moved, broken or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority.

This Palaeontological Environmental Impact Assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

ACCORDING TO SECTION 35 OF THE NATIONAL HERITAGE RESOURCES ACT 1999, DEALING WITH ARCHAEOLOGY, PALAEONTOLOGY AND METEORITES:

35. (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8) *(a)*, all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) Destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) Destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) Bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) Serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) Carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph *(a)* to apply for a permit as required in subsection (4); and *(d)* recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

(6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

(7) *(a)* Within a period of two years from the commencement of this Act, any person in possession of any archaeological or palaeontological material or object or any meteorite which was acquired other than in terms of a permit issued in terms of this Act, equivalent provincial legislation or the National Monuments Act, 1969 (Act No. 28 of 1969), must lodge with the responsible heritage resources authority lists of such objects and other information prescribed by that authority. Any such object which is not listed within the prescribed period shall be deemed to have been recovered after the date on which this Act came into effect. *(b)* Paragraph *(a)* does not apply to any public museum or

university. *(c)* The responsible authority may at its discretion, by notice in the *Gazette* or the *Provincial Gazette*, as the case may be, exempt any institution from the requirements of paragraph *(a)* subject to such conditions as may be specified in the notice, and may by similar notice withdraw or amend such exemption.

(8) An object or collection listed under subsection (7) — *(a)* Remains in the ownership of the possessor for the duration of his or her lifetime, and SAHRA must be notified who the successor is; and *(b)* must be regularly monitored in accordance with regulations by the responsible heritage authority.

HERITAGE RESOURCES MANAGEMENT

38. (1) Subject on the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50 m in length; (c) any development or other activity which will change the character of a site—(i) exceeding 5 000 m^2 in extent; or (ii) involving three or more existing erven or subdivisions thereof; or (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority (d) the re-zoning of a site exceeding 10 000 m² in extent; (e) or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

2 OBJECTIVE

The **objective of a Palaeontological Impact Assessment is to determine the impact of the development on potential palaeontological material** at the site.

According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the aims of the palaeontological impact assessment are: 1) to identify the palaeontological importance of the exposed and subsurface rock formations in the development footprint 2) to evaluate the palaeontological importance of the formations 3) to determine the impact of the development on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

When a palaeontological desktop study is compiled, the potentially fossiliferous rocks (i.e. groups, formations, etc.) present within the study area are established from 1:250 000 geological maps. The topography of the development area is identified using 1:50 000 topography maps as well as Google

Earth Images of the development area. Fossil heritage within each rock section is obtained from previous palaeontological impact studies in the same region, the PalaeoMap from SAHRIS; and databases of various institutions (identifying fossils found in locations specifically in areas close to the development area). The palaeontological importance of each rock unit of the development area is then calculated. The possible impact of the proposed development footprint on local fossil heritage is established on the following criteria: 1) the palaeontological importance of the rocks and 2) the type and scale of the development footprint and 3) quantity of bedrock excavated.

In the event that rocks of moderate to high palaeontological sensitivity are present within the study area, a field-based assessment by a professional palaeontologist is required. Based on both the desktop data and field examination of the sedimentary rock exposures, the impact significance of the planned development is measured with recommendations for any further studies or mitigation. In general destructive impacts on palaeontological heritage only occur during construction. The excavations will transform the current topography and may destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

Mitigation comprises the sampling, collection and recording of fossils and may precede construction or, more ideally, occur during construction when potentially fossiliferous bedrock is exposed. Preceding the excavation of any fossil heritage a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible because our knowledge of local palaeontological heritage may be increased.

3 GEOLOGICAL AND PALAEONTOLOGICAL HERITAGE

The geology of the KZN- Mozambique Barrier Structure footprint is represented by the 1:250 000 2632 Kosi Bay Geological map (Fig.2), while the Geology of the Swaziland-Mozambique Border Patrol Road is represented in the 3530 Barberton geological map (Fig.3). Geological Maps are provided by the Counsel of Geosciences. Discussions will be based on the above mentioned Geological Maps as well as the QGIS maps. The abbreviations of the Geological maps are explained in Table 1.

The geology of the development footprint will be discussed in chronological order. Geological groups and formations not relevant to the development footprint will be mentioned for chronological reasons but not discussed.

Figure 2: Geological map (1:250 000, 2632Kosi Bay) of the proposed development footprint of the KZN-Mozambique Barrier Structure. The approximate location is indicated by the black dashed line. Geological Maps are provided by the Counsel of Geosciences. Abbreviations of the rock types are explained in Table 1

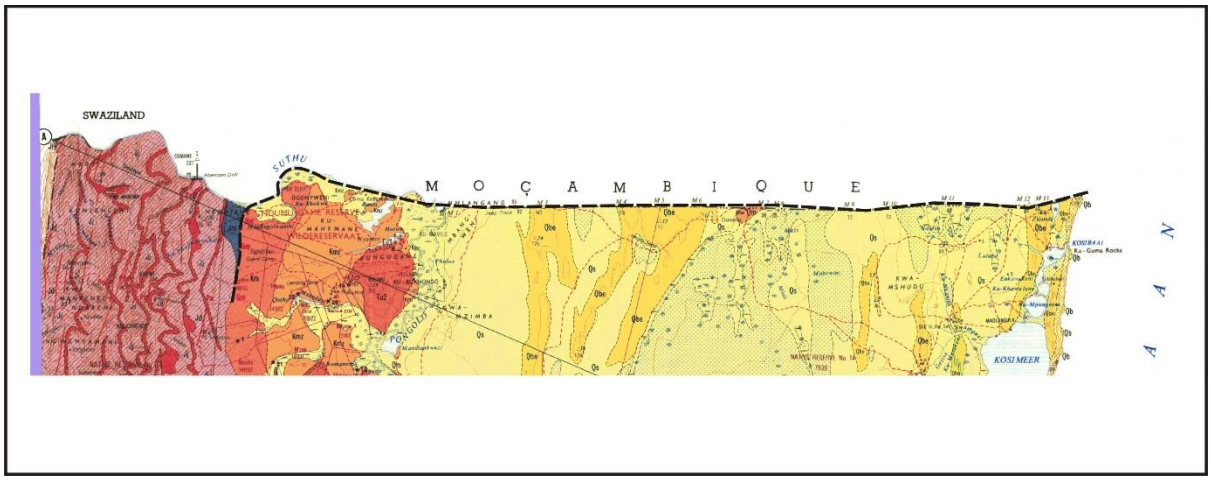


Figure 3: Geological map (1: 250 000, 3530 Barberton) of the proposed development footprint of the Swaziland-Mozambique Border Patrol Road. The approximate location is indicated by the black dashed line. Geological Maps are provided by the Counsel of Geosciences. Abbreviations of the rock types are explained in Table 1.

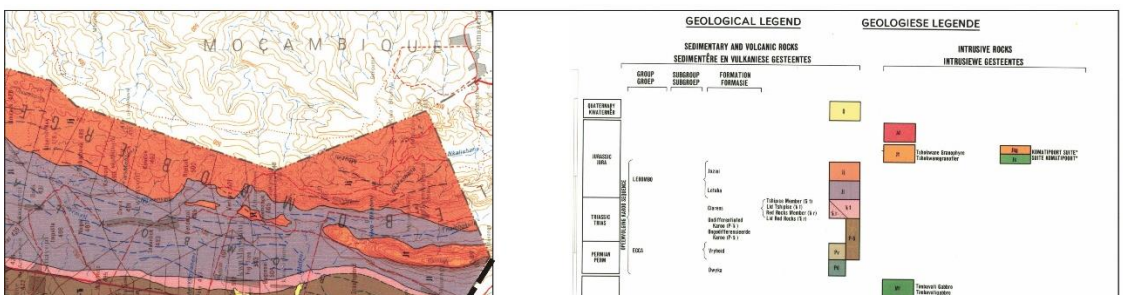
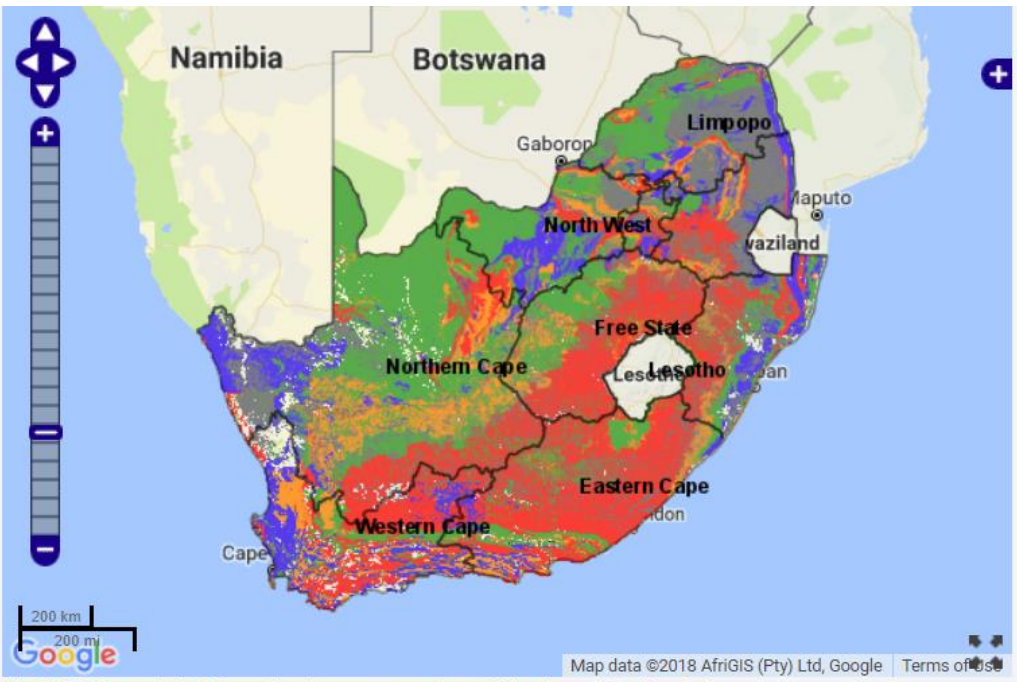


Table 1: Explanation of symbols for the geological map and Period. SG = Supergroup; Gr-Group; Fm = Formation. Palaeontological sensitivity is indicated by colour codes: Very High=-Red; High = orange. According to the SAHRIS PalaeoMap site visits is required for areas of High to Very High Palaeontological Sensitivity.

Symbol	Group/Formation	Lithology	Period
2632 Kosi Bay Geological Map Published in 1986 Sheet Explanation by Du Preez and Wolmarans 1986			
Qs	Quaternary	Yellowish redistribute sand	Cenozoic
Qbe	Berea Fm	Red dune cordon sand	Cenozoic
Qb	Bluff Fm	Calcareous sandstone	Cenozoic
Qm	Muzi Fm	Argillaceous sandstone	Cenozoic
Kmz	Zululand Gr Mzinene Fm	Marine siltstone with shelly and concretionary horizons	Cenozoic
3530 Barberton Geological map Published in 1986 Sheet Explanation by F. Walraven and F.J. Hartzer			
Q	Quaternary	Superficial deposit, alluvium and scree	Cenozoic
Jd	Karoo dolerite		Jurassic
Jl	Lebombo Gr Letaba Fm	Green, fine-grained mafic lava, locally porphyritic, amygdaloidal interlayered rhyolite especially near top	Jurassic
Jt	Tshokwane Granophyre	Intrusive rocks Pink, medium	Jurassic

		grained quartz feldspar granophyre, microgranite and syenite	
Jj	Lebombo Gr Josini Fm	Red to light brown, fine grained rhyolitic lava, porphyritic rhyolite and tuf	Jurassic
P-T	Undifferentiated Karoo	Mudrock and sandstone	Permian to Triassic
Znm	Nelspruit Suite	Intrusive rocks	Swazian
Zu	Kaap Valley Granite		Swazian
Zm Zf Zgk Zt	Barberton: Moodies Gr Barberton: Fig Tree Gr Barberton: Onverwach Gr Geluk Subgroup Kromberg Fm Tjakastad Subgroup	Predominantly volcanic igneous rocks, plus some igneous intrusions, minor sediments such as banded iron formation, chert, quartzite, conglomerate, schists	Swazian



1 in 250 000 geological formation layers are courtesy of the Council for GeoScience

For more information, go to How to Use the Palaeontological (fossil) Sensitivity Map

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Maps

Figure 4. 1 in 250 000 geological formation layers (Courtesy of the Council of GeoSciences. http://www.sahra.org.za/sahris/map/palaeo

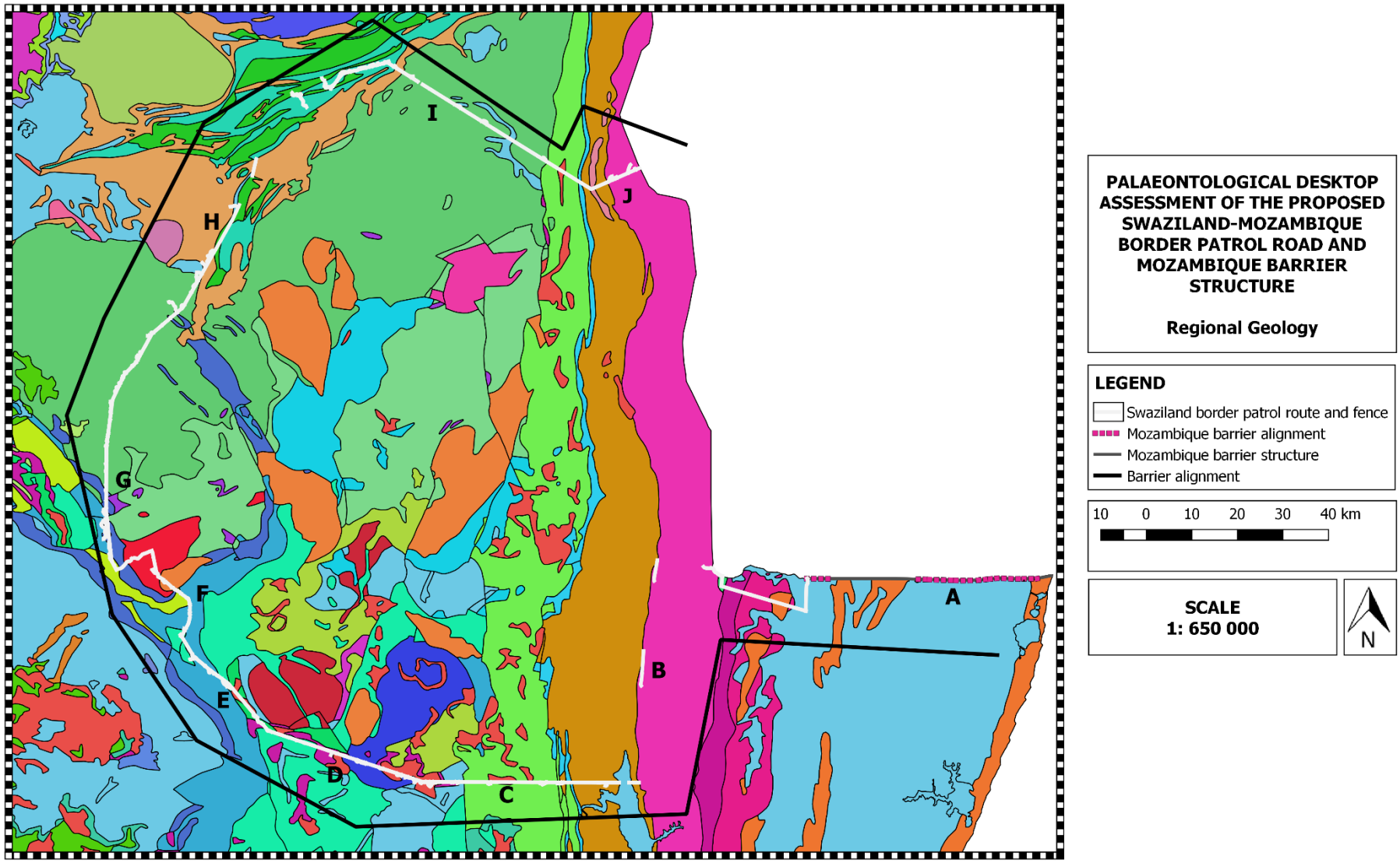


Figure 5. The surface geology of the proposed Swaziland-Mozambique Border Patrol Road and Mozambique Barrier Structure. The map is divided into different sections for discussion purposes. Section A and J has a High to very High Palaeontological Sensitivity. Map drawn by QGIS Desktop-version 2.18.12.

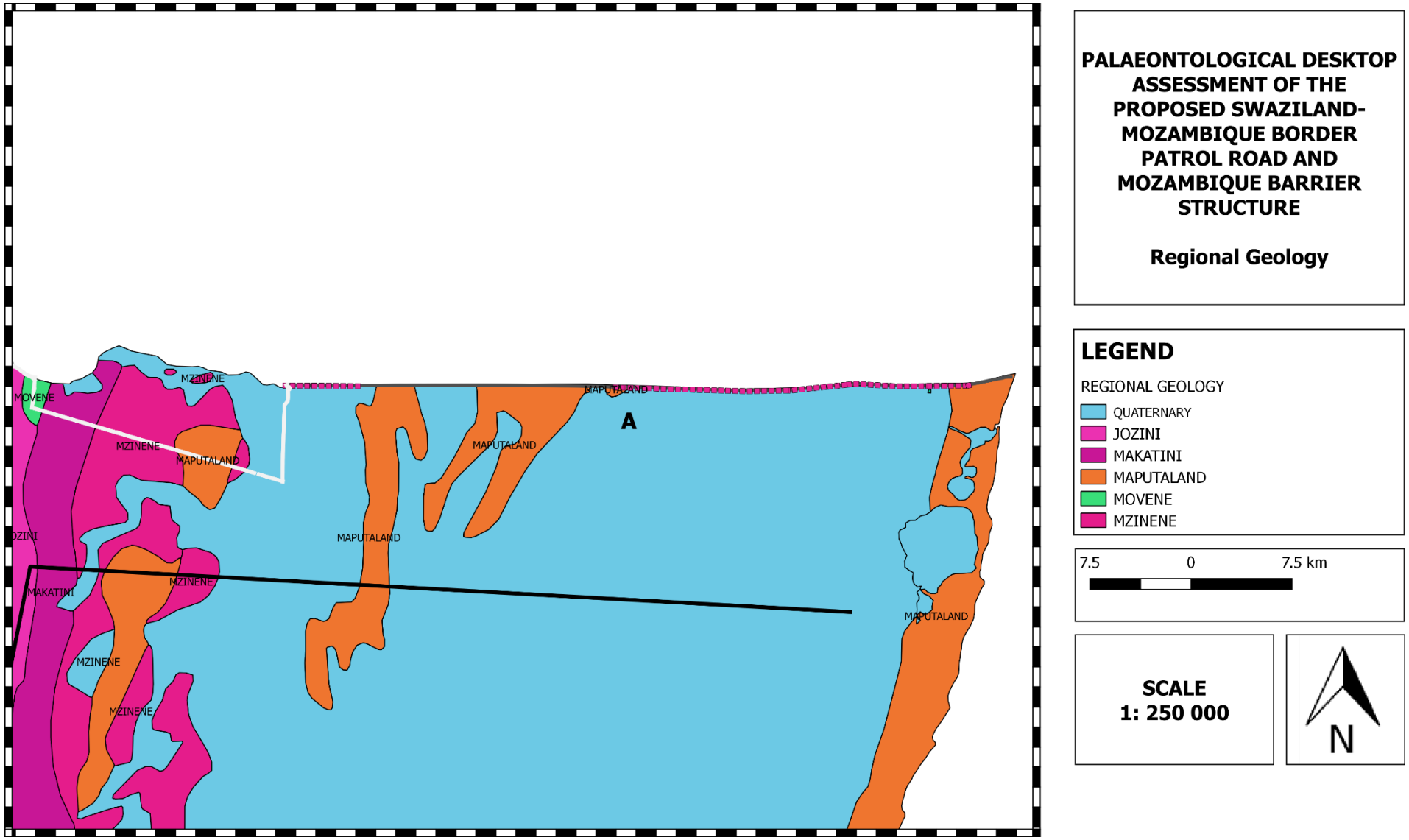


Figure 6. The surface geology of Section A of the proposed KZN-Mozambique border control barrier. The proposed development area is completely underlain by Quaternary superficial deposits of the Maputuland Group. These sediments have a high to very high Palaeontological Sensitivity. Map drawn by QGIS Desktop-version 2.14.20.

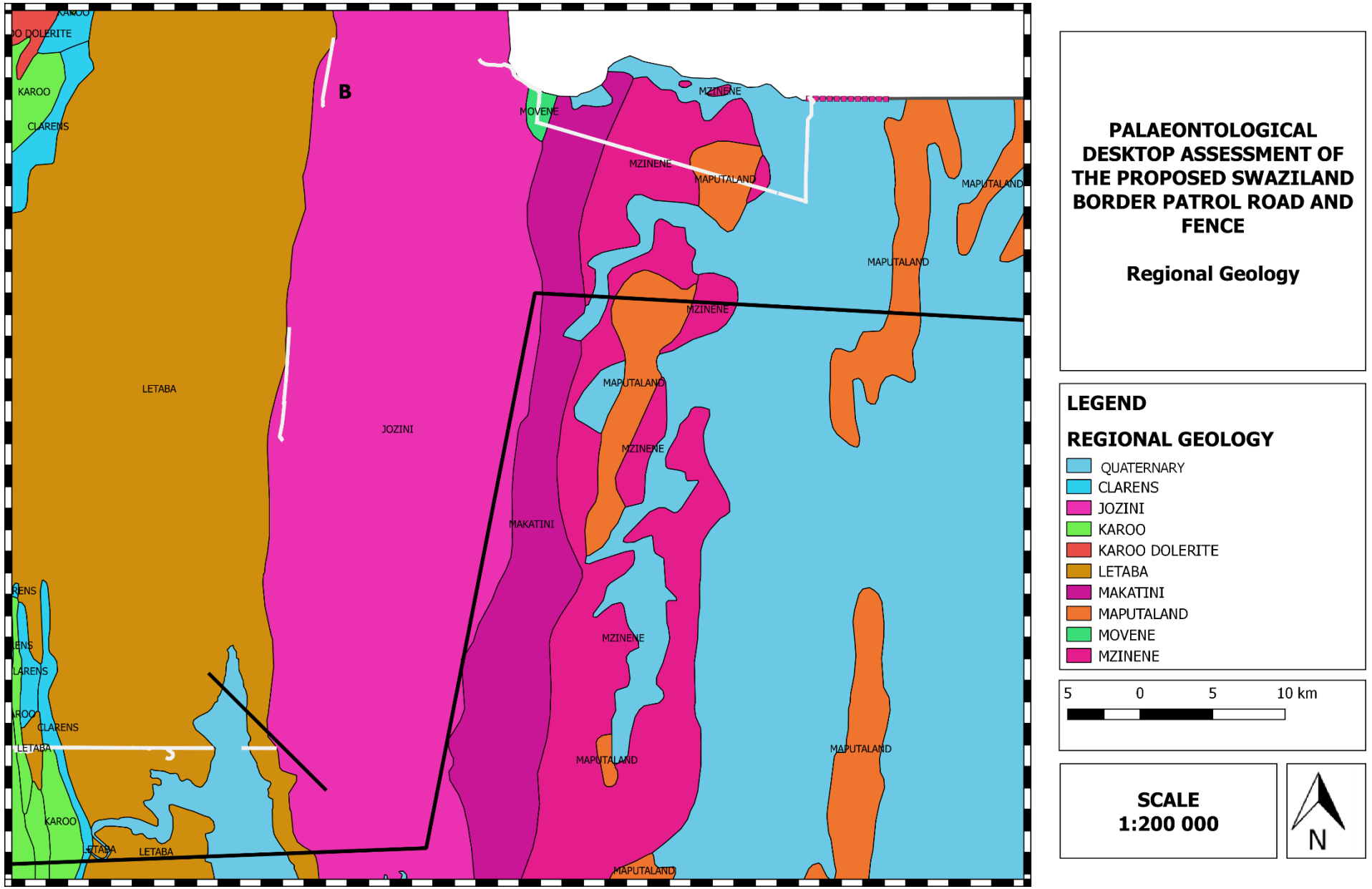


Figure 7. The surface geology of Section B of the proposed Swaziland Border Patrol Road and fence. The proposed development area is underlain by Quaternary deposits Josini and Letaba Formations, Movene and Makatini Formations. Map drawn by QGIS Desktop-version 2.14.20.

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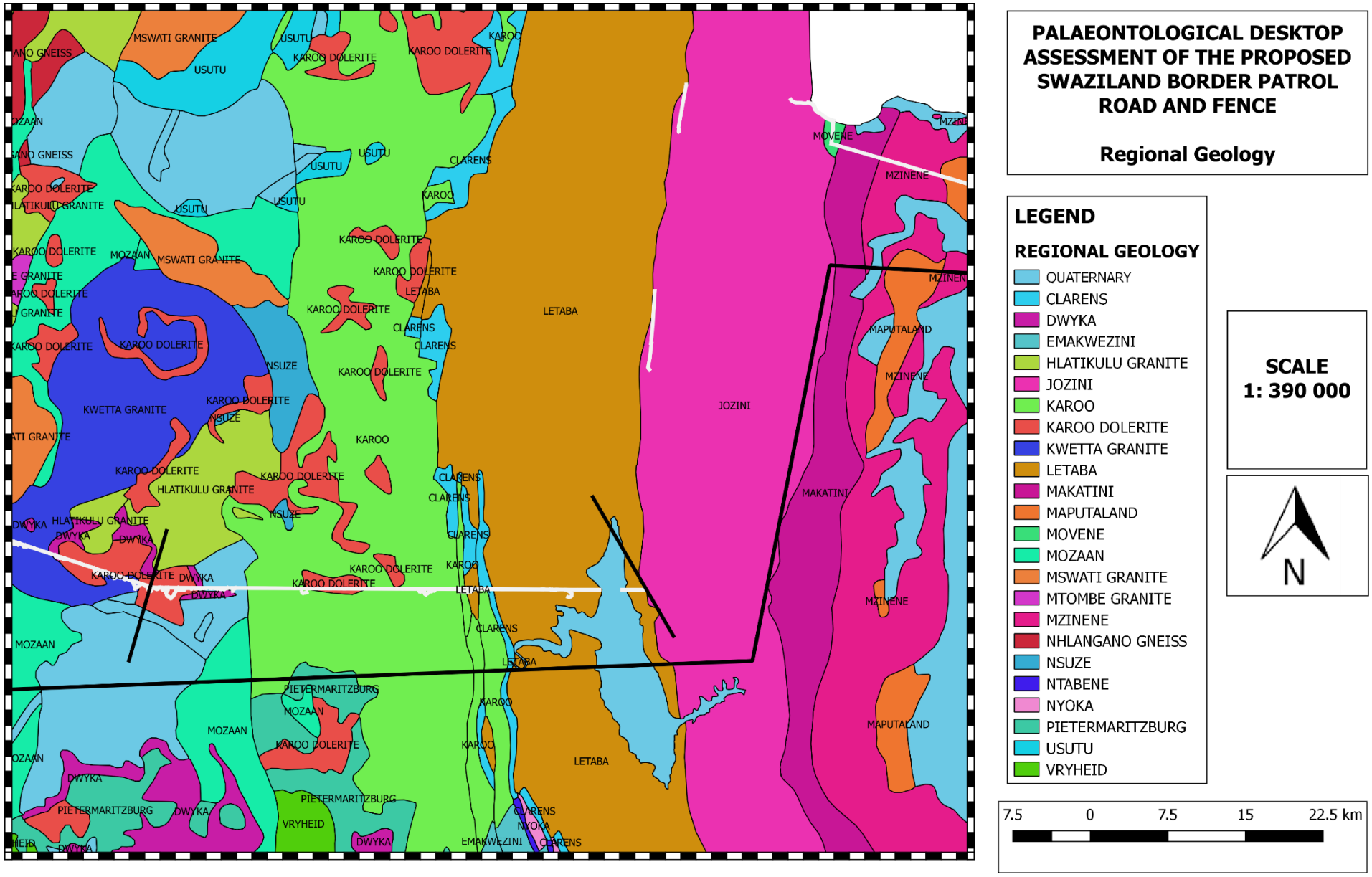

Figure 8. The surface geology of Section C of the proposed Swaziland-Mozambique Border Patrol Road and fence. The proposed development area is completely underlain by Josine Fm, Karoo Dolerite, Dwyka, the undifferentiated Karoo, Pietermaritzburg Fm, and Mozaan Fm. Map drawn by QGIS Desktop-version 2.14.20.

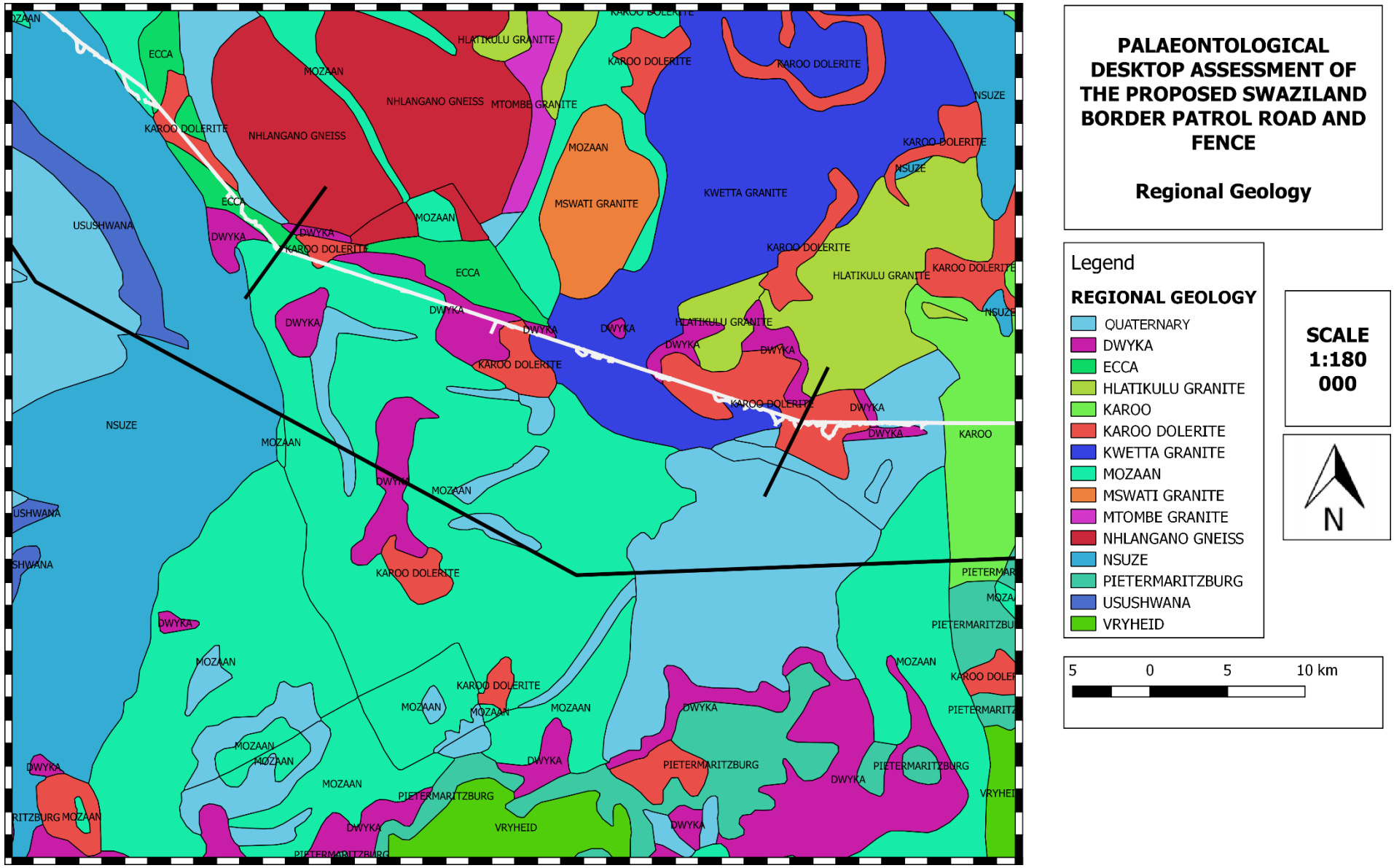

Figure 9. The surface geology of Section D of the proposed Swaziland Border Patrol Road and fence. The proposed development area is completely underlain by Quaternary, Karoo dolerite, the undifferentiated Karoo, the Dwyka and Ecca Groups. Map drawn by QGIS Desktop-version 2.14.20.

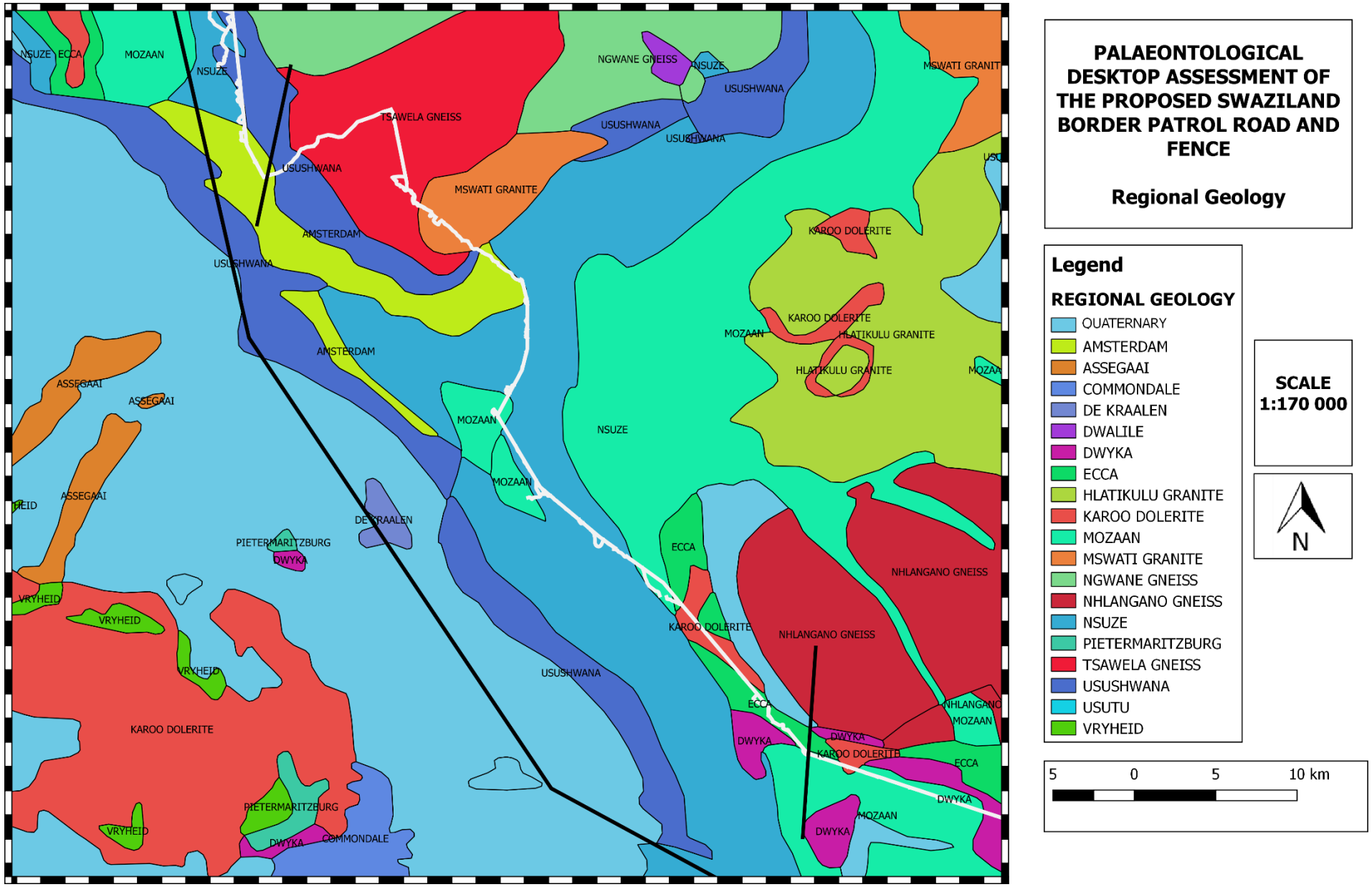

Figure 10. The surface geology of Section E of the proposed Swaziland Border Patrol Road and fence. The proposed development area is completely underlain by Nsuze and Mozaan Fm, Karoo dolerite, Ecca Group and Usushwana Fm. Map drawn by QGIS Desktop-version 2.14.20.

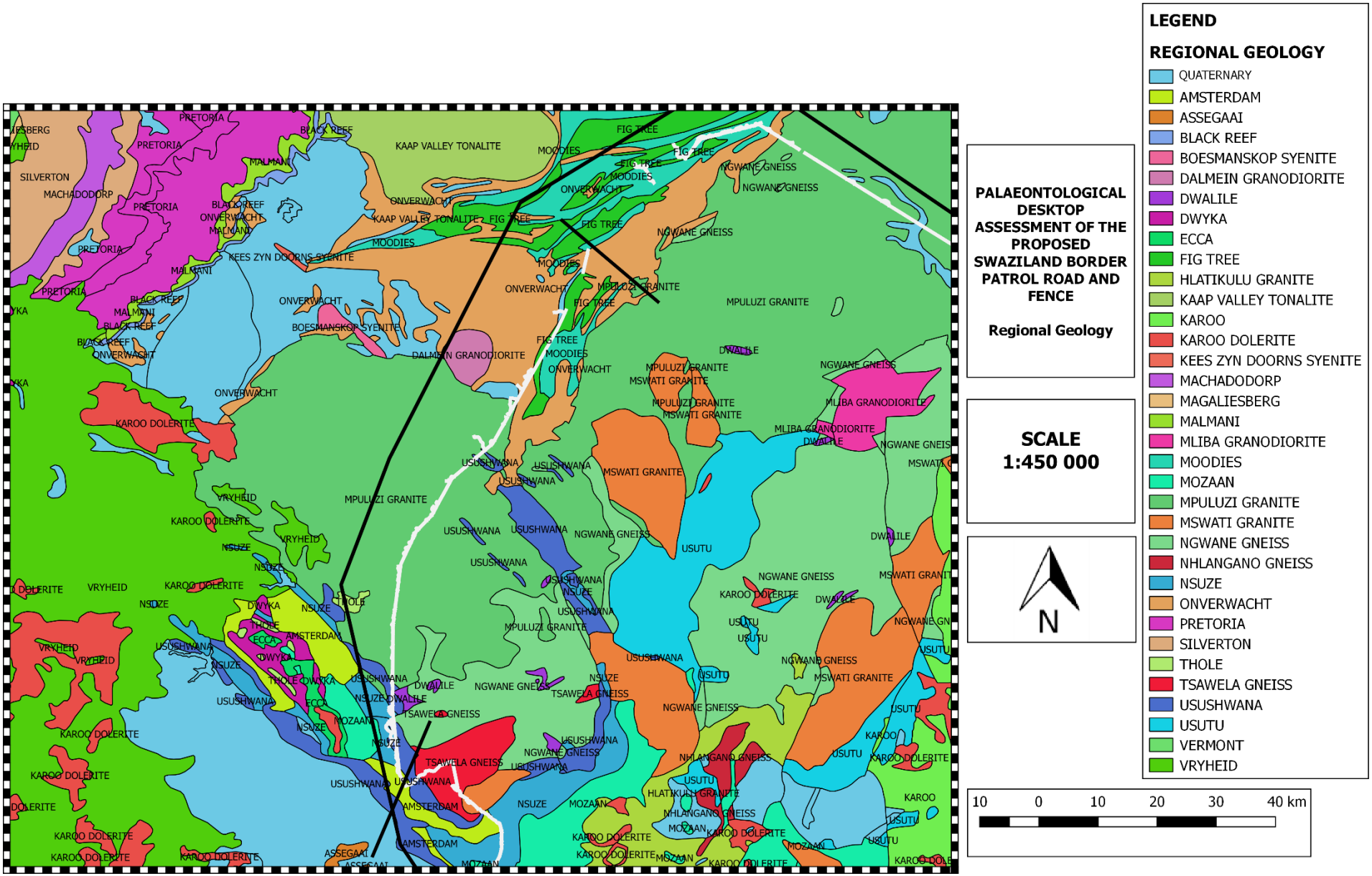

Figure 11. The surface geology of Section F of the proposed Swaziland Border Patrol Road and fence. The proposed development area is completely underlain by Quaternary, Barberton Sequence, Usushwana and Nsuze Fm. Map drawn QGIS Desktop-version 2.14.20 with GRASS 7.2.2

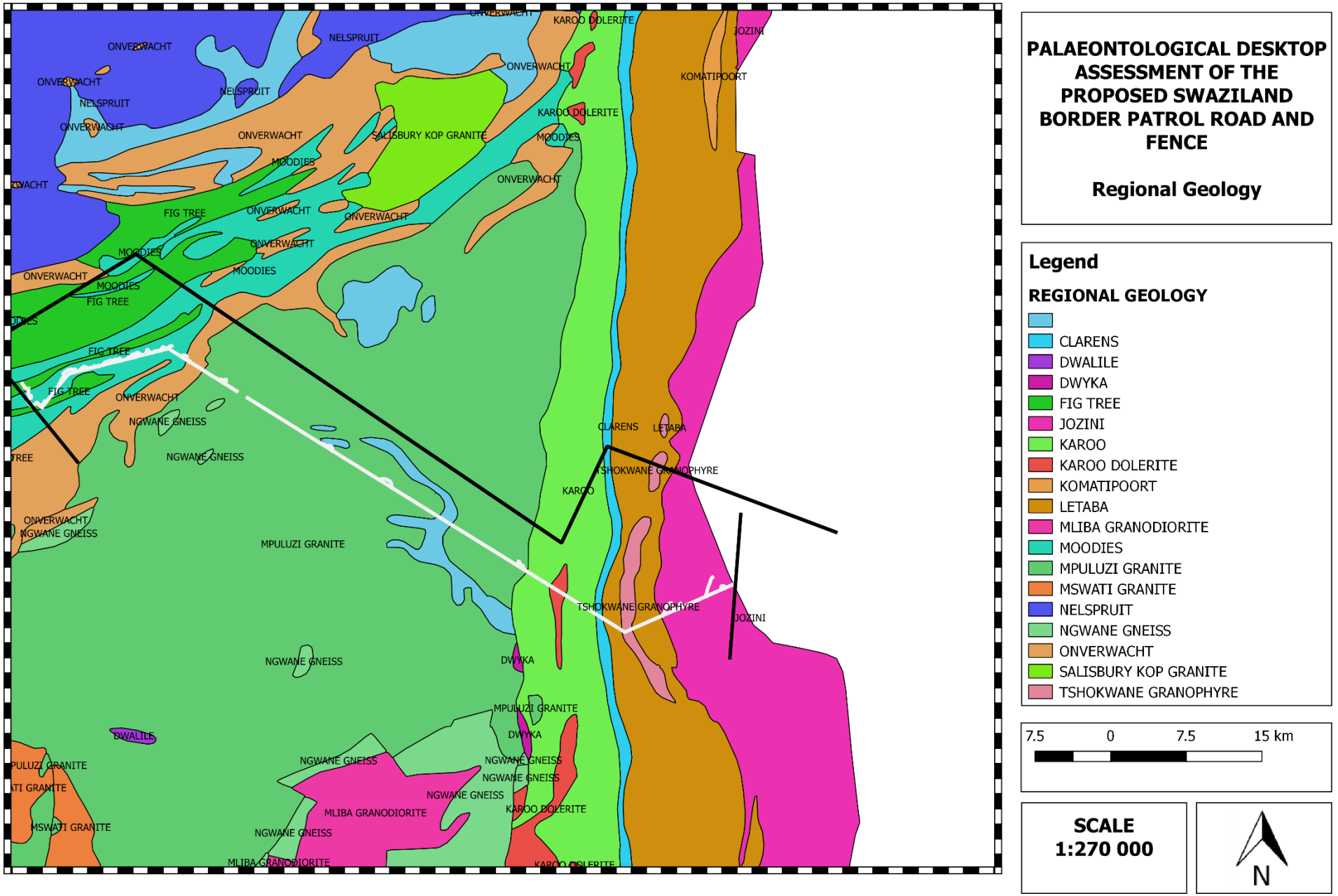

Figure 12. The surface geology of Section G of the proposed Swaziland Border Patrol Road and fence. The proposed development area is primary underlain by Mpuluzi Granite intrusive rocks, Barberton Sequence as well as the Undifferentiated Karoo. The Undifferentiated Karoo has a Very High Palaeontological Sensitivity. Map drawn by QGIS Desktop-version 2.14.20 with GRASS 7.2.2.

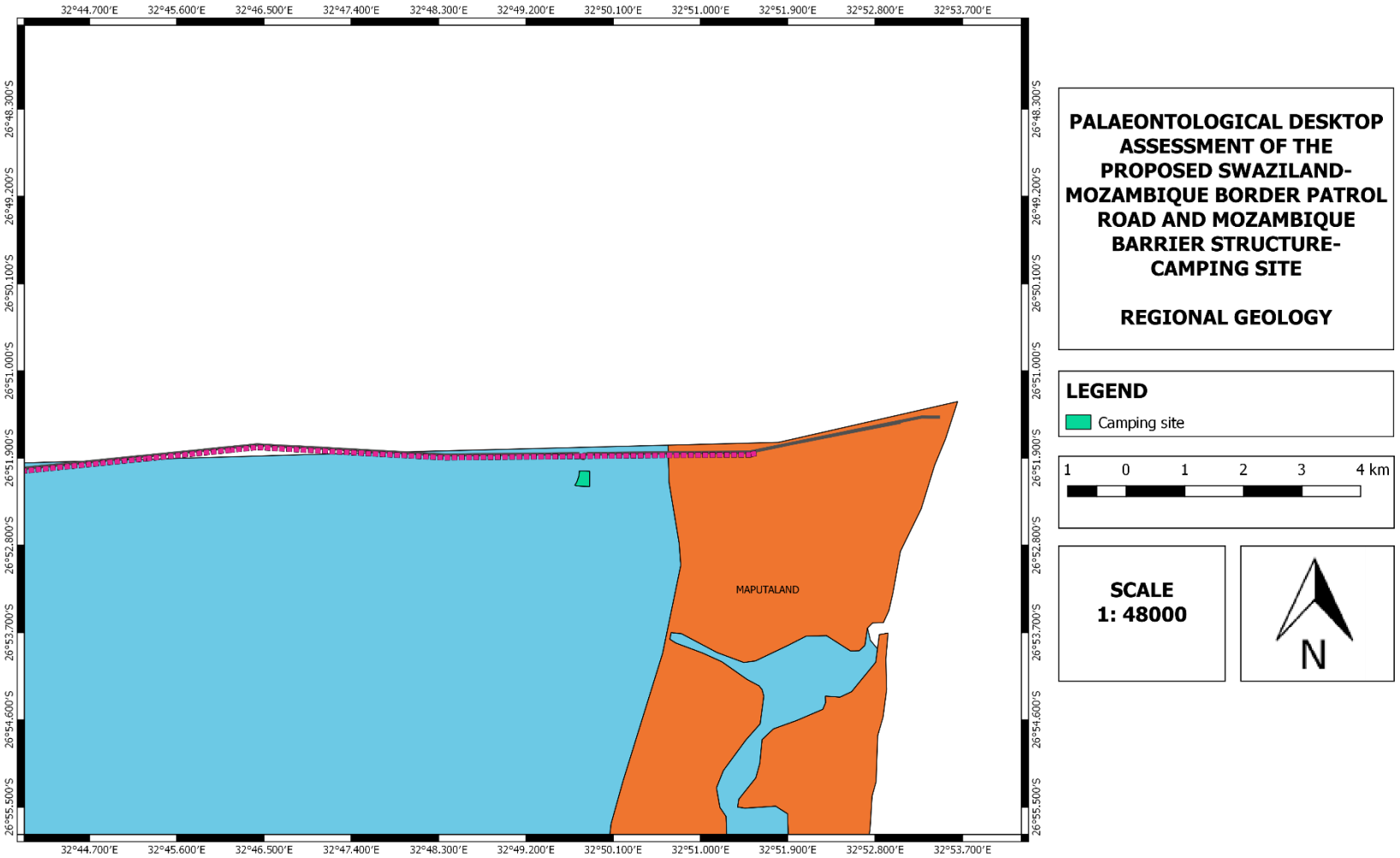

Figure 13. The surface geology of the camping site of the proposed project. The proposed development area is completely underlain Quaternary superficial deposits. Map drawn by QGIS Desktop-version 2.18.12.

4 GEOLOGY AND PALAEONTOLOGICAL HISTORY

4.1 GEOLOGY

The geological history of Kwazulu-Natal spans over 3100 million years (My) of the Earth history.

4.1.1 Kaapvaal Craton and Natal Metamorphic Province

The ancient geological basis of Kwazulu-Natal is represented by the Kaapvaal Craton and the Natal Metamorphic Province. The Archaen Kaapvaal Craton is approximately 3000 My old and was shaped when the Earth's basaltic crust was infringed by granite. The basalts which is approximately 3500 My old are preserved as greenstone fragments in the granite. After the formation of the Kaapvaal Craton, the latter was uplifted and exposed to the atmosphere resulting in erosion of sediment into shallow basins. The Pongola basin was deposited on these early basins.

The Barberton Sequence of Mpumalanga consists of three Groups namely the oldest Onverwacht Group, middle Fig Tree Group and youngest Moodies group. These groups consists of mainly volcanic igneous rocks, plus some igneous intrusions, as well as minor sediments such as banded iron formation, chert, quartzite, conglomerate, schists.

4.1.2 Pongola Supergroup

The lower Pongola Supergroup comprises of the Nsuze Group and is a sequence of basalt, minor limestone and sandstone. The Mozaan Group is underlain by the Nsuze Group while the intrusive Pongola Granites are also present.

4.1.3 Natal Group

The Natal Group is approximately 190 Million years old and was the first sedimentary sequence deposited on the new basements and spans the Cambrian to the Ordovician Periods.

4.1.4 Karoo Supergroup

In the development footprint the Karoo Supergroup is known as the undifferentiated Karoo.

4.1.4.1 Dwyka Group

The Natal Group is overlain by the Dwyka Group which is a thick rock unit of tillite which was deposited by retracting ice sheets in a glacial setting. The Dwyka was deposited approximately 300 Mya. At that time South Africa was part of the supercontinent Gondwana. The Dwyka forms the lowermost and thus oldest deposits of the Karoo Basin and is thus part of the Karoo Supergroup. The Karoo Basin records approximately 120 My of southern Gondwana geological history.

4.1.4.2 Ecca Group

The Ecca Group comprises of thick clay and silt beds and were deposited in a large sea in the Karoo Basin. These sediments now form the shales of the Pietermaritzburg Formation. The latter formation is overlain by the Vryheid Formation and is in turn overlain by the Volksrust Formation. The Ecca Group was deposited as Gondwana moved towards the equator.

4.1.4.3 Beaufort Group

The Beaufort Group was deposited on the sediments of the Ecca Group. The Beaufort Group is characterised by red, green and purple coloured mudstones which were deposited in a drying swampland. The 250 million year old rocks also contains the record the largest known extinction event, namely the end-Permian mass extinction, in which most of the known species died out.

The Beauford Group comprises of the older Adelaide Subgroup and younger Tarkastad Subgroup. The Adelaide Subgroup overlies the Volksrust Formation of the Ecca Group. The Beaufort Group is subdivided into a series of biostratigraphic units on the basis of its faunal content. This Subgroup is divided into three Formations namely the oldest Kroonap formation, the Middleton Formation and the youngest Balfour formation. The latter formation is followed by the Katberg/Verkykerskop and Burgersdorp/Driekoppen Formations of the Tarkastad Subgroup.

4.1.5 Stormberg Group

The Beaufort Group is followed by the Stormberg Group. The Stromberg Group consist of the following formations the oldest Molteno, middle Elliot and youngest Clarens Formation.

4.1.6 Drakensberg Group and Lebombo Group

The Stormberg Group is capped by the Jurassic volcanic deposits of the Drakensberg Formation and Lebombo Group. The Drakensberg Group formed with volcanic lava outbursts and the associated breakup of Gondwana, approximately 190 Mya. Cracks in the earth's crust were filled with molten lava that cooled to form dolerite dykes. Magma injected horizontally between sediments, cooled down and formed horizontal sills of dolerite. The last volcanic event which produced rhyolite lava formed the Lebombo Mountains. These volcanic events were followed by uplifting that in time separated Africa from Antarctica. The youngest formation of the Drakensberg Group is the Mzamba Formation.

4.1.7 Zululand Group

The Drakensberg Group is followed by the Zululand Group. The latter group consist of siltstone and sandstone and are the first marine deposits that formed in the newly opened Indian Ocean. This deposits were deposited in the Cretaceous approximately 145 to 65 mya.

The Geology of the KwaZulu-Natal Jurassic is unconformable overlain by younger sediments of the Mzamba Formation. The Zululand Group overlies the Mzamba Formation of the Drakensberg Group and comprises of three formations namely the Makatini, Mzinene Formation and St Lucia Formations.

The oldest formation of this group is the Makatini Formation which consists of small pebble conglomerates, sandstone, siltstone and limestone of up to 80 m thick.

The Mzinene Formation comprises of glauconotic siltstone and sandstone. The St Lucia Formation is lithological similar to the Mzinene Formation.

4.1.8 Maputuland Group

During the last glacial period the earth was much colder and the sea levels approximately 100 metres beneath the present. The coastline thus extended far out in the sea, while large rivers eroded deep valleys along the coast. As the earth warmed the sea level rose and the valleys were infilled with estuarine muds and shelly sands which now forms the Maputuland Group (65 million years ago to the present).

During the Caenozoic the sea-levels withdrew from the high levels during the Cretaceous. The Tertiary calcrenite and limestone Uloa Formation overlies the St Lucia Formation. The Muzi Formation comprises of swamp deposits consisting of mottled, brown clayey sand. This formation is characterised by few outcrops. The Muzi Formation is overlain by the Port Durnford Formation which consists of mudstone, lignite clay and sand. In turn the Port Durnford Formation is overlain by the Bluff and Berea Formations. The coastal dune corridors is formed by the Bluff Formation which consists of a pale brown sandstone deposit. The Bluff Formation consists of red, orange and yellow Aeolian sand.

The KwaZulu-Natal coastline are still shaped by fluctuations in sea-level. Recent deposits consists of alluvium, sand and calcrete while the Masotchenei Formation consists of palaeosols of Cenozoic colluvial deposits.

4.2 PALAEONTOLOGY

4.2.1 Kaapvaal and Natal Metamorphic province

The Kaapvaal and Natal Metamorphic province consist of igneous rock thus contain no fossils. The palaeontological significance of this groups is thus zero.

Archaean microfossils and microbial trace fossils (bacterial borings) have been documented from cherts and volcanic glasses in the Fig Tree Group and Onverwacht Group of the Barberton Sequence in Mpumalanga.

4.2.2 The Pongola Supergroup

Stromatolites are found in the Nsuze group. Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-based life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.

4.2.3 The Natal Group

To date no fossils have been found from this group

4.2.4 Karoo Supergroup

4.2.4.1 The Dwyka Group

The Dwyka Group is characterised by trackways, mostly produced by fish and arthropods (invertebrates). Other trace fossils include fossilized faeces of chondrichthyian (cartilaginous) fish. Body fossils include foraminifera and single-celled radiolarians, bryozoans, sponges, primitive starfish, nautiloids (marine invertebrates similar to the living Nautilus), cephalopods, gastropods, bivalves (brachiopods and palaeoniscoid fish. Fossil plants have also been found, including lycopods, moss, leaves and stems. Fossil spores and pollens as well as fossilized wood. Body fossils are generally scarce and most of the Dwyka sediments are of low overall palaeontological sensitivity

4.2.4.2 The Ecca Group

Pietermaritzburg Formation

Generally body fossils are absent from this Formations but trace fossils have been recorded from the upper layers of the Pietermaritzburg Formation. The Vryheid Formation is known for the rich coal

deposits which developed due to the accumulation of plant material. Invertebrate ichnofossils (tracefossils) have been described from this formation. Trace fossils as well as the bivalve Megadesmus have been described from the Volksrust Formation.

4.2.4.3 Beaufort Group

The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete transition from early "reptiles" to mammals.

The Balfour Formation has an abundant assemblage of vertebrates. Fossils of the Balfour Formation includes vertebrates from the *Daptocecphalus* and *Lystrosaurus* Assemblage Zones (AZ) (Rubidge et al, 1995; MacRae, 1999; McCarthy and Rubidge, 2005; Johnson et al, 2009). Several important trace fossil assemblages, comprising vertebrate tracks and casts of vertebrate burrows have also been described from this Formation (Groenewald, 1996; Johnson *et al*., 2009).

The Middleton Formation is known for its Glossopteris fossils plant assemblages. At their peak development during the Permian these plants inhabited a diversity of ecological niches, which includes riverine forests which was dominated by conifers, cycadeoids and ginkos. Diverse assemblages of insects are also recorded from this Formation. This Formation is represented by a rich assemblage of vertebrates found in the *Pristerognathus, Tropidostoma* and *Cistecephalus* Assemblage Zones of the Karoo Basin, (Rubidge, *et al*, 1995; MacRae, 1999; McCarthy, 2005).

The *Eodicynodon* and *Tapinocephalus* Assemblage Zones are present in the Kroonap Formation. The *Eodicynodon* AZ is characterised by *Eodicynodon* and *Tapinocaninus* fossils. The *Tapinocephaus* AZ has a rich diversity of Therapids, dinocephalia, while fish, amphibia and plant fossils are also present.

The *Lystrosaurus* AZ also includes the Palingkloof Member (*Daptocephalus* AZ, Adelaide Subgroup) (Groenewald, *et al,* 1995, Rubidge, 2005). The lower Palingkloof Member is palaeontologically important as it precedes the Permo-Triassic Extinction Event which is the contender for the greatest Mass Extinction in history. This extinction almost destroyed the vertebrate fauna and killed off the diverse glossopterid plants. The fossil heritage of the Early Triassic Katberg Formation is thus also palaeontological significant because they document the recovery of terrestrial biotas succeeding the catastrophic end-Permian Mass Extinction event (approximately 251 million years ago).

The *Lystrosaurus* AZ (Katberg/ Verkykerskop Formations) is named after the dicynodont *Lystrosaurus* which contributes up to 95% of fossils found in this biozone (Botha & Smith 2007). The *Lystrosaurus* AZ is also known for the small captorhinid parareptiles *Procolophon* and a crocodile-like early archosaur, *Proterosuchus*. Armour-plated "labyrinthodont" amphibians (e.g. *Lydekkerina*) are also present in this biozone as well as small true reptile owenettids, therocephalians, and early cynodonts (*e.g. Galesaurus, Thrinaxodon*). This biozone is also characterized by vertebrate and invertebrate burrows. Invertebrate burrows are represented by aquatic and land living organisms while tetrapod burrows include various cynodonts, procolophonids and *Lystrosaurus* (Groenewald 1991, Groenewald and Kitching, 1995, Damiani, *et al.* 2003, Abdala, *et al.* 2006). Vascular plants in this biozone are generally rare but petrified wood ("*Dadoxylon*") and leaves of glossopterid progymnosperms and arthrophyte ferns (*Schizoneura*, *Phyllotheca*) are present.

The *Cynognathus* AZ (Burgersdorp/ Driekoppen formations) is dominated by amphibians, reptiles and therapsids. The Burgersdorp biotas include rich freshwater vertebrate fauna, fish groups as well as large capitosaurid and trematosuchid amphibians. The reptile fauna includes lizard-like sphenodontids, rhynchosaurs, and primitive archosaurs. Therapsids include *Kannemeyeria and* numerous small to medium-sized carnivorous and herbivorous therocephalians and advanced cynodonts. Tetrapod trackways and burrows are also present.

4.2.5 The Stormberg Group

The Molteno Formation is world renowned for its Mesozoic *Dicroidium* assemblages (plant fossils). The Elliot Formation is known for its early dinosaur and mammal remains while the Clarens Formation is known for dinosaur fossils and footprints. This Group has a high Palaeontological sensitivity.

4.2.6 Drakensberg Group and Lebombo Group

Jurassic Drakensberg and Lebombo Groups and associated dolerite has an igneous origin and contain no fossils. The palaeontological significance of this groups is thus zero.

The Mzamba Formation comprises of shark teeth, vertebrate remains and charred wood remains (bored by Teredoa gastropod).

4.2.7 Zululand Group

The Zululand Groups is known for ammonite fossils (large snail-like animals up to one metre in size) which thrived in the warm ocean. These ammonite shells are common in almost all exposures of Cretaceous rocks.

The Makatini Formation contains large wooden fossil logs that are extensively drilled by Teredo wood boring organisms. The overlying Mzinene Formation with a rich invertebrate fauna, including ammonites, bivalves, gastropods, echinoids and nautiloids. Large wooden fossil logs that are extensively drilled by Teredo wood boring organisms is commonly found in the formation. Fine grained sediments contain bored fossil tree trunks, small plant fragments as well as marine invertebrates. This formation has a High Palaeontological Sensitivity. Scientist interpret the palaeo-environment as shallow-marine.

The upper St Lucia Formation contains an abundance of echinoid, bivalve, gastropod and cephalopod remains as well as fossil logs, plant fragments, reptile bones and at least 62 ostracod species and is much more fossiliferous than the underlying Mzinene Formation.

4.2.8 Maputuland Group

The Maputuland Group forms a layer of Tertiary and Cretaceous sequences. The less detailed subdivision of Wolmarans and Du Preez (1986) of the Maputuland Group will be used for reasons of simplicity, preferred to the more detailed subdivision of Johnson et al (2006).

The largest portion of the Uloa Formation consists of approximately 5 metres of unbedded calcirudite, known as the “Pecten Bed”, due to the richness of the bivalve *Aeqipectenuloa*. Brachiopods, coralline algae, corals, echinoids, foraminifera and Gastropods are present in this formation, as well as isolated teeth of the extinct giant shark *Carcharodon megalodon* (Johnson et al, 2006). This Group has a high Palaeontological sensitivity.

No fossils have been documented from the Muzi Formation. The Bluff Formation has local fossiliferous zones whereas the Berea Formation, Masotcheni Formation and recent alluvial and sand deposits, do not contain significant fossil remains.

The Port Durnford Formation contains a sequence of carbonaceous muds and sand, comprising fossils of terrestrial vertebrates for example antelope, buffalo, elephant, hippopotamus, rhinoceros as well as marine fossils including crustaceans and fish, foraminifera, marine molluscs and fragments of turtles and crocodiles. This Group has a high Palaeontological sensitivity.

The Bluff Formation is a nearly unbroken outcrop with fossils recorded from small deposits of coral limestone. The Berea Formation is not known to contain significant fossil vertebrates but petrified wood has been described from this Formation.

In the recent alluvium, sand and calcrete and Masotcheni Formation of the coastal plains of Kwazulu-Natal no significant fossil remains have been described.

Quaternary superficial deposits

Cenozoic deposits are largely confined to coastal areas where very rich assemblages of marine fossils (KwaZulu-Natal and Eastern and Western Cape coasts) are recorded (MacRae, 1999; Johnson et al, 2006). But, numerous forms of superficial deposits of Late Caenozoic (Miocene to Pliocene to Recent) age occur in the Karoo Basin (Partridge *et al*. 2006). From a Palaeontological point of view the Quaternary superficial deposits have been relatively neglected in the past but they may sometimes contain important fossil biotas. These superficial deposits contain pedocretes (colluvial slope deposits, wasted surface gravels, river alluvium or/and wind-blown sands) as well as spring and pan sediments. The Quaternary fossil assemblages are typically sparse, low in diversity, and occur over a wide geographic area. These fossil biota may include bones, teeth and horn cores of mammals and reptiles, non-marine bivalves and gastropods, ostrich egg shells, trace fossils (faeces and termitaria), and plant remains in organic-rich alluvial horizons. This Group has a high Palaeontological sensitivity.

5 GEOGRAPHICAL LOCATION OF THE SITE

The proposed development follows the borders of South Africa and its neighbouring countries Mozambique and Swaziland (Fig 1).

6 METHODS

As part of the Palaeontological Impact Assessment, a field-survey of the development footprint was conducted in February 2018 to assess the potential risk to palaeontological material (fossil and trace fossils) in the proposed footprint of the development. A physical field-survey was conducted on foot and by vehicle within the proposed development footprint. The results of the field-survey, the author's experience, aerial photos (using Google Earth, 2018), topographical and geological maps were used to assess the proposed development footprint. No consultations were undertaken for this Impact Assessment.

The National Defence Force is thanked for their support and escort throughout the KZN development footprint as the chance of a car hijack was eminent. It is much appreciated.

6.1 Assumptions and limitations

The accurateness of Palaeontological Desktop Impact Assessments is reduced by old fossil databases that does not always include relevant locality or geological formations. The geology in various remote areas of South Africa may be less accurate because it is based entirely on aerial photographs. The accuracy of the sheet explanations for geological maps is inadequate as the focus was never intended to be on palaeontological material.

The entire South Africa have not been studied palaeontologically. Similar Assemblage Zones but in different areas, might provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations generally assume that unexposed fossil heritage is present within the development area. Thus, the accuracy of the Palaeontological Impact Assessment will be improved by a field-survey.

7 FIELD OBSERVATIONS

The following photographs were taken on a site visit to the proposed development footprint. Only the areas in the development footprint with a High to very High Palaeontological Sensitivity (according to the SAHRIS Sensitivity Map) were evaluated. No fossils were found in the proposed development footprint although several gastropod fossils are known to the author from the Ndumu Game reserve.

High and very Palaeontological Sensitive areas at the KZN –Mozambique Border

26° 52’02”S 32°49’44”E Border	

26° 52’02”S 32°49’44”E Proposed Camp Site	
26° 51’51”S 32°51’04”E Border fence and road next to the fence	
26° 50’28”S 32°52’44”E Border fence and road next to the fence	

26° 51’48”S 32°45’60”E Border fence	
26° 51’49”S 32°47’29”E Vegetation next to the border fence	
26° 52’05”S 32°41’38”E Thick unfossiliferous topsoil without outcrops	

Lush vegetation without fossiliferous outcrops	
Border fence at Tembe National Elephant Park	

Very High Palaeontological Sensitive areas at the Swaziland Border

25° 55’57”S 32°45’38”E	

25° 55’53.73”S 32°45’38.06”E	
25° 55’58”S 32°45’03.52”E	
25° 56’11.03”S 32°46’02.14”E	

8 FINDINGS AND RECOMMENDATIONS

The proposed project is underlain by various sedimentary rocks of which the **Quaternary** and the **Undifferentiated Karoo** has a **high Palaeontological sensitivity** as well as **the Zululand Group** with a **very high palaeontological sensitivity**. The various intrusive rocks have an igneous origin and is thus unfossiliferous and has a zero palaeontological sensitivity. As part of the Palaeontological Impact

Assessment, a field-survey of the development footprint was conducted in February 2018 to assess the potential risk to palaeontological material (fossil as well as trace fossils) in the proposed footprint of the development. A physical field-survey of the proposed development and camping site was conducted on foot and by vehicle and during this field survey, **no fossiliferous outcrops** were found in the development footprint. For this reason, a **low palaeontological sensitivity** is allocated to the development footprint. Although fossils are uncommon and only occur periodically a solitary fossil may be of scientific value as many fossil taxa are known from a single fossil. The recording of fossils will expand our knowledge of the Palaeontological Heritage of the development area.

The scarcity of fossil heritage at the proposed development footprint indicate that the impact of the proposed development will be of a low significance in palaeontological terms. It is therefore considered that the proposed Swaziland-Mozambique Border Patrol Road and Mozambique Barrier Structure is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the unlikely event that fossil remains are uncovered during any phase of construction, either on the surface or unearthed by new excavations and vegetation clearance, the ECO in charge of these developments ought to be alerted immediately. These discoveries should be protected (preferably *in situ*) and the ECO must report to SAHRA so that appropriate mitigation (*e.g.* recording, collection) can be carry out by a professional paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies proposed by SAHRA.

8.1 INTRODUCTION: IMPACT ASSESSMENT METHODOLOGY

Impact assessment must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance is provided in this Section.

The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects. The environmental impact assessment is focussed on the following phases of the project namely:

- Planning Phase;
- Construction Phase; and
- Operational Phase.

As the project entails rehabilitation of existing infrastructure which will be permanent, decommissioning is not applicable to this project, however, impacts associated with post construction clean-up are considered.

8.2 IMPACT ASSESSMENT METHODOLOGY

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- ***Nature:*** A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- ***Extent:*** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- ***Duration:*** Indicates what the lifetime of the impact will be;
- ***Intensity:*** Describes whether an impact is destructive or benign;

- ***Probability:*** Describes the likelihood of an impact actually occurring; and
- ***Cumulative:*** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The criteria to be used for the rating of impacts are provided in **Table 8-1**.

Table 8-1: Criteria to be used for the rating of impacts

Criteria	Description			
EXTENT	**National (4)** The whole of South Africa	**Regional (3)** Provincial and parts of neighbouring provinces	**Local (2)** Within a radius of 2 km of the construction site	**Site (1)** Within the construction site
DURATION	**Permanent (4)** Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	**Long-term (3)** The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	**Medium-term (2)** The impact will last for the period of the construction phase, where after it will be entirely negated	**Short-term (1)** The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
INTENSITY	**Very High (4)** Natural, cultural	**High (3)** Natural, cultural and	**Moderate (2)** Affected environment	**Low (1)** Impact affects the

Criteria	Description			
	and social functions and processes are altered to extent that they permanently cease	social functions and processes are altered to extent that they temporarily cease	is altered, but natural, cultural and social functions and processes continue albeit in a modified way	environment in such a way that natural, cultural and social functions and processes are not affected
PROBABILITY OF OCCURRENCE	**Definite (4)** Impact will certainly occur	**Highly Probable (3)** Most likely that the impact will occur	**Possible (2)** The impact may occur	**Improbable (1)** Likelihood of the impact materialising is very low

Significance is determined through a synthesis of impact characteristics. Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Table 8-2: Criteria for the rating of classified impacts

	Class	Description
+	**Any value**	Any positive / beneficial 'impact', i.e. where no harm will occur due to the activity being undertaken.
–	**Low impact (4 -6 points)**	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
	Medium impact (7 -9 points)	Mitigation is possible with additional design and construction inputs.
	High impact (10 -12 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
	Very high impact (12 - 14 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status		Denotes the perceived effect of the impact on the affected area.
Positive (+)		Beneficial impact.
Negative (-)		Deleterious or adverse impact.
Neutral (/)		Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the *status quo* – i.e. should the project not proceed. Therefore, not all negative impacts are equally significant.		

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMPr.

8.3 POTENTIAL IMPACTS AND SIGNIFICANCE

The following sections will provide a description of the potential impacts as identified by the specialist assessment, EAP and through the PPP as well as the assessment according to the criteria described in **Table 8-1** and **8-2**.

All potential impacts associated by the proposed development through the construction and operation of the development life-cycle have been considered and assessed in the following sections. As the infrastructure is expected to be permanent, the decommissioning phase impacts have not been considered.

It must be noted that any impact on the Palaeontological Heritage will only be during the CONSTRUCTION phase and that only the Areas of High and Very High Palaeontological Sensitivity will be impacted upon.

8.3.1 Construction Phase Impacts

Table 8-3: Construction phase impacts

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)	
Construction	**Aspect:** ***T***he excavations and clearing of vegetation during the construction phase will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly disturb, destroy or permanently close-in fossils at or below the ground surface. These fossils will then be lost for research. **Impact:** Destruction of fossil Heritage Damaging impacts on	**Without**	1	4	1	2	-8	Medium Negative
		With	1	4	1	1	-7	Medum Negative
		Key mitigation measures: *Not necessary* In the event that fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably *in situ*) and the ECO must report to SAHRA so that appropriate mitigation (*e.g.* recording, collection) can be carry out by a professional paleontologist. Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an approved collection which comprises a museum or university collection, while all fieldwork and reports should meet the minimum standards for palaeontological impact studies proposed by SAHRA. The lack of appropriate exposure at the proposed development footprint indicates that the						

Phase	Potential Aspect and/or Impact	Mitigation	Extent (E)	Duration (D)	Intensity (I)	Probability (P)	Significance (E+D+I+P)
	palaeontological heritage occur during the **construction** phase which will modify the existing topography	impact of the development is of low significance in palaeontological terms					

The numbering included in the above tables came as a result of Table 8-4

CONTENT OF SPECIALIST REPORTS ACCORDING TO APPENDIX 6 OF THE EIA REGULATIONS 2014 AS AMENDED IN 2017

(1) A specialist report prepared in terms of these Regulations must contain-

a) details of-
   (i) the specialist who prepared the report; and

   (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
c) an indication of the scope of, and the purpose for which, the report was prepared;
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
g) an identification of any areas to be avoided, including buffers;
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
i) a description of any assumptions made and any uncertainties or gaps in knowledge;
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;
k) any mitigation measures for inclusion in the Environmental Management Programme (EMPr);
l) any conditions for inclusion in the environmental authorisation;
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
n) a reasoned opinion- (i) as to whether the proposed activity or portions thereof should be authorised; and (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in

the EMPr, and where applicable, the closure plan;

o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
q) any other information requested by the competent authority.
r) Original signed specialist declaration.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty three years. She has experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 10 years and have been been conducting Palaeontological Impact Assessments since 2014. 80 Technical reports on palaeontology (scoping reports have been written

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;

- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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SIGNATURE: