Zitholele Consulting

Ndumo-Gezisa 132kV Power Line, Manguzi, Umkhanyakude District Municipality, Maputaland Region of KwaZulu-Natal Province

Phase 1 – Heritage Impact Assessment

Eskom Holdings SOC Limited: Eastern Regions

Issue Date: 29 April 2013

Revision No.: 1

Project No.: 12775

Declaration of Independence

The report has been compiled by PGS Heritage, an appointed Heritage Specialist for Zitholele Consulting. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment Process, which includes the Baseline Information report as well as this final report.

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Date:	*29 04 2013*		
Document Title:	Ndumo-Gezisa 132kV Power Line		
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EXECUTIVE SUMMARY

PGS Heritage (PGS) was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Environmental Assessment (BA) for the Ndumo-Gezisa 132kV line, linking the proposed Ndumo substation near Makhane's Drift and the proposed Gezisa substation near Manguzi, Maputaland region of KwaZulu-Natal Province.

The archival research and field assessment has shown that the study area and surrounds has a rich historical and archaeological history.

The purpose of the site evaluation was to identify the most feasible alignment from a heritage perspective. Although the impact rating has indicated that the type and severity of impact before and after mitigation rate the same, the **amount** of possible heritage sensitive areas on the five alternatives rate differently, with Alternative 2 possibly having the lowest impact on heritage resources. This is probably related to the fact that the largest part of this alignment is through the Tembe Nature reserve, which is void of dense human habitation.

Alternatives 3c and 3b rate as the second best alternatives, mostly due to the fact that Alternative 3a runs parallel to the P522-2 road, that has a high settlement concentration along its alignment.

Alt Name	*PNTCNT*	*Preferential Rating (Unweighted)*
1	32	3
2	10	1
3a	30	3
3b	34	3
3c	24	2
3d	25	2

It must however, be noted that most heritage resources are point specific and therefore, with realignment within the final corridor, it is possible to avoid or to mitigate possible impacts on heritage resources to acceptable levels.

The next step in the compilation of a site specific heritage management plan will be an archaeological walk down and a Phase 1 palaeontological assessment of the final designed alignment and foot print areas of the proposed final alignment as ilistrated in **Figure 25**, to identify all heritage resources to be impacted by the final route alignment and pylon placements.

The studies will provide timeous management of such sites, either through realignment of the proposed development or mitigation of such sites where needed.

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1 INTRODUCTION

PGS Heritage (PGS) was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Environmental Assessment (BA) for the Ndumo-Gezisa 132kV line, linking the proposed Ndumo substation near Makhane's Drift and the proposed Gezisa substation near Manguzi, Umkhanyakude District Municipality, Maputaland region of KwaZulu-Natal Province.

1.1 Scope of the Study

The aim of the study is to develop a general overview of the study area, and to identify highly sensitive heritage features to inform corridor selection. This study will not be at a detailed level, and further studies will be required during the construction phase, as part of the EMP, to verify that no impacts occur to heritage features.

1.2 Specialist Qualifications

This Heritage Impact Assessment (HIA) was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 60 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes and will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, Principal Archaeologist for this project, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation, as well as being accredited as a Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

Dr Gideon Groenewald has a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating

fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

1.3 Assumptions and Limitations

The Report deals with available published data and cannot be utilised as the final information on heritage resources in the study area. The assumption is that this report will inform the development of the final corridor alignment for the power line, and that this final alignment will require a walkdown when the route alignment and pylon placements have been finalised.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

i. National Environmental Management Act (NEMA) Act 107 of 1998
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
iii. KwaZulu Natal Heritage Resources Act 4 of 2008
iv. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
v. Development Facilitation Act (DFA) Act 67 of 1995

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

i. National Environmental Management Act (NEMA) Act 107 of 1998
    a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
    b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
    c. Environmental Impacts Assessment (EIA) – Section (32)(2)(d)
    d. EMP (EMPr) – Section (34)(b)
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
    a. Protection of Heritage Resources – Sections 34 to 36; and
    b. Heritage Resources Management – Section 38
iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002

a. Section 39(3)

iv. Development Facilitation Act (DFA) Act 67 of 1995

a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34 (1) of the NHRA states that "no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…". The NEMA (Act No 107 of 1998) states that an integrated EMP should (23:2 (b)) "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive legally compatible AIA report is compiled.

Terminology

Abbreviations	***Description***
AIA	Archaeological Impact Assessment
AMAFA	Amafa aKwaZulu-Natali – Provincial Heritage Authority
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act

NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

Archaeological resources

This includes:

i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
iii. wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
iv. wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
v. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
ii. carrying out any works on or over or under a place;
iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
iv. constructing or putting up for display signs or boards;
v. any change to the natural or existing condition or topography of land; and
vi. any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age, between 400 000 and 2500 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance.

Holocene

The most recent geological time period which commenced 10 000 years ago.

Late Stone Age

The archaeology of the last 30 000 years, associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800s, associated with people who carried out iron working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30-300 000 years ago, associated with early modern humans.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Refer to **Appendix C** for further discussions on heritage management and legislative frameworks.

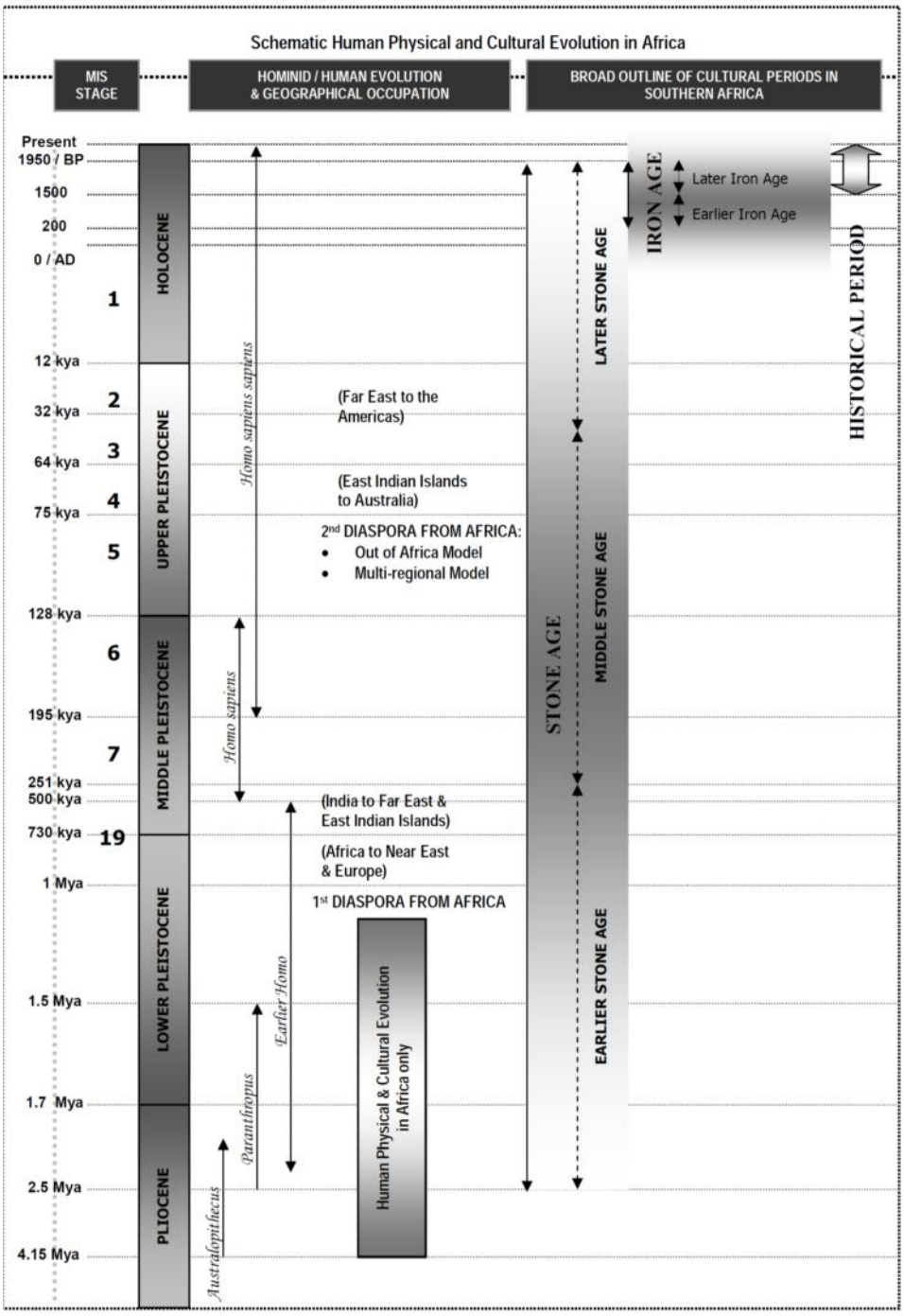

Figure 1 - Human and Cultural Time line in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

The study area (**Figure 2**) defined by the cadastral boundaries of the area is approximately 70 km across and 50 km in length. The project is located in the northern Kwa-Zulu Natal Province between the towns of Mkanes Drift and Manguzi. The area is bordered by several nature reserves, with the Tembe Elephant Reserve on the northern most part of the

boundary, the Greater St Lucia Wetland reserve along the eastern boundary and Ndumu game reserve on the north-western boundary. The P522 road traverses the centre of the study area.

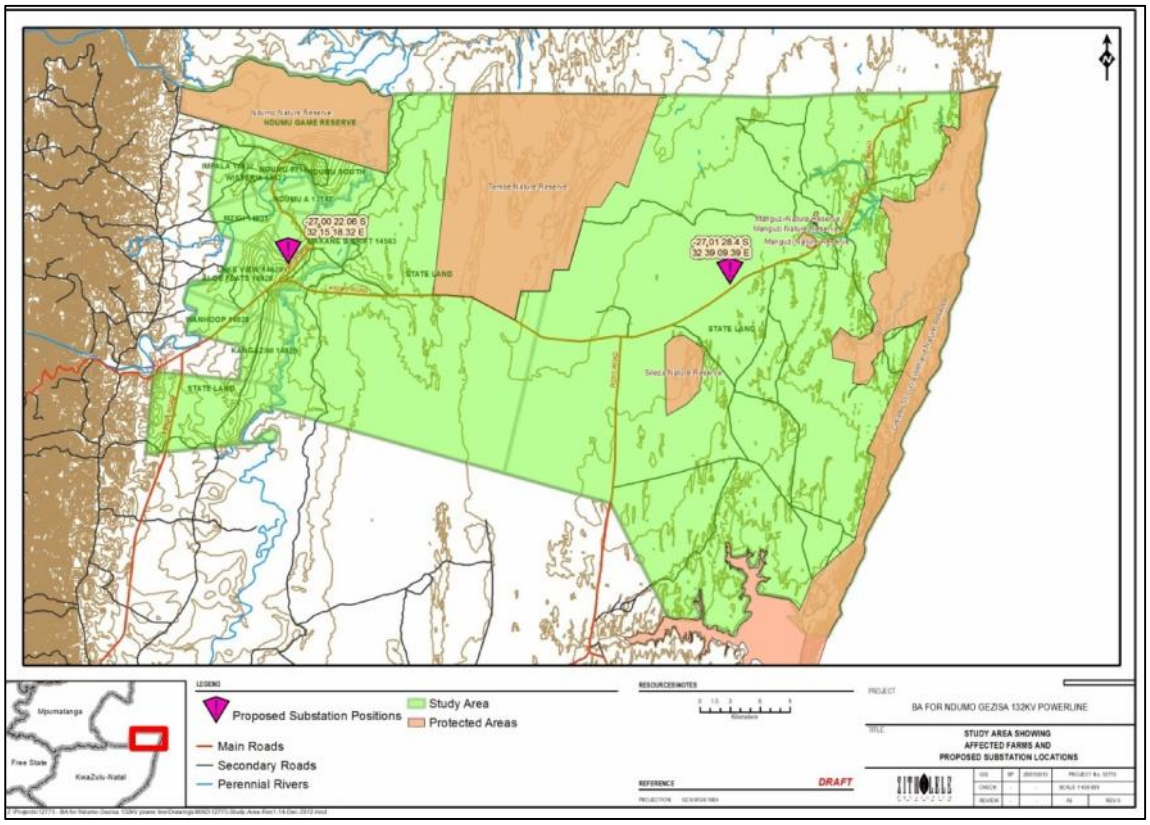

Figure 2 – Study area

2.2 Technical Project Description

The existing 22kV networks emanating from the existing Makhatini and Nondabuya 132/22kV substations are highly constrained in terms of capacity and cannot cater for additional electrification load growth on the Makhatini Flats. It is imperative to establish a new 132kV network of power lines and substations on the Makhatini Flats to cater for existing and projected electrification load growth. New 132/22KV substations are required near Shemula Gate, Mbazwana and Manguzi.

The new 132kV power line and substation projects have been sectionalized as follows:

- Nondabuya-Ndumo 132kV line with a 132/22kV substation, to be called Ndumo, between Shemula Gate and Makhane's Drift - BA is complete; and

- Candover-Mbazwana-Gezisa 132kV line, which includes a proposed Mbazwana 132/22kV substation for Mbazwana and a 132/22kV substation, to be called Gezisa, to supply Manguzi Town – BA complete
- The Ndumo-Gezisa 132kV line needs to be constructed, linking the proposed Ndumo substation near Makhane's Drift and the proposed Gezisa substation near Manguzi.

2.2.1 Proposed projects

For this project, 3 potential routes have been identified.

1. Northern Route – North of the Tembe Elephant Reserve Bordering the Mozambique [border?].
2. Central Route – A straight line connecting the two proposed substations (**Figure 2**).
3. Southern Route – South of the Tembe Elephant Reserve, along the P522 road.

Authorization will be sought for a 500m corridor; however the final servitude will be 36m wide. During construction of the power line, access roads will be established or tracks driven. This track will be about 4m wide. This track will also be used during the operational phase for maintenance vehicles to obtain access to the power line servitude. Additionally, bush clearing will be undertaken along the centre line of the power line of 4m wide to enable stringing, and an area of 40m X 40m (1600 m2) cleared at tower / pylon locations. Similarly all access roads and tracks will be cleared of vegetation for 4m wide.

3 BACKGROUND INFORMATION - HERITAGE

3.1 The Archival findings

The archival research focused on available information sources, which were used to compile a background history of the study area and surrounds. This data then informed the possible heritage resources to be expected during field surveying.

Archaeological background

The archaeology of KwaZulu-Natal spans three archaeological periods: the Stone Age, Iron Age and Historical/Colonial period. The early periods in Stone Age archaeology of the region are recorded, amongst others, in Sibudu Cave on the coast of KwaZulu-Natal, which shows

evidence for early forms of cognitive human behavioural patterns in the Middle Stone Age of South Africa some 40 000 years BP (Wadley, 2005). The caves, plains, valleys and hills of KwaZulu-Natal are also known to have been occupied previously by the San people. Evidence for this includes stone artefacts and an abundance of rock art, predominantly in the form of rock paintings in areas such as the Giants Castle and Kamberg in the Drakensburg Mountains (Vinnicombe, 1976). Rock art sites have been also been documented in the areas around Estcourt, Mooi River and Dundee.

Stone Age

The Stone Age can be roughly divided into three periods:

Earlier Stone Age (2 million - 400 000 Before Present/BP)
Middle Stone Age (300 000 – 30 000 BP)
Later Stone Age (30 000 BP – recent times)

Border Cave

Border Cave is situated some 40 kilometres to the north-east of the study area at the Ingodini Border Cave Museum Complex. The site is probably the most well-known archaeological site in the larger Pongola area and is a tourist attraction.

The site was first investigated by Raymond Dart in 1934. His excavations exposed a thick deposit of archaeological material dating from the Iron Age, which was overlaying Middle Stone Age artefacts. During the early 1940s, the archaeological deposits were disturbed by guano collectors.

The guano excavations revealed human bone fragments that were forwarded to Dart, in 1941. The remains were that of an infant dating back to around 100 000 years ago. A single perforated Conus shell was found with the infant remains (Wells, 1945).

Further excavations by Beaumont in the early 1970's exposed a complete MSA sequence preceded by Early and Later Iron Age deposits. The Iron Age deposits date between 200-800BP, with the MSA stratigraphy dating from 130 000 to 35 000BP (Klein, 1977).

Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

The Early Iron Age: Most of the first millennium AD.
The Middle Iron Age: 10th to 13th centuries AD.
The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work iron ore into implements that assisted them in creating a favourable environment to make a better living. Iron is a very hard metal to work with, compared to gold and copper that have lower melting temperatures and therefore are easier to forge. A drawback of gold and copper is the limited occurrence of the ore, compared to iron ore.

In Africa, we proceeded technologically directly from the Stone Age to the Iron Age, whereas in Eurasia there was a prolonged Copper and Bronze Age preceding the Iron Age. In southern Africa, metallurgical techniques made their first appearance in a rather advanced state that permitted the smelting of Copper and Iron directly after a Stone Age economic way of live.

This scenario provides a strong argument that metallurgical technology was introduced from elsewhere and did not develop locally. To effectively smelt iron ore by reduction requires a temperature of at least 1100°C, that is 400°C below the metal's melting point. To obtain a temperature this high was probably unattainable in ancient furnaces. But the prolonged heating of ore in contact with abundant charcoal, needed to obtain a sufficiently high temperature for the reduction of the oxide ores, enabled the iron to obtain enough carbon to make it mild steel. If this mild steel was repeatedly heated and hammered during the forging process, it will harden.

Early Iron Age background

Early in the first millennium AD, there seems to be a significant change in the archaeological record of the greater part of eastern and southern Africa lying between the equator and Natal. This change is marked by the appearance of a characteristic ceramic style that belongs

to a single stylistic tradition. These Early Iron Age people practiced a mixed farming economy and had the technology to work metals like iron and copper.

A meaningful interpretation of the Early Iron Age has been hampered by the uneven distribution of research conducted so far; this can be attributed partly to the poor preservation of these early sites.

Linguistic and archaeological research has developed a model of Bantu distribution from Central Africa down towards Southern Africa from around 1000 BC to 500 AD. This movement has resulted in the current tribal distribution as known today (**Figure 3**).

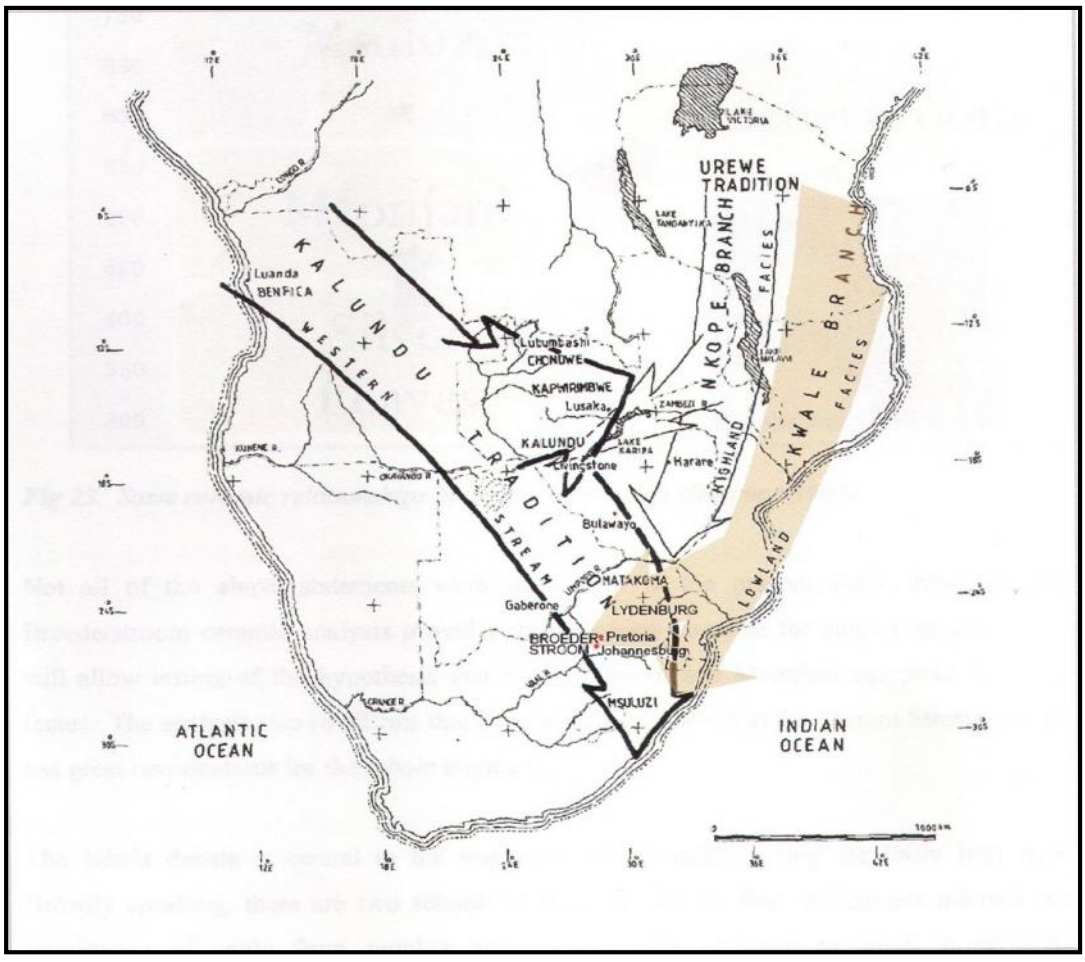

Figure 3 - Map of Western and Eastern Bantu movements from the Central Lakes area

Late Iron Age background

The second period of occupation in KwaZulu-Natal was during the **Early and Middle Iron Age**; an occupation of the KwaZulu-Natal region by the Bantu speakers who migrated from

as far as the Great Lakes regions of Congo and Cameroon. Existing evidence dates the Iron Age in southern Africa to the first millennium AD (Huffman, 2007). The site of Mzonjani, 15 km from Durban, is the oldest known Iron Age site in KwaZulu-Natal, dating to the 3rd Millennium AD (Huffman, 2007).

Archaeologically, the Natal area of current day KwaZulu-Natal was occupied by the Zulu people by AD 1050 (Huffman, 2007). These findings are backed by historical accounts, oral traditions, the study of linguistics, as well as anthropological and archaeological data (as presented through material culture and artefacts). The archaeological evidence of the Iron Age people in the region is represented through distinct ceramic traditions, stone walls and other structural features such as grain bins and hut floor remains, kraal remains, vitrified cattle dung (sheep and goat), iron implements, iron slag, bellows and furnaces. The area that was occupied by the Nguni speaking group of the Eastern Bantu language stream is characterised by settlement patterns defined as the Central Cattle Pattern (CCP) (Huffman, 2007). The earliest known type of stonewalling that characterises this settlement pattern (CCP) in the region (KZN) is known as Moor Park, which dates from the 14th to 16th Centuries AD (Huffman, 2007). This type of stonewalling can be found in defensive positions on hilltops in the Midlands of KZN (Huffman, 2007) (**Figure 4**).

Archaeologists have concluded that the function of these structures was to serve mainly defensive purposes - the site of Moor Park is "*located on the spurs and ends of hills, stone walls cut the settlement off from the remaining terrain and perimeter walls enclose about two thirds of the settlement, leaving the back free*" (Huffman, 2007).

However, it has to be noted that the CCP and other forms of Iron Age stonewalling features are not restricted and/or endemic to the eastern Bantu Speaking language group and/or the Nguni, to whom the Zulu people belong. Huffman's (2007) has validated this, "*Iron Age stonewalling occurs over much of Southern Africa*". He goes on to say, "*as the most visible sign of agro-pastoral settlement, there are several classifications, mostly for specific areas and few for larger regions*". It also has to be noted that these stonewall structures were not the most dominant and/or preferred form of building for the KwaZulu-Natal Ngunis, even though some are dated to also have been built during the times of war between the Colonial powers and the Zulus (for example, during the Anglo-Zulu War).

In KwaZulu-Natal, the most dominant and preferred form of Iron Age structures are the 'beehive huts'- documented in many historical records dating as far back as the colonial times (***Figure 5***).

This presents a challenge to the archaeological study of the Iron Age in the province. Huffman (2007) argues that the archaeology of KwaZulu-Natal is not as prominent as in other parts of the country because most of the structures were built of thatch material that does not preserve well. The same is true for their ceramics. The type site of Moor Park therefore presents a unique view of the Iron Age in KwaZulu-Natal.

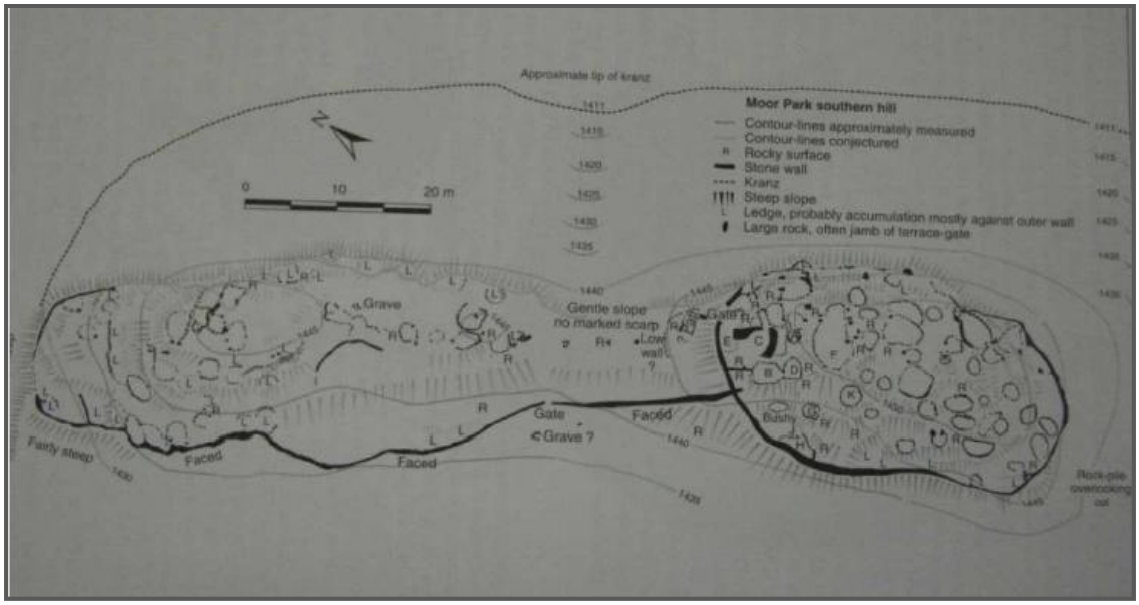

Figure 4 - Site of Moor Park; picture ©T, N. Huffman (2007) to illustrate the C.C.P stonewalling (see also Davies 1974, from which the picture was initially taken).

The third phase of occupation in current day KZN was the **Late Iron Age** – a period just before the contact with the colonial settlers. In KwaZulu-Natal and other parts of southern Africa, this period was characterised by a variety of expansionist battles fought by different chiefdoms, culminating in the pre-colonial southern African war called *Imfecane* (Ommer-Cooper, 1993). In the province of KwaZulu-Natal it started during the early 1800's when the amaZulu were still under the 'static kingdom' of Senzangakona (Omer-Cooper, 1993). In KZN, the *Imfecane* brought about many battles between and within the different local Zulu chiefdoms.

In other parts of the country the *Imfecane* also affected the Koni (Limpopo Province), the Tswana by the Ndebele ka-Mzilikazi (interior regions of the country) and the amaMpondo, amaHlubi, abaThembu and amaXhosa in the Eastern Cape regions (Wright, 1991).

The *Imfecane* featured very prominently in KwaZulu-Natal during the reign of King Shaka KaSenzangakhona (Ommer-Cooper, 1993). Some of these battle and raids spread as far north as countries like present-day Zimbabwe and Zambia.

In Zululand, one of the bigger local chiefdoms that Shaka conquered is the Ndwandwe chiefdom of Zwide kaLanga, which was situated north of Shaka's territory around the modern day kwaNongoma (Knight, 1998).

Shaka managed, to some degree, to achieve his ideal kingdom by strategically expanding/extending the traditional *amabutho* system. The *amabutho* were the brigade of young men of similar age gathered together for a period of national service (Wright, 1991). The *amabutho* were quartered at large royal homesteads, *amakhanda* (**Figure 6**) - which were sited strategically above the surrounding country to guard against both outside attack and internal dissension, like the site of Moor Park discussed above. During the times of need, *amabutho* would be organised into *impi* to fight and protect the Zulu kingdom. The *amabutho,* organised into *impi,* would also be sent out to attack and take over rival chiefdoms that were opposed to King Shaka's rule and in the process incorporate them under his monarchy.

As powerful as it may have been, King Shaka's reign as the Zulu King did not last long, as he was assassinated by his younger brothers in September 1828. One of them, Dingane KaSenzangakhona, then became King. It is argued that by the time of Shaka's assassination he had not yet fully managed to assume and reconcile into his kingdom all the local Zulu chiefdoms: "many *chiefdoms within the kingdom were still unreconciled to Zulu rule, while Zulu influence south of Thukela [was still] patchy*" (Knight, 1998).

The area south of the Thukela River (Natal) was to some degree devoid of King Shaka's hold. He did not manage to assimilate all the chiefdoms south of uThukela under his rule and this had negative ramifications for the Zulu kingdom in the years to come. King Shaka moved the royal homestead to KwaDukuza, Stanger, south of upper Thukela River before his assassination by Dingane (and Mpande), who later relocated it again and rebuilt it at

uMgungundlovu, '*The Place Surrounding the Elephant'* in the emaKhosini valley where King Shaka and King Dingane's forefathers are buried. The moving of the royal homestead by both Shaka and Dingane presents an interesting "thesis' into the internal dynamics and politics of the Royal House and possibly 'one of the reasons' for the assassination of King Shaka by his brothers. One important reason for the relocation of the royal homestead back to uMgungundlovu - north of the upper Thukela River - was the growing influence of the white community at Port Natal (settlers) and the encroaching Trek Boers who crossed the Ukhahlamba Mountains into Natal in the 1837 (Knight, 1998).

The period of encroachment of first Natal, then Zululand, represents a **fourth phase** of settlement or occupation of KwaZulu-Natal, before it became open to most people during the periods of Union (1910-1961), Nationalist rule (1947-1994), and democratic South Africa (1994-to date)

Figure 5- Pre-industrial Zulu village: beehive huts, note homestead built using thatch material (Colonial period photograph) (Laband & Thompson, 2000)

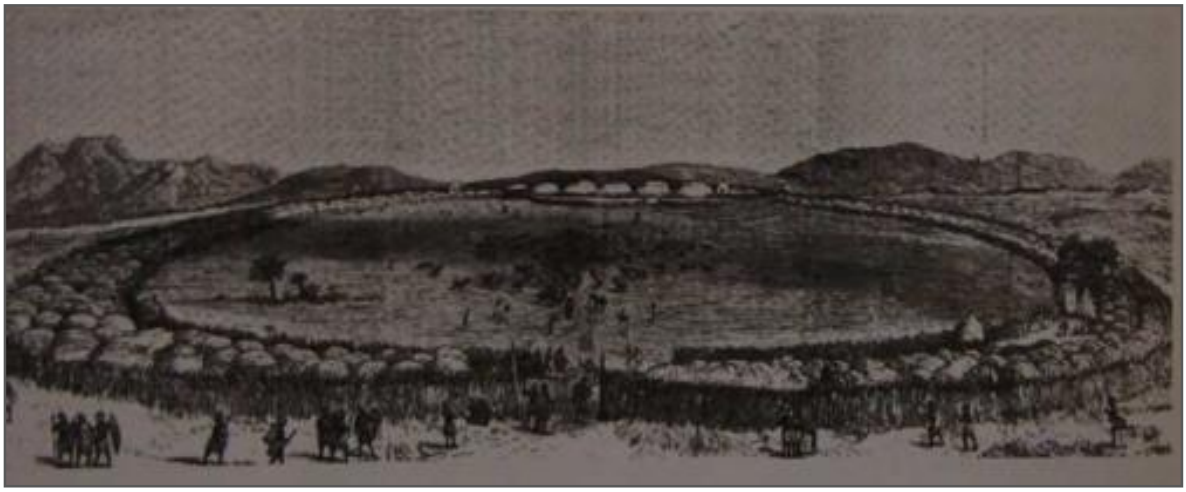

Figure 6 - An illustration of iKhanda or the royal homestead (Laband & Thompson, 2000)

Natal and Zululand: A Colonial Period Account of KwaZulu-Natal

The settler and Boer influence south of the upper Thukela (uThukela) River and the strong Zulu influence north of the river during the late 1830s, become important in understanding the development of the two territories divided by the river, which later became known as Natal and Zululand. This also marks the fourth phase in the development of what is today known as the KwaZulu-Natal province.

Since the 1830s, the KwaZulu-Natal landscape was divided into the north and the south; Natal in the south and Zululand in the north. Zululand can be broadly defined as the land between the uThukela River (some 100km north of present day Durban) and the Pongola River and Swaziland to the north, with Natal as the area south of the u-Thukela River. Initially this border was blurry and unmarked by any geographic or physical feature until the colonial period:

"*Certainly, this was the extent of the Zulu kingdom during its most static phase, although at times the Zulu kings exercised authority over the country considerably further south, while their hold over the northern borders was always tenuous. In fact, the kings defined their boundaries in terms of people who gave them allegiance, rather than by geographical features, and the idea of a single Zulu identity is largely mythical*" (Knight, 1998).

Knight (1998) goes on to argue that "the history of Zululand and its southern neighbour Natal has always been inextricably mixed, and the physical boundaries between them

blurred". Natal came to exist when, "the Portuguese explorer, Vasco da Gama, had noted [the existence of the south-eastern seaboard] in his log on Christmas Day 1497, as he sailed around the Cape and up the east coast of Africa, searching for a route to the Indies. He christened it *Terra Natalis*, in honour of the birth of Christ, and for the [following?] centuries Natal was used to describe the country south of uThukela" (*idem*: 15).

Existing archival evidence for the formal proclamation of uThukela River as the political boundary dividing Zululand (in the north) and Natal (in the south) dates to the 1850s, during King Cetshwayo kaMpande's rule as the Zulu King (***Figure 7***).

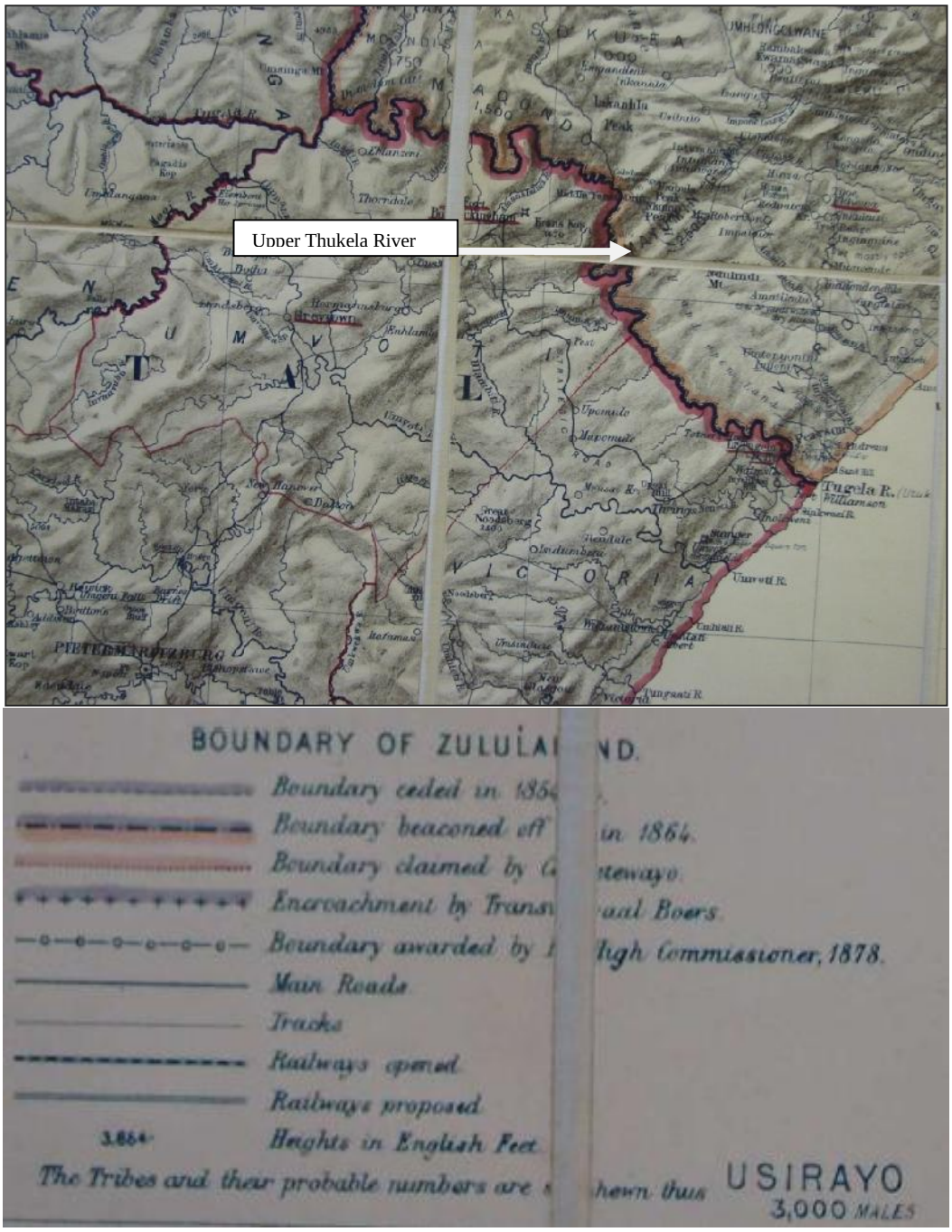

Figure 7- Map showing the Natal (south of Thukela River) and Zululand (north of Thukela River) Boundary, as well as the boundary proclaimed by King Cetshwayo in the 1870s when he became King. The first official proclamation of the boundary dividing Natal and Zululand took place in 1854 (Note the map legends).
Stanford's Large Scale Map of Zulu Land with adjoining parts of Natal, Transvaal and Portuguese Africa, March 4th 1879 © Map Archives, Cullen Library, University of the Witwatersrand, Johannesburg, South Africa.

Zulu Civil War and the Split in the Royal House

Following the December 16, 1838, victory against Dingane, the Boers attempted to capture Dingane on numerous occasions, but their attempts were in vain, in some cases with Dingane abandoning his royal homesteads and in some, both sides failing to secure a clear and clean victory against one another, until a ***Peace Accord*** was struck between the Zulu and the Boers, facilitated by the British, in 1839 (Knight, 1998)

Some Zulu chiefs seemed to have no longer had respect and trust in Dingane and his authority was questioned. This was followed by a split in the Royal House, with Prince Mpande KaSenzangakhona defecting to the south of uThukela River where his older brother, Shaka, had established the royal homestead previously. By now the battle for the soul of Zululand was within the Royal House until Mpande defeated Dingane in a civil war of 1840 in the Maqongqo Hills, assisted by Nongalaza kaNondela (a famous and brave Zulu warrior and chief) who previously had fought on Dingane's side against the settlers and the Boers (Knight, 1998).

Following his defeat, Dingane fled to the northern borders of Zululand, in the Lebombo Mountains on the Swazi border, where he tried to rebuild his kingdom with loyal followers and where he later died. In the southern regions, the strong hold of the Zulu kingdom, Dingane was succeeded by his younger brother Mpande in February 1840.

Mpande had by now built relations with the Boers following his defeat of his older brother Dingane. However, his assistance from the side of the Boers came at a heavy price tag to him:

> *"In fact, the practical role played by the Trekkers in Dingane's final defeat had been limited, but the price they demanded for it was high, and Mpande knew he dared not provoke them. The Trekkers appropriated thousands of head of cattle, and grandly*

extended their claim to Zulu territory up to the Mfolozi River, annexing nearly half of the kingdom – far more land, in fact, than there were farmers to occupy it. In the event, the Boers also had little time to enjoy this victory. In 1842, disturbed by the unsettling effects the Trekker policies were having in the region as a whole, British troops returned to Port Natal. Pretorius refused to accept their authority and fighting broke out on the fringe of a great lagoon. More troops were rushed up from the Cape, and the Trekkers' resistance collapsed. Natal became a British Colony, and many Boers, disgusted by the prospects of living under British rule once more, trekked back across the mountains into the interior regions of the country".
(Knight, 1998).

After two decades of struggle, Natal had passed from nominal control of the Zulu kings to that of the Boers, and finally to the British. According to Knight (1998) this could, logically, only mean one thing for the future, to bring all the three groups into further conflict. In the meantime, King Mpande agreed to fix the southern boundaries of the kingdom for the first time in an accord signed by him and the British administration in Natal (***Figure 7***). This Anglo-Zulu accord specified the Natal-Zulu border as the line of the Mziyathi and Thukela rivers - an agreement which allowed Mpande quietly to recover all the territory the Boers had extracted from him.

His reign as the Zulu King continued for another 30 years, until his death in 1872, leaving the kingdom to Cetshwayo KaMpande.

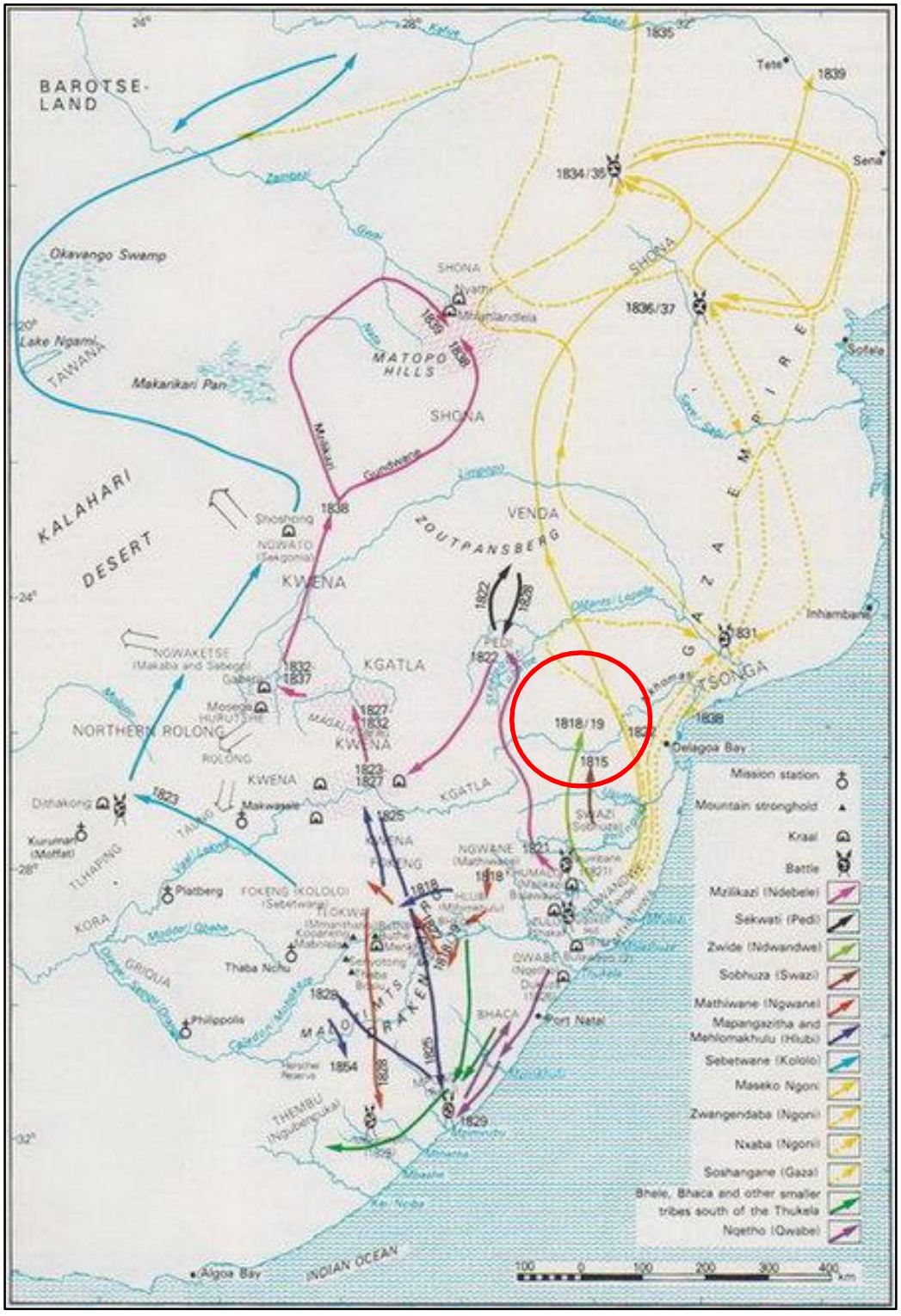

Figure 8 - Map indicating the movement of tribes between 1818 and 1835.

Mabudu – Tembe Tribe and Maputaland

The UmKayakhude Municipality in the north of KwaZulu-Natal is generally referred to as Maputaland. This name and that of the Maputo River (Pongola River) was derived from the Mabudu/Mabudu-Tembe who claimed authority over the vast area in 1822 when Captain W Owen of the British Navy visited the area (Kloppers, 2003).

Origins

According to Kloppers (2003), the Mabudu/Mabudu-Tembe developed under the rule of chief Mabudu (c.1740-1798) when, through the utilization of groups of young men, he strengthened his power and influence to enable him to centralise his power and aid in the development of his chiefdom.

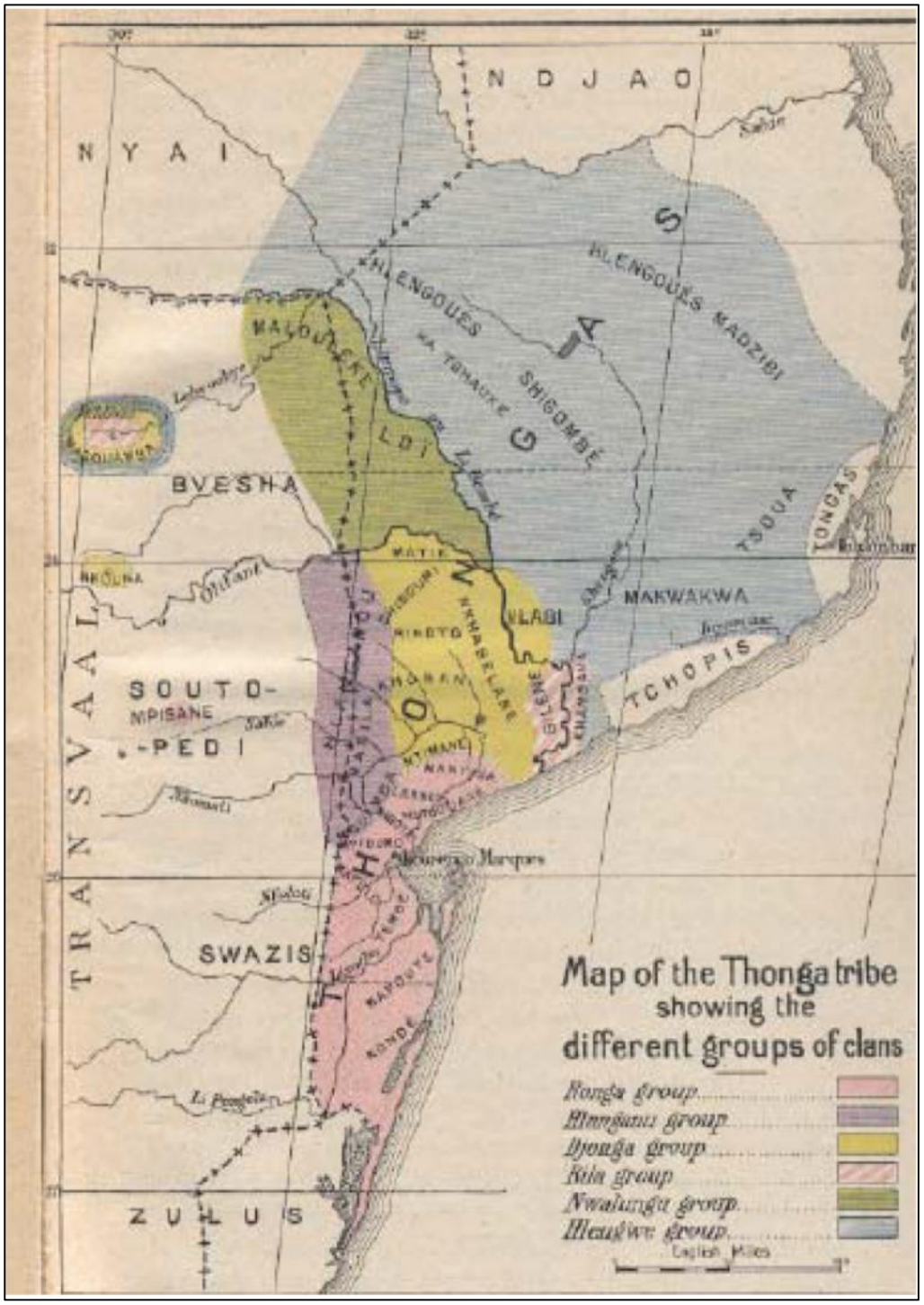

Figure 9 - An early 20th century representation of the distribution of the Tsonga clans in south-east Africa (Junod, 1962)

The Mabudu/Mabudu-Tembe is classified as a junior branch of the Tembe or Tembe-Thonga clan and is associated with the Ronga clan (Kloppers, 2003). Junod (1962) produced a map of the Thonga tribes where the Ronga Tribe's boundaries encapsulate that of the current study area (**Figure 9**).

Although the Mabudu/Mabudu-Tembe is classified as part of the Tsonga clan, they exhibit strong links with the Swazi through oral records. Although this discussion is a fair generalization of the origins of the Mabudu/Mabudu-Tembe, this is still a contentious issue up to the present (Kloppers, 2003).

General history

In the middle of the eighteenth century, the Mabudu/Mabudu-Tembe was the strongest political and economic unit in south-east Africa, and established their control over the area between Delagoa Bay to Lake St Lucia and the Pongola River to the Indian Ocean. During this time when the Mabudu strengthened their kingdom, the Ndwandwe and Mthethwa kingdoms were developing (Kloppers, 2003).

The subsequent conflict between the Ndwandwe and Mthethwa kingdoms had a major influence on the Mabudu and could have been much more catastrophic had Shaka not been assassinated. The Mabudu had a long history of trade with the Zulu Chiefdoms, that resulted in a military and trading alliance with Dingiswayo and this relationship continued after his death, with Shaka, his successor (Kloppers, 2003).

The upheavals caused by the actions of Shaka and Zwide however, lead to the inundation of the Mabudu by numerous groups and individuals which lead to the loss of their distinctive culture (Kloppers, 2003).

Colonialism

During 1875, Maputaland was divided between the areas of northern Portuguese and southern British control. The efforts of the Mabuda to unite the area under one colonial ruler was in vain and the Mabudu royal family ruled from the present Mozambique until 1896, before moving south to settle under British rule (Kloppers, 2003).

The Mabudu chiefdom was acknowledged by the South African government and, as a result of this, enjoyed freedom from the Zulu up until 1976 when the Mabudu was classified as a Zulu and not a Tsonga clan and Maputaland was incorporated into the KwaZulu Homeland. The precursor to this incorporation was the institution of a tribal Authority under the Tembe "tribe" on 18 April 1958, later followed by the proclamation of the Ingwavuma District Authority that incorporated the Tembe Tribal Authority and the Mathenjwa and Nayawo Tribal authorities.

By 1976, the Mabuda chiefdom was included as one of the 203 tribal authorities of KwaZulu and on 28 January 1977 KwaZulu was given self-governing status, thus cementing the structures under which the Mabudu chiefdom was governed (Kloppers, 2003).

3.1.1 Findings of the Heritage Scoping Document

The findings can be compiled as follows and were combined to produce a heritage sensitivity map for the project:

Archaeology

Research into the archaeological evidence in the study area has shown the presence of significant archaeological sites outside the study area, such as Border Cave. Heritage Impact Assessments conducted from other Eskom related projects have identified Earlier and Middle Stone Age sites exposed in borrow pits (Jaarsveld, 2011).

No further direct reference to archaeological sites within the study area could be found, however inferences with regards to Later Iron Age Settlements associated with the Swazi, Ndwandwe and Mabudu in the late 1700s to early 1800s can be made.

Historical

Evaluation of the 1:50 000 Topographical maps produced in the 1980s, as well as recent aerial photographs and Google Earth satellite images has focused on the following delineations:

1. Single structures – Point source
2. Homesteads - Polygon
3. Tribal areas / high density rural settlements - Polygon
4. Significant places – Point Source

The aim of the analysis was to identify areas that could have possible heritage significance. From a regional analysis perspective, the above delineations cover the following possible heritage finds (**Figure 10**):

1. Archaeological sites
2. Traditional Cultural Places (TCPs)
3. Cemeteries and grave sites, usually associated with tribal areas and homestead settlements

NB: This analysis and identification of possible heritage sensitive areas does not show these areas as no-go areas but only as possibly sensitive towards heritage and therefore, need to be treated as such until the final alignments have been identified and ground truthing could prove the contrary with regards to sensitivity.

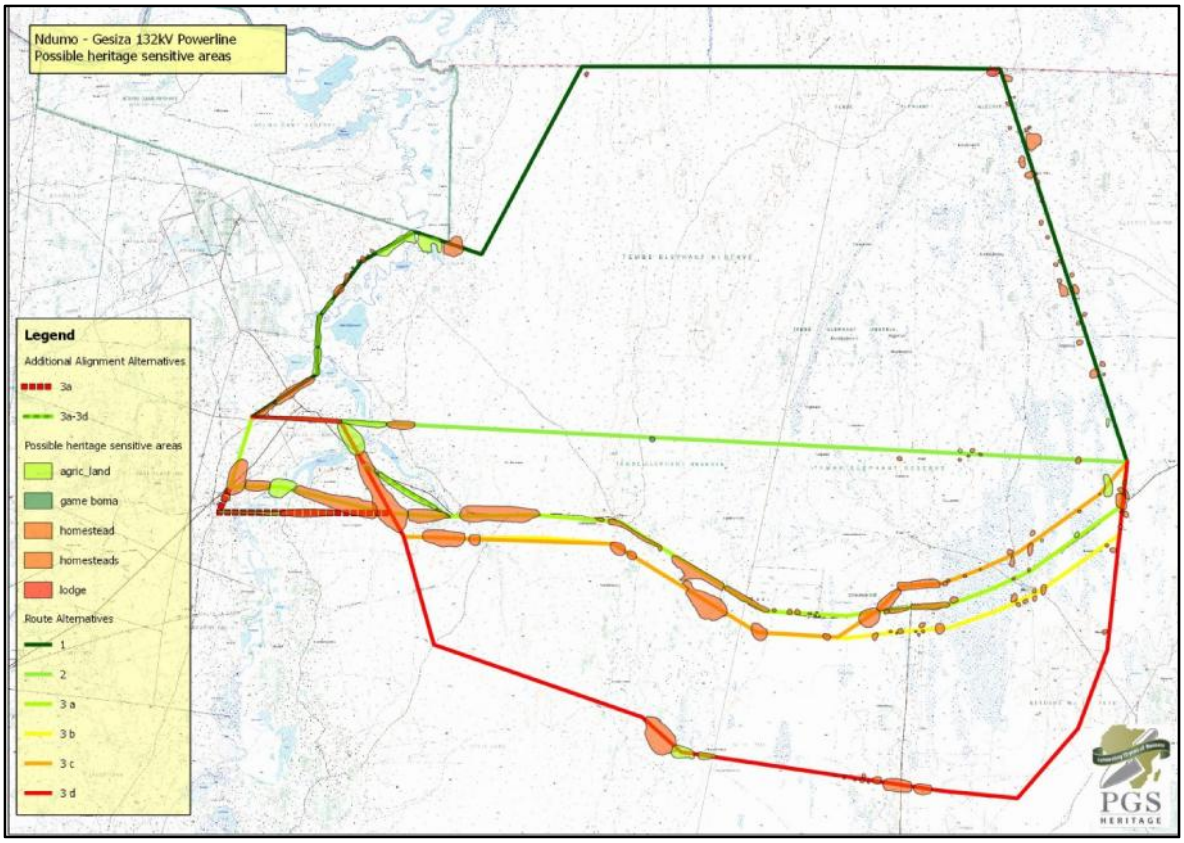

Figure 10 – Heritage Sensitivity Map (Refer to Appendix A)

Palaeontology *(Extracted directly from Palaeontological Desktop Assessment in Appendix F)*

The known fossil heritage within each rock unit was determined from the published scientific literature and previous palaeontological impact studies in the same region (**Figure 121**).

The Mzinene Formation (Kmz)

The Mzinene Formation consists of glauconitic siltstone and sandstone with a rich invertebrate fauna, including bivalves, gastropods, ammonites, nautiloids and echinoids. Lithophaga, i.e. bored concretions, are common. Fossil logs, bored by *Teredo* are frequently found in the formation (Johnson *et al*, 2006).

The palaeo-environment is interpreted as shallow-marine.

The Uloa Formation (Tu2)

The Uloa Formation is a succession of calcarenite and thin limestone with a basal coquina, shelly conglomerate, low-angle stratified boulder/cobble conglomerate, sandstone and siltstone, deposited in the littoral zone on palaeoshorelines along the Lebombo foothills and closer to the present coastline from Mtunzini to Port Edward (Johnson *et al*, 2006; Wolmarans and Du Preez, 1986; Du Preez and Wolmarans, 1986). A main portion of the formation comprises about 5 metres of unbedded calcirudite, locally known as the “Pecten Bed” on account of the abundance of the bivalve *Aeqipecten uloa*. Gastropods, brachiopods, coralline algae, corals, polyzoa, foraminifera and echinoids are also present, as well as isolated teeth of the extinct giant shark *Carcharodon megalodon* (Johnson et al, 2006). The depositional environment is interpreted as a response to at least three transgressive marine events superimposed on a first-order marine regression during the Neogene.

The Muzi Formation (Qm)

The clayey nature and mottled appearance with root-like structures leads to the interpretation of a swamp or vlei deposit for this unit (Wolmarans and Du Preez, 1986). No other fossils are described from this unit.

The Berea Formation (Qbe)

No significant vertebrate fossils have been recorded from the Berea Formation (Wolmarans and Du Preez, 1986). Petrified wood with fossil wood, flattened *Syzigium* logs, have been described from the Formation.

Redistributed sand (Qs)

No significant fossils have been described from these sediments (Wolmarans and Du Preez, 1986; Johnson *et al*, 2006).

Wind-blown sand

No significant fossils have been described from these sediments (Wolmarans and Du Preez, 1986; Johnson *et al*, 2006).

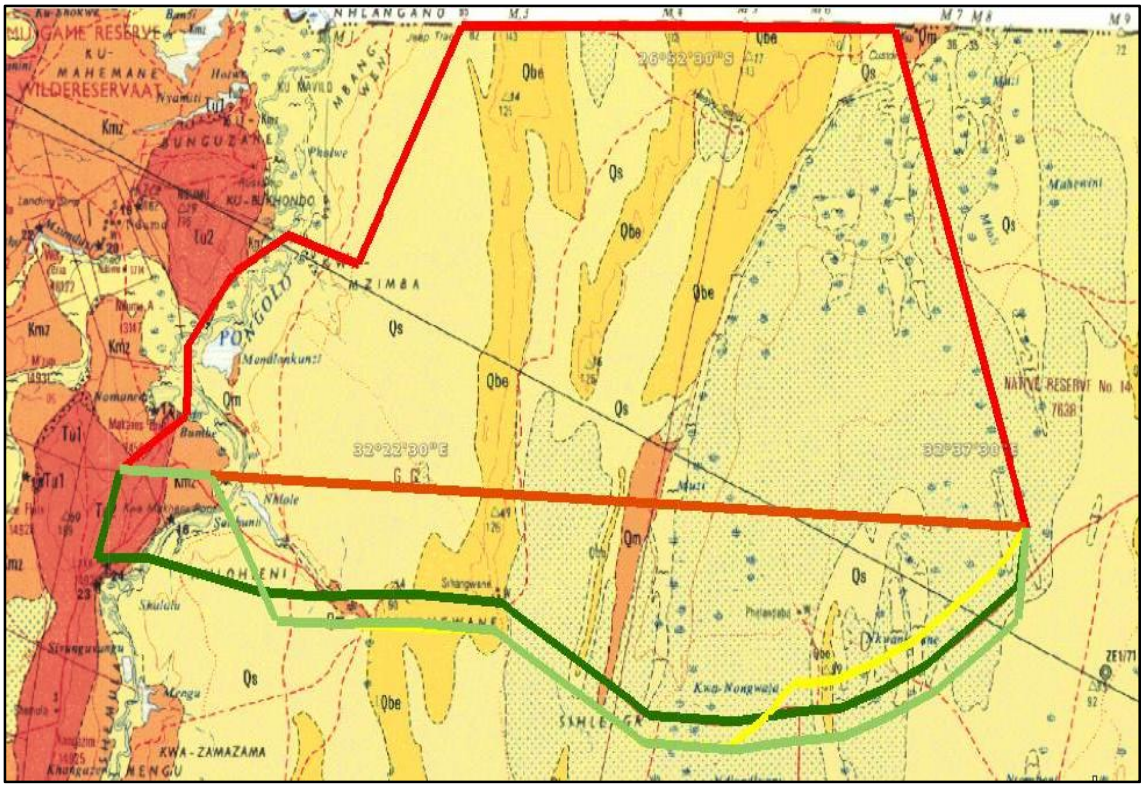

Figure 11 - Geology of the study area

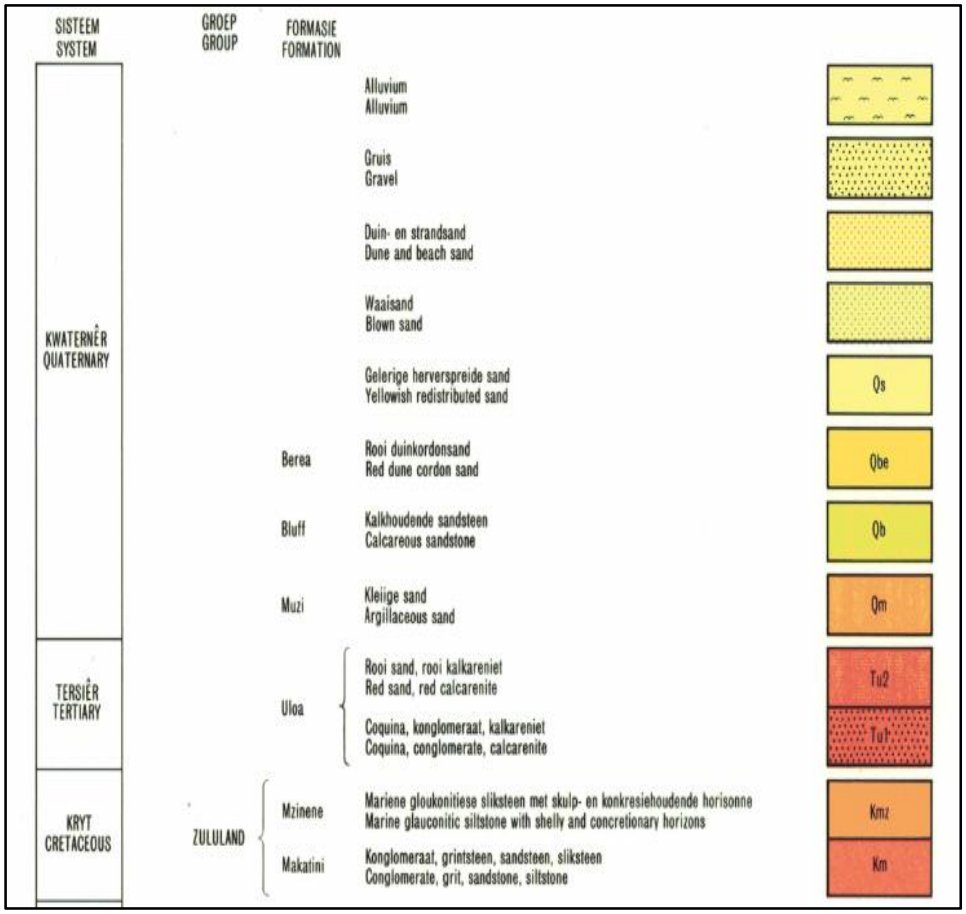

Figure 12 – Geology of the study area - legend

3.2 Field work findings

The initial alignment assessment provided six alternatives for the specialist studies to be assessed (**Figure 13**).

A site visit of the Corridors provided for the study was conducted at the end of April 2013. The aim of the site visit was to evaluate the alignment and the possible types of heritage resources to be expected in the study area. At no stage was a formal survey of each alignment alternative done, as the final phase of the study would entail a walkdown of the final alignment during the Environmental Management Programme (EMPr) implementation.

Focus was placed on the areas where the alternative would cross roads and rivers, as well as alignments close to roads (**Figure 14 - Figure 20**).

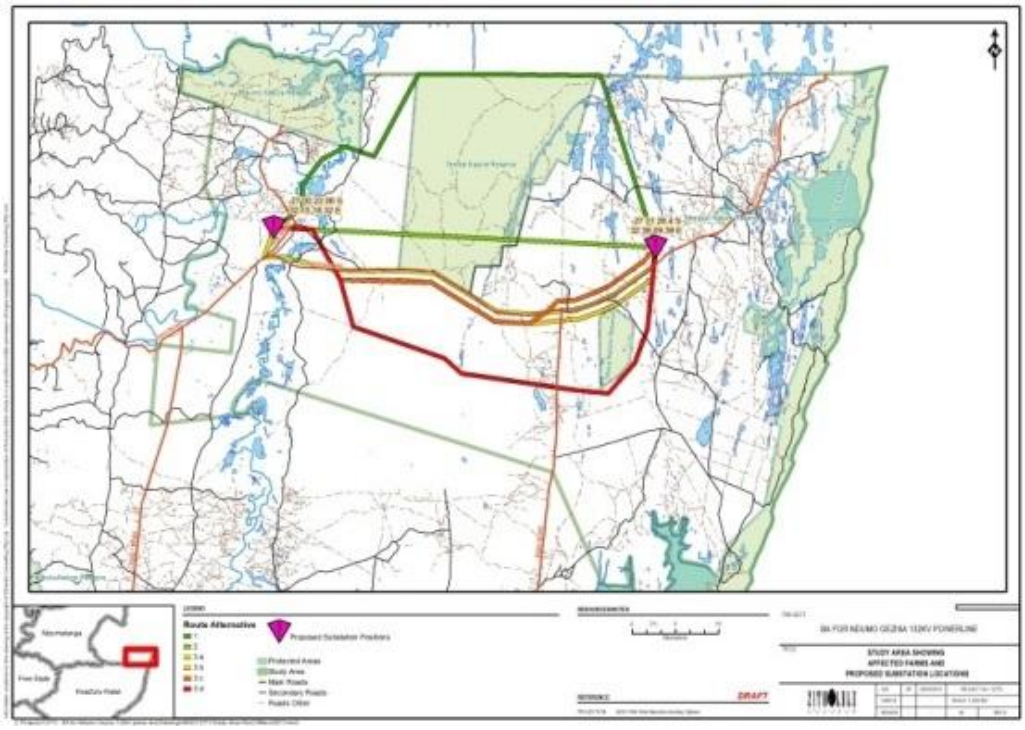

Figure 13 – Route alignments and corridors as part of final route selection

Figure 14 – Crossing of Alternative 3a of the P435 road

Figure 15 – Crossing of Alternative 3d of the P435 road

Figure 16 – Crossing of Alternative 1 of the P435 road at the Makahana Crèche

Figure 17 – Crossing of Alternative 3d and 2 on the D1861 road - note the homestead on the side of the road

Figure 18 – Crossing of Alternative 3b at the Makanes Bridge over the Pongola River

Figure 19 – Alignment of Alternative 3a on the side of the P522-2 road towards Kosi Bay

Figure 20 – Crossing of Alternatives 2, 3a, 3b and 3d on the R22 road

The field visit finding indicated that:

1. The area is densely populated, specifically along roads where the density of the population varied from a conglomeration of homesteads to single homesteads, and in some cases, only a cattle kraal with a single structure.
2. Agricultural fields were in most cases concentrated around the rivers and low lying wetter areas.
3. Homesteads were shown to contain in numerous cases of graves, as well as ancestral shrines, that must be viewed as culturally sensitive.
4. As in most rural areas, cemeteries were characterised by one or two graves and distributed over the whole of the study area where homesteads and settlements were to be found.

From the field visit, previous work in the area and the archival research, the list of possible heritage impacts was compiled and listed with possible impacts in Section 3.3 of this report.

3.3 Heritage Issues and Potential Impacts

ISSUE	Impact on archaeological sites
DISCUSSION	As seen from the archival work, field visit and discussion in Sections 3.1 and 3.2, the possibility of archaeological finds has been confirmed and thus a walk down of the final route will be required after the design and pylon placement has been done.
EXISTING IMPACT	The large scale farming activities in the eastern, western and northern section of the study area would have impacted on heritage resources.
PREDICTED IMPACT	Unidentified archaeological sites and the discovery of such sites during construction can seriously hamper construction timelines. A walk down of the final design alignment can thus provide valuable information on such sites in the study area and provide timeous management of such sites through realignment of the development or mitigation of such sites, where needed.
MITIGATION	Archaeological walk down of final alignment.
CUMULATIVE EFFECT	None foreseen at this stage.

ISSUE	Impact on historical sites
DISCUSSION	As seen from the archival work, field visit and discussion in Sections 3.1 and 3.2, the possibility of historical sites has been confirmed and thus a walk down of the final route will be required after the design and pylon placement has been done.
EXISTING IMPACT	The large scale farming activities in the eastern, western and northern section of the study area would have impacted on heritage resources.
PREDICTED IMPACT	Unidentified historical sites and the discovery of such sites during construction can seriously hamper construction timelines. A walkdown of the final designed alignment can thus provide valuable information on such sites in the study area and provide timeous management of such sites through realignment of the development or mitigation of such sites, where needed.
MITIGATION	Archaeological walk down of final alignment.

ISSUE	Impact on graves and cemeteries sites
DISCUSSION	Although field work has indicated that in most of the tribal areas no burials outside formal cemeteries occur, this would not have been the case in earlier times.
EXISTING IMPACT	Impact due to earlier developments cannot be excluded
PREDICTED IMPACT	Unidentified graves and cemeteries and the discovery of such structures during construction can seriously hamper construction timelines. In the event that these graves and cemeteries cannot be avoided, a grave relocation process needs to be started. Such a process impacts on the spiritual and social fabric of the next of kin and associated communities. A walk down of the final designed alignment can thus provide valuable information on such sites in the study area and provide timeous management of such sites through realignment of the development or mitigation of such sites, where needed.
INVESTIGATION REQUIRED	Archaeological walk down of final alignment.
CUMULATIVE EFFECT	None foreseen at this stage.

ISSUE	Impact on palaeontological sites
DISCUSSION	The study area is mainly underlain by Quaternary aged redistributed and windblown sand deposits, with the western part being mainly underlain by Tertiary aged rocks of the Uloa Formation and Cretaceous aged rocks of the Mzinene Formation of the Zululand Group. There are also small sections of the routes underlain by Quaternary aged rocks of the Muzi and Berea Formations.
EXISTING IMPACT	Impact due to earlier developments cannot be excluded
PREDICTED IMPACT	There is a high possibility that fossils could be encountered during excavation of the Uloa and Mzinene Formations and there is a good possibility of uncovering root structures and fossilised wood during excavation of the Muzi and Berea Formations. There is thus a good possibility of finding fossils during the excavation of pylon foundations. If fossils are found, they would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would have a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation, will have a beneficial palaeontological impact.

	Unidentified palaeontological sites and the discovery of such sites during construction can seriously hamper construction timelines. Field work can thus provide valuable information on such sites in the study area and provide timeous management of such sites through realignment of the development or mitigation of such sites, where needed.
INVESTIGATION REQUIRED	It is therefore recommended that: • If deep excavations into the Mzinene, Uloa, Muzi or Berea Formations are envisaged in identified high and medium sensitivity areas, a Palaeontologist must be appointed as part of the Environmental Component of the Construction Team. The Palaeontologist must accompany the surveyor and topsoil clearing teams to assess exposed potential fossil bearing areas and rescue any fossils from the construction footprint. • If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist. • In highly sensitive areas, the palaeontologist must compile a Phase 1 report to the Heritage Authority.
CUMULATIVE EFFECT	None foreseen at this stage.

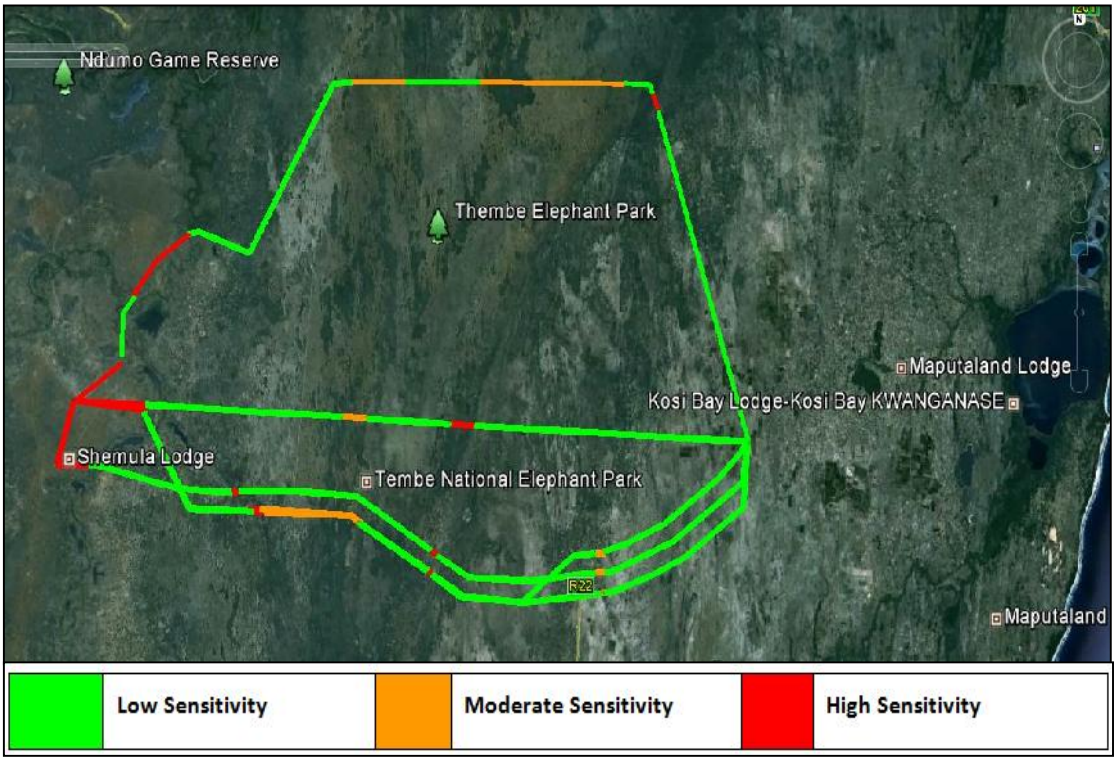

Figure 21 – Palaeontological sensitivity map of proposed routes

3.4 Evaluation of route alignment

The evaluation of heritage resources on such a large scale desktop study can only be conducted effectively by assigning the heritage resources with geographical positions through a coordinate system and them referencing them against the proposed alignment corridors.

These heritage resources points were analysed as a vector data set against the provided alignment corridors, also converted to vector data sets. The outcome of this data analysis provided information with regards to corridor/heritage intersects.

Data Normalisation

The data utilised for the heritage resources vector set was developed through possible heritage sensitive areas as identified in Google Earth satellite images and available 1:50 000 maps. This data was digitised and saved as polygon vector data (**Figure 222**). This data was then transformed to point data through a polygon geometry tool generating centre points from the polygon areas identified (**Figure 233**).

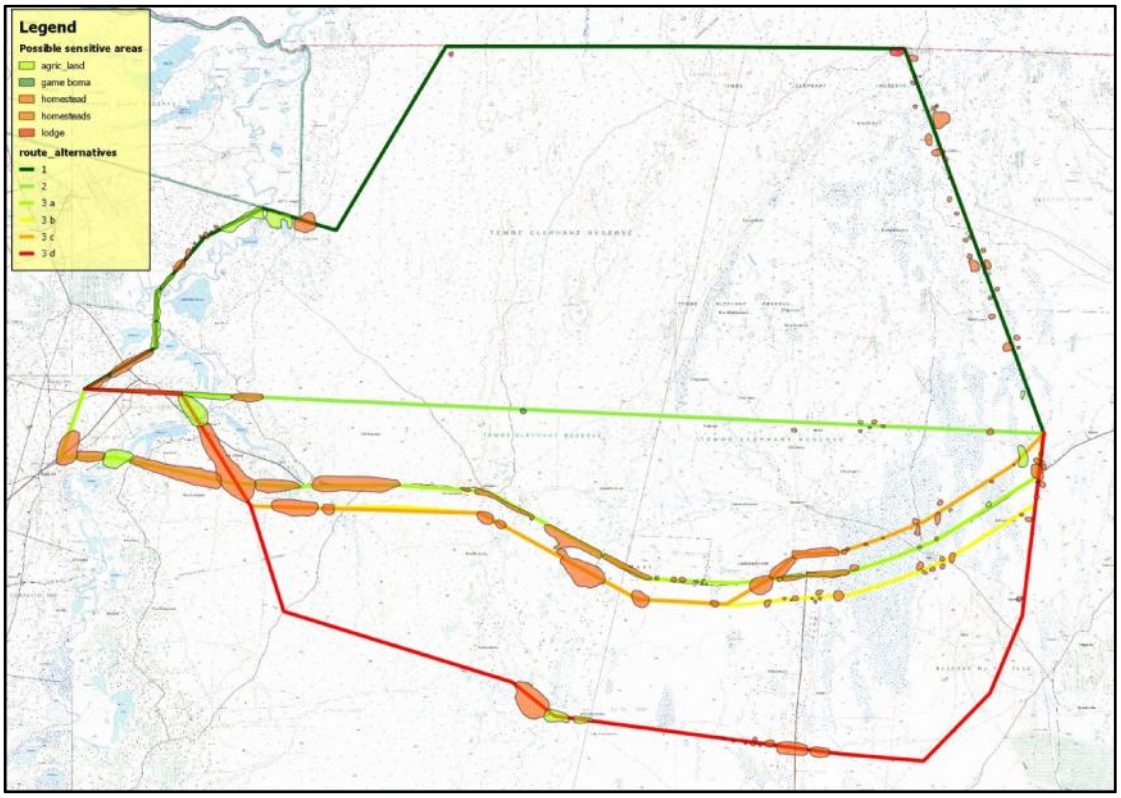

Figure 22 – Alternatives with delineated sensitive areas

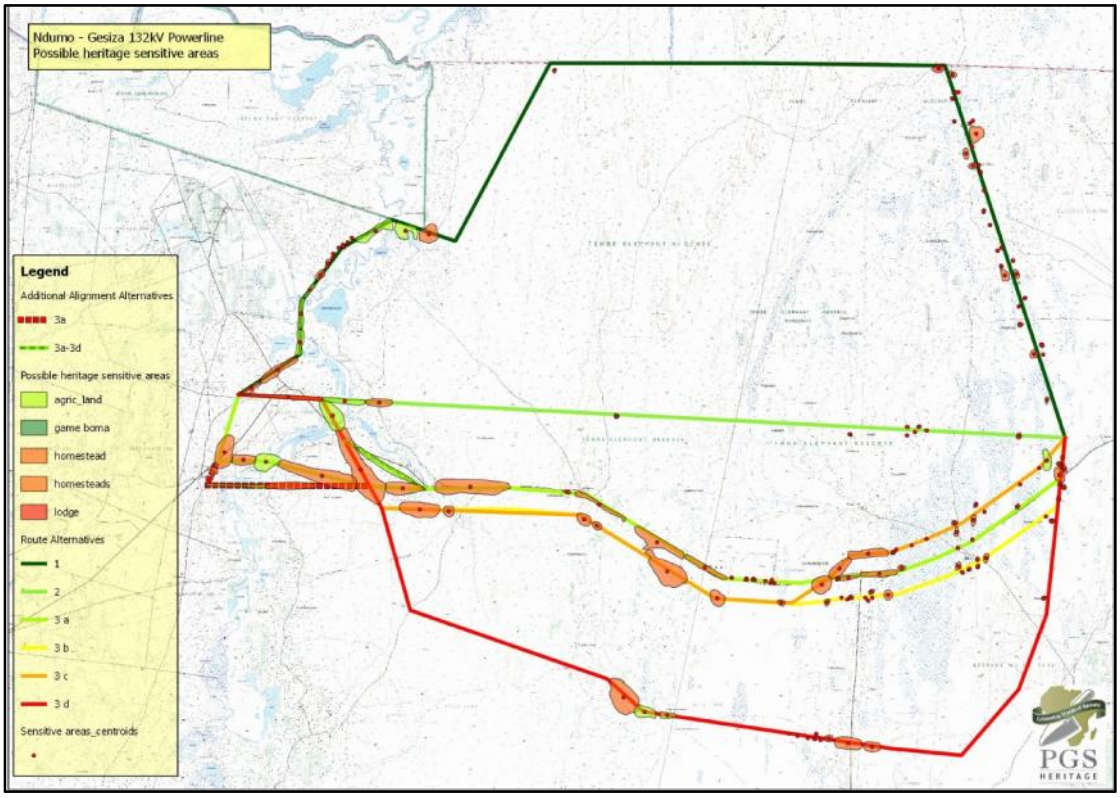

Figure 23 – Alternatives with polygon converted to centroid

A 500 meter corridor for each alternative was developed from the alignment alternatives provided to PGS. This provided data that could be utilised for analysis of the potential heritage sites to be impacted by corridor alignments.

3.4.1 Geographic Information System Software and application

The GIS software utilised is Quantum GIS (QGIS), an Open Source Geographic Information System (GIS) licensed under the GNU General Public License, an official project of the Open Source Geospatial Foundation (OSGeo). The current version utilised for this project is QGIS 1.8.0 “Lisboa” released on 26 May 2012.

The three spatial analysis applications utilised during the assessment of the heritage resources affected by the corridor alignments were:

- Vector Geometry Tool: Line to Polygon
- Vector Geometry Tool: Polygon to Centroid
- Vector Analysis Tool: Points in Polygon

3.4.2 Findings of Analysis

Running the Point in Polygon Analysis provided a final outcome of possible heritage resources intersected by each of the corridor alignments (**Figure 24**). It must also be noted that the list of heritage resources identified during the desktop evaluation and site visit can in no way be seen as complete as there is still potential for resources to be discovered.

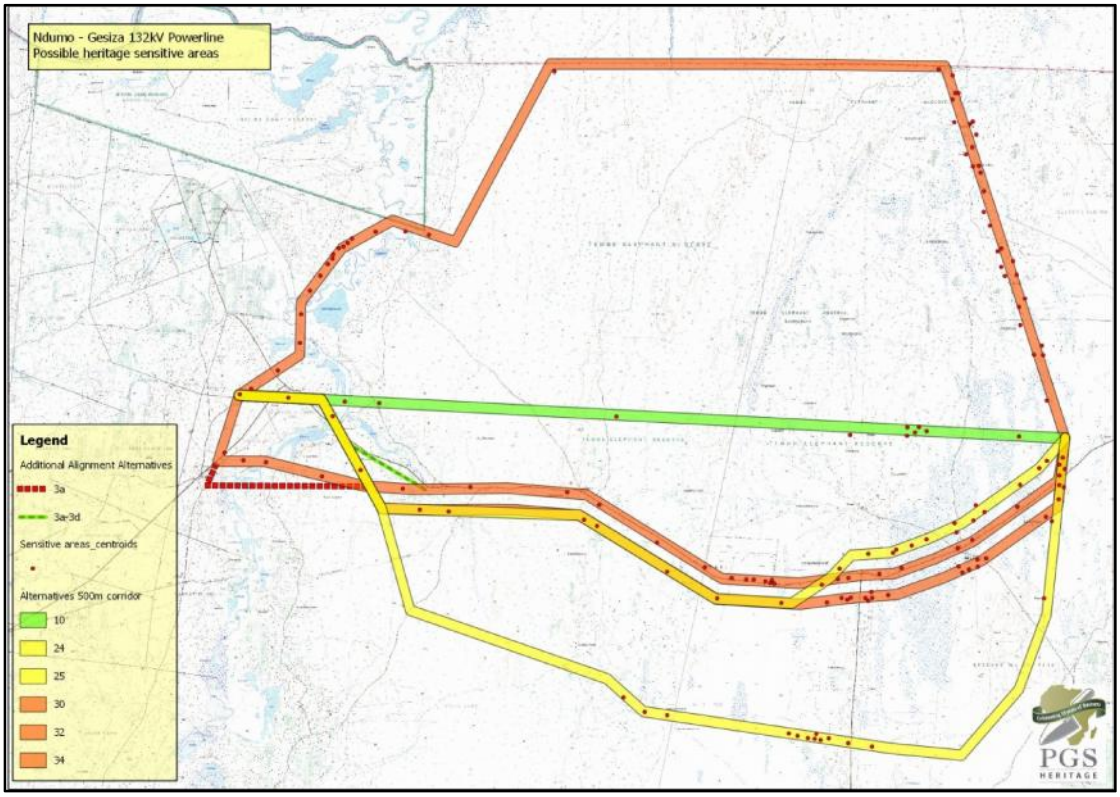

Figure 24 – Alternative corridor routes plotted and graded according to possible sensitive heritage areas intersected

The following table lists the number of identified heritage resource areas intersected by the corridor alignments and gives preferential rating of the alternative according to the number of intersects:

PNTCNT (Point Count) indicates the number of intersects (heritage sensitive areas) occurring for each corridor.

Alt Name	*PNTCNT*	*Preferential Rating*
1	32	3
2	10	1
3a	30	3
3b	34	3
3c	24	2
3d	25	2

A last proviso is that the presence of heritage resources on this scale does not identify areas as no-go areas since the sizes of the corridor alignments makes provision for sensitivity towards heritage resources within the corridor itself.

3.5 Route Alternative Impact Rating Scales

The following tables evaluated the possible impacts on heritage resources of each of the alternatives.

Probability:

5 – Definite/don't know

4 – Highly probable

3 – Medium probability

2 – Low probability

1 – Improbable

0 – None

Duration:

5 – Permanent

4 - Long-term (ceases with the operational life)

3 - Medium-term (5-15 years)

2 - Short-term (0-5 years)

1 – Immediate

Scale:

5 – International

4 – National

3 – Regional (>5km)

2 – Local (<5km)

1 – Site only

0 – None

Magnitude:

5 - Very high/don't know

4 – High

3 – Moderate

2 – Low

1 – Minor

$$SP = \frac{Magnitude + Duration + Scale}{3} * Probability$$

Rank	Description
4-5	Very High Environmental Significance
3-4	High Environmental Significance
2-3	Moderate Environmental Significance
1-2	Low Environmental Significance
0-1	Very Low Environmental Significance

Note that, although the impact rating has indicated the type and severity of impact before and after mitigation to rate the same, the **amount** of possible heritage sensitive areas on the five alternatives rates differently: with Alternative 2 possibly having the lowest impact on heritage resources. This is probably related to the fact that the largest part of this alignment is through the Tembe Nature Reserve, which is void of dense human habitation.

Alternatives 3c and 3b rate as the second best alternatives, mostly due to the fact that Alternative 3a runs parallel to the P522-2 road, which has a high settlement concentration along its alignment.

3.5.1 Impact evaluation without mitigation

Alternative 1

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

Alternative 2

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

Alternative 3a

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

Alternative 3b

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

Alternative 3c

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

Alternative 3d

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	5	2	1.60
Impact on historical resources	4	1	5	2	1.60
Impact on cemeteries and graves	4	1	5	2	1.60
Impact on palaeontological resources	6	3	5	4	4.80
				Average	2.4

3.5.2 Impacts with mitigation measures implemented

alternative 1

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	2	1	0.53
Impact on historical resources	4	1	2	1	0.53
Impact on cemeteries and graves	4	1	2	1	0.53
Impact on palaeontological resources	4	1	5	4	3.73
				Average	1.33

alternative 2

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	2	1	0.53
Impact on historical resources	4	1	2	1	0.53
Impact on cemeteries and graves	4	1	2	1	0.53
Impact on palaeontological resources	4	1	5	4	3.73
				Average	1.33

alternative 3a

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	2	1	0.53
Impact on historical resources	4	1	2	1	0.53
Impact on cemeteries and graves	4	1	2	1	0.53
Impact on palaeontological resources	4	1	5	2	1.60
				Average	0.80

alternative 3b

Impact	Magnitude	Scale	Duration	Probability	Significance
Impact on archaeological resources	4	1	2	1	0.53
Impact on historical resources	4	1	2	1	0.53
Impact on cemeteries and graves	4	1	2	1	0.53
Impact on palaeontological resources	4	1	5	4	3.73
				Average	1.33

4 FINAL ROUTE ALIGNMENT

The evaluation of all the environmental parameters including heritage has produced a final route alignment (**Figure 25**) that is set forward in the final Basic Assessment Report (BAR). This final alignment incorporates the best alternatives of al the proposed alternative alignments but in essence follows Route alignment 3a with a deviation to the western section close to the Ndumo substation.

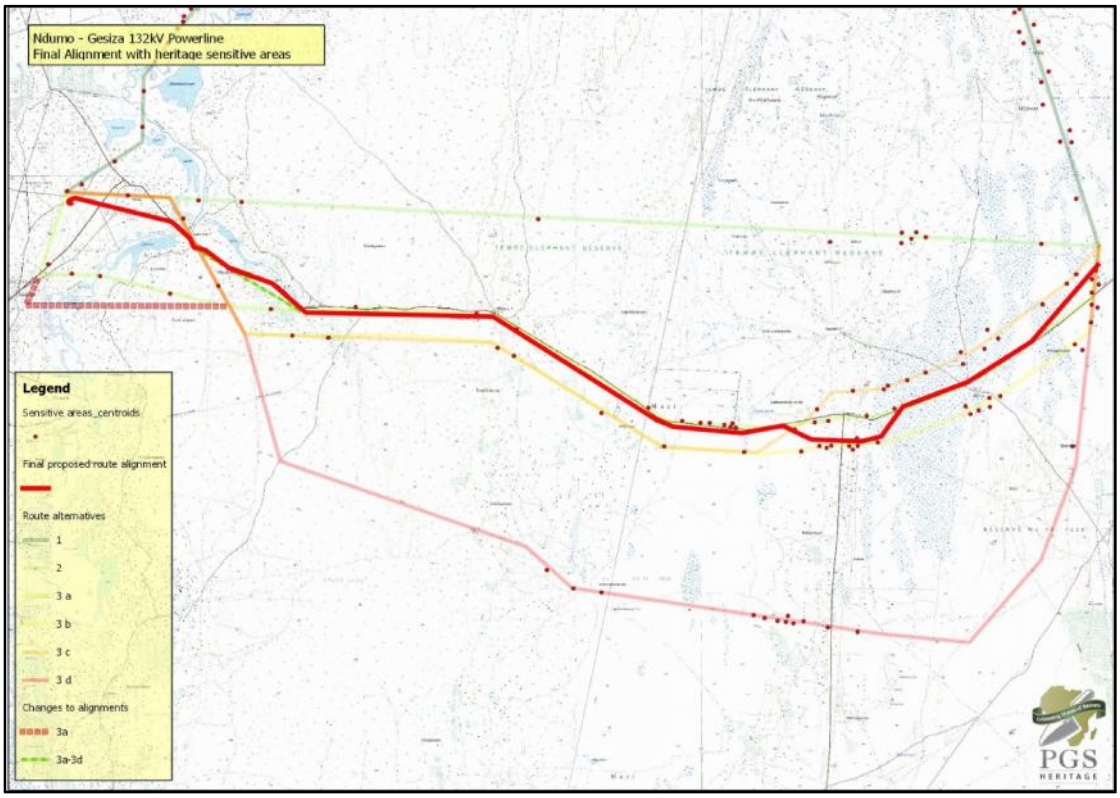

Figure 25 – Final proposed route alignment

5 CONCLUSIONS AND RECOMMENDATIONS

The archival research and field assessment has shown that the study area and surrounds have a rich historical and archaeological history.

The purpose of the site evaluation was to identify the most feasible alignment from a heritage perspective. Note that, although the impact rating has indicated the type and severity of impact before and after mitigation to rate the same, the **amount** of possible heritage sensitive areas on the five alternatives rates differently: with Alternative 2 possibly having the lowest impact on heritage resources. This is probably related to the fact that the largest part of the alignment is through the Tembe Nature reserve, which is void of dense human habitation.

Alternatives 3c and 3b rate as the second best alternatives, mostly due to the fact that Alternative 3a runs parallel to the P522-2 road, which has a high settlement concentration along its alignment.

Alt Name	*PNTCNT*	*Preferential Rating (Unweighted)*
1	32	3
2	10	1
3a	30	3
3b	34	3
3c	24	2
3d	25	2

It must however, be noted that most heritage resources are point specific and therefore, with realignment within the final corridor, it is possible to avoid or to mitigate possible impacts on heritage resources to acceptable levels.

The next step in the compilation of a site specific heritage management plan will be an archaeological walk down and a Phase 1 palaeontological assessment of the final designed alignment and foot print areas of the proposed final alignment as ilistrated in **Figure 25**, to identify all heritage resources to be impacted by the final route alignment and pylon placements.

The studies will provide timeous management of such sites through realignment of the development or mitigation of such sites, where needed.

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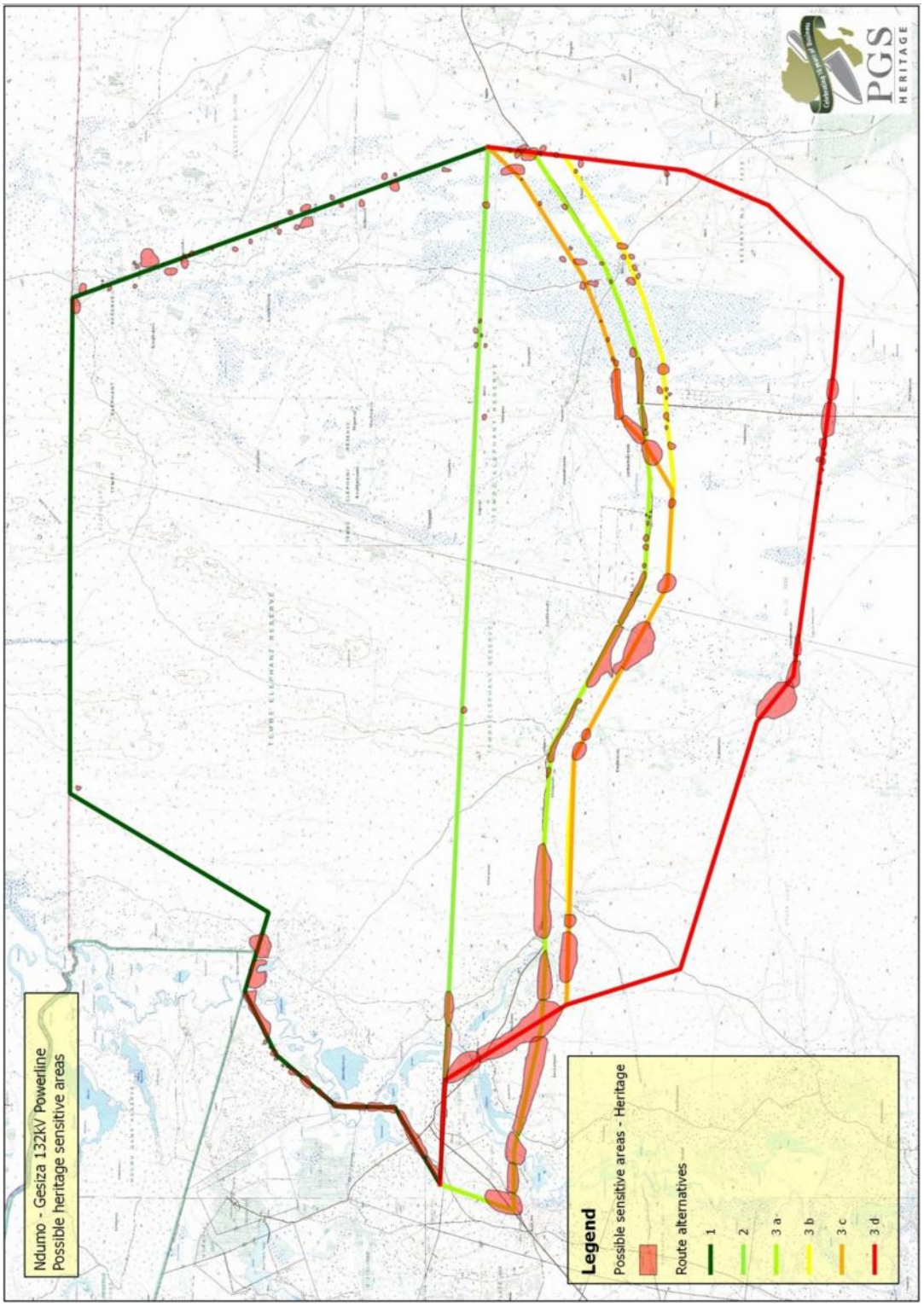
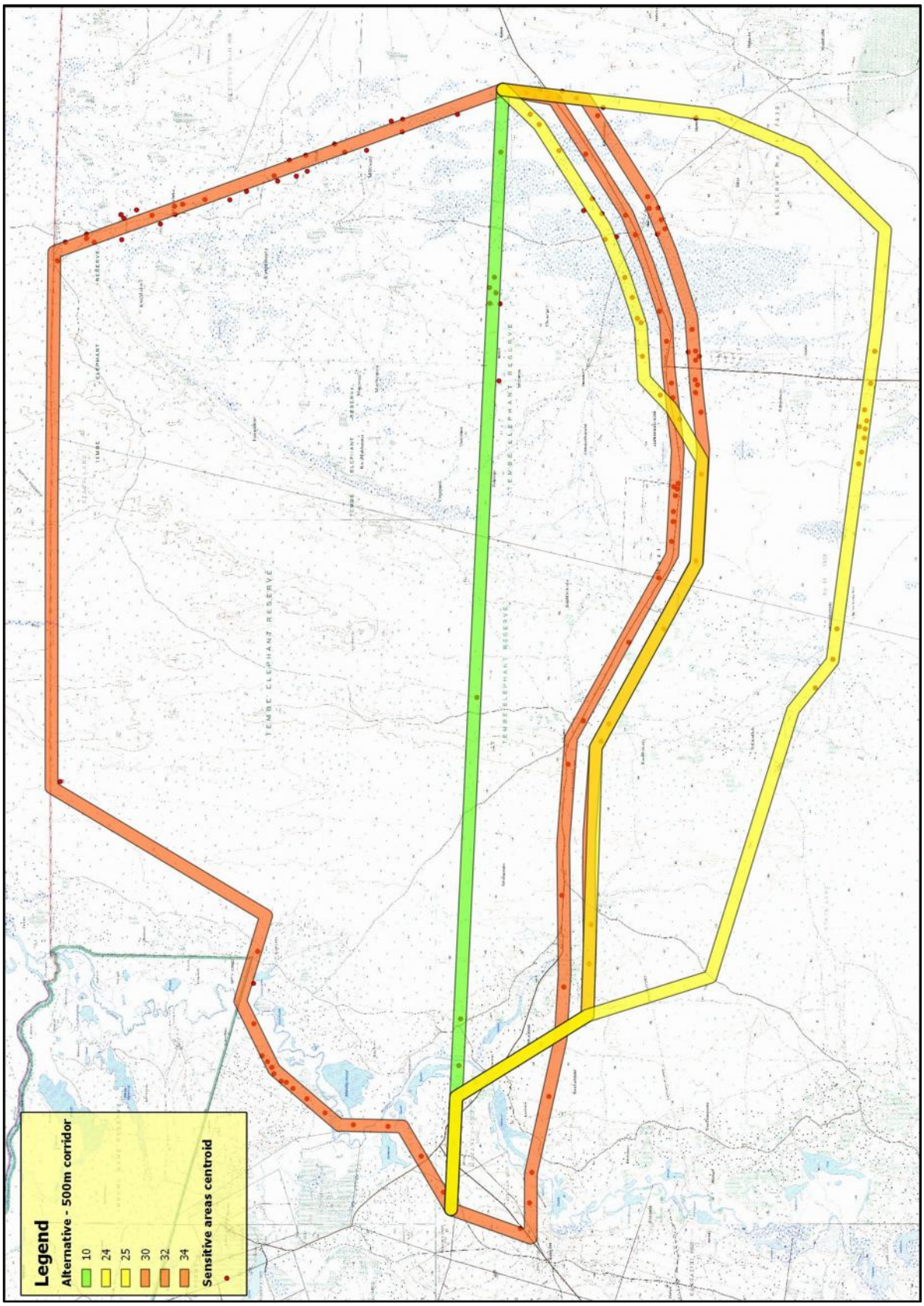
Appendix A

HERITAGE SENSITIVITY MAPS




Legend
Alternative - 500m corridor
10
24
25
30
32
34
Sensitive areas centroid
TEMBE ELEPHANT RESERVE

Appendix B

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

3.1 General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit from the provincial heritage authority is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In the heritage legislation, permits are required to damage, destroy, alter, or disturb them. People who already possess material are required to register it. The management of heritage resources is integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have an interest in the graves: they must be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle should be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999, section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection, to all historic and pre-historic cultural remains, including graves and human remains.

3.2 Graves and cemeteries

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and

regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Appendix D

HERITAGE ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage (PGS) for the proposed Ndumo-Gezisa 132kV Power Line Project will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002). The HIA process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site.

- Step II – Physical Survey: A physical survey will be conducted on foot through the proposed project area by qualified archaeologists, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

- Step III – The final step involves the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites is based on four main criteria:

- **site integrity** (i.e. primary vs. secondary context),
- **amount of deposit, range of features** (e.g., stonewalling, stone tools and enclosures),
    - Density of scatter (dispersed scatter)
        - Low - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **uniqueness** and
- **potential** to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate pylon position
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site

- Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 1: Site significance classification standards as prescribed by SAHRA

FIELD RATING	**GRADE**	**SIGNIFICANCE**	**RECOMMENDED MITIGATION**
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	-	Low Significance	Destruction

Appendix E

THE SIGNIFICANCE RATING SCALES FOR THE EIA

Appendix F

PALAEONTOLOGICAL DESKTOP ASSESSMENT

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE NDUMO GEZISA 132KV POWER LINE NEAR ST LUCIA IN KWAZULU-NATAL PROVINCE

FOR

HIA CONSULTANTS

DATE: 03 April 2013

By

GIDEON GROENEWALD

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by PSG Heritage and to undertake a desktop survey, assessing the potential palaeontological impact of the proposed Ndumo Gezisa 132kV Power Line, situated in the uMhlabuyalingana Municipality of the Umkhanyakude District.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the development.

The study area, defined by the cadastral boundaries of the area, is approximately 70 km across and 50 km in length. The project is located in the northern KwaZulu-Natal Province between the towns of Mkanes Drift and Manguzi. The area is bordered by several nature reserves with the Tembe Elephant Reserve on the northern most past of the boundary, the Greater St Lucia Wetland reserve along the eastern boundary and Ndumu game reserve on the north western-boundary. The P522 road traverses the centre of the study area.

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2632 Mkuze) in conjunction with Google Earth. The known fossil heritage within each rock unit was determined from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience. The major limitation of this study is that no supporting field assessment was made and the assumption that existing geological maps and datasets used to assess site sensitivity are correct and reliable.

The study area is mainly underlain by Quaternary aged redistributed and windblown sand deposits with the western part being mainly underlain by Tertiary aged rocks of the Uloa Formation and Cretaceous aged rocks of the Mzinene Formation of the Zululand Group. There are also small sections of the routes underlain by Quaternary aged rocks of the Muzi and Berea Formations.

There is a high possibility that fossils could be encountered during excavation of the Uloa and Mzinene Formations and good possibility of uncovering root structures and fossilised wood during excavation of the Muzi and Berea Formations. There is thus a good possibility of finding fossils during the excavation of pylon foundations.

Recommendations:

- If deep excavation into the Mzinene, Uloa, Muzi or Berea Formations are envisaged in identified high and medium sensitivity areas, a Palaeontologist must be appointed as part of the Environmental Component of the Construction Team. The Palaeontologist must accompany the surveyor and topsoil clearing teams to assess exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
- If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- In highly sensitive areas, the palaeontologist must compile a Phase 1 report to the Heritage Authority.

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1 INTRODUCTION

1.1 Background

Gideon Groenewald was appointed by PSG Heritage to undertake a desktop survey, assessing the potential palaeontological impact of the proposed Ndumo Gezisa 132kV Power Line, situated in the uMhlabuyalingana Municipality of the Umkhanyakude District.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the development.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

1.2 Aims and Methodology

Following the *"SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports"* the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

In preparing a palaeontological desktop study, the potential fossiliferous rock units (groups, formations, etc) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1.1 below.

Table 1.1 Palaeontological Sensitivity Analysis Outcome Classification

Sensitivity	Description
Low Sensitivity	Areas where a negligible impact on the fossil heritage is likely. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.
Moderate Sensitivity	Areas where fossil bearing rock units are present but fossil finds are localised or within thin or scattered sub-units. Pending the nature and scale of the proposed development the chances of finding fossils are moderate. A field-based assessment by a professional palaeontologist is usually warranted.
High Sensitivity	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops and the chances of finding fossils during a field-based assessment by a professional palaeontologist are very high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan

1.3 Scope and Limitations of the Desktop Study

The study will include: i) an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units; ii) a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports; iii) data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and iv) where feasible, location and examination of any fossil collections from the study area (e.g. museums).

The key assumption for this scoping study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing. There is also an inadequate database for fossil heritage for much of the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA. Most development study areas have never been surveyed by a palaeontologist.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and, without supporting field assessments, may lead to either:

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium etc).

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The study area (Figure 2.1) defined by the cadastral boundaries of the area is approximately 70 km across and 50 km in length. The project is located in the northern KwaZulu-Natal Province between the towns of Mkanes Drift and Manguzi. The area is bordered by several nature reserves with the Tembe Elephant Reserve on the northern most part of the boundary, the Greater St Lucia Wetland reserve along the eastern boundary and Ndumu game reserve on the north western boundary. The P522 road traverses the centre of the study area.

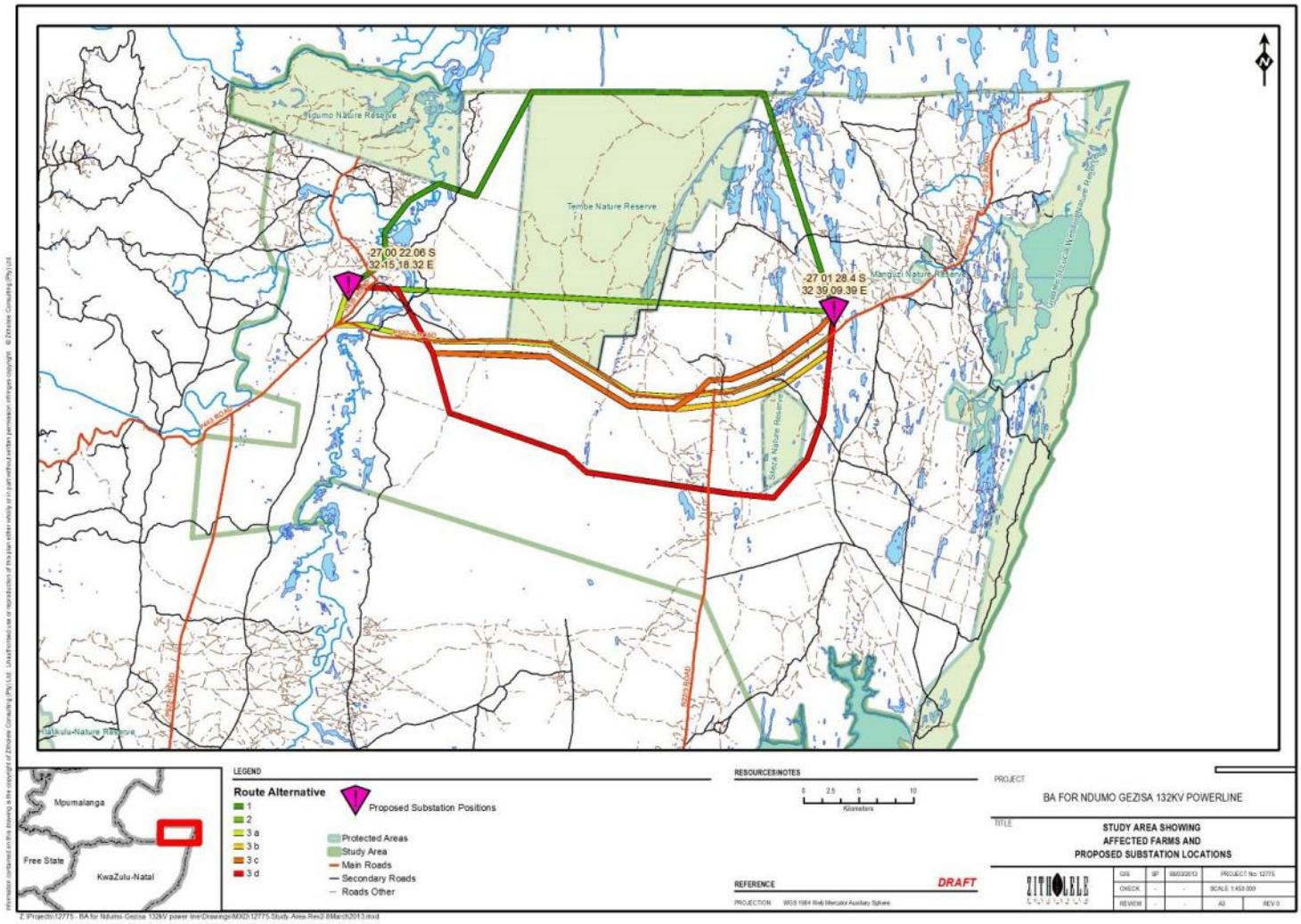

*Figure **Error! No text of specified style in document.**.26 Location of the study area showing the proposed alternative routes*

*Figure **Error! No text of specified style in document.**.27 Google image showing the proposed alternative routes*

3 GEOLOGY OF THE AREA

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2632 Mkuze) in conjunction with Google Earth.

3.1 The Mzinene Formation (Kmz)

The Mzinene Formation is mainly a glauconitic fossiliferous sandstone with well-defined *Teredo*-type hiatus concretions (Du Preez and Wolmarans, 1986). The Mzinene Formation is separated from the Makatini Formation by a hard ground or well indurated concretionary horizon bored by *Lithophaga*, a rock boring gastropod (Johnson et al, 2006).

3.2 Uloa Formation (Tu2)

During the Cenozoic Erathem, sea-level began to fall from the high levels experienced during the Cretaceous. The Tertiary Uloa Formation is a highly fossiliferous formation of calcrenite and thin limestone with a basal coquina that discordantly overlies the St Lucia Formation (Wolmarans and Du Preez, 1986; Du Preez and Wolmarans, 1986; Johnson et al, 2006).

3.3 Muzi Formation (Qm)

The Pleistocene sediments area divided into a lower Muzi Formation, which represents a vlei or swamp deposit consisting of mottled, brown clayey sand with few outcrops (Wolmarans and Du Preez, 1986).

3.4 Berea Formation (Qbe)

The Berea Formation consists of red, orange and yellow aeolian sand, in the form of dune cordons along the coast of KwaZulu-Natal as well as in the study area. The Berea Formation is interpreted as the weathering product of the Bluff Formation or equivalent older deposits. (Wolmarans and Du Preez, 1986).

3.5 Redistributed sand (Qs)

In more recent times, fluctuations in sea-level have continued to shape the KwaZulu-Natal coastline. Large areas in the study area are overlain by redistributed yellowish sand.

3.6 Wind-blown sand

The eastern parts of the study area are overlain by wind-blown sand.

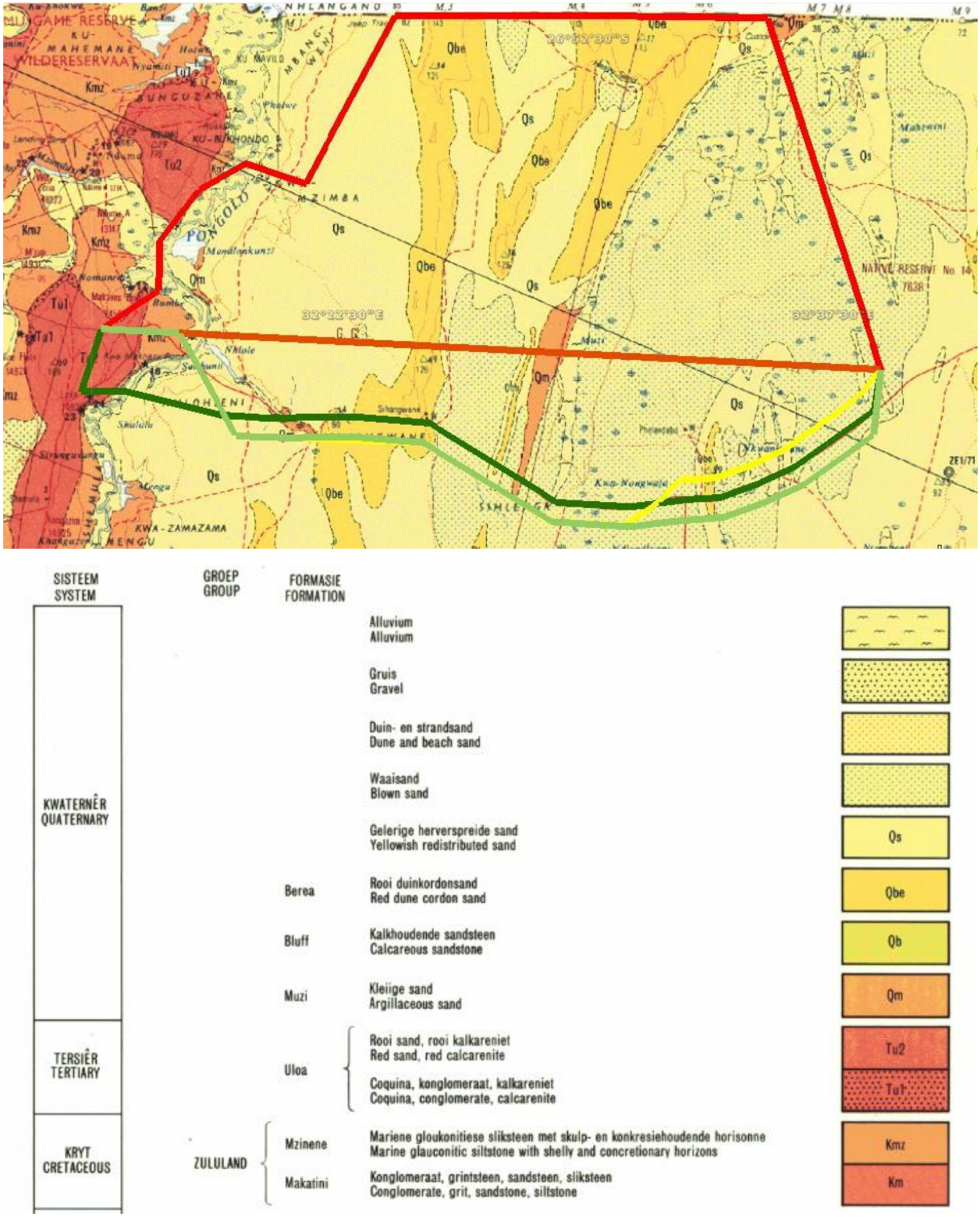

Figure 3. 1 Geology of study area

4 PALAEONTOLOGY OF THE AREA

The known fossil heritage within each rock unit was determined from the published scientific literature and previous palaeontological impact studies in the same region.

4.1 The Mzinene Formation (Kmz)

The Mzinene Formation consists of glauconitic siltstone and sandstone with a rich invertebrate fauna, including bivalves, gastropods, ammonites, nautiloids and echinoids. Lithophaga, i.e. bored concretions, are common. Fossil logs, bored by *Teredo* are frequently found in the formation (Johnson et al, 2006). The palaeo-environment is interpreted as shallow-marine.

The Uloa Formation (Tu2)

The Uloa Formation is a succession of calcarenite and thin limestone with a basal coquina, shelly conglomerate, low-angle stratified boulder/cobble conglomerate, sandstone and siltstone, deposited in the littoral zone on palaeoshorelines along the Lebombo foothills and closer to the present coastline from Mtunzini to Port Edward (Johnson et al, 2006; Wolmarans and Du Preez, 1986; Du Preez and Wolmarans, 1986). A main portion of the formation comprises about 5 metres of unbedded calcirudite, locally known as the "Pecten Bed" on account of the abundance of the bivalve *Aeqipecten uloa*. Gastropods, brachiopods, coralline algae, corals, polyzoa, foraminifera and echinoids are also present, as well as isolated teeth of the extinct giant shark *Carcharodon megalodon* (Johnson et al, 2006). The depositional environment is interpreted as a response to at least three transgressive marine events superimposed on a first-order marine regression during the Neogene.

4.2 The Muzi Formation (Qm)

The clayey nature and mottled appearance with root-like structures leads to the interpretation of a swamp or vlei deposit for this unit (Wolmarans and Du Preez, 1986). No other fossils are described from this unit.

4.3 The Berea Formation (Qbe)

No significant vertebrate fossils have been recorded from the Berea Formation (Wolmarans and Du Preez, 1986). Petrified wood with fossil wood, flattened *Syzigium* logs, have been described from the Formation.

4.4 Redistributed sand (Qs)

No significant fossils have been described from these sediments (Wolmarans and Du Preez, 1986; Johnson et al, 2006).

4.5 Wind-blown sand

No significant fossils have been described from these sediments (Wolmarans and Du Preez, 1986; Johnson et al, 2006).

5 PALAEONTOLOGICAL SENSITIVITY

The palaeontological sensitivity is predicted after identifying potentially fossiliferous rock units; ascertain the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity is summarised in Table 5.1 and illustrated in Figure 5.1 below.

Table.5.1 Palaeontological sensitivity of the formations in the study area

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Mzinene Formation	Glauconotic siltstone and sandstone. Cretaceous	Bivalves, gastropods, ammonites, nautiloids and echinoids. Fossil logs, bored by Teredo	None	High
Uloa Formation	Calcarenite and thin limestone with a basal coquina, shelly conglomerate, low-angle stratified boulder/cobble conglomerate, sandstone and siltstone. Tertiary	Bivalve *Aeqipecten uloa*, gastropods, brachiopods, coralline algae, corals, polyzoa, foraminifera and echinoids are also present, as well as isolated teeth of the extinct giant shark *Carcharodon megalodon*	None	High
Muzi Formation	Clayey nature and mottled appearance. Quaternary	Root structures	None	Medium
Berea Formation	Red, orange and yellow Aeolian sand. Quaternary	Petrified wood with fossil wood, flattened Syzigium logs	None	Medium
Redistributed sand	Yellowish sand. Quaternary	None	None	Low
Wind-blown sand	Blown sand. Quaternary	None	None	Low

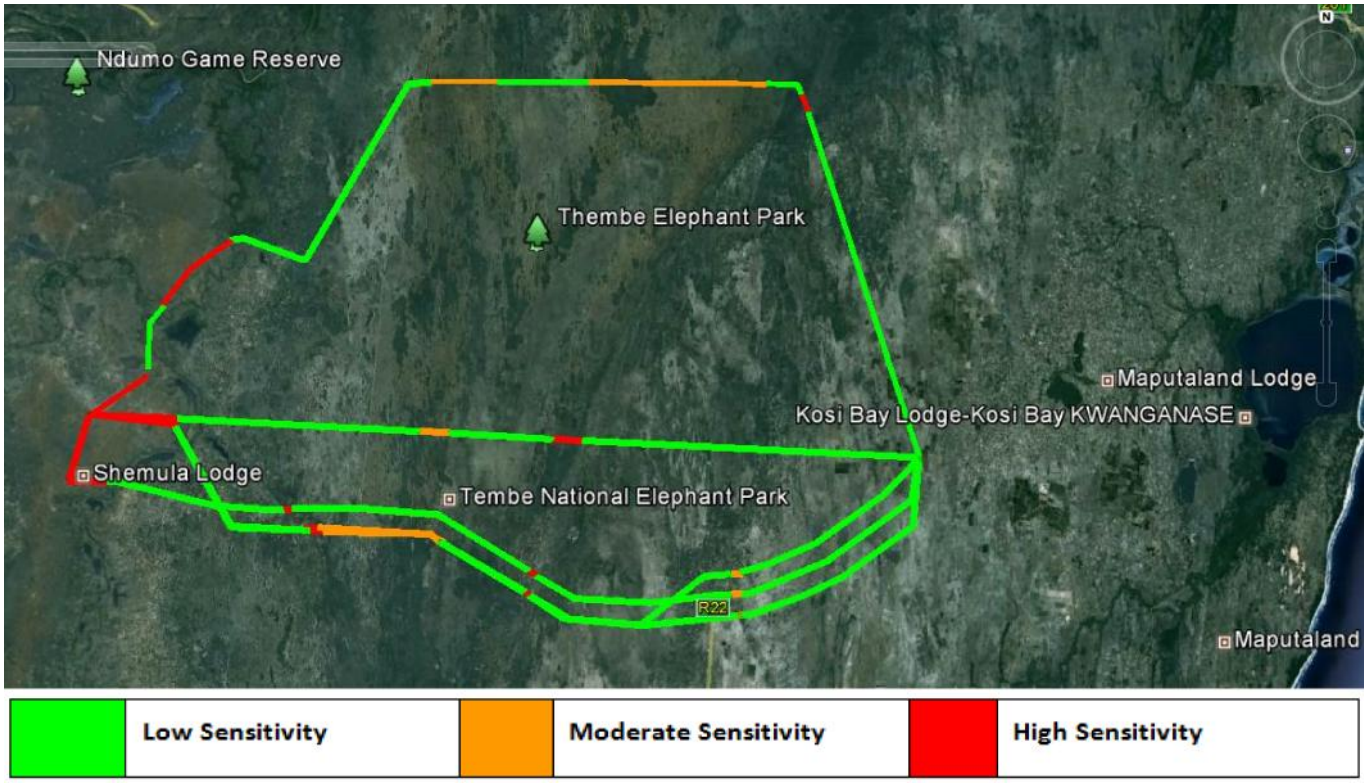

*Figure **Error! No text of specified style in document.**.28 Google image showing the palaeosensitivity of the proposed routes*

6 CONCLUSION AND RECOMMENDATIONS

The study area is mainly underlain by Quaternary aged redistributed and windblown sand deposits with the western part being mainly underlain by Tertiary aged rocks of the Uloa Formation and Cretaceous aged rocks of the Mzinene Formation of the Zululand Group. There are also small sections of the routes underlain by Quaternary aged rocks of the Muzi and Berea Formations.

There is a high possibility that fossils could be encountered during excavation of the Uloa and Mzinene Formations and good possibility of uncovering root structures and fossilised wood during excavation of the Muzi and Berea Formations. There is thus a good possibility of finding fossils during the excavation of pylon foundations.

If fossils are found, they would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would have a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation, will have a beneficial palaeontological impact.

It is therefore recommended that:

- If deep excavations into the Mzinene, Uloa, Muzi or Berea Formations are envisaged in identified high and medium sensitivity areas, a Palaeontologist must be appointed as part of the Environmental Component of the Construction Team. The Palaeontologist must accompany the surveyor and topsoil clearing teams to assess exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
- If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- In highly sensitive areas, the palaeontologist must compile a Phase 1 report for submission to the Heritage Authority.

7 REFERENCES

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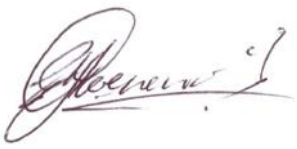
QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

8 DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



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