Zitholele Consulting

KUSILE POWER STATION ASH DISPOSAL FACILITY

Nkangala District Municipality, Mpumalanga and Metsweding District Municipality, Gauteng

Heritage Impact Assessment

Issue Date: 11 October 2013 (Final revision – 26 June 2014)

Revision No.: 1

Project No.:

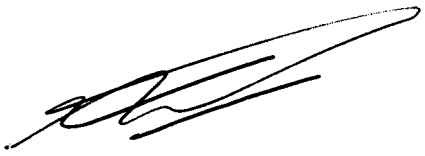
Professional Grave Solutions (Pty) Ltd T/A PGS Heritage & Grave Relocation Consultants
PO Box 32542 Totiusdal 0134, T +27 12 332 5305 F: +27 86 675 8077
Reg No 2003/008940/07

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 that includes this final report.

HERITAGE CONSULTANT: PGS Heritage

CONTACT PERSON: Wouter Fourie
Tel: +27 (0) 12 332 5305
Email: wouter@gravesolutions.co.za



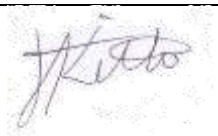
SIGNATURE: _____

ACKNOWLEDGEMENT OF RECEIPT

CLIENT: Zitholele Consulting (Pty) Ltd

CONTACT PERSON: Dr Mathys Vosloo
Zitholele Consulting (Pty) Ltd
Address: PO Box 6002, Halfway House, 1685
Telephone: +27 11 207 2079
Fax: +27 86 676 9950

SIGNATURE: _____

Report Title	*Proposed Construction of Ash Disposal Facility for Kusile Power Station, Mpumalanga and Gauteng Provinces –heritage Impact Assessment*		
Control	**Name**	**Signature**	**Designation**
Author	**J Kitto**		**Heritage Specialist**
	W Fourie		**Principal Investigator**

EXECUTIVE SUMMARY

PGS Heritage was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) for the proposed Ashing Facility associated with the Kusile Power Station.

Utilising the archival study completed for the HIA as a guide, the field work identified a total of 2 heritage structures and 4 cemeteries on **Site A** and 6 heritage structures and 5 cemeteries on Site B. The palaeontological research for the project has also identified palaeontological sensitive areas within the ashing facility foot print on both **Site A** and **Site B** that will require further monitoring and mitigation such as collection of material that will require permitting during constrution.

Evaluating the impacts and extent of impacts on heritage resources, it has been found that **Site A** will have a lower cumulative impact as the extent of mitigation will be less than required on **Site B**. **Site A** will require the relocation of 47 graves in comparison with the 40 identified at **Site B**, however the extent of palaeontological mitigation and mitigation to historical structures will require a larger monitary input. Thus **Site A** will be the preferred site from a heritage perspective.

The following recommendations with regards to the heritages resources (excluding palaeontological resources) that may be impacted by development on either sites will be required where redesign of the foot print area or realignment of the conveyor alignments are not possible.

Heritage Structures

- No further mitigation required for the destruction of the architectural structures identified;
- For the sites where homestead remains were identified, the possibility of finding still born burials exists and any such burials uncovered should be included in the grave relocation process
- Demarcate sites B4, B5, B6, B10, B11 relocate the conveyor alignment.

Cemeteries

For the cemeteries, identified in the footprint of the proposed ashing facility. The cemeteries will have to be relocated as their position within the foot print area does not make provision for a redesign to accommodate them.

It is recommended that the graves be relocated after a full grave relocation process that includes comprehensive social consultation. The grave relocation process as required by the regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA) must include:

- A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, which will be at least 60 days in length;
- Site notices indicating the intent of the relocation;
- Newspaper Notice indicating the intent of the relocation;
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- The whole process must be done by a reputable company that is well versed in relocations;
- The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.

Palaeontology

As assessed under Section 3 and 38 of the NHRA the palaeontological significance of the Vryheid Formation will require the following mitigation measures if excavation during construction is made into this Formation bedrock:

- A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.
- A palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.
- The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

Further to these recommendations the general Heritage Management Guidelines in Section 6 of this report need to be incorporated into the EMP for the project.

CONTENTS **Page**

LIST OF FIGURES

List of Appendices

1 INTRODUCTION

PGS Heritage was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) for the proposed Ash Disposal Facility associated with the Kusile Power Station, which is located between the N4 and N12 highways, just before Witbank, in the Nkangala District Municipality, Mpumalanga.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the EIA in the development of a comprehensive EMP to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

This background information document aims to provide a broad background on the possible heritage sensitive areas within the study area, as identified from available published data and from an initial field survey of the five/six alternative sites.

1.2 Specialist Qualifications

This Heritage Background Information Report was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry. PGS will only undertake heritage assessment work where their staff has the relevant expertise and experience to undertake that work competently. Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator, he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

Jennifer Kitto, Heritage Specialist for this project, has 15 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well-versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

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 palaeo-ecological 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

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed during construction, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

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. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
iv. 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 (EMP) – 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 (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 HIA report is compiled.

Table 1: Terminology

Abbreviations	***Description***
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
ECO	Environmental Control Officer
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. 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 the 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 1800's, associated with iron working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 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 D** for further discussions on heritage management and legislative frameworks

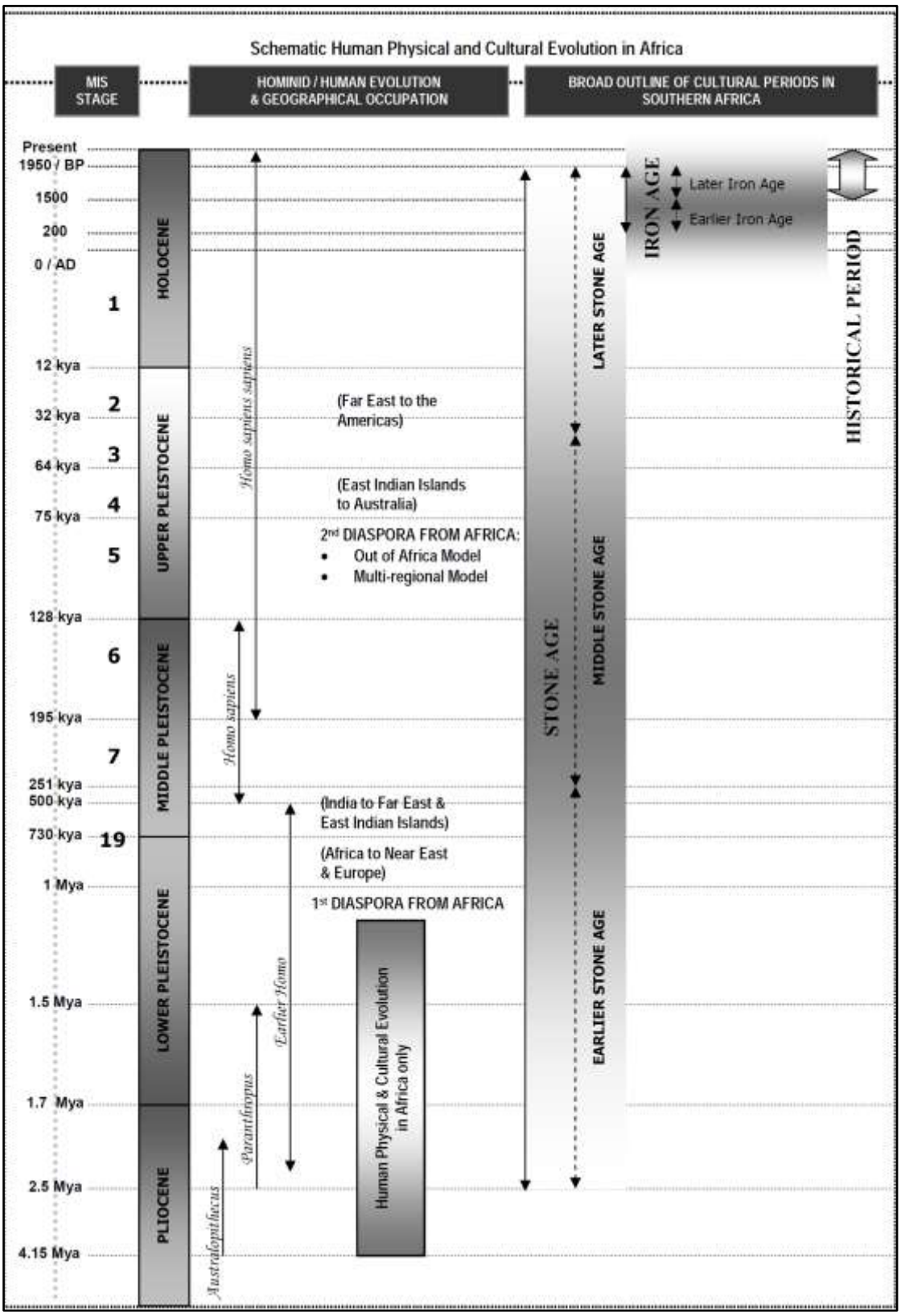


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

The overall study area consisted of five alternative areas that are located in the general area situated south of the N4, linking the towns of the Bronkhorstspruit and Witbank, and north of the N12, linking Johannesburg and Witbank (**Figure 2**).

The study area consisted of five suitable areas (Areas: A, B, C, G and F) located within a 15 km radius around the Kusile Power Station. The size of the areas vary between 1 500ha and 2 000ha in size. Area G is comprised of two smaller areas named (G and A_{small}). Area F is not large enough to accommodate the volume of ash for the 60 year horizon and must therefore be combined with either G or A_{small}. Thus six (6) alternative scenarios were generated for the ash disposal facility.

The six alternatives are:

- Scenario 1 (Area A);
- Scenario 2 (Area B);
- Scenario 3 (Area C);
- Scenario 4 (Area G & A_{small});
- Scenario 5 (Area F &G); and
- Scenario 6 (Area F &A_{samll}).

Each alternative consisted of a disposal facility, a service corridor of 500 m wide and associated infrastructure such as, but not limited to, roads, return water dams and other storm water management infrastructure. The total extent of area investigated was ~7 000 ha (**Figure 3**).

The outcome of the environmental Scoping Phase indicated that Site A will be the most suitable from a total environmental impact option. **Site A** was then the initial the focus of this Heritage Impact Assessment Report (HIA)

Subsequent communication and discussions between Zitholele Consulting and the Department of Water Affairs resulted in a decision/agreement to assess the impact on Site B to the same level as Site A. This report therefore includes an assessment of the heritage resources present within Site B and compares the impact on heritage resources between Site A and Site B.

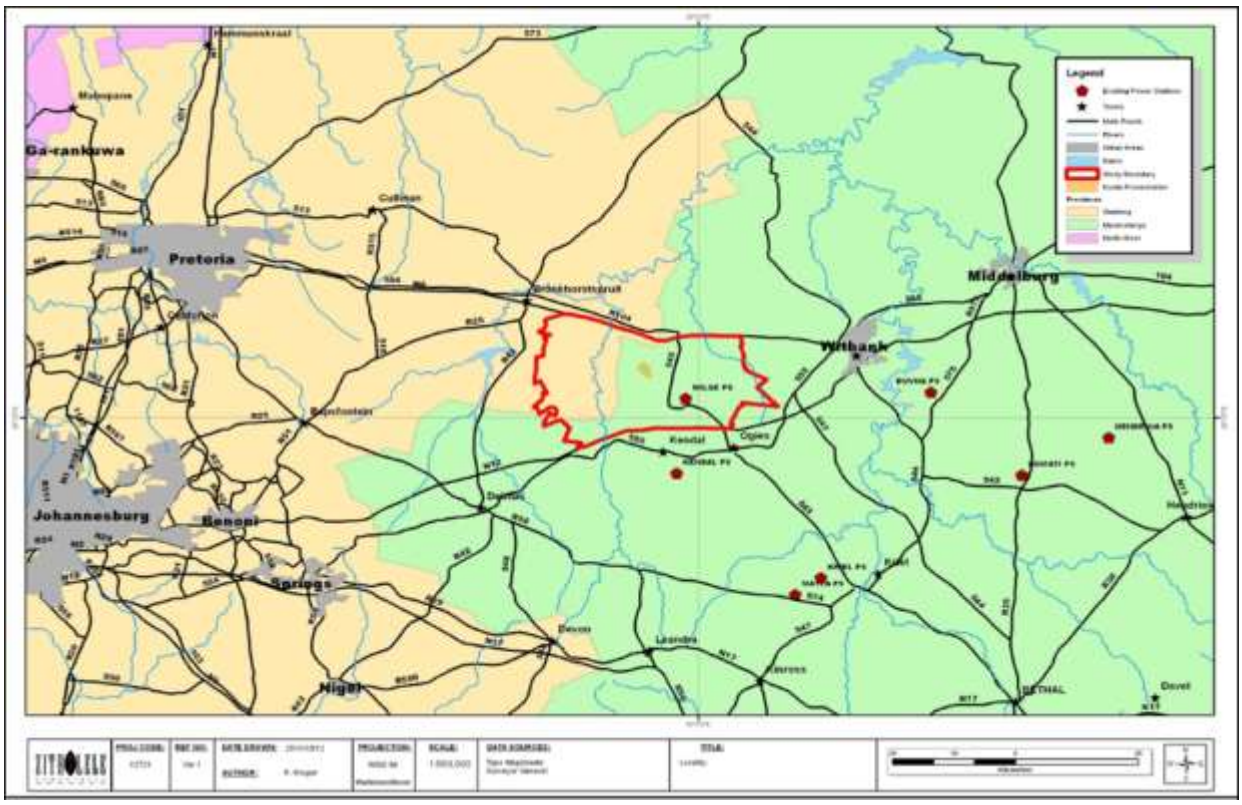


Figure 2 – General Locality Map

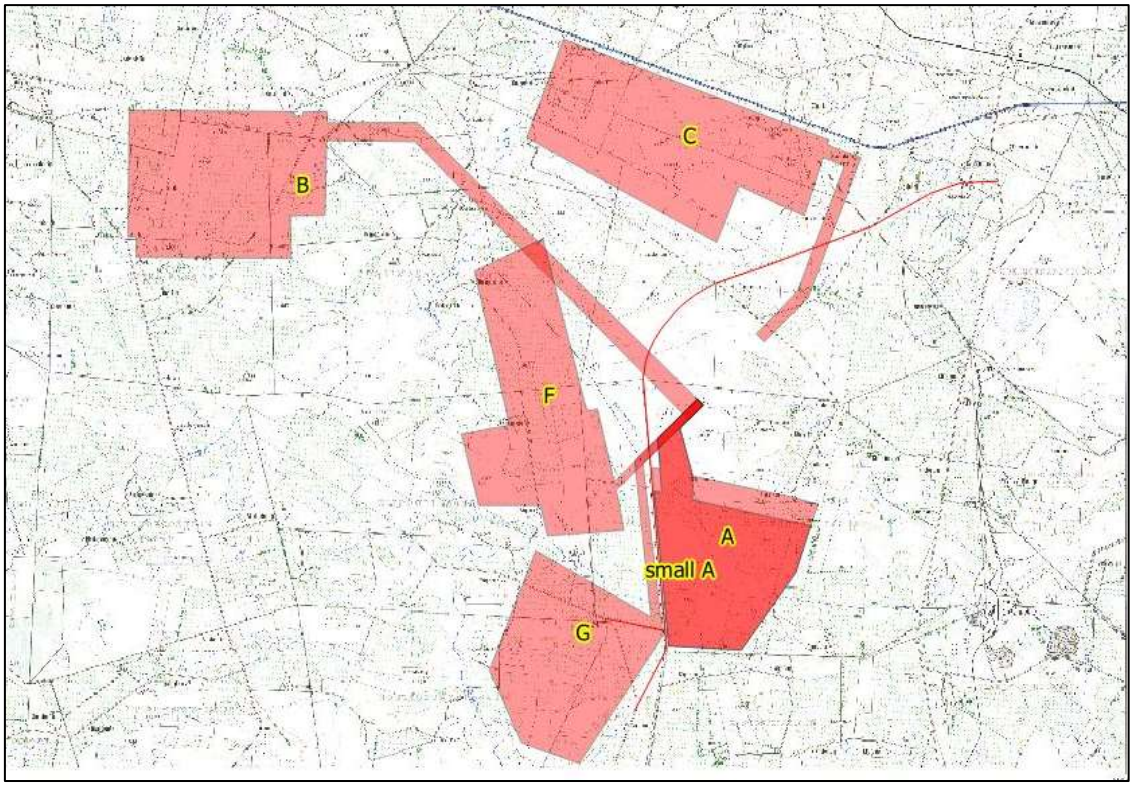


Figure 3 –Alternative sites studied during the Scoping Phase (Zitholele)

2.2 Methodology

2.2.1 Desktop and Archival Research

A search was conducted of the published literature regarding the history and archaeology of the general study area. Both historical and recent topographical maps as well as satellite information (Google earth) were analysed for indications of possible historic or archaeological structures. A desktop palaeontological impact assessment was also commissioned.

2.2.2 Initial Field Survey – Scoping level

An initial field survey was conducted by a team from PGS over a period of four days in total (10-11 and 24-25 January 2013). At this stage (comparison of alternative areas), the survey was conducted at the scoping level. Written descriptions, photographs and GPS coordinates were taken of all heritage sites identified during the survey.

Once the final preferred area/s have been identified, it is recommended that a more detailed survey be conducted of the preferred area/s, to identify heritage sites that may not have been obvious at the scoping stage.

3 BASELINE ENVIRONMENT - HERITAGE

3.1. The Archival findings

The archival research focused on available information sources (published literature and historical maps) that 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 the initial field surveying.

Table 2: Summary of archival data found on the area of study

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The **Earlier Stone Age** is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and this comprises more refined and better made stone artefacts, such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.(Fourie, 2008)

250 000 to 40 000 years ago	The **Middle Stone Age** is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. Middle Stone Age sites may occur along rivers and streams but none have been identified in the study area and their occurrence is difficult to predict. (De Jong, 2010)
40 000 years ago – AD 400	The **Later Stone Age** is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the general region. These vary from sealed (i.e. cave) sites, located to the north and south of the study area, to open sites in the Magaliesberg. Also, for the first time we get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. (Van Schalkwyk a, 2006) There appears to be a gap in the Mpumalanga LSA record between 9 000 BP and 5 000 BP. This may have to do with the general lack of Stone Age research in the province, but it also encompasses a period of rapid warming and major climate fluctuation, which may have forced people to seek out more protected and viable environments in this area. The Mpumalanga Stone Age record becomes visible again in the mid-Holocene at the farm Honingklip (HKLP) near Badplaas in the Carolina District. Here two LSA sites were found on opposite sides of a bend in the Nhlazatshe River, about 1km west of its confluence with the Teespruit. The HKLP sites are in the foothills of the Drakensberg, where the climate is warmer than the Highveld but cooler than the Lowveld (Delius (ed), 2006).
AD400-AD1100	**Early Iron Age** 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 practised a mixed farming economy and had the technology to work metals like iron and copper. The expansion of early farmers, who, among other things, cultivated crops, raised livestock, mined ore and smelted metals, occurred in this area between AD 400 and AD 1100. Dates from Early Iron Age sites indicate that by the beginning of the 5th century AD Bantu-speaking farmers had migrated down the eastern lowlands and settled in the Mpumalanga Lowveld. Subsequently, farmers continued to move into and between the Lowveld and Highveld of Mpumalanga until the 12th century. These Early Iron Age sites tend to be found in similar locations. Sites were found within 100m of water, either on a riverbank or at the confluence of streams. The close proximity to streams meant that the sites were often located on alluvial fans. The nutrient rich alluvial soils would have been favoured for agriculture. The availability of floodplains and naturally wetter soils would

	have been important for the practice of dryland farming. This may have been particularly so during the Early Iron Age, when climate reconstruction for the interior of South Africa suggests decreased rainfall between AD 900 and AD 1100 and again after AD 1450 (Delius, 2006).
AD 1500-AD 1700	While there is some evidence that the Early Iron Age continued into the 15th century in the Lowveld, on the escarpment it had ended by AD1100. The Highveld, particularly around Lydenburg, Badfontein, Sekhukhuneland, Roossenekal, and Steelpoort, became active again from the 15th century onwards. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements (Delius, 2006).
AD 1700 – AD 1840	The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the first association of the study area's surroundings with the Iron Age. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007).
AD 1821 – AD 1823	After leaving present-day KwaZulu-Natal the Khumalo Ndebele (more commonly known as the Matabele) of Mzilikazi migrated through the general vicinity of the study area under discussion before reaching the central reaches of the Vaal River in the vicinity of Heidelberg in 1823 (www.mk.org.za). Two different settlement types have been associated with the Khumalo Ndebele. The first of these is known as Type B walling and was found at Nqabeni in the Babanango area of KwaZulu-Natal. These walls stood in the open without any military or defensive considerations and comprised an inner circle of linked cattle enclosures (Huffman, 2007). The second settlement type associated with the Khumalo Ndebele is known as Doornspruit, and comprises a layout which from the air has the appearance of a 'beaded necklace'. This layout comprises long scalloped walls (which mark the back of the residential area) which closely surround a complex core which in turn comprises a number of stone circles. The structures from the centre of the settlement can be interpreted as kitchen areas and enclosures for keeping small stock. It is important to note that the Doornspruit settlement type is associated with the later settlements of the Khumalo Ndebele in areas such as the Magaliesberg Mountains and Marico and represent a settlement under the influence of the Sotho with whom the Khumalo Ndebele intermarried. The Type B settlement is associated with the early Khumalo Ndebele settlements and conforms more to the typical Zulu form of settlement. As the Khumalo Ndebele passed through the general vicinity of the study areas shortly after leaving Kwazulu-Natal, one can assume that their settlements here would have conformed more to the Type B than the Doornspruit type of settlement. It must be stressed however that no published information could be found which indicates the presence of Type B sites in the general vicinity of the study area. No iron age sites objects or features have been identified in the study area (Van Schalkwyk, 2006).
1836	The first Voortrekker parties crossed over the Vaal River (Bergh, 1999).
1850s – 1860s	This period saw the early establishment of farms by white farmers in the general vicinity of the study area. This said, the archival study has shown that all the farms within the study area were formally inspected by the

	government of the Zuid-Afrikaansche Republiek during February 1868. Of course, this does not necessarily mean that before this date no farms had already been settled and farmed on, simply that during February 1868 the farms were officially proclaimed and registered with government. The permanent settlement of white farmers in the general vicinity of the study area would have resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Features that can typically be associated with early farming history of the area include farm dwellings, sheds, rectangular stone kraals, canals, farm labourer accommodation and cemeteries. Although it is possible that a few heritage sites associated with the very first establishment of white farmers from the study area and surroundings would likely still exist, this would be few in number due to their age as well as the destruction of farmsteads by the British forces during the South African War in accordance with the so-called 'scorched earth' policy. The other sites often associated with these early farms are graves and cemeteries for both white farmers and black farm labourers. These sites are often all that remains of the farmstead of the mid to late 19th century.
1872 - 1894	During this time a number of small coal mining operations were started in the general vicinity, but as no railway line connected this area with the coal markets further to the west, it proved a difficult commercial undertaking. By 1889 there were four coal mines in the Witbank area, namely Brugspruit Adit, Maggie's Mine, Steenkoolspruit and Douglas (Falconer, 1990).
First South African War	***Memorial site for Battle of Bronkhorstpruit*** The site comprises two separate memorials commemorating the fatalities of the Battle of Bronkhorstspruit in 1880 which was the first engagement of the First South African War. The two memorials are located on either side of the R25 (Pretoria-Bronkhorstspruit) road. British Memorial to the 94th Regiment. This has been recently restored (the original gravestones have been set into a concrete memorial wall) and re-fenced. The inscription on the memorial states that it was, "erected by the Northern Transvaal Soldiers Graves Association and the South African War Veterans Association on 23rd April 1961".

	 *Figure 4 –British memorial* The Memorial commemorating the victory of the Boer forces was erected by the Historic Monuments Commission in 1966. This has also been re-fenced recently.  *Figure 5 –View of Boer Memorial*
1899 - 1902	**The Anglo Boer War** (1899-1902) took place during this time. The Balmoral concentration camp was established on 25 July 1901. It was created in order to take the overflow from the Middelburg and Belfast camps and was divided into the districts from which most of the inmates came – Balmoral, Lydenburg and, later, Ermelo (http://www2.lib.uct.ac.za/mss/bccd/Histories/Balmoral/). The original site was an old military camp, occurring just south of the railway station. The camp was unfenced as the entire area was protected by

	blockhouses. Although both E.R Harvey (the first superintendent) and the Ladies' Commission were satisfied with the original site, when the Military Governor of the Transvaal, General Maxwell, visited the camp on 14 January 1902, he ordered it to be moved to rising ground, almost a mile away. Although the hospital moved in May, the main camp was only transferred in June 1902 (http://www2.lib.uct.ac.za/mss/bccd/Histories/Balmoral/).
1880s-1914	**Witbank** Originally the early residents of Witbank area were mainly stock farmers as there was no market for agricultural produce. Crops were restricted to the needs of the local families. Early travelers in the area, such as Thomas Baines, as far back as 1872 mentioned the coal used by local residents as fuel. Evidence has also been found that at first the African people, and later the Voortrekkers, mined coal from the outcrop, especially in the riverbeds, and transported it by ox-wagon to the Witwatersrand. Actual systematic mining at Witbank only started in 1896 when Samuel Stanford, together with the Neumann Group, established the company Witbank Colliery Limited, and sank the first shaft on the farm Witbank. Earlier the farm was generally known as Swartbosch although the official name was Leraatsfontein. It was given the name Witbank because it was not so cumbersome and because of the large quartz rock which, in the words of Thomas Baines," loomed like a wagon tent in the distance." The town Witbank was laid out in 1903 by Witbank Colliery Limited and in the same year Samuel Stanford erected the first wood and iron building, consisting of a shop and hotel. Witbank Colliery Limited controlled the town until 9 April 1906 when a health committee was appointed. On 13 May 1910 a village council was elected and on the 8 November 1914 the town was granted muncipal status. The mining of coal did not initially result in a population increase. But with the advent of the railwayline between Pretoria and Lourenco Marques (now Maputo) the mining industry was firmly placed on an economic basis, and thereafter the population increased considerably http://global.britannica.com/EBchecked/topic/646020/Witbank) .

3.1.1 Findings of the Heritage Scoping Document

The findings was compiled to produce heritage sensitivity maps for the project, based on the provided footprints and study area in 2013:

Historical

Evaluation of the 1:50 000 Topographical maps surveyed in 1941 and drawn in 1945, as well as recent aerial photographs and Google Earth has focused on the following delineations:

1. Single structures – Point source
2. Possible graves/cemeteries – Point Source

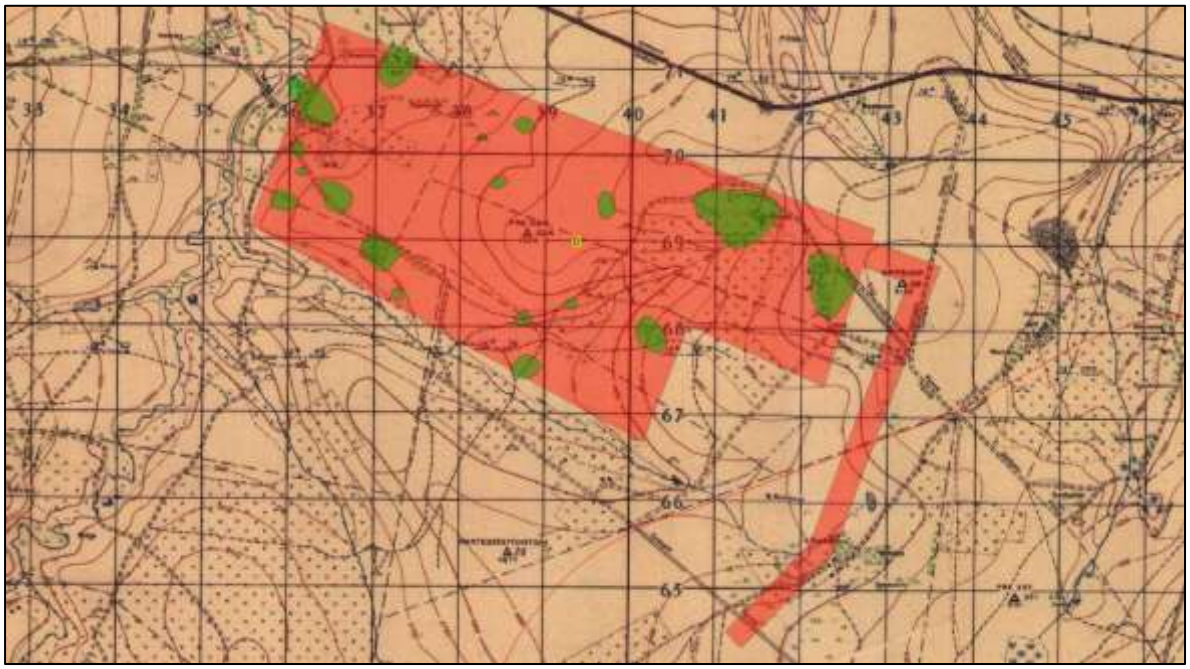


Figure 6 – 1941 map of Area C (with possible sensitive areas delineated)

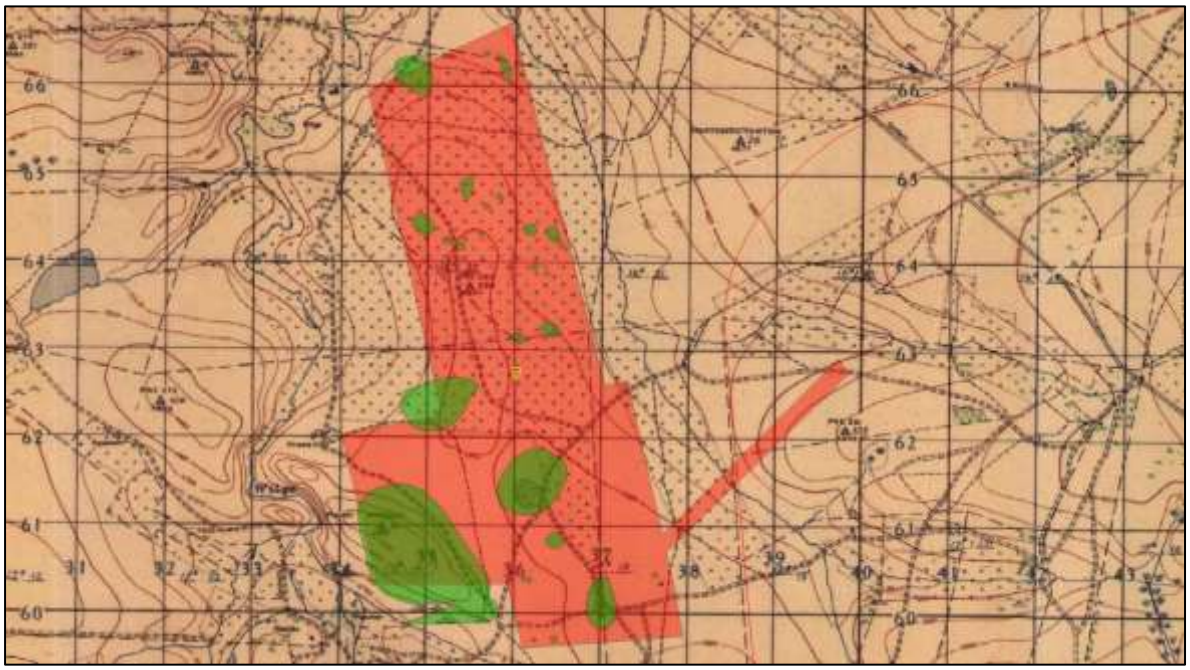


Figure 7 – 1941 map of Area F (with possible sensitive areas delineated)

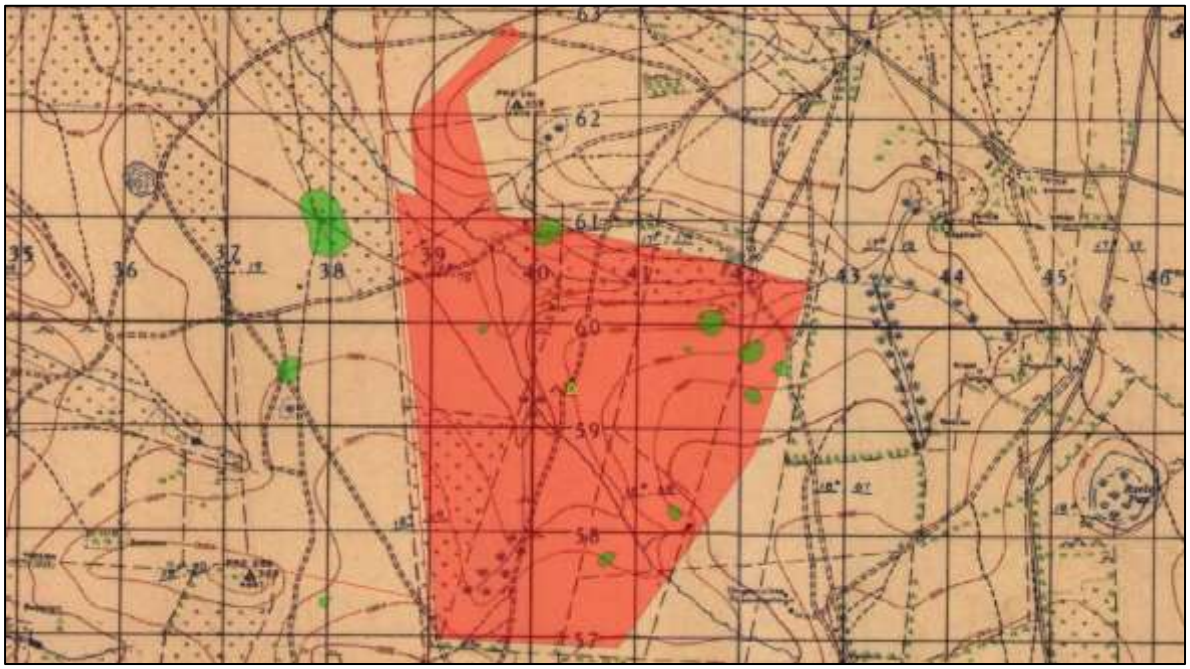


Figure 8 – 1941 map of Area A (with possible sensitive areas delineated)

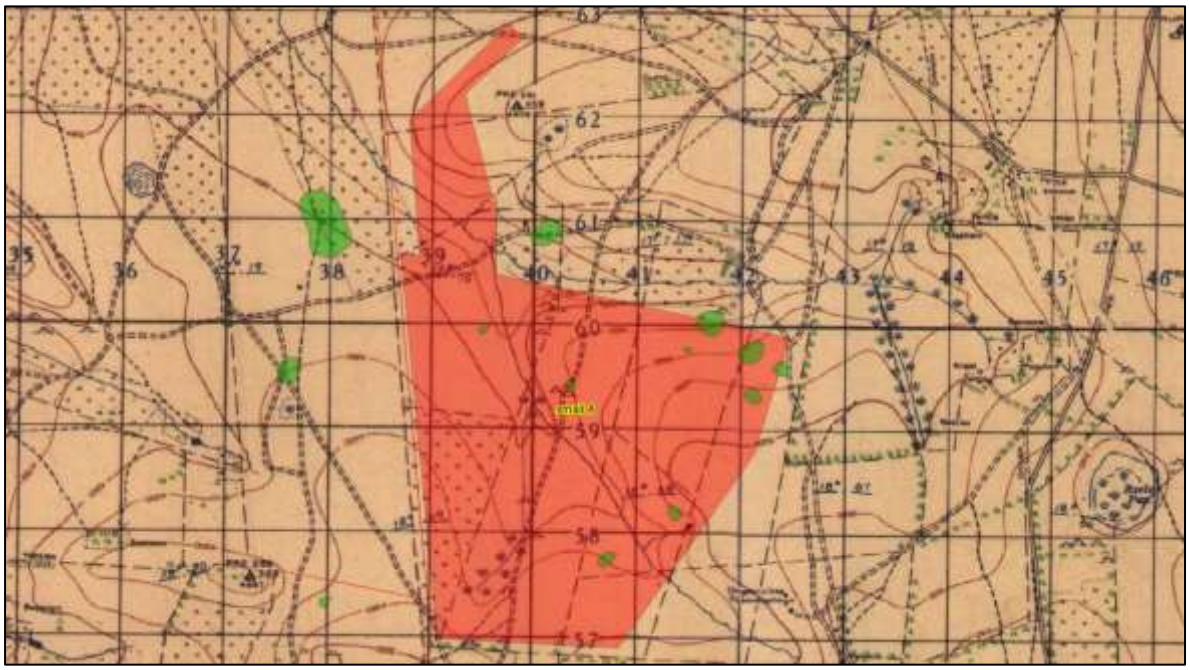


Figure 9 – 1941 map of Area A_{small} (with possible sensitive areas delineated)

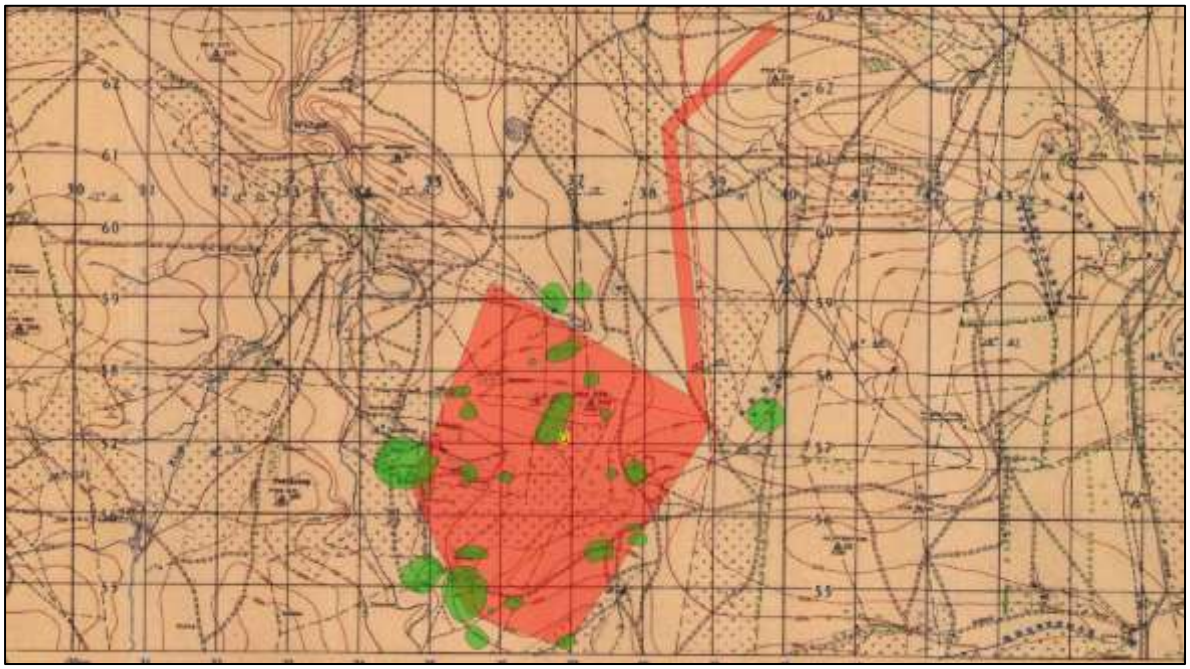


Figure 10 – 1941 map of Area G (with possible sensitive areas delineated)

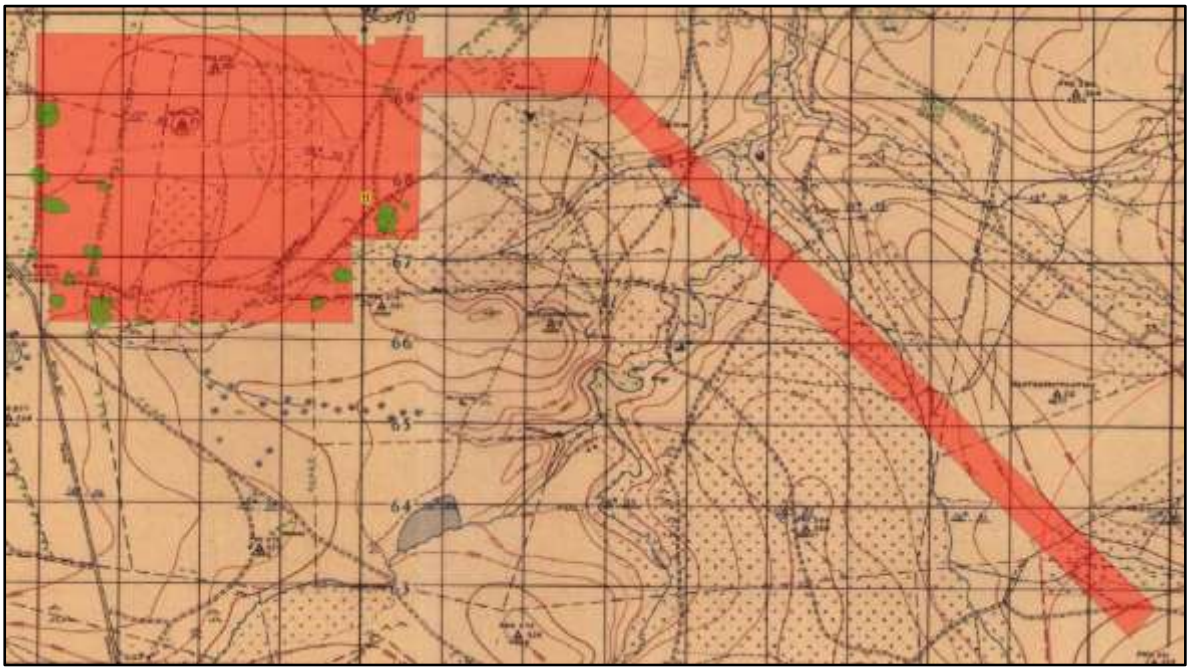


Figure 11 – 1941 map of Area B (with possible sensitive areas delineated)

The aim of the analysis was to identify areas that could have possible heritage significance. From a regional analysis perspective this delineations cover the following possible heritage finds:

1. Archaeological sites
2. Cemeteries and grave sites
3. Historical structures

Augmented with the site survey information, the sites identified during the field work were overlain with the sensitivity map developed, to gain a better understanding of the landscape's cultural fabric.

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 needs to be treated as such until the final preferred site/s have been identified and detailed ground truthing could prove the contrary with regards to sensitivity.

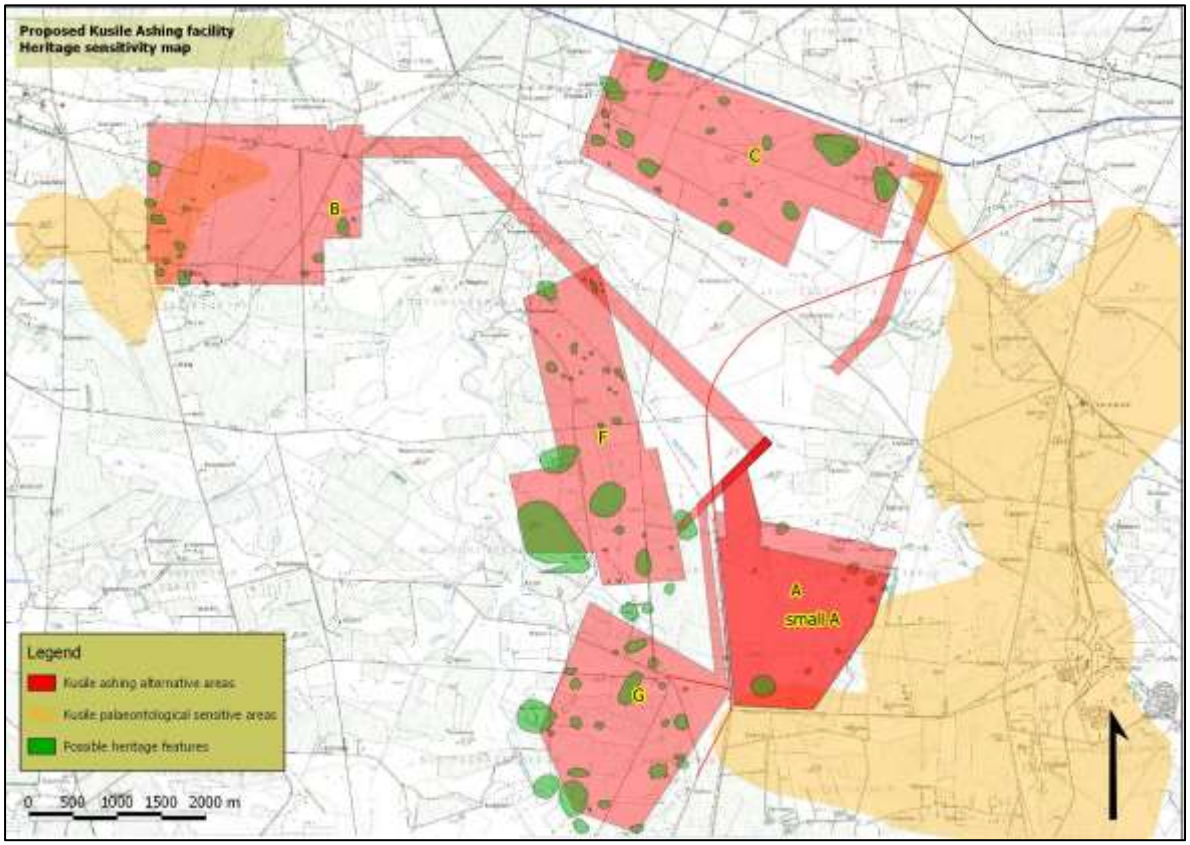


Figure 12 – Heritage Sensitivity Map

The table below (**Table 3**) sets out the ranking of the different options based on the desktop and initial scoping level surveys of the various Areas.

Table 3 – Analysis of heritage sensitivity (**NOTE: The ranking is based on 1 = least preferred and 5/6 = most preferred)**

Impact Description	**A**	**B**	**C**	**A & F**	**A & G**	**F & G**
Cemeteries (graves)	4 (±47)	5 (40)	8 (±146)	4 (±55)	5 (±107)	5 (±88)
Ranking	**6**	**2**	**1**	**5**	**3**	**4**

Palaeontology	Localised	Development footprint	None	None	None	None
Ranking	**2**	**1**	**6**	**3**	**4**	**5**
Historical Structures	2	6	6	1	1	2
Ranking	**2**	**1**	**1**	**3**	**3**	**2**
Stone Age Site	Possible	Unknown	Not likely	Possible	Possible	Possible
Ranking	**4**	**5**	**6**	**2**	**3**	**1**
Total Heritage Impacts ranking	**6**	**4**	**1**	**5**	**2**	**3**

This heritage sensitivity from the spatial analysis and field work was then included in the overall site selection criteria, which included physical (water, vegetation, ecology, etc.) social (settlement, social-economic data and heritage), for the sites in question. From this analysis **Site A** was identified as the most preferred option.

Subsequent communication and discussions between Zitholele Consulting and the Department of Water Affairs resulted in a decision/agreement to assess the impact on Site B to the same level as Site A. This report therefore includes an assessment of the heritage resources present within Site B and compares the impact on heritage resources between Site A and Site B.

3.2 Findings of field work on Site A

Four cemeteries (**A1, A4, A5 and A6**), consisting of 47 graves in total, were identified in **Site A.** The cemeteries contain African farmworker graves. It is likely that some of the graves will be 60 years or older and thus protected under Section 36 of the NHRA. The remains of a recent farmhouse (**A3**) and farm workers housing (**A2**) were also identified (**Figure 13**).

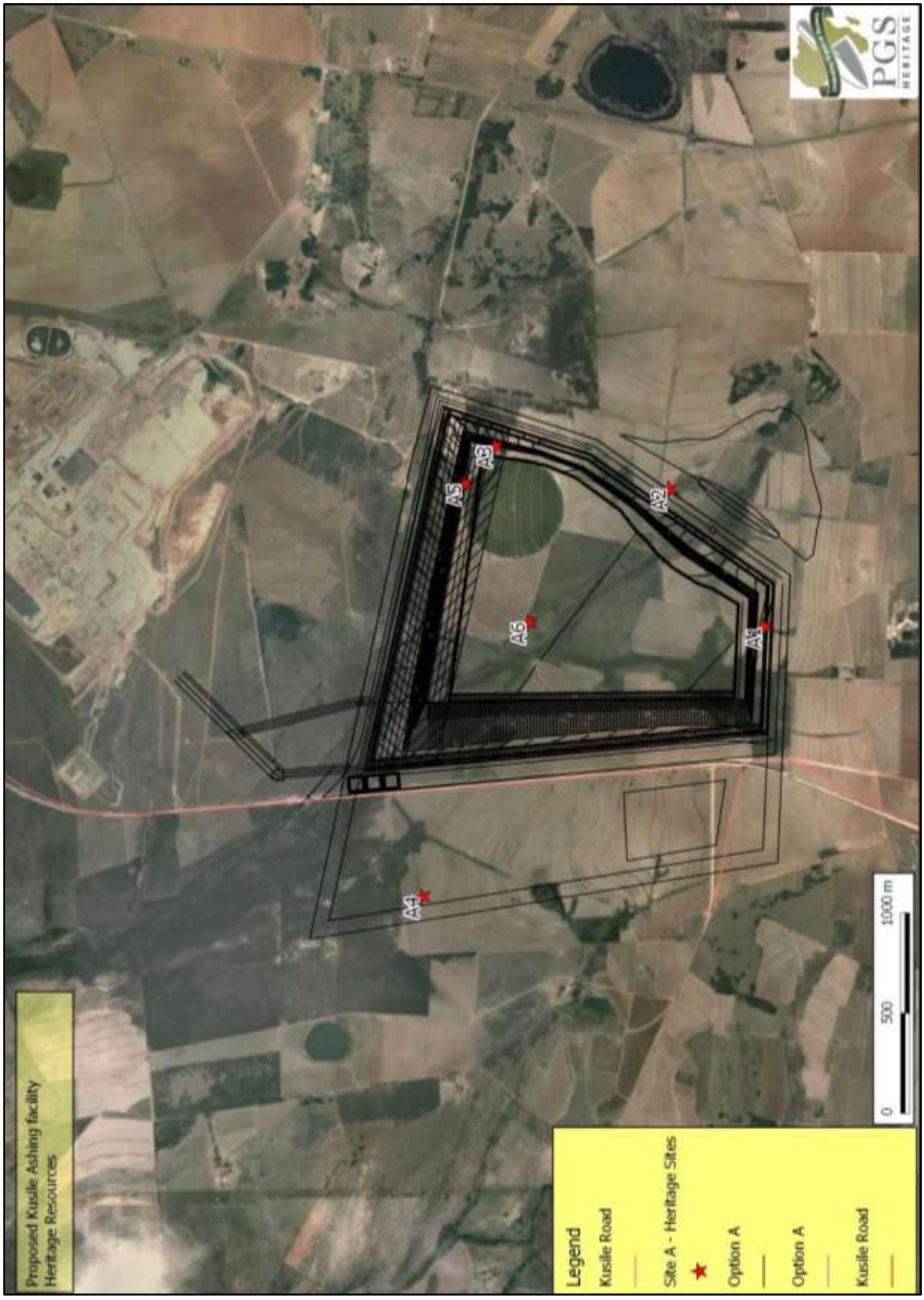


Figure 13 – Heritage resources in Site A as identified during the field work

3.2.1 Cemetery - Site A1

GPS Coordinates: S25.97548°, E28.91045°

Impact Area: Ashing facility

Cemetery of 24 African graves; mostly all stone packed, but a few with headstones and inscription: Mtombeni (1940-197? Iron railing), Mahlangu (1972 Headstone).

Figure 14 – Site A1, Mtombeni grave

Figure 15 – Site A1, view of graves

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

3.2.2 Recent-historic – Labourer Housing - Site A2

GPS coordinates: S25.96784°, E28.92279°
Impact Area: Ashing facility

A small farm labourer accommodation structure was identified at this location. The structure is brick-built and has a sloped corrugated iron roof. The structure measures approximately 6m x 6m in size. The structure also has metal door and window frames.

A damaged brick-built dam is situated near the farm labourer's quarters. It measures approximately 12m in diameter and approximately 1.5m high. It is not functioning anymore, as an entrance has been created through the wall. An old style water pump is also situated near the house.

Figure 16 – Site A2, farm labourer house

Figure 17 – Site A2, brick and cement dam

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.C** and of low heritage significance.

Mitigation:

- No mitigation will be required before destruction;
- It is however advisable to enquire into the existence of still born burials during the relocation of the workers; and
- If it is found that still born burials do exist a grave relocation process for the relocation of such remains needs to be implemented as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

3.2.3 Recent Historic Structure - Site A3

GPS coordinates: S25.95379°, E28.92663°

Impact Area: Ashing facility

The foundation remains of a recent farmhouse were identified (with modern tiles, plastic light switch, asbestos sheeting, etc.).

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.C** and of low heritage significance.

Mitigation:

- No mitigation will be required before destruction;

Figure 18 – Site A3, remains of recent farmhouse

3.2.4 Cemetery - Site A4

GPS coordinates: S25.94792°, E28.88626°

Impact Area: Ashing facility

An informal cemetery with thirteen informal graves was identified at this location. The cemetery was situated in a Mielie-field and was not fenced. Most of the graves had informal mounds of packed rocks as dressing and some of them had inscribed cement headstones. The graves were all overgrown with grass and other vegetation and were not maintained. Some of the graves were also damaged.

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on.

Figure 19 – Site A4, informal cemetery

Figure 20 - Site A4, stone-packed graves

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

3.2.5 Cemetery - Site A5

GPS coordinates: S 25.95132°, E 28.92326°
Impact Area: Ashing facility

An informal cemetery with 10 informal graves was identified at this location. The informal cemetery is associated with the Ntuli family with graves with birth dates dating between 1920 to 1970.

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

3.2.6 Cemetery - Site A6

GPS coordinates: 25.95652°, E 28.91084°
Impact Area: Ashing facility

An informal cemetery with 10 informal graves was identified at this location. The informal cemetery is associated with the Mahlangu family with graves having birth dates dating between 1920 to 1930.

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

Figure 21 - Site A6, Mahlangu family cemetery (van Schalkwyk, 2006)

3.3 Findings of field work on option Site B

Two PGS staff members surveyed the study area by vehicle and foot over three days: 17-19 September 2013. Not able to contact all landowners to arrange access.

A total of 11 heritage sites were identified inside or close to the borders of the study area: five grave sites (**B1-3, B7, and B12**), five historic structures (**B4-6, and B10-11**), and one historic spring (**B9**). One heritage site was identified outside the site but possibly close enough to be affected by an indirect impact from the proposed ash disposal facility. This is the memorial site for the Battle of Bronkhorstpruit, which dates to the first South African (Anglo-Boer) War of 1880-1881..

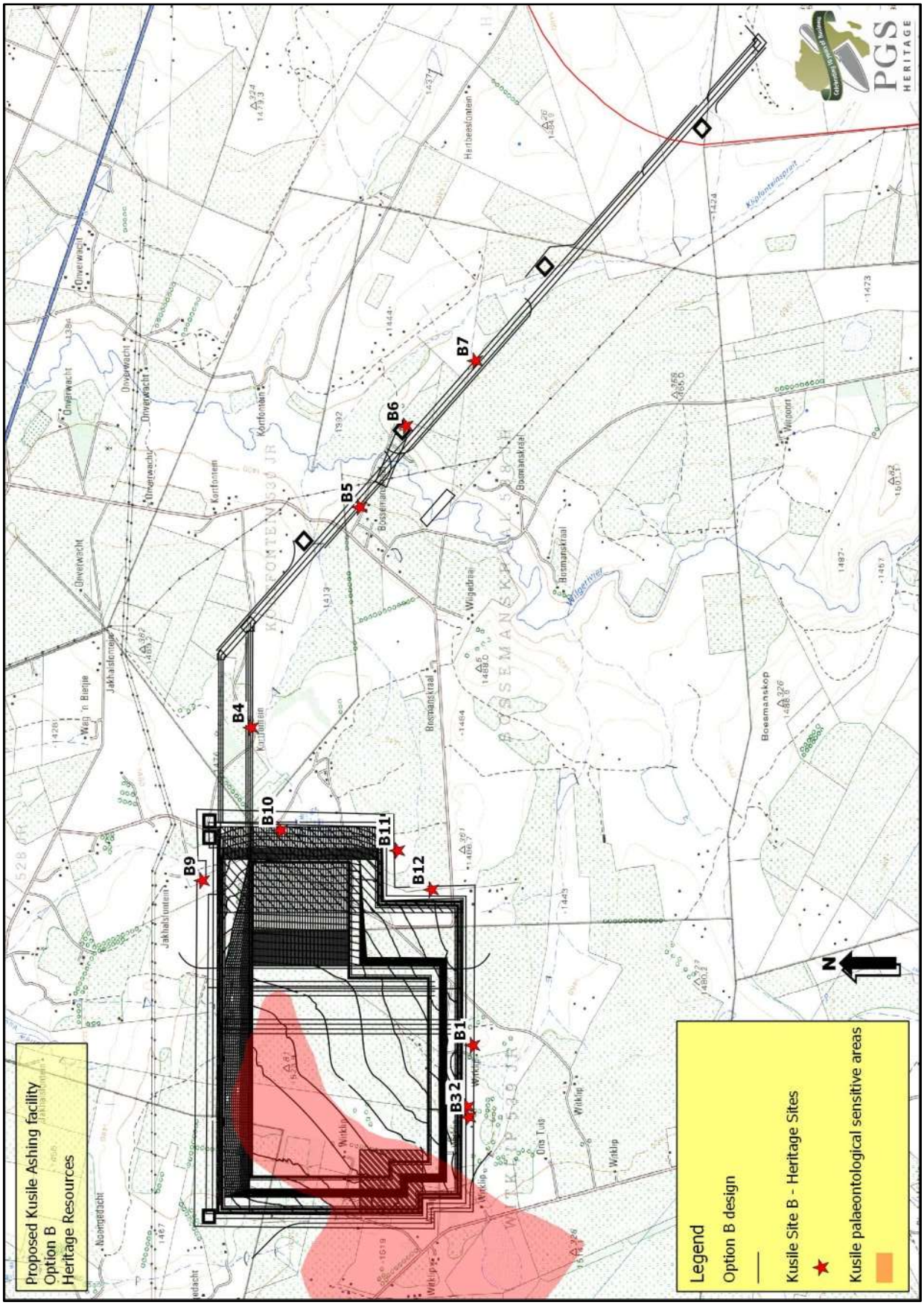


Figure 22 – Heritage resources in and around Site B, and on conveyor corridors as identified during the field work

3.3.1 Cemetery - Site B1

GPS coordinates: S25.89960°, E28.79895°

Impact Area: Ashing facility

A cemetery with formal European (Afrikaans) graves was identified at this location. Approximately nine graves are visible. Some of the names and dates legible from the headstones include: Nicolaas 1945, Engelbrecht 1931, Nel 1934, Prinsloo 1929. These graves are all older than 60 years and situated outside a municipal cemetery, therefore they are protected under section 36 of the National Heritage Resources Act No 23 of 1999 (NHRA).

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on, and cannot be relocated without obtaining a permit from the relevant heritage and health authorities.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

Figure 23 – Site B1, view of graves

Figure 24 – Site B1, view of graves

3.3.2 Cemetery - Site B2

GPS coordinates: 25.89902°, E28.79250°

Impact Area: Ashing facility

A cemetery with formal European (Afrikaans) graves was identified at this location. Three formal graves are visible: one double grave and one single grave. The names and dates of death on the headstones are: Prinsloo 1909 and Prinsloo 1929. There is also at least one possible African informal stone packed grave with no headstone.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on. and cannot be relocated without obtaining a permit from the relevant heritage and health authorities.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

Figure 25 – site B2, view of double grave

Figure 26 – Site B2, view of single grave

Figure 27 – Site B2, view of African grave

3.3.3 Cemetery - Site B3

GPS coordinates: S2589918°, E28.79141°
Impact Area: Ashing facility

An informal cemetery with 5-7 stone-packed graves was identified at this location. They are probably African graves and have no obvious headstones. Since the graves are located in a stand of wattle trees, the number of graves is not definite.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on, and cannot be relocated without obtaining a permit from the relevant heritage and health authorities.

Mitigation:
It is recommended that in the event that the cemeteries cannot be incorporated into the development, the graves be relocated after a full grave relocation process that includes a comprehensive social consultation. Refer to Section 6 for heritage management requirements.

Figure 28 – Site B3, view of graves

3.3.4 Farmstead – Site B4

GPS Coordinates: S25.87636°, E28.83229°

Impact Area: Conveyor

The site consist of a main farm house and some outbildings with cattle kraals. The original structures are indicated on the 1941 maps and older than 60 years and thus protected under Section 34 of the NHRA.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.B** and of low to medium heritage significance.

Mitigation:

It is recommended that the conveyor alignment be adjusted to preserve this site.

3.3.5 Old farmstead – Site B5

***GPS coordinates*:** S25.88774°, E28.85542°
Impact Area: Conveyor

The site consist of a main farm house and some outbildings with cattle kraals. The original structures are indicated on the 1941 maps and older than 60 years and thus protected under Section 34 of the NHRA.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.B** and of low to medium heritage significance.

Mitigation:
It is recommended that the conveyor alignment be adjusted to preserve this site.

3.3.6 Stone kraal – Site B6

GPS Coordinates: S25.89258°, E28.86395°
Impact Area: Conveyor

The site consist of a large square stone walled kraal. The walling is not indicated on the 1941 maps but can still be older than 60 years and protected under Section 34 of the NHRA.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.B** and of low to medium heritage significance.

Mitigation:
It is recommended that the conveyor alignment be adjusted to preserve this site.

3.3.7 Cemetery – Site B7

GPS Coordinates: S25.89984°, E28.87063°

Impact Area: Conveyor

This site consists of a cemetery with ±16 African graves and the remains of a stone kraal. Some of the graves have headstones, with visible names including: Masemula (1986 & 1987), Chili (1987), Maposika (1966), Sikomzo (1963/6)

Figure 29 – Site B7, African cemetery

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance.

Mitigation:

It is recommended that the conveyor alignment be adjusted to preserve this site.

NOTE – No Site B8 is listed in the report

3.3.8 Historic Spring - Site B9

GPS Coordinates: S25.87123°, E28.81624°

Impact Area: Ashing facility [*this site is located right on the border of the study are*a]

The landowner also pointed out a spring located close to the historic house, which was apparently utilised when the property was used as an historical outspan. No structures of historical significance were found on site.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.C** and of low heritage significance.

Mitigation:

No further mitigation required.

Figure 30 – Site B9, view of spring location from house

Figure 31 – Site B9, view of recent stone walling at spring site

Figure 32 – Site B9, view showing spring

3.3.9 Possible site – Stone Walling B10

GPS Coordinates: S25.87943°, E28.82152°
Impact Area: Ashing facility

A linear feature made up of stones which looked like a stone wall was identified at this location. However, since there were breaks visible between the discrete sections of stones the feature could also be the results of field clearing.

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.C** and of low heritage significance.

Mitigation:
No mitigation will be required before destruction

Figure 33 – Site B10, view of stone feature, showing linear nature

3.3.10 Historic structures B11

GPS Coordinates: S25.89171°, E28. 81939°

Impact Area: Ashing facility [*Located just outside boundary of study area but probable indirect impact – could be in corridor area*]

The remains of several historic structures were identified at this location. One is a large square-shaped stone kraal. The foundations of at least two other stone structures were visible. This site is located in an area of dense vlei grass, with scattered fruit trees, along the boundary of one of the mielie fields the site is indicated on the 1941 maps and thus older than 60 years and protected under Section 34 of the NHRA.

In accordance to the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.C** and of low heritage significance.

Mitigation:

No mitigation will be required before destruction

Figure 34 – Site B11, view showing corner of kraal

Figure 35 – Site B11, view showing kraal entrance

Figure 36 – Site B11, view of stone structure

3.3.11 Cemetery B12

GPS Coordinates: S25.89527°, 28.81528°

Impact Area: Ashing facility

An informal cemetery containing approximately five visible graves was identified at this location. Two of the graves have headstones with inscriptions. One headstone has the name, Skosana, and one date of, 1962 (which is probably the date of death). The other headstone only has one legible date, 1940 (which could be either the date of birth or death). The cemetery is located in an area between two mielie fields and is very overgrown with grass. There are also has many stones from field clearing.

In accordance with the classification standards as prescribed by SAHRA (**Appendix D**), the site is graded as **Grade GP.A** and of high heritage significance. The design of the ashing facility has been done taking into account the environmental and social constraints of the selected site. A redesign of the facility will not be possible and as such the cemetery will be impacted on, and cannot be relocated without obtaining a permit from the relevant heritage and health authorities.

Mitigation:

- The cemetery will have to be relocated through a comprehensive grave relocation process as stipulated in Regulation 548 as promulgated under the National Heritage Reocurces Act (NHRA).

Figure 37 – Site B12, view of graves

Figure 38 – site B12, view of graves

3.4 Palaeontological desktop work

The palaeontological sensitivity is predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself (refer to **Appendix B** for the full study). The palaeontological sensitivity of the study area/s is summarised in the table below.

Table 4: Palaeontological Sensitivity of Geological Units on Site

Geological Unit	**Rock Type and Age**	**Fossil Heritage**	**Vertebrate Biozone**	**Palaeontological Sensitivity**
Daspoort Formation	Quartz Arenites, subordinate mudrocks and ironstones VAALIAN	None	*None*	None
Silverton Formation	Shales VAALIAN	None	*None*	None
Magaliesberg Formation	Marine sandstone	None	*None*	None

Diabase	Diabase VAALIAN - MOGOLIAN	None	*None*	None
Dwyka Formation	Diamictite EARLY PERMIAN	*Dwykea goedhopensis* *Palaeovittaria sp.* *Ottokaria buriadica* *Glossopteris sp.* Fish scales and tracks	*None*	Low
Vryheid Formation	Grey to black mudstone & sandstone PERMIAN	Abundant plant fossils of *Glossopteris* and other plants trace fossils	*None*	High sensitivity

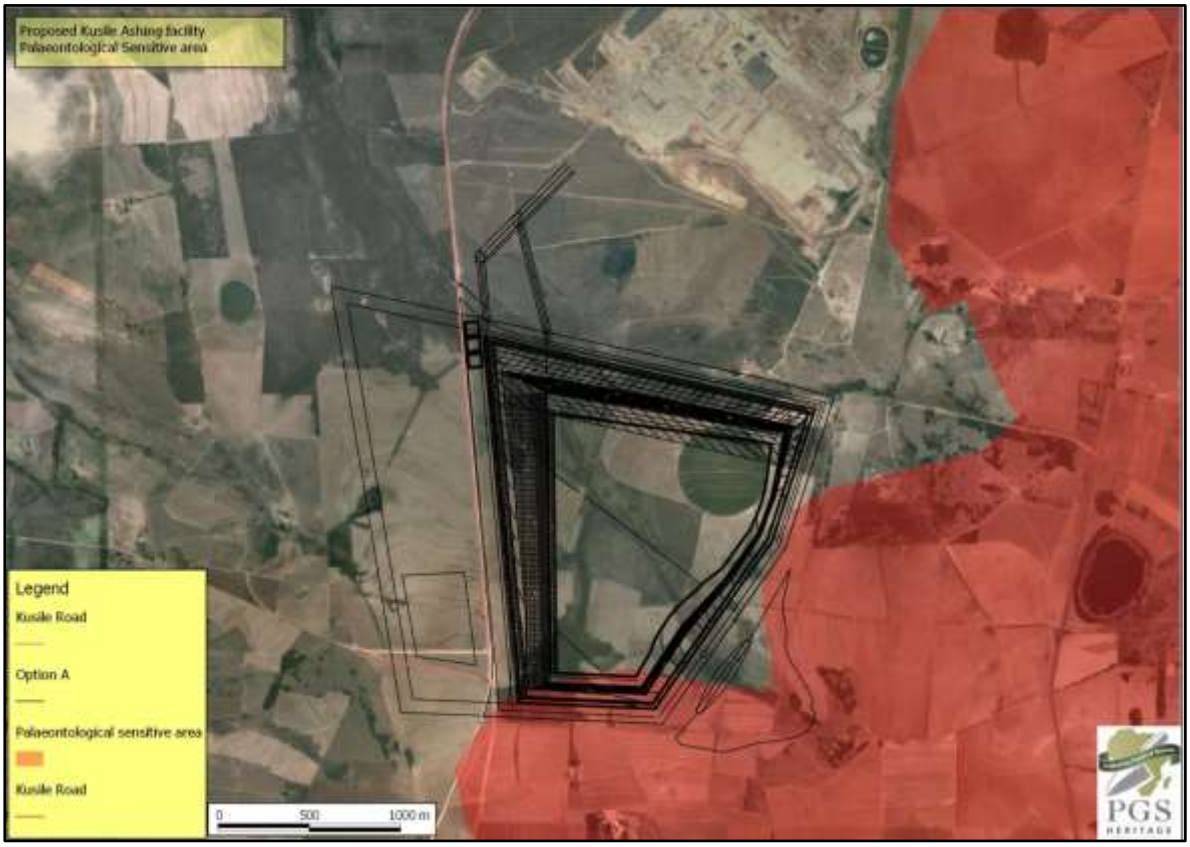


Figure 39 - Palaeontological sensitive areas in proposed footprint: Site A

The palaeontological sensitivity assessment of Site A shows that there is an area in the southern part of the site which is underlain by geological formations that are of a high palaeontological sensitivity.

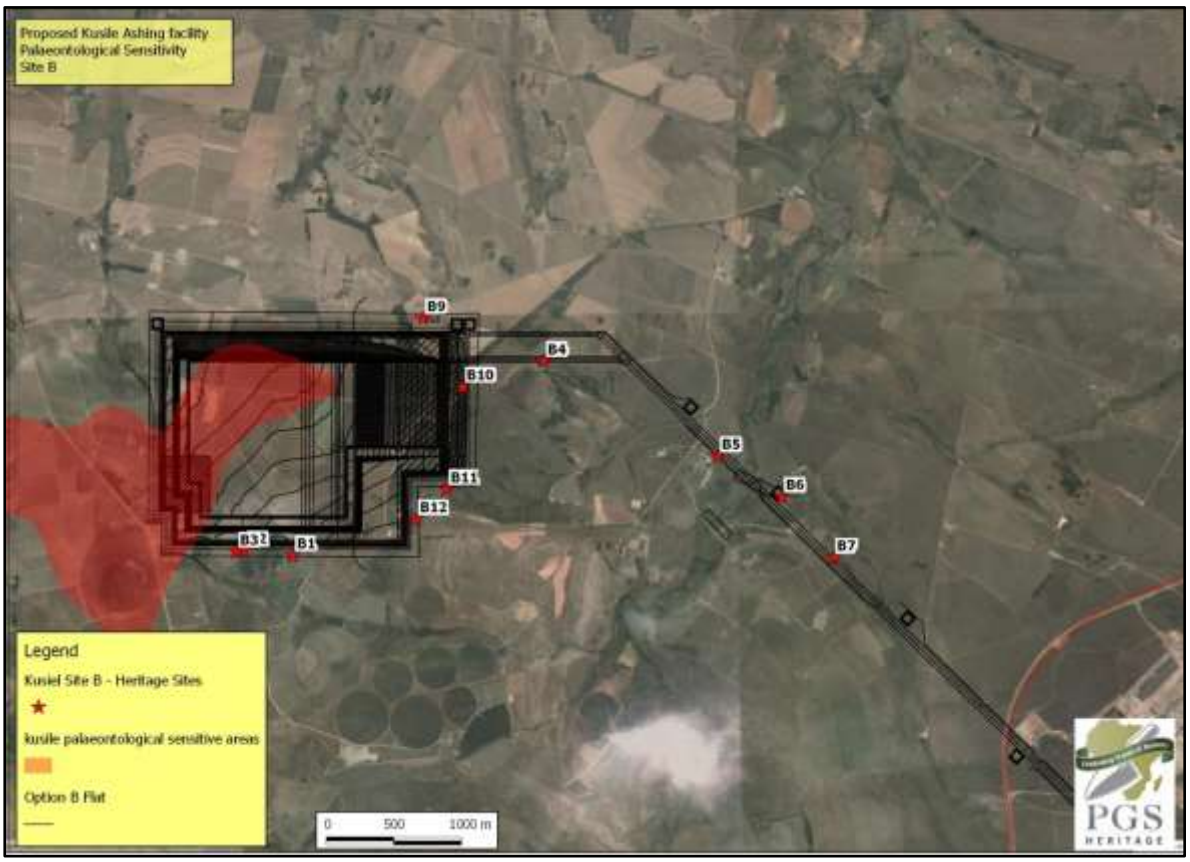


Figure 40 - Palaeontological sensitive areas in proposed footprint: Site A

The palaeontological sensitivity assessment of Site B shows that there is a large area in the western half of Site B which is underlain by geological formations that are of a high palaeontological sensitivity.

4 ENVIRONMENTAL IMPACT STATEMENT

Refer to Appendix E for the impact rating methodology and formulae

4.1 Status Quo

4.1.1 Site A

Section 3 provides a background reference to history of the site, as well as the more recent status as evaluated in the field during this study. The 1941 topo graphical map (**Figure 41**) of the site depicts various infrastructure that was verified during the field work and assigned a heritage significance rating.

Four cemeteries (**A1, A4, A5 and A6**), consisting of 47 graves in total, were identified in the site. The cemeteries contain African farmworker graves. It is likely that some of the graves will be 60 years or older and thus protected under Section 36 of the NHRA. The remains of a recent farmhouse (**A3**) and farm workers housing (**A2**) were also identified.

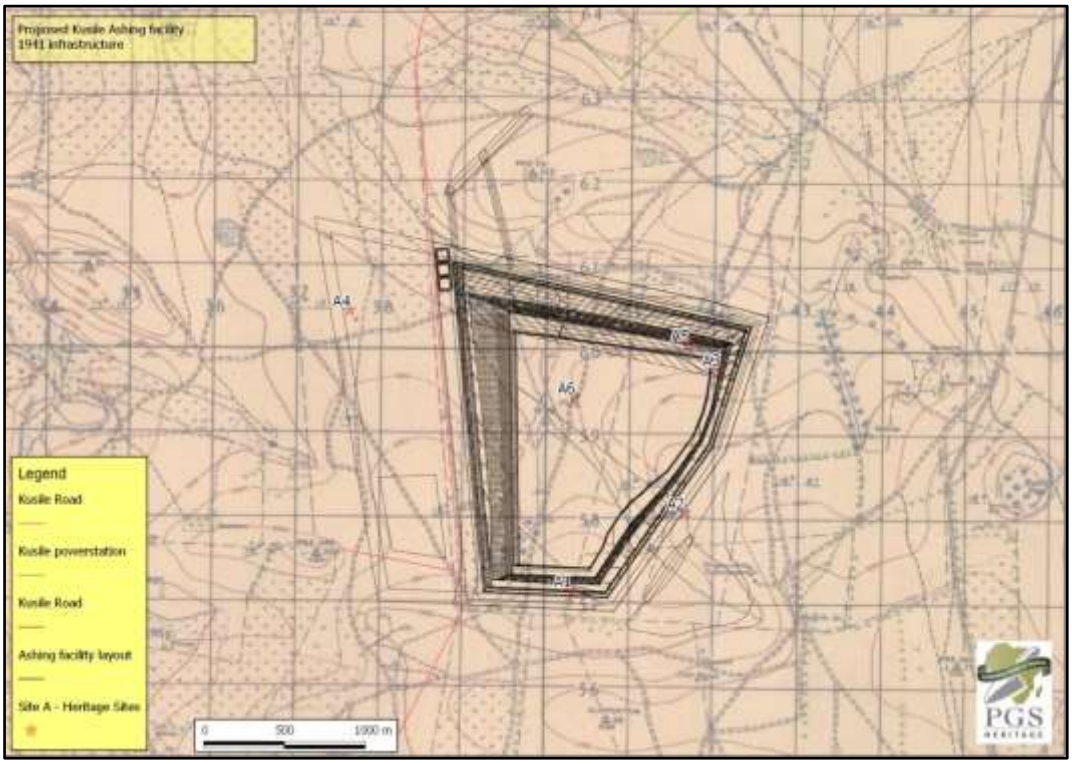


Figure 41 – 1941 map depicting infrastructure (Site A) and identified heritage sites

Impacts identified are natural (burrowing animals and vegetation) and impacts mainly the cemeteries and graves within the area, while the demolishing and subsequent scavenging of building material has led to the destruction of houses and outbuildings on farmsteads.

The combined weighted base line impact (

Table 5) to heritage resources is **definitely** of a VERY LOW negative significance, affecting *isolated sites*. The impact will be *incidental* and *likely to occur*. The impact risk class is thus **Very Low**.

Table 5: Rated baseline impact on heritage resources – Site A

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
STATUS QUO	INITIAL BASELINE IMPACTS TO ENVIRONMENT	Negative	**Definite**	1	1	1	3	**-0.7**
				VLOW	ISO	INCID	LIKE	**VLOW**

4.1.2 Site B

Section 3 provides a background reference to history of the study area, as well as the more recent status as evaluated in the field during this study. The 1941 topo graphical map (**Figure 42**) of the study area depicts various infrastructure that was verified during the field work and assigned a heritage significance rating.

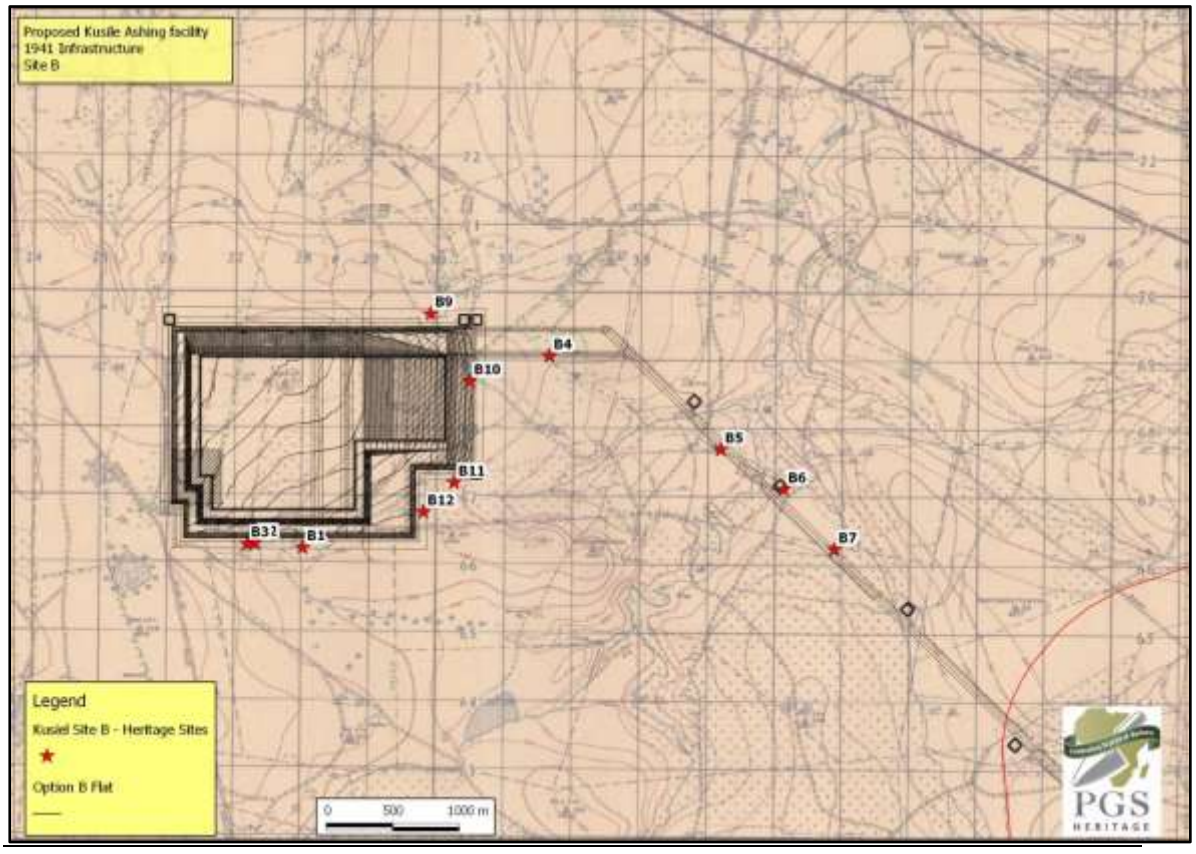


Figure 42 – 1941 map depicting infrastructure(Site B) and identified heritage sites

Eleven heritage sites were identified inside or close to the borders of Site B. Five cemetery/grave sites consisting of 40 graves in total, were identified in or adjacent to the study area (**B1, B2, B3, B7, B12**). Some of the cemeteries contain African farmworker graves and some contain European (Afrikaans) graves. Some of the graves in these cemeteries have inscriptions that definitely date them as being 60 years or older and thus protected under Section 36 of the NHRA. Four historic structures (**B4, B5, B6, B10, B11**), and one spring (**B9**) used as an historic outspan were also identified.

Impacts identified are natural (burrowing animals and vegetation) and impacts mainly the cemeteries and graves within the area, while the demolishing and subsequent scavenging of building material has led to the destruction of houses and outbuildings on farmsteads.

The combined weighted base line impact (**Table 6**) to heritage resources is **definitely** of a VERY LOW negative significance, affecting *isolated sites*. The impact will be *incidental* and *likely to occur*. The impact risk class is thus **Very Low**.

Table 6: Rated baseline impact on heritage resources – Site B

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
STATUS QUO	INITIAL BASELINE IMPACTS TO ENVIRONMENT	Negative	**Definite**	1	1	1	3	**-0.7**
				VLOW	ISO	INCID	LIKE	**VLOW**

4.2 Project Impact (Unmitigated)

4.2.1 Site A

During the construction of the ash disposal facility, access roads, pipelines, trenches / channels, Transmission lines re-routing, and installation of the barrier system impacts will occur to the identified and chance find heritage resources. These impacts will occur as a result of construction activities such as topsoil stripping, excavations and vegetation clearing. The most notable impacts will be on the existing cemeteries and the palaeontological sensitive substrata in the south western section of the study area.

The total impact on the heritage resource during the construction phase of the project is given in **Table 7** below.

The combined weighted project impact to cemeteries and palaeontological resources (prior to mitigation) will **definitely** be of a HIGH negative significance, affecting *isolated sites*. The impact will be *permanent* and *is going to happen*. The impact risk class is thus **Moderate High to High.**

Table 7: Rated Impacts on heritage resources during construction

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
Project Impact 1	Cemeteries	Negative	**Definite**	5	1	5	5	**-4.1**
				HIGH	ISO	PERM	OCCUR	**HIGH**
Project Impact 2	Palaeontology	Negative	**Definite**	5	1	5	4	**-3.2**
				HIGH	ISO	PERM	VLIKE	**MODH**

4.2.2 Site B

During the construction of the ash disposal facility, access roads, pipelines, trenches / channels, Transmission lines re-routing, and installation of the barrier system impacts will occur to the identified and chance find heritage resources. These impacts will occur as a result of construction activities such as topsoil stripping, excavations and vegetation clearing. The most notable impacts will be on the existing cemeteries and the palaeontological sensitive substrata in the western half of the study area.

The total impact on the heritage resource during the construction phase of the project is given in

Table 8 below.

The combined weighted project impact to cemeteries and palaeontological resources (prior to mitigation) will **definitely** be of a HIGH negative significance, affecting *isolated sites*. The impact will be *permanent* and *is going to happen*. The impact risk class is thus **Moderate High to High.**

Table 8: Rated Impacts on heritage resources during construction

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
Project Impact 1	Cemeteries	Negative	**Definite**	5	1	5	5	**-4.1**
				HIGH	ISO	PERM	OCCUR	**HIGH**
Project Impact 2	Palaeontology	Negative	**Definite**	5	1	5	4	**-3.2**
				HIGH	ISO	PERM	VLIKE	**MODH**
Project Impact 3	Historical Structures	Negative	**Definite**	1	1	5	4	**-2.1**
				VLOW	ISO	PERM	VLIKE	**MODL**
Project Impact 4	Stone Age Site	Negative	**Definite**	1	1	5	2	**-1**
				VLOW	ISO	PERM	UNLIKE	**VLOW**

4.3 Cumulative Impact

4.3.1 Site A

The baseline impacts are considered to be **Very Low**, and additional project impact (if no mitigation measures are implement) will increase the significance of the existing baseline impacts, the cumulative unmitigated impact will **definitely** be of a HIGH negative significance, *isolated sites* in extent. The impact *is going to happen* and will be permanent. The impact risk class is thus **High**.

Table 9: Cumulative impact on heritage resources

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
CUMULATIVE IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **BEFORE MITIGATION**	Negative	**Definite**	6	1	5	5	**-4.4**
				VHIGH	ISO	PERM	OCCUR	**HIGH**

4.3.2 Site B

The baseline impacts are considered to be **Very Low**, and additional project impact (if no mitigation measures are implement) will increase the significance of the existing baseline impacts, the cumulative unmitigated impact will **definitely** be of a HIGH negative significance, *isolated sites*

in extent. The impact *is going to happen* and will be permanent. The impact risk class is thus **High**.

Table 10: Cumulative impact on heritage resources

IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
CUMULATIVE IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **BEFORE MITIGATION**	Negative	**Definite**	6 VHIGH	1 ISO	5 PERM	5 OCCUR	**-4.4** **HIGH**

4.4 Mitigation Measures

The mitigation measures required will be the same for both Site A and B, where cemeteries or palaeontological resources are affected. However, the historical structures identified on Site B may require additional mitigation to that of Site A. To manage the potential impact on the heritage resources during construction and thus minimising the impact will require the following:

4.4.1 Cemeteries:

It is recommended that the cemeteries identified for relocation be relocated after a full grave relocation process that includes comprehensive social consultation. The grave relocation process must include:

- A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, which will be at least 60 days in length;
- Site notices indicating the intent of the relocation;
- Newspaper Notice indicating the intent of the relocation;
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- The whole process must be done by a reputable company that is well versed in relocations;

- The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.

4.4.2 Palaeontology

If the excavations uncover the Vryheid Formation bedrock:

- A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.
- A palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.
- The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

4.4.3 Historical Structures

It is recommended that in the event that the site cannot be incorporated into the development, the structures are evaluated by a conservation architect or architectural historian to determine the significance and make further recommendations. Refer to Section 6 for heritage management requirements. Sites B5 and B10, may require further investigation and documentation if they will be negatively affected by the development footprint.

Further to these recommendations the general Heritage Management Guidelines in Section 6 need to be incorporated into the EMP for the project.

4.5 Residual Impact

4.5.1 Site A

The impact to heritage resources will be permanent as heritage resources cannot be restored. The proposed mitigation measures will enable the documentation of any palaeontology found and the preservation of human remains through the relocation to cemeteries as requested by the next-of-kin.

Table 11: Residual impact on heritage resources

Rated By:		Site A						
IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
RESIDUAL IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **AFTER MITIGATION**	Negative	**Probable**	2 LOW	1 ISO	5 PERM	5 OCCUR	**-2.9** **MODL**

The residual impact on heritage resources beyond the closure phase of the project will be reduced through mitigation measures but not to within baseline conditions. After mitigation the impacts to heritage resources will **probably** be of a LOW negative significance, affecting the *isolated sites*. The impact *is going to happen* and will be permanent. The impact risk class is thus **Moderate Low**.

4.5.2 Site B

The impact to heritage resources will be permanent as heritage resources cannot be restored. The proposed mitigation measures will enable the documentation of any palaeontology found and the preservation of human remains through the relocation to cemeteries as requested by the next-of-kin.

Table 12: Residual impact on heritage resources

Rated By:		Site B						
IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
RESIDUAL IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **AFTER MITIGATION**	Negative	**Probable**	2 LOW	1 ISO	5 PERM	5 OCCUR	**-2.9** **MODL**

The residual impact heritage resources beyond the closure phase of the project will be reduced through mitigation measures but not to within baseline conditions. After mitigation the impacts to heritage resources will **probably** be of a LOW negative significance, affecting the *isolated sites*. The impact *is going to happen* and will be permanent. The impact risk class is thus **Moderate Low**.

4.6 Impact Matrix and site rating

The impacts identified and discussed above have been rated according to the impact assessment methodology described in **Appendix E**. These ratings are provided in the matrix presented in below.

Table 13: Rated Impacts on heritage resources during construction – Site A

Rated By:		Site A						
IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
STATUS QUO	INITIAL BASELINE IMPACTS TO ENVIRONMENT	Negative	**Definite**	1 VLOW	1 ISO	1 INCID	3 LIKE	**-0.7** **VLOW**
Project Impact 1	Cemeteries	Negative	**Definite**	5 HIGH	1 ISO	5 PERM	5 OCCUR	**-4.1** **HIGH**
Project Impact 2	Palaeontology	Negative	**Definite**	5 HIGH	1 ISO	5 PERM	4 VLIKE	**-3.2** **MODH**
CUMULATIVE IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **BEFORE MITIGATION**	Negative	**Definite**	6 VHIGH	1 ISO	5 PERM	5 OCCUR	**-4.4** **HIGH**
RESIDUAL IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **AFTER MITIGATION**	Negative	**Probable**	2 LOW	1 ISO	5 PERM	5 OCCUR	**-2.9** **MODL**

Table 14: Rated Impacts on heritage resources during construction – Site B

Rated By:		Site B						
IMPACT DESCRIPTION		Direction of Impact	**Degree of Certainty**	Magnitude	Spatial	Temporal	Probability	**Impact Risk**
Code	*Phase*							
	CONSTRUCTION							
STATUS QUO	INITIAL BASELINE IMPACTS TO ENVIRONMENT	Negative	**Definite**	1 VLOW	1 ISO	1 INCID	3 LIKE	**-0.7** **VLOW**
Project Impact 1	Cemeteries	Negative	**Definite**	5 HIGH	1 ISO	5 PERM	5 OCCUR	**-4.1** **HIGH**
Project Impact 2	Palaeontology	Negative	**Definite**	5 HIGH	1 ISO	5 PERM	4 VLIKE	**-3.2** **MODH**
Project Impact 3	Historical Structures	Negative	**Definite**	1 VLOW	1 ISO	5 PERM	4 VLIKE	**-2.1** **MODL**
CUMULATIVE IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **BEFORE MITIGATION**	Negative	**Definite**	6 VHIGH	1 ISO	5 PERM	5 OCCUR	**-4.4** **HIGH**
RESIDUAL IMPACT	INITIAL IMPACTS TO ENVIRONMENT + ADDITIONAL IMPACTS FROM PROJECT, **AFTER MITIGATION**	Negative	**Probable**	2 LOW	1 ISO	5 PERM	5 OCCUR	**-2.9** **MODL**

4.6.1 Site ranking

Evaluating the impacts and extent of impacts on heritage resources, it has been found that **Site A** will have a lower cumulative impact as the extent of mitigation will be less than required on **Site B**. **Site A** will require the relocation of 47 graves in comparison with the 40 identified at **Site B**, however the extent of palaeontological mitigation and mitigation to historical structures will require a larger monitary input. Thus **Site A** will be the preferred site from a heritage perspective.

5 ENVIRONMENTAL MANAGEMENT PLAN

Table 15*: Environmental Management Plan for management of heritage resources: Site A*

Management / Environmental Component:	**EMPr Reference Code:**		
Heritage Resources			
Primary Objective:			
Minimise impacts on heritage resources through timeous mitigation measures			
Implementation	**Responsibility**	**Resources**	**Monitoring / Reporting**
1. Develop heritage training section to include in induction program for employees during construction	Environmental manager	Appointed heritage specialist	
2. Demarcate cemeteries with 20 meter buffer during construction, until relocated	Environmental manager	ECO	Weekly
3. Grave relocation of sites **A1, A4, A5 and A6 (REFER TO Section 6.2.2 for general guidelines)**	Environmental manager	Appointed grave relocation specialist	Implement at earliest availability
4. Palaeontological management	Environmental manager	Appointed Palaeontologist	Monitor during deep excavations
a) A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.			
b) Palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.			
c) The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.			
d) Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs			

Table 16*: Environmental Management Plan for management of heritage resources: Site B*

Management / Environmental Component:	**EMPr Reference Code:**		
Heritage Resources			
Primary Objective:			
Minimise impacts on heritage resources through timeous mitigation measures			
Implementation	**Responsibility**	**Resources**	**Monitoring / Reporting**
1. Develop heritage training section to include in induction program for employees during construction	Environmental manager	Appointed heritage specialist	
2. Demarcate cemeteries with 20 meter buffer during construction, until relocated	Environmental manager	ECO	Weekly
3. Grave relocation of sites **B1, B2, B3, B7, and B12** 4. **(REFER TO Section 6.2.2 for general guidelines)**	Environmental manager	Appointed grave relocation specialist	Implement at earliest availability
5. Palaeontological management	Environmental manager	Appointed Palaeontologist	Monitor during deep excavations
a) A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.			
b) Palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.			
c) The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.			
d) Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs			
5. Historical Structures: demarcate sites B4, B5, B6, B10, B11 and evaluated by a conservation architect or architectural historian to determine the significance and make further recommendations.	Environmental manager	Appointed heritage specialist	

6 HERITAGE MANAGEMENT GUIDELINES

6.1 General Management Guidelines

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-

(a) the construction of a road, wall, transmission line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

  (i) exceeding 5 000 m^2 in extent; or

  (ii) involving three or more existing erven or subdivisions thereof; or

  (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

  (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the SAHRA needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.

2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner, preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).

This survey and evaluation must include:

(a) The identification and mapping of all heritage resources in the area affected;

(b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Heritage Resources Act;

(c) An assessment of the impact of the development on such heritage resources;

(d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:

   a. Heritage;

   b. Graves;

   c. Archaeological finds; and

   d. Historical Structures.

   This module must be tailor made to include all possible finds that could be expected in that area of construction.

4. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.

5. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.

6. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.

7. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.

8. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.

9. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.

10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

The definition of an archaeological/palaeontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, in the inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

The purpose of an archaeological/palaeontological monitoring programme is:

- To allow, within the resources available, the preservation by recording of archaeological/palaeontological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/palaeontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring programme is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring programme is to establish and make available information about the archaeological resource existing on a site.

PGS can be contacted on the way forward in this regard.

Table 17: Roles and responsibilities of archaeological and heritage management

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should attend all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology support team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology support team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into the employee induction course).	The client	Environmental Consultancy and the Archaeologist,
If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

6.2 All phases of the project

6.2.1 Archaeology

Based on the findings of the HIA, all stakeholders and key personnel should undergo an archaeological induction course during this phase. Induction courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions. Two courses should be organised – one aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This needs to be supervised by a qualified archaeologist. This course should be reinforced by posters reminding operators of the possibility of finding archaeological/palaeontological sites.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small scale infrastructure development associated with the project/operations.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to during the subsequent history of the project. In general these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction/operational phase, it is important to recognize any significant material being unearthed, and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to attend relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development on a recurrent basis, with more frequent visits to the actual workface and operational areas.

In addition, feedback reports can be submitted by the archaeologist to the client and SAHRA to ensure effective monitoring. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/palaeontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/palaeontological monitoring programme.

6.2.2 Graves

In the case where a grave is identified during construction the following measures must be taken:

- Upon the accidental discovery of graves, a buffer of at least 20 meters should be implemented.
- If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a rescue permit must be applied for with SAHRA and the local South African Police Services must be notified of the find.
- Where it is then recommended that the graves be relocated, a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
ii. Site notices indicating the intent of the relocation;
iii. Newspaper notices indicating the intent of the relocation;
iv. A permit from the local authority;
v. A permit from the Provincial Department of Health;
vi. A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
vii. An exhumation process that keeps the dignity of the remains intact;

viii. The whole process must be done by a reputable company that is well versed in relocations;

ix. The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

6.2.3 Heritage Structures

- No further mitigation is required for the destruction of most of the architectural structures identified (especially those where only the remains of walls and/or foundations survive).
- For the sites where homestead remains were identified, the possibility of finding still born burials exists and any such burials uncovered should be included in the grave relocation process.
- The structures at sites B5 and B10 will require an application for a demolition permit and this will usually require the documentation of these structures.

7 CONCLUSIONS AND RECOMMENDATIONS

Utilising the archival study completed for the HIA as a guide, the field work identified a total of 2 heritage structures and 4 cemeteries on Site A and 6 heritage structures and 5 cemeteries on Site B. The palaeontological research for the project has also identified palaeontological sensitive areas within the ashing facility foot print on both Site A and Site B that will require further monitoring.

Evaluating the impacts and extent of impacts on heritage resources, it has been found that **Site A** will have a lower cumulative impact as the extent of mitigation will be less than required on **Site B**. **Site A** will require the relocation of 47 graves in comparison with the 40 identified at **Site B**, however the extent of palaeontological mitigation and mitigation to historical structures will require a larger monitary input. Thus **Site A** will be the preferred site from a heritage perspective.

The following recommendations with regards to the heritages resources that may be impacted by development on either sites will be required where redesign of the foot print area or realignment of the conveyor alignments are not possible.

7.1.1 Heritage Structures

- No further mitigation required for the destruction of the architectural structures identified.
- For the sites where homestead remains were identified, the possibility of finding still born burials exists and any such burials uncovered should be included in the grave relocation process.
- Demarcate sites B4, B5, B6, B10, B11 and relocate the conveyor alignment.

7.1.2 Cemeteries

For the cemeteries identified in the footprint of the proposed ashing facility, the cemeteries will have to be relocated as their position within the foot print area does not make provision for a redesign to accommodate them.

It is recommended that the graves be relocated after a full grave relocation process that includes comprehensive social consultation. The grave relocation process must include:

- A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, which will be at least 60 days in length;
- Site notices indicating the intent of the relocation;
- Newspaper Notice indicating the intent of the relocation;
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- The whole process must be done by a reputable company that is well versed in relocations;
- The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.

7.1.3 Palaeontology

If the excavations uncover the Vryheid Formation bedrock:

- A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.
- A palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.
- The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.
- Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs.

Further to these recommendations the general Heritage Management Guidelines in Section 6 need to be incorporated into the EMP for the project.

8 REFERENCES

Bergh, J.S. (ed.). 1999: Geskiedenis Atlas van Suid-Afrika: Die Vier Noordelike Provinsies. J.L. van Schaik. Pretoria.

Delius P (ed), 2006, Mpumalanga – Reclaiming the Past, Defining the Future

De Jong RC, 2010. Heritage Impact Assessment Report: Proposed Colliery On Portions 3 And 23 Of The Farm Welgelegen 221 Ir Near Delmas, Mpumalanga. Cultmatrix

Falconer, K.W. 1990. Spotlight on 100 Years of Coal Mining in Witbank in Journal of the South African Institute of Mining and Metallurgy, April 1990.

Fourie, W. (2008). Archaeological Impact Assessments within South African Legislation. South African Archaeological Bulletin, 63(187), 77-85.

Bonner, P., 2002. Kings, Commoners and Concessionaires: The Evolution and Dissolution of the Nineteenth-Century Swazi State. s.l.:Cambridge University Press.

Camp, T. A. S., 2012. THE CONSERVATION HISTORY OF THE FORMER EASTERN TRANSVAAL REGION. [Online]

Available at: http://www.tangala.co.za/history.php

Huffman, T., 2007. Handbook to the Iron Age of Pre-Colonial Farming Societies in South Africa. s.l.:University of KwaZulu-Natal Press.

Klein, R. G., 1977. The Mammalian Fauna from the Middle and Later Stone Age (Later Pleistocene) Levels ofBorder Cave, Natal Province, South Africa. The South African Archaeological Bulletin,, pp. 14-27.

Knight, I., 1998. Great Zulu Battles 1838 – 1906. Arms and Amour.

Laband , J. & Thompson, P., 2000. The Illustrated Guide to the Anglo-Zulu War. Pietermaritzburg: University of Natal Press..

Omer-Cooper, J., 1993. Has the Imfecane a Future? A Response to the Cobbing Critique. Journal of Southern African Studies, pp. 273-294.

Vinnicombe, P., 1976. People of the Eland: Rock Paintings of the Drakensberg Bushmen a Reflection of their Life and Thoughts. s.l.:University of Natal Press.

Vuuren, L. v., 2009. Pongolapoort Dam - development steeped in controversy. The Water Wheel , May/Jun.

Wadley, L., 2005. A Typological Study of the Final Middle Stone Age Tools from Sibudu Cave, KwaZulu-Natal. The South African Archaeological Bulletin, pp. 51-63.

Wells, H. B. S. C. B. D. M. L. H., 1945. Fossil Man in the Lebombo Mountains, South Africa: The 'Border Cave,' Ingwavuma District, Zululand. Man, Volume 45, pp. 6-13.

Wright, J., 1991. A. T Bryant & the Wars of Shaka. History in Africa, pp. 409-425.

Van Schalkwyk, J. a. September 2006. Heritage Impact Scoping Assessment For The Proposed New Largo Mining Development, Witbank Area, Mpumalanga. National Cultural History Museum

Van Schalkwyk, J. b. October 2006. Heritage Impact Assessment For The Proposed New Power Station, Witbank Area. National Cultural History Museum

Internet

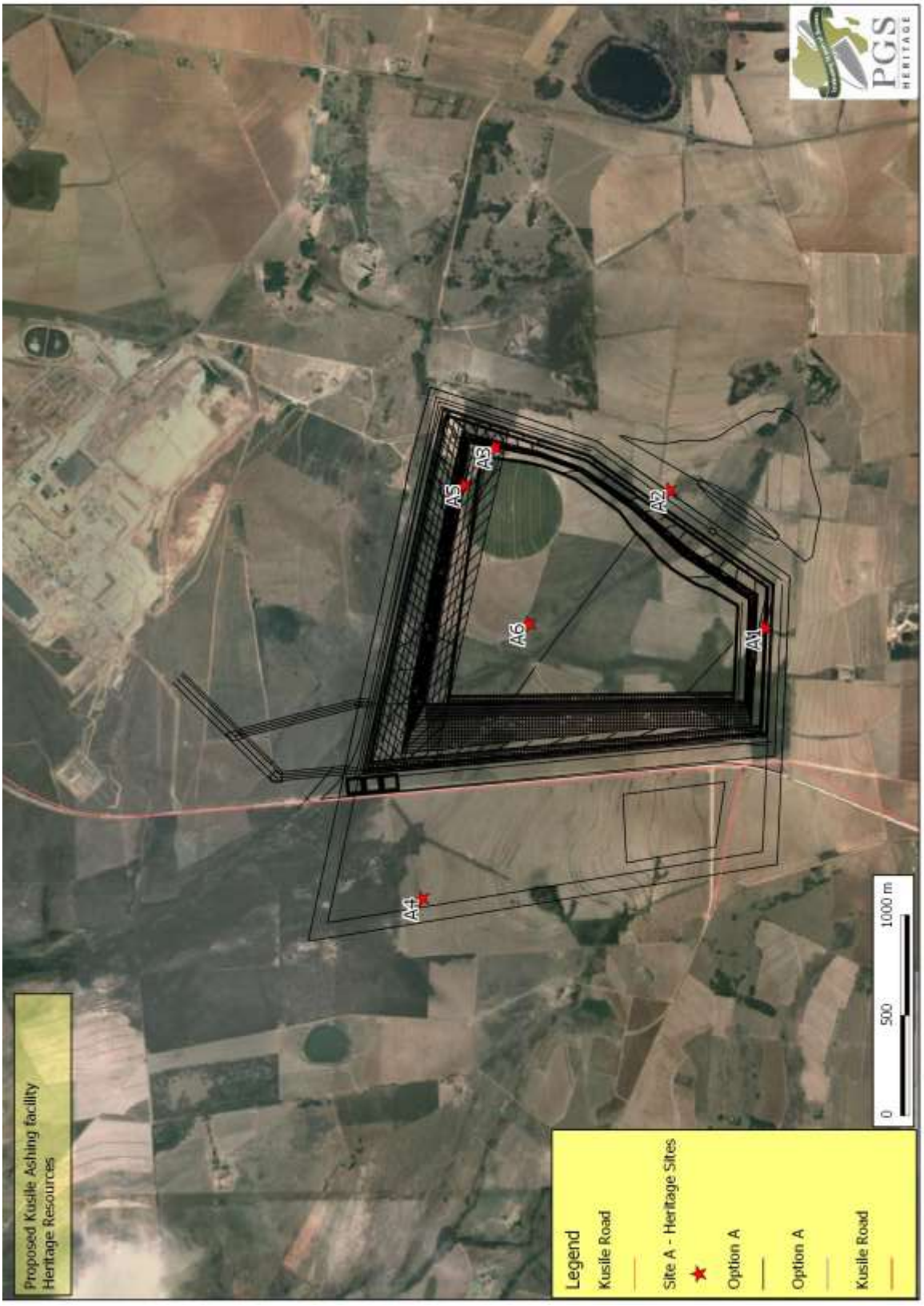
http://global.britannica.com/EBchecked/topic/646020/Witbank

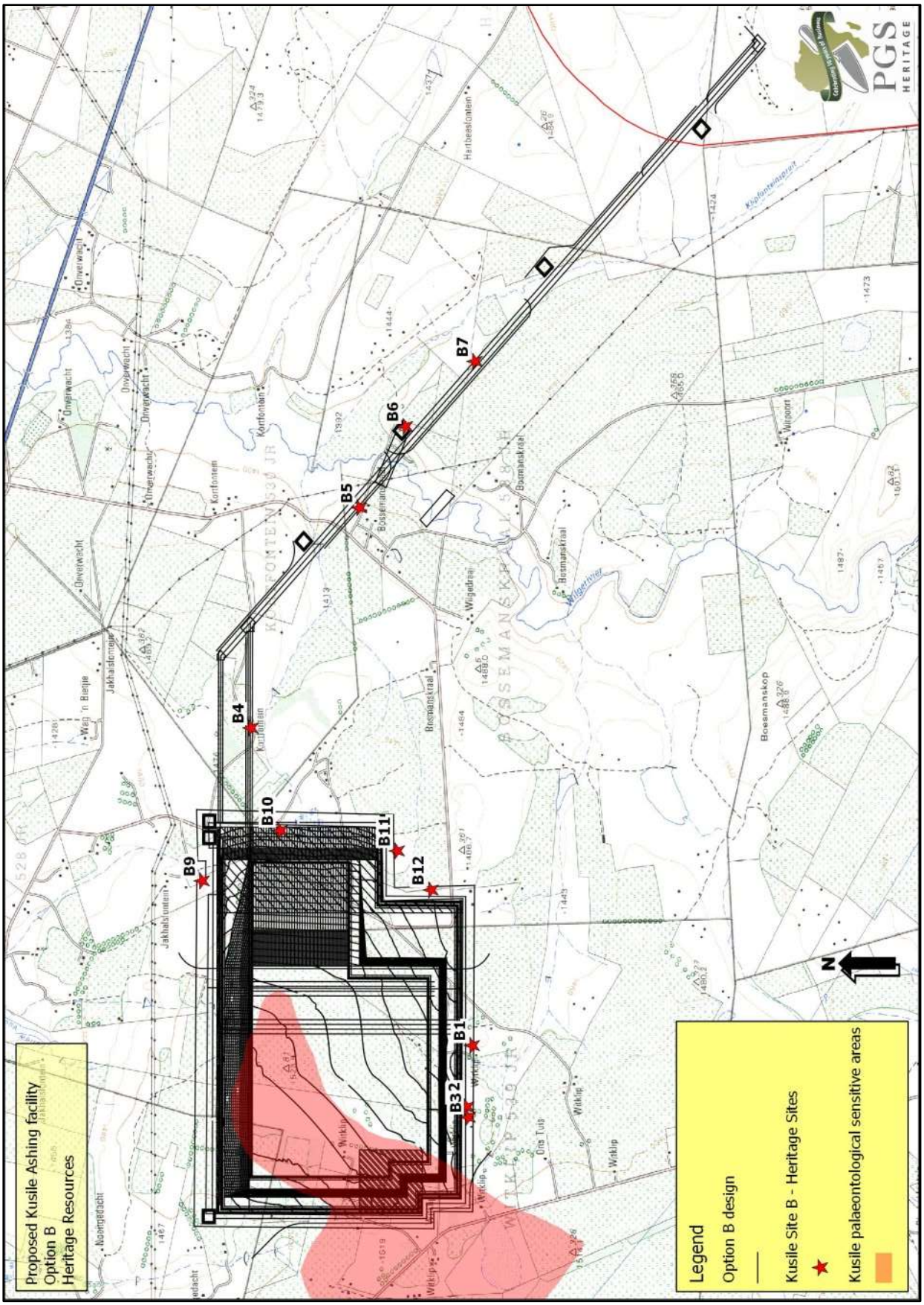
http://www2.lib.uct.ac.za/mss/bccd/Histories/Balmoral/

UCT database of British Concentration Camps of the South African War 1900-1902

Appendix A

HERITAGE RESOURCES MAP




Proposed Kusile Ashing facility
Option B
Heritage Resources
Legend
Option B design
Kusile Site B - Heritage Sites
Kusile palaeontological sensitive areas
N
B1
B4
B5
B6
B7
B9
B10
B11
B12
B32
PGS
HERITAGE

Appendix B

PALAEONTOLOGICAL IMPACT ASSESSMENT DESKTOP REPORT

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED CONSTRUCTION OF AN ASH DISPOSAL FACILITY NEAR KUSILE POWER STATION, GAUTENG & MPUMALANGA PROVINCES

FOR

HIA CONSULTANTS

DATE: 22 JANUARY 2013

By

MMGES
Metsi Metseng Geological & Environmental Services

Suite 91
Private Bag X62
Bethlehem 9700
info@mmges.co.za
Fax 086 743 6864
+27 82 070 0735
+27 82 829 4978
www.mmges.co.za
VAT 4260183498
Reg 1999/30444/23

EXECUTIVE SUMMARY

Metsi-Metseng Geological and Environmental Services CC was appointed by PSG Heritage and Grave Relocation Consultants to undertake a desktop survey, assessing the potential palaeontology impact of the proposed construction of an ash disposal site for the Kusile power station. Five alternative sites were identified for the proposed development. The sites are situated on the boundary of the Gauteng and Mpumalanga Provinces with sites located in either one of the provinces or stretching over the boundary.

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.

The proposed area to be used as an ash disposal site is situated between the towns of Bronkhorstspruit, Witbank and Ogies on the border of the Gauteng and Mpumalanga Provinces close to the N4 Highway.

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2528 Pretoria) 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 area earmarked for the development of the ash disposal site has a variety of underlying geology, ranging from Vaalian aged rocks consisting of the Daspoort, Silverton and Magaliesberg Formations of the Pretoria Group to Permian aged rocks of the Dwyka Formation of the Karoo Supergroup and the Vryheid Formation of the Ecca Group of the Karoo Supergroup. Diabase occurs across the site as large sills.

There is a high possibility that fossils could be encountered during excavation of the Vryheid Formation. These fossil finds would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be 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 be a beneficial palaeontological impact.

It is therefore recommended that:

1. **For sites A, B and G,** if the excavations uncover the Vryheid Formation bedrock:
    - 1.1. A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.
    - 1.2. A palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.
    - 1.3. The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.
    - 1.4. Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs
2. **For sites C and F** no Palaeontological impact is foreseen.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1. Background

Metsi-Metseng Geological and Environmental Services CC was appointed by PSG Heritage and Grave Relocation Consultants to undertake a desktop survey, assessing the potential palaeontology impact of the proposed construction of an ash disposal site for the Kusile power station. Five alternative sites were identified for the proposed development. The sites are situated on the boundary of the Gauteng and Mpumalanga Provinces with sites located in either one of the provinces or stretching over the boundary. The locality of each site with reference to farm name, province, district municipality and local municipality is listed below.

- Site A: Farms Klipfontein 566 and Dwaalfontein 565, Mpumalanga Province, Nkangala District Municipality, Delmas Local Municipality.
- Site B: Farm Witklip 539, Gauteng Province, Metsweding District Municipality, Kungwini Local Municipality
- Site C: Farms Spitskop 533 and Onverwacht 532, Gauteng & Mpumalanga Provinces, Metsweding and Nkangala District Municipalities, Kungwini and Delmas Local Municipalities
- Site F: Farms Dwaalfontein 565 and Witpoort 563, Gauteng and Mpumalanga Provinces, Metsweding and Nkangala District Municipalities, Kungwini and Delmas Local Municipalities
- Site G: Farms Klipfontein 566, Nooitgedacht 564 and Dwaalfontein 565, Gauteng and Mpumalanga Provinces, Metsweding and Nkangala District Municipalities, Kungwini and Delmas Local Municipalities.

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.

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 identifying exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assessing the level of palaeontological significance of these formations;
- to commenting on the impact of the development on these exposed and/or potential fossil resources and

- to making 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 and Google Earth imagery. 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 there is likely to be a negligible impact on the fossil heritage. 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

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

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 are also 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 and 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 proposed area to be used as an ash disposal site is situated between the towns of Bronkhorstspruit, Witbank and Ogies on the border of the Gauteng and Mpumalanga Provinces close to the N4 Highway (Figure 2.1).

Figure 2.1 Locality of the proposed ash dump site alternatives

3. GEOLOGY OF THE AREA

The area earmarked for the development of the ash dump site has a variety of underlying geology, ranging from Vaalian aged rocks consisting of the Daspoort, Silverton and Magaliesberg Formations of the Pretoria Group to Permian aged rocks of the Dwyka Formation of the Karoo Supergroup and the Vryheid Formation of the Ecca Group of the Karoo Supergroup. Diabase occurs across the site as large sills (Figure 3.1).

3.1. Daspoort Formation (Vdq)

The Daspoort Formation consists of mature quartz arenites, subordinate mudrocks and ironstones in the east of the basin. Elsewhere it predominantly comprises sandstones, pebbly arenites, conglomerates and mudrocks (Johnson et al. 2006).

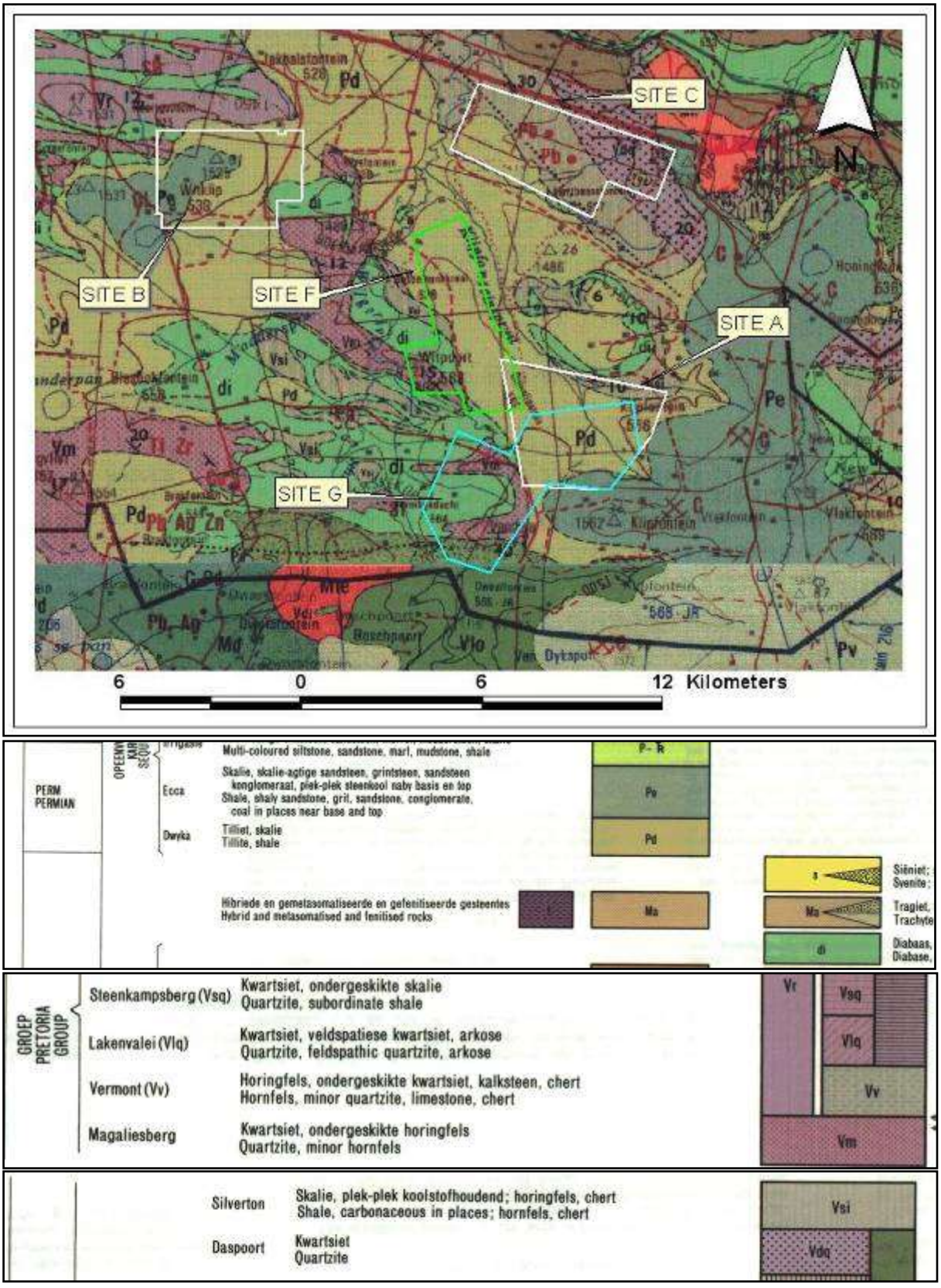


Figure 3.1 Geology of the Study Area (Geo Maps 2528 Pretoria)

3.2. Silverton Formation (Vsi)

The Silverton Formation mainly consists of high-alumina shales. The shales of the Lydenburg Member is also rich in carbonate.

3.3. Magaliesberg Formation (Vm)

The Magaliesberg Formation is generally interpreted as a shallow-marine sandstone, but more recent studies suggest that these sandstones represent a regressive shoreline with a combination of braid-deltas and high-energy tidal channels (Johnson et al. 2006).

3.4. Diabase (di)

Diabase is a very hard igneous rock which has the same properties and composition as Jurassic aged Dolerite. The Diabase on site occurs in the form of sills which can be a few to several tens of meters thick.

3.5. Dwyka Formation (Pd)

The Dwyka Formation is represented by a coarse diamictites, sandstones and mudstones.

3.6. Vryheid Formation (Pe/Pv)

The Vryheid Formation of the Ecca Group of the Karoo Supergroup consists of inter-bedded grey to black shales, siltstones and sandstones of various thicknesses which were deposited under fluvial deltaic conditions. Thick coal beds are also present throughout the formation.

4. PALAEONTOLOGY OF THE AREA

4.1. Daspoort Formation (Vdq)

Due to the age of this Formation, no fossil material will be found within rocks of the Daspoort Formation.

4.2. Silverton Formation (Vsi)

Due to the age of this Formation no fossil material will be found within rocks of the Silverton Formation.

4.3. Magaliesberg Formation (Vm)

Due to the age of this Formation no fossil material will be found within rocks of the Magaliesberg Formation.

4.4. Diabase (di)

Due to the igneous character of these rocks, no fossil material can be found.

4.5. Dwyka Formation (Pd)

Fossil leaves, wood and trackways have been recorded from the south and northwest but not from the Mpumalanga coal fields (Bamford, 2011).

4.6. Vryheid Formation (Pv)

The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; *Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp., Asterotheca spp., Liknopetalon enigmata, Glossopteris > 20 species, Hirsutum 4 spp., Scutum 4 spp., Ottokaria 3 spp., Estcourtia sp., Arberia 4 spp., Lidgetonnia sp., Noeggerathiopsis sp. and Podocarpidites sp.*

According to Bamford (2011) "Little data have been published on these potentially fossiliferous deposits. Around the coalmines there is most likely to be good material and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites, however, in the interests of heritage and science such sites should be well recorded, sampled and the fossils kept in a suitable institution."

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1985).

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation of Natal. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the north-eastern part of the Karoo basin was marine. In KwaZulu-Natal a shallow basin margin accommodated a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly *Corophioides*) which are assigned to ichnogenus *Diplocraterion* (Mason and Christie, 1985).

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 Geological Units on Site

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Daspoort Formation	Quartz Arenites, subordinate mudrocks and ironstones VAALIAN	None	*None*	None
Silverton Formation	Shales VAALIAN	None	*None*	None
Magaliesberg Formation	Marine sandstone	None	*None*	None
Diabase	Diabase VAALIAN - MOGOLIAN	None	*None*	None
Dwyka Formation	Diamictite EARLY PERMIAN	*Dwykea goedhopensis* *Palaeovittaria sp.* *Ottokaria buriadica* *Glossopteris sp.* Fish scales and tracks	*None*	Low
Vryheid Formation	Grey to black mudstone & sandstone PERMIAN	Abundant plant fossils of *Glossopteris* and other plants trace fossils	*None*	High sensitivity

	Low Sensitivity		Moderate Sensitivity		High Sensitivity

Figure 5.1 Palaeontological Sensitivity Localities

6. CONCLUSION AND RECOMMENDATIONS

The study area is mainly underlain by Vaalian aged rocks of the Daspoort, Silverton and Magalieberg Formations of the Pretoria Group and Permian aged sedimentary rocks of the Dwyka Formation and Vryheid Formation of the Ecca Group which forms part of the Karoo Supergroup. Diabase occurs across the site in the form of Diabase sills.

There is a high possibility that fossils could be encountered during excavation of the Vryheid Formation. These fossil finds would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be 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 be a beneficial palaeontological impact.

It is therefore recommended that:

1. **For sites A, B and G,** if the excavations uncover the Vryheid Formation bedrock:
    - 1.1. A Palaeontologist is appointed as part of the Environmental Construction Team for identified high palaeontological sensitive areas.
    - 1.2. A palaeontological rescue and/or destruction permit is obtained by the Palaeontologist.
    - 1.3. The Palaeontologist accompanies the surveyor and foundation teams during the initial excavation phases to rescue any fossil bearing material from the construction footprint.
    - 1.4. Compile a Phase 2 report to the Heritage Authority responsible after palaeontological construction inputs
2. **For sites C and F** no Palaeontological impact is foreseen.

7. REFERENCES

Bamford M 2011. Desktop study Palaeontology Ermelo to Empangeni – Eskom powerline. Internal report BPI Palaeontology, WITS University.

Groenewald GH 1996. Stratigraphy and Sedimentology of the Tarkastad Subgroup, Karoo Supergroup, South Africa. Unpubl PhD Thesis, University of Port Elizabeth.

Johnson MR, Anhaeusser CR and Thomas RJ (Eds) 2006. The Geology of South Africa. GSSA, Council for Geoscience, Pretoria.

Mason TR and Christie ADM 1985. Palaeoevironmental significance of ichnogenus *Diplocraterion* torell from the Permian Vryheid Formation of the Karoo Supergroup, South Africa. ScienceDirect - Palaeogeography, Palaeoclimatology, Palaeoecology : Palaeoevironment.

Rubidge BS (ed) 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup), South Africa. South African Committee for Stratigraphy.

8. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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).

9. 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.

Dr Gideon Groenewald
Geologist

Appendix D

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 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 new 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 are 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 interest in the graves: they may be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle will 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 E

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 Kusile ash Disposal Facility 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 consists 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 was 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 involved 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 was 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 18: 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

IMPACT ASSESSMENT METHODOLOGY

1 APPROACH TO ASSESSING IMPACTS:

- Impacts are assessed separately for the **construction**, **operational**, **closure**, and post-closure phases of the project;
- Impacts are described according to the ***Status Quo***, ***Project Impact***, ***Cumulative Impact***, ***Mitigation Measures*** and ***Residual Impact*** as follows:
  - The Status Quo assesses the existing impact on the receiving environment. The existing impact may be from a similar activity, e.g. an existing ash dump, or other activities e.g. mining or agriculture.
  - The project impact assesses the potential impact of the proposed development on an environmental element;
  - The cumulative impact on an environmental element is the description of the project impact combined with the initial status quo impacts that occur;
  - Mitigation measures that could reduce the impact risk are then prescribed; and
  - The residual impact describes the cumulative impact after the implementation of mitigation measures.
- Impacts are rated against a predetermined set of criteria including (magnitude, duration, spatial scale, probability, and direction of impact);
- A rating matrix is provided for each environmental element per project phase summarising all the aforementioned in a single table.

More detailed description of each of the assessment criteria and any abbreviations used in the rating matrix is given in the following sections.

1.1 Magnitude / Significance Assessment

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1000 km^2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 19 below.

Table 19: Description of the significance rating scale.

Rating			**Description**
Score	**Code**	**Category**	

7	SEV	SEVERE	Impact most substantive, no mitigation possible
6	VHIGH	VERY HIGH	Impact substantive, mitigation difficult/expensive
5	HIGH	HIGH	Impact substantive, mitigation possible and easier to implement
4	MODH	MODERATE-HIGH	Impact real, mitigation difficult/expensive
3	MODL	MODERATE-LOW	Impact real, mitigation easy, cost-effective and/or quick to implement
2	LOW	LOW	Impact negligible, with mitigation
1	VLOW	VERY LOW	Impact negligible, no mitigation required
0	NO	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

1.2 Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table** 20**.**

Table 20: Description of the spatial rating scale.

Rating			**Description**
Score	**Code**	**Category**	
7	NAT	*National*	The maximum extent of any impact.
6	PRO	*Provincial*	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a provincial scale
5	DIS	*District*	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a district scale
4	LOC	*Local*	The impact will affect an area up to 5 km from the proposed route corridor.
3	ADJ	*Adjacent*	The impact will affect the development footprint and 500 m buffer around development footprint
2	DEV	*Development footprint*	Impact occurring within the development footprint
1	ISO	*Isolated Sites*	The impact will affect an area no bigger than the servitude.

1.3 Duration / Temporal Scale

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in Table 21.

Table 21: Description of the temporal rating scale.

Rating			Description
Score	Code	Category	
5	PERM	Permanent	The environmental impact will be permanent.
4	LONG	Long term	The environmental impact identified will operate beyond the life of operation.
3	MED	Medium term	The environmental impact identified will operate for the duration of life of the line.
2	SHORT	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
1	INCID	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.

1.4 Degree of Probability

The probability or likelihood of an impact occurring will be described as shown in **Table 22** below.

Table 22: Description of the degree of probability of an impact accruing

Score	Code	Category
5	OCCUR	*It's going to happen / has occurred*
4	VLIKE	*Very Likely*
3	LIKE	*Could happen*
2	UNLIKE	*Unlikely*
1	IMPOS	*Practically impossible*

1.5 Degree of Certainty

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used as discussed in Table 23 below. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 23: Description of the degree of certainty rating scale

Rating	Description
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

1.6 Impact Risk Calculation

To allow for impacts to be described in a quantitative manner in addition to the qualitative description, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

$$Impact\ Risk = \frac{\text{Significance} + \text{Spatial} + \text{Temporal}}{2.714} \times \frac{\text{Probability}}{5}$$

An example of how this rating scale is applied is shown below inTable 24:

Table 24: Example of rating scale

Impact	Magnitude	Spatial scale	Temporal scale	Probability	Rating
Greenhouse gas emissions	2	*3*	3	3	1.8
	LOW	*Local*	Medium Term	*Could Happen*	**LOW**

***Note**: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 2.714 to give a criteria rating of 2,95. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,95 is then multiplied by the probability rating (0,6) to give the final rating of 1,8, which is rounded to the first decimal.*

The impact risk is classified according to 5 classes as described in

Table 25 below.

Table 25: Impact Risk Classes

Rating	Impact class	Description
6.1 - 7.0	**7**	**SEVERE**
5.1 - 6.0	**6**	**VERY HIGH**
4.1 - 5.0	**5**	**HIGH**
3.1 - 4.0	**4**	**MODERATE-HIGH**
2.1 - 3.0	**3**	**MODERATE-LOW**
1.1 - 2.0	**2**	**LOW**
0.1 - 1.0	**1**	**VERY LOW**

Therefore with reference to the example used for greenhouse gas emissions above, an impact rating of 1.8 will fall in the Impact Class 2, which will be considered to be a Low impact.

1.7 Notation of Impacts

In order to make the report easier to read the following notation format is used to highlight the various components of the assessment:

- Significance or magnitude- IN CAPITALS
- Spatial Scale – *in italics*
- Duration – in underline
- Probability – *in italics and underlined.*
- Degree of certainty - **in bold**