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**HERITAGE**  

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**Zitholele Consulting**

**KENDAL POWER STATION 30-YEAR ASH DISPOSAL FACILITY**

**Nkangala District Municipality, Mpumalanga**

**Heritage Impact Assessment**

**Issue Date:** 21 June 2016

**Revision No.:** 3

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***Declaration of Independence***

PGS Heritage (Pty) Ltd  
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 (Pty) Ltd 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.*

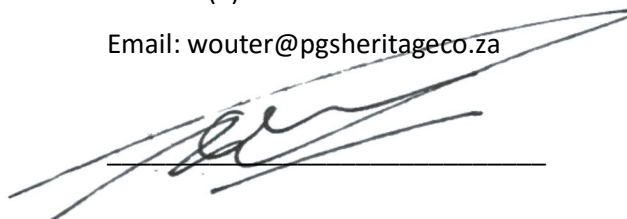
### **General declaration:**

- *I act as the independent specialist in this application;*
- *I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;*
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- *I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;*
- *I will comply with the Act, Regulations and all other applicable legislation;*
- *I have no, and will not engage in, conflicting interests in the undertaking of the activity;*
- *I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;*
- *all the particulars furnished by me in this form are true and correct; and*
- *I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.*

**HERITAGE CONSULTANT:** PGS Heritage

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

**SIGNATURE:**



A handwritten signature in black ink, appearing to be 'Wouter Fourie', is written over a horizontal line. The signature is stylized and somewhat cursive.

**CLIENT:** Zitholele Consulting (Pty) Ltd

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

**SIGNATURE:** \_\_\_\_\_

<b>Report Title</b>	<i>Proposed Construction of a 30 year ash disposal facility for the Kendal Power Station, Mpumalanga and Gauteng Provinces –Baseline Information Report: Heritage</i>		
<b>Control</b>	<b>Name</b>	<b>Signature</b>	<b>Designation</b>
<b>Author</b>	W Fourie		<b>Principal Investigator</b>
<b>Zitholele</b>	T Oosthuizen		

## 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 30-year ash disposal Facility associated with the Kendal Power Station, Nkangala District Municipality, Mpumalanga.

The process of site selection and identification of a final alternative for the construction of the proposed Kendal Ashing Disposal Facility, consisted of the evaluation of four original site alternatives (Site B, C, F and H). The heritage study along with the various other environmental sub-disciplines provided input in the final site selection and design of May 2016.

By combining the various studies as well as the recommendations from the engineering team, Site H was selected as the preferred site, with two alternatives being provided for final analysis in the impact assessment phase. A final design was provided in May 2016.

The field work on the preferred site (**Site H**) revealed a total of 8 newly discovered heritage sites. The heritage sites consist of 7 cemeteries (**KAD10, KAD16, KAD17, KAD18, KAD19, KAD20 and KAD21**) with approximately 149 graves and a single farmstead (**KAD15**). with some features dating from 1901. All seven cemeteries will be directly impacted by the proposed development and will require the relocation of approximately 149 graves.

The farmstead at **KAD15** will be directly impacted and destroyed.

An assessment of the palaeontological sensitivity of the area has shown that the site is underlain by Permian Vryheid Formation sediments of the Karoo Supergroup that has a Moderate palaeontological sensitivity. No further studies were required but the implementation of the management measures as required in this report will mitigate any possible impacts.

As no impact on heritage resources are foreseen during operation and after closure, the following mitigation measures will need to be implemented before and during construction:

### ***Cemeteries:***

It is recommended that the 7 cemeteries identified for relocation be relocated after a full grave relocation process that includes comprehensive social consultation. The grave relocation process must include:

- a) 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;
- b) Site notices indicating the intent of the relocation;
- c) Newspaper Notice indicating the intent of the relocation;
- d) A permit from the local authority;
- e) A permit from the Provincial Department of Health;
- f) 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;
- g) An exhumation process that keeps the dignity of the remains and family intact;
- h) The whole process must be done by a reputable company that is well versed in relocations;
- i) 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.

### ***Structures***

1. Site **KAD15** (Homestead dating back to 1900) will be demolished and the following measures must be implemented:
  - a. the whole site will have to be completely documented with layout plans of the larger site;
  - b. plans of each structure;
  - c. documentation of the larger landscape of the farmstead;
  - d. each building must also be photographed in detail to document the current state as well as construction techniques and materials.
2. An application for demolition of these can then be submitted in accordance with Section 34 of the NHRA (Act 25 of 1999) to the Mpumalanga Provincial Heritage Authority (M-PHRA).

3. M-PHRA will then issue a permit for the demolition of the site and its structures.

### ***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.

The impact assessment has rated the impact on the graves as HIGH, while the impact of the farmstead and palaeontology is rated as MODERATE. By implementing the proposed management measures the impact clas could be reduced to LOW/MODERATE.

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## **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 30-year Ash Disposal Facility (ADF) associated with the Kendal Power Station, Nkangala District Municipality, and Emalahleni Local 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 four alternative (B, C, F and H) sites.

### **1.2 Specialist Qualifications**

PGS Heritage (PGS) compiled this HIA Report.

The staff at PGS has a combined experience of nearly 70 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 (APHP).

### **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.

#### **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

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. EMPr (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

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 EMPr 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
ADF	Ash disposal facility
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Program
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
MPHRA	Mpumalanga Provincial Heritage Authority
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 2 500 000 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 **Annexure A** for further discussions on heritage management and legislative frameworks

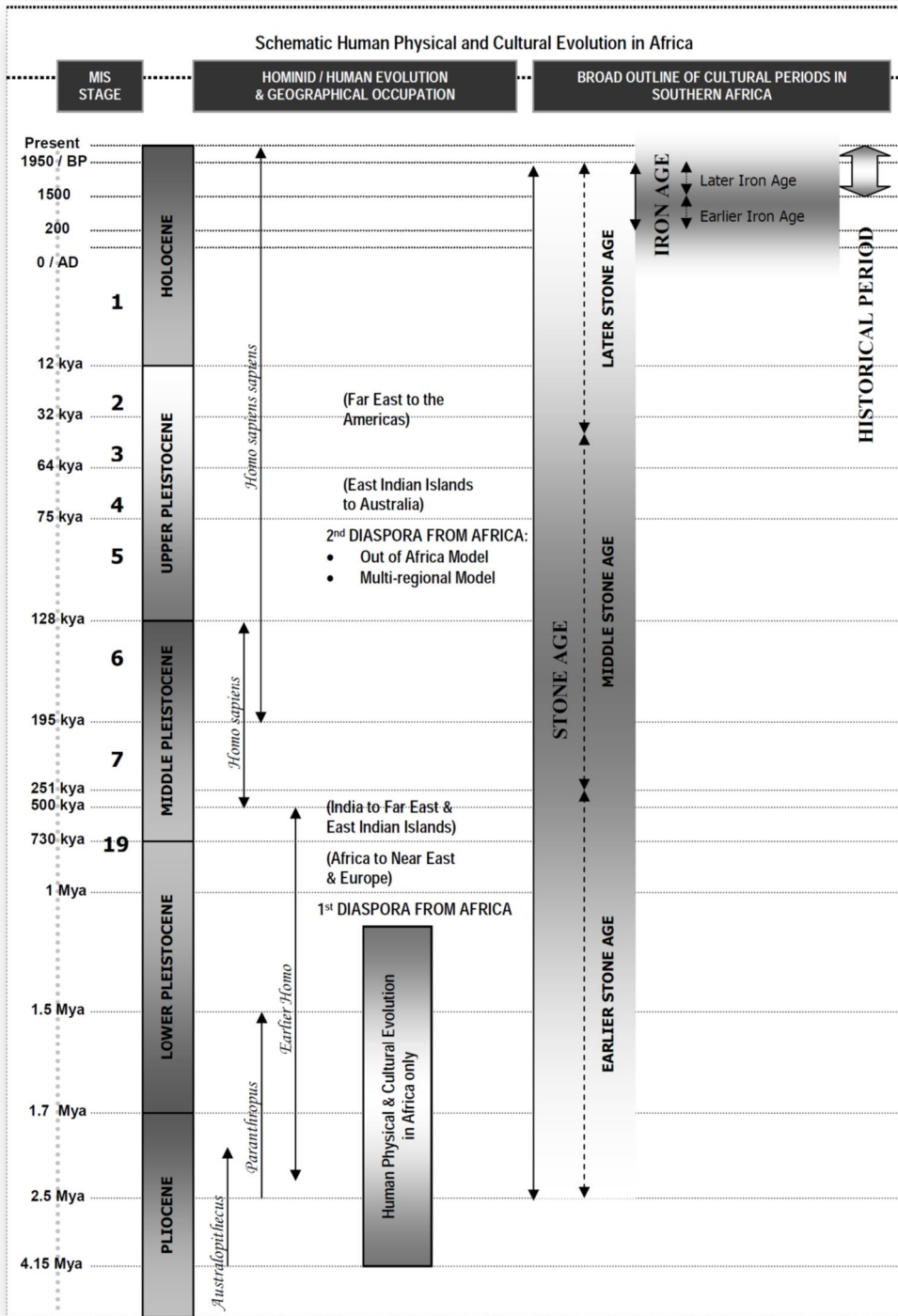


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Site Location and Description

The overall study area (*Figure 2*) consists of four alternative areas (that are located in the general area situated south of the N12, linking the towns of the Benoni and Witbank.

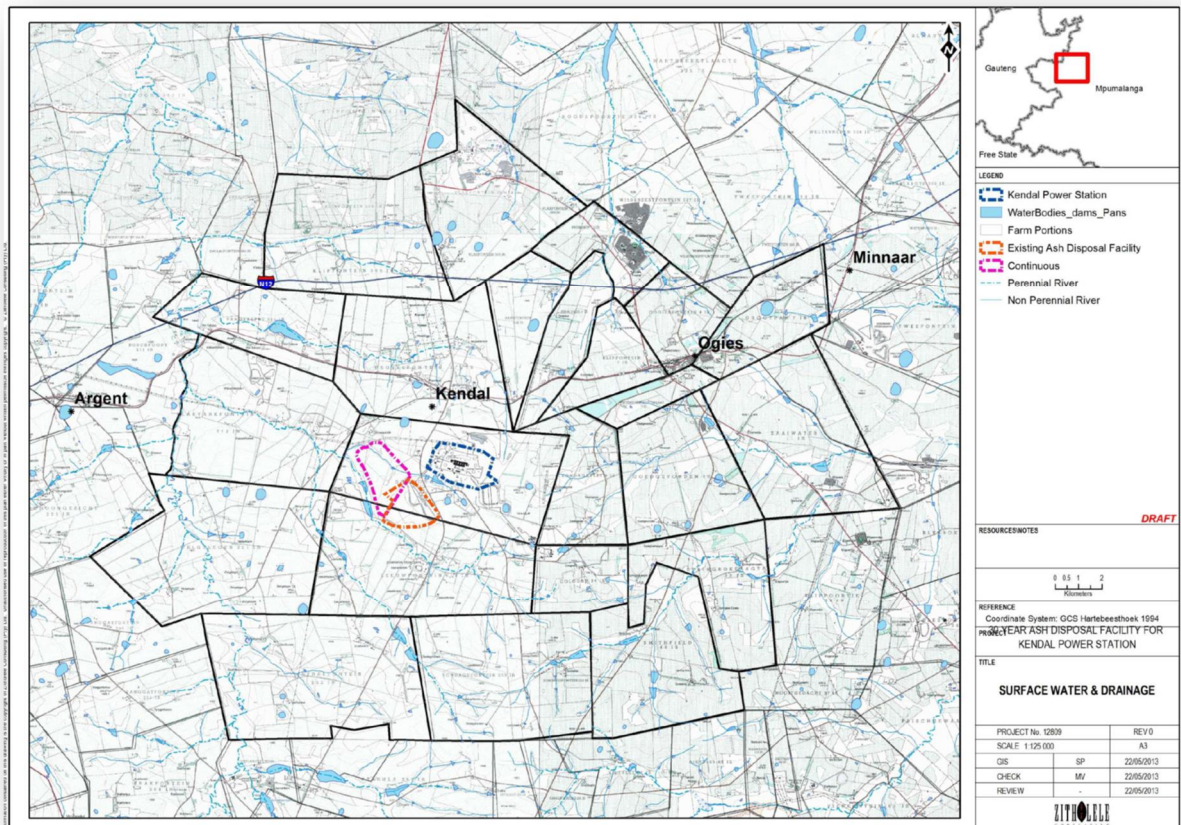


Figure 2 – General Locality Map

### 2.2 Project background

Kendal Power Station was commissioned in the mid 1980's, with a forty (40) year operating life. The initial dry ash disposal site was designed to have a capacity for the operating life with an eight (8) year contingency period. The life of the power station has since been upgraded to sixty (60) years and with some other contributing factors, such as the dry density and the load factor, the initial dry ash dump is now under capacity.

Eskom appointed Zitholele Consulting (Pty) Ltd (Zitholele) to undertake the environmental impact assessment (EIA) to extend the existing Kendal dry ash-dump into the north westerly direction



(This project is known as the Kendal Continuous Project). Zitholele was also responsible for the conceptual engineering design for the options identified on the Kendal Continuous Project and to recommend a preferred option. These engineering designs for this project were used to underpin and inform the EIA.

The total additional capacity required for the Ash Disposal Facility (ADF) is 292.7 Mm<sup>3</sup>, from October 2013 to December 2058. Due to the current boundary and operating machinery limitations this capacity will not be reached on the current ashing site. A suitable site for the remaining ash to be deposited has been identified, hence the Kendal 30 Year Project. The size of this new ADF is dependent on the current site capacity.

**Kendal 30-year ADF Statistics**The following main statistics apply to the proposed Kendal 30-year ADF preferred Site (Site H)):

- Start of construction: Year 2025
- Years of operation: 27
- Volume: 177 Million m<sup>3</sup>
- Footprint: 404.7 ha
- Height: 75 m

Refer to **Annexure B** for a more detail on the project description.

## **2.3 Methodology**

### *2.3.1 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.

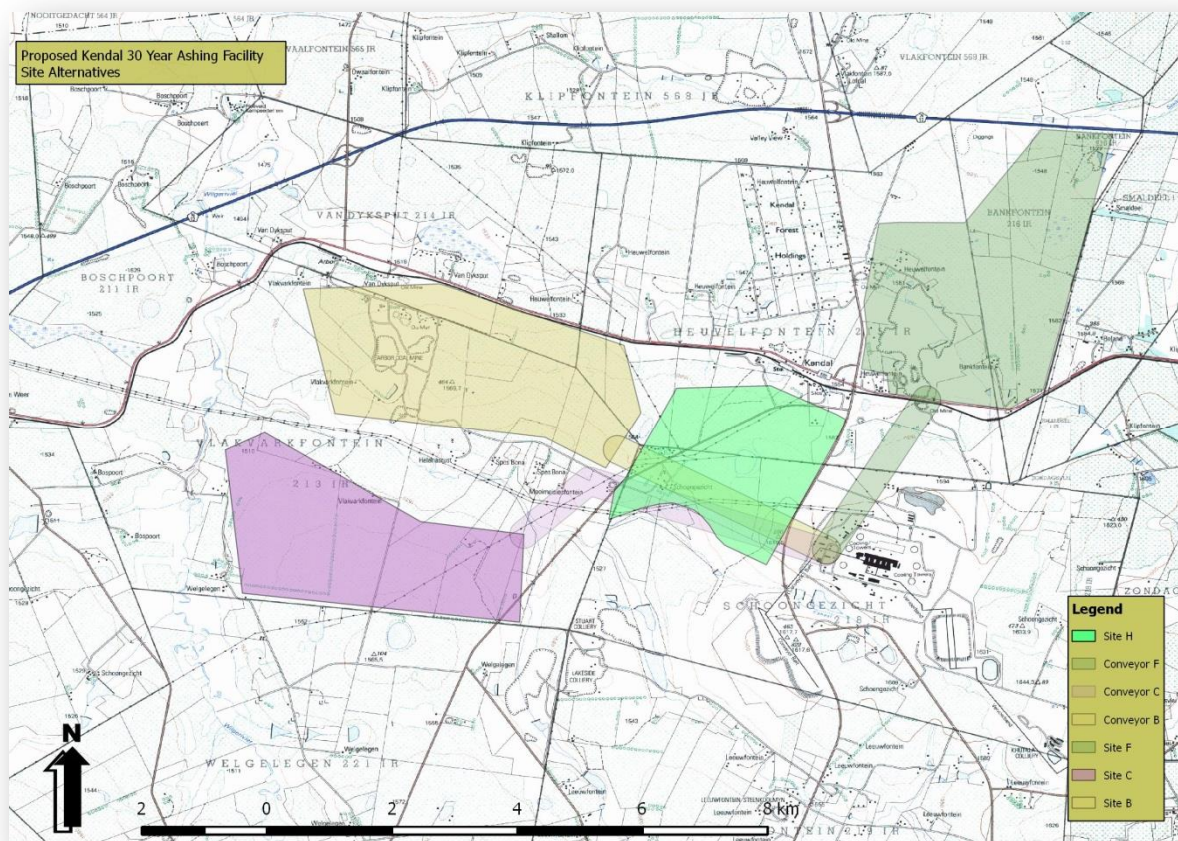


Figure 3 – The original four alternative study areas (Zitholele, 2015)

### 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 around the four alternatives

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The <b>Earlier Stone Age</b> 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 Acheulean and this comprises more refined and better made stone artefacts, such as the cleaver and bifacial hand axe. The Acheulean dates back to approximately 1.5 million years ago. (Fourie, 2008)

<p>250 000 to 40 000 years ago</p>	<p>The <b>Middle Stone Age</b> 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)</p>
<p>40 000 years ago – AD 400</p>	<p>The <b>Later Stone Age</b> 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)</p> <p>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.</p> <p>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)</p>
<p>AD400-AD1100</p>	<p><b>Early Iron Age</b></p> <p>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.</p> <p>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</p>

	<p>have been important for the practice of dry land 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).</p>
AD 1500-AD 1700	<p>While there is some evidence that the EIA 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)..</p>
AD 1700 – AD 1840	<p>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).</p>
AD 1821 – AD 1823	<p>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 (<a href="http://www.mk.org.za">www.mk.org.za</a>).</p> <p>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.</p> <p>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.</p> <p>No iron age sites objects or features have been identified in the study area (Van Schalkwyk 2006)</p>
1836	<p>The first Voortrekker parties crossed over the Vaal River (Bergh, 1999).</p>
1850s – 1860s	<p>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</p>

	<p>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.</p> <p>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.</p>
1872 - 1894	<p>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).</p>
1899 - 1902	<p><b>The Anglo Boer War (1899-1902)</b> took place during this time.</p> <p>After the British occupation of Pretoria on the 5th of June 1900, the subsequent British victories at Diamond Hill and Dalmanutha and the retreat of the republican forces under General Louis Botha toward the eastern boundary of the Zuid-Afrikaansche Republiek (Z.A.R.), the large Boer commandoes started to reform themselves into smaller, more mobile groups. This led to the guerrilla phase of the South African War which largely consisted of hit-and-run tactics. With one or two exceptions, this method of warfare by the republican forces lasted for the remaining two years of the war, until the signing of the peace treaty at Melrose House on the 31st of May 1902. During this period of guerrilla warfare a number of small skirmishes took place in the general vicinity of the study area, but no indication could be found for any of these to have taken place within the study area itself.</p> <p>One of the most important battles from the South African War to have taken place in the general vicinity of the study area, was the Battle of Bakenlaagte, approximately 15 kilometres to the south-east of the present study area.</p> <p>The origins of this battle can be found in the tendency of the British forces in this part of Southern Africa to move columns between the British camps at Syferfontein (Bethal) in the south and Brugspruit (Clewer) in the north. This movement of columns led General Louis Botha to plan a strategy whereby such a column could be successfully attacked. During the end of October 1900 he ascertained that another column was about to leave Bethal for Brugspruit and subsequently ordered all available small commandos in the general vicinity to gather at a pre-destined place, from where a massed force</p>

of some 2000 horsemen could attack the column.

The column that General Louis Botha got wind of was a reasonably large force consisting of the 3rd Mounted Infantry (501 men), 25th Mounted Infantry (462 men), 2nd Scottish Horse (434 men), 84th Battery of the Royal Field Artillery (comprised of four guns and 84 men), CC and R sections of Vickers-Maxims (36 men), 1st Field Troop Royal Engineers (14 men) and the 2nd Battalion The Buffs (650 men). Lieutenant-Colonel G.E. Benson commanded the column.

At 5 AM on the morning of the 30th October 1901, Benson's column left the camp at Syferfontein near Bethal and started moving in a north-western direction. Their aim was to camp on the farm Bakenlaagte between Brugspruit and Bethal. However, the numerous drifts and watercourses which the units had to negotiate caused the entire column to be spread out over a large area in a reasonably short period of time. Therefore, although Benson and his advance guard reached Bakenlaagte at 9 AM, the remainder of the column was still far behind. During the afternoon, the rear-guard became even more isolated from the remainder of the column when one of their wagons got embedded in the mud of a river crossing. This rear-guard group consisted of two companies of the 3rd Mounted Infantry, one company of The Buffs and a Vickers-Maxim gun. At this point, the republican forces that had followed the column all the way from Bethal started to press closer to the rear-guard. This led the rear guard's commanding officer Brevet Major F.G. Anley to order that the wagon be abandoned and the men to push hard for Bakenlaagte.

Meanwhile, Benson had ordered two of the artillery guns onto a ridge between Bakenlaagte camp and the rear-guard units, to provide support for the latter. However, when he heard of the rear guard's retreat back to camp, he ordered two squadrons of the 2nd Scottish Horse to accompany him toward the rear-guard to rescue the abandoned wagon. At this opportune moment General Louis Botha ordered his men to attack. Twelve hundred armed horsemen appeared on the scene and decimated the retreating units of the rear-guard. The advance of the Boer horsemen was so severe that Benson ordered the two artillery pieces onto a ridge closer to Bakenlaagte. The Boer attack also stopped Benson's advance and he and the men of the 2nd Scottish Horse, who were accompanying him, were forced to make for the same ridge. At this point the force on this ridge consisted of two guns of the 84th Royal Field Artillery, 25 men of the 25th Mounted Infantry, a company of the 3rd Mounted Infantry, 20 men of the 2nd Scottish Horse and 70 men of The Buffs.

The republican forces now charged towards the British position on the ridge. In the words of Grant (1906).

"On came the federal regiments, their outriders swarming over the heels of the hindmost men of the Scottish Horse. As they galloped their numbers swelled...Two thousand horsemen raced down upon Benson and the men with him around the guns. So grand and terrible a spectacle had not been seen nor had the earth so shaken on a battlefield in South Africa...Alone on the gigantic bosom of the veld the little knot with Benson calmly faced the

	<p>approaching catastrophe.”</p> <p>As the Boer horsemen approached the occupied ridge they dismounted and crawled toward the summit. Within a short while, fierce fighting broke out and before long the Boer forces occupied the ridge. The losses on the British side were catastrophic. Of the 280 officers and men who had occupied the ridge, 66 had been killed and 165 wounded. The losses on the Boer side were not recorded.</p> <p>Although their successful assault on the ridge left the camp at Bakenlaagte largely undefended, the Boer forces did not attack it and subsequently withdrew from the battlefield (Grant, 1906).</p>
1880s-1914	<p><b>Witbank</b></p> <p>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 travellers 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.</p> <p>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 municipal status. The mining of coal did not initially result in a population increase. But with the advent of the railway line between Pretoria and Lourenco Marques ( now Maputo) the mining industry was firmly placed on an economic basis, and thereafter the population increased considerably <a href="http://global.britannica.com/EBchecked/topic/646020/Witbank">http://global.britannica.com/EBchecked/topic/646020/Witbank</a> ) .</p>

### 3.1.1 Major Jackson Series, Sheet “Bethal”, Revised Edition April 1901

A section of the “Bethal” sheet from the Major Jackson Map Series is depicted in *Figure 4*. The map series was compiled, surveyed and produced during the Anglo Boer War of 1899 to 1902 (National Archives, Maps, 3/559). The “Bethal” sheet was first printed in June 1900, and was revised during February and April 1901. The analysis of the 4 alternatives is done in Section 3.1.3.

### 3.1.2 *Untitled Map, possibly dated to c. 1913*

The map depicted in *Figure 5* was found in an archival file (JUS, 560, 1852/30) without any indication of its origin or exact age. However, the map's style conforms to a series of 1:125 000 scale topographical maps undertaken of the former Free State and Transvaal areas during c. 1913. As the file itself dates from 1924, the map pre-dates this date. The analysis of the 3 options are done in Section 3.1.3.

### 3.1.3 *Findings of the Heritage Scoping Document*

The findings of the heritage Scoping document can be compiled as follows and are combined to produce a heritage sensitivity map for the project:

#### **Historical**

Evaluation of the 1:50 000 Topographical maps of 1901, 1913, 1954, as well as recent aerial photographs and Google Earth has focused on the following delineations:

1. Single structures
2. Possible graves/cemeteries



*Figure 4 – 1901 map of Area B (with possible sensitive areas delineated)*





Figure 5 – 1913 map of Area B (with possible sensitive areas delineated)

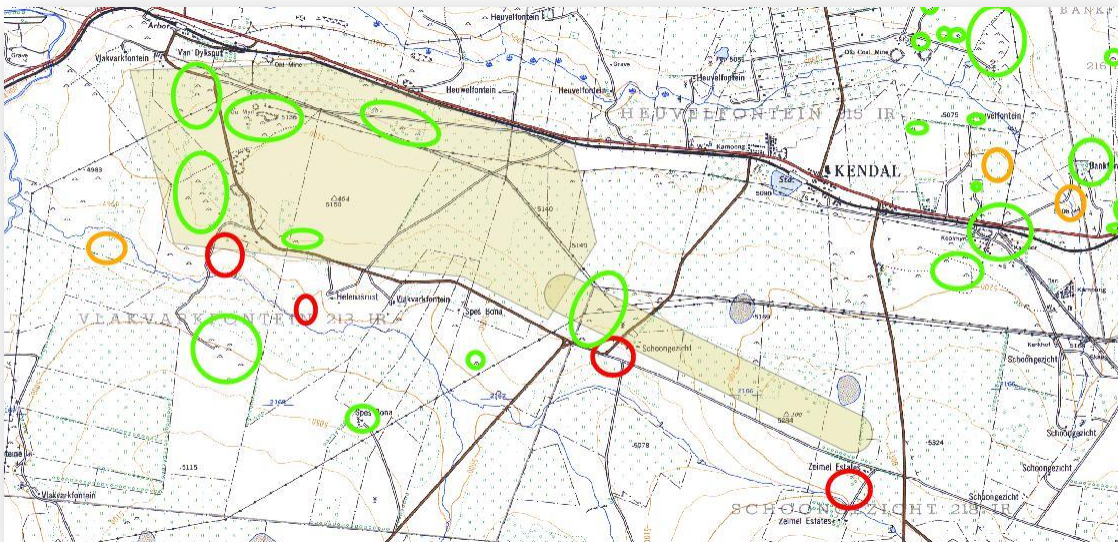


Figure 6 – 1954 map of Area B (with possible sensitive areas delineated)



Figure 7 – 1901 map of Area C (with possible sensitive areas delineated)



Figure 8 – 1913 map of Area C (with possible sensitive areas delineated)

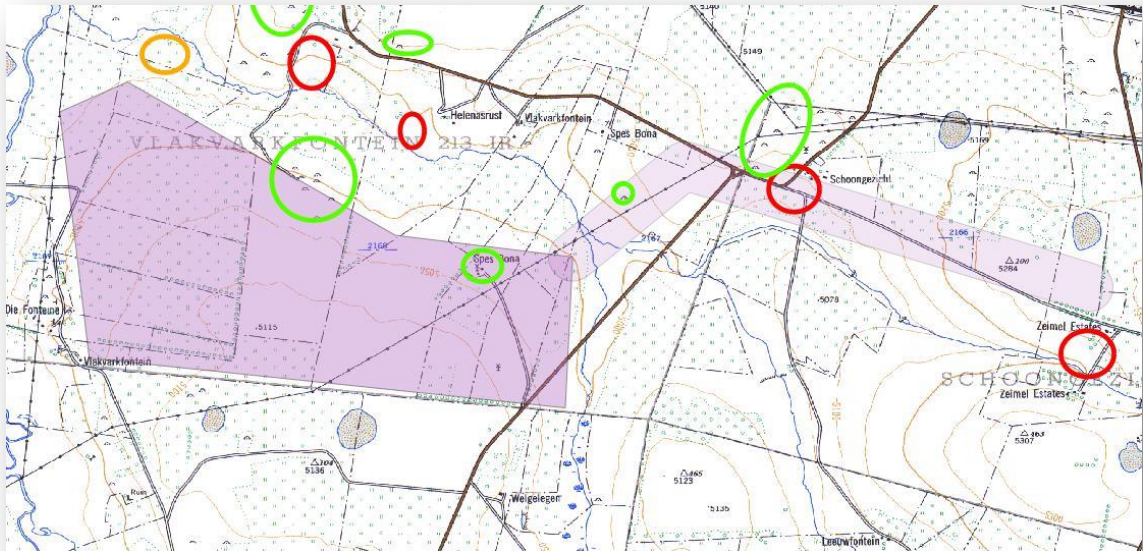


Figure 9 – 1954 map of Area C (with possible sensitive areas delineated)



Figure 10 – 1901 map of Area F (with possible sensitive areas delineated)

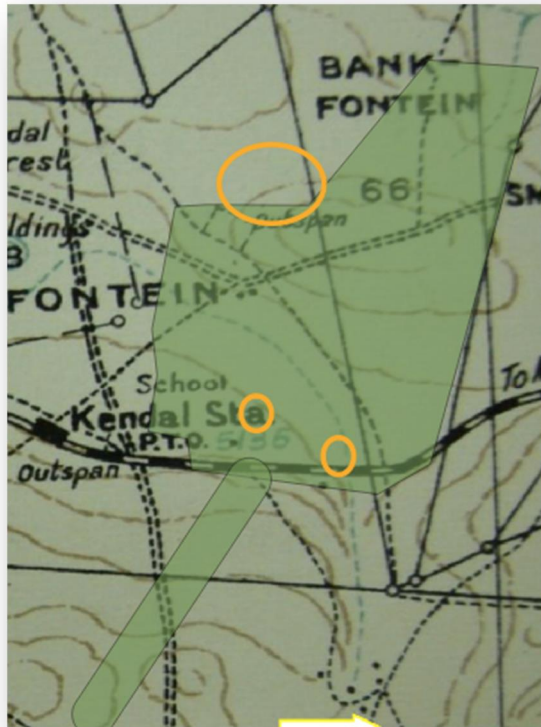


Figure 11 – 1913 map of Area F (with possible sensitive areas delineated)

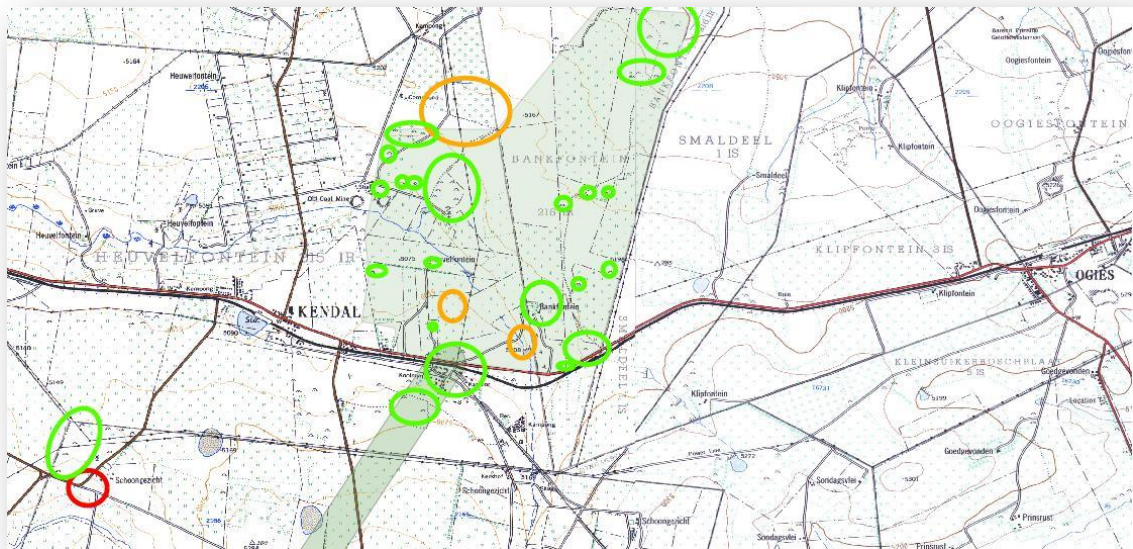
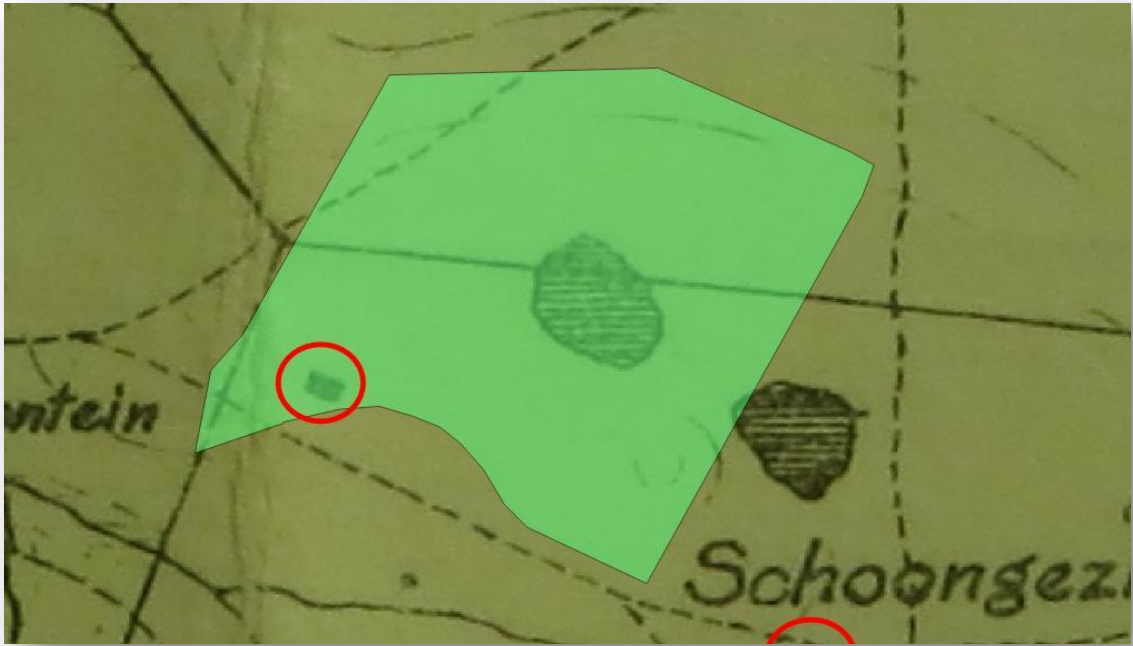


Figure 12 – 1954 map of Area F (with possible sensitive areas delineated)



*Figure 13 – 1901 map of Area H (with possible sensitive areas delineated)*

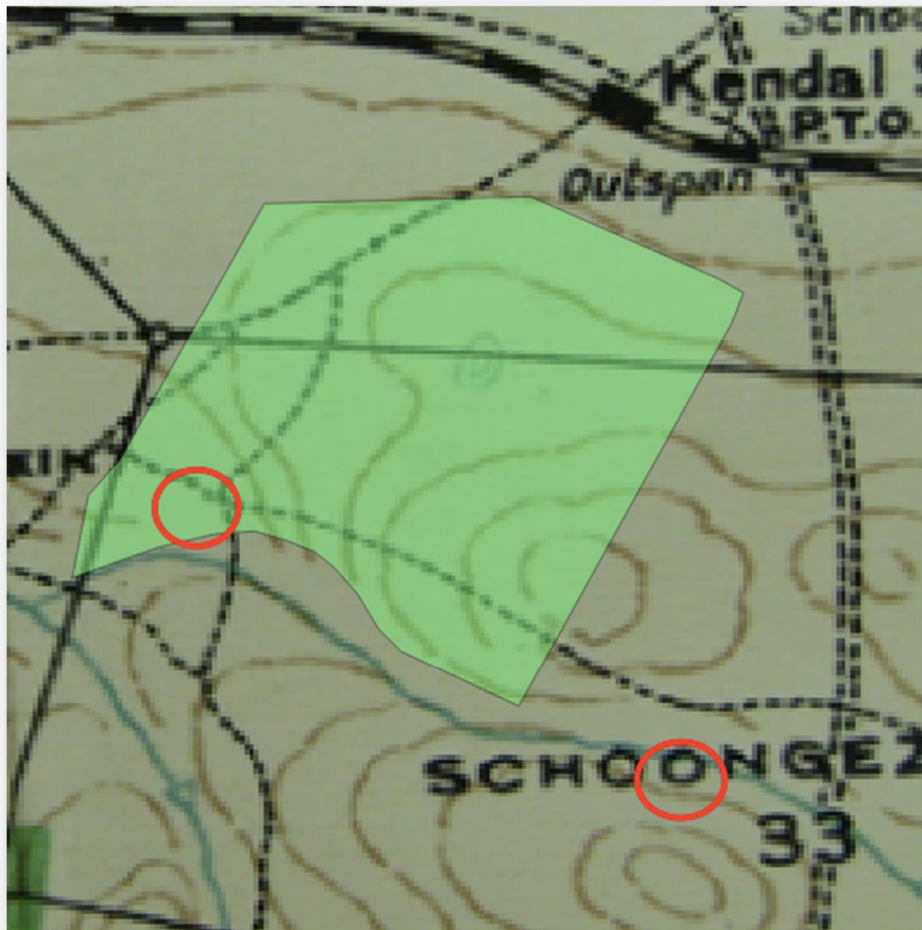


Figure 14 – 1913 map of Area H (with possible sensitive areas delineated)

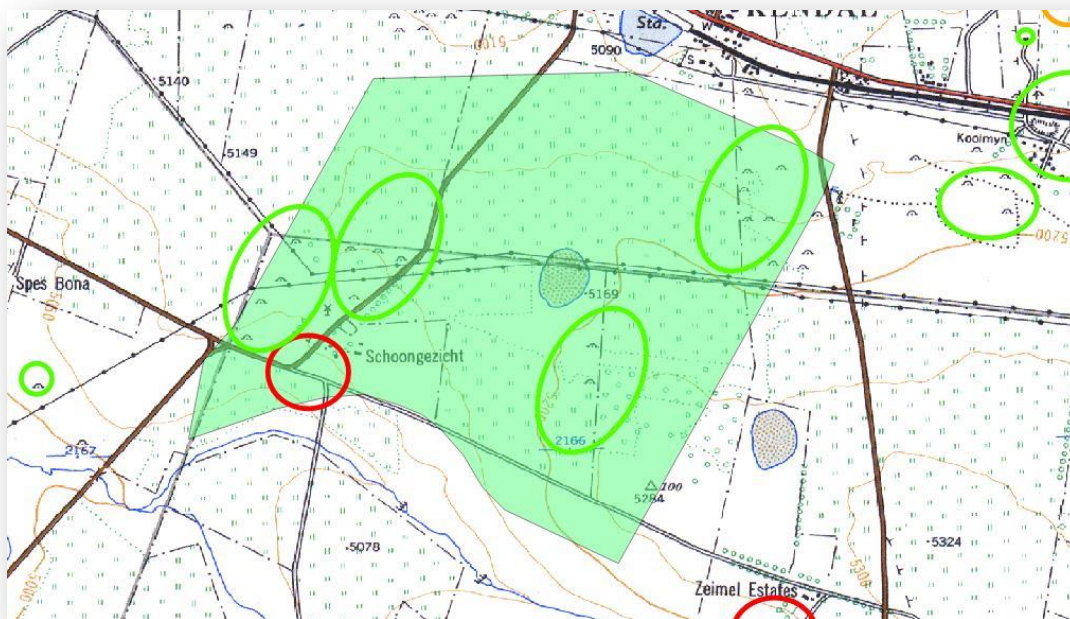


Figure 15 – 1954 map of Area H (with possible sensitive areas delineated)

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

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

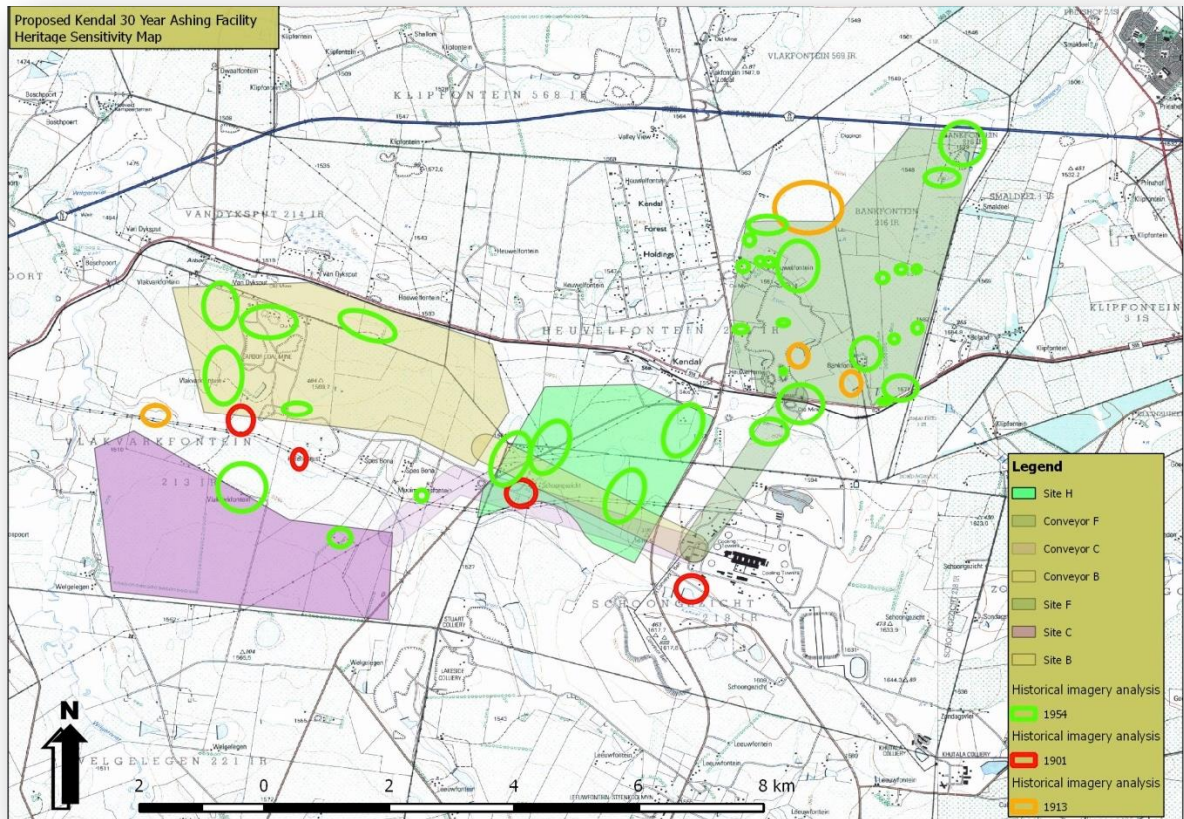


Figure 16 – Heritage Sensitivity Map (Refer to Annexure A)

Augmented with the site survey information, the sites identified during the fieldwork were overlain with the sensitivity map developed (Figure 16), 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 has been identified and detailed ground truthing could prove the contrary with regards to sensitivity.

### 3.2 Site Selection findings from the Scoping Study

The site selection processing combining all the different environmental sub-disciplines as well as the input from the engineering design has decided on Site H and provide two final ashing alternatives (During the specialist study process, the foot print area of site H has changed during the design of the two ashing options and moved more westwards. Therefore, the new Site H actually encroaches on a section of the original Site B):

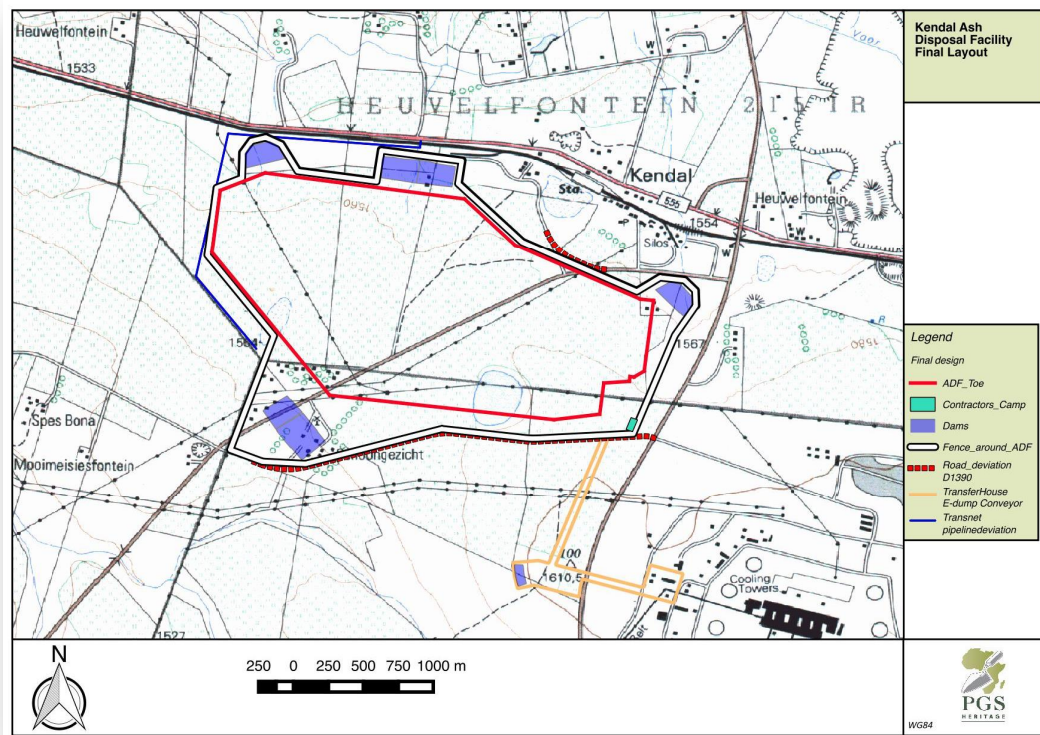


Figure 17 – Final ADF design (Eskom, May 2016)

## 4 HERITAGE FINDS

The heritage impact assessment required the analysis and determination of the significance of heritage sites found during the fieldwork to enable the development of mitigation measures that will reduce the impact from the proposed development on the heritage sites.

### 4.1 Site significance criteria

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 3: 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)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction

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<sup>2</sup>
    - Medium - 10-50/50m<sup>2</sup>
    - High - >50/50m<sup>2</sup>
- **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

## 4.2 Base Line Survey

### Site H

The field work revealed a total of 8 newly discovered heritage sites. The heritage site consist of 7 cemeteries (**KAD10, KAD16, KAD17, KAD18, KAD19, KAD20 and KAD21**) with approximately 149 graves and a single farmstead (**KAD15**). Refer to **Annexure C** for the site distribution maps.

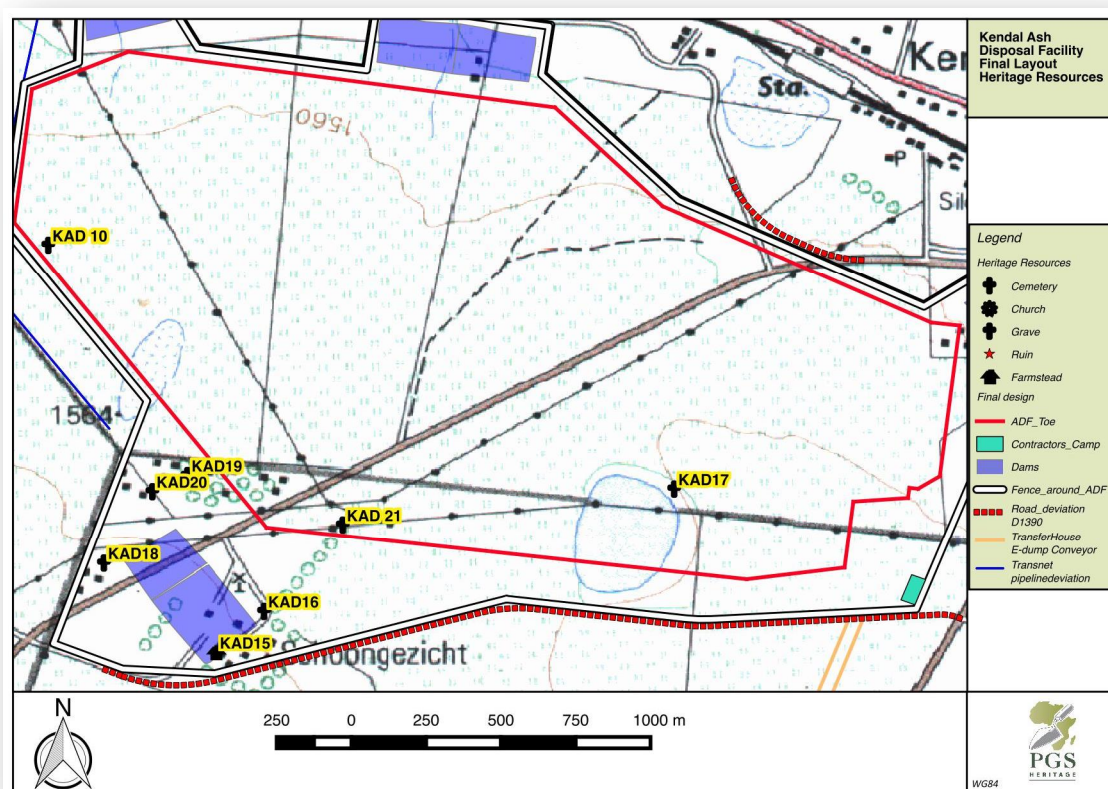


Figure 18 – ADF layout with heritage features

#### 4.2.1 KAD10

**GPS coordinates:** S26.06355 E28.92852

A small, informal cemetery with approximately six graves was identified at this location. The cemetery was situated in a ploughed field next to gravel road. The graves were placed in a line next to each other and were orientated from the east to west. Four of the graves had informal

mounds of packed rocks as dressings and two of the graves had cement headstones. The cemetery was not maintained recently.

**Site size:** Approximately 4m x 15m in size.



*Figure 19 – Site KAD10*

**Field Rating:** Grade 4A

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** By final design layout – foot print of ADF

**Impacts:** The cemetery will be directly impacted by the proposed development. These graves will have to be relocated.

**Mitigation:**

1. If the graves are to be kept in situ due to a redesign of the two Disposal Options:
  - a. The grave must be fenced with a buffer of at least 20 meters during construction;
  - b. This fence must be made permanent during the operational phase of the project;
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).
3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

#### 4.2.2 KAD15

**GPS Coordinates:** S26.07719 E28.93412

The site consists of an extended farmstead with numerous out buildings and two dwellings of the original Schoongezicht farm. The farmstead contains elements dating from 1900 and numerous additional structures have been added over the past 113 years to the layout of the farmstead. The structures represent a rich historical layering representing the development of farmstead over time.

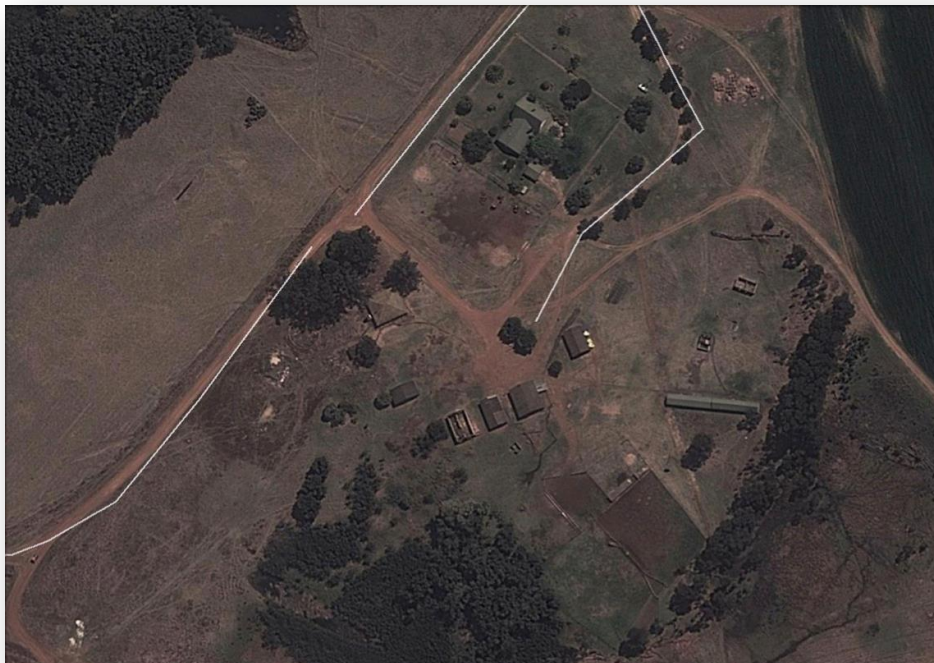
The older farmhouse has recently been demolished. An older structure was situated approximately 50m to the south-west of the main farmstead. The original structure was square and measured approximately 6m x 6m in size. A later addition was made on the western side of the original structure and it measured approximately 4m x 7m. The original structure had a pitched corrugated iron roof and the addition had a sloping corrugated iron roof. The building had metal door- and window-frames. It did not have an electrical or water system. The building was most probably used as a storeroom on the farm but was not in use any more and not maintained.

A disused water tower was situated approximately 10m from the identified storeroom. The water tower measured approximately 1.5m x 1.5m at the base and was approximately 6m high. Some building rubble was found next to the water tower. One of the farm workers, Johannes Mhlanga,

said that an old house used to be at that location. The house was demolished years ago due to its derelict state.

Another old storeroom or shed was identified approximately 50m to the east of the first storeroom identified. This storeroom was situated in a line of storerooms or buildings which were used on the farm. The other structures were modern or more recent buildings and were not older than 60 years. This old storeroom was in a derelict state and was not being used any more. The structure measured approximately 12m x 18m in size. The outer walls of this structure was built with sandstone blocks and cement and measured between 40cm-50cm thick. The inner walls were built with sandstone blocks and a mud-mixture which was used as mortar. The inner wall had a door opening with a wooden lintel. No doorframes or doors were left in the building. A few metal window frames were still left. The structure had a brick paved floor, but did not have a roof any more. From the shape of the wall at the entrance of the building it was evident that the structure had a pitched roof before it was removed. The structure was not being maintained and was overgrown with grass and other vegetation.

**Site size:** Approximately 200m x 200m in size.



*Figure 20 – Site KAD15*



*Figure 21 – Outbuilding with high vaulted windows*



*Figure 22 – Old barn*



*Figure 23 – Water tower at the back of building*

**Field Rating:** Generally Protected B (4B)

**Heritage Significance:** Medium Significance

**Legislative protection:** Section 34 of the NHRA (Act25 of 1999)

**Directly Impacted:** By final design placement of water management dams

**Impacts:** It is possible that the buildings will be damaged during construction activities.

**Mitigation:**

1. As first option the site should be demarcated as a no-go area during construction;
2. If the site and its building area to be demolished:
  - a. the whole site will have to be completely documented with layout plans of the larger site;
  - b. plans of each structure;

- c. documentation of the larger landscape of the farmstead;
  - d. each building must also be photographed in detail to document the current state as well as construction techniques and materials.
3. An application for demolition of these can then be submitted in accordance with Section 34 of the NHRA (Act 25 of 1999) to the Mpumalanga Provincial Heritage Authority (M-PHRA).
  4. M-PHRA will then issue a permit for the demolition of the site and its structures.

#### 4.2.3 KAD16

**GPS Coordinates:** S26.07582 E28.93573

A small informal cemetery with 5 graves was identified at this location. The graves were situated in an open stretch of field approximately 50m north-east of the main farmstead. The graves were placed in a line next to each other and were orientated from west to east. All of the graves had rectangular shaped brick- packed or brick and cement constructed frames as dressing. Two of the graves also had inscribed sandstone headstones which were placed at the western end of the graves. The two graves with headstones dated from 1912 and 1921 and belonged to the “Hattingh” family. The graves were not maintained and were overgrown with grass and other vegetation.

A large, inscribed granite monument was placed next to these graves. This monument was fenced and was placed in line with the graves. The monument was placed there by Mr. Piet Pretorius who recognised and commemorated the life of Dr. Albert Hertzog and their political struggle as HNP (Herstigte Nasionale Party) members against the political reforming trends in South Africa during the 1990’s. The monument was placed there in 1990.

**Site size:** Approximately 5m x 8m in size.





*Figure 24 – Site KAD16 – Hatting graves*



*Figure 25 – Site KAD16 – Close up of headstone*



*Figure 26 – Site KAD16 – Memorial of Dr Albert Hertzog*

**Field Rating:** Grade 3B

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** No direct impact, but inside fenced area

**Impacts:** No direct impact is envisaged on the graves. If all graves are to be relocated as part of a larger relocation process a full grave relocation process must be done.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the

provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).

3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

#### 4.2.4 KAD17

**GPS Coordinates:** S26.07171 E28.94945

A large, informal cemetery with approximately 119 graves was identified at this location. The cemetery was situated next to and on the eastern side of a natural pan. The graves were arranged in multiple lines and most were orientated from the east to west. A few graves were also orientated from south to north. Most of the graves had informal mounds of packed rocks as dressings and had cement headstones. Two of the graves had more formal granite dressings with inscribed granite headstones. The graves dated from the 1960's up to the 1980's. The cemetery was overgrown with grass and other vegetation and was not maintained recently.

The grave count on this cemetery was confirmed by Mr Andre Janse van Rensburg of Eskom. A site visit and meeting between PGS, Zitholele and Eskom representatives has confirmed the amount of graves. Mr Janse van Rensburg further indicated that they have been keeping count of the number of graves in this cemetery since 2008.

**Site size:** Approximately 40m x 40m in size.



*Figure 27 – Site KAD17 – View of cemetery (Kendal Power Station in the background)*



*Figure 28 – Site KAD17 – Close up view of some of the headstones*

**Field Rating:** Grade 4A

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** Directly impacted by ADF footprint.

**Impacts:** These graves will have to be relocated before the construction activities commence.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).
3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

**4.2.5 KAD18**

**GPS Coordinates:** S26.07420 E28.93038

The grave of a small child was identified at this location. The grave was situated at the back of one of the farm worker's houses and within the fenced stand. The grave was marked with two big rocks which were placed on top of the grave. No headstone was present. Margaret Motileni who was the mother of this child showed the grave. It was the grave of Khomotso Motileni who was born on October 28, 2008 and passed away on October 30, 2008. The grave was not maintained and was overgrown with grass and other vegetation.

**Site size:** Approximately 2m x 2m in size.



*Figure 29 – Site KAD18 – View of grave just behind the house*

**Field Rating:** Grade 4A

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** No direct impact, but inside fenced area

**Impacts:** No direct impact is envisaged on the graves. If the associated families are to be relocated from their current homesteads the possibility does exist that these graves will have to be relocated as part of a larger relocation process.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated with the relocation of the community.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the

provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).

3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

#### 4.2.6 KAD19

**GPS Coordinates:** S26.07126 E28.93317

A single, informal grave was identified at this location. The grave was situated in an open stretch of field near a homestead of one of the farm worker families. The grave had an oval shaped mound of packed rocks as a dressing and it was orientated from west to east. It did not have a headstone. The grave was not maintained and was overgrown with grass and other vegetation. The buried person was unknown at this stage and the age of the grave was also not known.

**Site size:** Approximately 3m x 2m in size.



*Figure 30 – Site KAD18 – View of grave just behind the house*

**Field Rating:** Grade 4A

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).

**Directly Impacted:** No direct impact, but inside fenced area.

**Impacts:** No direct impact is envisaged on the graves. If the associated families are to be relocated from their current homesteads the possibility does exist that the graves will have to be relocated with them.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated with the relocation of the community.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).
3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

#### 4.2.7 KAD20

**GPS Coordinates:** S26.07180 E28.93200

A cluster with three graves was identified at this location. The graves were situated in an open stretch of field near a homestead of one of the farm worker families. Two graves were placed next to each other and the third grave was placed in front of them. All of the graves were orientated from west to east. Two of the graves only had informal mounds of rock as dressings and the other grave had a rectangular shaped brick and cement built frame as dressing. An inscribed headstone was found in the grass next to the three graves. This headstone most probably belonged to the grave with the brick-built dressing. The headstone was for the grave of Gedion Mtembu who died on 11/12/1962 and was buried on 16/12/1962. The farm workers did not know these graves or



whom they belonged to. The graves were not maintained recently and were overgrown with grass and other vegetation.

**Site size:** Approximately 10m x 5m in size.



*Figure 31 – Site KAD20 – View of cemetery*



*Figure 32 – Site KAD20– Inscribed headstone*

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** No direct impact, but inside fenced area

**Impacts:** No direct impact is envisaged on the graves. If the associated families are to be relocated from their current homesteads the possibility does exist that these graves will have to be relocated as part of a larger relocation process.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated with the relocation of the community.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).
3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

#### 4.2.8 KAD21

*GPS Coordinates:* S26.072916 E28.938364

A cluster of approximately fourteen (14) graves was identified at this informal cemetery. The cemetery is heavily overgrown and an accurate grave count was not possible. The graves are situated in the central part of the southern section of both layout Options.

**Site size:** Approximately 10m x 5m in size.

**Heritage Significance:** High Significance

**Legislative protection:** Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005)

**Directly Impacted:** Directly impacted by the ADF footprint

Impacts: These graves will have to be relocated before the construction activities commence.

**Mitigation:**

1. Eskom has indicated that the graves cannot be left inside the ADF project area and will have to be relocated with the relocation of the community.
2. In the event that the graves in this cemetery are to be relocated a full grave relocation process must be done. This relocation process must be done in accordance with the provisions as laid out in Section 36 of the NHRA (Act 25 of 1999) and Mpumalanga Cemeteries, Crematoria and Exhumation of Bodies Act, 2005 (Act 8 of 2005).
3. The process must commence well in advance of any construction activity that needs to take place in the cemetery's vicinity.

### **4.3 Palaeontology**

An evaluation of the studies done by Groenewald (2013a & 2013b) has shown that the 4 alternative sites has a “variety of underlying geology” ranging “from Vaalian aged rocks consisting of the Silverton 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.”

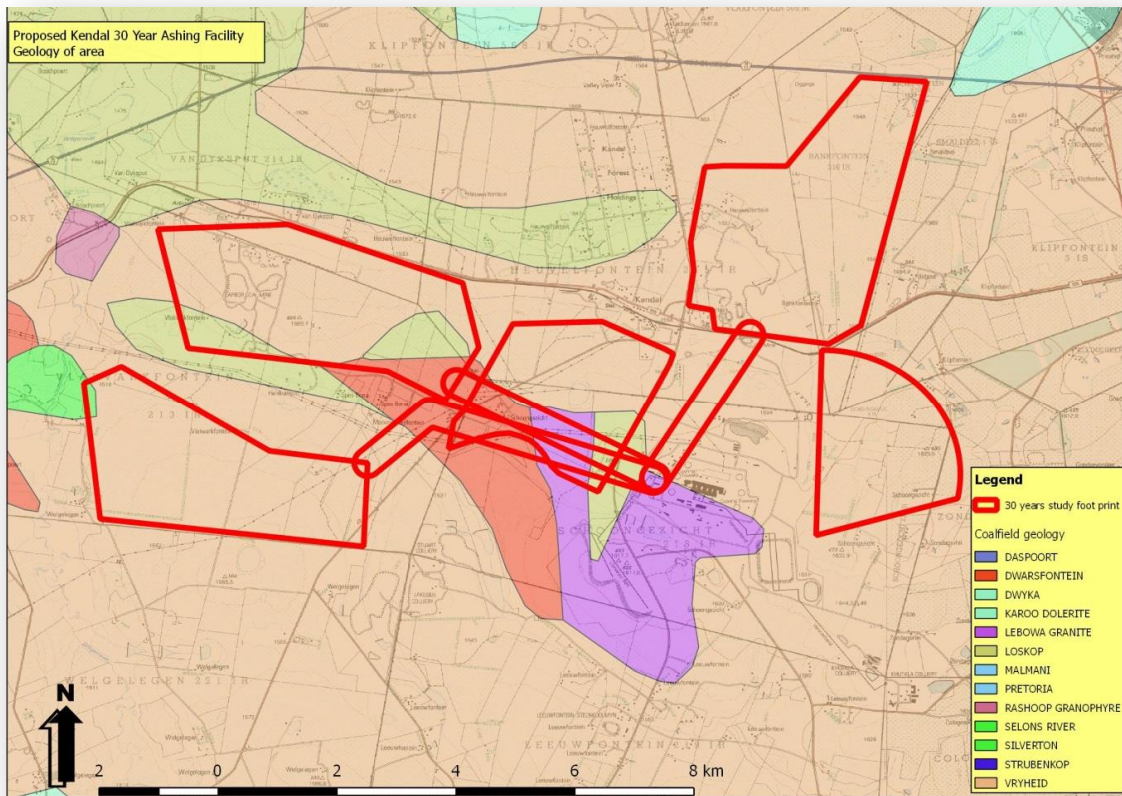


Figure 33 – General geology of study area (1:1000 000 data)

*“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., Likhonpetalon 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)", (Groenewald, 2013).*

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Vryheid Formation	Grey to black mudstone & sandstone PERMIAN	Abundant plant fossils of <i>Glossopteris</i> and other plants trace fossils	<i>None</i>	Moderate sensitivity

## 5 IMPACT ASSESSMENT

The following section provides an evaluation of the impacts predicted on the final selected site, incorporating the various environmental studies, that is a combination of site H and B. Section ***Error! Reference source not found.*** of this report provides the background on the possible scenarios considered as the final option.

The Impact Assessment valuation is based on the methodology described in **Annexure D** of this report and will focus on existing, cumulative and residual impacts as predicted for the three project stages of the proposed development.

The field work revealed a total of 8 newly discovered heritage sites. The heritage sites consist of 7 cemeteries (**KAD10, KAD16, KAD17, KAD18, KAD19, KAD20 and KAD21**) with approximately 149 graves and a single farmstead (**KAD15**).

### 5.1 Existing Impacts – Pre-Construction

The 8 heritage sites identified consists of 7 cemeteries and one farmstead. None of these sites are currently maintained. The impacts identified at the base line evaluation are:

#### 5.1.1 Cemeteries and graves

1. Burrowing animals causing dressings and headstones to fall in or collapse;
2. Vegetation overgrowing the cemeteries;

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	LOW	<i>Proposed site</i>	<u>Incidental</u>	<u>Could happen</u>	Very low
Cemeteries and graves	-	1	1	1	2	0.4

The baseline impacts are considered to be LOW negative significance, on the *proposed site* in extent. The impact could happen and will be incidental. The impact risk class is thus **Very Low**.

### 5.1.2 Farmstead

The farmstead is currently impacted by the destruction of some of the structures such as the original farmhouse by the current owners due to the ruined state of the structures as well as the possible squatting problems in inhabitable structures.

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	LOW	<i>Proposed site</i>	<u>Incidental</u>	<u>Could happen</u>	Very low
Impact on find spot	-	2	1	1	2	0.5

The baseline impacts are considered to be of a LOW negative significance, on the *proposed site* in extent. The impact could happen and will be incidental. The impact risk class is thus **Very Low**.

## 5.2 Cumulative Impacts – Construction and Operations

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 and definite impacts will be on the existing cemeteries and the palaeontological sensitive substrata.

### 5.2.1 Cemeteries

Seven cemeteries **KAD10, KAD16, KAD17, KAD18, KAD19, KAD20** and **KAD21** will be directly impacted by the construction activities associated with the proposed ashing facility.

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	HIGH	<i>Local</i>	<u>Permanent</u>	<u>It's going to happen</u>	High
Impact on cemeteries and graves	-	4	2	5	5	3.7

The cumulative unmitigated impact will **definitely** be of a HIGH negative significance, *local* in extent. The impact *is going to happen* and will be permanent. The impact risk class is thus **High**.

### 5.2.2 Farmstead

The farmstead will be destructed during construction.

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	Medium	<i>Proposed site</i>	<u>Permanent</u>	<u>Will happen</u>	Moderate
Impact on find spot	-	3	1	5	5	3

The cumulative unmitigated impact will **definitely** be of a Medium negative significance, *on the proposed site* in extent. The impact *will happen* and will be permanet. The impact risk class is thus **Medium**.

### 5.2.3 Palaeontology

Groenewald (2013a) identifies the impact on palaeontological resources associated with the Permian Vryheid Formation sediments of the Karoo Supergroup as MODERATE impact.

GEOLOGICAL UNIT	ROCK TYPE AND AGE	FOSSIL HERITAGE	VERTEBRATE BIOZONE	PALAEONTOLOGICAL SENSITIVITY
Vryheid Formation	Grey to black mudstone & sandstone PERMIAN	Abundant plant fossils of <i>Glossopteris</i> and other plants trace fossils	<i>None</i>	Moderate sensitivity

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	MODERATE	<i>Proposed site</i>	<u>Permanent</u>	<u>Could happen</u>	Low
Impact on palaeontology	-	3	1	5	3	1.8

The cumulative unmitigated impact will **definitely** be of a MODERATE negative significance, *on the proposed site* in extent. The impact could happen and will be permanent. The impact risk class is thus **Low**.

### 5.3 Residual Impacts – Closure

No further impacts after closure are foreseen on heritage resources.

## 6 MANAGEMENT MEASURES

To manage the potential impact on the heritage resources during construction and thus minimising the impact will require the following:

### 6.1.1 Cemeteries:

The design criteria of the ADF could not make provision for the protection of the cemeteries *in situ*, and all seven cemeteries (**KAD10, KAD16, KAD17, KAD18, KAD19, KAD20** and **KAD21**) will need to be relocated.

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:

- j) 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;
- k) Site notices indicating the intent of the relocation;



- l) Newspaper Notice indicating the intent of the relocation;
- m) A permit from the local authority;
- n) A permit from the Provincial Department of Health;
- o) 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;
- p) An exhumation process that keeps the dignity of the remains and family intact;
- q) The whole process must be done by a reputable company that is well versed in relocations;
- r) 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.

**Approximate Costs:** R2 500 000 excluding wake fees and compensation to the next-of-kin

### 6.1.2 Structures

1. Site **KAD15** will be demolished and the following measures must be implemented:
  - a. the whole site will have to be completely documented with layout plans of the larger site;
  - b. plans of each structure;
  - c. documentation of the larger landscape of the farmstead;
  - d. each building must also be photographed in detail to document the current state as well as construction techniques and materials.
2. An application for demolition of these can then be submitted in accordance with Section 34 of the NHRA (Act 25 of 1999) to the Mpumalanga Provincial Heritage Authority (M-PHRA).
3. M-PHRA will then issue a permit for the demolition of the site and its structures.

**Approximate Costs:** R 60 000

### 6.1.3 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.

**Approximate Costs:** R 670 000

## 7 CONCLUSION

The process of site selection and identification of a final alternative for the construction of the proposed Kendal Ashing Disposal Facility, consisted of the evaluation of four original site alternatives (Site B, C, F and H). The heritage study along with the various other environmental sub-disciplines provided input in the final site selection and design of May 2016.

By combining the various studies as well as the recommendations from the engineering team, Site H was selected as the preferred site, with two alternatives being provided for final analysis in the impact assessment phase. A final design was provided in May 2016.

The field work on Site H revealed a total of 8 newly discovered heritage sites. The heritage sites consist of 7 cemeteries (KA **KAD10**, **KAD16**, **KAD17**, **KAD18**, **KAD19**, **KAD20** and **KAD21**) with approximately 149 graves and a single farmstead (**KAD15**). with some features dating from 1901. All seven cemeteries will be directly impacted by the proposed development and will require the relocation of approximately 149 graves.

The farmstead at **KAD15** will be directly impacted and destroyed.

An assessment of the palaeontological sensitivity of the area has shown that the site is underlain by Permian Vryheid Formation sediments of the Karoo Supergroup that has a Moderate palaeontological sensitivity. No further studies were required but the implementation of the management measures as required in this report will mitigate any possible impacts.

The impact assessment has rated the impact on the graves as HIGH, while the impact of the farmstead and palaeontology is rated as MODERATE.

As no impact on heritage resources are foreseen during operation and after closure, the following mitigation measures will need to be implemented before and during construction:

#### 7.1.1 *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:

- s) 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;
- t) Site notices indicating the intent of the relocation;
- u) Newspaper Notice indicating the intent of the relocation;
- v) A permit from the local authority;
- w) A permit from the Provincial Department of Health;
- x) 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;
- y) An exhumation process that keeps the dignity of the remains and family intact;
- z) The whole process must be done by a reputable company that is well versed in relocations;
- aa) 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.

#### 7.1.2 *Structures*

4. Site **KAD15** will be demolished and the following measures must be implemented:

- a. the whole site will have to be completely documented with layout plans of the larger site;
- b. plans of each structure;
- c. documentation of the larger landscape of the farmstead;

- d. each building must also be photographed in detail to document the current state as well as construction techniques and materials.
5. An application for demolition of these can then be submitted in accordance with Section 34 of the NHRA (Act 25 of 1999) to the Mpumalanga Provincial Heritage Authority (M-PHRA).
6. M-PHRA will then issue a permit for the demolition of the site and its structures.

### 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.

## 8 REFERENCES

### 8.1 Published Sources

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, R.C. 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.

Grant, M.H, 1906. History of the war in South Africa 1899–1902. London: Hurst & Blackett

Groenewald, Gideon. 2013a. Palaeontological Desktop Assessment of the proposed Construction of an Ash Dump Site Near Kusile Power Station, Gauteng & Mupumalanga Provinces

Groenewald, Gideon. 2013b. Palaeontological Desktop Assessment of the proposed Kendal Ashing Facility Near Ogies In Mpumalanga Province

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

Morris, D. (2008). Archaeological and Heritage Phase 1, Impact Assessment for proposed upgrading of Sishen Mine Diesel Depot Storage Capacity at Kathu, Northern Cape. Kimberley: McGregor Museum.

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

## **8.2 Maps**

JUS, 560, 1852/30 – Map of Bethal area

Major Jackson Series, Sheet “Bethal”, Revised Edition April 1901

**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 administered by a local authority. Graves in the category located inside a formal cemetery administered 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.



**Annexure B**  
**Project Outline**

# 12935 Kendal Power Station – 30 Year ADF Project.

## Conceptual Engineering Design Overview

20 May 2016

1	Background: Zitholele Consulting undertook the Environmental Impact Assessment (EIA) to extend the existing Kendal Power Station dry ash disposal facility (ADF). Zitholele also undertook the conceptual engineering design for the extension of the existing dump which informed the EIA.
2	Background: The total additional capacity required for the ADF is 292.7 Million m <sup>3</sup> from October 2013 to December 2058.
3	Background: Due to the current boundary and operating machinery limitations this capacity will not be reached on Kendal Power Station's current ashing site and a suitable site for the remaining ash to be deposited was identified, hence the Kendal 30 Year ADF Project.
4	Site H was chosen for the remaining ash to be deposited.
5	Background: At the beginning of the project we identified two scenarios to be used in the conceptual engineering design of the ADF. In order to maximise the footprint of the current ADF at Kendal Power Station, a stream diversion was recommended. Department of Water & Sanitation were unconvinced regarding the diversion and hence the two scenarios. Scenario 1: Stream diversion is approved by DWS. More ash will be disposed on the current ash dump site. Scenario 2: Stream diversion is not approved by Water & Sanitation. Less ash will be disposed of on the current ash dump site and the proposed new ADF on the alternate site will have a larger footprint. After a meeting held with DWS, conditional approval of the stream diversion was given. Zitholele have therefore concentrated on Scenario 1 . approval of stream diversion.
6	Start of construction of new ADF: 2025

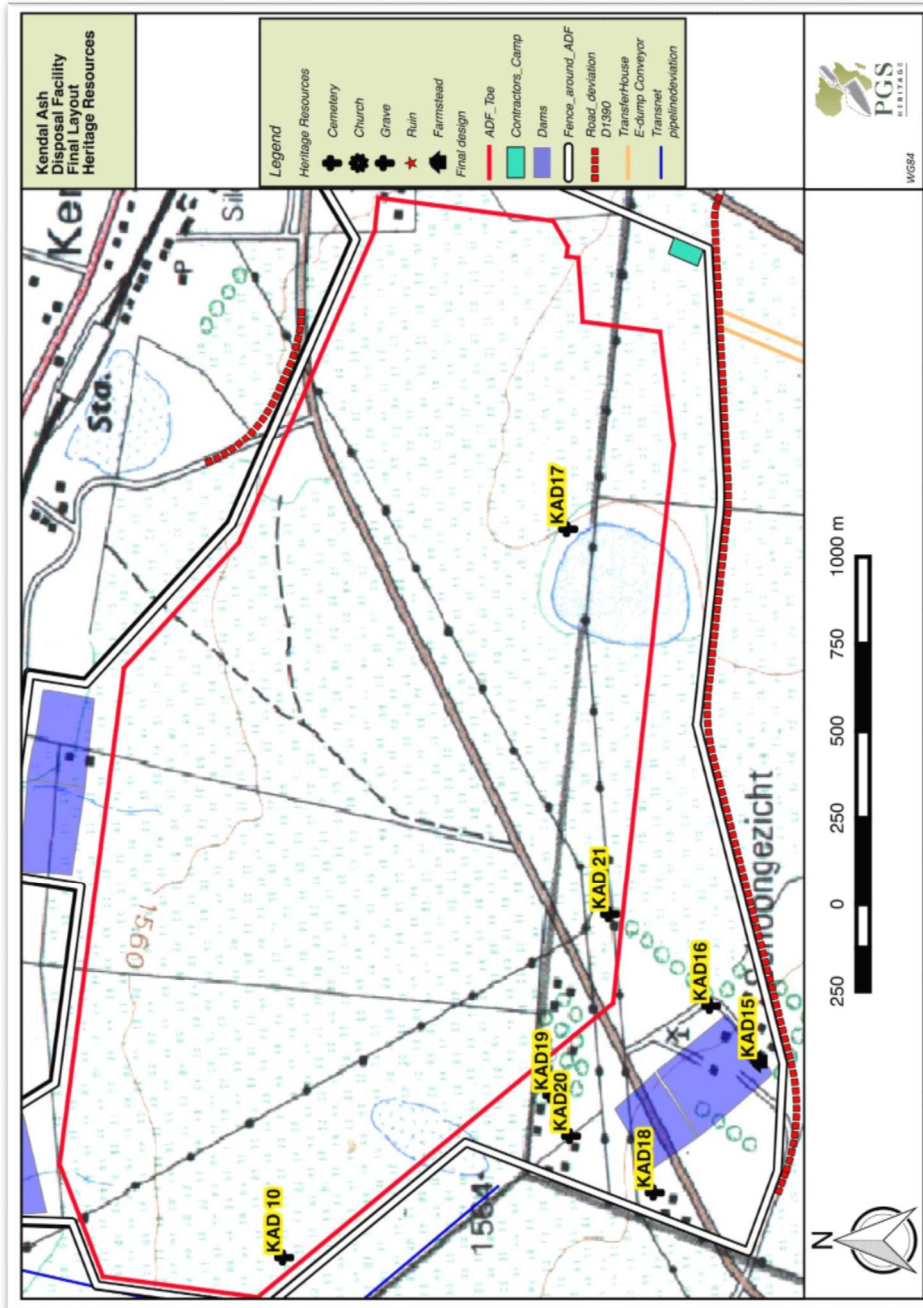
	Years of operation for new ADF: 27
7	The new ADF is modelled to 2058. Required volume = 176.2 Million m <sup>3</sup> , Accumulated volume achieved = 177.7 Million m <sup>3</sup>
8	Footprint area of new ADF = 404.7 Ha
9	A fixed conveyor will be constructed from the existing Emergency Dump (E-dump) at the power station and will cross under Road
10	Fixed conveyors will extend from the new E-dump towards the ADF on to which extendable and then shift-able conveyors will be fixed in order to dispose ash on the footprint of the ADF starting from the eastern side of the site and progressing to the western side of the site.
11	A starter platform will be built on the eastern side of the site first and will be constructed with bulldozers. The rest of the ADF will be constructed with the conveyor-stacker system.
12	A 1:15 sloped ramp will be constructed on the eastern side of the new ADF and will reach a maximum height of 75 metres (maximum height of ADF)
13	There is a geotechnical fault on the northern side of the site known as the Ogies Dyke. The ADF footprint extends over the dyke towards the north.
14	Several power lines will require diversion: <ul style="list-style-type: none"> <li>- 11 kV: 1 No. off (Distribution)</li> <li>- 88 kV: 2 No. off (Distribution)</li> <li>- 22 kV: 1 No. off (Distribution)</li> <li>- 132 kV: 2 No. off (Distribution)</li> <li>- 400 kV: 2 No. off (Transmission)</li> </ul>
15	The new ADF is tapered on the south western corner due to parcels of land that have mining rights attached to them, situated on the western side of the site, and the need to avoid utilising these parcels of land.
16	The proposed ADF will have a ring access road constructed around

	its perimeter together with stormwater canals intercepting impacted runoff and directing to a pollution control dam.
17	The Kusile Bulk Water line does not require relocation. (For Scenario 1)
18	Road D1390 which runs through the proposed new ADF footprint will need to be diverted. The new diverted alignment of the road is on the southern side of the proposed new ADF and intersects with the access road leading to the Kendal Power Station main entrance.  The new diverted Road D1390 will have a 40 metre road reserve.
19	A distance of 362 metres has been achieved between the existing silos, on the north eastern side of the proposed new ADF, and the perimeter of the proposed ADF.
20	The liner construction will be staged in three year stages. At any given point there will be 1 . 2 years of available footprint of constructed liner.
21	The liner design will be the same as per the extension of the existing ash dump design. (Class C Barrier System)
22	There will be three access points to the proposed new ADF, with the main access point being at the south eastern corner of the ADF.
23	A proposed Contractor's camp is situated at the south eastern corner of the site.
24	A proposed stockpile area will be situated south of the ADF.
25	Seven proposed new dams are to be constructed. Four pollution control dams (PCD) at the proposed new ADF, one PCD at the proposed new E-dump and two clean water dams. Pump stations will be constructed at each of the dams.
26	The proposed dams will be constructed in stages. Stage 1: Dam 1 (PCD) . Vol: 150 MI Dam 2 (PCD at E-Dump) . Vol: 14.75 MI Stage 2: Dam 3 (Clean) . Vol: 158 MI . Sized for 50 year storm event

	<p>Dam 4 (PCD) . Vol: 150 MI</p> <p>Dam 5 (Clean) . Vol: 197 MI . Sized for 50 year storm event</p> <p>Dam 6 (PCD) . Vol: 100 MI</p> <p>Stage 3: Dam 7 (PCD) . Vol: 150 MI</p>
27	<p>Water for dust suppression will be extracted from all five proposed PCDs and from the existing Dirty Water Dam and Emergency Dirty water dam.</p>
28	<p>Dust Suppression Philosophy:</p> <p>The Emergency Dirty Water Dam will need to always have 55 M available storage capacity therefore it is given priority for dust suppression to maintain this volume.</p> <p>If the Emergency Dirty Water Dam has the available storage available, then water for dust suppression will have to be abstracted from the existing Dirty Water Dam, Dam 1, Dam 4, Dam 5 or Dam 7. Water will be abstracted from the dam with the highest volume by percentage of its storage capacity.</p> <p>Dam 1 will be used as a storage reservoir for dust suppression. Water from the five other pollution control dams are pumped here for dust suppression. Dam 1 will be sized to accommodate a two day storage capacity for dust suppression.</p>
29	<p>Once the maximum open ash area has moved beyond Dams 3,4,5 &amp; 6, the area behind the open ash area will be rehabilitated and these dams will become clean water dams.</p>

30	<p>Water Balance Models:</p> <p>Stage 1: Dam 1 (PCD)                            Dam 2 (PCD at E-Dump)</p> <p>Dust suppression from Dam 2 to E-dump modelled with efficiency of E-dump variable.</p> <p>Dust suppression from Dam 1, Ex. EDWD &amp; Ex. DWD onto ADF.</p> <p>Wash water flow included as an input &amp; output to each dam.</p> <p>Stage 2: Dam 1 (PCD)                            Dam 2 (PCD at E-Dump)                            Dam 3 (Clean)                            Dam 4 (PCD)                            Dam 5 (Clean)                            Dam 6 (PCD)</p> <p>Dust suppression from Dam 2 to E-dump modelled with efficiency of E-dump variable.</p> <p>Dust suppression from Dam 1, 4 &amp; 6, Ex. EDWD &amp; Ex. DWD onto ADF.</p> <p>Wash water flow included as an input &amp; output to Dam 1 &amp; Dam 2.</p> <p>Irrigation from Dam 3 &amp; 5 onto rehabbed areas.</p> <p>Stage 3: Dam 1 (PCD)                            Dam 2 (PCD at E-Dump)                            Dam 3 (Clean)                            Dam 4 (Clean)                            Dam 5 (Clean)                            Dam 6 (Clean)                            Dam 7 (PCD)</p> <p>Dust suppression from Dam 2 to E-dump modelled with efficiency of E-dump variable.</p> <p>Dust suppression from Dam 1, Dam 7, Ex. EDWD &amp; Ex. DWD onto ADF.</p> <p>Wash water flow included as an input &amp; output to Dam 1 &amp; Dam 2.</p> <p>Irrigation from Dam 3, 4, 5 &amp; 6 onto rehabbed areas.</p>
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Annexure C  
HERITAGE MAPS



**THE SIGNIFICANCE RATING SCALES FOR THE EIA**



## 1. Impact Assessment Methodology

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in Table 1.

Table-1: Quantitative rating and equivalent descriptors for the impact assessment criteria

Rating	Significance	Extent Scale	Temporal Scale
1	VERY LOW	<i>Proposed site</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

### 1.1 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 (1 000 km<sup>2</sup>) 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 1** below.

Table 1: Description of the significance rating scale

Rating	Description
5	Very high Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	High Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of

Rating		Description
		these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	Moderate	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	Very low	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity are needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	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 2.

Table 2: Description of the significance rating scale

Rating		Description
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level).
3	Local	The impact will affect an area up to 10 km from the proposed site.
2	Study Site	The impact will affect an area not exceeding the Eskom property.
1	Proposed site	The impact will affect an area no bigger than the ash disposal site.

## 1.3 Duration 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 3**.

Table 3: Description of the temporal rating scale

Rating	Description
1	Incidental The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	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.
3	Medium term The environmental impact identified will operate for the duration of life of facility.
4	Long term The environmental impact identified will operate beyond the life of operation.
5	Permanent The environmental impact will be permanent.

#### 1.4 Degree of Probability

Probability or likelihood of an impact occurring will be described as shown in Table 4 below.

Table 4: Description of the degree of probability of an impact occurring

Rating	Description
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely
5	It's going to happen / has occurred

#### 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 5**. 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 5: 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.
Don't know	The consultant cannot, or is unwilling, to make an assessment given available information.

## 2. Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, 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:

$$\text{Impact Risk} = \frac{(\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal}) \times \text{Probability}}{3 \times 5}$$

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

Table 6: Example of Rating Scale

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	LOW	<i>Local</i>	<u>Medium-term</u>	<i>Could Happen</i>	
Impact to air	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1.6</b>

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the Table 8 below.

Table 8: Impact Risk Classes

Rating	Impact Class	Description
0.1 – 1.0	<b>1</b>	<b>Very Low</b>
1.1 – 2.0	<b>2</b>	<b>Low</b>
2.1 – 3.0	<b>3</b>	<b>Moderate</b>
3.1 – 4.0	<b>4</b>	<b>High</b>
4.1 – 5.0	<b>5</b>	<b>Very High</b>

Therefore with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

## 2.1 Cumulative Impacts

It is a requirement that the impact assessments take cognisance of cumulative impacts. In fulfilment of this requirement the impact assessment will take cognisance of any existing impact sustained by the operations, any mitigation measures already in place, any additional impact to environment through continued and proposed future activities, and the residual impact after mitigation measures.

It is important to note that cumulative impacts at the national or provincial level will not be considered in this assessment, as the total quantification of external companies on resources is not possible at the project level due to the lack of information and research documenting the effects of existing activities. Such cumulative impacts that may occur across industry boundaries can also only be effectively addressed at Provincial and National Government levels.

## 2.2 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
- Temporal Scale – in underline
- Probability – in *italics and underlined*
- Degree of certainty - in **bold**
- Spatial Extent Scale – in *italics*