PROPOSED EXTENSION OF THE CONTINUOUS ASH FACILITY AND EMERGENCY ASH DUMP FOR THE KENDAL POWER STATION

Kendal, Nkangala District, Mpumalanga

Final Heritage Impact Report

Issue Date:	26 May 2014
Revision No.:	2
Client:	Zitholele Consulting

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Declaration of Independence

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

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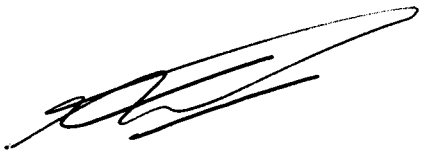

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ACKNOWLEDGEMENT OF RECEIPT

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EXECUTIVE SUMMARY

PGS Heritage (PGS) was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the extension of the Continuous Ash facility and Emergency Ash Dump for the Kendal Power Station, Kendal, Mpumalanga Province.

During the heritage study 3 heritage sites were identified of which one will require further mitigation work.

The following mitigation and direct management measures during construction will be required:

Possible graves

1. Investigate the presence of more structures through the clearing of vegetation.
2. If it is found after site clearance that the structure still present the possibility of being a grave, it is recommended that a test excavation be done to determine the presence of a grave.
3. If the structure is determined to be a grave, a full grave relocation process with a detailed social consultation process needs to be initiated to enable the possible relocation of the remains.

Palaeontology

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2628 East Rand) in conjunction with Google Earth. The known fossil heritage within each rock unit was determined from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience. The major limitation of this study is that no supporting field assessment was made and the assumption that existing geological maps and datasets used to assess site sensitivity are correct and reliable.

Recommendations:

1. If excavation that will affect bedrock into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas.
2. If excavation that will affect bedrock into the Vryheid Formation is envisaged, the Palaeontologist must accompany the surveyor and topsoil clearing teams assessing exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
    a. If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
    b. If applicable, the palaeontologist must compile a Phase 1 report to the Heritage Authority.

General

Further to these recommendations the general Heritage Management Guidelines in Section 6.1 need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

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1 INTRODUCTION

PGS Heritage (PGS) was appointed by Zitholele Consulting to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the extension of the Continuous Ash facility and Emergency Ash Dump for the Kendal Power Station, Kendal, Mpumalanga Province.

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).

1.2 Specialist Qualifications

This Heritage Impact Report was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where the 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).

Marko Hutton, Field Archaeologist, is registered with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation.

Dr Gideon Groenewald has a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic

sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

1.3 Assumptions and Limitations

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

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

1.4 Legislative Context

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

i. National Environmental Management Act (NEMA), Act 107 of 1998
ii. National Heritage Resources Act (NHRA), Act 25 of 1999
iii. Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002
iv. Development Facilitation Act (DFA), Act 67 of 1995

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

i. National Environmental Management Act (NEMA) Act 107 of 1998
    a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
    b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
    c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
    d. Environmental Management Programme (EMPr) – Section (34)(b)
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
    a. Protection of Heritage Resources – Sections 34 to 36; and
    b. Heritage Resources Management – Section 38
iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
    a. Section 39(3)
iv. Development Facilitation Act (DFA) Act 67 of 1995
    a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, "no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…" The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage".

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in

the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

1.5 Terminology and Abbreviations

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;

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;

iii. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

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

Development

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

i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;

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

Early Stone Age

The archaeology of the Stone Age between 700 000 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 20 000 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 20-300 000 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.

ABBREVIATIONS	DESCRIPTION
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

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

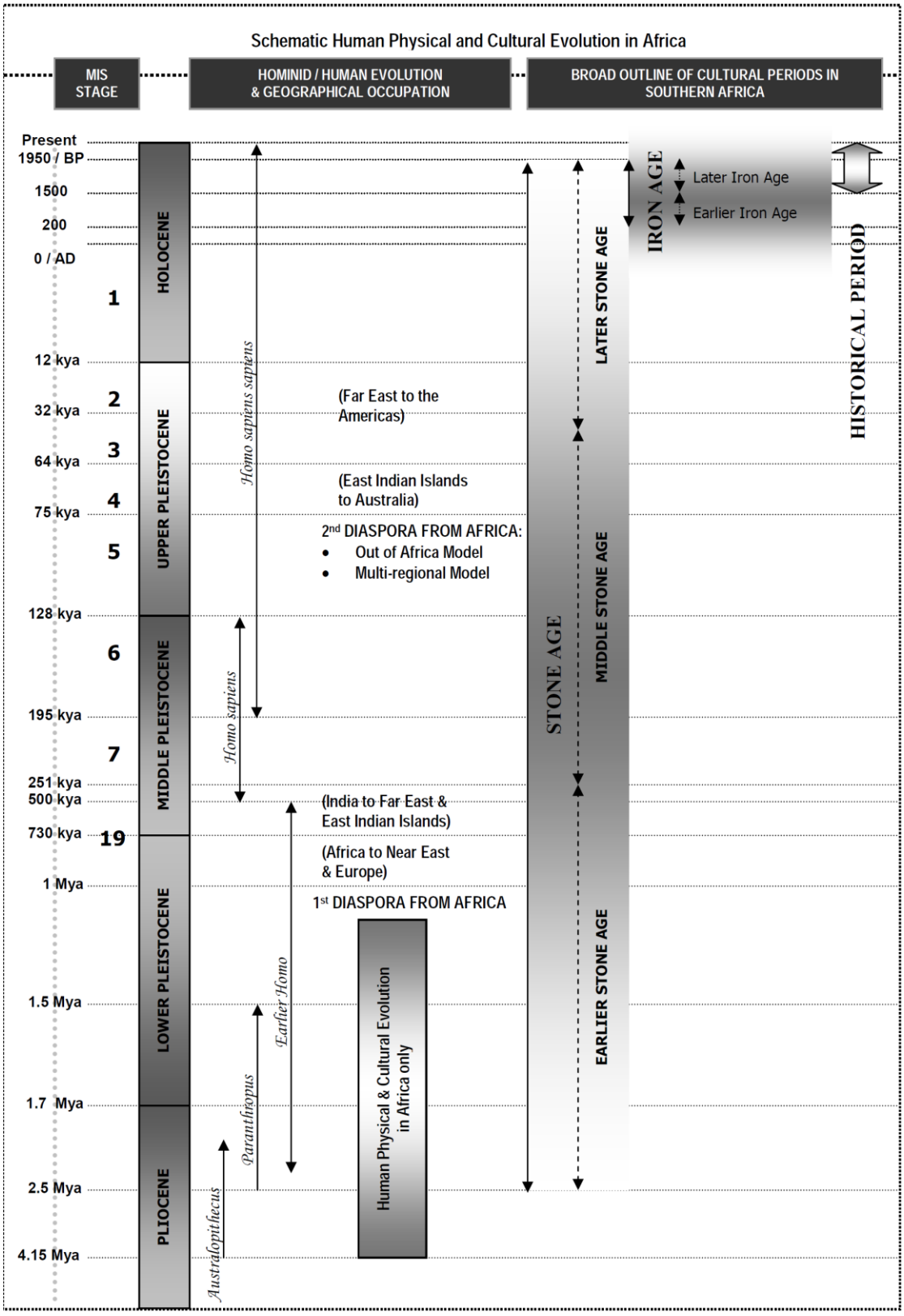


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

The Kendal Power Station is situated 8 kilometres to the west of the town of Ogies on the farm Schoongezicht 218 IR, Emalahleni Municipal area of the Nkangala District in the Mpumalanga Province.

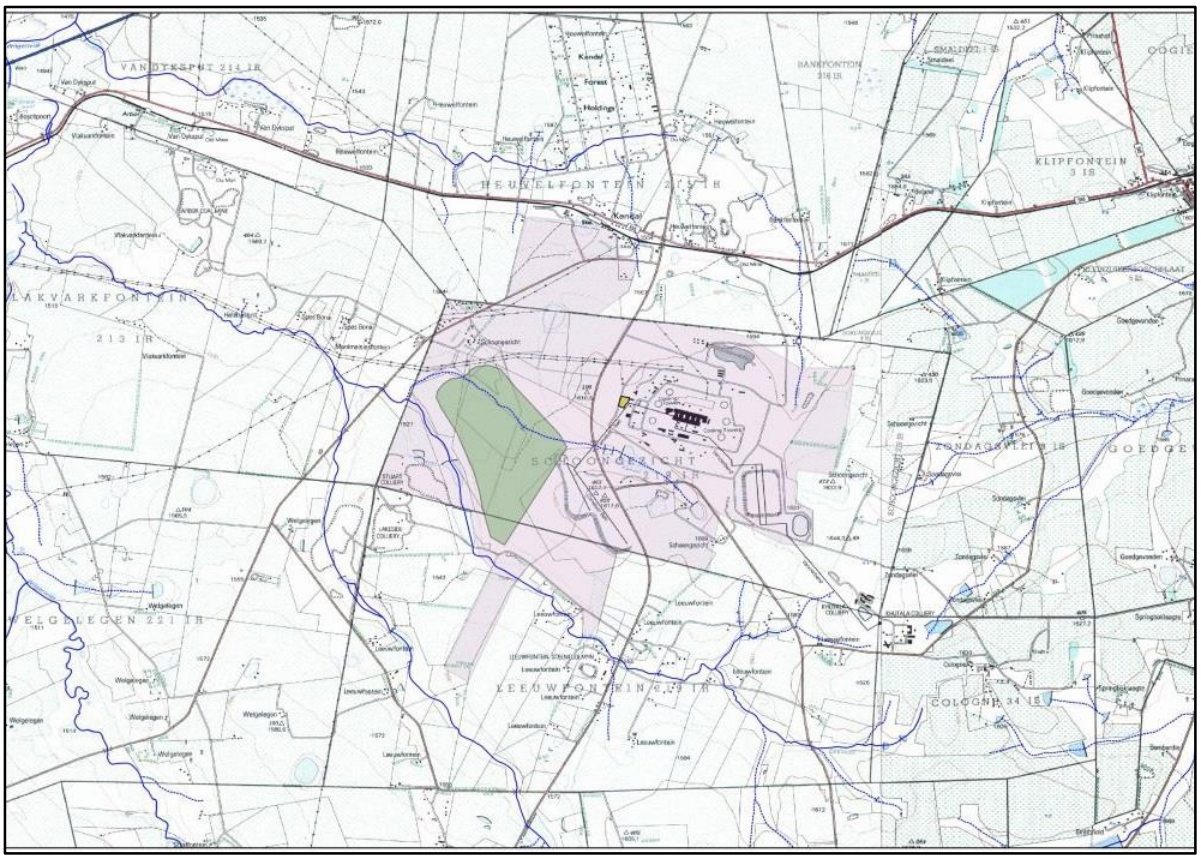


Figure 2 – Regional locality Map

The proposed sites are situated adjacent and to the north of the existing and currently used disposal facility as per **Figure 3**.

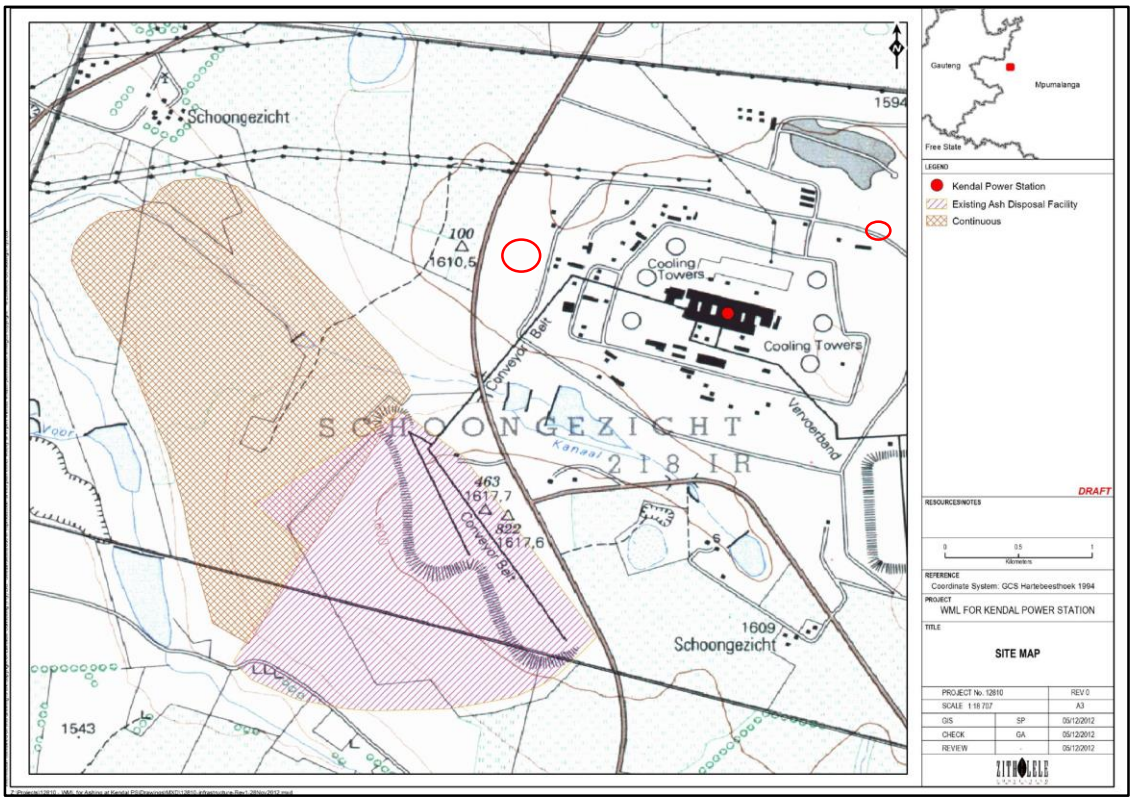


Figure 3 – Locality map of proposed extension and emergency dump

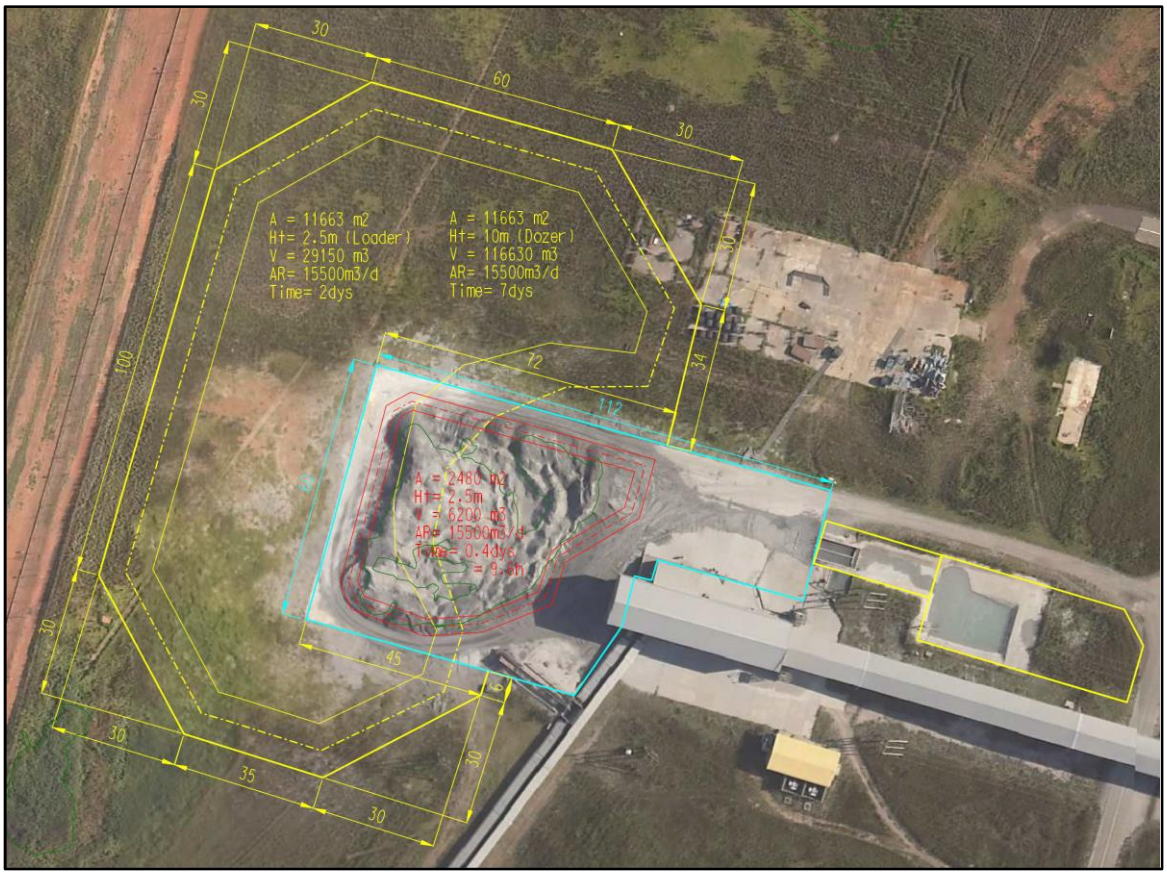


Figure 4 – Locality map of proposed emergency dump (red circle in Figure 3)

2.2 Project background

The following section was taken from the Scoping document as prepared by Zitholele Consulting for this project.

Kendal Power Station is a coal-fired power station situated south west of the town of Ogies and became operational in 1993.

It has an indirect dry-cooling system that uses a cooling tower and water. However, the principle of operation is similar to that used in a car radiator. Heat is conducted from the water by means of A-frame bundles of cooling elements arranged in concentric rings inside the tower. Cooling water (clean water) flowing through these elements, cools down as the cold air passes over them and returns to the condenser. This is referred to as a closed system as there is no loss of water due to evaporation and uses significantly less water in its cooling processes than conventional wet cooled power stations. Kendal has six (6) 686 megawatt (MW) generators and is currently the largest coal-fired power station in the world and holds several Eskom performance records. The station's cooling towers are the largest structures of their kind in the world with a height and base diameter of 165m. Kendal has six 686 megawatt (MW) units that generates 4 116 MW.

The current ash disposal facility of the Kendal Power Station is running out of space due to the poor quality coal accessible for combustion, which produces more ash than was anticipated. In addition the life span of Kendal has also been extended to 2053, which would render the available ash disposal space inadequate to accommodate continuation of disposal.

Alternatives have been considered, and it is envisaged that the continuation of the Kendal Ash Disposal Facility will include the following:

- Continuing the current ash disposal activity onto Eskom owned land with an estimated footprint of ~310ha (including associated infrastructure);
- Expansion of the emergency dump area (See Figure 4 – Emergency dumping area);

Figure 5 – Conceptual engineering design (May 2014)

2.3 Project motivation

The following project motivations are relevant:

- Environmental authorisation was not previously required for the Kendal Ash disposal facility, due to the fact that no environmental regulations were in place when construction started. Nonetheless an area earmarked for disposal of the ash was delineated during the planning stages of the power station.
- Kendal Power Station is running out of space due to the poor quality coal accessible for combustion which produces more ash than was anticipated.
- The life span of Kendal has also been extended to 2053.

2.4 Description of the waste stream

*2.4.1 **Sources of Waste to be disposed***

This project will address the following waste stream produced at Kendal Power Station:
Fly and coarse ash from coal burning operations.

2.5 Technical Project Description

*2.5.1 **Footprint and Lifespan***

The footprint required by the new facility was calculated to be approximately 310 hectares. The facility is anticipated to accommodate an ash volume of 103 Million m3 and have a dump height of 60m. Side slopes of 1[v]:5[h] were used with an approach slope of 1[v]:20[h]. The model information is summarised in Table 3-2.

*2.5.2 **Height***

The footprint and geotechnical conditions will influence the height of the continuous disposal facility as shown above. Further details to be provided at a later stage.

*2.5.3 **Operation of the facility***

The current operations at the facility shall continue to the North by means of extending the current stacker and spreader. Management activities will include dust suppression from return water dams and re-vegetation of the stable areas of the dump will commence as part of the re-vegetation and rehabilitation of the area. The final design will determine how the return water dams will function and where these will constructed.

The following associated infrastructure is envisaged for the continuation of the ash disposal facility.

*2.5.4 **Clean and Dirty Water Separation (return water dams and trenches / drains)***

A clean and dirty water separation system will be designed for the facility dependant on the slope. Dirty storm water from the facility will be collected and channelled to a return water dam. The capacity requirements will be determined by an engineering investigation that will be undertaken during the EIA phase. Clean water cut-off canals/trenches/drains will be established to divert clean water back into the natural environment.

*2.5.5 **Pipelines or canals***

A network of pipelines or canals, design dependant, will be installed to, amongst others: transport water to and from the return water dams; transport water for dust suppression; and to transport water collected from the waste facility to the return water dam.

*2.5.6 **Internal and external Access Roads***

Access roads will be established, initially to allow for construction vehicles, but some of these roads may be retained post construction to allow for maintenance of the facility. The location of these access roads has not yet been determined, and will form part of the next phase of assessment.

*2.5.7 **Fencing and Access Control***

It is envisaged that the access roads and disposal site will be fenced off for safety and security reasons.

*2.5.8 **Storm Water Drainage and Monitoring Boreholes***

As part of the site design, on-going monitoring of the site storm water drainage features will be undertaken and additional monitoring boreholes are to be installed for monitoring. Monitoring is to be conducted with reference to applicable standards. As part of the conceptual designs a storm water management plan will be developed to ensure that storm water is adequately addressed.

2.5.9 ***Relocation of Existing Service Infrastructure***

Any services on the proposed property shall be identified as part of the impact assessment phase and the rerouting of any of these services will be investigated and potential corridors identified. It is envisaged that, wherever possible, the rerouting of services will be addressed as a component of this EIA and not as a separate study undertaken at a later date.

2.5.10 ***Construction Area***

The construction area for the ash disposal site will be the footprint of the disposal site, as well as any additional features required as part of the construction i.e. an access road, conveyors, new pipelines/canals, and areas to be rehabilitated. At this stage the full size of the site and associated infrastructure is estimated to be in the order of 310 ha. The exact surface area is still to be determined by the design of the facility. Construction activities will be limited to the areas mentioned above.

2.5.11 ***Expansion of the E-dump***

The E-dump, as per **Figure 4** above, will need to be extended in order to ensure appropriate space in case of emergency.

3 ASSESSMENT METHODOLOGY

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

3.1 Methodology for Assessing Heritage Site significance

This Heritage Impact Assessment (HIA) report was compiled by PGS Heritage (PGS) for the proposed extension of the Kendal Continuous Ash Facility and Emergency Ash Dump. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by a qualified archaeologist (March 2013), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

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

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
    - Low - <10/50m2
    - Medium - 10-50/50m2
    - High - >50/50m2
- 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 development activity position;
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

Site Significance
Site significance classification standards prescribed by the SAHRA (2006) and approved by the ASAPA for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 1: Site significance classification standards as prescribed by SAHRA.

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

3.2 Methodology for Impact Assessment

The impact assessment is conducted by determining how the proposed activity will affect the state of the environment previously described. Specific requirements are:

- Undertake a comparative assessment to identify and quantify the environmental and/or social aspects of the various activities associated with the proposed project;
- Assess the impacts that may accrue and the significance of those impacts using the methodology as described below; and
- Identify and assess cumulative impacts utilising the same rating system.

3.2.1 IMPACT ASSESSMENT METHODOLOGY

The impacts must be rated according to the methodology described below. Where possible, mitigation measures must be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology was 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 is 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 2.

Table 2: Quantitative rating and equivalent descriptors for the impact assessment criteria

Rating	Significance	Extent Scale	Temporal Scale
1	VERY LOW	*Isolated sites / proposed route*	Incidental
2	LOW	*Study area*	Short-term
3	MODERATE	*Local*	Medium-term
4	HIGH	*Regional / Provincial*	Long-term
5	VERY HIGH	*Global / National*	Permanent

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

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^2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 3 below.

Table 3: 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 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.

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 4.

Table 4: Description of the spatial 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 route.
2	Study Area	The impact will affect an area not exceeding the Eskom servitude.
1	Isolated Sites / proposed route	The impact will affect an area no bigger than the power line pylon footing..

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 5.

Table 5: 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.

Degree of Probability

Probability or likelihood of an impact occurring will be described as shown in Table 6 below.

Table 6: 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

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 7. 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 7: 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.

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:

Impact Risk = ((SIGNIFICANCE **+** *Spatial* **+** Temporal) **÷** 3) **X** (Probability **÷** 5)

An example of how this rating scale is applied is shown in Table 8 below.

Table 8: Example of Rating Scale

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	LOW	Local	Medium-term	Could Happen	
Impact to air	2	3	3	3	1.6

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 9 below.

Table 9: Impact Risk Classes

Rating	Impact Class	Description
0.1 – 1.0	1	Very Low

1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

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.

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.

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 <u>underline</u>
- Probability – in <u>*italics and underlined*</u>
- Degree of certainty - in **bold**
- Spatial Extent Scale – in *italics*

4 CURRENT STATUS QUO

4.1 Archaeological Background

The Stone Age is divided in Earlier; Middle and Later Stone Age and refers to the earliest people of South Africa who mainly relied on stone for their tools.

Earlier Stone Age: The period from ± 2.5 million yrs - ± 250 000 yrs ago. Acheulean stone tools are dominant.

Middle Stone Age: Various lithic industries in SA dating from ± 250 000 yrs – 22 000 yrs before present.

Later Stone Age: The period from ± 22 000-yrs before present to the period of contact with either Iron Age farmers or European colonists.

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

The Early Iron Age: Most of the first millennium AD.

The Middle Iron Age: 10th to 13th centuries AD

The Late Iron Age: 14th century to colonial period.

4.2 Historical Background

4.2.1 ***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 6**. 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 following observations can be made from the map:

Three farmhouses are depicted in the study area. These features are distributed across one farm, Schoongezicht.

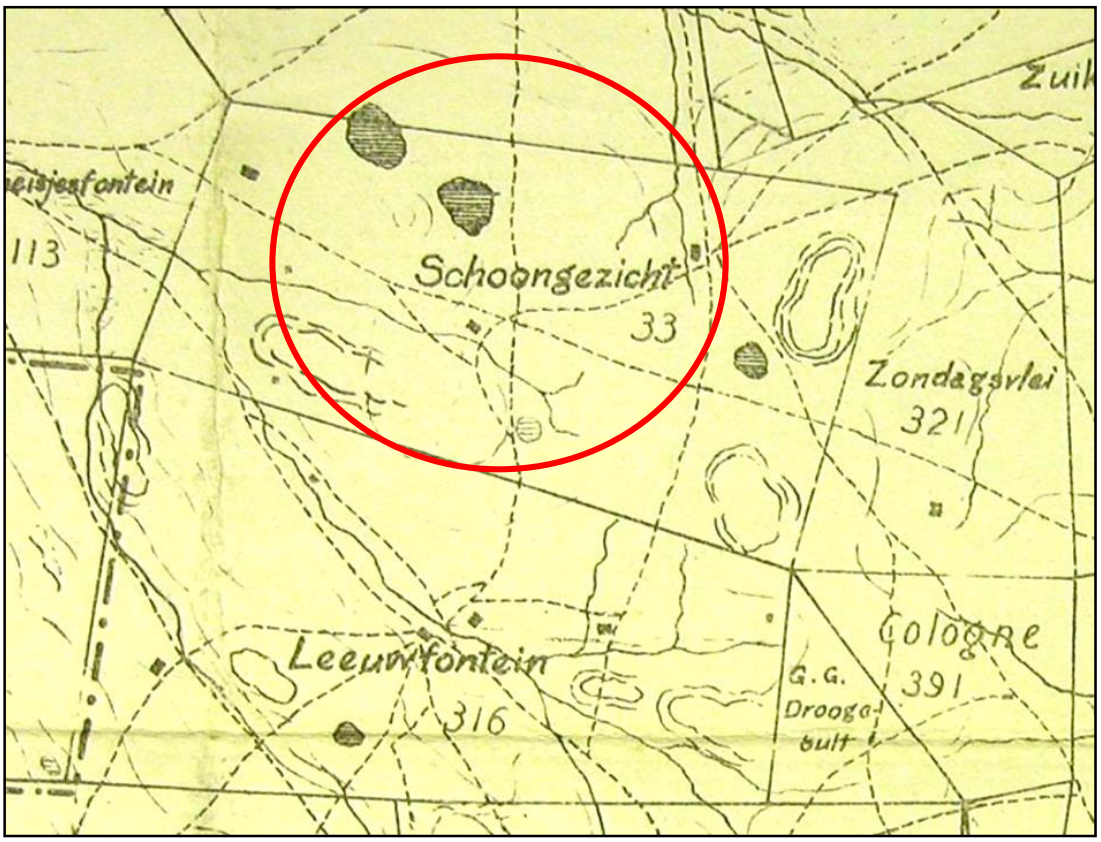


Figure 6 - A section of the 'Bethal' sheet of the Major Jackson Map Series dated to April 1901 is shown. The approximate boundaries of the study area are outlined in red

*4.2.2 **Untitled Map, possibly dated to c. 1913***

The map depicted in **Figure 7** 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 following observations can be made:

The map depicts seven farmhouse/building individual structures.

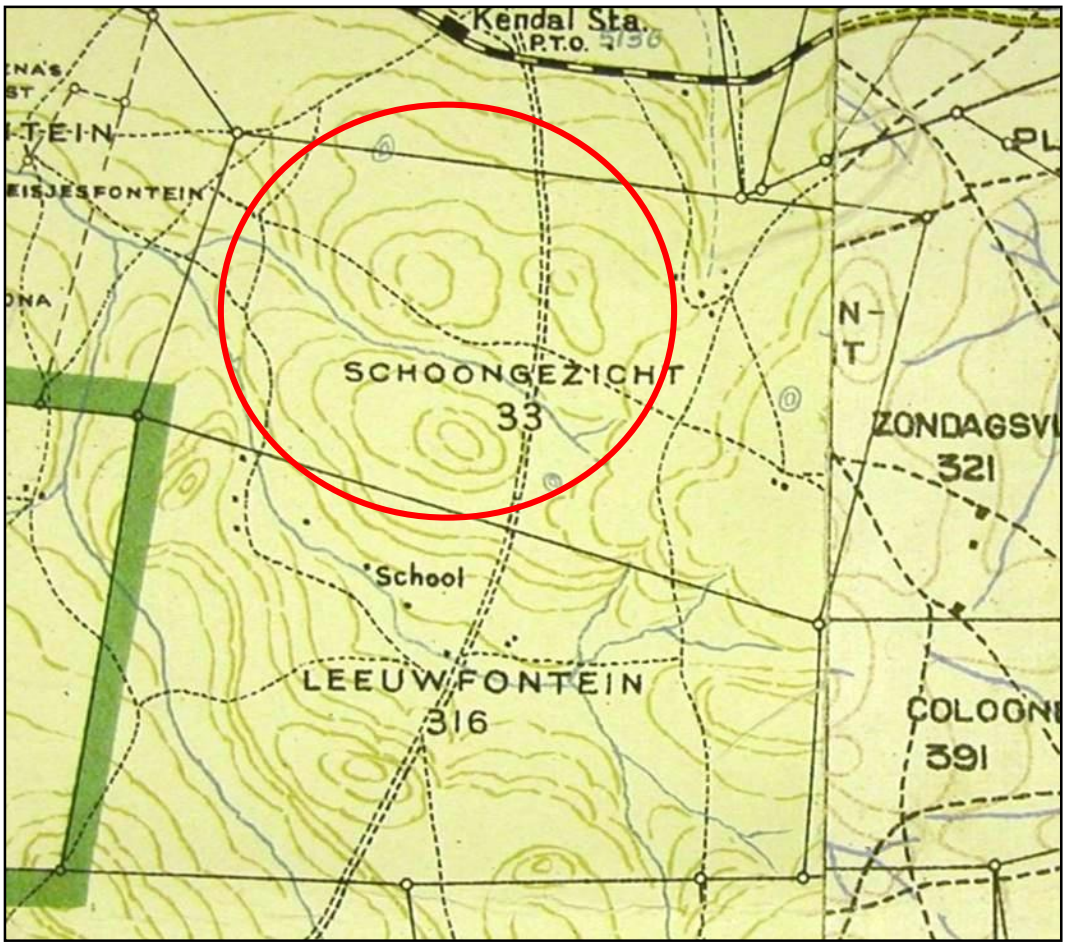


Figure 7 - *A section of an untitled and undated map is shown*.

4.3 THE STUDY AREA AND THE SOUTH AFRICAN WAR

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.

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.

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 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). The column was commanded by Lieutenant-Colonel G.E. Benson.

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 rearguard 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 rearguard 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 rearguard. This led the rearguard'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 rearguard units, to provide support for the latter. However, when he heard of the rearguard's retreat back to camp, he ordered two squadrons of the 2nd Scottish Horse to accompany him toward the rearguard 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 rearguard. 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 approaching catastrophe."

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.

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).

4.4 Palaeontology of the area

The following section is an extract from the Palaeontological Desktop Study, attached as **Appendix C**.

The study area is mainly underlain by Vaalian and Mokolian aged igneous rocks of the Transvaal Sequence and Bushveld Complex, with three small outlying areas, including the E-dump area, underlain by Permian Vryheid Formation sediments of the Karoo Supergroup. (Figure 8).

The Permian Balfour Formation (Pub) is well known to contain fossils and is interpreted as a meandering river deposit grading upwards into a lacustrine environment. The Formation is correlated with the Dicynodon Assemblage zone, which is known as a productive fossil bearing strata (Rubidge et al, 1995). The upper part of the Balfour Formation is known as the Palingkloof Member which in turn is associated with the Lystrosaurus Assemblage zone (Groenewald, 1996).

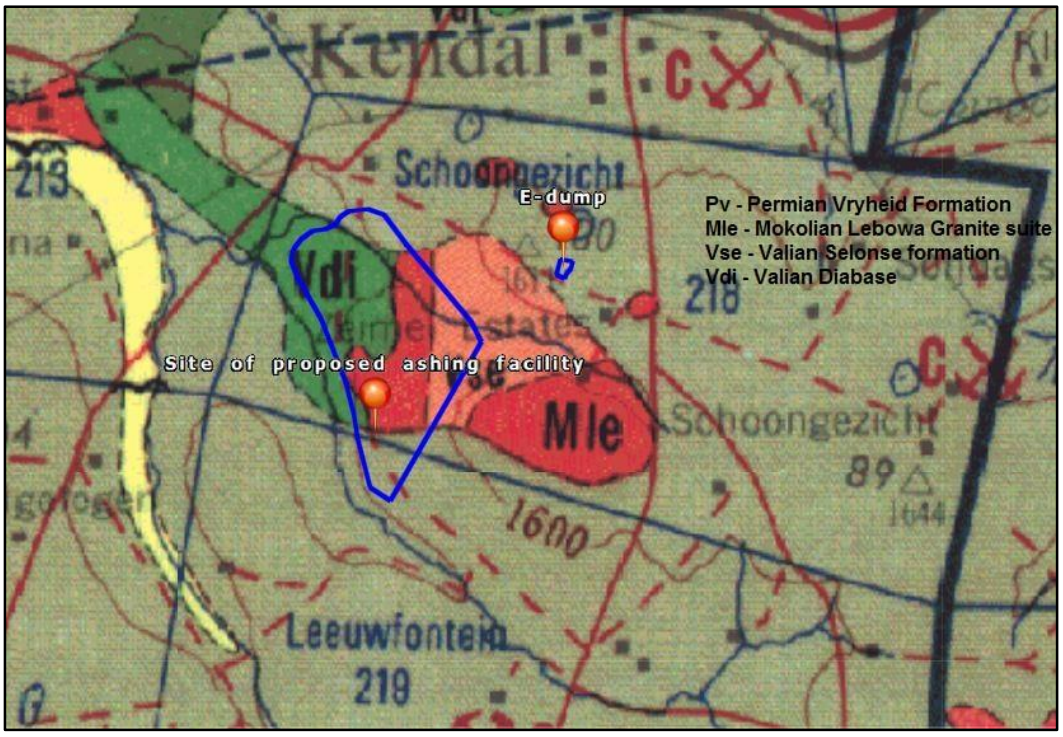


Figure 8 – Geology of the study area

Selons River Formation (Vse)

The Selons River Formation of the Rooiberg Group of the Transvaal Super Group is a Porphyrite Rhyolite with interbedded mud and sandstone.

Valian Diabase (Vdi)

Diabase of Valian age, intrusive igneous rock.

Mokolian Lebowa Granite suite (Mle)

Medium-grained porphyritic granite, red, coarse-grained biotite granite.

Vryheid Formation (Pv)

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

4.4.1 ***Palaeontological significance***

The palaeontological sensitivity is predicted after identifying potentially fossiliferous rock units; ascertain the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity is summarised in **Table 10** and Figure 14.

Table 10 - Palaeontological Significance of Geological Units on Site

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

There is a moderate possibility that fossils could be encountered during excavation of bedrock in the Vryheid Formation. The development of an ashing facility will most likely not result in deep excavation of geology.

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

4.5 Fieldwork findings

*4.5.1 **Methodology***

The field work was conducted by an archaeologist of PGS through controlled exclusive survey of the study area as well as the emergency dump inside the Kendal Power Station. Tracklogs of the fieldwork was logged and is depicted in **Figure 9**.

All structure identified was logged with handheld GPS and documented with digital camera.

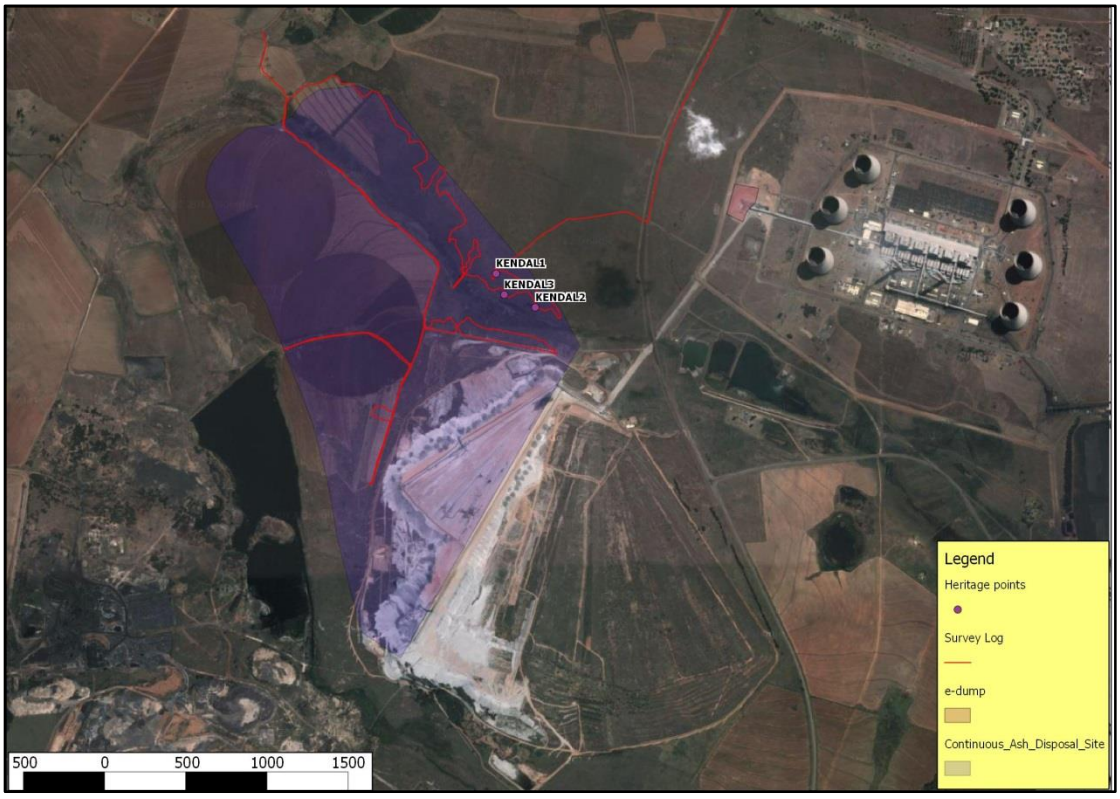


Figure 9 – Survey track logs

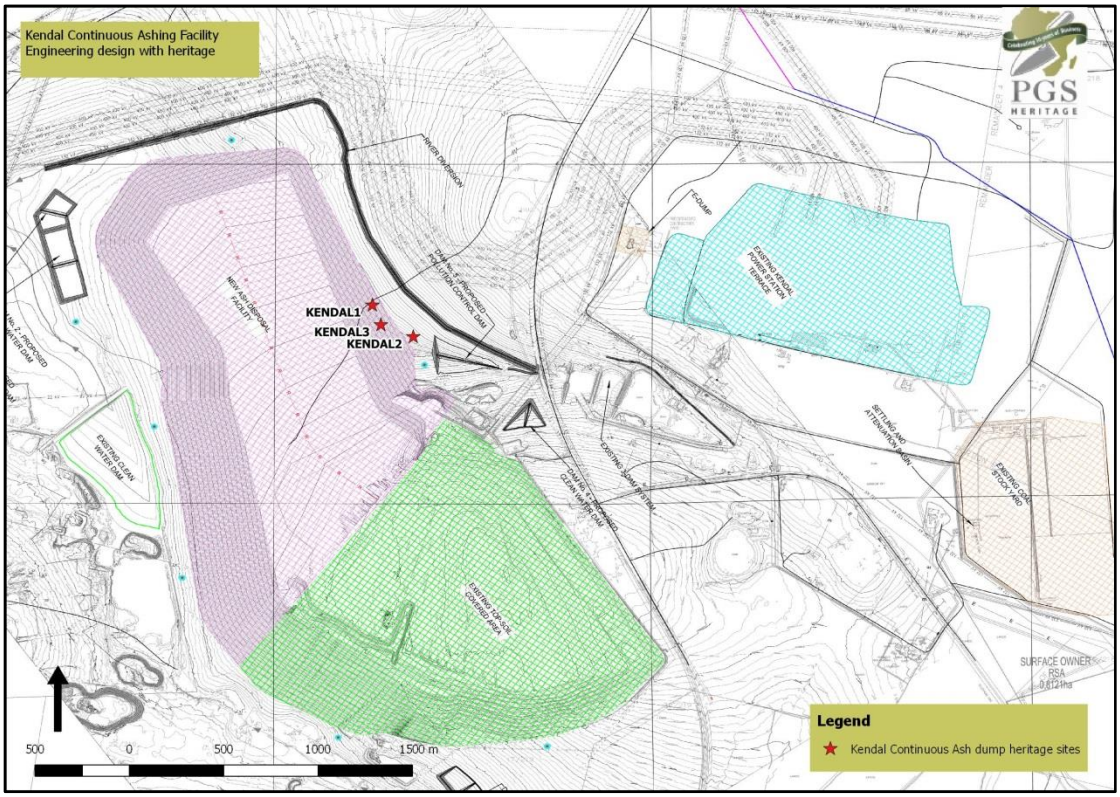


Figure 10 – Continuous Ashing facility – engineering design with heritage sites indicated

4.5.2 ***Kendal 1***

GPS Coordinates: S26.09028 E28.94527

The site consists of the ruins of a farm worker homestead, constructed with cement bricks and mortar. The structure consists of 3 rooms, with two entrances to the outside facing east. A low stone build wall forms a courtyard on the eastside of the structure.

The structure was constructed in the last 20 years has no heritage significance.

Figure 11 – Structure as viewed from the east towards the existing ash dump

Impact Evaluation:

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	VERY LOW	*Isolated Sites / proposed site*	Permanent	*Very Likely*	
Impact on heritage structure	-	1	1	5	4	1.87

Mitigation:

No further mitigation required

4.5.3 ***Kendal 2***

GPS Coordinates: S26.09195 E28.94744

The site consists of a single stone packed structure aligned east-west, situated to the western side of a eucalyptus grove. The dense vegetation made a thorough evaluation of the site difficult. However the size, shape and alignment indicate that the structure can be a grave. The site is provisionally graded as having a Heritage Significance of **Grade 3B Local Significant.**

Figure 12 – Position of stone structure viewed towards existing ash dump

Figure 13 – Close-up of stone structure (note dense vegetation)

Impact Evaluation:

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	HIGH	*Study Area*	Permanent	*Could happen*	
Impact on possible grave	-	4	2	5	3	2.20

Mitigation:

1. Investigate the presence of more structures through the clearing of vegetation.
2. If it is found after site clearance that the structure still present the possibility of being a grave, it is recommended that a test excavation be done to determine the presence of a grave or grave pit.
3. If the structure is determined to be a grave, a full grave relocation process with a detailed social consultation process need to be initiated to enable the possible relocation of the remains.

4.5.4 ***Kendal 3***

GPS Coordinates: S26.09132 E28.94573

The site is classified as a find spot and is situated on a low rocky ridge to the eastern side of the eastern tributary running through the study area. Two Later Stone Age reworked glass shards were found between loose rocks on the outcrop. No other stone tools were found during the scan of the area. The find spot has a of low heritage significance.

The structure was constructed in the last 20 years has no heritage significance.

Figure 14 – View of find spot from east toward existing ash dump

Figure 15 – LSA artefacts manufactured from glass.

Impact Evaluation:

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	VERY LOW	*Isolated Sites / proposed site*	Permanent	*Very Likely*	
Impact on find spot	-	1	1	5	4	1.87

Mitigation:

No further mitigation required

Refer to Appendix A for distribution maps of heritage sites.

*4.5.5 **Palaeontology***

The development might have an impact on the palaeontology of the site and therefore monitoring and mitigation in terms of the palaeontological heritage are required.

The following colour coding method is used to classify a development area's palaeontological impact as illustrated in **Figure 16**:

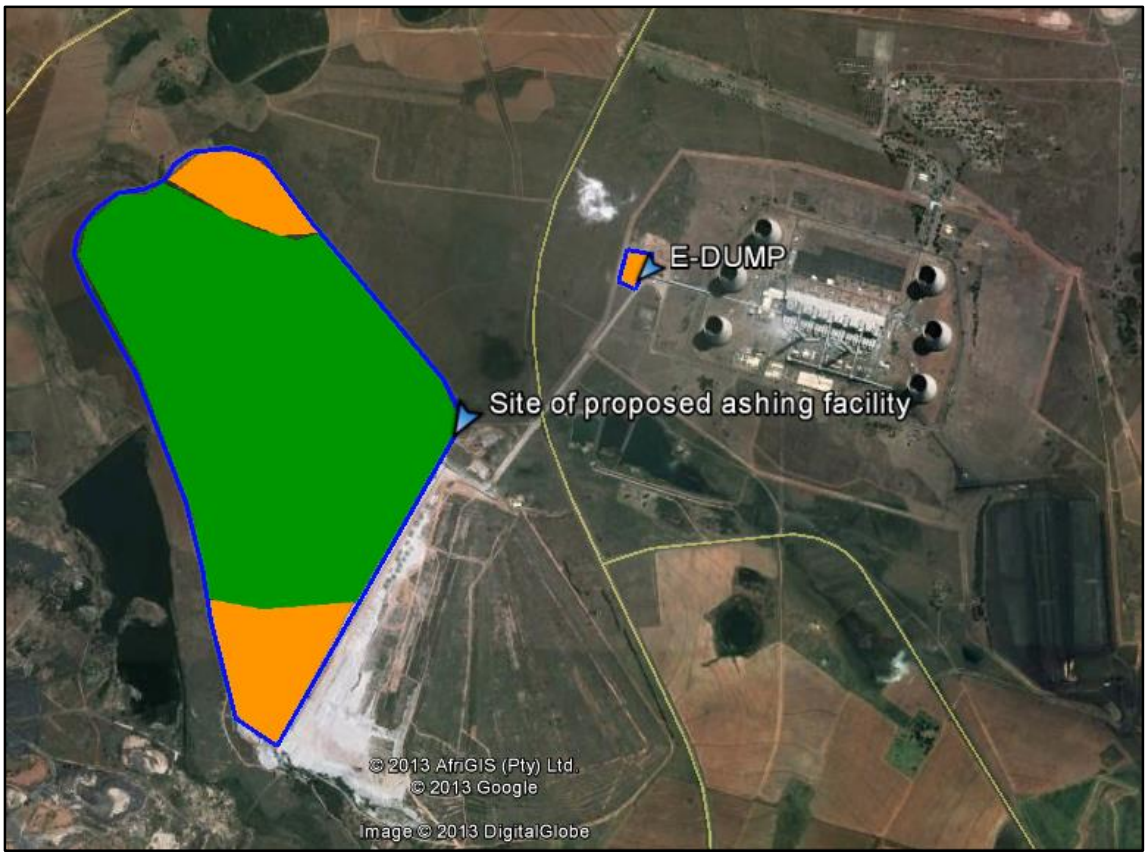
- **Red colouration** indicates a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops on the site/route and the chances of finding fossils during the construction phase are very high.
- **Orange colouration** indicates a possibility of finding fossils of a specific assemblage zone either in outcrops or in bedrock on the site/route. Fossils will probably be present on the site/route and the chances of finding fossils during the excavation phase are high.
- **Green colouration** indicates that there is no possibility of finding fossils in that section of the site/route development.

Impact Evaluation

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	HIGH	*Study Area*	Permanent	*Could happen*	
Impact on palaeontology	-	4	2	5	3	2.20

Mitigation:

1. If excavation that will affect bedrock into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas.
2. If excavation that will affect bedrock into the Vryheid Formation is envisaged, the Palaeontologist must accompany the surveyor and topsoil clearing teams assessing exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
    a. If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
    b. If applicable, the palaeontologist must compile a Phase 1 report to the Heritage Authority.



	Low Sensitivity		Moderate Sensitivity		High Sensitivity

Figure 16 – Palaeontological Sensitivity

Mitigation:

No further mitigation required.

5 CONCLUSIONS AND RECOMMENDATIONS

During the heritage study 3 heritage sites were identified of which one will require further mitigation work.

The following mitigation and direct management measures during construction will be required:

Possible graves

1. Investigate the presence of more structures through the clearing of vegetation.

2. If it is found after site clearance that the structure still present the possibility of being a grave, it is recommended that a test excavation be done to determine the presence of a grave or grave pit.
3. If the structure is determined to be a grave, a full grave relocation process with a detailed social consultation process needs to be initiated to enable the possible relocation of the remains.

Palaeontology

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2628 East Rand) in conjunction with Google Earth. The known fossil heritage within each rock unit was determined from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience. The major limitation of this study is that no supporting field assessment was made and the assumption that existing geological maps and datasets used to assess site sensitivity are correct and reliable.

Recommendations:

1. If excavation that will affect bedrock into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas.
2. If excavation that will affect bedrock into the Vryheid Formation is envisaged, the Palaeontologist must accompany the surveyor and topsoil clearing teams assessing exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
    a. If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
    b. If applicable, the palaeontologist must compile a Phase 1 report to the Heritage Authority.

General

Further to these recommendations the general Heritage Management Guidelines in Section 6.1 need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

6 HERITAGE MANAGEMENT GUIDELINES

6.1 General Management Guidelines

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

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

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

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

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

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

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

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

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

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

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

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

This survey and evaluation must include:

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

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

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

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

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

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

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

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

    a) Heritage;
    b) Graves;
    c) Palaeontology;
    d) Archaeological finds; and
    e) Historical Structures.

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

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

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

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

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

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

9. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.
10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

The purpose of an archaeological/palaeontological monitoring programme[1] is:

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

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

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

Table 11: Roles and responsibilities of archaeological and heritage management

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

6.2 All phases of the project

6.2.1 ***Archaeology***

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

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

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

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

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

6.2.2 ***Graves***

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

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

The grave relocation process must include:

i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
ii. Site notices indicating the intent of the relocation;
iii. Newspaper notices indicating the intent of the relocation;
iv. A permit from the local authority;
v. A permit from the Provincial Department of Health;

vi. A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;

vii. An exhumation process that keeps the dignity of the remains intact;

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

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

7 REFERENCES

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

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

Major Jackson Series, Sheet "Bethal", Revised Edition April 1901

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.

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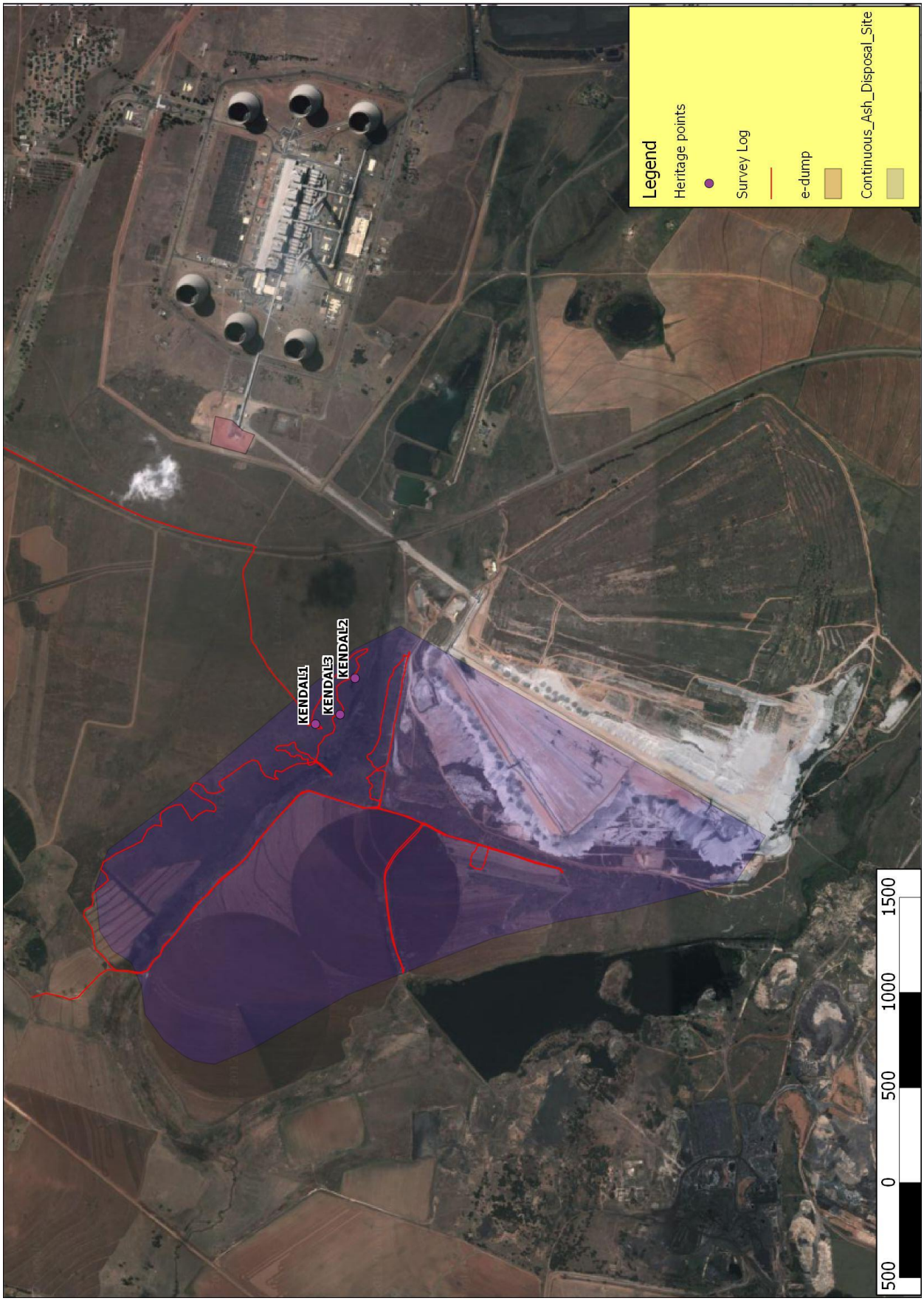
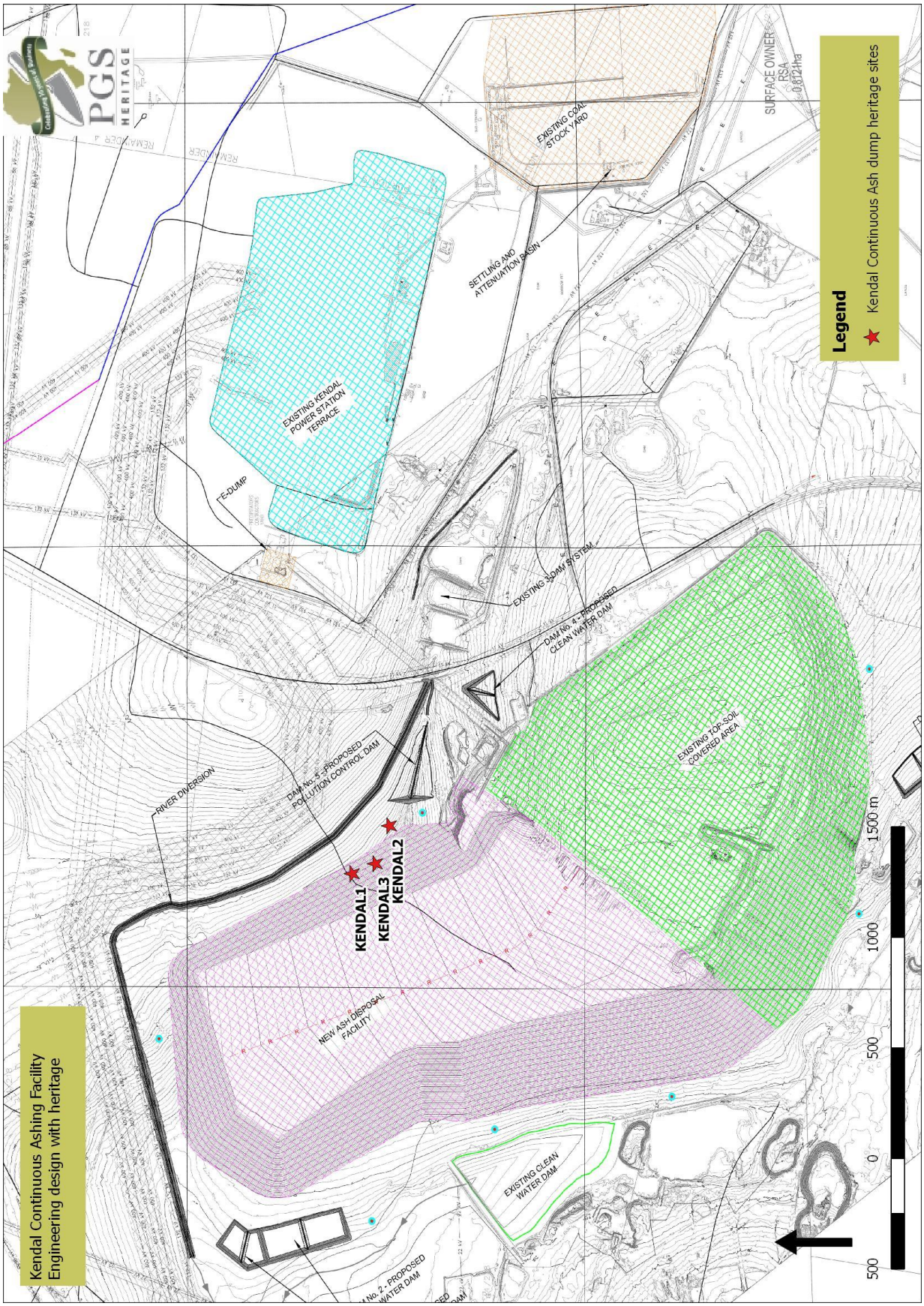
Appendix A

HERITAGE SITE DISTRIBUTION MAPS


Legend
Heritage points
Survey Log
e-dump
Continuous_Ash_Disposal_Site
KENDAL1
KENDAL3
KENDAL2
500
0
500
1000
1500


Kendal Continuous Ashing Facility
Engineering design with heritage
Legend
Kendal Continuous Ash dump heritage sites
KENDAL1
KENDAL3
KENDAL2
NEW ASH DISPOSAL FACILITY
EXISTING KENDAL POWER STATION TERRACE
EXISTING COAL STOCK YARD
SETTLING AND ATTENUATION BASIN
SURFACE OWNER
RSA
0.6124ha
E-DUMP
EXISTING 33dAM S/SYSTEM
DAM No. 4 - PROPOSED CLEAN WATER DAM
EXISTING TOP SOIL COVERED AREA
DAM No. 3 - PROPOSED POLLUTION CONTROL DAM
RIVER DIVERSION
EXISTING CLEAN WATER DAM
DAM No. 2 - PROPOSED WATER DAM
500
0
500
1000
1500 m

Appendix B

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

3.1 General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit 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 NHRA, permits are required to damage, destroy, alter, or disturb them. People who already possess material are required to register it. The management of heritage resources is integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a formal cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to 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 under 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 under the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

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

Appendix C

PALAEONTOLOGICAL DESKTOP ASSESSMENT

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED KENDAL ASHING FACILITY NEAR OGIES IN MPUMALANGA PROVINCE

FOR

HIA CONSULTANTS

DATE: 18 MARCH 2013

By

GIDEON GROENEWALD

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by PSG Heritage to undertake a desktop survey, assessing the potential palaeontological impact of the proposed Kendal Ashing Facility, situated in the Emalahleni Municipality of the Nkangala District, Mpumalanga Province.

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

The proposed ashing facility of approximately 310 ha is situated close to the town of Ogies in the Mpumalanga Province.

A basic desktop assessment of the topography and geology of the area was made by using 1:250 000 geological maps (2628 East Rand) in conjunction with Google Earth. The known fossil heritage within each rock unit was determined from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience. The major limitation of this study is that no supporting field assessment was made and the assumption that existing geological maps and datasets used to assess site sensitivity are correct and reliable.

Recommendations:

- If deep excavation into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas.
- If deep excavation into the Vryheid Formation is envisaged, the Palaeontologist must accompany the surveyor and topsoil clearing teams assessing exposed potential fossil bearing areas and rescue any fossils from the construction footprint.
- If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.
- If applicable, the palaeontologist must compile a Phase 1 report to the Heritage Authority.

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1 INTRODUCTION

1.1 Background

Gideon Groenewald was appointed by PSG Heritage to undertake a desktop survey, assessing the potential palaeontology impact of the proposed Kendal Ashing Facility, situated in the Emalahleni Municipality of the Nkangala District, Mpumalanga Province.

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

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

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

1.2 Aims and Methodology

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

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

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

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

Table 1.1 Palaeontological Sensitivity Analysis Outcome Classification

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

1.3 Scope and Limitations of the Desktop Study

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

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

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

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

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed ashing facility of approximately 310 ha is situated near the town of Ogies in the Mpumalanga Province (Figure 2.1).

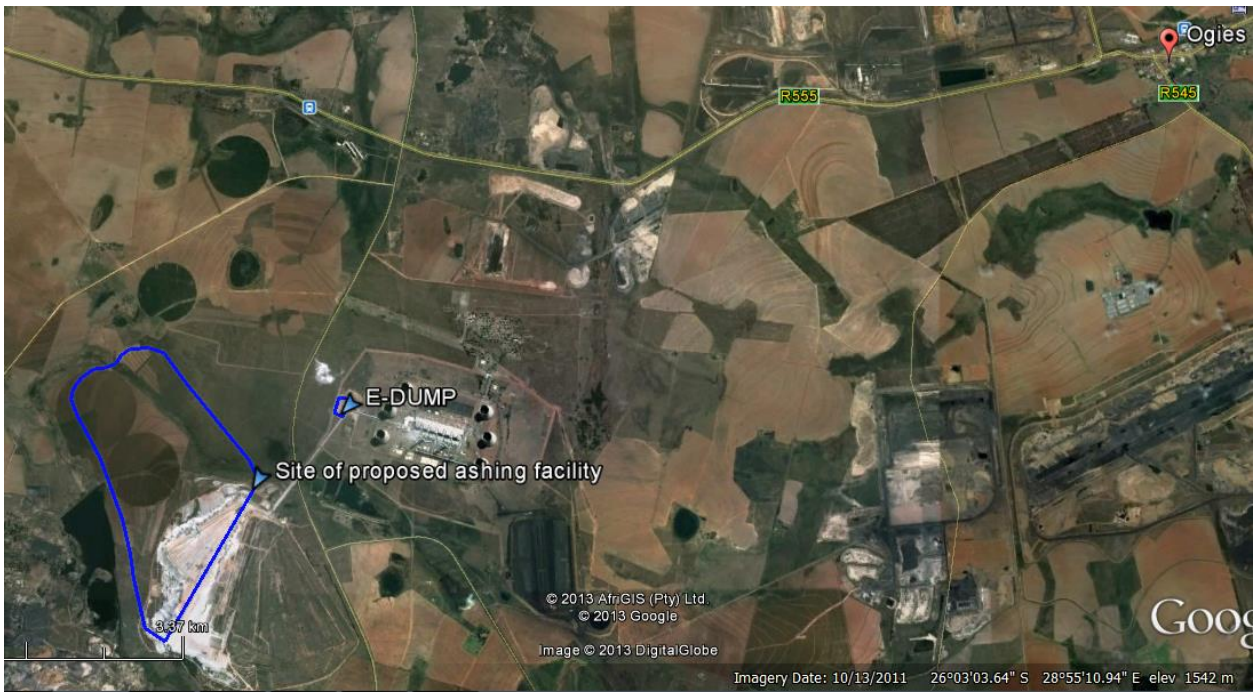


Figure 2.1 Site of ashing facility

3 GEOLOGY OF THE AREA

The study area is mainly underlain by Vaalian and Mokolian aged igneous rocks of the Transvaal Sequence and Bushveld Complex, with three small outlying areas, including the E-dump area, underlain by Permian Vryheid Formation sediments of the

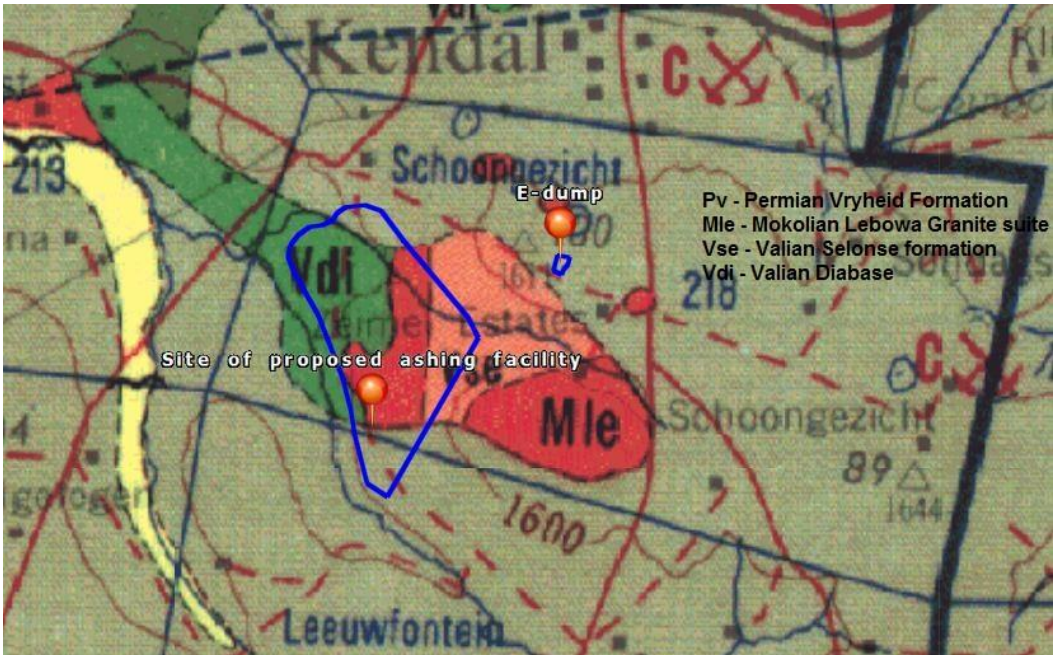


Figure 3.1 Geology of study area

Karoo Supergroup. (Figure 3.1).

3.1 Selons River Formation (Vse)

The Selons River Formation of the Rooiberg Group of the Transvaal Super Group is a Porphyrite Rhyolite with interbedded mud and sandstone.

3.2 Valian Diabase (Vdi)

Diabase of Valian age, intrusive igneous rock.

3.3 Mokolian Lebowa Granite suite (Mle)

Medium-grained porphyritic granite, red, coarse-grained biotite granite.

3.4 Vryheid Formation (Pv)

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

4 PALAEONTOLOGY OF THE AREA

4.1 Selons River Formation (Vse)

Due to the age and igneous character of Porphyrite Rhyolite it will contain no fossils.

4.2 Valian Diabase (Vdi)

Due to the igneous character, these rocks will not contain fossils

4.3 Mokolian Lebowa Granite suite (Mle)

Due to the igneous character, these rocks will not contain fossils

4.4 Vryheid Formation (Pv)

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

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

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

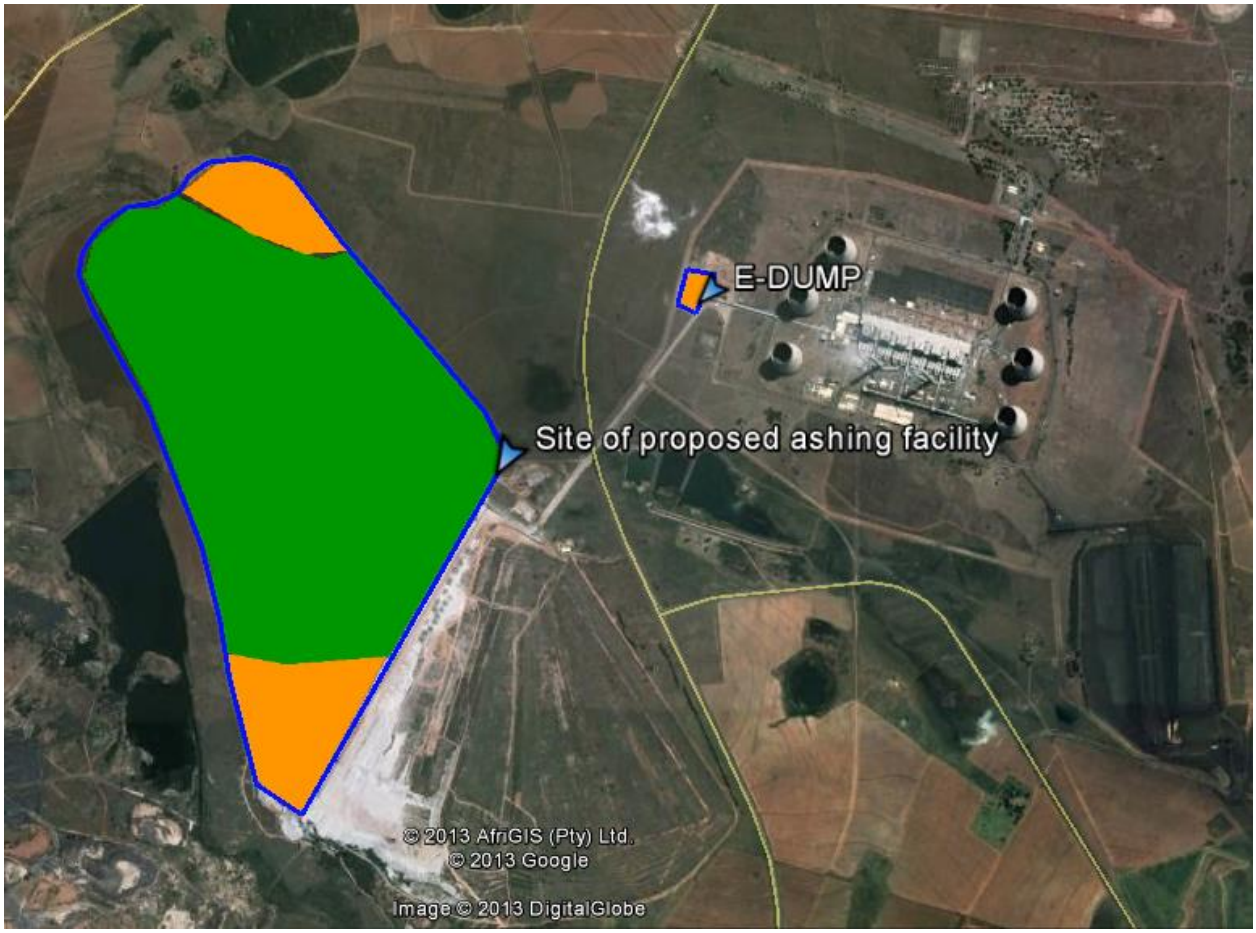
The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation of Natal. The Karoo sediments are almost entirely lacking in body fossils, but ichnofossils are locally abundant. Modern sedimentological and ichnofaunal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

5 PALAEONTOLOGICAL SENSITIVITY

The palaeontological sensitivity is predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The palaeontological sensitivity is summarised in Table 4.1 and illustrated in Figure 5.1 below.

Table 5.1 Palaeontological Sensitivity of Geological Units on Site

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



	Low Sensitivity		**Moderate Sensitivity**		**High Sensitivity**

Figure.5.1 Palaeontological Sensitivity Localities

6 CONCLUSION AND RECOMMENDATIONS

The study area is mainly underlain by Vaalian and Mokolian aged igneous rocks of the Transvaal Sequence and Bushveld Complex, with three small outlying areas, including the E-dump area, underlain by Permian Vryheid Formation sediments of the Karoo Supergroup.

There is a moderate possibility that fossils could be encountered during deep excavation of the Vryheid Formation. The development of an ashing facility will most likely not result in deep excavation of geology.

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

It is therefore recommended that:

If deep excavation into the Vryheid Formation is envisaged, a Palaeontologist must be appointed as part of the Environmental Construction Team for the identified medium sensitivity areas.

If deep excavation into the Vryheid Formation is envisaged, the Palaeontologist must accompany the surveyor and topsoil clearing teams assessing exposed potential fossil bearing areas and rescue any fossils from the construction footprint.

If applicable, a palaeontological rescue and/or destruction permit must be obtained by the Palaeontologist.

If applicable, the palaeontologist must compile a Phase 1 report to the Heritage Authority.

7 REFERENCES

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

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

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

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

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

8 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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

9 DECLARATION OF INDEPENDENCE

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

Dr Gideon Groenewald
Geologist