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HaskoningDHV**
Enhancing Society Together

Appendix P: Heritage and Palaeontology

Heritage Impact Assessment

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
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Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBAPOWER STATION IN LEPHALALE, LIMPOPO PROVINCE

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4.2 The specialist appointed in terms of the Regulations_

I, J A van Schalkwyk _____, declare that --

General declaration:

I act as the independent specialist in this application

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Name of company (if applicable):

5 April 2014

Date:

**HERITAGE IMPACT ASSESSMENT FOR THE
PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBA
POWER STATION, LEPHALALE, LIMPOPO PROVINCE**

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBA POWER STATION, LEPHALALE, LIMPOPO PROVINCE

Report No: 2014/JvS/021
Status: Revised
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Date: April 2014

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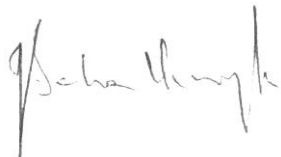
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Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services.



J A van Schalkwyk (D Litt et Phil)
Heritage Consultant
April 2014

EXECUTIVE SUMMARY

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBA POWER STATION, LEPHALALE, LIMPOPO PROVINCE

Ash is a by-product of the combustion of coal in coal fired power stations. At Matimba Power Station, this ash is currently being disposed by means of 'dry-ashing' at a facility approximately 3 km (three kilometres) south of the power station. The proposed ash disposal facility will ensure that the power station is able to accommodate the ashing requirements for the remaining life (approximately 44 years) of the power station.

In accordance with Section 38 of the National Heritage Resource Act, 1999 (Act No 25 of 1999), an independent heritage consultant was appointed by **Royal HaskoningDHV** to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of site alternatives where the proposed ash disposal facility is to be located and linear infrastructure route.

The cultural landscape qualities of the larger region essentially consist of a single component, which is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) and a much later colonial (farmer) component.

As this is an environment that presents very little resources such as hills and outcrops for settling in, poor grazing and a lack of open water, the habitation of the region by humans has always been very low. It was only with the arrival of drilling rigs that below surface water could be accessed, that the population density increased.

Alternative 1:

- A ruined house structure has been identified as existing on the site. As this feature is accorded a low significance, it is viewed as recorded in full after inclusion in this report and no further mitigation action is required.

Alternative 2:

- As no heritage sites occur on alternative site 2, there would be no impact resulting from the proposed development.

However, the remains of a small house structure that was demolished in approximately 1999 exists close to the western boundary of the development site. According to Mr Mokau who has been living in this house before it was demolished there is also a grave(s) in the vicinity of the house. The graves were only marked with stones and did not have any inscriptions. The last time it was seen, it was covered by a tree that had fallen over it. During the site visit, it could not be located despite searching for it for nearly an hour. A second farm worker, known only as John, who claimed to have last seen the grave, could also not locate it. According to current understanding, this site (the house as well as the graves) would be located just outside the proposed development. However, it is indicated in this report as a red flag area which should be avoided.

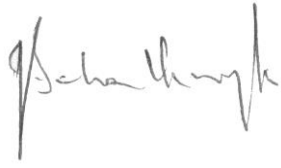
It is recommended that before development takes place on Site Alternative 2, Exxaro should get their workers, e.g. Mr Mokau, to locate and identify the graves, after which they should be properly plotted and isolated in order to prevent accidental damage.

Linear infrastructure route which includes conveyor route and access roads for Alternative 2:

- As no heritage sites occur on the linear infrastructure route for alternative site 2, there would be no impact resulting from the proposed development.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

Both site alternatives as well as the proposed linear infrastructure route to site alternative 2 can be utilised for the proposed project provided that the recommendations and mitigation measures made in the report are adhered to.

A handwritten signature in black ink, appearing to read 'J A van Schalkwyk', written in a cursive style.

J A van Schalkwyk
Heritage Consultant
September 2013

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

TECHNICAL SUMMARY

Property details						
Province	Limpopo					
Magisterial district	Ellisras					
District municipality	Waterberg					
Topo-cadastral map	2327DA					
Closest town	Lephalale (Ellisras)					
Farm name	Alternative 1: Zwartwater 507LQ; Alternative 2: sections of Vooruit 449LQ, Ganzepan 446LQ, Appelvlakte 448LQ; Droogeheuvel 447LQ					
Coordinates	Outer edges (approximate)					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	-23.61016	27.58286	2	-23.62675	27.58916
	3	-23.61403	27.62319	4	-23.59737	27.61693
	1	-23.70965	27.58241	2	-23.73145	27.57957
	3	-23.72163	27.61556	4	-23.70507	27.59936

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	Yes
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	Yes
Any other development category, public open space, squares, parks, recreation grounds	No

Development	
Description	Construction of a proposed ash disposal facility
Project name	Matimba Ash Disposal Facility

Land use	
Previous land use	Agriculture
Current land use	Game farming

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	II
TECHNICAL SUMMARY	IV
TABLE OF CONTENTS	V
LIST OF FIGURES.....	V
GLOSSARY OF TERMS AND ABBREVIATIONS	VI
1. INTRODUCTION.....	7
2. TERMS OF REFERENCE	7
3. HERITAGE RESOURCES.....	8
4. STUDY APPROACH AND METHODOLOGY	9
5. DESCRIPTION OF THE AFFECTED ENVIRONMENT	12
6. SITE SIGNIFICANCE AND ASSESSMENT	20
7. CONCLUSIONS.....	22
8. REFERENCES.....	24
APPENDIX 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE RESOURCES	26
APPENDIX 2: RELEVANT LEGISLATION	27

LIST OF FIGURES

	Page
Figure 1: Map showing selected site alternatives and linear infrastructure route for alternative 2	9
Figure 2: Track log of the field surveys on Site Alternative 1.....	11
Figure 3: Track log of the field surveys on Site Alternative 2.....	11
Figure 4: Track log of the field survey for the Site Alternative 2 linear infrastructure route.....	12
Figure 5: Location of the sites alternatives in the regional context.....	13
Figure 6: Views over Site Alternative 1	13
Figure 7: Views over Site Alternative 2	13
Figure 8: Views over Site Alternative 2 linear infrastructures route.....	14
Figure 9: Typical Later Stone Age rock art in the region.	15
Figure 10: Examples of farmsteads and farming related features in the region.	16
Figure 11: The oldest cemetery in Lephalale.....	16
Figure 12: Head-gear of the first mine shaft that was sunk in the region.	17
Figure 13: Proposed Site Alternative 1	18
Figure 14: The remains of the old house structure	18
Figure 15: Proposed Site Alternative 2	19
Figure 16: The remains of the old house structure and Mr Mokau.....	20

GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Study area: Refers to the entire study area as indicated by the client in the accompanying Fig. 1 and 2.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 000 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Late Stone Age	30 000 - until c. AD 200

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country

ABBREVIATIONS

ADRC	Archaeological Data Recording Centre
ASAPA	Association of Southern African Professional Archaeologists
CS-G	Chief Surveyor-General
EIA	Early Iron Age
ESA	Early Stone Age
LIA	Late Iron Age
LSA	Later Stone Age
HIA	Heritage Impact Assessment
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBA POWER STATION, LEPHALALE, LIMPOPO PROVINCE

1. INTRODUCTION

Matimba Power Station, located in the Limpopo Province close to Lephalale (Ellisras) town, is a 3990MW installed capacity base load coal fired power station, consisting of 6 units. Matimba is a direct dry cooling power station, an innovation necessitated by the severe shortage of water in the area where it is situated. The station obtains its coal from the Exxaro Grootegeluk Colliery for the generation of electricity.

Ash is a by-product of the combustion of coal in coal fired power stations. The ash is being disposed by means of 'dry-ashing', at a facility approximately three (3) kilometres south of the power station. The proposed ash disposal facility will ensure that the power station is able to accommodate the ashing requirements for the remaining life (approximately 44 years) of the power station.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act, 1999 (Act No 25 of 1999), no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such a site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by **Royal HaskoningDHV** to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the proposed ash disposal facility is to be located.

This HIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations (2010) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and is intended for submission to the South African Heritage Resources Agency (SAHRA).

2. TERMS OF REFERENCE

2.1 Scope of work

The aim of this HIA, broadly speaking, is to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the site and linear infrastructure route where it is planned to establish the proposed ash disposal facility.

The scope of work for this study consisted of:

- Conducting of a desk-top investigation of the alternative sites and linear infrastructures route, in which all available literature, reports, databases and maps were studied; and
- A visit to the proposed alternative sites and linear infrastructures route.

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed alternative sites and linear infrastructure route;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

2.2 Limitations

- The unpredictability of archaeological remains occurring below the surface.

2.3 Assumptions

- It is assumed that the Social Impact Assessment and Public Participation Process might also result in the identification of sites, features and objects, including sites of intangible heritage potential in the alternative sites and linear infrastructures route and that these then will also have to be considered in the selection of the preferred site.
- It is assumed that a Paleontological Review (if required) will be done by a suitably qualified specialist.

3. HERITAGE RESOURCES

3.1 The National Estate

The NHRA, 1999 (Act No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
 - ancestral graves;
 - royal graves and graves of traditional leaders;
 - graves of victims of conflict;
 - graves of individuals designated by the Minister by notice in the Gazette;
 - historical graves and cemeteries; and
 - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
 - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - objects to which oral traditions are attached or which are associated with living heritage;
 - ethnographic art and objects;
 - military objects;
 - objects of decorative or fine art;
 - objects of scientific or technological interest; and
 - books, records, documents, photographic positives and negatives, graphic, film or video material 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).

3.2 Cultural significance

In the NHRA, Section 2 (vi), it is stated that “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in the community, or pattern of South Africa's history;

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

4. STUDY APPROACH AND METHODOLOGY

4.1 Extent of the Study

Two site alternatives have been proposed for the establishment of the proposed ash disposal facility: this survey and impact assessment covers the two alternatives sites as well as the proposed conveyor belt route as presented in Figure 1.

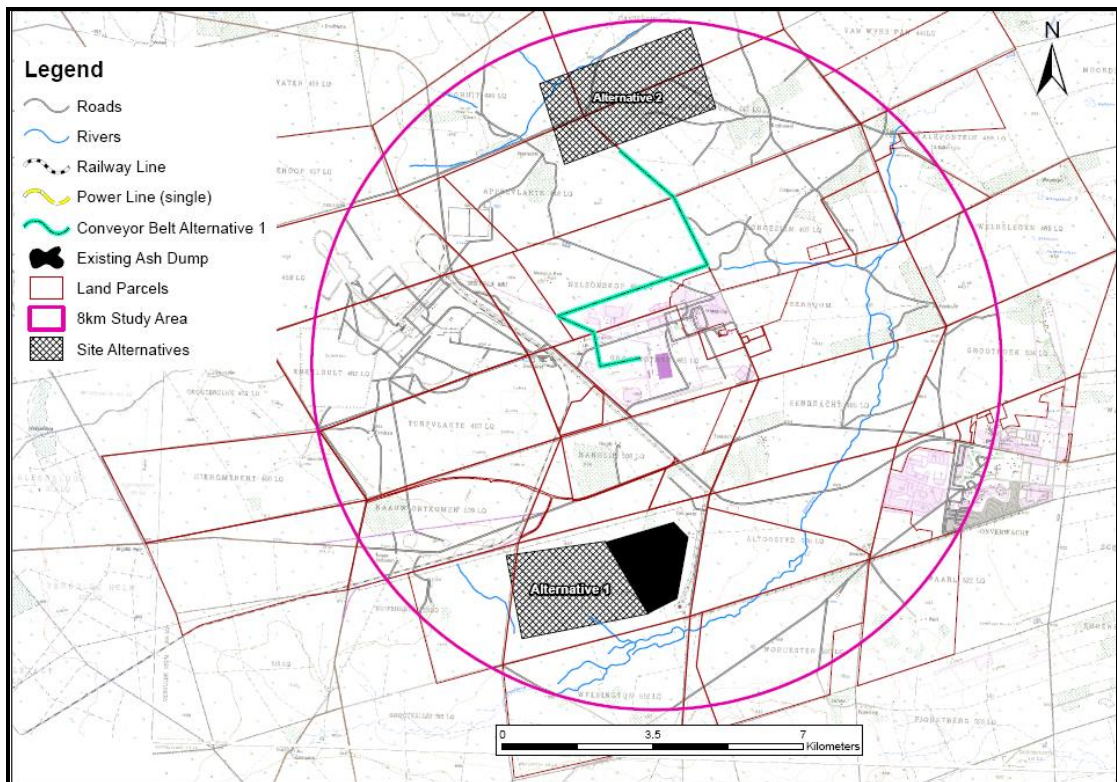


Figure 1: Map showing selected site alternatives and linear infrastructure route for alternative

2

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

4.2 Methodology

4.2.1 Preliminary investigation

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. A few publications deal with the events and people in the larger region - Baines 1877; Eastwood, Bristow & Van Schalkwyk 1999; Hall & Smith 2000. Some HIA surveys done in nearby areas were also accessed - Huffman & Van der Walt 2008; Pistorius 2007, 2009; Van Schalkwyk 2007, 2009a-c, 2011, 2012.

- Information on events, sites and features in the larger region were obtained from these sources.

4.2.1.2 Data bases

The *Heritage Atlas Database*, the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

- Database surveys produced a number of sites located in adjacent areas.

4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references in Section 8 below.

- Information of a very general nature was obtained from these sources.

4.2.2 Field survey

The area that had to be investigated was identified by **Royal HaskoningDHV** at a specialists' technical workshop and maps of the selected sites produced. Both sites were surveyed by following existing farm tracks and fire breaks. This strategy was determined by information obtained from aerial photographs and the existing topocadastral map. Outcrops, clumps of trees, open spaces and water courses were specifically investigated.

During the site visit for Alternative 1 on the farm Zwartwater on 15 August 2012, Mr Johan Dampers was interviewed. He has been the site manager for Roshcon, who manage the ash disposal facility, since 1988.

During the site visit for Alternative 2 on 19 July 2013 the various land owners and farm managers were interviewed – see Section 8.4 below. In addition, Mr Lukas Mokau who was born on the farm Grootegeeluk (adjacent to the farms for Alternative 2) and who for many years lived on the farm Appelvlakte, was also interviewed.

The linear infrastructure route for Alternative 2 was identified only in 2014 and was surveyed in April 2014, which required an update of the original report.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

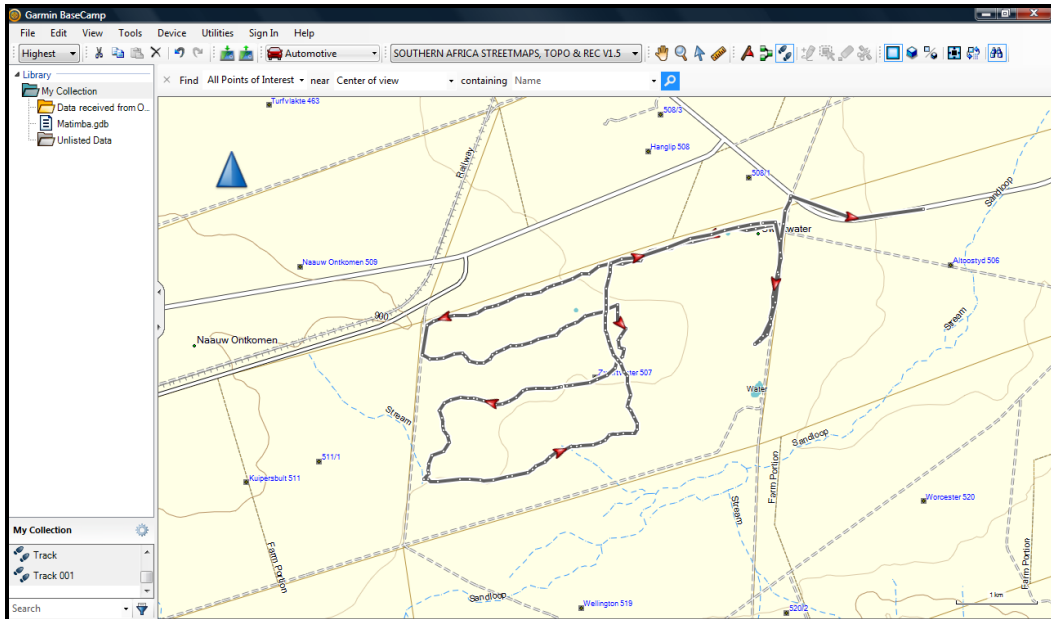


Figure 2: Track log of the field surveys on Site Alternative 1

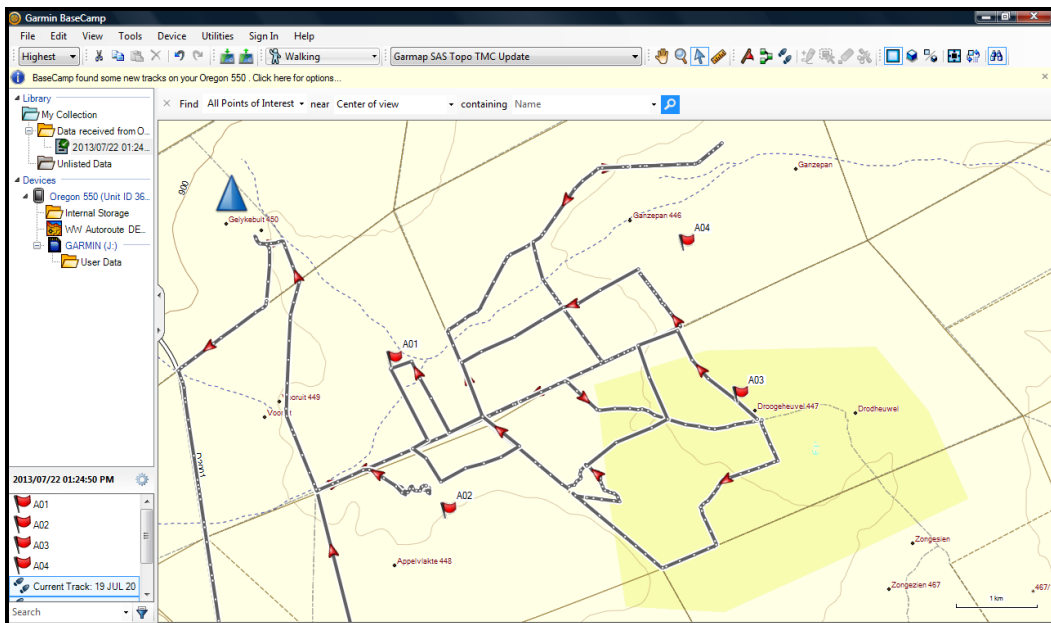


Figure 3: Track log of the field surveys on Site Alternative 2

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

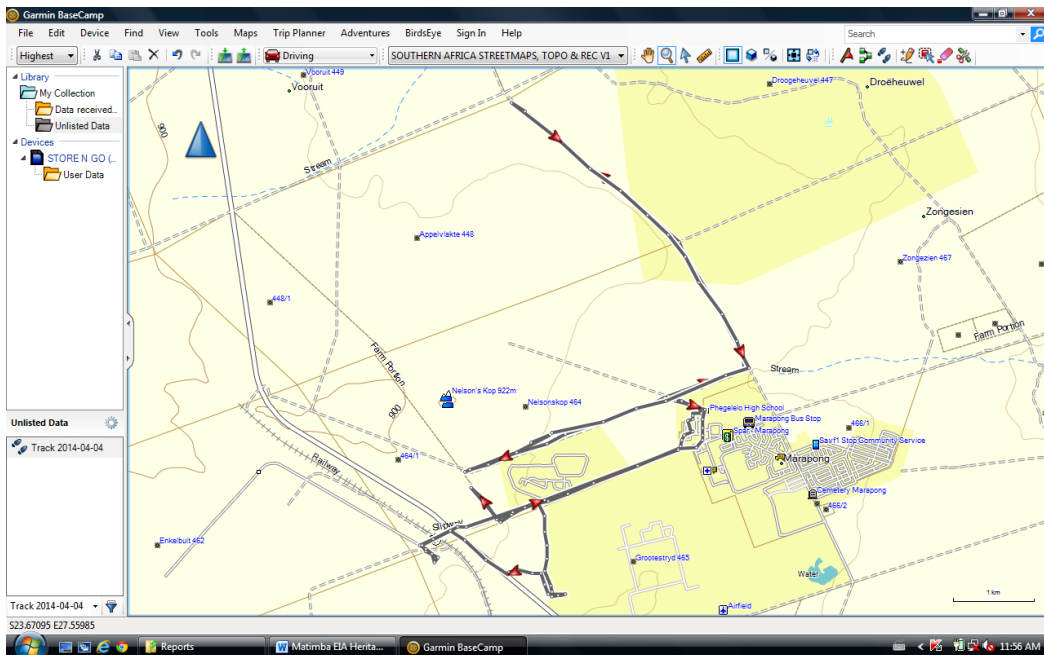


Figure 4: Track log of the field survey for the Site Alternative 2 linear infrastructure route

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 Site location and description

Site alternative 1 is located in the southern section of the 8 km radius study area, on the farm Zwartwater 507 LQ which is owned by Eskom. Part of this farm is currently utilized as an ash disposal facility.

Site alternative 2 under investigation is situated on sections of the farms Vooruit 449LQ, Ganzepan 446LQ, Appelvlakte 448LQ and Droogeheuvel 447LQ, located to the north east of the Eskom Matimba Power Station and to the west of Lephalale in Limpopo Province (Figure 3).

The linear infrastructure route for alternative 2 will cross the farms Appelvlakte 448LQ, Nelsonskop 464LQ and Grootestryd 465LQ (Fig. 4).

The topography of the area is very flat and very few features (e.g. hills, outcrops or rock shelters, rivers) that usually drew people to settle in its vicinity are found in the region. All the rivers crossing the area are non-perennial. The biggest river, the Sandloop / Mokolo, passes some distance to the east of the study area, flowing from south to north.

The geology is made up of alternating bands of arenite and shale, with a basalt intrusion to the west of the study area. All is overlain by sand, probably aeolic in origin, having being laid down from the west.

The area can be described as typical savannah, with the original vegetation consisting of Mixed Bushveld, with a section to the north classified as Sweet Bushveld. In the recent past, all of these properties were used for cattle farming and game ranching.

The Title Deed for the various farms indicates that the farms were first surveyed during the period 1908/1909, but it does not state to whom it was granted. It is therefore presumed that it remained state land until sold privately in the 1950s.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

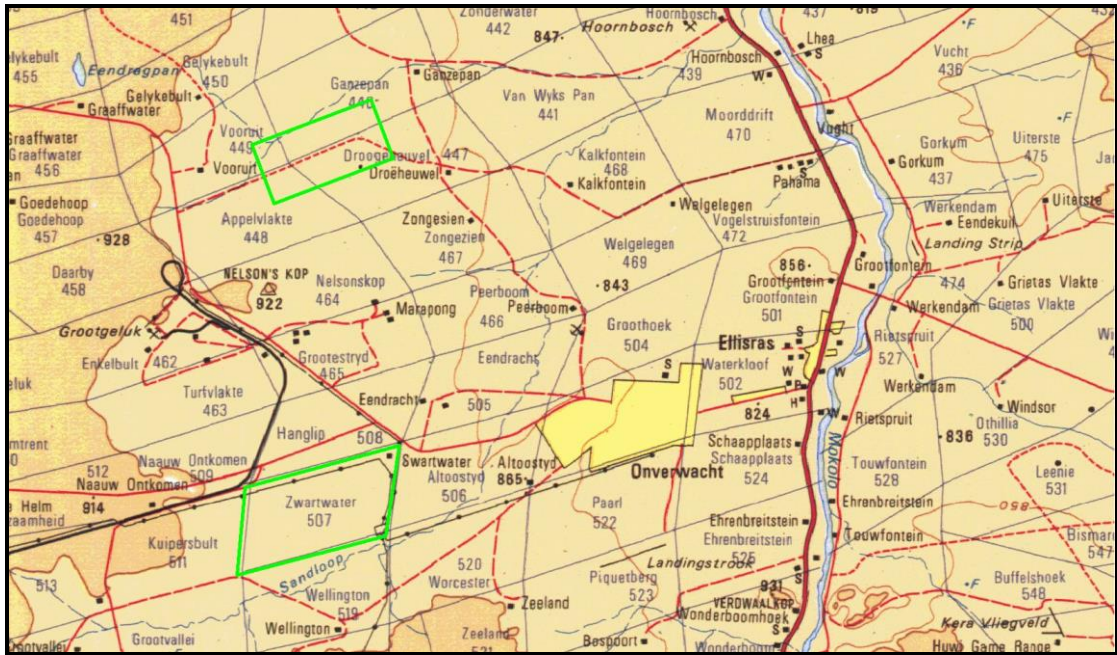


Figure 5: Location of the sites alternatives in the regional context (Map 2326: Chief Surveyor-General)



Figure 6: Views over Site Alternative 1



Figure 7: Views over Site Alternative 2



Figure 8: Views over Site Alternative 2 linear infrastructures route.

5.2 Heritage potential of the larger region

The cultural landscape qualities of the larger region essentially consist of a single component, which is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) and a much later colonial (farmer) component.

As this is an environment that presents very little resources such as hills and outcrops for settling in, poor grazing and a lack of open water, the habitation of the region by humans has always been very low. It was only with the arrival of drilling rigs that below surface water could be accessed, that the population density increased.

- **Pre-colonial period**

Stone tools are known to occur in a low density on the banks of some of the rivers as well as at the foot of outcrops and small hills. These mostly date to the Earlier Stone Age as well as to the Middle Stone Age and include typical points, blades and rectangular flakes. However, all these objects were found on the surface and are therefore out of their original context. As a result, they are viewed to have low significance. Some rock art dating to the Later Stone Age occur in a number of shelters to the north-west of Lephalale.

Iron Age sites are only known to occur to the south, north and east of the general study area. These are linked to the Tswana and date in all probability to the period from 1600 and later.

On the koppie named Koorn Kop some interesting engravings of animal spoor, cupules and cut marks were identified on the southern face of the hill. In addition, on top of the hill a number of small stone walled sites occur. A few non-diagnostic stone flakes and potsherds occur in the shelter.

From ethnographic sources it is known that hills or promontories, for example in the Karoo, are important features to the San because they offer vantage points in an otherwise remarkably flat landscape from which the springbok may be watched (Deacon 1988). This is probably the purpose of the stone circles on top of Nelson's Kop, serving as lookout points. The fact that there is a big panel with a variety of engravings on it indicates that this is in all probability a site of potency, for the making of rain by the San and later Sotho-Tswana speaking people in the area (see Van der Ryst *et al* 2004).

- **Archaeological sites**

NHRA Category	Archaeological and palaeontological sites
Protection status	
	General Protection - Section 35: Archaeology, palaeontology and meteorites



Figure 9: Typical Later Stone Age rock art in the region.

The stone tools in the picture to the right are not from the region and are only used to illustrate the difference between Early (left), Middle (middle) and Later Stone Age (right) technology.

- **Colonial history**

The historic period starts off quite late in this part of the country. Probably one of the earliest published sources that refer to the area, in a generalised sense, is that of the explorer Thomas Baines who passed through the area during the early 1870s. Although for other sections of his travels he gives detailed descriptions of the local population, he does not comment on anybody in this particular area. Although his rendering of the various rivers and other topographical features are quite accurate for the time, he seems to imply that there were no communities settled here (Baines 1877).

In the town of Lephalale (Ellisras) there is a cemetery containing the graves of some of the earliest white settlers in the area. The town of Ellisras was only laid out in December 1960, and was named after two of the pioneer families in the area, Ellis and Erasmus. In 2002, the name was changed to Lephalale. This latter name is taken from the Phalala River, which is derived from the Tswana verb 'to flow' or 'one which overflows' (Raper 2004: 86, 204).

With reference to both site alternatives, some information has been obtained about the different farms. It seems as if they were part of government land until the early part of the 20th century and most were only surveyed in the period 1909-1910. Drilling activities undertaken by the "Irrigation Department" in 1920, apparently revealed more than water; the presence of coal and oil bearing shale was established on the farms Grootegeluk and Hooikraal. This prompted an individual by the name of F.F. Pienaar to peg 50 claims on each of the farms Kringatspruit, Hooikraal, Grootegeluk and Enkelbult (Reference MM1713/20, 1920; Reference MM2827/20, 1920).

- **Farmsteads**

Farmsteads are complex features in the landscape, being made up of different yet interconnected elements. Typically these consist of a main house, gardens, outbuildings, sheds and barns, with some distance from the labourer housing and various cemeteries. In addition, roads and tracks, stock pens and wind mills complete the setup. An impact on one element therefore impacts on the whole.

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
	General Protection - Section 34: Structures older than 60 years



Figure 10: Examples of farmsteads and farming related features in the region.

- **Cemeteries**

Apart from the formal cemeteries that occur in municipal areas (towns or villages), a number of these, some quite informal, i.e. without fencing, are expected to occur sporadically all over, but probably in the vicinity of the various farmsteads. Many might also have been forgotten, making it very difficult to trace the descendants in a case where the graves are to be relocated.

Most of these cemeteries, irrespective of the fact that they are for land owners or farm labourers (with a few exceptions where they were integrated), are family orientated. They therefore, serve as important ‘documents’ linking people directly by name to the land.

NHRA Category	Graves, cemeteries and burial grounds
Protection status	
General Protection - Section 36: Graves or burial grounds	



Figure 11: The oldest cemetery in Lephalale.

- **Infrastructure and industrial heritage**

In many cases this aspect of heritage is left out of surveys, largely due to the fact that it is taken for granted. However, the land and its resources could not be accessed and exploited without the development of features such as roads, bridges, railway lines, electricity lines and telephone lines, as well as industries that exploit locally available resources.

NHRA Category	Buildings, structures, places and equipment of cultural significance
Protection status	
General Protection - Section 34: Structures older than 60 years	

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility



Figure 12: Head-gear of the first mine shaft that was sunk in the region.

5.3 Development proposal

To accommodate future ashing requirements (approximately 44 years) of the Matimba Power Station, Eskom proposes to establish an ash disposal facility. Two site alternatives are under consideration in the EIA study (refer to Figure 1):

- Alternative 1 - Farm Zwartwater 507LQ.
- Alternative 2 - portions of the farms Vooruit 449LQ, Ganzepan 446LQ, Appelvlakte 448LQ and Droogeheuvel 447LQ,

5.4 Identified heritage sites

The following cultural heritage resources were identified in the study area (consisting of Site Alternative 1, 2 and linear infrastructure route to Site Alternative 2):

• Site Alternative 1

5.4.1.1 Stone Age

- No sites, features or objects dating to the Stone Age were identified.

5.4.1.2 Iron Age

- No sites, features or objects dating to the Iron Age were identified.

5.4.1.3 Historic period

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

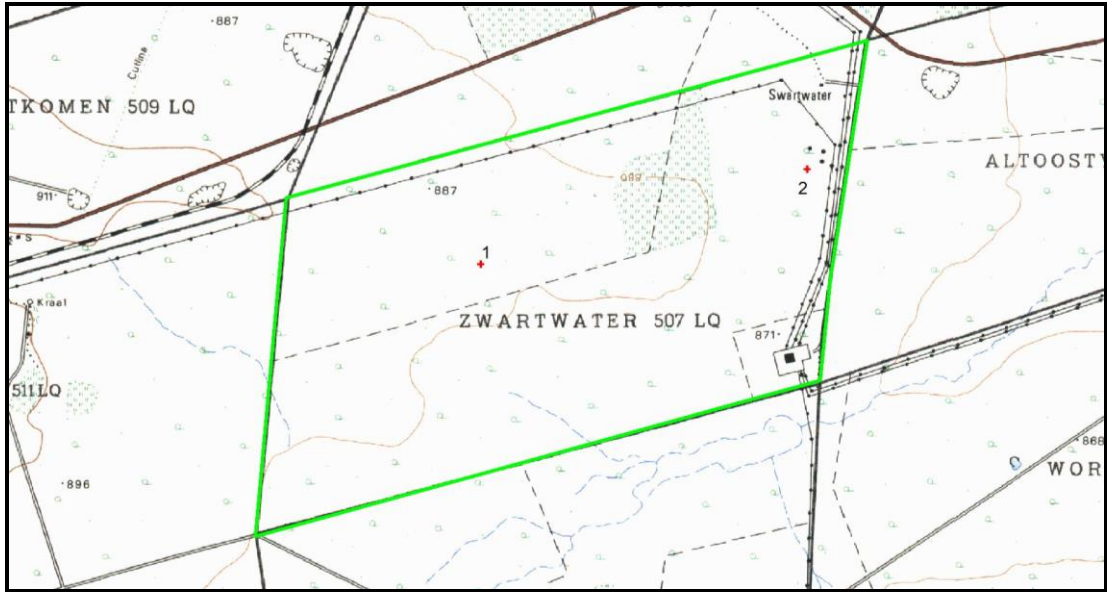


Figure 13: Proposed Site Alternative 1

- Archaeological sites: Alternative 1

NHRA Category	Archaeological and palaeontological sites
Protection status	General Protection - Section 35: Archaeology, palaeontology and meteorites

Location	1	S 23.71195	E 27.59564
Description	A small two roomed structure which is in a bad state of repair. The roof and all the fittings have been removed. Even some of the bricks have been taken out, possibly for recycling. This makes it difficult to date the site. Surrounding this structure are found broken bottles, metal cans, pieces of wire, etc. From this it is deduced that the structure served either as accommodation for a labourer overseeing the farm and/or as a store room for farming equipment.		
Significance	Low on a regional level – Grade III		
Mitigation	As this feature is accorded a low significance, it is viewed as recorded in full after inclusion in this report and no further mitigation action is required.		



Figure 14: The remains of the old house structure.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

- **Site Alternative 2**

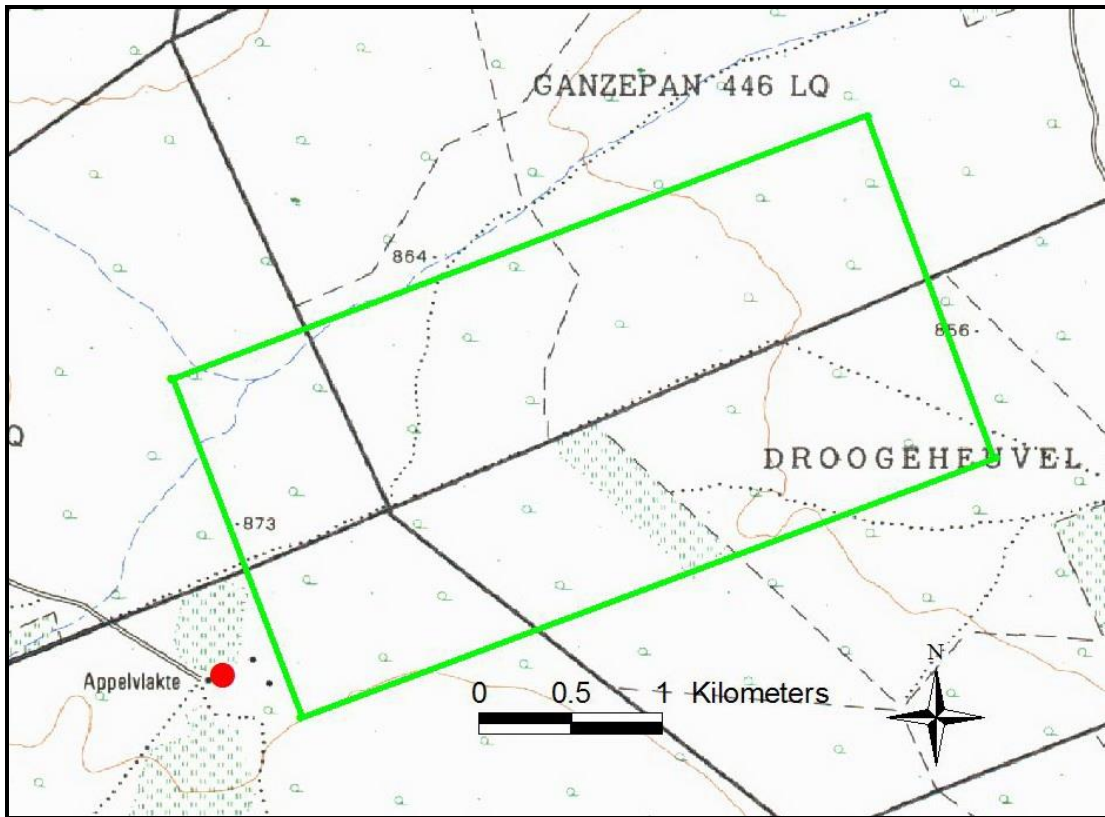


Figure 15: Proposed Site Alternative 2

5.4.2.1 *Stone Age*

- No sites, features or objects dating to the Stone Age were identified.

5.4.2.2 *Iron Age*

- No sites, features or objects dating to the Iron Age were identified.

5.4.2.3 *Historic period*

- Archaeological sites: Alternative 2

NHRA Category	Archaeological and palaeontological sites
Protection status	General Protection - Section 35: Archaeology, palaeontology and meteorites

Location	1	S 23.62492	E 27.58449
Description	<p>The remains of a small house structure that was demolished in approximately 1999 centres around the above coordinates. According to Mr Mokau who has been living in this house before it was demolished there are also grave(s) in the vicinity of the house. It was only marked with stones and did not have any inscriptions. The last time it was seen, it was covered by a tree that had fallen over it. During the site visit, it could not be located despite searching for it for nearly an hour. A second farm worker, known only as John, who claimed to have last seen it, could also not locate it.</p> <p>According to current understanding this site would be located just outside the proposed development area on site alternative 2. However, it is indicated in this report as a red flag area which should be avoided.</p>		
Significance	Low on a regional level – Grade III		

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

Mitigation

It is recommended that Exxaro get their workers, e.g. Mr Mokau, to locate and identify the graves, after which they should be properly plotted and isolated.



Figure 16: The remains of the old house structure and Mr Mokau.

- **Linear Infrastructure Route to Site Alternative 2**

5.4.3.1 Stone Age

- No sites, features or objects dating to the Stone Age were identified.

5.4.3.2 Iron Age

- No sites, features or objects dating to the Iron Age were identified.

5.4.3.3 Historic period

- No sites, features or objects dating to the historic period were identified.

6. SITE SIGNIFICANCE AND ASSESSMENT

6.1 Heritage assessment criteria and grading

The NHRA stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the NHR Act:

- **Grade I:** Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II:** Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III:** Other heritage resources worthy of conservation, on a local authority level.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the applicable mitigation measures would allow the development activities to continue.

6.2 Statement of significance

A matrix was developed whereby the above criteria, as set out in Sections 3(3) and 7 of the NHRA, were applied for each proposed site and linear infrastructure route (see Appendix 1). This allowed some form of control over the application of similar values for similar sites. Three categories of significance are recognized: low, medium and high. In terms of Section 7 of the NHRA, all the heritage resources (NHRA Category: Archaeological and palaeontological

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

sites) currently known or which are expected to occur in the alternative sites and linear infrastructure route are evaluated to have a grading as identified in the table below.

Table 1: Summary of identified heritage resources in site alternative 1

Identified heritage resources	
<i>Category, according to NHRA</i>	<i>Identification/Description</i>
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	Yes
archaeological site or material (Section 35)	None
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	None
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

Table 2: Summary of identified heritage resources in site alternative 2

Identified heritage resources	
<i>Category, according to NHRA</i>	<i>Identification/Description</i>
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	None
archaeological site or material (Section 35)	None
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	Yes
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

Table 3: Summary of identified heritage resources in the linear infrastructure route for site alternative 2

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

Identified heritage resources	
<i>Category, according to NHRA</i>	<i>Identification/Description</i>
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	None
archaeological site or material (Section 35)	None
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	Yes
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

6.3 Impact assessment

Impact analysis of cultural heritage resources under threat by the proposed development, are based on the present understanding of the development.

Alternative 1:

- A ruined house structure has been identified to exist in the study area. As this feature is accorded a low significance, it is viewed as recorded in full after inclusion in this report and no further mitigation action is required.

Alternative 2:

- As no heritage sites occur in the alternative study area, there would be no impact resulting from the proposed development.

Linear infrastructure Route to Site Alternative 2

- As no heritage sites occur on the conveyor route for alternative site 2, there would be no impact resulting from the proposed development.

7. CONCLUSIONS

The cultural landscape qualities of the larger region essentially consist of a single component, which is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) and a much later colonial (farmer) component.

As this is an environment that presents very little resources such as hills and outcrops for settling in, poor grazing and a lack of open water, the habitation of the region by humans has always been very low. It was only with the arrival of drilling rigs that below surface water could be accessed, that the population density increased.

Alternative 1:

- A ruined house structure has been identified as existing on the site. As this feature is accorded a low significance, it is viewed as recorded in full after inclusion in this report and no further mitigation action is required.

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

Alternative 2:

- As no heritage sites occur on alternative site 2, there would be no impact resulting from the proposed development.

However, the remains of a small house structure that was demolished in approximately 1999 exists close to the western boundary of the development site. According to Mr Mokau who has been living in this house before it was demolished there is also a grave(s) in the vicinity of the house. The graves were only marked with stones and did not have any inscriptions. The last time it was seen, it was covered by a tree that had fallen over it. During the site visit, it could not be located despite searching for it for nearly an hour. A second farm worker, known only as John, who claimed to have last seen the grave, could also not locate it. According to current understanding, this site (the house as well as the graves) would be located just outside the proposed development. However, it is indicated in this report as a red flag area which should be avoided.

It is recommended that before development takes place on Site Alternative 2, Exxaro should get their workers, e.g. Mr Mokau, to locate and identify the graves, after which they should be properly plotted and isolated in order to prevent accidental damage.

Linear infrastructures route, Alternative 2:

- As no heritage sites occur on the conveyor route for alternative site 2, there would be no impact resulting from the proposed development.

Both site alternatives as well as the proposed linear infrastructure route to site alternative 2 can be utilised for the proposed project. Furthermore, the recommendations and mitigation measures provided in the preceding sections must be adhered to.

8. REFERENCES

8.1 Data bases

Chief Surveyor General

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.

Heritage Atlas Database, Pretoria.

National Archives of South Africa:

- Depot: SAB, Source MNW, Volume 515, Reference MM1713/20, Date 1920
- Depot: SAB, Source MNW, Volume 535, Reference MM2827/20, Date 1920

8.2 Literature

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Van Schalkwyk, J.A. 2008. *Heritage survey report for the development of a water reservoir and pipelines for the new Medupi Power Station, Ellisras magisterial district, Limpopo Province*. Unpublished report 2008/JvS/015. Pretoria.

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Van Schalkwyk, J.A. 2009a. *Heritage scoping assessment for the proposed development of a power station west of Lephalale, Ellisras magisterial district, Limpopo Province*. Unpublished report 2009/JvS/001. Pretoria

Van Schalkwyk, J.A. 2009b. *Heritage impact assessment report for the proposed coal-fired power stations in the Waterberg region west of Lehalale, Limpopo Province*. Unpublished report 2009KH003. Pretoria.

Van Schalkwyk, J.A. 2009c. *Heritage scoping assessment for the proposed development of coal mining activities west of Lephalale, Ellisras magisterial district, Limpopo Province*. Unpublished report 2009/JvS/023. Pretoria.

Van Schalkwyk, J.A. 2011. *Heritage impact assessment report for the proposed establishment of the Exxaro PV plant on the farm Nelsonskop, north-west of Lephalale, Limpopo Province*. Pretoria: Unpublished report 2011/JvS/085.

Van Schalkwyk, J.A. 2012. *Heritage impact assessment for the continuous disposal of ash at the Matimba Power Station ash dump, Lephalale region, Limpopo Province*. Unpublished report 2012/JvS/043.

8.3 Maps and aerial photographs

1: 50 000 Topocadastral maps: 2327DA
Google Earth

8.4 Interviews

Mr J Dampers of Roschcon - Zwartwater
Mr J Molepo of Exxaro Coal – farm Vooruit 449LQ & Appelvlakte 448LQ
Mr L Grobler – Droogeheuvel 447LQ
Mr L Swanepoel – Ganzepan 446LQ
Mr L Mokau – Exxaro

APPENDIX 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. Historic value				
Is it important in the community, or pattern of history				
Does it have strong or special association with the life or work of a person, group or organisation of importance in history				
Does it have significance relating to the history of slavery				
2. Aesthetic value				
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group				
3. Scientific value				
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage				
Is it important in demonstrating a high degree of creative or technical achievement at a particular period				
4. Social value				
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons				
5. Rarity				
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage				
6. Representivity				
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects				
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class				
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.				
7. Sphere of Significance		High	Medium	Low
International				
National				
Provincial				
Regional				
Local				
Specific community				
8. Significance rating of feature				
1.	Low			
2.	Medium			
3.	High			

APPENDIX 2: RELEVANT LEGISLATION

All archaeological and palaeontological sites and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

- (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.
- (2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.
- (3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- (4) No person may, without a permit issued by the responsible heritage resources authority-
 - (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
 - (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
 - (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
 - (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

- (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.
- (2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.
- (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-
 - (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
 - (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
 - (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- (4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the

Cultural Heritage Impact Assessment for the Proposed Matimba Ash Disposal Facility

applicant and in accordance with any regulations made by the responsible heritage resources authority.

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Palaeontological Impact Assessment

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBAPOWER STATION IN LEPHALALE, LIMPOPO PROVINCE

Specialist:	Prof Marion Bamford		
Contact person:	As above		
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Professional affiliation(s) (if any)	FRRSAf, ASSAf, PSSA, SASQUA, IOP		
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Telephone:	012 367 5973	Fax:	012 367 5878
E-mail:	prashika.reddy@rhdhv.com		

MEB

4.2 The specialist appointed in terms of the Regulations_

I, MARION K. BAMFORD , declare that --

General declaration:

I act as the independent specialist in this application

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

MKBamford

Signature of the specialist:

University of the Witwatersrand

Name of company (if applicable):

16 April 2015.

Date:

Palaeontological Impact Assessment for Proposed Continuous Ash Disposal Facility for the Matimba Power Station in Lephalale, Limpopo Province

Phase 2 – site visits

**for
Royal HaskoningDHV**

20 January 2015

Prof Marion Bamford
Evolutionary Studies Institute
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Palaeontological Impact Assessment for Proposed Continuous Ash Disposal Facility for the Matimba Power Station in Lephalale, Limpopo Province

Summary

Two alternative sites have been proposed for the continuous ash disposal facility for Matimba Power Station... Both alternative sites were visited as well as the proposed route for the conveyor belt. No fossils were found on any of the farms or areas surveyed by a professional palaeontologist. The area has almost no relief and is covered by deep Kalahari sand and bushveld vegetation (mature trees, shrubs and little grass). As far as the palaeontology is concerned both alternatives can be utilized for the proposed continuous project.

List of Figures

Figure 1: Map from Google Earth

Figure 2: Geological map of northwestern Limpopo.

Figure 3: more detailed geological map of the area

Figure 4: Photographs from Alternative 1 site

Figure 5: Photographs from Alternative 2 – Farm Vooruit

Figure 6: Photographs from Alternative 2 – Farm Applevlakte

Figure 7: Photographs from Alternative 2 – Farm Nelsonskop

Figure 8: Photographs from Alternative 2 – Farm Droogeheuvel

Figure 9: Photographs from Alternative 2 – Farm Ganzepan

List of Tables

Table 1: Explanation of symbols for the geological map in Fig 2

Background

As requested by Royal HaskoningDHV, on behalf of Eskom here is a quotation to carry out a palaeontological impact assessment for the above project. There are two alternatives for this project: Alternative 1 (blue polygon to the southeast of Matimba) is deemed by SAHRA (CaseID 2195) to be moderately and Alternative 2 (red polygon to the northeast of Matimba) and the conveyor route are considered to have a high to very high sensitivity and a site visit is requested by SAHRA.

Included in the development are the following types of infrastructure:

- Conveyor system for ash transportation
- Drainage system
- Site office
- Workshop
- Contractors' yard
- Water supply pipelines, for ash/dust suppression
- Ash water return dams
- Storm water control dams (these will be constructed as per the GN 704 of the National Water Act (No. 36 of 1998)
- Storm water control berms
- Access roads to, on and around the facility. These roads include temporary roads during construction and permanent roads during the operation.

Ash disposal site – The design of this site will be dependent on aspects such as the results of the ash classification study, topography, etc.

In accordance with the national legislation (National Heritage Resources Act (Section 25 of 1999) the sites to be developed must be assessed for the occurrence of any palaeontological material. If any fossils are likely to be present then their importance and rarity must be gauged and if they are important then plans must be put in place to remove the fossils (under a SAHRA permit and housed in an recognized institution), protect them and/or divert the proposed construction.

Extract from SAHRA Case ID 2195

“No palaeontological assessment was undertaken for this project. According to the SAHRA fossil sensitivity map, Alternative 2 and the conveyor route is situated in an area that has a high to very high fossil sensitivity. A field based palaeontological assessment would be required before authorisation is granted for this alternative. Alternative 1 is located in an area of moderate sensitivity; a desktop assessment is required and dependent on the results of this, a field assessment may be necessary.

“Comment:

SAHRA has reviewed the Final Scoping Report and Heritage Assessment and recommends the following:

1. SAHRA requests that the heritage impact assessment is revised in the light of the heritage sites highlighted in Figure 14 and 32 of the Scoping Report. The impact that the proposed Alternative 1, 2 and the conveyor belt will have on these sites must be clearly explained in the assessment.
2. A palaeontological desktop assessment be undertaken for Alternative 1. If the paleontologist deems it suitable, a letter of exemption may be submitted to the heritage authority suggesting that no further palaeontological studies are necessary.
3. A palaeontological impact assessment be undertaken for Alternative 2 and the related conveyor belt.

4. If Alternative 2 is preferred for the ash disposal facility, a palaeontological field assessment will be required and must be submitted to SAHRA for commenting before authorisation is granted. The field assessment must include the proposed conveyor route alignment.”

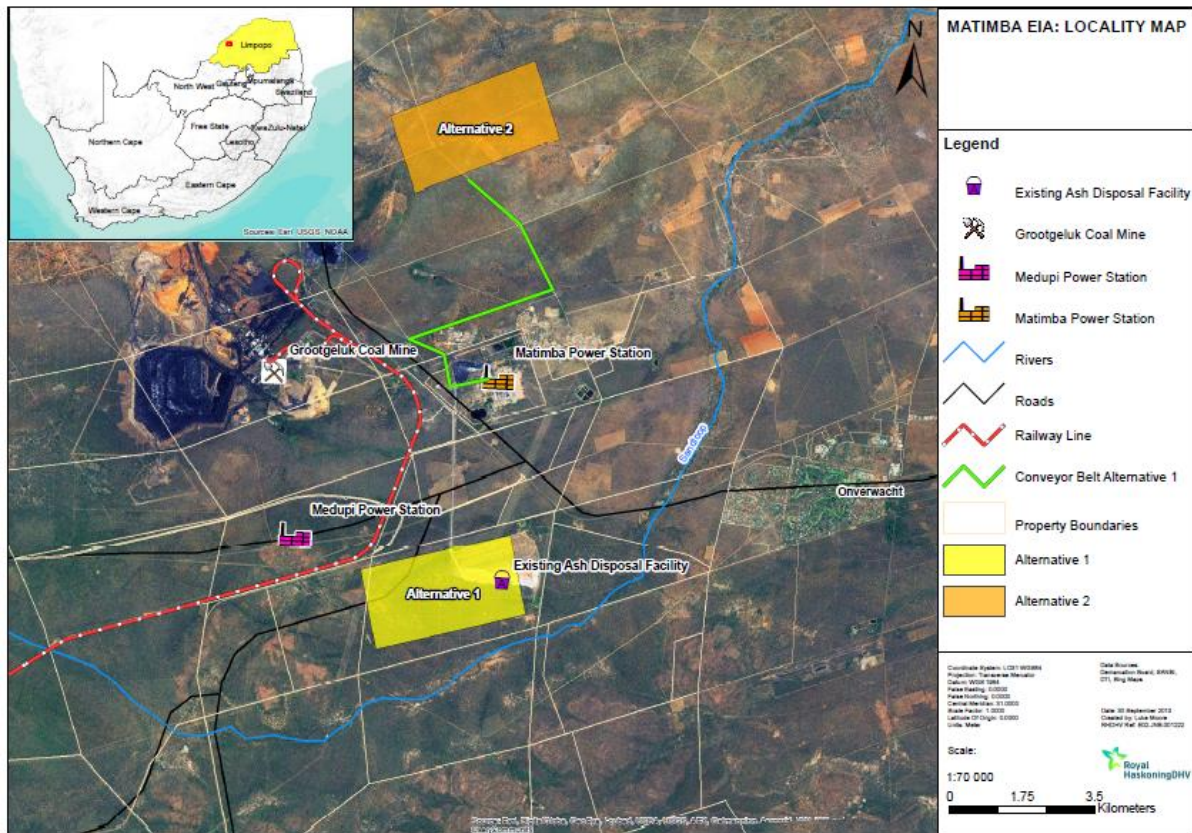


Figure 1: Map showing the two alternative proposed sites for the continuous ashing plant at Matimba, Limpopo. Map supplied by Prashika Reddy of Royal HaskoningDHV. Alternative 2 (northern site in red) is considered to be highly or very highly sensitive as far as palaeontological deposits are concerned. Alternative 1 (southern blue area) is considered to be moderately sensitive.

Methods

The published geological and palaeontological literature, unpublished records and databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

Geology and Palaeontology

According to the maps by the Geological Survey, the site lies in the undifferentiated Permian and Triassic deposits, with very old rocks to the south and east of Lephalale (Figure 2, Table 1). From more detailed studies of the coal deposits in South Africa (Snyman 1998) the Grootgeluk Mine lies on the edge of the Ecca deposits, adjacent to Beaufort Group sediments (Figure 3). Both Alternative 1 (south, blue polygon) and Alternative 2 (north, red polygon) most probably lie on the edge of the Ecca sediments or within the Ecca sediments with the Waterberg Group formations, Sandriviersberg and Mokalakwaena (Msm), further south (Figure 3). However it is not clear from the literature where the boundary is. Imprints of fossil leaves from this area are mentioned by Johnson *et al.*, (2006) but no references are given. The palynology has been studied by MacRae (1988) and correlated with that from the Pafuri Basin.

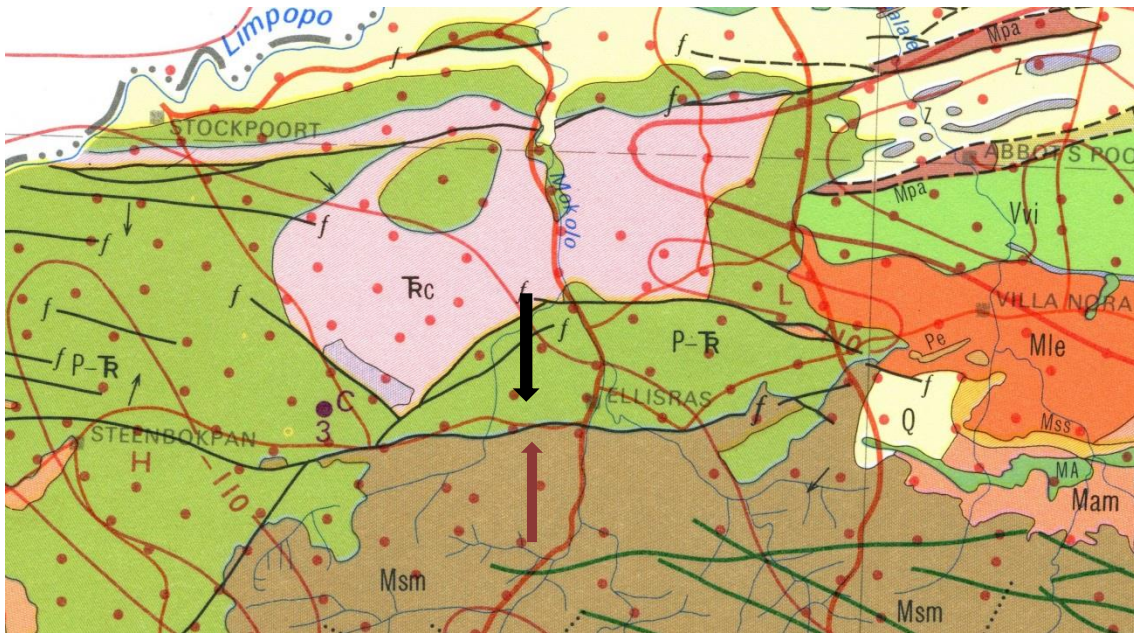


Figure 2: Geological map of northwestern Limpopo showing the proposed area for the Matimba continuous ashing project to the west of Lephalale (Ellisras). Arrows show Alternative 1 (southern, medium sensitivity) and Alternative 2 (northern, high to very high sensitivity). Abbreviations of the rock types are explained in Table 1. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 1: Explanation of symbols for the geological map in Figure 2, and approximate ages from the references: Barker *et al.*, 2006; Cawthorn *et al.*, 2006; Johnson *et al.*, 2006.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Last ca 20 Ma
Trc	Clarens Formation	Sandstone, siltstone	Upper Triassic-Jurassic ca 220-180 Ma
P-Tr	Undifferentiated Permian and Triassic	Shale, sandstone, mudstone, coal	Ca 300-200 Ma
Msm	Sandriviersberg and Mokalakwa Fms, Kransberg Subgroup, Waterberg Group	Sandstones, conglomerates	1700-2000 Ma
Mam	Aasvoëlkop and Makgabeng Formations, Matlabas subgroup, Waterberg Group	Sandstones, mudstones	1700-2000 Ma
Mle	Lebowa Granite Suite	Hornblende and biotite granites	>2000 Ma

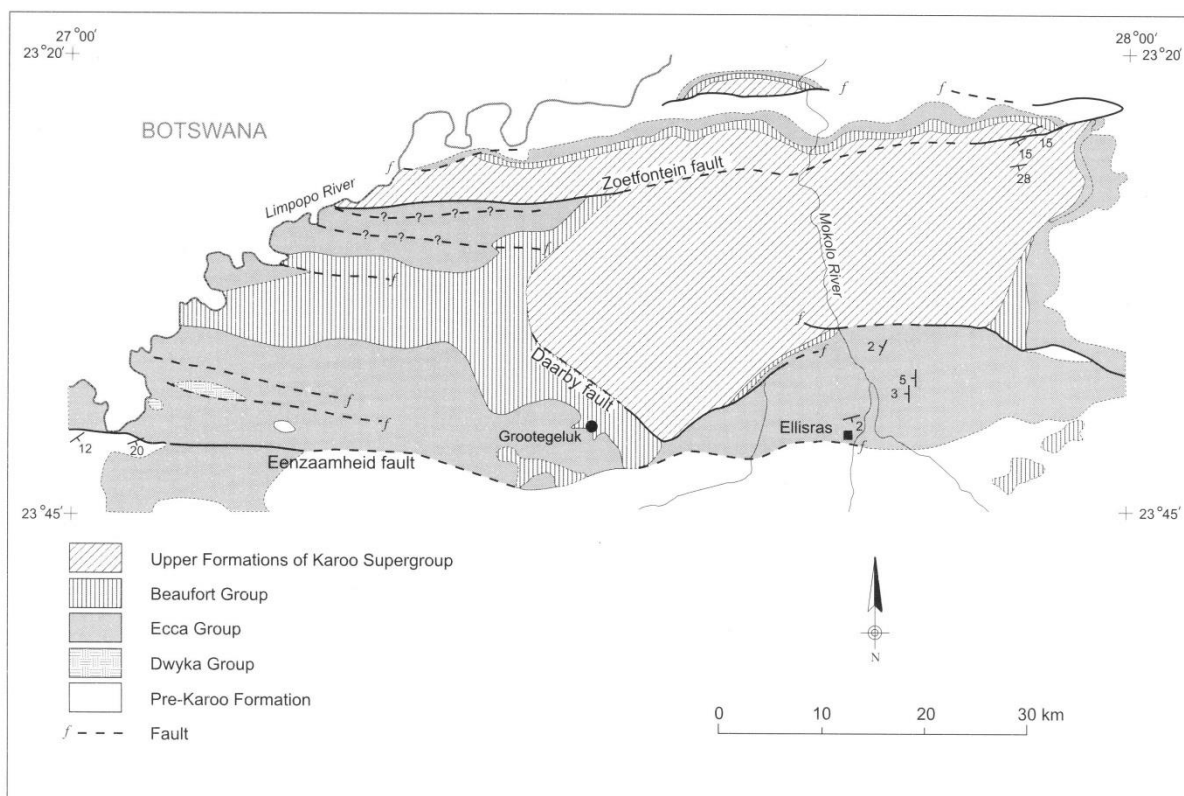


Figure 3: More detailed geological map of the area taken from Snyman, 1998 who based it on the unpublished MSc thesis of Botha, 1984). Grootegeluk is the name of the Exxaro Mine close to Matimba power station.

The Ellisras Basin is important economically for coal, especially the Grootegeluk Formation and interfingering Goedgedacht Formation, which are being mined by Exxaro for export and for the Matimba Power Station. It is also not clear how deep these coal and related shale layers (that would have well preserved leaves) are. If they are exposed at the surface then the fossils will have been badly weathered and of no palaeontological interest or value. Unless there are exploratory trenches or pits in the two sites, it will not be possible to evaluate the fossil potential.

Recommendation from SAHRA

Since fossil leaves of the *Glossopteris* flora have been recorded from this area a site study is required. Both alternatives are within close proximity so both should be investigated on the same visit. However it is critical to have the potentially fossiliferous layers exposed in order for them to be assessed by a palaeontologist.

Site visits

Southern site (blue polygon – Alternative 1 – medium sensitivity)

A site visit was conducted on 18 December 2014. The dump here is active and the area was cleared of vegetation and the adjacent still vegetated extension site.

The area has very little relief, no outcrops and no river cuttings. The soil is deep Kalahari sand with large, mature trees dominated by *Sclerocarya birrea* (marula), *Terminalia sericea*, *Acacia nigrescens*, *Acacia erioloba*, *Grewia flava* and *Grewia flavescens*, plus many others (Figure 4). Areas that had had the topsoil and vegetation removed revealed more deep sand and some patches of small gravel

(Figure 4d). No rocks and no fossils were found. According to the engineer and based on drill cores, the ash dump sites are not over coal deposits.

Northern site – (red polygon – Alternate 2 – high sensitivity)

On Friday 16 January 2015, the following farms were visited Vooruit 449 LQ, Appelvlakte 448 LQ and Nelsonskop 445 LQ. Then Mr Louis Grobler's assistant unlocked gates for me to access Droogeheuvel 447 LQ. Finally Mr Louw Swanepoel provided access to the farm Ganzepan 446 LQ.

Vooruit 449LQ – the southeast portion of this farm is almost flat with no relief, no rocky outcrops and no river cuttings. The deep Kalahari sand supports a dense vegetation of large, mature trees including, *Acacia karroo*, *Boscia albitrunca*, *Burkea africana*, *Combretum apiculatum*, *Dichrostachys cinerea* (locally dominant), *Terminalia sericea*, *Sclerocarya birrea* and shrubs of *Grewia flava* and tall grass of *Digitaria eriantha*. Figure 5 shows typical views of the farm. No fossils were found.

Appelvlakte 448LQ – the northeast portion of the farm has the same topography and vegetation as Vooruit (Figure 6). No fossils were found. Even from the vantage of a bit of height from the top of Nelsonskop kopjie no change in the topography or vegetation could be seen.

Nelsonskop 445LQ – the conveyor belt system is proposed to run along the southern and northeastern borders of this farm. Here the vegetation and topography are the same as the two farms to the north – almost flat, Kalahari sand and bushveld woody vegetation (Figure 7). No outcrops or fossils were found along this route. The vegetation here is the same as the other farms except it also has dense stands of *Spirostachys africana* (tamboti).

Droogeheuvel 447LQ – the northwestern part of this farm was surveyed (Figure 8). It has the same vegetation and almost flat topography as the others but there is some minor local relief where depressions have become wetlands (one natural one near the homestead and not part of the affected area, and one artificial within the area). This revealed deep Kalahari sands with a local thin layer of neoformed clay supporting sedges (*Cyperus laevigatus* and *Schoenoplectus cf limona*). Tracts of land have been cleared for agriculture and abandoned. The regrowth comprises *Tephrosia* sp.-dominated herbaceous vegetation or mixed grasses. Only saplings have recolonized the previously cleared tracts and some tracts also have large *Acacia erioloba* trees that were not removed. No fossils were found.

Ganzepan 446LQ – the southeastern part of the farm was surveyed (Figure 9). The topography and vegetation were the same as the other farms. *Terminalia sericea* was the dominant tree; many small fenced paddocks for cattle were present, some very disturbed, others appeared unaffected. The farmhouse was derelict and abandoned but appears to be used for storage and occasional game hunting. No fossils were found on this farm.

Conclusion

There was no evidence of fossils on the southern site (Alternative 1) and no fossils on any of the farms of the northern site, including the boundary where the conveyor belt is planned to run (Alternative 2). There were no rocks, no rocky outcrops, shale or sandstones, only deep loose sand which is not suitable for the preservation of fossils.

Recommendation

As far as the palaeontological assessment is concerned BOTH alternatives are suitable for the proposed continuous ash disposal facility for Matimba power plant.

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Photographs from site visits



Figure 4 – Alternative 1 (blue polygon, southern). Site close to active continuous ash disposal site.



Figure 5 – Alternative 2 (red polygon) – Farm Vooruit

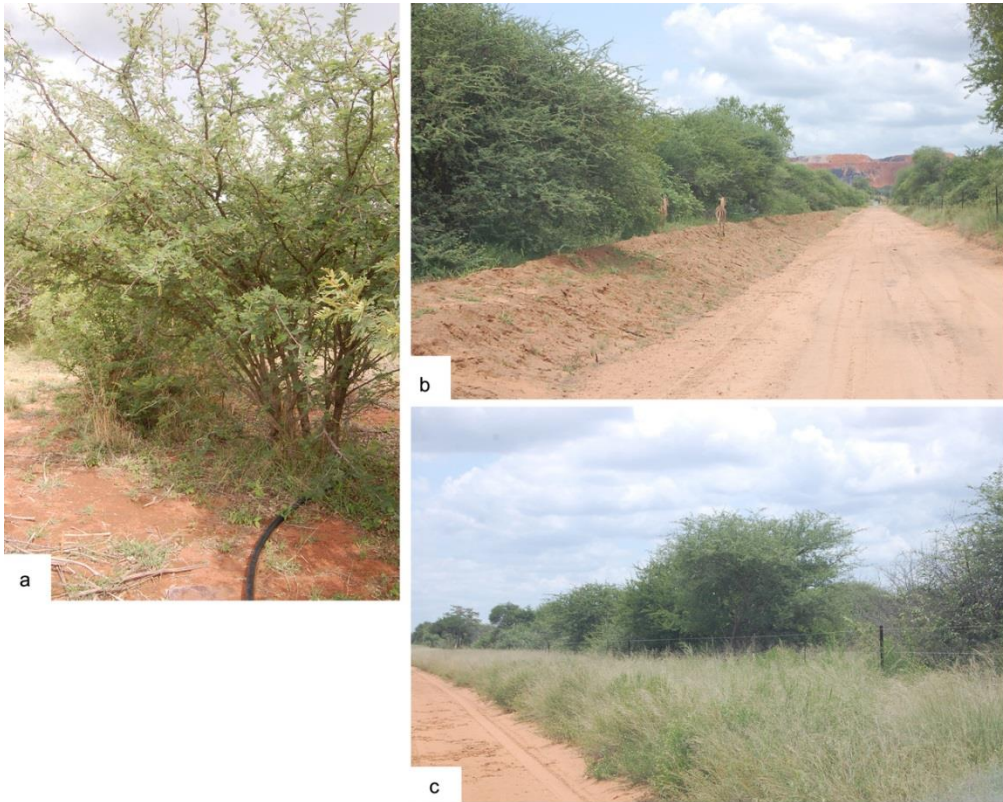


Figure 6 – Alternative 2 (red polygon) – Farm Appelvlakte

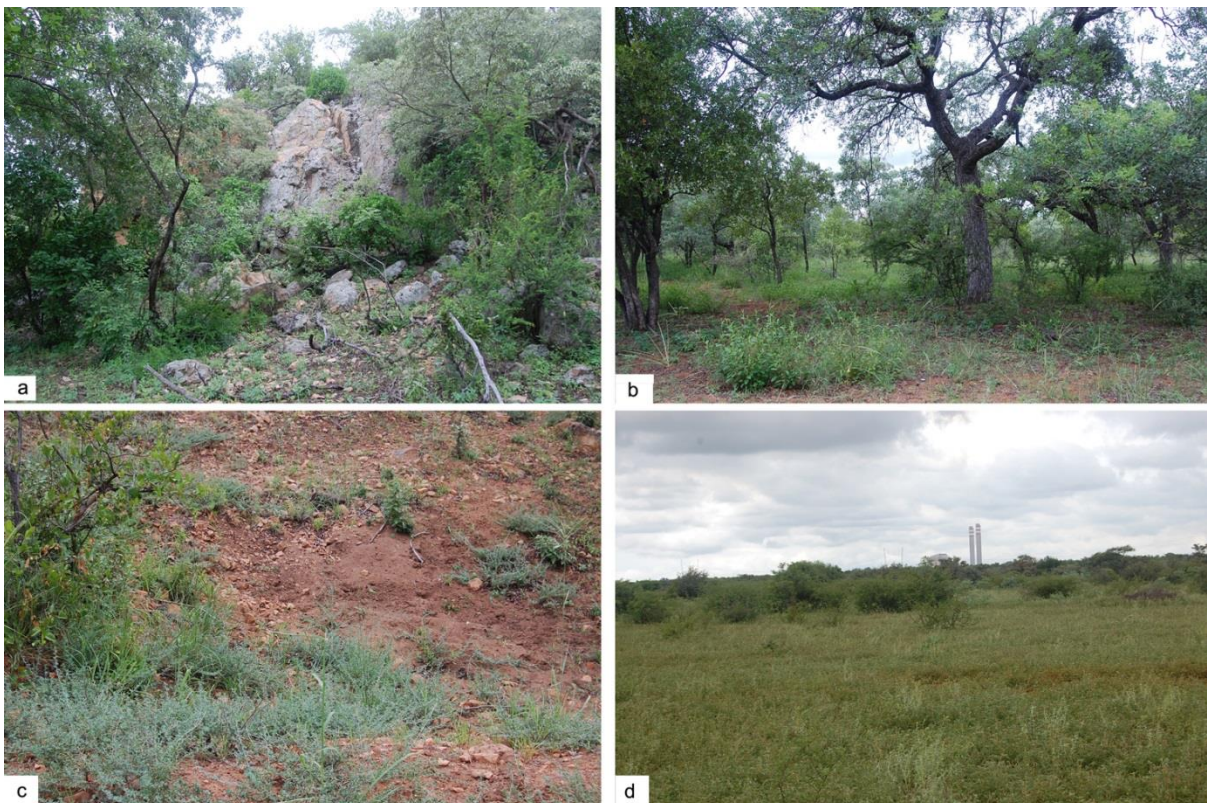


Figure 7 – Alternative 2 (red polygon) - Farm Nelsonskop

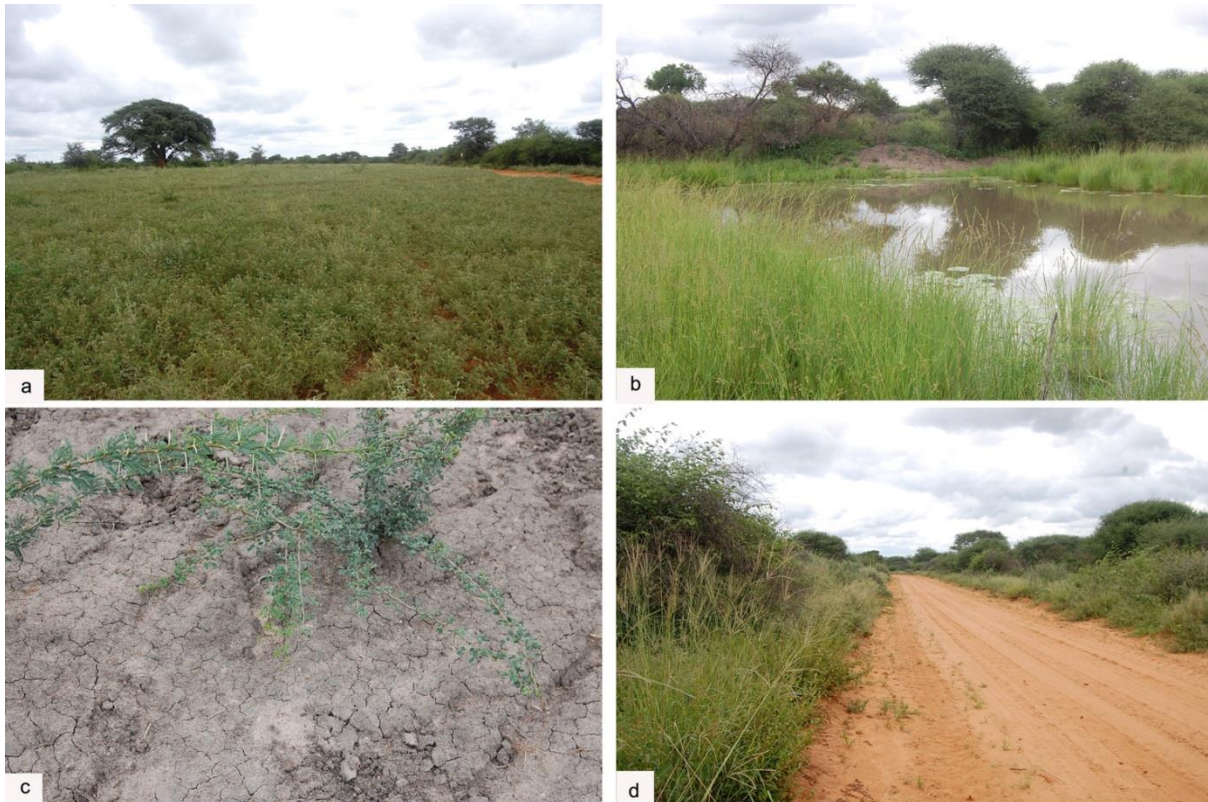


Figure 8 - Alternative 2 (red polygon) Farm Drooghevel

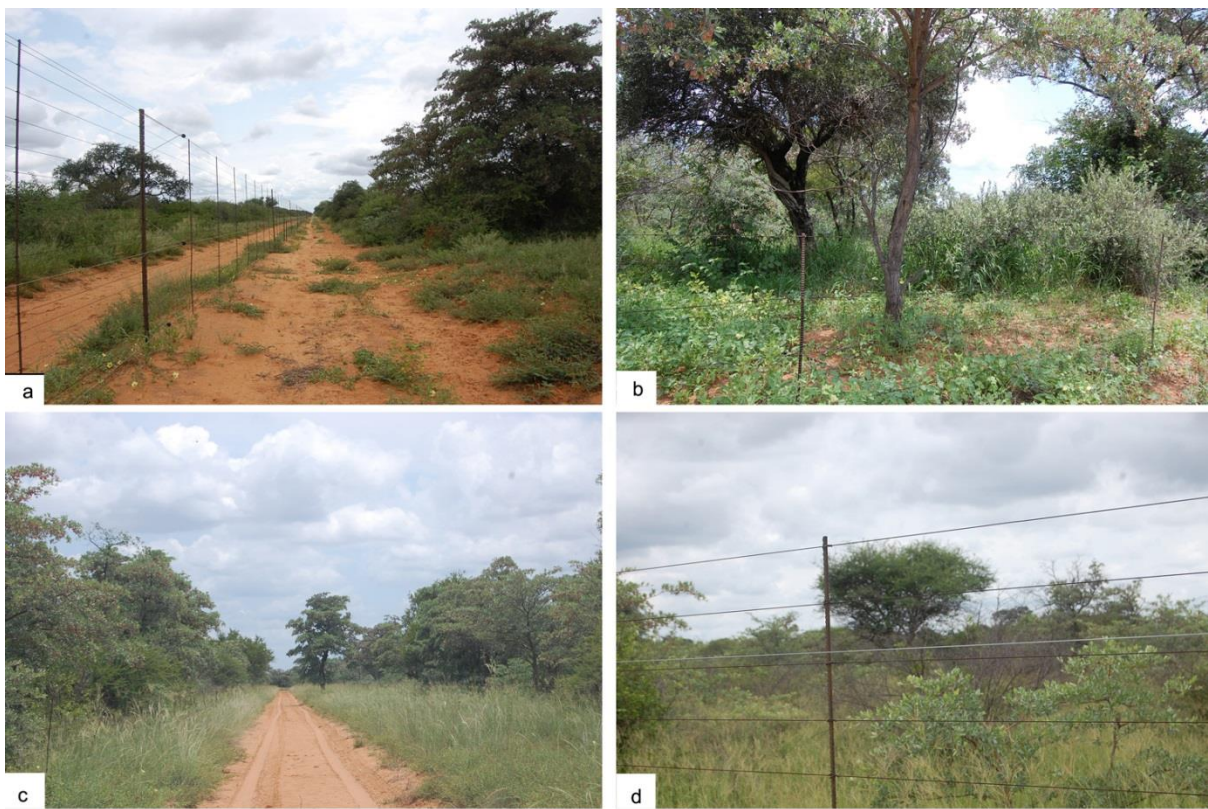


Figure 9 – Alternative 2 (red polygon) Farm Drooghevel

Declaration of No Conflict of Interests

I, Marion Kathleen Bamford, declare that I have performed this Palaeontological Impact Assessment to the best of my ability and experience and hereby declare no conflict of interest between myself, Royal HaskoningDHV, Eskom, Exxaro or the local community.

Signed in Johannesburg on the 21st of January 2015.

Qualifications and Experience:

PhD, University of the Witwatersrand, 1990

Thirty years of research experience in Palaeontology, including field work in southern and eastern Africa, South America, Europe, Australia.

Twenty years of experience in Palaeontological Impact Assessments.

Published over 85 peer-reviewed journal articles, book chapters, scholarly works.

Presented my research at over 40 local and international conferences.