



PGS HERITAGE

HERITAGE IMPACT ASSESSMENT

**PROPOSED BLOCK C OPEN PIT PROJECT LOCATED NEAR DRIEFONTEIN,
MKHONDO LOCAL MUNICIPALITY, GERT SIBANDE DISTRICT MUNICIPALITY,
MPUMALANGA PROVINCE**

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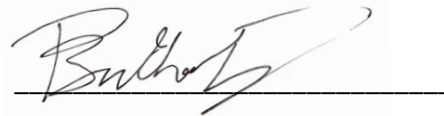
Declaration of Independence

The report has been compiled by PGS Heritage (Pty) Ltd, an appointed Heritage Specialist for EXM Advisory Services (Pty) Ltd. 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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Report Title	Heritage Impact Assessment for the Proposed Block C Open Pit Project located near Driefontein, Mpumalanga Province		
Control	Name	Signature	Designation
Author	Polke Birkholtz		Project Manager / Heritage Specialist & Archaeologist

The heritage impact assessment report has been compiled taking into account the NEMA Appendix 6 (2014, as amended 2017) requirements for specialist reports as indicated in the table below.

NEMA Regs (2014, as amended 2017) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Page iii and Section 1.2
The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to Appendix B
A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
An indication of the scope of, and the purpose for which, the report was prepared	Section 1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 3
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Sections 5 & 6
An identification of any areas to be avoided, including buffers	Sections 6 & 8
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer Figure 27
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Sections 7 & 8
Any mitigation measures for inclusion in the EMPr	Section 8
Any conditions for inclusion in the environmental authorisation	Section 8
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and	Executive Summary & Section 9
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	
A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. No public participation process was undertaken by PGS Heritage.
A summary and copies if any comments that were received during any consultation process	Not applicable. See comment above.
Any other information requested by the competent authority.	Not applicable. No consultation with the heritage authorities has as of yet taken place.

EXECUTIVE SUMMARY

Introduction

PGS Heritage (Pty) Ltd was appointed by EXM Advisory Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed Block C Open Pit Project. The study area is located near Driefontein and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality, Mpumalanga Province.

General Desktop Study

An archaeological and historical desktop study was undertaken to provide a historical framework for the project area and surrounding landscape (refer **Chapter 5**). This was augmented by an assessment of previous archaeological and heritage studies completed for the study area and surrounding landscape. Furthermore, an assessment was made of the early editions of the relevant topographic maps.

No evidence for the presence of archaeological or heritage sites from within the study area could be revealed during the desktop study.

Palaeontology

Ms. Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**. Please note that only the impact assessment and mitigation components of the palaeontological report are included in the main component of this report. Please refer **Chapters 7 & 8**.

Ms. Butler found that the proposed development area is “...entirely underlain by the Vryheid Formation of the Ecca Group (Karoo Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Vryheid Formation is Very High while the Ecca has a moderate Palaeontological Sensitivity...”.

Fieldwork

Intensive field surveys of the study area were undertaken by foot and vehicle by an experienced

fieldwork team comprising one archaeologist/heritage specialist (Polke Birkholtz) accompanied by a fieldwork assistant (Derrick James). The focus in the fieldwork was placed on the undisturbed sections of the study area. The fieldwork was aimed at locating and documenting sites falling within the proposed development area. The fieldwork was undertaken on Friday, 23 August 2019.

Despite the intensive fieldwork undertaken, no evidence for any archaeological or heritage sites could be identified.

Impact Assessment

No evidence for any archaeological or heritage sites could be identified during the fieldwork. As a result, no assessment of the impact of the proposed development on identified archaeological and heritage sites will be undertaken, as the impact would be zero.

The impact assessment undertaken in the palaeontological desktop study was included in this chapter. This impact assessment revealed that the proposed development is expected to have a High Impact Risk on palaeontology if no mitigation is undertaken first.

Mitigation

The palaeontological report recommends that an EIA level palaeontology report be conducted *“...to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the EIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment will be conducted and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.”*

Conclusions

On the condition that the requirement for a field-based palaeontological impact assessment and any additional mitigation measures required by such a study are suitably addressed, no heritage reasons can be given for the development not to continue.

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1 INTRODUCTION

PGS Heritage (Pty) Ltd was appointed by EXM Advisory Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed Block C Open Pit Project. The study area is located near Driefontein and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality, Mpumalanga Province.

1.1 Scope of the Study

The aim of this HIA is to identify possible heritage sites and finds that may occur in the proposed development area and to assess the impact of the proposed development on these identified heritage sites. The study also aims to inform the developers to manage 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 HIA was compiled by PGS Heritage (Pty) Ltd. The staff at PGS Heritage (Pty) Ltd. has a combined experience of nearly 70 years in the heritage consulting industry and has 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.

Polke Birkholtz, the project manager and author, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is also accredited with the CRM Section of the same association. He has 18 years of experience in the heritage assessment and management field and holds a B.A. (cum laude) from the University of Pretoria specialising in Archaeology, Anthropology and History and a B.A. (Hons.) in Archaeology (cum laude) from the same institution.

1.3 Assumptions and Limitations

The following assumptions and limitations to this study exist:

- 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, as well as the density of vegetation cover found in some areas. 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.

- The study area boundaries depicted in **Figure 2** was provided by the client. As a result, this was the area assessed during the fieldwork. Should any additional development footprints located outside of this study area boundary be required, such additional areas will have to be assessed in the field by an experienced archaeologist / heritage specialist before construction commences.

1.4 Legislative Context

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

- i. National Environmental Management Act (NEMA) Act 107 of 1998
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002

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

- i. GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998
 - a. Basic Assessment Report (BAR) – Regulations 19 and 23
 - b. Environmental Scoping Report (ESR) – Regulation 21
 - c. Environmental Impacts Assessment (EIA) – Regulation 23
 - d. Environmental Management Programme (EMPr) – Regulations 19 and 23

- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38

- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)

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

1.5 Terminology and Abbreviations

Archaeological resources

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

Cultural Significance

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

Development

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. These may include:

- 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 earliest archaeological phase identified in South Africa. It refers to the archaeology of the Stone Age, dating to between roughly 700 000 and 2 500 000 years ago.

Heritage

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

Heritage Resources

This means any place or object of cultural significance

Later Stone Age

The archaeology of the last 20 000 years, associated with fully modern people.

Late Iron Age

The archaeology of the last 1000 years up to the 1800s, associated with ironworking and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age, dating to between 20 000-300 000 years ago, associated with early modern humans.

Palaeontology

The study of 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 of any site which contains such fossilised remains or trace.

Study Area

The term study area refers to the area that is defined in Section 2.1 of this report.

Development Footprint Areas

Development footprint areas represent the actual development areas such as the TSF extension area.

Table 1 - Abbreviations

<i>ABBREVIATION</i>	<i>DESCRIPTION</i>
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resources Management
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment / Early Iron Age
EMPr	Environmental Management Programme Report
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Later Stone Age
LIA	Late Iron Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

Refer to **Appendix A** for further discussion on heritage management and legislative matters.

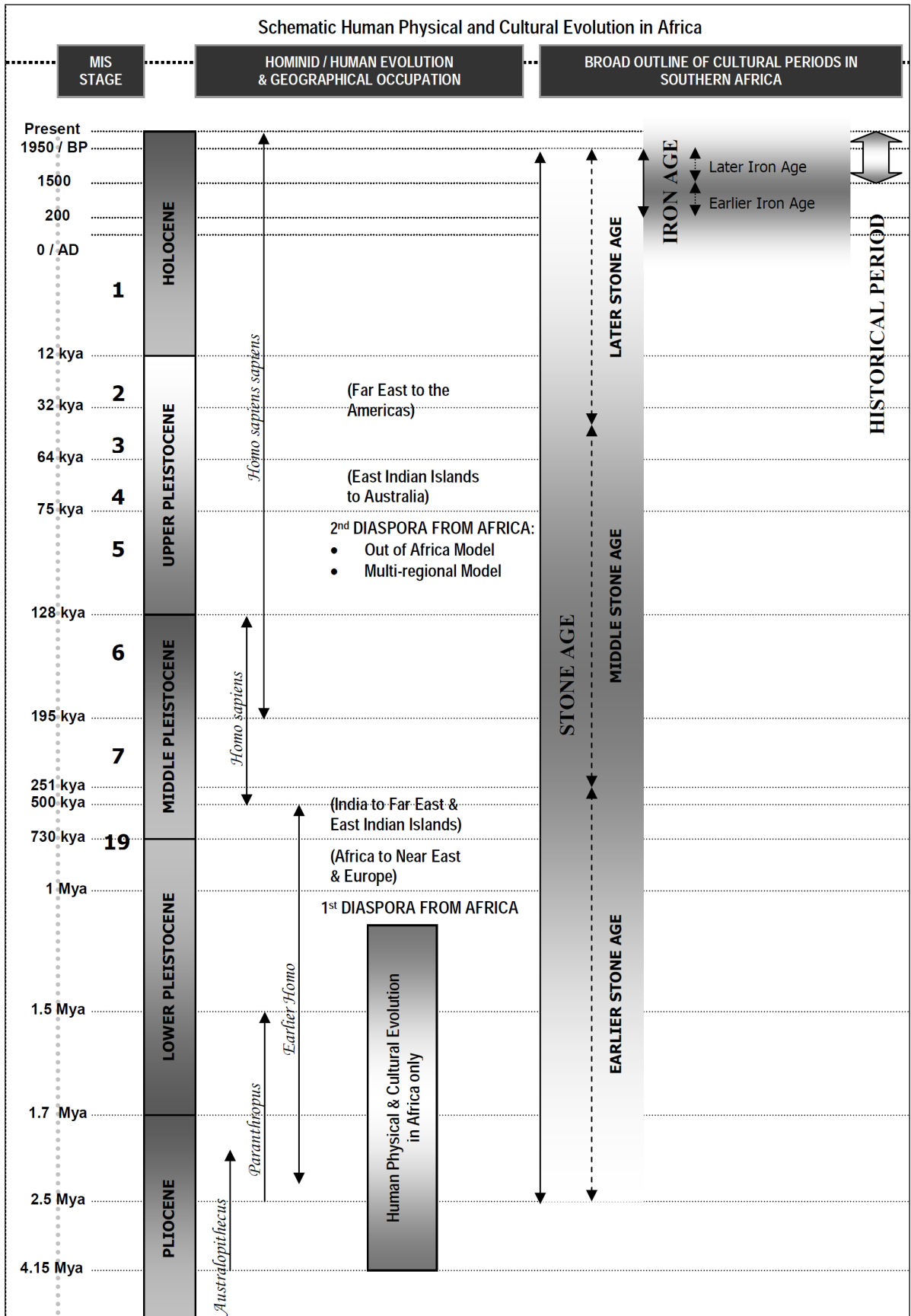


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008).

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location

Study Area Coordinates	Northernmost point: S 27.005954 E 30.406630	Easternmost point: S 27.018053 E 30.412888
	Southernmost point: S 27.021336 E 30.410736	Westernmost point: S 27.010860 E 30.403564
Location	The study area is located within the Mkhondo Local Municipality and the Gert Sibande District Municipality, Mpumalanga Province. The study area is located adjacent to Driefontein and 22.3km south-west of Iswepe.	
Property	Portions of the farm Roodekraal 21 HT.	
Topographic Map	2730AB	
Study Area Extent	The combined extent of the study area is approximately 74.5 hectares.	



Figure 2 – Locality plan depicting the study area (red polygon) within its surrounding landscape. This map was compiled by PGS Heritage using Google Earth Pro.

2.2 Technical Project Description

The content of this section was provided by EXM Advisory Services (Pty) Ltd.

2.2.1 Overview of the Block C Project

Kangra is currently mining the underground and opencast coal resources at Maquasa West Extension. The life of mine for the opencast resources is expected to be reached in November 2019. In order to prevent retrenchments and allow for continuity in mining, the current staff operating the Maquasa West opencast pit will need to be moved to another opencast pit coal resource area. Kangra is proposing to develop the Block C Pit to augment current production. The Block C Pit will be located within the Maquasa East Operation, to the east of the existing discard dump and north of the processing plant (See Figure below). It will be located within the mine's mining right area on the farm Roodekraal 21 HT which is owned by Kangra.

2.2.1.1 Surface Infrastructure

The Block C Open Pit Project will largely utilise existing support infrastructure located at the Maquasa East Section. The infrastructure is operated under the mine's approved EMPr and Water Use Licence. This includes:

- Processing Plant (South of the Pit);
- Run of Mine (ROM) Stockpile Pad (located at the processing plant);
- Haul and service roads;
- Workshops and washbay areas (Processing plant area);
- Non-mineralogical waste storage areas;
- Fuel/hazardous storage; and
- Explosives storage.

The following infrastructure will require modification/expansion to accommodate the Block C Open Pit Project

- Overburden Dump; and
- Clean water channels close to the open pit.

The content of this section was provided by Agreenco Environmental Projects (Pty) Ltd.

2.2.1.2 Open Pit Mining Method

The coal seam to be mined includes the GUS 1B and GUS C coal seam. This resource lies shallow and therefore open pit mining methods will be applied. The pit will require a clearance of 19.5 ha. Topsoil will be stripped at 30cm and stockpiled for future rehabilitation purpose. Thereafter drilling and blasting will be undertaken to loosen and expose the overburden. Blasting will be undertaken during daylight hours. Controlled blasting methods will be employed at the mine. Typical controlled blasting strategies utilize small diameter blast holes detonated as a pre-shear line in harder massive rock or as a post-shear (cushion) line in weak or heavily fractured rock. This blasting method reduces the production of flyrock.

Conventional mining methods will be applied which includes opencast strip and roll over mining method with continuous rehabilitation. This implies that the overburden will be stripped from the initial cut and stockpiled for future rehabilitation. Thereafter, the stripped overburden is used as backfill for successive strips that are mined to ensure continuous rehabilitation. An option of in-pit crushing is proposed for the development.

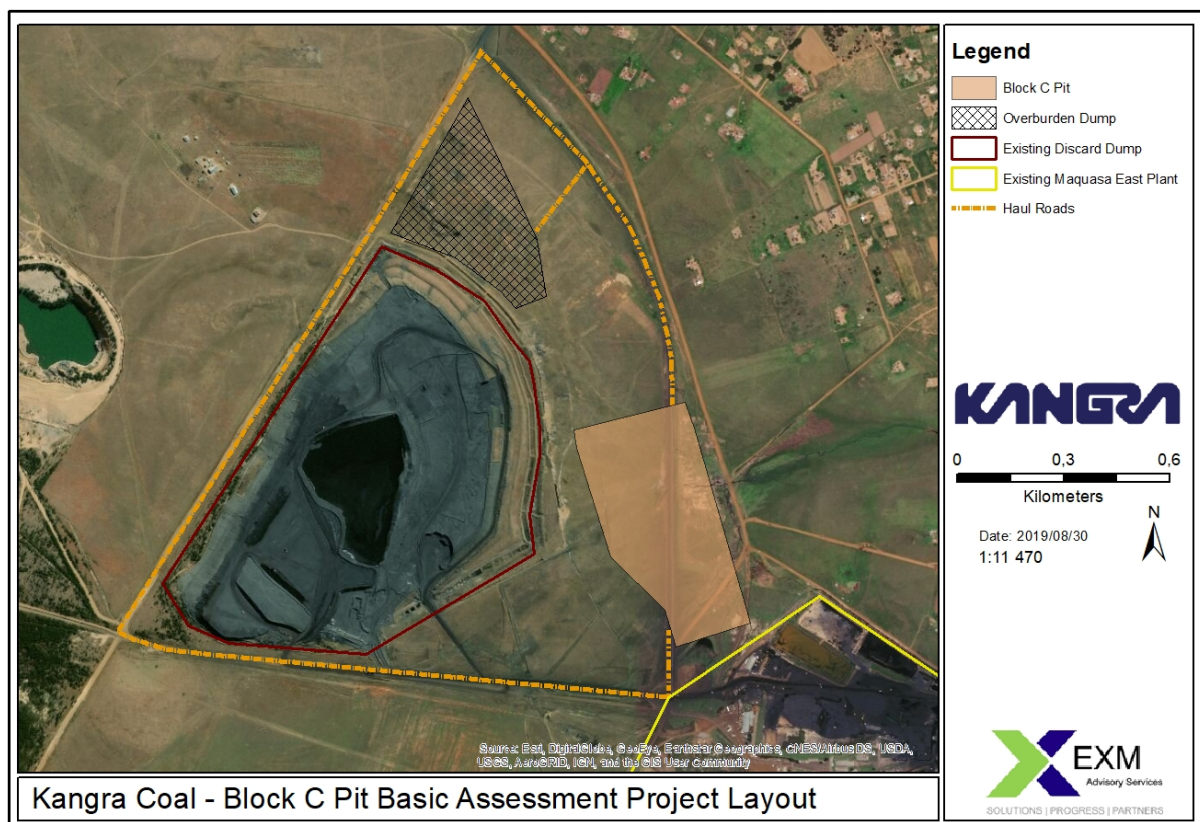


Figure 3 – Proposed development layout plan as provided by the client.

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

The HIA process consisted of three steps:

Step I – Desktop Study: An archaeological and historical background study was undertaken using available sources. Previous archaeological and heritage studies from the study area and surroundings were also accessed using inter alia the South African Heritage Resources Information System (SAHRIS) of the South African Heritage Resources Agency (SAHRA). Furthermore, an assessment was made of the early editions of the relevant topographic maps.

Step II – Physical Survey: Intensive field surveys of the study area were undertaken by foot and vehicle by an experienced fieldwork team comprising one archaeologist/heritage specialist (Polke Birkholtz) accompanied by a fieldwork assistant (Derrick James). The focus in the fieldwork was placed on the undisturbed sections of the study area. The fieldwork was aimed at locating and documenting sites falling within the proposed development area. The fieldwork was undertaken on Friday, 23 August 2019.

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

The significance of heritage sites was based on five 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
- the 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 position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site

Site Significance

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

Table 2 - 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	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium	Recording before destruction
Generally Protected C (GP.C)	-	Low	Destruction

3.2 Methodology for Impact Assessment

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

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

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria.

A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 3** below.

Table 3 – Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	<i>Isolated corridor / proposed corridor</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

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

Significance Assessment

The 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, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the impact will be considered to be HIGH to VERY HIGH. A more detailed description of the impact significance rating scale is given in **Table 4** below.

Table 4 – 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 is 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 5** below.

Table 5 – Description of the spatial significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the site.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the study area boundary.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

Temporal/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 or duration scale is rated according to criteria set out in **Table 6** below.

Table 6 – 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 the project.
4	Long-term	The environmental impact identified will operate beyond the life of operation of the project.
5	Permanent	The environmental impact will be permanent.

Degree of Probability

The probability or likelihood of an impact occurring will be outlined in **Table 7** below.

Table 7 – 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

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 8**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making.

Table 8 – 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.

Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner, in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment

criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale, as described below:

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

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

Table 9 – Example of rating scale

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Local	Medium Term	Could Happen	Low
Impact on heritage structures	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion 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 below.

Table 10 – 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 heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

4 CURRENT STATUS QUO

The Block C Pit will be located within the Maquasa East Operation, to the east of the existing discard dump and north of the processing plant. A tar access road to the main mine offices cuts through the eastern section of the study area. Residential dwellings associated with Driefontein are located a short distance north-east and east of the study area.

Significant sections of the study area have been disturbed and modified by mining activities. According to the historical imagery function of Google Earth Pro, a large section of the study area was already disturbed by 2003, with more disturbance taking place in c. 2010. The southern components of the study area appear to be less disturbed than its central and northern components.

The study area is located within the Eastern Highveld Grassland vegetation type. This vegetation type is characterized by “...slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra*, *Celtis africana*, *Diospyros lycioides subsp lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Rhus magalismontanum*).” (www.sanbi.org).

In terms of geology, the Eastern Highland Grassland vegetation type is associated with “...red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup)...” (www.sanbi.org).

A number of photographs below provide general views of the study area and the landscape within which it is located.



Figure 4 – General view along a section of the study area. A section of the discard dump can be seen on the left. Photograph was taken in a northern direction.



Figure 5 – This view was taken in an eastern direction and depicts a section of the study area in the foreground with Driefontein visible in the background.



Figure 6 – This view of a section of the study area was taken in a south-western direction from a point located in proximity to the north-eastern corner of the study area. The discard dump can clearly be seen in the background.



Figure 7 – Similar view of a section of the study area as depicted in the previous image. The mine truck is shown driving along the tar access road that cuts through the eastern end of the study area.

5 DESKTOP STUDY FINDINGS

5.1 Overview of the Archaeology and History of the Study Area and Surroundings

DATE	DESCRIPTION
The Study Area during the Stone Age	
With the exception of the Later Stone Age, very little is known about the Stone Age archaeology of the study area and its immediate surroundings.	
2.5 million to 250 000 years ago	<p>The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.</p> <p>No information regarding ESA sites from the study area or its immediate surroundings could be located.</p>
>250 000 to 40 000 years ago	<p>The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013).</p> <p>No information regarding MSA sites from the study area or its immediate surroundings could be located. An MSA surface scatter was identified during a previous heritage study a short distance south-east of Dirkiesdorp (Huffman, 1993). This site is located approximately 18.8km south of the present study area. Furthermore, a previous heritage impact assessment indicates that MSA surface scatters are known from the farms Watervaldrift I and Watervaldrift II (ERM, 2013). The farm Watervaldrift is located 20.7km north-east of the present study area.</p>
40 000 years ago to c. 1800s	<p>The Later Stone Age (LSA) is the third archaeological phase identified and is characterised by an abundance of very small stone tools known as microliths as well many rock art sites across the country. This period is associated with hunter-gatherers (San) as well as early pastoralists (Khoekhoe).</p> <p>No LSA sites are known from the study area or direct vicinity. The surroundings of the study area, and especially the landscape a short distance west of the study area, are well suited for Later Stone Age sites due to the many shelters and overhangs located in the sandstone cliffs of this landscape. Furthermore, a previous heritage impact assessment indicates that LSA surface scatters are known from the farms Twyfelaar, Watervaldrift II, Idalia, Rustplaas and Oak Harbour (ERM, 2013). The closest of these farms to the present study area is Twyfelaar, which is located 16.6km farm north-east of the present study area.</p>
The Study Area during the Iron Age	
The arrival of early farming communities during the first millenium, heralded in the start of the Iron Age	

for South Africa. The Iron Age is that period in South Africa’s archaeological history associated with pre-colonial farming communities associated with agricultural and pastoralist farming activities, metal working, cultural customs such as lobola as well as the tangible representation of the significance of cattle imprinted on their settlement layouts (known as the Central Cattle Pattern) (Huffman, 2007).

<p>AD 200 – AD 900</p>	<p>The earliest phase in the Iron Age history of Southern African is known as the Early Iron Age. According to the distribution maps published by Huffman (2007) the only possible presence of Early Iron Age sites in the study area and surrounding landscape would be in the form of the so-called Silver Leaves facies of the Kwale Branch of the Urewe Tradition. This facies is dated to between AD 280 and AD 450. The key features on the decorated ceramics of the Silver Leaves facies comprise multiple facets in the first position (Huffman, 2007).</p>
<p>AD 900 – AD 1300</p>	<p>The second phase in the Iron Age history of Southern Africa is known as the Middle Iron Age. No sites from the Middle Iron Age are known from the study area and surrounding landscape.</p>
<p>AD 1300 – AD 1850</p>	<p>The third and final phase in the Iron Age history of Southern Africa is known as the Late Iron Age. This period is associated with the Nguni and Sotho-Tswana speaking people (Huffman, 2007). Bergh (1999) identifies two main Late Iron Age groups within the wider vicinity of the study area, namely the Phuthing and the Khumalo Ndebele (Matabele). Lombard (1980) also mentions a Late Iron Age group he refers to as the Nhlapo people and indicates that when the first white people came to stay in the Ermelo district they already found the Nhlapo people in the vicinity of Maviristad. As mentioned elsewhere, the farm Maviristad 321 IT is located some 29.4km north-west of the study area. During these later stages of the Late Iron Age, the area under discussion fell under the sphere of influence of the Swazi.</p>

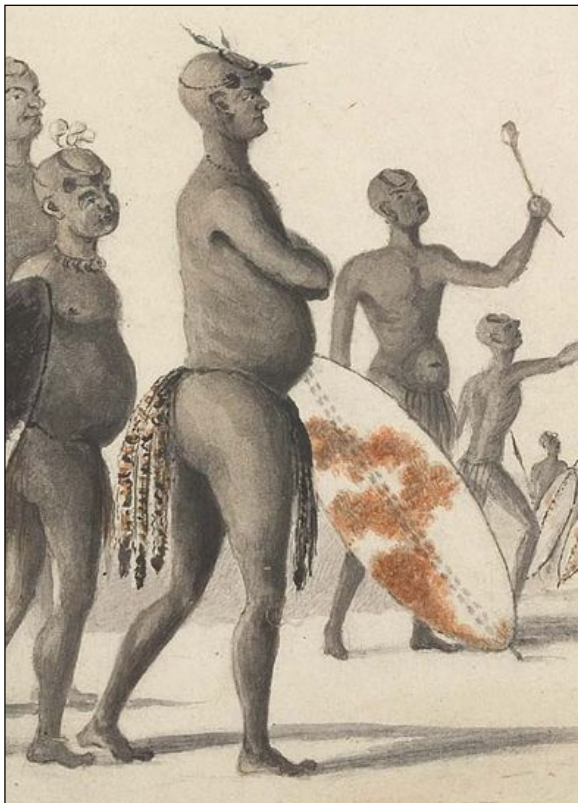


Figure 8

King Mzilikazi of the Matabele. This illustration was made by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za).

The Early Historical Period

The early Historical Period within the study area and surroundings was characterised by the arrival of white people on a permanent basis in the area. During the 1830s a mass migration of roughly 2 540 Afrikaner families (comprising approximately 12 000 individuals) from the frontier zone of the Cape Colony to the interior of Southern Africa took place. These people were later to be known as Voortrekkers (those who travel ahead) and formed part of the first mass movement of whites into the interior of Southern Africa (Visagie, 2011).

The arrival of white people, with a long-term view of occupation and settlement, into these areas, led to a period of conflict. This period also saw the first establishment and surveying of defined properties and farms within the study area.

1836	The first Voortrekker parties crossed over the Vaal River in 1836.
1845	The district of Lydenburg was established (Bergh, 1999). The study area fell within this district at the time.
c. 1855	<p>Before this time, a chief by the name of Mlambo (son of Magonondo) and his Nhlapo Clan were settled “...at the source of the Ngwempisi river at the foot of the Ntabande mountain...” (Matsebula, 1972). Although the Ntabande Mountain could not be identified, the remainder of this description of the locality of the settlement of Nhlapo indicates that the area referred to must have been located approximately 16.4km north-west of the present study area.</p> <p>After the death of Mlambo Nhlapo shortly before c. 1855, a dispute arose between his two sons Mhlangala and Bashele over the chieftainship. When Bashele realised that he was about to lose the conflict he called on the protection of the Swazi King Mswati who sent out a regiment to protect Bashele. According to this version of events, Mhlangala was killed and Bashele was installed as chief under King Mswati (Matsebula, 1972).</p> <p>Myburgh (1956) provides a slightly different version of events which he recorded from community elders during his research into the oral histories of the tribes of the Carolina District. He also refers to the dispute between the two sons of Mlambo Nhlapo over his chieftainship but indicates that the sons’ names were Mhlangala and Gama. In this version of events Gama realised that he was losing the war with his brother and asked the Zulu King Mpande for assistance. King Mpande however referred him to the Swazi King Mswati who in turn ordered his elite iNyatsi regiment to assist Gama. Mhlangala’s settlement on the farm Maveriesstad 321 IT was attacked by both Gama and the iNyatsi regiment which resulted in Mhlangala deciding to flee. The farm Maveriesstad 321 IT is located 29.4km north-west of the present study area.</p> <p>From this point on, two versions of events exist. According to the Nhlapo, the Swazi regiment was halted in their pursuit of Mhlangala by the appearance of a lightning strike. However, according to the Swazi oral histories the iNyatsi regiment met up with the men of Mhlangala on the eMsohotjeni Mountain on the farm Sobbeken 390 IT (located 5.4km east of the present study area). However, their attack was restricted by a severe snow storm which allowed Mhlangala and his followers to flee. They eventually settled in the Mlambo area of present day Lesotho (Myburgh, 1956).</p>

November 1859	<p>The town of Marthinus Wesselstroom in the district of Wakkerstroom was formally established. The town later became known as Wakkerstroom as well (Hofmeyr et.al., 2009). Wakkerstroom is located 45km south-west of the study area. Although the study area initially fell within Lydenburg, it would appear that with the declaration of the District of Wakkerstroom 1859, the study area now fell just within this newly proclaimed district (Bergh, 1999).</p>
Early 1860s	<p>During the early 1860s the first Voortrekker families started establishing themselves in the wider vicinity of the study area including Hendrik Teodor Bührmann, Nicolaas Jacobus Breytenbach and F.P. van Rhede van Oudtshoorn (Lombard, 1980).</p> <p>The permanent settlement of white farmers in the general vicinity of the study area would have resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Features that can typically be associated with early farming history of the area include farm dwellings, sheds, rectangular stone kraals, canals, farm labourer accommodation and cemeteries.</p> <p>Although it is possible that a few heritage sites associated with the very first establishment of white farmers from the study area and surroundings would likely still exist, these would be few in number due to their age as well as the destruction of farmsteads by the British forces during the South African War in accordance with the so-called 'scorched earth' policy.</p> <p>The other sites often associated with these early farms are graves and cemeteries for both white farmers and black farm labourers. These sites are often all that remains of the farmsteads of the mid to late nineteenth century.</p>
12 February 1880	<p>The town of Ermelo was officially proclaimed by the administrator of the Transvaal William Owen Lanyon (Lombard, 1980). Ermelo is located approximately 67.2km north-west of the study area.</p>
1882	<p>The town of Piet Retief was officially proclaimed in 1882 (Bergh, 1999). This town is located 35.5km east of the present study area.</p>
1899 - 1902	<p>On 11 October 1899 war broke out between Britain and the two Boer republics of the Orange Free State and Transvaal (Zuid-Afrikaansche Republiek). No battles or skirmishes from the war are known to have occurred within the study area or its immediate surroundings.</p> <p>As part of the strategy by the British High Command to hinder the movement of the Boer Commandos during the so-called Guerilla War Phase, vast lines comprising blockhouses and forts were erected across most of South Africa. In terms of the study area, the closest of these blockhouse lines was the so-called Volksrust-Wakkerstroom-Piet Retief-Derby lines with a total length of 141 km and comprising 121 individual blockhouses and forts. A total of 100 of these blockhouses and forts were built between Wakkerstroom and Derby (Hattingh & Wessels, 1997).</p> <p>Some of these blockhouses and forts still exist today, with the closest example to the present study area in all likelihood the extensive stonewalled fortifications located on the farm Amsterdam (Van der Westhuizen & Van der Westhuizen, 2013). These fortifications are located 12.4km south-east of the present study area.</p>



Figure 9 – Google Earth image showing the Amsterdam farmstead on the right with the stonewalled British fortifications visible on the left. These fortifications formed part of the blockhouse line between Wakkerstroom and Piet Retief during the South African War (1899-1902).

The Twentieth Century

The twentieth century for the study area and surroundings was characterised by both infrastructural development as well as the impacts of government regulated racial discrimination.

1912	One of the founding members of the South African Native Congress (later the African National Congress) Pixley ka Izaka Seme established the Native Farmers Association of Africa (NFAA) which aim was to acquire land for black farmers. In the same year the NFAA purchased three farms for this purpose, namely Driefontein, Daggakraal and Drieapan (Delius, 2007). Of these three properties, the farm Driefontein 388 IT is situated the closest to the study area and is located 1.4km to the east.
1924	The town of Sheepmoor appears to have been established during this time. Sheepmoor is located 34.5km north-west of study area.
1965	In 1965 the Driefontein community was declared a so-called “black spot” by the Apartheid government which meant that the authorities intended to remove the residents of this community to respective homelands. While very little was initially done by the government to implement these measures, the early 1980s saw increasing pressures placed on the Driefontein community climaxing in the death of community leader and staunch opponent of the proposed

removal, Saul Mkhize. His funeral at Driefontein on 16 April 1983 was attended by more than 2,000 people representing various anti-Apartheid organisations. In October 1985 the government of the day decided not to proceed with the planned removal.



Figure 10 – The funeral of Saul Mkhize on 16 April 1983 at Driefontein (Delius, 2007:283).

<p>1986</p>	<p>In 1986 a zoned earth-fill type dam was built on the Assegai River. It was built for industrial and urban use. The dam was named after the one of the farms on which it was built, namely the farm Heyshope (www.wikipedia.org).</p> <p>The Heyshope Dam is located approximately 1.4km south-east of the study area.</p>
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5.2 Previous Archaeological and Heritage Studies from the Study Area and Surroundings

A search of the South African Heritage Resources Information System (SAHRIS) database revealed that a number of previous archaeological and heritage impact assessments had been undertaken within the surroundings of the study area.

These previous studies are as follows:

- **Huffmann, T.N. 1993. Archaeological Survey for Savemore Colliery**

This study area is located south-east of Dirkiesdorp on the farms Grootlaagte 70 HT and St Helena 67 HT. During the fieldwork a total of three heritage sites were identified, namely a MSA surface scatter, Late Iron Age stonewalled site and structures associated with the Historic Period. The study area for this 1993 project is located approximately 18km south of the present study area.

- **Huffmann, T.N. 1995. Archaeological Survey of Balgarthan Colliery**

This study area is located on the farms Naauwhoek 37 HT and Roodepoort 38 HT. During the fieldwork a total of nine heritage site types were identified, namely a European Farm Complex, seven Swazi Homesteads as well as a Recent Homestead. The study area for this 1995 project is located approximately 14.6km south-west of the present study area.

- **Nel, J. & S. Karodia, 2013. Heritage Impact Assessment Report for the Proposed Kusipongo Resource Mining Expansion Project**

The study area for this 2013 report extends over a massive area, with the closest distance between this area and the current study area being 1.4km. During the fieldwork a total of thirty sites were identified, including two historical structures, one stonewalled site associated with the Late Iron Age or Early Historic Period as well as four sites comprising graves and burial grounds.

5.3 Historical Topographic maps

An assessment of available archival and historical maps was undertaken as a way to establish a historic layering for the study area. These historic maps are also valuable resources in identifying possible heritage sites and features located within the study area. The only maps used for the present study are the First and Second Editions of the 2730AB Topographic Sheets.

5.3.1 First Edition of the 2730AB Topographic Sheet

A section of the First Edition of the 2730AB Topographic Sheet can be seen in **Figure 11** below. This map sheet was based on aerial photography undertaken in 1961, was surveyed in 1969 and drawn in

1969 by the Trigonometrical Survey Office.

The following observations can be made from the map:

- No possible heritage features are depicted within the study area boundaries;
- Three tracks are shown crossing diagonally across the study area. These tracks may have been cattle tracks or paths;
- No evidence for mining activities are depicted within the study area and surroundings;
- A plantation is depicted a short distance north-east of the present study area, with another plantation shows a short distance south-west of the study area; and
- The settlement of Driefontein can be to the east of the study area.

5.3.2 Second Edition of the 2730AB Topographic Sheet

A section of the Second Edition of the 2730AB Topographic Sheet can be seen in **Figure 12** below. This map sheet was printed in 1989.

The following observations can be made from the map:

- No possible heritage features are depicted within the study area boundaries;
- One track is shown passing horizontally across the study area. This track may have been a cattle track or path;
- No evidence for mining activities are depicted within the study area and surroundings;
- A plantation is depicted a short distance north-east of the present study area, with another plantation shows a short distance south-west of the study area; and
- The settlement of Driefontein can be to the east of the study area.

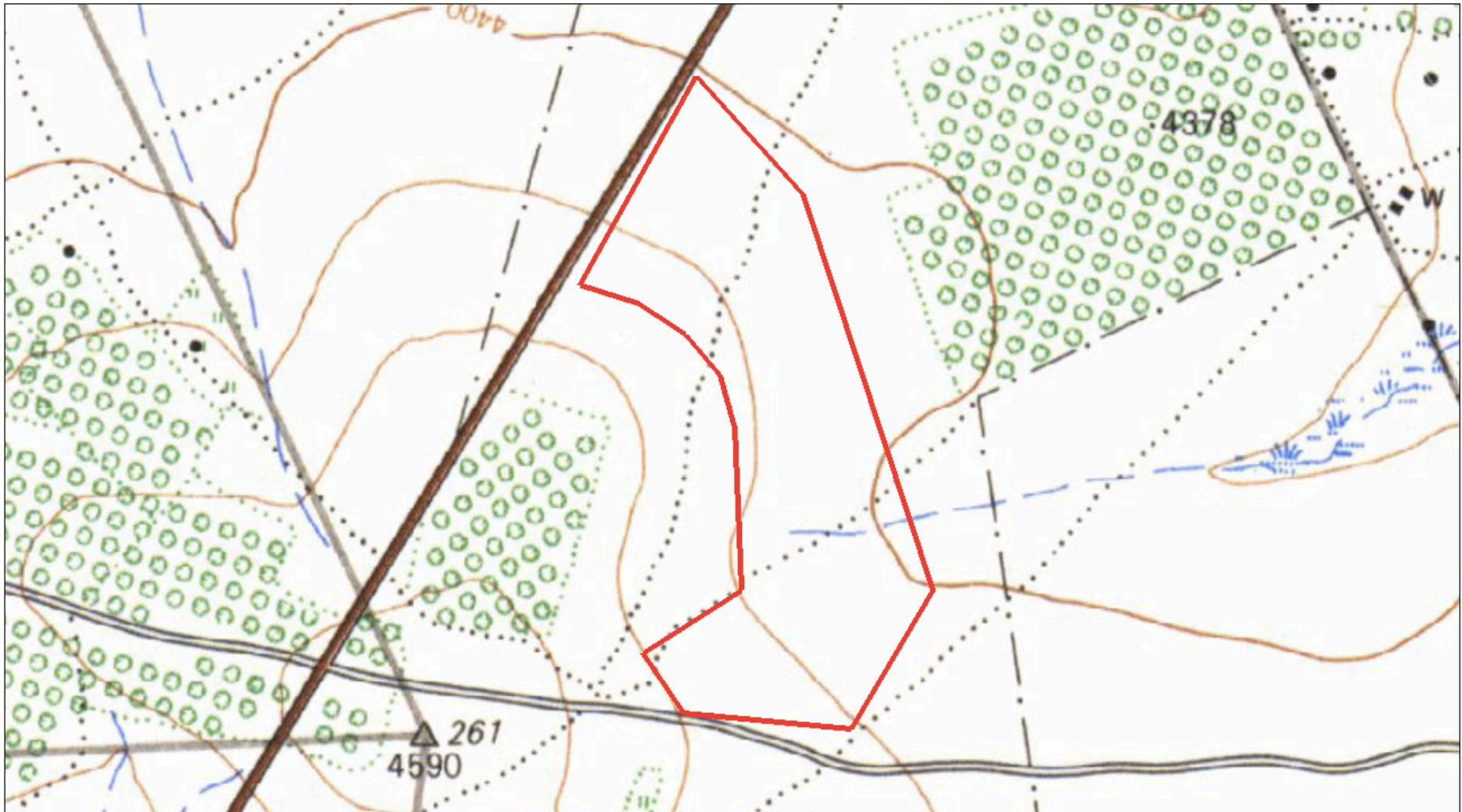


Figure 11 - Section of the First Edition of the 2730AB Topographic Map that was surveyed in 1969 and drawn in 1969. The study area boundaries are depicted in red.

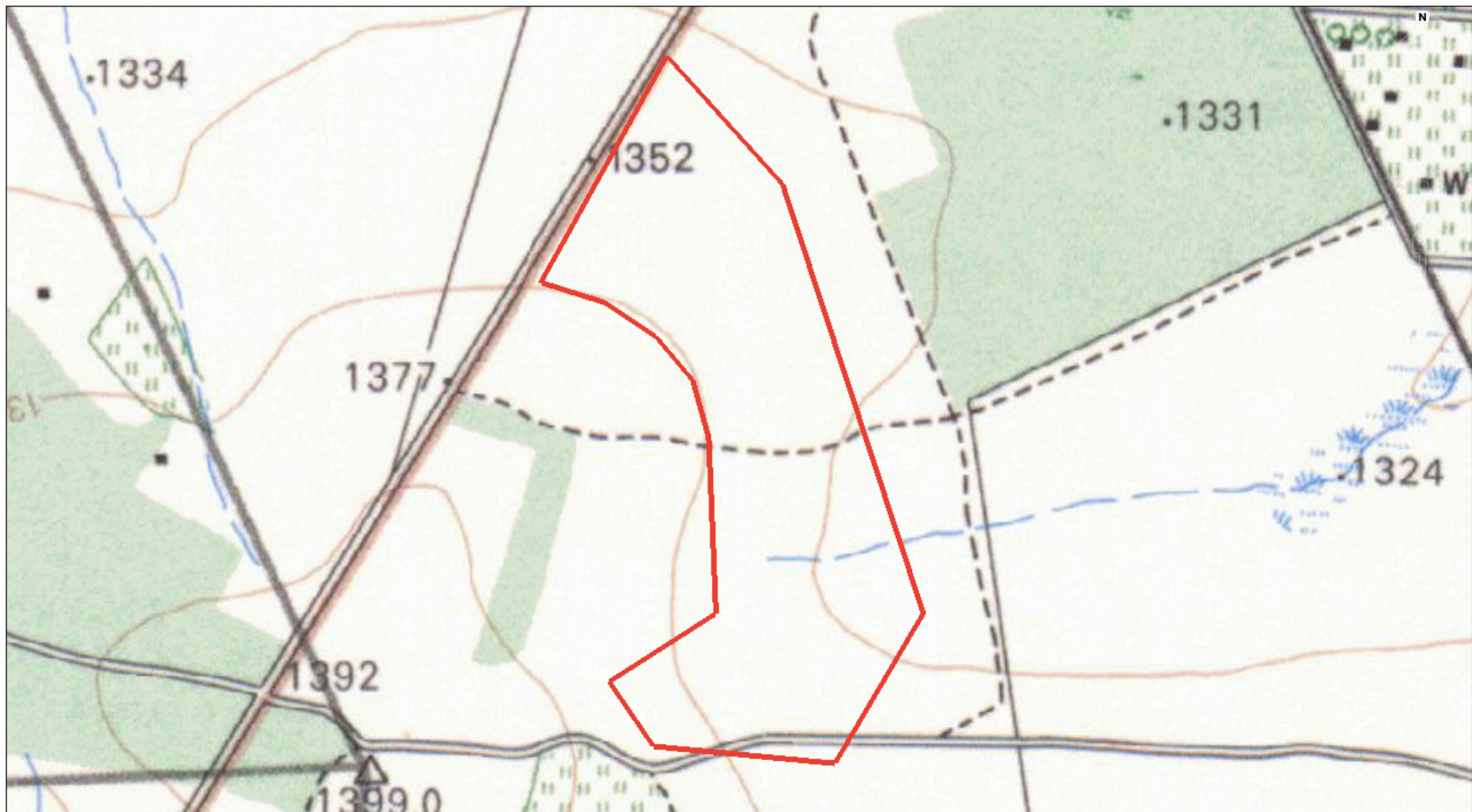


Figure 12 - Section of the Second Edition of the 2730AB Topographic Map that was printed in 1989. The study area boundaries are depicted in red.

6 FIELDWORK FINDINGS

Intensive field surveys of the study area were undertaken by foot and vehicle by an experienced fieldwork team comprising one archaeologist/heritage specialist (Polke Birkholtz) accompanied by a fieldwork assistant (Derrick James). The focus in the fieldwork was placed on the undisturbed sections of the study area. The fieldwork was aimed at locating and documenting sites falling within the proposed development area. The fieldwork was undertaken on Friday, 23 August 2019.

Despite the intensive fieldwork undertaken, no evidence for any archaeological or heritage sites could be identified. During the fieldwork, hand-held GPS devices were used to record track logs. These recorded track logs show the routes followed by the fieldwork team on site. The recorded track logs are also shown on maps depicted on the subsequent pages.



Figure 13 – Google Earth image showing the study area boundaries in red line with the recorded GPS track logs in white line .

7 ASSESSMENT OF IMPACT OF PROPOSED DEVELOPMENT

7.1 Assessment of Development Impact on Identified Heritage Sites

No evidence for any archaeological or heritage sites could be identified during the fieldwork. As a result, no assessment of the impact of the proposed development on identified archaeological and heritage sites will be undertaken, as the impact would be zero.

7.2 Assessment of Development Impact on Palaeontology

In this section, the impact of the proposed development on palaeontology will be assessed. This section was taken from the desktop-based palaeontological impact assessment undertaken by Ms. Elize Butler. In terms of the impact of the proposed development on palaeontology, she indicates that the “...development footprint is completely underlain by the Vryheid Formation of the Ecca Group. The Palaeontological Sensitivity of this formation is rated as Very High. The expected duration of the impact is assessed as potentially permanent. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be **permanent**. Impacts on palaeontological heritage during the construction phase could potentially occur but are regarded as having a Very High possibility.”

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

$$\text{Impact Risk} = \frac{(5 + 2 + 5)}{3} \times \frac{4}{5}$$

IMPACT RISK = 3.2

Table 11 - Assessment of Impact on Palaeontology

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Very High	Study Area	Permanent	Very likely	High
Impact on palaeontology	5	2	5	4	3.2

This calculation has revealed that the impact risk of the proposed development on palaeontology falls within Impact Class 4, which represents a High Impact Risk. As a result, mitigation would be required (refer Chapter 8).

8 REQUIRED MITIGATION MEASURES

8.1 Introduction

The impact assessment calculations undertaken in the previous chapter have revealed that the proposed development is expected to have a High Impact Risk in terms of palaeontology. As a result, mitigation measures would be required.

8.2 Required Mitigation Measures for Palaeontology

The palaeontological report recommends that an EIA level palaeontology report be conducted *“...to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the EIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment will be conducted and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.”*

9 CONCLUSIONS AND RECOMMENDATIONS

Introduction

PGS Heritage (Pty) Ltd was appointed by EXM Advisory Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the environmental process for the proposed Block C Open Pit Project. The study area is located near Driefontein and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality, Mpumalanga Province.

General Desktop Study

An archaeological and historical desktop study was undertaken to provide a historical framework for the project area and surrounding landscape. This was augmented by an assessment of previous archaeological and heritage studies completed for the study area and surrounding landscape. Furthermore, an assessment was made of the early editions of the relevant topographic maps.

No evidence for the presence of archaeological or heritage sites from within the study area could be revealed during the desktop study.

Palaeontology

Ms. Elize Butler of Banzai Environmental (Pty) Ltd was commissioned to undertake a desktop Palaeontological Impact Assessment. Her report and findings are attached in full in **Appendix C**. Please note that only the impact assessment and mitigation components of the palaeontological report are included in the main component of this report. Please refer **Chapters 7 & 8**.

Ms. Butler found that the proposed development area is “...entirely underlain by the Vryheid Formation of the Ecca Group (Karoo Supergroup). According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Vryheid Formation is Very High while the Ecca has a moderate Palaeontological Sensitivity...”.

Fieldwork

Intensive field surveys of the study area were undertaken by foot and vehicle by an experienced

fieldwork team comprising one archaeologist/heritage specialist (Polke Birkholtz) accompanied by a fieldwork assistant (Derrick James). The focus in the fieldwork was placed on the undisturbed sections of the study area. The fieldwork was aimed at locating and documenting sites falling within the proposed development area. The fieldwork was undertaken on Friday, 23 August 2019.

Despite the intensive fieldwork undertaken, no evidence for any archaeological or heritage sites could be identified.

Impact Assessment

No evidence for any archaeological or heritage sites could be identified during the fieldwork. As a result, no assessment of the impact of the proposed development on identified archaeological and heritage sites will be undertaken, as the impact would be zero.

The impact assessment undertaken in the palaeontological desktop study was included in this chapter. This impact assessment revealed that the proposed development is expected to have a High Impact Risk on palaeontology if no mitigation is undertaken first.

Mitigation

The palaeontological report recommends that an EIA level palaeontology report be conducted *“...to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the EIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment will be conducted and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.”*

Conclusions

On the condition that the requirement for a field-based palaeontological impact assessment and any additional mitigation measures required by such a study are suitable addressed, no heritage reasons can be given for the development not to continue.

10 PREPARERS

This Heritage Impact Assessment was written by the following preparers:

- Polke Birkholtz – Project Manager / Archaeologist / Author

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Historic Topographic Maps

All the historic and early topographic maps used in this report were obtained from the Directorate: National Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

Internet

www.sanbi.org

Google Earth

All the aerial depictions and overlays used in this report are from Google Earth.

Appendix A

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

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 terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb them. Furthermore, individuals who already possess heritage 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 located in a cemetery (such as ancestral graves in rural areas), are protected. The legislation also 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 resources authority and, if there is a 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 prehistoric cultural remains, including graves and human remains.

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 reinternment 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 Resources Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administered by a local authority. Graves in the category located inside a formal cemetery administered by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

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

Appendix B
CURRICULUM VITAE

**PROFESSIONAL CURRICULUM
FOR POLKE DOUSSY BIRKHOLTZ**

Name: Polke Doussy Birkholtz

Date & Place of Birth: 9 February 1975 – Klerksdorp, North West Province, South Africa

Place of Tertiary Education & Dates Associated:

Institution: University of Pretoria

Qualification: BA (Cum Laude) - Bachelor of Arts Specializing in Archaeology, History & Anthropology

Date: 1996

Institution: University of Pretoria

Qualification: BA Hons (Cum Laude) - Bachelor of Arts with Honours Degree Specializing in Archaeology

Date: 1997

Qualifications:

BA - Degree specialising in Archaeology, History and Anthropology

BA Hons - Professional Archaeologist

Memberships:

Association of Southern African Professional Archaeologists (ASAPA)

Professional Member of the CRM Section of ASAPA

Overview of Post Graduate Experience:

1997 – 2000 – Member/Archaeologist – Archaeo-Info

2001 – 2003 – Archaeologist/Heritage Specialist – Helio Alliance

2000 – 2008 – Member/Archaeologist/Heritage Specialist – Archaeology Africa

2003 - Present – Director / Archaeologist / Heritage Specialist – PGS Heritage

Languages: English: Speak, Read & Write & Afrikaans: Speak, Read & Write

Total Years' Experience: 19 Years

Experience Related to the Scope of Work:

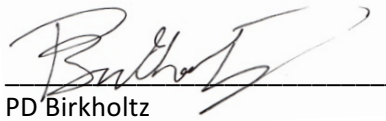
- Polke has worked as a **HERITAGE SPECIALIST / ARCHAEOLOGIST / HISTORIAN** on more than 300 projects, and acted as **PROJECT MANAGER** on almost all of these projects. His experience includes the following:
 - Development of New Sedimentation and Flocculation Tanks at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Greenline*.

- EThekweni Northern Aqueduct Project, Durban, KwaZulu-Natal. Heritage Impact Assessment for *Strategic Environmental Focus*.
- Johannesburg Union Observatory, Johannesburg, Gauteng Province. Heritage Inventory for *Holm Jordaan*.
- Development at Rand Water's Vereeniging Pumping Station, Vereeniging, Gauteng Province. Heritage Impact Assessment for *Aurecon*.
- Comet Ext. 8 Development, Boksburg, Gauteng Province. Phase 2 Heritage Impact Assessment for *Urban Dynamics*.
- Randjesfontein Homestead, Midrand, Gauteng Province. Baseline Heritage Assessment with Nkosinathi Tomose for Johannesburg City Parks.
- Rand Leases Ext. 13 Development, Roodepoort, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Relocation of the Hillendale Heavy Minerals Plant (HHMP) from Hillendale to Fairbreeze, KwaZulu-Natal. Heritage Impact Assessment for *Goslar Environmental*.
- Portion 80 of the farm Eikenhof 323 IQ, Johannesburg, Gauteng Province. Heritage Inventory for *Khare Incorporated*.
- Comet Ext. 14 Development, Boksburg, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Rand Steam Laundries, Johannesburg, Gauteng Province. Archival and Historical Study for *Impendulo and Imperial Properties*.
- Mine Waste Solutions, near Klerksdorp, North West Province. Heritage Inventory for *AngloGold Ashanti*.
- Consolidated EIA and EMP for the Kroondal and Marikana Mining Right Areas, North West Province. Heritage Impact Assessment for *Aquarius Platinum*.
- Wilkoppies Shopping Mall, Klerksdorp, North West Province. Heritage Impact Assessment for *Center for Environmental Management*.
- Proposed Vosloorus Ext. 24, Vosloorus Ext. 41 and Vosloorus Ext. 43 Developments, Ekurhuleni District Municipality, Gauteng Province. Heritage Impact Assessment for *Enkanyini Projects*.
- Proposed Development of Portions 3, 6, 7 and 9 of the farm Olievenhoutbosch 389 JR, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Marsh*.
- Proposed Development of Lotus Gardens Ext. 18 to 27, City of Tshwane Metropolitan Municipality, Gauteng Province. Heritage Impact Assessment for *Pierre Joubert*.
- Proposed Development of the site of the old Vereeniging Hospital, Vereeniging, Gauteng Province. Heritage Scoping Assessment for *Lekwa*.
- Proposed Demolition of an Old Building, Kroonstad, Free State Province. Phase 2 Heritage Impact Assessment for *De Beers Consolidated Mines*.
- Proposed Development at Westdene Dam, Johannesburg, Gauteng Province. Heritage Impact Assessment for *Newtown*.
- West End, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
- Kathu Supplier Park, Kathu, Northern Cape Province. Heritage Impact Assessment for *Synergistics*.
- Matlosana 132 kV Line and Substation, Stilfontein, North West Province. Heritage

- Impact Assessment for *Anglo Saxon Group* and *Eskom*.
 - Marakele National Park, Thabazimbi, Limpopo Province. Cultural Resources Management Plan for *SANParks*.
 - Cullinan Diamond Mine, Cullinan, Gauteng Province. Heritage Inventory for *Petra Diamonds*.
 - Highveld Mushrooms Project, Pretoria, Gauteng Province. Heritage Impact Assessment for *Mills & Otten*.
 - Development at the Reserve Bank Governor's Residence, Pretoria, Gauteng Province. Archaeological Excavations and Mitigation for the *South African Reserve Bank*.
 - Proposed Stones & Stones Recycling Plant, Johannesburg, Gauteng Province. Heritage Scoping Report for *KV3*.
 - South East Vertical Shaft Section of ERPM, Boksburg, Gauteng Province. Heritage Scoping Report for *East Rand Proprietary Mines*.
 - Proposed Development of the Top Star Mine Dump, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
 - Soshanguve Bulk Water Replacement Project, Soshanguve, Gauteng Province. Heritage Impact Assessment for *KWP*.
 - Biodiversity, Conservation and Participatory Development Project, Swaziland. Archaeological Component for *Africon*.
 - Camdeboo National Park, Graaff-Reinet, Eastern Cape Province. Cultural Resources Management Plan for *SANParks*.
 - Main Place, Central Johannesburg, Gauteng Province. Phase 1 Heritage Impact Assessment for the *Johannesburg Land Company*.
 - Modderfontein Mine, Springs, Gauteng Province. Detailed Archival and Historical Study for *Consolidated Modderfontein Mines*.
 - Proposed New Head Office for the Department of Foreign Affairs, Pretoria, Gauteng Province. Heritage Impact Assessment for *Holm Jordaan Group*.
 - Proposed Modification of the Lukasrand Tower, Pretoria, Gauteng Province. Heritage Assessment for *IEPM*.
 - Proposed Road between the Noupoort CBD and Kwazamukolo, Northern Cape Province. Heritage Impact Assessment for *Gill & Associates*.
 - Proposed Development at the Johannesburg Zoological Gardens, Johannesburg, Gauteng Province. Detailed Archival and Historical Study for *Matakoma*.
- Polke's **KEY QUALIFICATIONS:**
 - Project Management
 - Archaeological and Heritage Management
 - Archaeological and Heritage Impact Assessment
 - Archaeological and Heritage Fieldwork
 - Archival and Historical Research
 - Report Writing
 - Polke's **INFORMATION TECHNOLOGY EXPERIENCE:**
 - *MS Office – Word, Excel, & Powerpoint*

- *Google Earth*
- *Garmin Mapsource*
- *Adobe Photoshop*
- *Corel Draw*

I, Polke Doussy Birkholtz, hereby confirm that the above information contained in my CV is true and correct.



PD Birkholtz

5 January 2019
Date

Appendix C

PALAEONTOLOGICAL REPORT