



PGS HERITAGE

HERITAGE IMPACT ASSESSMENT

**PROPOSED AMENDMENT OF THE KUSIPONGO UNDERGROUND AND
OPENCAST PROJECT, MKHONDO LOCAL MUNICIPALITY, GERT SIBANDE
DISTRICT MUNICIPALITY, MPUMALANGA PROVINCE**

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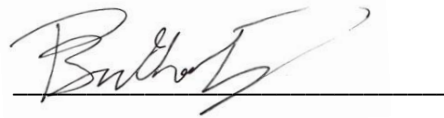
Declaration of Independence

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 Amendment of the Kusipongo Underground and Opencast Project, Mpumalanga Province		
Control	Name	Signature	Designation
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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 Figures 23 to 25
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 Amendment of the Kusipongo Underground and Opencast Coal Mine. The study area is located 31.5km north-east of Wakkerstroom, and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality of the 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.

The assessment of previous archaeological and heritage studies revealed the presence of one previously identified heritage site within the present study area. This site was visited and included in the present report as site KCP 10.

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**. Ms. Butler found that the proposed development area is *“...is underlain by the Vryheid Formation of the Ecca Group (Karoo Supergroup), while the central portion of Kusipongo mining right application is underlain by the Volksrust Formation (Ecca Group) and Karoo dolerite. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Vryheid Formation is Very High and that of the Volksrust Formation is High while the Karoo Dolerite Suite consists of igneous rock and thus has a Palaeontological Sensitivity of zero.”*

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.”

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 fieldwork was aimed at locating and documenting sites falling within the proposed development area and was undertaken from Monday, 19 August to Friday, 23 August 2019.

The intensive fieldwork resulted in the identification of 19 archaeological and heritage sites. For the purposes of this project, these sites were numbered from KCP 1 to KCP 19, and comprise the following:

- Burial grounds, graves and possible graves – nine sites
- Historic black homesteads where the risk exists for the presence of graves – four sites
- Historic black homesteads with graves and/or possible graves – two sites
- Late Iron Age stonewalled sites – one site
- Recent black homesteads where the risk exists for the presence of graves – one site
- Historic white farmsteads and structures – two sites

Impact Assessment

An overlay of the identified archaeological and heritage sites over the proposed development footprint areas was made, which was used to assess the impact of the proposed development on these identified archaeological and heritage sites. Both pre-mitigation and post-mitigation impact assessments were undertaken. Please refer **Chapter 7** for the impact assessment calculations. A series of site-specific mitigation measures are outlined in **Chapter 8** of this report.

Conclusions

While the unmitigated impact of the proposed development is expected to result in high negative

impacts in terms of the identified heritage fabric of the study area, these impacts can be suitably mitigated to acceptable levels by way of a range of mitigation measures outlined in this report. As a result, on the condition that the recommendations made in this report, are adhered to, 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 Amendment of the Kusipongo Underground and Opencast Coal Mine. The study area is located 31.5km north-east of Wakkerstroom, and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality of the 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 **Figures 20 to 25** were provided by the client. As a result, these were the areas assessed during the fieldwork. Should any additional development footprints located outside of these study area boundaries 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.

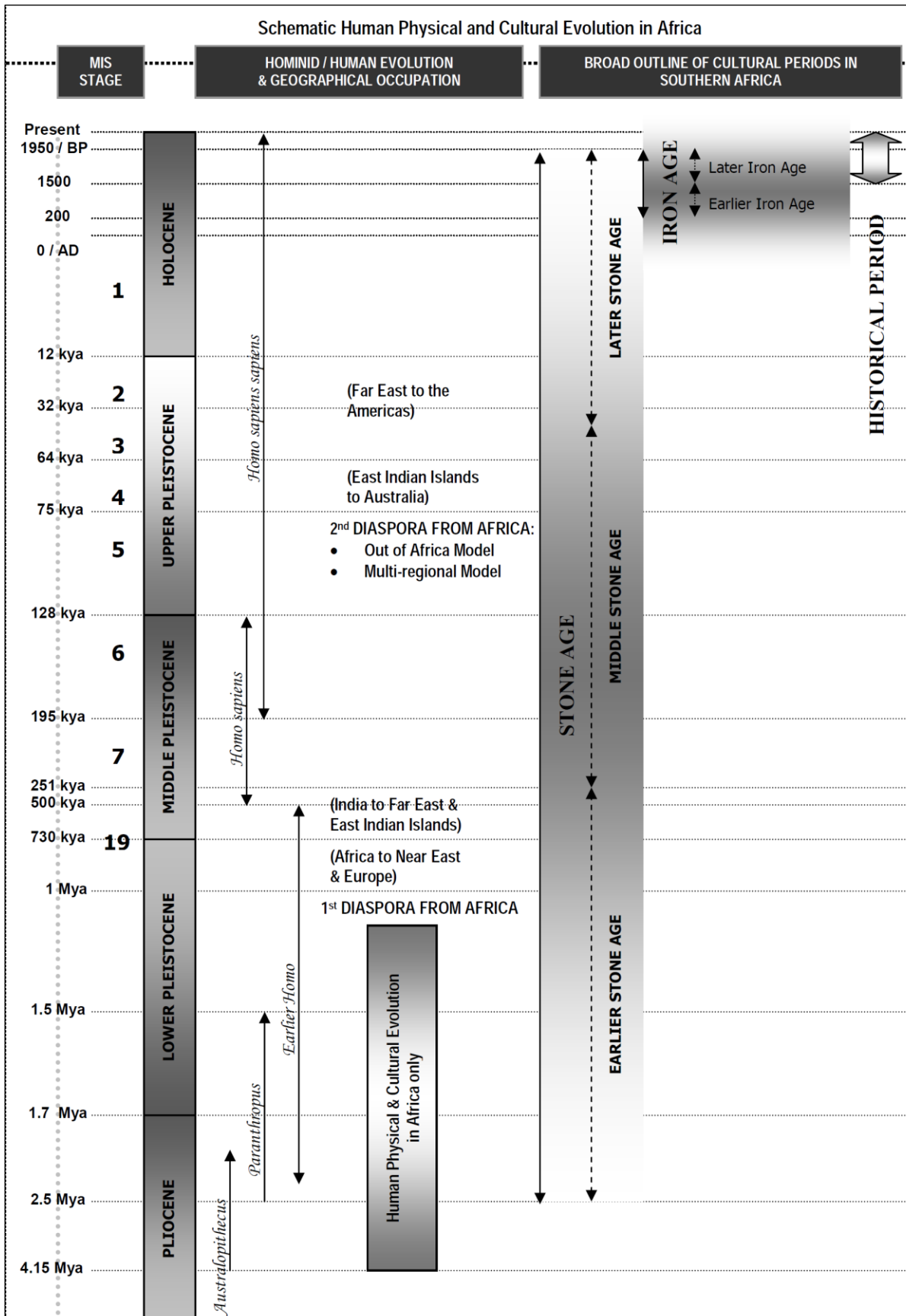


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008).

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location

Study Area Coordinates	Northernmost point: S 27.000480 E 30.253887	Easternmost point: S 27.086707 E 30.305565
	Southernmost point: S 27.095537 E 30.282872	Westernmost point: S 27.006100 E 30.248949
Location	The study area is located within the Mkhondo Local Municipality and the Gert Sibande District Municipality, Mpumalanga Province. The study area is located 31.5km north-east of the town of Wakkerstroom.	
Property	Portions of the following farms: Donkerhoek 10 HT, Donkerhoek 14 HT, Kikvorschfontein 35 HT, Roodepoort 38 HT and Twyfelhoek 379 IT	
Topographic Map	2730AB	
Study Area Extent	The combined extent of the study area is approximately 146 hectares.	

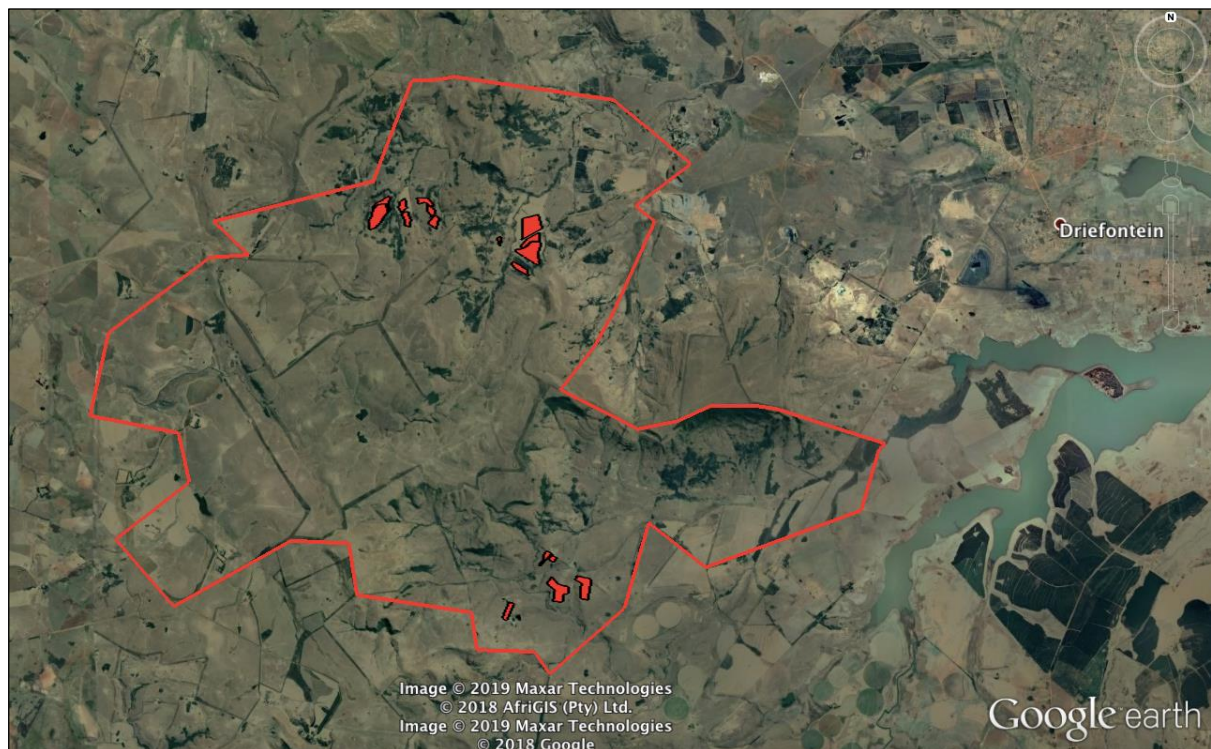


Figure 2 – Locality plan depicting the study area within its surrounding landscape. The red line depicts the mining right area whereas the red polygons outlined in black depict the proposed development footprint areas assessed for this report. The Heyshope Dam can be seen on the right. This map was compiled 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 Project Background

Kangra is currently mining the underground and opencast coal resources at Maquasa West. Kangra Coal (Pty) Ltd has been extracting and processing coal from the Maquasa operations and the current washing plant at Maquasa East since the late 1990's. The life of these existing operations is nearing its end and Kangra Coal is planning to develop new mining areas as a natural extension of the current mine workings. Mining the Kusipongo resource situated directly to the west of existing operations will extend the life of the Kangra Coal operations.

The Colliery currently operates on the Maquasa East, Maquasa West and Maquasa West Extension properties and is situated in the Gert Sibande District Municipality, Mpumalanga, located about 51km west of Piet Retief.

The proposed project is a key factor from a strategic point of view for Kangra Coal to extend its life of mine. Given that the existing operation which currently exploits the Maquasa West and Maquasa West Extension Mining Rights is approaching depletion, a new resource is required to maintain the current levels of production and employment. Should the mining operation close, many jobs will be lost, both directly at the mine and indirectly in terms of local contractors and businesses providing goods and services to the operation as well as the people dependent on those working for Kangra Coal (both directly and/or indirectly). The Kusipongo resource has been identified as a feasible option to extend the life of the Colliery.

2.2.2 Mining Right

Kangra Coal has an existing mining right and approved Environmental Management Programme (EMPr) for the Kusipongo resource which was authorised by the Mpumalanga Department of Mineral Resources (DMR) in July 2017. The mining right authorises underground mining within the north-eastern section of the mining rights area, with access being from an adit located at the Maquasa West Extension operations (Adit 5).

The distance from the existing adit at the Maquasa West Extension operations and the Kusipongo resource is approximately 1.2 kms and should this be the only access to the underground mine, it

will not sustain continuous employment nor meet market requirements for coal supply.

2.2.3 Project Description

Kangra Coal propose accessing the underground coal resource within a shorter timeframe and utilising additional sections to allow for efficient mining that will sustain the current production tonnages. In order to do this, four additional adits to access the underground resource will be required.

To further enhance the feasibility of the Kusipongo mining right, Kangra Coal is investigating the development of three (3) opencast coal mining pits within the mining right area. This would involve the removal of shallow coal via opencast methods (strip opencast mining with continuous rehabilitation) and utilising the high wall of these pits to improve access to the underground coal should no adit access be possible.

The three (3) proposed opencast pits include:

- Twyfelhoek pit (north-east section);
- Donkerhoek pit (north-west section); and
- Balgarthen pit (southern section).

There are three (3) proposed adits to access the underground coal resource, which will be located at each of the proposed opencast mining pits. A historical adit at Balgarthen exists, which is referred to as Balgarthen A. A fourth (4) adit is proposed at the Balgarthen opencast pit, known as the Balgarthen B adit.

2.2.4 Description of Mining Operations

2.2.4.1 Opencast Pits

Three (3) opencast pits are proposed in order to mine the shallow coal near the surface using conventional opencast strip mining and the roll-over method. This entails that the overburden will be stripped from the initial cut and stockpiled. With each successive cut taken the overburden and soils stripped will be used to backfill and top-dress the previous cut. In this way the soil is replaced from where it was removed thereby minimising the impact of soil removal. The overburden and soils that are stripped and stockpiled for use in the final void will need to be protected from wind and

water erosion as well as compaction.

The size of each of the proposed opencast pits is indicated as below:

- Twyfelhoek pit (north-east section) approximately 115 ha in size;
- Donkerhoek pit (north-west section) approximately 110 ha in size; and
- Balgarthen pit (southern section) approximately 310 ha in size.

It is anticipated that the opencast pits will yield approximately 65 000 tonnes run of mine (ROM) coal per month and mining will be undertaken for 2 years, where after the opencast pits will be rehabilitated and closed except for the access point to the underground mine sections.

2.2.4.2 Underground Mine

Underground mining is undertaken using conventional board-and-pillar layouts with checker board stooping. Checker board stooping is the removal of every second pillar as to leave a checker board effect after stooping and still allows for the roof to be stable and not collapse. Entry to the coal reserves is achieved by adits or high walls from opencast mining pits which includes infrastructure such as a lamp room, workshop, small office, change room, luffing and slewing conveyor and coal loading area.

The main coal seams currently mined at Maquasa West and Maquasa West Extensions are the GUS and DUN (Dundas) coal seams. The GUS coal seam is located above the DUN coal seam. It is only proposed for that the GUS seam be mined due to current mine economic and coal market conditions.

The GUS seam in the Kusipongo area can be divided into two, the lower GUS (mainly bright coal) and the upper GUS (mainly dull shale coal and carbonaceous shale). The contact between the upper and lower GUS is a very prominent thin sandstone band. The GUS seam in the Kusipongo area is typically 3.5 to 4 m thick.

It is anticipated the Run of Mine (ROM) coal will be approximately 42 000 tonnes per month from the underground mining operations. The underground mining operations will operate for approximately 10 years based on the proposed mining plan.

2.2.4.3 Transportation

ROM coal from the proposed opencast and underground mining operations at Balgarthen will be transported by road to the existing processing plant located at Maquasa East. ROM coal from the Donkerhoek and Twyfelhoek operations will be transported by road to Maquasa West, where it will be loaded onto the existing conveyor belt and transported to the processing plant at Maquasa East.

The haul roads are existing gravel roads of approximately 24 kms and 8 kms respectively. These roads will require upgrading to accommodate this traffic.

2.2.4.4 Water Management

The underground workings will require dewatering and there are currently a few options with regard to excess water from mine dewatering. The water will either be stored underground or piped to the pollution control dam. It is anticipated that water will also be recycled and used for dust suppression.

Following mine closure, if decant occurs, water will be treated depending on the quality of the decant. The selection of an appropriate water treatment process will be dependent on the mine decant volumes and decant water quality at the time.

2.2.4.5 Waste

General waste from employees will temporarily be stored on site before being disposed of at a licensed landfill site.

2.2.4.6 Sewage

Toilet facility requirements for the underground workings will be met with water-less toilets that will be brought to the surface when full for disposal to the portable sewage plant near Maquasa or taken to the municipal sewage works with a septic tank that will be discharged and cleaned regularly by an authorized company. Conservancy tanks will be installed for ablution facilities to be located above ground at various locations such as site offices and changing areas.

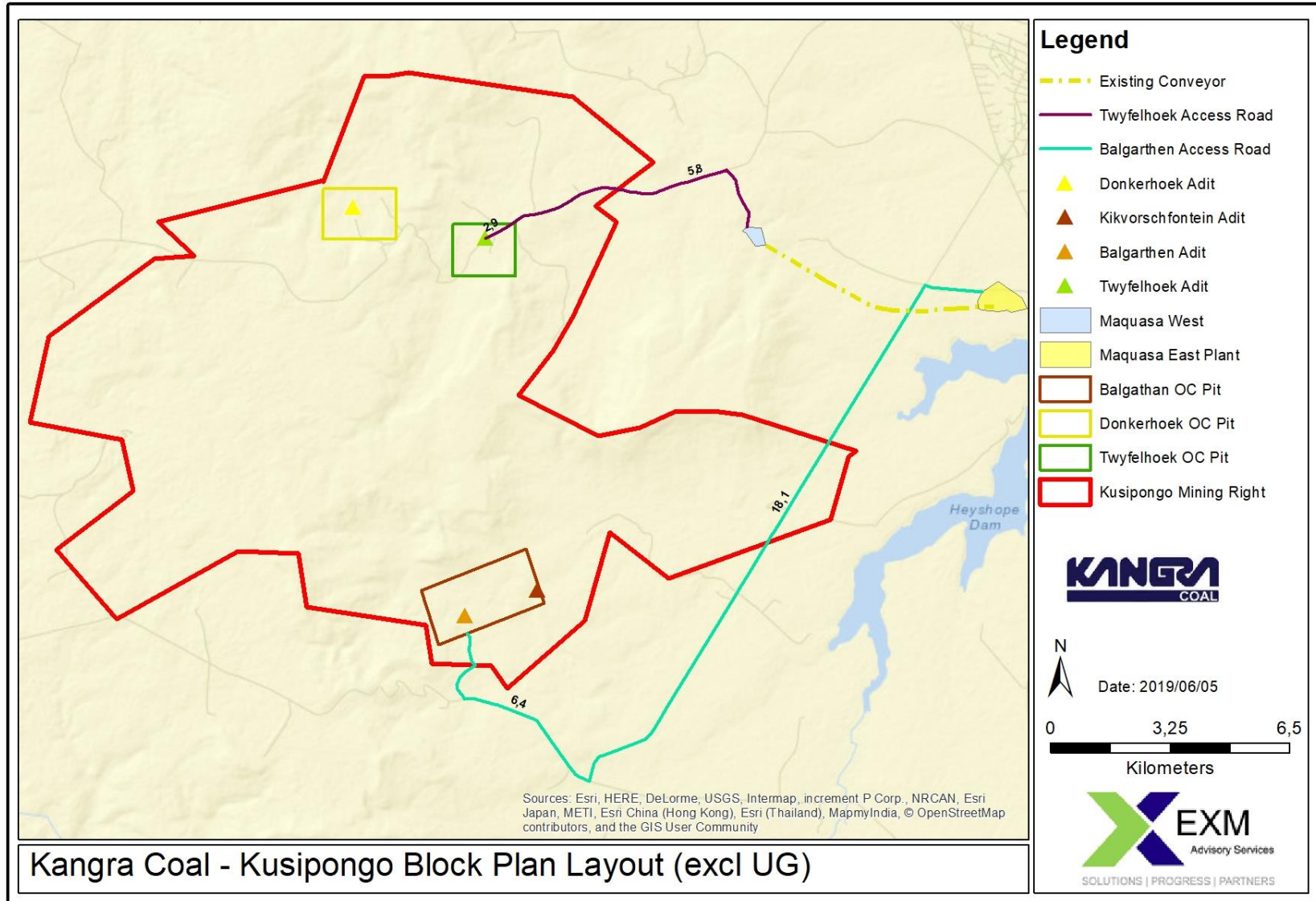


Figure 3 – Location of Proposed Opencast Pits and Adits. Map obtained from Draft Scoping Report by EXM (2019:14).

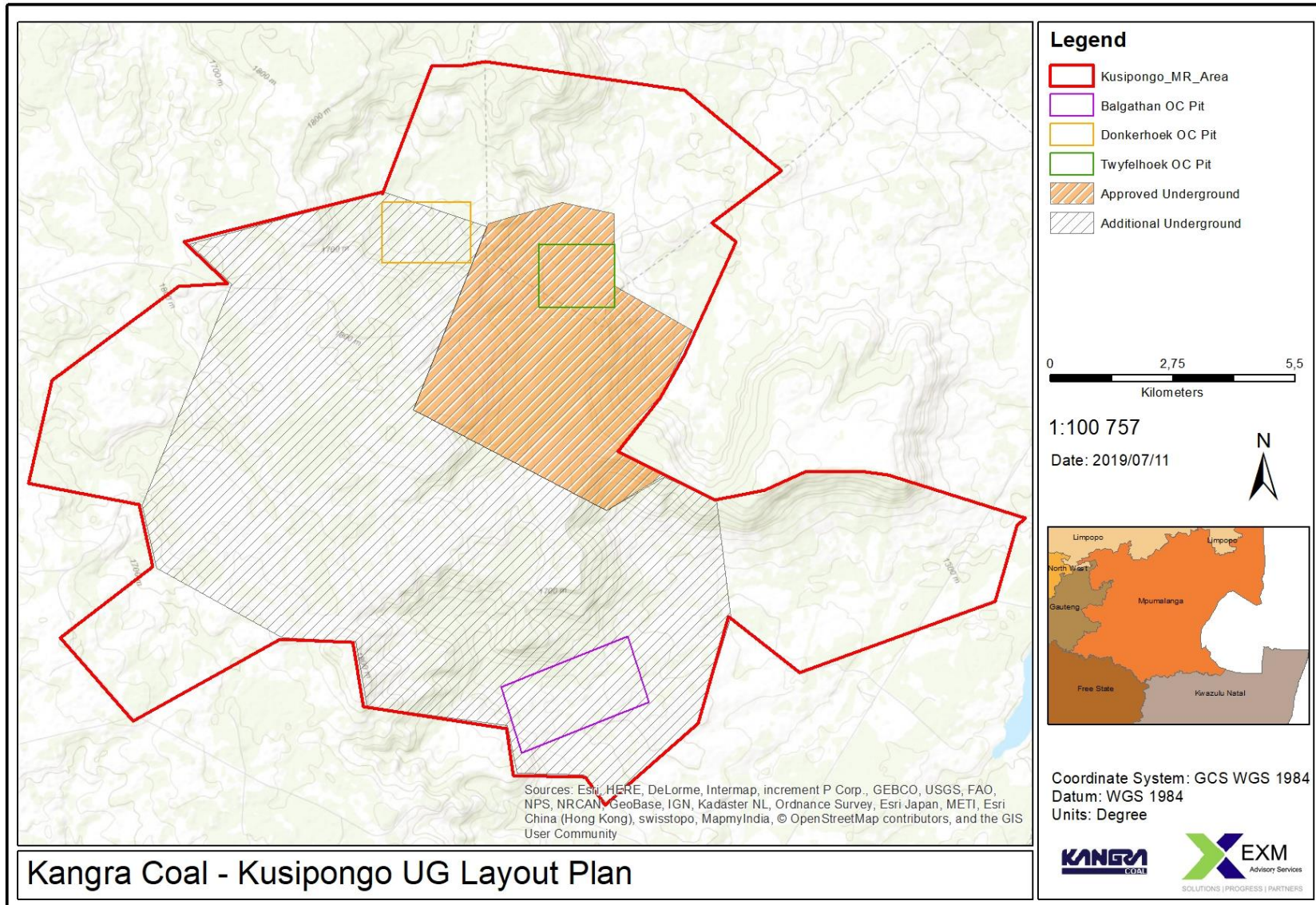


Figure 4 – Proposed Underground Mining Plan. Map obtained from Draft Scoping Report by EXM (2019:15).

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 from Monday, 19 August to 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:

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

3 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 study area is located in a landscape which includes level valleys, slopes and mountains. While sections of the study area had been disturbed by previous mining activities (such as the proposed Balgarten Adit), other areas are currently used for maize production (such as the proposed Twyfelhoek OC Dumps) and human habitation (various sections). This said, a relatively large section of the study area can still be described as undisturbed.

According to the Draft Scoping Report for the Proposed Amendment of the Kusipongo Underground and Opencast Mine (EXM, 2019), the study area is located within the Mesic Highveld Grassland Bioregion, which within the project area spans three vegetation types. These vegetation types are the Eastern Highveld Grassland, Paulpietersburg Moist Grassland and the Wakkerstroom Montane Grassland. The Draft Scoping Report mentions that a vegetation study had identified five vegetation zones within the project area, namely Forested Kloofs, Grassland Exposed Outcrops, Open Plateau Rocky Grasslands and Hydromorphic Seep Zones, Rocky Slope Grasslands and associated Drainage Lines, Valley Bottom Grasslands and River Systems.

In terms of geology, the Draft Scoping Report by EXM (2019:36) indicates that the project area “...is underlain by the sedimentary rocks of the Madzaringwe Formation of the Eccca Group, which forms part of a segment of the north eastern margin of the Karoo basin, filled with sediments belonging to the Karoo Supergroup. The sedimentary rocks were deposited discordantly on the basement, defined by the Undifferentiated Onverwacht Group, consisting of lava, tuff, schists and chert. The former forms part of the Barberton Sequence. During the deposition of sediments in the Karoo basin, tension in the crust due to continuing loading lead to failure and subsequently intrusion of Post-Karoo dolerite sills and dykes along weak zones such as fractures, fissures and faults. Consequently, dykes and sills varying between a few centimetres to a couple of metres in thickness intruded the Project Area. Most dolerite dykes have a vertical or near-vertical dip.”

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



Figure 5 – General view of a section of the proposed Balgarthen Adit. As can be seen from this image, this section of the study area was extensively disturbed by previous mining activities.



Figure 6 – General view of a section of the Twyfelhoek component of the study area.



Figure 7 – Another general view of the Twyfelhoek component of the study area, showing homesteads in amongst blackwattle plantations.



Figure 8 – Sections of the study area are also disturbed by crop farming activities. This view is of a section of the Donkerhoek component of the study area.



Figure 9 – A significant component of the study area can be described as largely undisturbed. This view is across a section of the Balgarthen component of the study area.



Figure 10 – Another view of a section of the study area which is largely undisturbed. This view is of a section of the Donkerhoek component 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	
<p>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.</p>	
<p>2.5 million to 250 000 years ago</p>	<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>
<p>>250 000 to 40 000 years ago</p>	<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 15.2km south-east 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 31.3km north-east of the present study area.</p>
<p>40 000 years ago to c. 1800s</p>	<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 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 27.2km north-east of the present study area.</p>
The Study Area during the Iron Age	
<p>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-</p>	

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 24.7km north 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>

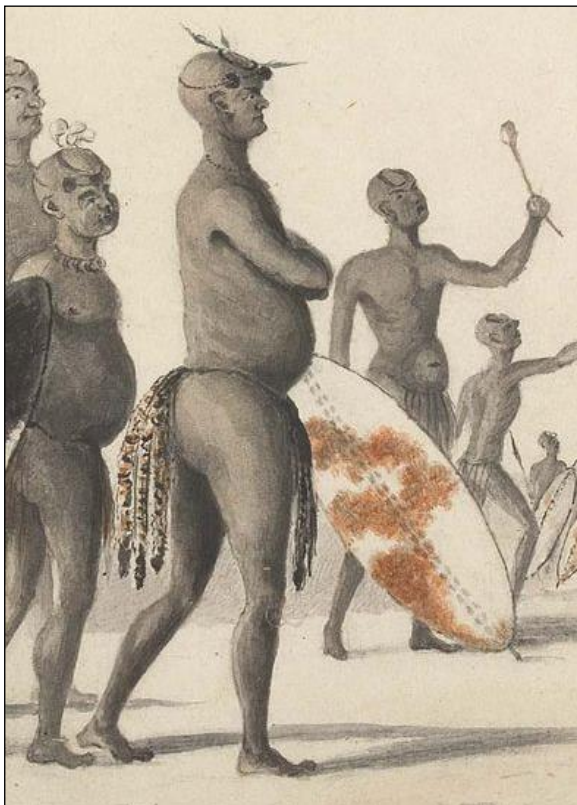


Figure 11

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 4.1km north by 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 Mavieriestad 321 IT was attacked by both Gama and the iNyatsi regiment which resulted in Mhlangala deciding to flee. The farm Mavieriestad 321 IT is located 24.7km north 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 eMsobotjeni Mountain on the farm Sobbeken 390 IT (located 17.5km 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 31.5km 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 58.4km 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 50.7km 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 15.2km south-east of the present study area.</p>



Figure 12 – 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 Driepan (Delius, 2007). Of these three properties, the farm Driefontein 388 IT is situated the closest to the study area and is located 12.3km to the east.
1924	The town of Sheepmoor appears to have been established during this time. Sheepmoor is located 31.4km north 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 13 – The funeral of Saul Mkhize on 16 April 1983 at Driefontein (Delius, 2007:283).

1986

In 1986 a zoned earth-fill type dam was built on the Assegaai 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). The Heyshope Dam is located some 7.1km east and north-east of the study area.

5.2 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.

The discussion that follows below will be undertaken on an individual basis in terms of each of the proposed development sections, namely Balgarthen, Twyfelhoek and Donkerhoek.

5.3.1 The Balgarthen Section

5.3.1.1 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 1**

A single hut is depicted just within the proposed footprint area of the Balgarthen Adit. During the fieldwork it was found that this entire area had been extensively disturbed as a result of recent mining activities, and as a result, no evidence for this map feature could be identified.

- **Feature 2**

A single hut is depicted immediately outside the proposed footprint area of the Balgarthen B Adit Dump. During the fieldwork, a cemetery was identified nearby at site KCP 7 whereas a small stone-packed structure was also identified nearby at site KCP 8. Both these sites may have been associated with this historic black homestead at Feature 2.

5.3.1.2 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 1**

A single hut is depicted just within the proposed footprint area of the Balgarthen Adit. This appears to be the same hut as depicted on the First Edition map. No evidence for this site could be identified during the fieldwork. As indicated above, this may have been due to the disturbed character of the immediate surroundings of the locality of this map feature.

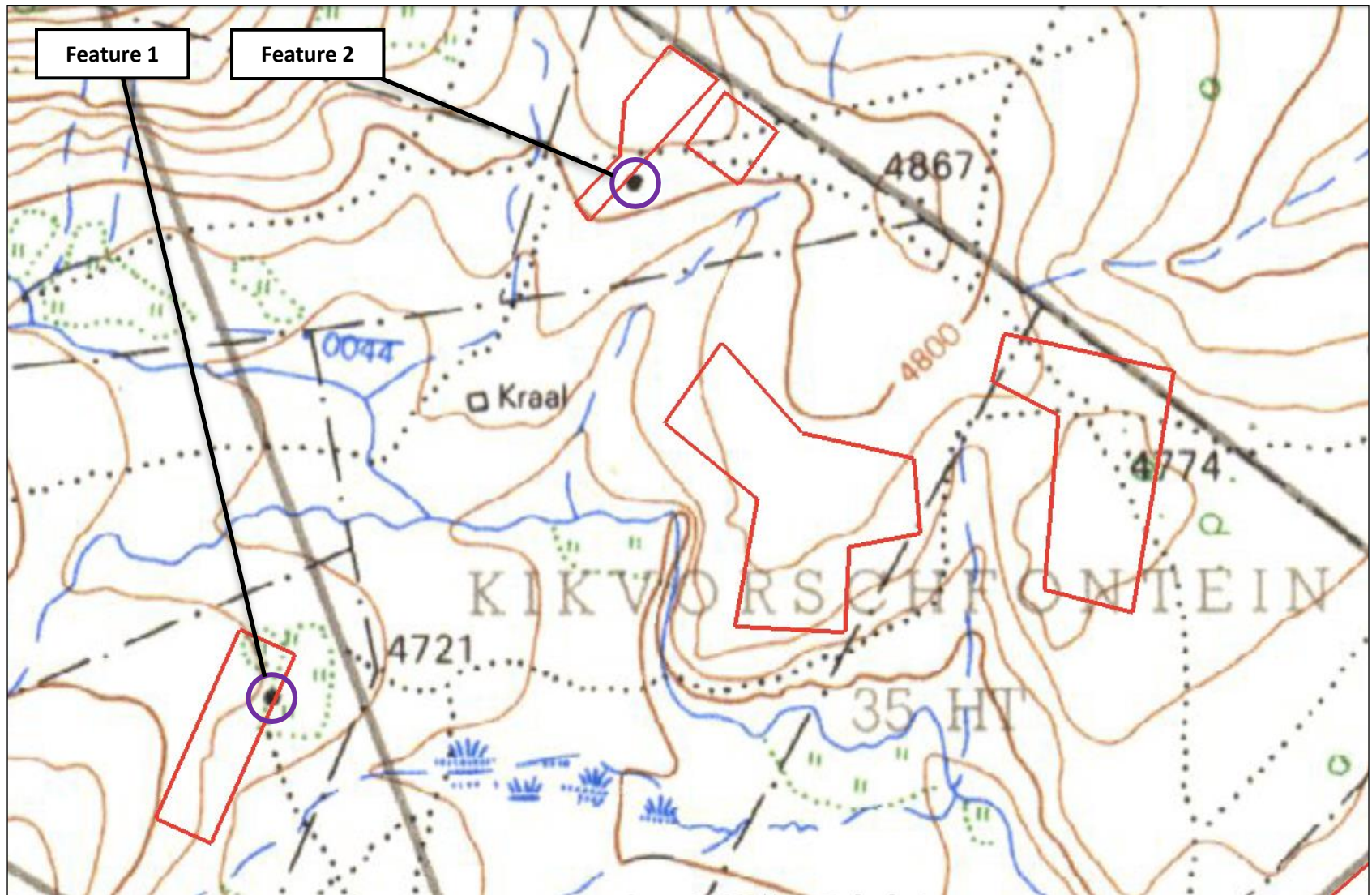


Figure 14 – The Balgarthen section of the proposed project as depicted on the First Edition of the 2730AB Topographic Map that was surveyed in 1969 and drawn in 1969. The proposed development footprints associated with this section of the study area are depicted in red.



Figure 15 - The Balgarthen section of the proposed project as depicted on the Second Edition of the 2730AB Topographic Map that was printed in 1989. The study area boundaries are depicted in red.

5.3.2 The Twyfelhoek Section

5.3.2.1 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 3**

A single hut is depicted just within the proposed footprint area of the Twyfelhoek Opencast Pit Footprint. No evidence for the site could be identified during the fieldwork.

- **Feature 4**

A cluster of two buildings is depicted within the proposed footprint area of the Twyfelhoek Opencast Pit. The map indicates that at the time, these two buildings formed part of the Twyfelhoek farmstead. The poorly preserved tangible remains of this farmstead was identified during the fieldwork (refer site **KCP 14**).

- **Feature 5**

A single building is depicted is depicted within the proposed footprint area of the Twyfelhoek Opencast Dumps. No evidence for this building could be identified during the fieldwork. However, this may be due to the fact that this area is currently used as an agricultural field.

5.3.2.2 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 3**

A single hut is depicted just within the proposed footprint area of the Twyfelhoek Opencast Pit Footprint. No evidence for the site could be identified during the fieldwork.

- **Feature 4**

A cluster of two buildings is depicted within the proposed footprint area of the Twyfelhoek Opencast Pit. The map indicates that at the time, these two buildings formed part of the Twyfelhoek farmstead. The poorly preserved tangible remains of this farmstead was identified during the fieldwork (refer site **KCP 14**).

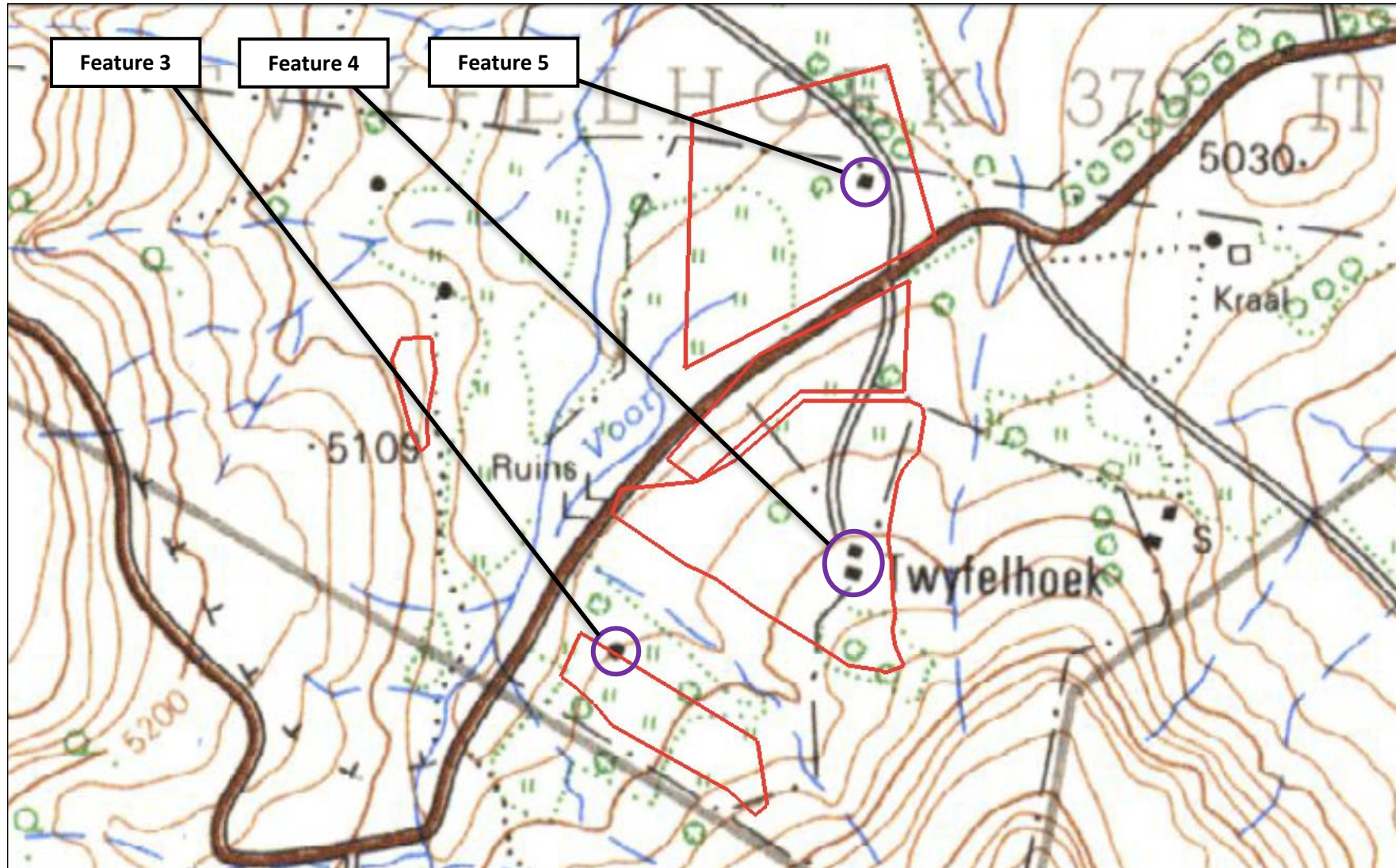


Figure 16 – The Twyfelhoek section of the proposed project as depicted on the First Edition of the 2730AB Topographic Map that was surveyed in 1969 and drawn in 1969. The proposed development footprints associated with this section of the study area are depicted in red.

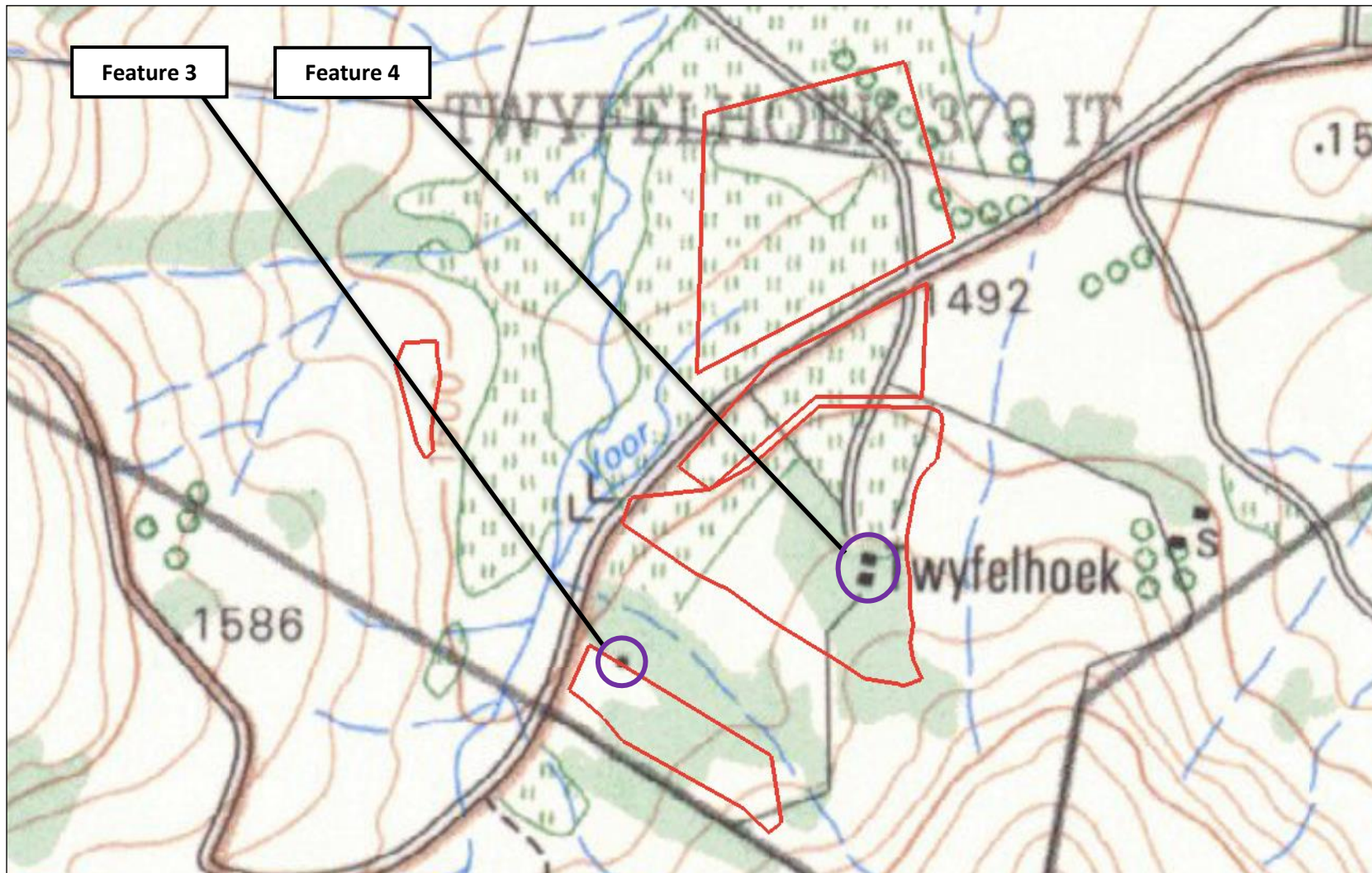


Figure 17 - The Twyfelhoek section of the proposed project as depicted on the Second Edition of the 2730AB Topographic Map that was printed in 1989. The study area boundaries are depicted in red.

5.3.3 The Donkerhoek Section

5.3.3.1 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 6**

What appears to be a single hut is depicted just outside the footprint area of the Donkerhoek Opencast. No evidence for the site could be identified during the fieldwork.

- **Feature 7**

A single building is depicted within the proposed footprint area of the Donkerhoek Opencast. The remains of a historic farmstead were identified during the fieldwork (refer site **KCP 18**).

5.3.3.2 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 possible heritage features are depicted on this map within (and in proximity to) the proposed development footprint areas:

- **Feature 7**

A building is depicted within the proposed footprint area of the Donkerhoek Opencast. The remains of a historic farmstead were identified during the fieldwork (refer site **KCP 18**).

- **Feature 4**

A single building is depicted outside of the proposed footprint area of the Donkerhoek ROM Stockpile.

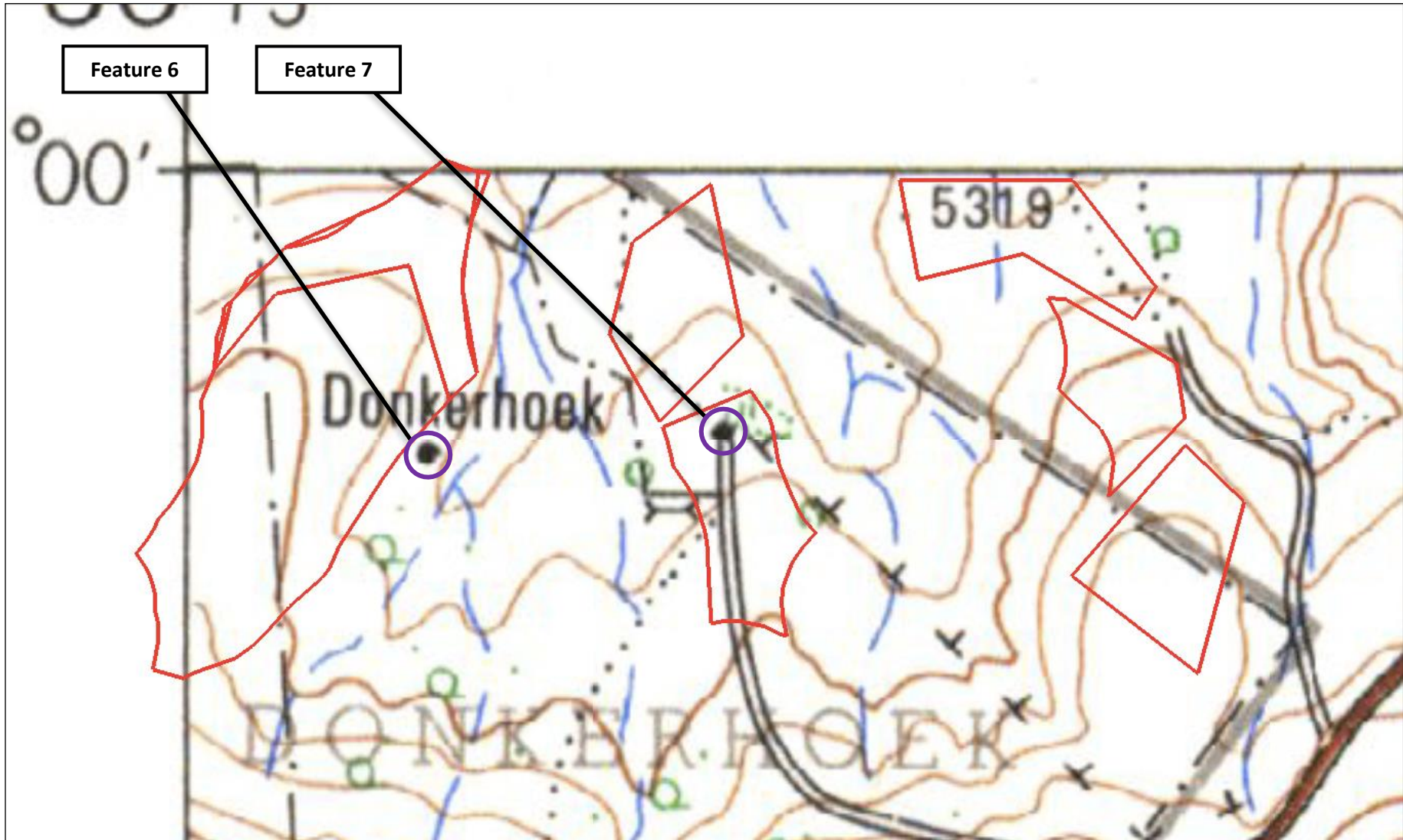


Figure 18 – The Donkerhoek section of the proposed project as depicted on the First Edition of the 2730AB Topographic Map that was surveyed in 1969 and drawn in 1969. The proposed development footprints associated with this section of the study area are depicted in red.

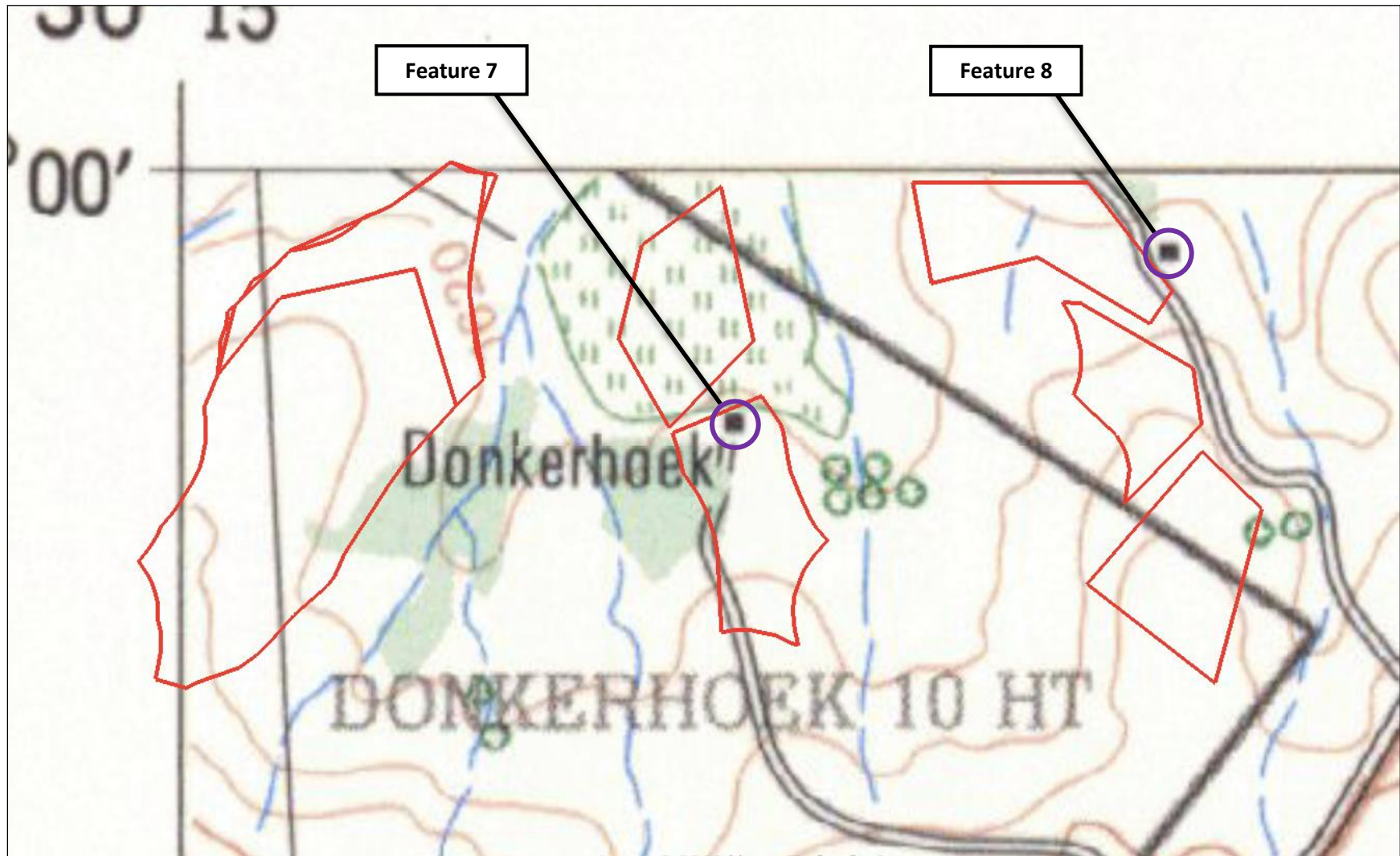


Figure 19 - The Donkerhoek section of the proposed project as depicted on the Second Edition of the 2730AB Topographic Map that was printed in 1989. The study area boundaries are depicted in red.

5.3 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 15km south-east 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. No coordinates for any of the identified sites are provided in the report. The only component from the present study area located in either on of the two above-mentioned farms, is the previously disturbed Balgarthen Adit, which is located on the farm Roodepoort 38 HT.

- ***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, and included both the Twyfelhoek and Donkerhoek sections of the present study area. 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. Only one of these sites were identified within the present study area, namely a cemetery identified as site S.36-005. This cemetery was visited during the present study and is included in this report as site KCP 10.

6 FIELDWORK FINDINGS

6.1 Introduction

Intensive field surveys of the proposed development footprints were undertaken primarily by foot by an experienced fieldwork team comprising one archaeologist/heritage specialist (Polke Birkholtz) accompanied by a fieldwork assistant (Derrick James). The fieldwork was aimed at locating and documenting sites falling within the proposed development area. The fieldwork was undertaken from Tuesday, 20 August to Friday, 23 August 2019.

The intensive fieldwork resulted in the identification of 19 archaeological and heritage sites. For the purposes of this project, these sites were numbered from KCP 1 to KCP 19, and comprise the following:

- Burial grounds, graves and possible graves – nine sites
- Historic black homesteads where the risk exists for the presence of graves – four sites
- Historic black homesteads with graves and/or possible graves – two sites
- Late Iron Age stonewalled sites – one site
- Recent black homesteads where the risk exists for the presence of graves – one site
- Historic white farmsteads and structures – two sites

Site distribution maps depicting the respective positions of these 19 archaeological and heritage sites appear on subsequent pages.

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 20 – Google Earth image depicting the Balgarthen section’s development footprints in red with the recorded track logs in white.



Figure 21 – Google Earth image depicting the Twyfelhoek section’s development footprints in red with the recorded track logs in white.

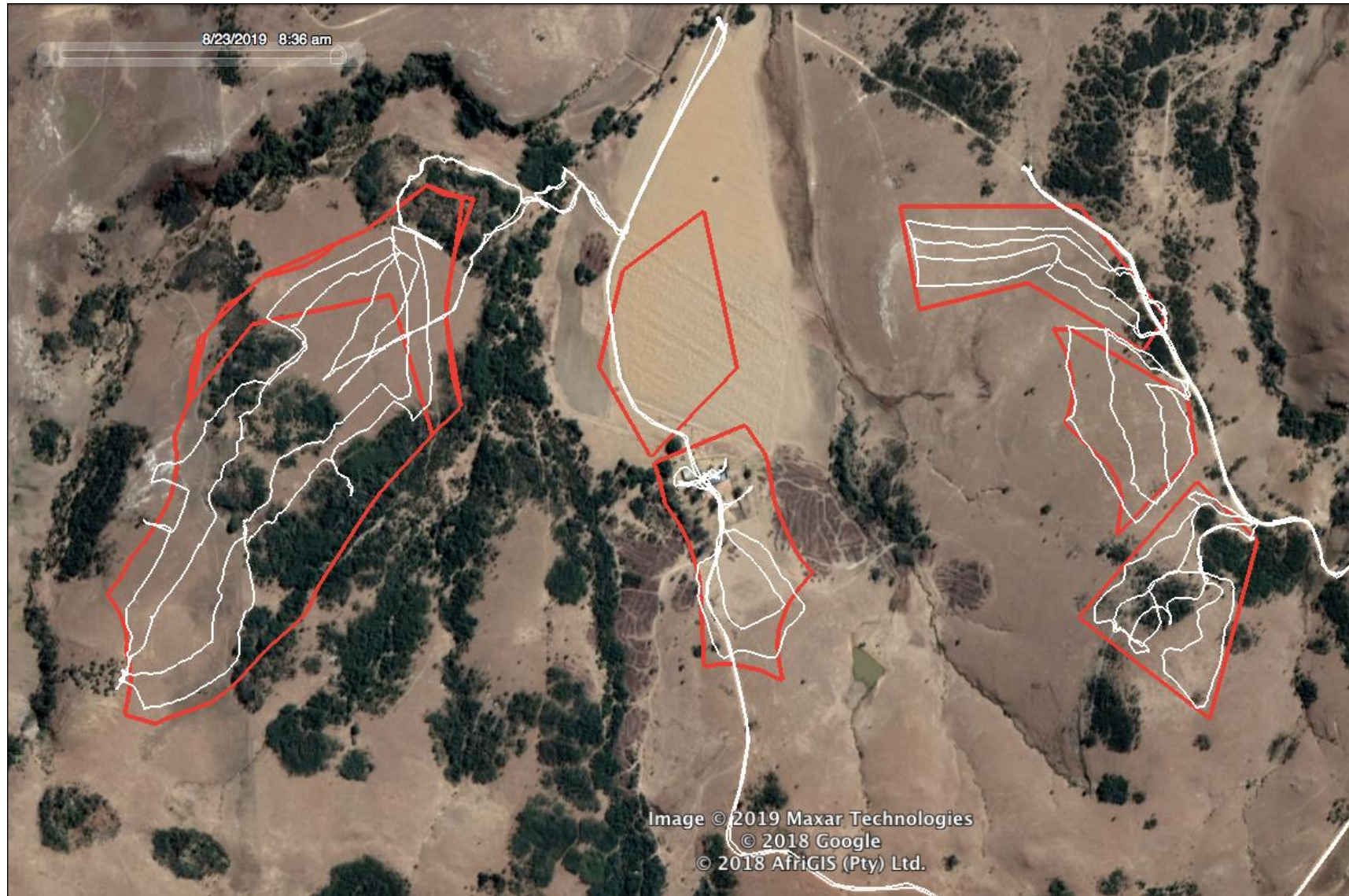


Figure 22 – Google Earth image depicting the Donkerhoek section’s development footprints in red with the recorded track logs in white.



Figure 23 – Google Earth image depicting the sites that were identified at the Balgarthen section of the study area.



Figure 24 – Google Earth image depicting the sites that were identified at the Twyfelhoek section of the study area.

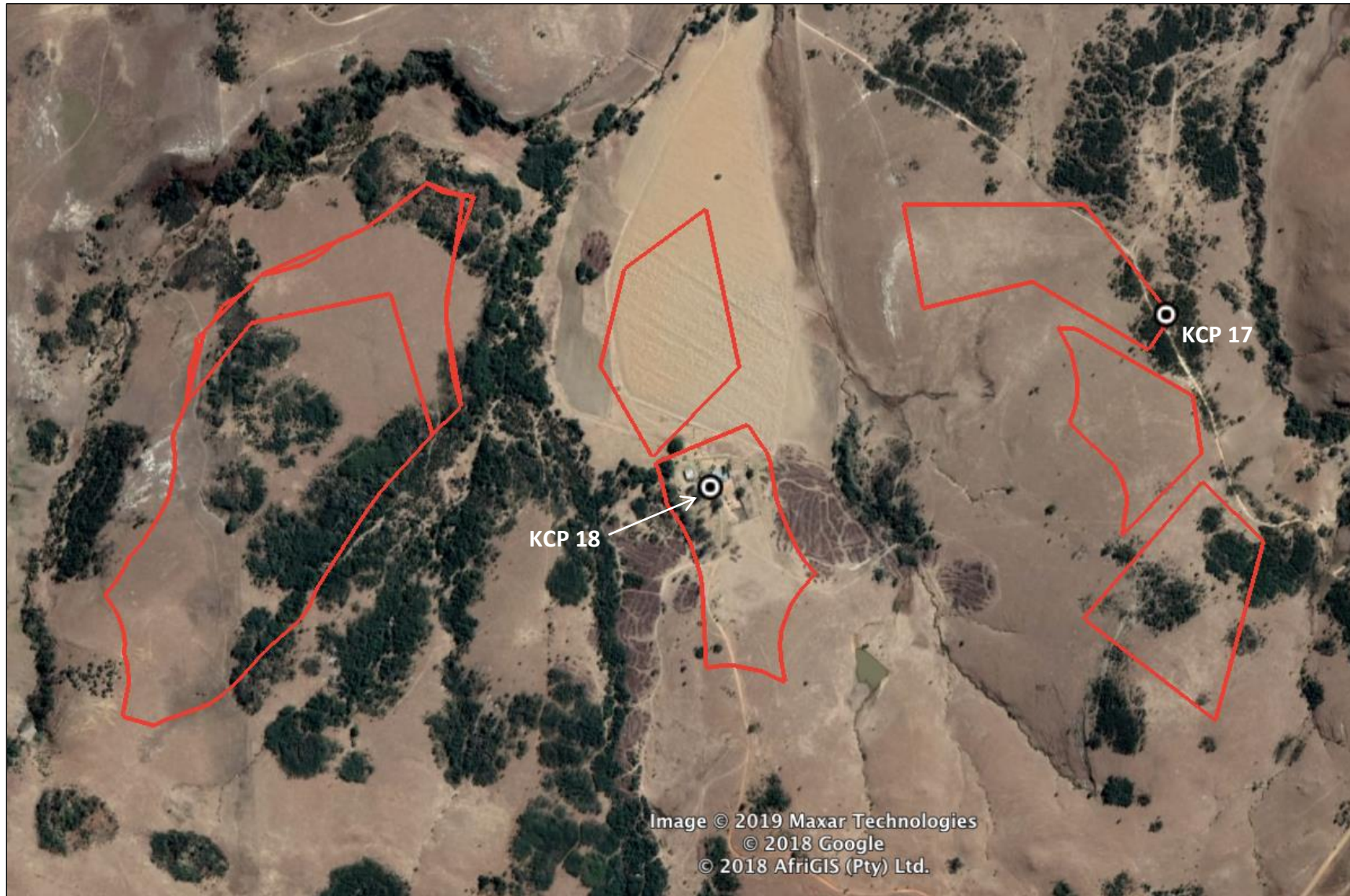


Figure 25 – Google Earth image depicting the sites that were identified at the Donkerhoek section of the study area.

6.2 Fieldwork Findings

6.2.1 KCP 1

Site Coordinates:

S 27.08843

E 30.30367

Site Description:

The site comprises a circular stonepacked feature, roughly three meters in diameter. The stonepacked feature has an old tree growing from its centre, which suggests that it was packed some time ago.

Although no definite evidence for the presence of a grave could be observed here, such as a headstone or grave goods, the feature can be identified as a possible grave. The site appears to be associated with nearby sites such as KCP 2 and KCP 5.

Site Extent:

The site is approximately 3m x 3m in extent.

Site Significance:

Until such time that the presence of graves here has been confirmed or disproved, the site must be viewed as containing a grave. All graves have high levels of emotional, religious and in some cases historical significance. As a result, the site is provisionally deemed to be of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 26 – General view of the possible grave at site KCP 1. The scale is in 10cm increments.



Figure 27 – Close-up view of the possible grave at site KCP1. The scale is in 10cm increments.

6.2.2 KCP 2

Site Coordinates:

S 27.08944

E 30.30386

Site Description:

The site comprises a poorly preserved historic black homestead with one possible grave. The only tangible remains of the homestead still evident is a circular foundation for a hut, which has a diameter of four meters. A few meters east of the foundation structure an oval stone-lined feature was identified which has the appearance of a grave. The site is located in the general proximity of a possible grave at KCP 1 and a stonewalled livestock enclosure at KCP 5. It seems likely for all these sites to have been associated with one another.

Past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. As the site is not occupied anymore, no direct information with regards to the presence (or not) of such graves is currently available.

Site Extent:

The site is roughly 50m by 50m in extent.

Site Significance:

The tangible remains of the historic black homestead are in a poor state of preservation. As a result, without the presence of graves, the site would be of little heritage significance. However, the risk exists for unmarked stillborn graves to have been buried at the homestead. Furthermore, a possible grave was also identified here. All graves have high levels of emotional, religious and in some cases historical significance. While the presence of unmarked stillborn graves has not yet been verified, the presence of a possible grave at the homestead means that the site must be viewed as of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 28 – General view of the poorly preserved remains of the hut at site KCP 2. Scale is in 10cm increments.



Figure 29 – General view of the possible stone-lined grave identified near the hut at site KCP 2. Scale is in 10cm increments.

6.2.3 KCP 3

Site Coordinates:

S 27.09152

E 30.30404

Site Description:

A single circular stonewalled enclosure of approximately 20m in diameter was identified here. The stonewalled enclosure is located roughly 25m from the proposed development footprint area known as Balgarthen B ROM Stockpile.

The site may be associated with either the Late Iron Age or early Historic Period. It can be interpreted as a Nguni-type homestead or *umuzi*, and can likely be associated with the Swazi. Due to dense grass cover no cultural material in the form of potsherds, grinders, hut floors or grainbin foundations could be identified. The typical Nguni settlement layout would either have comprised an outer enclosing wall within which both the huts and centrally located cattle enclosure would have been located, or alternatively, no enclosing wall with only a centrally located cattle enclosure with the huts built around this centrally located enclosure. If the settlement layout at site KCP 3 concurs with the latter settlement layout, it seems possible for the domestic space around the cattle enclosure to have extended somewhat into the nearby proposed development footprint area as well.

Site Extent:

The site is roughly 40m by 40m in extent.

Site Significance:

KCP 3 is certainly not unique within the surrounding landscape, but represents the only site from within the present study area that can be associated with the Late Iron Age or early Historic Period. The site is of **Generally Protected B (GP. B) or Medium Significance**.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 30 – General view of the stonewalled enclosure at site KCP 3. Scale is in 10cm increments.



Figure 31 – Closer view of a section of walling from site KCP 3. The scale is in 10cm increments.

6.2.4 KCP 4

Site Coordinates:

S 27.09106

E 30.30337

Site Description:

The site comprises a poorly preserved historic black homestead comprising a circular foundation for a hut, which is five meters in diameter. The central surface of the hut recedes down and may have been excavated. The site can be associated with nearby sites such as KCP 1, KCP 2 and KCP 5.

Past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. As the site is not occupied anymore, no direct information with regards to the presence (or not) of such graves is currently available.

Site Extent:

The site is roughly 5m by 5m in extent.

Site Significance:

The tangible remains of the historic black homestead are in a poor state of preservation. As a result, without the presence of graves, the site would be of little heritage significance. However, the risk exists for unmarked stillborn graves to have been buried at the homestead. All graves have high levels of emotional, religious and in some cases historical significance. While the presence of unmarked stillborn graves has not yet been verified, the site can still be deemed to be of **Generally Protected B (GP. B)** or **Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 32 – General view of the circular foundation structure for a hut at site KCP 4. Scale is in 10cm increments.

6.2.5 KCP 5

Site Coordinates:

S 27.08888

E 30.30519

Site Description:

A stonewalled livestock enclosure with associated rectangular herder hut were identified here. While the herder hut is located within the proposed development footprint area known as Balgarthen B ROM Stockpile, other sections of the site fall outside this footprint area. The site can be associated with nearby sites such as KCP 1, KCP 2 and KCP 4.

The kraal is not rectangular in shape, but curved, almost scalloped, with only the eastern and northern walls still preserved. The southern wall is badly damaged, and almost nothing remains of the structure's western wall. A rectangular herder hut (5m x 3m) was identified in the south-western corner of the livestock enclosure. The walls of the herder hut are quite thick and constructed with big stones on the outside with rubble in-between.

Although not certain, the potential risk does exist for unmarked stillborn graves (and other unmarked graves) to have been buried here.

Site Extent:

The site is roughly 25m by 10m in extent.

Site Significance:

On their own, the livestock enclosure and herder hut are of low significance. However, the risk exists for unmarked graves to have been buried here. While the presence of unmarked stillborn graves has not yet been verified, the site can still be deemed to be of **Generally Protected B (GP. B)** or **Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 33 – General view of the rectangular herder hut attached to the livestock enclosure at site KCP 5. The scale is in 10cm increments.



Figure 34 – View across the livestock enclosure at site KCP 5. Scale is in 10cm increments.



Figure 35 – A section of walling from the livestock enclosure at site KCP 5. Scale is in 10cm increments.



Figure 36 – Cross-section view of a section of walling from the livestock enclosure at site KCP 5. The scale is in 10cm increments.

6.2.6 KCP 6

Site Coordinates:

S 27.09077

E 30.29860

Site Description:

A historic black homestead is located here and comprises a large rectangular stonewalled livestock enclosure associated with two circular huts. The site is certainly older than 60 years, and possibly older than 100 years as well. The site is located 15m from the Balgarthen B OC Dump footprint area.

The walling of the livestock enclosure is in a reasonably good condition, and was constructed in the traditional way by first packing a double row of large stones and then filling the space in-between with smaller stones known as rubble. The livestock enclosure is 16m x 10m in extent and has an entrance on its southern end which is marked with an upright monolithic-type stone. Attached to the south-western side of the kraal are two smaller structures, which may have been used as a herder hut and calf enclosure. One of these structures is 6m x 5m in extent, whereas the second structure is 4m x 4m in extent.

Two circular hut foundations are located to the north-west of the livestock enclosure, with a crescent-shaped cooking screen identified between the two huts. The larger of the two huts is still in a very good condition and measures five meters in diameter, the smaller hut is four meters in diameter. A second crescent-shaped cooking screen was identified north-east of the kraal.

Although no surface evidence for graves could be identified at the site, past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. As the site is not occupied anymore, no direct information with regards to the presence (or not) of such graves is currently available.

Site Extent:

The site is roughly 50m by 50m in extent.

Site Significance:

The tangible remains of the historic black homestead and kraal are in a relatively good state of preservation, and provide a good example of this type of historic black homestead from the surroundings of the study area. Furthermore, the risk exists for unmarked graves to have been buried at the site. Until such time that the presence of stillborn graves here has been confirmed or disproved, the site must be viewed as containing graves. All graves have high levels of emotional, religious and in some cases historical significance. However, the presence of graves at the site has not yet been confirmed, with only the risk for the presence of such unmarked graves at the site currently identified. The site is of **Generally Protected B (GP. B)** or **Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 37 – General view of the historic black homestead identified at site KCP 6. Scale is in 10cm increments.



Figure 38 – The upright stone marking the entrance to the livestock enclosure at site KCP 6. The scale is in 10cm increments.



Figure 39 – Close-up view of one of the huts at site KCP 6. Scale is in 10cm increments.

6.2.7 KCP 7

Site Coordinates:

S 27. 08254

E 30. 29381

Site Description:

A cemetery comprising 13 rectangular stonepacked graves was identified at site KCP 7. The site is located 14m outside the development footprint area known as Balgarthen B Adit Dump. The cemetery is enclosed by a well-built stonepacked wall, which shows evidence of having been extended at some point in the history of the cemetery to allow for the expansion of the burial ground.

All the grave dressings are orientated along the east-west axis. While no formal engraved headstones could be identified at the cemetery, unmarked upright stones were placed on the western ends of some of the graves.

The cemetery at site KCP 7 may have been associated with the structure at site KCP 8.

Site Extent:

The site is roughly 30m by 30m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 40 – General view of the cemetery located at site KCP 7. Scale is in 10cm increments.



Figure 41 – Closer view of some of the stonepacked graves at site KCP 7. Scale in 10cm increments.

6.2.8 KCP 8

Site Coordinates:

S 27.082900

E 30.292474

Site Description:

The site comprises a rudimentary stone structure which may have formed part of a historic black homestead. It is located 8m from the proposed development footprint area known as Balgarthen B Adit Dump.

Although no surface evidence for graves could be identified at the site, past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. As the site is not occupied anymore, no direct information with regards to the presence (or not) of such graves is currently available.

Site Extent:

The site is roughly 20m by 20m in extent.

Site Significance:

Until such time that the presence of graves here has been confirmed or disproved, the site must be viewed as containing graves. All graves have high levels of emotional, religious and in some cases historical significance. However, the presence of graves at the site has not yet been confirmed, with only the risk for the presence of such unmarked and marked graves at the site currently identified. The site is of **Generally Protected B (GP. B)** or **Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 42 – General view of the rudimentary stone structure at site KCP 8.

6.2.9 KCP 9

Site Coordinates:

S 27.017888

E 30.290076

Site Description:

The site comprises the single grave of Mr. Albert Yete Ndlamenze and is located east of the homestead of the family. The grave is located 57m from the development footprint area known as the Twyfelhoek OC Pit. The grave dressing is orientated along the east-west axis, and has a granite-lined dressing with a formal granite headstone.

Site Extent:

The site is roughly 10m by 10m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. a)** or **High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.

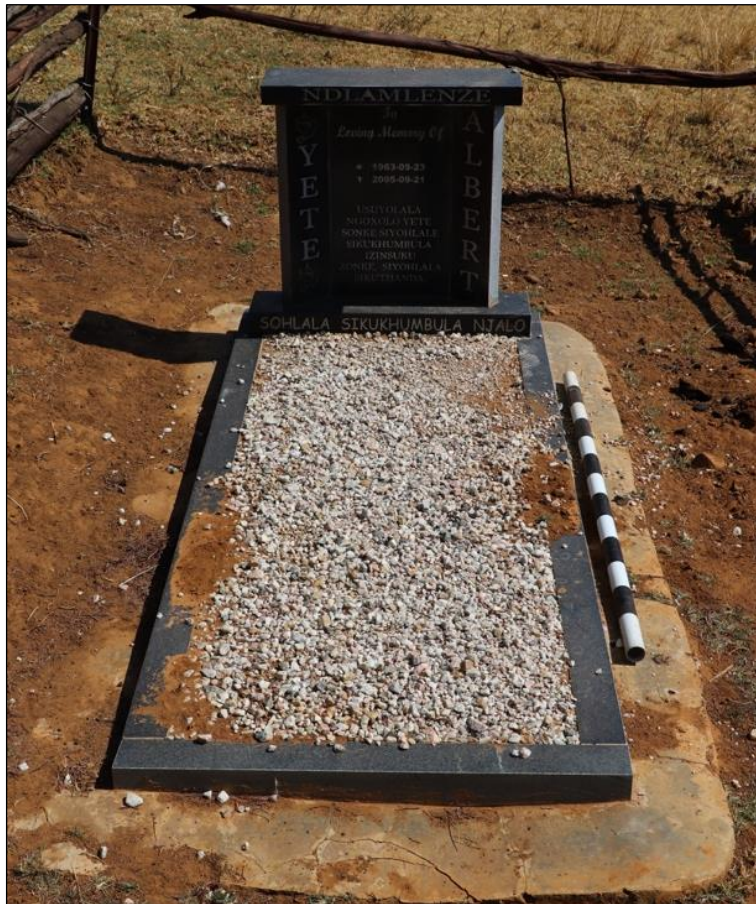


Figure 43 – General view of the grave located at site KCP 9. The scale is in 10cm increments.

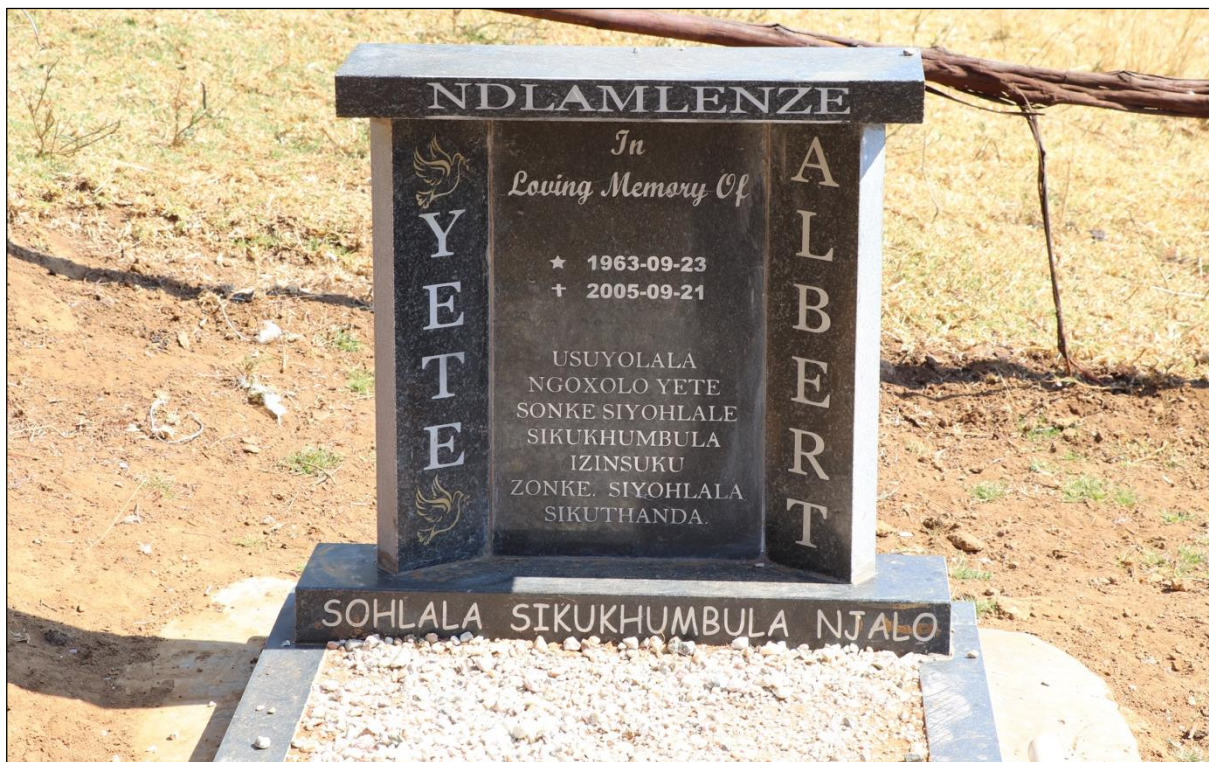


Figure 44 – The headstone on the grave located at site KCP 9.

6.2.10 KCP 10

Site Coordinates:

S 27.01723

E 30.28753

Site Description:

A cemetery comprising 42 graves was identified at site KCP 10. The burial ground is located within a clearing in a black wattle plantation. Barring two graves, all the graves dressings from the site are rectangular or oval shaped and stone packed. Quite a few of the graves have its own small enclosing wall of stone. Two of the graves have granite markers, whereas a number of graves have upright stones as headstones on which the name of the deceased was scratched. These granite markers and upright stones indicate that the cemetery can be associated with the Masondo family.

On the northern end of the site a cluster of four graves had been enclosed by a wire fence. One of these graves has a cement headstone on which the name Zenzile Nkosi appears. One of these four graves contain a recently erected granite dressing and headstone, which has not yet been officially unveiled and has a blanket covering it.

Site Extent:

The site is roughly 50m by 50m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 45 – General view of the cemetery located at site KCP 10. Scale is in 10cm increments.



Figure 46 – One of the upright stones from the cemetery on which the name of the deceased was written. The family name Masondo can be seen at the bottom.



Figure 47 – One of the granite markers observed at the site. As can be seen from this image, the family name indicated on this marker is again Masondo.



Figure 48 – An example of a stone packed grave with a symbolic stonepacked enclosing wall. A number of the graves from site KCP 10 contain these enclosing wall. The scale is in 10cm increments.

6.2.11 KCP 11

Site Coordinates:

S 27.01653

E 30.28597

Site Description:

The site comprises the single grave of Ms. Fikile Simelane and is located east of the homestead of the family. The grave is located 14m from the development footprint area known as the Twyfelhoek OC Pit.

The grave has a stonepacked dressing that is orientated along the east-west axis. The grave has a upright stone on its western end on which the name 'Fikile' appears. This informal headstone also appears to contain the date of death, which appears to indicate that the deceased passed away in 1987.

Site Extent:

The site is roughly 10m by 10m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 49 – General view of the grave located at site KCP 11. The scale is in 10cm increments.



Figure 50 – Closer view of the upright stone placed on the western end of the dressing at site KCP 11.

6.2.12 KCP 12

Site Coordinates:

S 27.013918

E 30.289463

Site Description:

The site comprises a currently occupied homestead that is located within the development footprint known as Twyfelhoek OC Pit. No residents of this homestead was at home at the time of the fieldwork. This means that this homestead is the only one from the study where the presence or absence of unmarked stillborn graves could not be confirmed with the family. The risk therefore exists for the presence of unmarked stillborn graves.

Site Extent:

The site is roughly 60m by 50m in extent.

Site Significance:

Until such time that the presence of graves here has been confirmed or disproved, the site must be viewed as containing graves. All graves have high levels of emotional, religious and in some cases historical significance. However, the presence of graves at the site has not yet been confirmed, with only the risk for the presence of such unmarked and marked graves at the site currently identified. The site is of **Generally Protected B (GP. B)** or **Medium Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 51 – A general view of the homestead at site KCP 12.

6.2.13 KCP 13

Site Coordinates:

S 27.01526

E 30.29041

Site Description:

A poorly preserved historic black homestead and burial ground were identified a few meters from the proposed development footprint area known as the Twyfelhoek OC Pit. The burial ground is located within the homestead and consists of a total of six stonepacked graves. A few of the graves have upright stones placed on their western ends for headstones, some of which contain the details of the deceased. From the names of the deceased that could be read on these informal headstones, the cemetery can be associated with the Masondo family.

The tangible remains of the homestead include a thatched hut and a few other structures. Past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. As the site is not occupied anymore, no direct information with regards to the presence (or not) of such unmarked stillborn graves is currently available.

Site Extent:

The site is roughly 50m by 40m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 52 – General view of the cemetery located at site KCP 13. The scale is in 10cm increments.



Figure 53 – Another view of the cemetery at KCP 13 showing its position within the historic black homestead. The scale is in 10cm increments.



Figure 54 – One of several upright stones placed on the western ends of the graves as informal headstones. Some of these upright stones contain the details of the deceased. The family name Masondo can clearly be read on this informal headstone.



Figure 55 – This poorly preserved hut from site KCP 13 is located a few meters from the burial ground. The scale is in 10cm increments.

6.2.14 KCP 14

Site Coordinates:

S 27.01346

E 30.29158

Site Description:

The site comprises the poorly preserved remains of a white farmstead. All that remains of the original farmhouse are some of the stone foundations, a section of a brick wall and planted vegetation such as jacaranda trees. A small distance west of the farmhouse the circular foundation structure for a hut-type structure known vernacularly as a rondawel was identified. Such rondawels formed part of the outbuildings often encountered at historic farmsteads, and were either used as accommodation for boys or as a meat storage area.

The farmstead is depicted on the First Edition of the 2730AB Topographic Sheet that was surveyed in 1969. This means that the site is at least 50 years old.

Site Extent:

The site is roughly 140m by 100m in extent.

Site Significance:

The farmstead at site KCP 14 is poorly preserved. It is deemed to be of **Generally Protected C (GP. C)** or **Low Significance**.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 56 – View of the ruins of the homestead located at site KCP 14. Scale in 10cm increments.



Figure 57 – Close-up view of a section of brick walling from the homestead at site KCP 14. The scale is in 10cm increments.

6.2.15 KCP 15

Site Coordinates:

S 27.01200

E 30.29229

Site Description:

A cemetery comprising six stonepacked graves for stillborn babies was identified at site KCP 15. These graves were buried adjacent to a dwelling and is located within a homestead. According to the head of the household, Mr. Masango, no other graves, marked or unmarked, are buried within this homestead.

Site Extent:

The site is roughly 15m by 15m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 58 – General view of the cemetery at site KCP 15. Note the proximity of the graves to the dwelling on the right. The scale is in 10cm increments.



Figure 59 – Closer view of some of the graves from site KCP 15. The scale is in 10cm increments.

6.2.16 KCP 16

Site Coordinates:

S 27.01028

E 30.28207

Site Description:

The site comprises a single grave located within the footprint area of the proposed Twyfelhoek Adit. The grave is located on a slope, is stone packed and orientated along the east-west axis. No formal headstone or grave goods could be seen. The grave does not appear to be maintained by family.

Site Extent:

The site is roughly 10m by 10m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 60 – Single stone packed grave located at site KCP 16. The scale is in 10cm increments.

6.2.17 KCP 17

Site Coordinates:

S 27.00214

E 30.26542

Site Description:

A cemetery comprising two graves was identified at site KCP 17. The two graves have stonepacked, oval-shaped grave dressings that are orientated along the east-west axis. No formal headstones or grave goods are visible. The size of both grave dressings suggest that the two graves are both for children. The graves are enclosed by a rectangular, stonepacked wall.

Site Extent:

The site is roughly 10m by 10m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 61 – General view of the site at KCP 17 showing the rectangular enclosing wall within which two graves were identified. The scale is in 10cm increments.



Figure 62 – Closer view of the graves located at site KCP 17. The scale is in 10cm increments.

6.2.18 KCP 18

Site Coordinates:

S 27.004528

E 30.258353

Site Description:

The site comprises a poorly preserved white farmstead. The primary remaining elements of the original farmstead are two sandstone buildings. However, although these buildings are quite likely very old, they have both been extensively modified over the years.

The farmstead is depicted on the First Edition of the 2730AB Topographic Sheet that was surveyed in 1969. This means that the site is at least 50 years old.

Site Extent:

The site is roughly 140m by 140m in extent.

Site Significance:

Both structures are certainly older than 60 years, however, they have been extensively modified over the years and have very little heritage value. The site is of **Generally Protected C (GP. C)** or **Low Significance**.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 63 – Entrance to one of the sandstone buildings located at site KCP 18. The scale is in 10cm increments.



Figure 64 – General view of the second sandstone dwelling located at site KCP 18. The scale is in 10cm increments.

6.2.19 KCP 19

Site Coordinates:

S 27.09215

E 30.31675

Site Description:

A cemetery comprising 17 graves was identified at site KCP 19. All of the graves from the site have oval and rectangular stone packed grave dressings, with a natural stone placed on the western ends as a headstone. One of the graves has a dressing comprising a concrete slab with an inscribed slate headstone placed on the western end of the dressing. The cemetery appears to be regularly maintained and cleaned by the family.

Although the site is not located near any of the proposed development footprint area, it is located in reasonably close proximity to an existing road which may be used as an access and haul road to the Balgarthen section of the project. As a result, the cemetery was recorded and included in this report.

Site Extent:

The site is roughly 30m by 20m in extent.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. The site is of **Generally Protected A (GP. A)** or **Medium to High Significance**. This indicates that the site may not be impacted upon without prior mitigation.

Impact Assessment and Mitigation:

See Chapter 7 for impact assessment calculations and Chapter 8 for required mitigation measures.



Figure 65 – General view of the cemetery located at site KCP 19. The scale is in 10cm increments.



Figure 66 – Closer view of some of the graves from the cemetery at KCP 19. The scale is in 10cm increments.

7 ASSESSMENT OF IMPACT OF PROPOSED DEVELOPMENT

7.1 Introduction

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites.

The following general observations will apply for this impact assessment:

- The impact assessment methodology utilised in this section is outlined and explained in more detail in **Section 3.2** of this report.
- Heritage sites with a Low Significance are not included in these impact risk assessment calculations. The reason for this is that sites of Low Significance will not require mitigation. These sites are KCP 14 and KCP 18.
- One site of Medium to High Significance is located far enough from the proposed footprints that no development impacts are expected on it. As a result, no impact assessment will be undertaken for this site and no site-specific mitigation measures compiled. General mitigation measures will still apply. The site in question is KCP 9, which is located 57m east of nearest development footprint area.

7.2 Assessment of Pre-Mitigation Impact on the identified Heritage Sites

7.2.1 Assessment of the Pre-Mitigation Impact on sites KCP 1, KCP 10, KCP 15, KCP 16 and KCP 17

In this section, the unmitigated impact of the proposed development on these six sites will be assessed. These sites all comprise graves or possible graves located within the development footprints. It is expected that should the development proceed without any mitigation, these sites will also be destroyed during the Pre-Construction Phase of the project, with no further impacts expected during the remainder of the project phases.

All graves have high levels of emotional, religious and in some cases historical significance. As a result, these sites are all of **Generally Protected A (GP. A)** or **Medium to High Significance**. The impact assessment calculations undertaken below reflect this.

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

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

IMPACT RISK = 4.33

Table 11 - Assessment of Pre-Mitigation Impact on Sites KCP 1, KCP 10, KCP 15, KCP 16 & KCP 17

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Regional	Permanent	Will Happen	Very High
Destruction of Graves and Possible Graves	4	4	5	5	4.33

This calculation has revealed that the pre-mitigation impact risk of the proposed development on these six sites containing graves and possible graves falls within Impact Class 5, which represents a Very High Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.2 Assessment of the Pre-Mitigation Impact on sites KCP 7, KCP 11 and KCP 19

In this section, the unmitigated impact of the proposed development on these three sites will be assessed. These sites all comprise graves or possible graves located just outside of the proposed development footprints. Site KCP 7 is located 14m from the nearest proposed development footprint, with KCP 11 at a distance of 15m from the nearest footprint. Site KCP 19 is located a few meters from a proposed haul road. It is expected that should the development proceed without any mitigation, these sites will also be disturbed during especially the Pre-Construction and Construction Phases of the project, with lesser impacts expected during the subsequent project phases.

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

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

IMPACT RISK = 3.2

Table 12 - Assessment of Pre-Mitigation Impact on Sites KCP 7, KCP 11 & KCP 19

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Regional	Long-term	Very Likely	High
Disturbance of Graves and Possible Graves	4	4	4	4	3.2

This calculation has revealed that the pre-mitigation impact risk of the proposed development on these three sites containing graves and possible graves falls within Impact Class 4, which represents a High Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.3 Assessment of the Pre-Mitigation Impact on site KCP 2

In this section, the unmitigated impact of the proposed development on this site will be assessed. Site KCP 2 comprises a historic black homestead associated with at least one possible grave. The risk also exists for unmarked stillborn graves to be buried at the site. The site is located within one of the proposed development footprint areas. It is expected that should the development proceed without any mitigation, this sites will be destroyed during the Pre-Construction Phase of the project, with no further impacts expected during the remainder of the project phases.

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

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

IMPACT RISK = 3.47

Table 13 - Assessment of Pre-Mitigation Impact on Site KCP 2

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Regional	Permanent	Very Likely	High
Destruction of Historic Black Homestead with Possible Graves	4	4	5	4	3.47

This calculation has revealed that the pre-mitigation impact risk of the proposed development on these six sites containing graves and possible graves falls within Impact Class 4, which represents a

High Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.4 Assessment of the Pre-Mitigation Impact on site KCP 13

In this section, the unmitigated impact of the proposed development on this site will be assessed. Site KCP 13 comprises a historic black homestead associated with a cemetery. The risk also exists for unmarked stillborn graves to be buried at the site. The site is located roughly 7m outside of one of the proposed development footprint areas. It is expected that should the development proceed without any mitigation, these sites will also be disturbed during especially the Pre-Construction and Construction Phases of the project, with lesser impacts expected during the subsequent project phases.

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

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

IMPACT RISK = 3.2

Table 14 - Assessment of Pre-Mitigation Impact on KCP 13

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Regional	Long-term	Very Likely	High
Disturbance of Historic Black Homestead with Graves	4	4	4	4	3.2

This calculation has revealed that the pre-mitigation impact risk of the proposed development on site KCP 13 falls within Impact Class 4, which represents a High Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.5 Assessment of the Pre-Mitigation Impact on Sites KCP 4, KCP 5 & KCP 12

In this section, the unmitigated impact of the proposed development on these three sites will be assessed. These sites comprise historic black homesteads located within the proposed development footprint areas. While the structural remains of these these homesteads have little heritage

significance, past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. This possible risk is included in the impact assessment calculations shown below.

It is expected that should the development proceed without any mitigation, these sites will be destroyed during the Pre-Construction Phase of the project, with no further impacts expected during the remainder of the project phases.

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

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

IMPACT RISK = 2.6

Table 15 - Assessment of Pre-Mitigation Impact on Sites KCP 4, KCP 5 & KCP 12

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Regional	Permanent	Possible	Moderate
Destruction of Historic Black Homesteads	4	4	5	3	2.6

This calculation has revealed that the pre-mitigation impact risk of the proposed development on sites KCP 4, KCP 5 and KCP 12 fall within Impact Class 3, which represents a Moderate Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.6 Assessment of the Pre-Mitigation Impact on Sites KCP 6 & KCP 8

In this section, the unmitigated impact of the proposed development on these sites will be assessed. Both these sites comprise historic black homesteads located just outside of the proposed development footprint areas, with KCP 6 located at a distance of 16m from the nearest development footprint area and KCP 8 located 8m away. While the structural remains of these these homesteads have little heritage significance, past experience has shown that in some cases unmarked stillborn babies were buried in close proximity to such black homesteads. These stillborn babies were frequently buried along the sides, or underneath, the parents' dwelling. This possible risk is included

in the impact assessment calculations shown below.

It is expected that should the development proceed without any mitigation, these sites will be disturbed during especially the Pre-Construction and Construction Phases of the project, with lesser impacts expected during the subsequent project phases.

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

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

IMPACT RISK = 2.2

Table 16 - Assessment of Pre-Mitigation Impact on Sites KCP 6 & KCP 8

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Regional	Long-term	Possible	Moderate
Disturbance to Historic Black Homesteads	3	4	4	3	2.2

This calculation has revealed that the pre-mitigation impact risk of the proposed development on sites KCP 6 and KCP 8 falls within Impact Class 3, which represents a Moderate Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.2.7 Assessment of the Pre-Mitigation Impact on Site KCP 3

In this section, the unmitigated impact of the proposed development on this site will be assessed. Site KCP 3 comprises a Late Iron Age or early Historic Period stonewalled enclosure. Although the stonewalled enclosure is located approximately 25m from the nearest development footprint area, it is possible for less visible components of the site, such as huts and middens, to be located either closer to the development footprint area, or just within it.

It is expected that should the development proceed without any mitigation, this site will be disturbed during especially the Pre-Construction and Construction Phases of the project, with lesser impacts expected during the subsequent project phases.

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

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

IMPACT RISK = 2

Table 17 - Assessment of Pre-Mitigation Impact on KCP 3

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Local	Long-term	Possible	Moderate
Disturbance to Late Iron Age site	3	3	4	3	2

This calculation has revealed that the pre-mitigation impact risk of the proposed development on sites KCP 3 falls within Impact Class 3, which represents a Moderate Impact Risk. As a result, mitigation would be required (refer Chapter 8).

7.3 Assessment of Post-Mitigation Impact on the identified Heritage Sites

7.3.1 Assessment of the Post-Mitigation Impact on sites KCP 1, KCP 10, KCP 15, KCP 16 and KCP 17

In this section, the post-mitigation impact of the proposed development on these six sites will be assessed.

The required mitigation measures for these sites are provided in **Chapter 8**.

The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 2

Table 18 - Assessment of Post-Mitigation Impact on Sites KCP 1, KCP 10, KCP 15, KCP 16 & KCP 17

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Moderate	Local	Long-Term	Possible	Moderate
Destruction of Graves and Possible Graves	3	3	4	3	2

This calculation has revealed that the post-mitigation impact risk of the proposed development on these six sites containing graves and possible graves falls within Impact Class 3, which represents a Moderate Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of Very High to a post-mitigation level of Moderate.

7.3.2 Assessment of the Post-Mitigation Impact on sites KCP 7, KCP 11 and KCP 19

In this section, the post-mitigation impact of the proposed development on these three sites will be assessed. The required mitigation measures for these sites are provided in **Chapter 8**. The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 1.2

Table 19 - Assessment of Post-Mitigation Impact on Sites KCP 7, KCP 11 & KCP 19

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Moderate	Local	Medium-term	Unlikely	Low
Disturbance of Graves and Possible Graves	3	3	3	2	1.2

This calculation has revealed that the post-mitigation impact risk of the proposed development on these three sites containing graves and possible graves falls within Impact Class 2, which represents a

Low Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of High to a post-mitigation level of Low.

7.3.3 Assessment of the Post-Mitigation Impact on site KCP 2

In this section, the post-mitigation impact of the proposed development on this site will be assessed. Site KCP 2 comprises a historic black homestead associated with at least one possible grave. The required mitigation measures for this site are provided in **Chapter 8**. The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 2

Table 20 - Assessment of Post-Mitigation Impact on Site KCP 2

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Moderate	Local	Long-Term	Possible	Moderate
Destruction of Historic Black Homestead with Possible Graves	3	3	4	3	2

This calculation has revealed that the post-mitigation impact risk of the proposed development on this site falls within Impact Class 3, which represents a Moderate Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level High to a post-mitigation level of Moderate.

7.3.4 Assessment of the Post-Mitigation Impact on site KCP 13

In this section, the post-mitigation impact of the proposed development on this site will be assessed. Site KCP 13 comprises a historic black homestead associated with a cemetery. The risk also exists for unmarked stillborn graves to be buried at the site. The required mitigation measures for this site is

provided in **Chapter 8**. The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 1.2

Table 21 - Assessment of Post-Mitigation Impact on KCP 13

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Moderate	Local	Medium-Term	Unlikely	Low
Disturbance of Historic Black Homestead with Graves	3	3	3	2	1.2

This calculation has revealed that the post-mitigation impact risk of the proposed development on this site falls within Impact Class 2, which represents a Low Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of Moderate to a post-mitigation level of Low.

7.3.5 Assessment of the Post-Mitigation Impact on Sites KCP 4, KCP 5 & KCP 12

In this section, the post-mitigation impact of the proposed development on these three sites will be assessed. These sites comprise historic black homesteads located within the proposed development footprint areas. The risk also exists for unmarked stillborn graves to be buried at these sites.

The required mitigation measures for this site is provided in **Chapter 8**.

The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 1.33

Table 22 - Assessment of Post-Mitigation Impact on Sites KCP 4, KCP 5 & KCP 12

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Local	Long-Term	Unlikely	Low
Destruction of Historic Black Homesteads	3	3	4	2	1.33

This calculation has revealed that the post-mitigation impact risk of the proposed development on these sites fall within Impact Class 2, which represents a Low Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of Moderate to a post-mitigation level of Low.

7.3.6 Assessment of the Post-Mitigation Impact on Sites KCP 6 & KCP 8

In this section, the post-mitigation impact of the proposed development on these sites will be assessed. These sites comprise historic black homesteads located just outside the proposed development footprint areas. The risk also exists for unmarked stillborn graves to be buried at these sites. The required mitigation measures for this site is provided in **Chapter 8**. The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 1.2

Table 23 - Assessment of Post-Mitigation Impact on Sites KCP 6 & KCP 8

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Local	Long-term	Unlikely	Low
Disturbance to Historic Black Homesteads	3	3	3	2	1.2

This calculation has revealed that the post-mitigation impact risk of the proposed development on sites KCP 6 and KCP 8 falls within Impact Class 2, which represents a Low Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of Moderate to a post-mitigation level of Low.

7.3.7 Assessment of the Post-Mitigation Impact on Site KCP 3

In this section, the post-mitigation impact of the proposed development on this site will be assessed. Site KCP 3 comprises a Late Iron Age or early Historic Period stonewalled enclosure. The required mitigation measures for this site is provided in **Chapter 8**. The calculations undertaken below surmises that these mitigation measures have been undertaken successfully.

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

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

IMPACT RISK = 1.33

Table 24 - Assessment of Post-Mitigation Impact on Sites KCP 3

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Local	Long-term	Unlikely	Low
Disturbance to Late Iron Age site	3	3	4	2	1.33

This calculation has revealed that the post-mitigation impact risk of the proposed development on site KCP 3 falls within Impact Class 2, which represents a Low Impact Risk. This means that the successful completion of the proposed mitigation measures is expected to reduce the impact risk from a pre-mitigation level of Moderate to a post-mitigation level of Low.

8 REQUIRED MITIGATION MEASURES

8.1 Introduction

The impact assessment calculations undertaken in the previous chapter have revealed that mitigation measures would be required for all the site groups assessed. In this chapter, the required mitigation measures for these site groups will be outlined.

8.2 Required Mitigation Measures for Identified Heritage Sites

8.2.1 Required Mitigation Measures for Sites KCP 1, KCP 10, KCP 15, KCP 16 and KCP 17

The impact significance calculations undertaken in **Chapter 7** have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of Very High Significance. As a result, mitigation measures are required for these sites.

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. However, should it not be possible to preserve these sites *in situ*, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

8.2.2 Required Mitigation Measures for Sites KCP 7, KCP 11 and KCP 19

The impact significance calculations undertaken in **Chapter 7** have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of High Significance. As a result, mitigation measures are required for these sites.

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. However, should it not be possible to preserve these sites *in situ*, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

8.2.3 Required Mitigation Measures for Site KCP 2

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on site KCP 2 is estimated to be of High Significance. As the site contains possible graves but also has the risk for unmarked stillborn graves to be buried here, it is recommended that the mitigation measures normally undertaken for the possible presence of unmarked stillborn graves be undertaken first. This is due to the fact that the mitigation measures required for unmarked graves may also assist with the confirmation of possible graves as graves.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.

- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required in terms of the possible risk for unmarked stillborn graves, however the mitigation measures outlined in Outcome 3 would be required for the site's possible graves.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item

must also be included in this mitigation report.

- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.4 Required Mitigation Measures for Site KCP 13

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on site KCP 13 is estimated to be of High Significance.

The following mitigation measures would be required for the confirmed graves from the site:

As cemeteries and graves have Medium to High Heritage Significance, the best option is to change the development footprint to allow for the *in situ* preservation of these sites. However, should it not be possible to preserve these sites *in situ*, the required mitigation measures are outlined below.

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The mitigation measures outline below, are required to mitigate the possible risk for the presence of unmarked stillborn graves at the site.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be

the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.

- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.5 Required Mitigation Measures for Sites KCP 4, KCP 5 and KCP 12

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of Moderate Significance.

The mitigation measures outline below, are required to mitigate the possible risk for the presence of unmarked stillborn graves at these sites.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted

identification of the next-of-kin in order to obtain their consent for the relocation.

- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.6 Required Mitigation Measures for Sites KCP 6 and KCP 8

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of Moderate Significance.

The mitigation measures outline below, are required to mitigate the possible risk for the presence of unmarked stillborn graves at these sites.

The following initial mitigation measure is required:

- A social consultation process to assess whether any local residents or the wider public is aware of the presence of graves here.

Depending on the outcome of the social consultation process, three different outcomes would be the result, namely:

- Outcome 1: The social consultation absolutely confirms that no graves are located here.
- Outcome 2: The social consultation absolutely confirms that graves are located here.
- Outcome 3: The social consultation does not yield any confident results.

The following mitigation measures would be required for sites falling under Outcome 1:

- No further mitigation would be required.

The following mitigation measures would be required for sites falling under Outcome 2:

- A grave relocation process must be undertaken.
- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin in order to obtain their consent for the relocation.
- Bilingual site and newspaper notices indicating the intent of the relocation.
- Permits from all the relevant and legally required authorities.
- An exhumation process that keeps the dignity of the remains and family intact.
- An exhumation process that safeguards the legal rights of the families as well as that of the mining company.
- The process must be done by a reputable company well versed in the mitigation of graves.

The following mitigation measures would be required for sites falling under Outcome 3:

- Test excavations to physically confirm the presence or absence graves.
- If no evidence for graves is found, the site will fall within Outcome 1 as outlined above. This means that no further mitigation measures would be required.
- If evidence for graves is found, the site will fall within Outcome 2 as outlined above. This

means that a full grave relocation process must be implemented.

Additionally, the following mitigation measures must be undertaken for all these sites:

- All structures and site layouts from each site must be recorded using standard survey methods and/or measured drawings. The end result would be a site layout plan.
- A mitigation report must be compiled for these sites within which all the mitigation measures and its findings will be outlined. The recorded drawings from the previous item must also be included in this mitigation report.
- The completed mitigation report must be submitted to the relevant heritage authorities.

8.2.7 Required Mitigation Measures for Sites KCP 3

The impact significance calculations undertaken in Chapter 7 have shown that the significance of the unmitigated impact of the proposed development on these sites is estimated to be of Moderate Significance.

The following initial mitigation measures are required for this site:

- An archaeological site layout plan must be compiled using accepted archaeological techniques.
- During the recording of the archaeological site layout plan, an attempt must be made to establish the extent of the site on its north-western, northern and north-eastern ends to confirm whether any components of the site are located within the nearby development footprint area.

If the recording of the site and its layout proves that no component of the site is located within the nearby development footprint area, no further mitigation would be required. However, if this work indicates that sections of the site are indeed located within this development footprint area, archaeological test excavations and a destruction permit would be needed. The resulting mitigation measures are as follows:

- A permit application to SAHRA for archaeological test excavations to take place.
- Once the permit is received, limited archaeological test excavations may also be required,

should a deposit be identified.

- Photographic recording of the site and its components must also be undertaken.
- An archaeological mitigation report must be compiled.
- A destruction permit application must be lodged with (SAHRA) to allow for the destruction of the site.

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 Amendment of the Kusipongo Underground and Opencast Coal Mine. The study area is located 31.5km north-east of Wakkerstroom, and is located within the Mkhondo Local Municipality and the Gert Sibance District Municipality of the 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. An assessment was also made of the early editions of the relevant topographic maps. The assessment of previous archaeological and heritage studies revealed the presence of one previously identified heritage site within the present study area. This site was visited and included in the present report as site KCP 10.

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**. Ms. Butler found that the proposed development area is “...is underlain by the Vryheid Formation of the *Ecca Group (Karoo Supergroup)*, while the central portion of Kusipongo mining right application is underlain by the *Volksrust Formation (Ecca Group)* and *Karoo dolerite*. According to the *PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Vryheid Formation is Very High and that of the Volksrust Formation is High while the Karoo Dolerite Suite consists of igneous rock and thus has a Palaeontological Sensitivity of zero.*”

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.”

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 fieldwork was aimed at locating and documenting sites falling within the proposed development area and was undertaken from Monday, 19 August to Friday, 23 August 2019.

The intensive fieldwork resulted in the identification of 19 archaeological and heritage sites. For the purposes of this project, these sites were numbered from KCP 1 to KCP 19, and comprise the following:

- Burial grounds, graves and possible graves – nine sites
- Historic black homesteads where the risk exists for the presence of graves – four sites
- Historic black homesteads with graves and/or possible graves – two sites
- Late Iron Age stonewalled sites – one site
- Recent black homesteads where the risk exists for the presence of graves – one site
- Historic white farmsteads and structures – two sites

Impact Assessment

An overlay of the identified archaeological and heritage sites over the proposed development footprint areas was made, which was used to assess the impact of the proposed development on these identified archaeological and heritage sites. Both pre-mitigation and post-mitigation impact assessments were undertaken. Please refer **Chapter 7** for the impact assessment calculations. A series of site-specific mitigation measures are outlined in **Chapter 8** of this report.

Conclusions

While the unmitigated impact of the proposed development is expected to result in high negative

impacts in terms of the identified heritage fabric of the study area, these impacts can be suitably mitigated to acceptable levels by way of a range of mitigation measures outlined in this report. As a result, on the condition that the recommendations made in this report, are adhered to, 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

11 REFERENCES

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National Archives MNW 976 MM1194/29

National Archives URU 745 1274; URU 816 560

National Archives, WAT 441/1952

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