# KOA SOUTH PROSPECTING RIGHT APPLICATION FOR BLACK MOUNTAIN MINING, NORTHERN CAPE PROVINCE

**Heritage Impact Assessment**

| | |
|---|---|
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## Declaration of Independence

- I, Jennifer Kitto, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

## Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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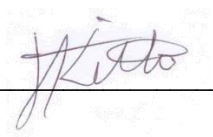
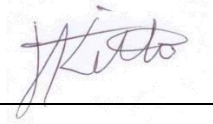
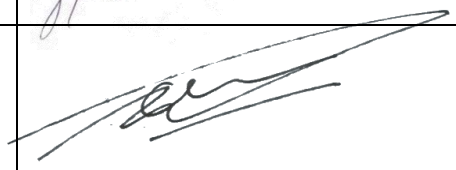
**SIGNATURE:** 

## ACKNOWLEDGEMENT OF RECEIPT

| Report Title | *Heritage Impact Report for the Koa South Prospecting Right for Black Mountain Mining, Northern Cape Province* | | |
|---|---|---|---|
| **Control** | **Name** | **Signature** | **Designation** |
| **Author** | **J Kitto** |  | **PGS Heritage Specialist** |
| **Reviewed** | **W Fourie** |  | **PGS Heritage Specialist/ Principal Investigator** |
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**SIGNATURE:** _____

The Heritage Impact Assessment Report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA): Appendix 6 of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended, 2017) requirements for specialist reports as indicated in the table below.

| **Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017** | **Relevant section in report** |
|---|---|
| 1.(1) (a) (i) Details of the specialist who prepared the report | Page ii of Report – Contact details and company |
| (ii) The expertise of that person to compile a specialist report including a curriculum vita | Section 1. – refer to Appendix A |
| (b) A declaration that the person is independent in a form as may be specified by the competent authority | Page ii of the report |
| (c) An indication of the scope of, and the purpose for which, the report was prepared | Section 3 |
| (cA) An indication of the quality and age of base data used for the specialist report | N/A |
| (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change; | Section 5 |
| (d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment | N/A, desktop report |
| (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used | Section 9.1 and Appendix B |
| (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives; | Section 7 |
| (g) An identification of any areas to be avoided, including buffers | Section 7 |
| (h) 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; | Section 7 |
| (i) A description of any assumptions made and any uncertainties or gaps in knowledge; | Section 13 |
| (j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment | Section 12 |
| (k) Any mitigation measures for inclusion in the EMPr | Section 11 |
| (l) Any conditions for inclusion in the environmental authorisation | Section 11 |
| (m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation | Section 11 |
| (n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and | Section 12 |
| (n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and | |
| (n)(ii) If the opinion is that the proposed activity, activities 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 | Section 11 |
| (o) A description of any consultation process that was undertaken during the course of carrying out the study | A public participation process was handled as part of the EAP process and is not elaborated on here. |
| (p) A summary and copies if any comments that were received during any consultation process | Not applicable. To date no comments regarding heritage resources that require input from a specialist have been raised. |
| (q) Any other information requested by the competent authority. | Not applicable. |
| (2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply. | No protocols or minimum standards for HIAs or PIAs promulgated through a governmental notice. |

## EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Environmental Impact Management Services (Pty) Ltd (EIMS), to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Assessment Report (BAR) for a proposed prospecting work programme submitted for a prospecting right application without bulk sampling for seven different areas located in the Namaqualand District, Northern Cape Province. This report focusses on Area 7 – Koa South, which is located on Farm Kalkfontein A 131 Portion 1 and Portion 2; and Farm Roode Draai 134 Portion 3 and Portion 4; located in the Pixley ka Seme District in the Northern Cape Province. The proposed properties are situated approx.69.56 kilometres South of the town of Prieska and 376 km kilometres South East of the town of Aggeneys.

The project will follow a phased approach starting with non-invasive prospecting techniques and depending on the outcomes may then move to the implementation of invasive techniques such as drilling.

The desktop heritage impact assessment identified various potential heritage resources within the study area, including historical structures, palaeontological resources and archaeological resources that could be impacted during invasive prospecting activities. No burial grounds or graves are depicted on the historical topographic maps for the study area. However, it is likely that unknown burial grounds and graves are present. Therefore, an impact assessment table was compiled for the potential presence of burial grounds and graves.

**Burial Grounds and Graves**

Burial grounds and graves have high heritage significance and are given a Grade IIIA significance rating in accordance with the system described in Section 9.1 of this document.

Assuming that unknown graves or burial grounds are present in the application area, the impact of the proposed activities on burial grounds and graves is rated as MEDIUM negative significance before mitigation, but with the implementation of the required mitigation measures the post-mitigation impact would be LOW negative.

**Historical Structures**

The impact of the proposed prospecting activities on potential historical structures is rated as LOW negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

Any identified historical structures should be avoided with a buffer of 30m to avoid damage during the prospecting activities.

**Palaeontology**

Banzai Environmental was appointed to do a Palaeontological Desktop Assessment (Butler 2020) and found that:

The proposed Prospecting Right Application area in the Northern Cape is completely underlain by basement bedrock of the Bushmanland Group of the Namaqua Metamorphic Province, igneous Karoo dolerite, as well as the Prince Albert, White Hill and Volksrust Formations (Ecca Group) of the Karoo Supergroup. Quaternary to Recent aeolian sediments of the Gordonia Formation (Kalahari Group) are also present. According to the SAHRIS PalaeoMap, the Palaeontological Sensitivity of the Kalahari Group is Moderate, the igneous rocks of the Bushmanland and Karoo Dolerite is insignificant or zero while the Prince Albert and Volksrust Formations has a High Palaeontological Sensitivity and the White Hill Formation a Very High Sensitivity.

The impact of the proposed prospecting activities on potential palaeontological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

In the event that fossil remains are discovered during any phase of the proposed prospecting activities, the Chance Find Protocol must be implemented by the ECO in charge of these developments.

**As only drilling is proposed for this project, it is considered that the Black Mountain Koa South Prospecting Right Application in the Northern Cape is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area if appropriate monitoring is implemented (Chance Find Procedures).**

**Archaeology**

Previous studies conducted in the surroundings of the study area have identified a number of archaeological sites. These include Stone Age (ESA, MSA and LSA) sites including find spots, surface scatters and rock art sites.

The impact of the proposed project on potential archaeological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

When physical prospecting is planned an archaeologist must first visit and assess the areas of impact and make recommendations on any finds made.

If any archaeological artefacts are discovered during any phase of the proposed prospecting activities, the Chance Find Protocol must be implemented by the ECO in charge of these developments.

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**General**

It is the combined considered opinion of the specialists that the overall impact of the development, on the potential heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

In the event that heritage resources are discovered during site clearance or prospecting activities, such activities must stop and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

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## TERMINOLOGY AND ABBREVIATIONS

**Archaeological resources**

This includes:

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

**Cultural significance**

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

**Development**

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

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

**Early Stone Age**

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

**Fossil**

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

**Heritage**

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

**Heritage resources**

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

**Holocene**

The most recent geological time period which commenced 20 000 years ago.

**Late Stone Age**

The archaeology of the last 30 000 years associated with fully modern people.

**Late Iron Age (Early Farming Communities)**

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

**Middle Stone Age**

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

**Palaeontology**

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

| Abbreviations | Description |
|---|---|
| AIA | Archaeological Impact Assessment |
| ASAPA | Association of South African Professional Archaeologists |
| CRM | Cultural Resource Management |
| DEFF | Department of Environment, Forestries and Fisheries |
| ECO | Environmental Control Officer |
| EIA practitioner | Environmental Impact Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| ESA | Early Stone Age |
| GPS | Global Positioning System |
| HIA | Heritage Impact Assessment |
| I&AP | Interested & Affected Party |
| LSA | Late Stone Age |
| LIA | Late Iron Age |
| MSA | Middle Stone Age |
| MIA | Middle Iron Age |
| NEMA | National Environmental Management Act |
| NHRA | National Heritage Resources Act |
| PHRA | Provincial Heritage Resources Authority |
| PSSA | Palaeontological Society of South Africa |
| SADC | Southern African Development Community |
| SAHRA | South African Heritage Resources Agency |

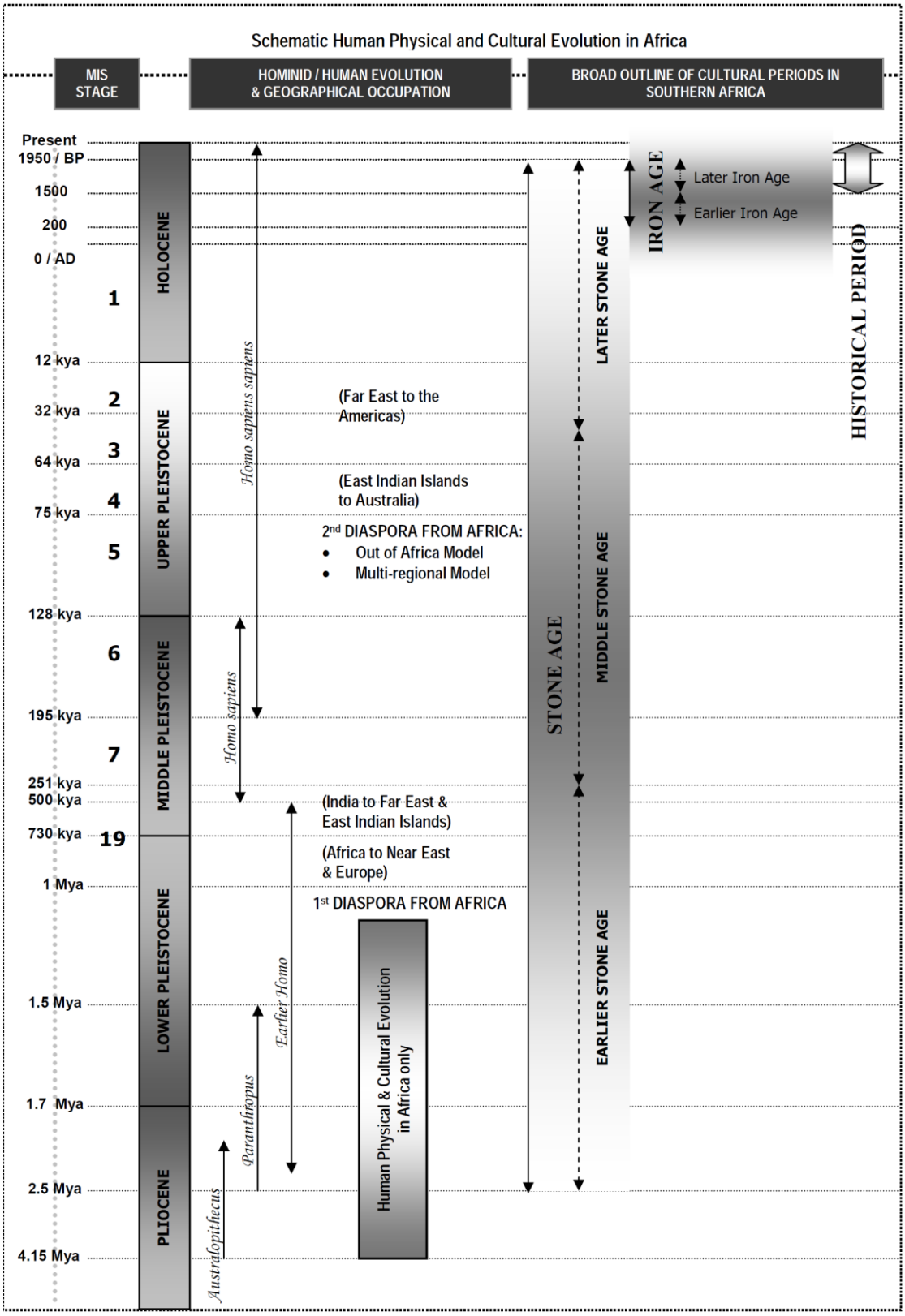


*Figure 1: Human and Cultural Timeline in Africa (Morris, 2008)*

# 1 SUMMARY OF SPECIALIST EXPERTISE

This HIA was compiled by PGS.

The staff at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Jennifer Kitto, author of this report and Heritage Specialist, has 21 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well-versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

Wouter Fourie, the Project Coordinator and author, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

# 2 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Environmental Impact Management Services (Pty) Ltd (EIMS), to undertake a Heritage Impact Assessment (HIA) that forms part of the Basic Assessment Report (BAR) for a proposed prospecting work programme submitted for a prospecting right application without bulk sampling for seven different areas located in the Namaqualand District, Northern Cape Province. This report focusses on Area 7 – Koa South, which is located on Farm Kalkfontein A 131 Portion 1 and Portion 2; and Farm Roode Draai 134 Portion 3 and Portion 4; located in the Pixley ka Seme District in the Northern Cape Province. The proposed properties are situated approx.69.56 kilometres South of the town of Prieska and 376 km kilometres South East of the town of Aggeneys

# 3 SCOPE OF WORK AND TERMS OF REFERENCE

## 3.1 Overview of the Scope of Work

PGS Heritage was appointed by EIMS to undertake a desktop Heritage Impact Assessment (HIA). The aims of the study are to identify potential heritage sites and finds that occur in the proposed prospecting right area as well as to assess the impact of the proposed activity on these identified heritage sites. The Heritage Impact Assessment aims to inform the Basic assessment Report

(BAR) in the development of a comprehensive Prospecting Work Programme (PWP) to assist the client/landowner in managing the identified 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).

The scope of work for the Heritage Impact Assessment Phase of the project can be itemised as follows:

1. The desktop studies will be undertaken as part of a basic assessment report (BAR) in support of seven prospecting right applications located near the town of Aggeneys in the Northern Cape.
2. The purpose of the above-mentioned studies is two-fold namely:
    a. To develop heritage features and heritage sensitivity maps for each of the prospecting right applications; and
    b. Undertake heritage impact assessments and develop management plans at a desktop level for each of the seven prospecting right applications.

**This report documents the desktop heritage study for Area 7 – Koa South. Note: this prospecting right application area is located closer to Prieska and approximately 375km away from Aggeneys and roughly 247km south-east of the other six prospecting right application areas (Figure 2).**

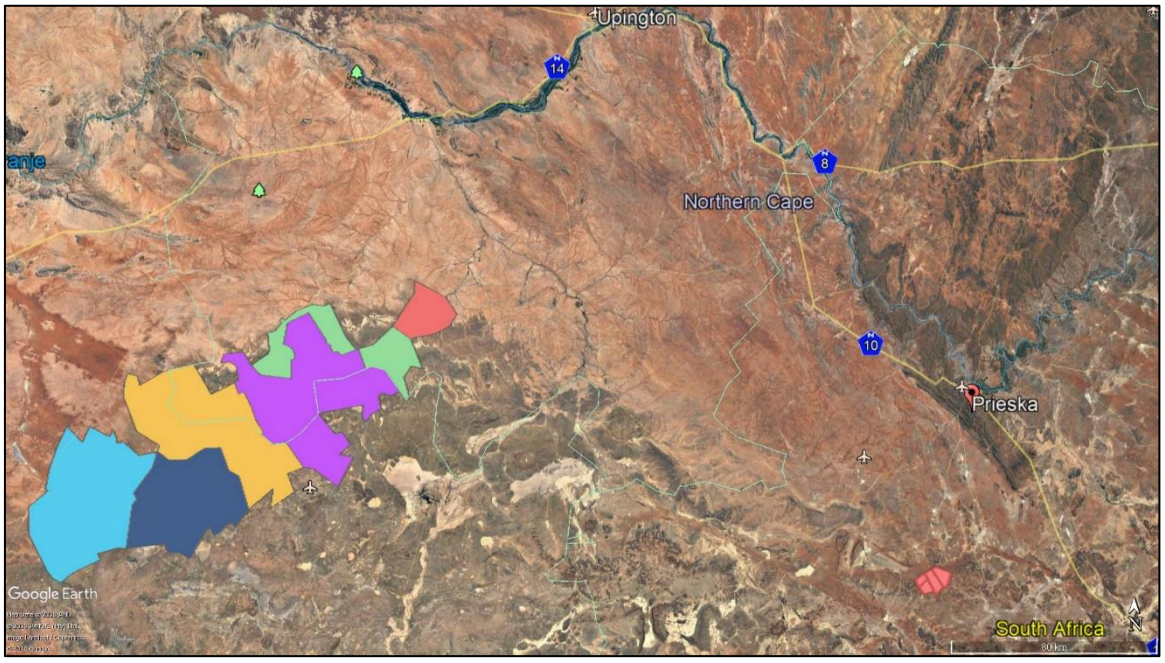


*Figure 2 – Location of Koa South prospecting right application area, in relation to the other six areas*

## 3.2 Definition of Study Area for Scope of Work

PGS Heritage was appointed by EIMS to undertake a desktop Heritage Impact Assessment (HIA) for a proposed prospecting work programme submitted for a prospecting right application without bulk sampling for various farm portions situated on Farm Kalkfontein A 131 Portion 1 and Portion 2; and Farm Roode Draai 134 Portion 3 and Portion 4; located in the Pixley ka Seme District in the Northern Cape Province. The proposed properties are situated approx.69.56 kilometres South of the town of Prieska and 376 km kilometres South East of the town of Aggeneys.

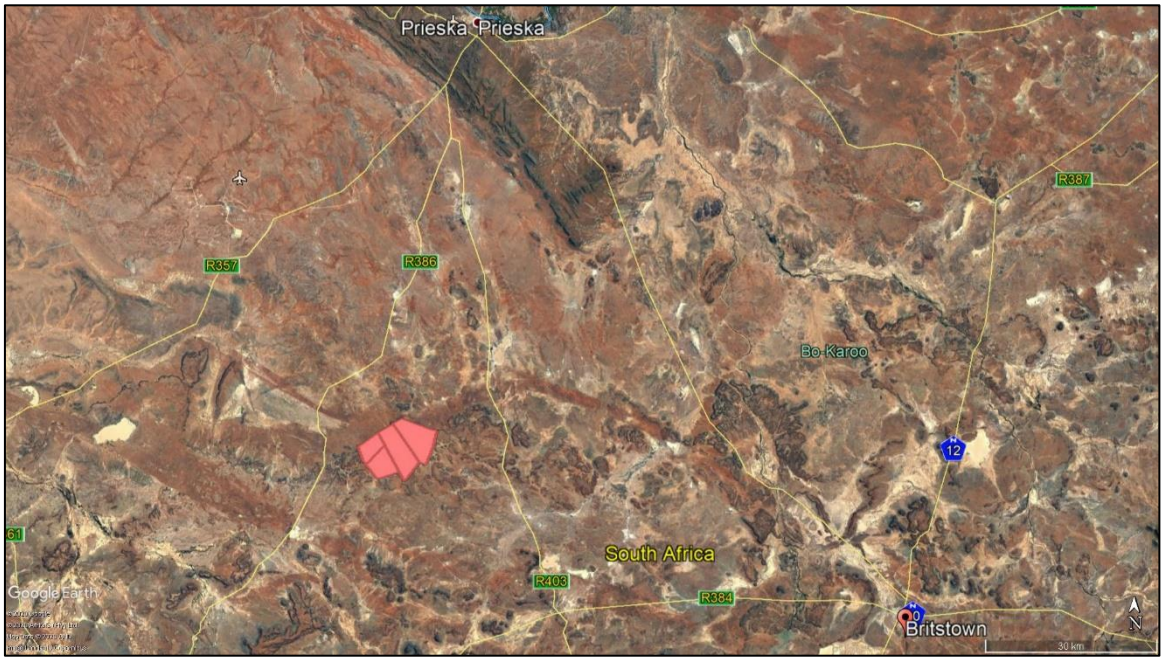


*Figure 3 - The study area within its regional context (pink shaded polygon)*

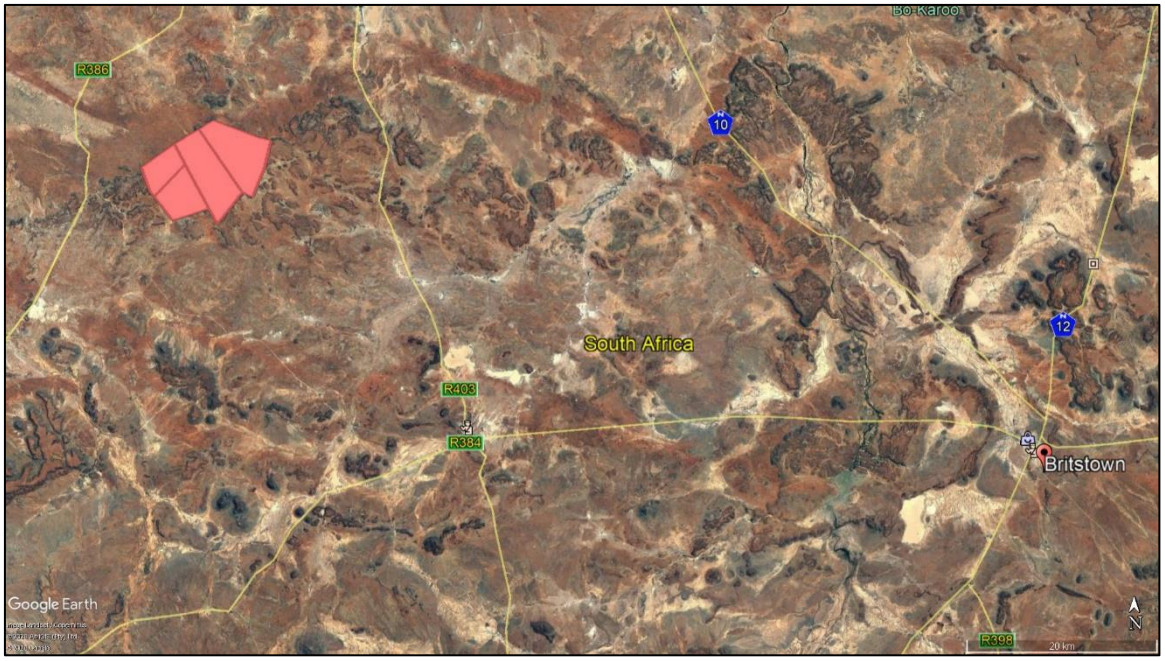


*Figure 4 - The study area within its local context (pink shaded polygon)*

| DEFINITION AND DESCRIPTION OF STUDY AREA | | |
|---|---|---|
| **Coordinates** | Northernmost<br>-30.282667°S, 22.606595°E<br>Southernmost<br>-30.380024°S, 22.610828°E | Easternmost<br>-30.301661°S, 22.669564°E<br>Westernmost<br>-30.326543°S, 22.527704°E |
| **Property** | The farm portions: Farm Kalkfontein A 131 Portion 1 and Portion 2; and Farm Roode Draai 134 Portion 3 and Portion 4; located in the Pixley ka Seme District in the Northern Cape Province. | |
| **Location** | The area is located approximately 77,3 km South-West of Prieska and 166 km North-West of De Aar, Pixley ka Seme District in the Northern Cape Province. | |
| **Extent** | The area is approximately 9234,1442 Ha (Nine Thousand Two Hundred and Thirty Four Hectares) | |
| **Land Description** | The Prospecting application area is located approximately 50 kilometers South East of the town of Copperton, and the Prieska base metal mine. It is situated between the R386 tar road from Carnavon to Prieska and the R403 tar road from Vosburg to Prieska. Several farm roads and servitude gravel roads cross these properties. Existing power lines are also situated across these properties.<br>The terrain of the proposed properties consists of plains and low hills with Cenozoic and Karoo-aged sediments overlying Namaquan granitic gneiss and meta-sediments. Several drainage lines, ridges and outcrops, as well as a few pans, do occur across some parts of these properties.<br>The vegetation of the general area and the proposed site is expected to be typical of the Upper Karoo which consists mainly of Karoo scrub and grass and the occasional Karoo Acacia and forms part of the vegetation in the Nama-Karoo biome (Mucina & Rutherford 2006).<br>The properties are expected to be previously largely undisturbed and mainly used for grazing of sheep and cattle. Existing farm infrastructure such as windmills, boreholes, fencing and livestock pens are expected to be sparsely dotted across the properties. Only a few tracks or roads cross these properties. | |

## 4 LEGISLATIVE AND POLICY FRAMEWORK

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

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

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

i. GNR 982 of 2014, as amended 2017 (Government Gazette 38282) promulgated under the (NEMA):
    a. Basic Assessment Report (BAR) – Regulations 19 and 23
    b. Environmental Scoping Report (ESR) – Regulation 21
    c. Environmental Impacts Report (EIR) – Regulation 23
    d. Environmental Management Programme (EMPr) – Regulations 19 and 23

ii. NHRA:
    a. Protection of Heritage Resources – Sections 34 to 36; and
    b. Heritage Resources Management – Section 38
iii. MPRDA Regulations of 2014:
    a. Environmental reports to be compiled for application of mining right – Regulation 48
    b. Contents of scoping report– Regulation 49
    c. Contents of environmental impact assessment report – Regulation 50
    d. Environmental management programme – Regulations 51
    e. Environmental management plan – Regulation 52

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority, and that an HIA will be required if a development triggers any of the development types listed in section 38 of the NHRA. Sections 34-36 further stipulate the protections afforded to structures older than 60 years, archaeological and palaeontological sites and material and meteorites, and graves and burial grounds, as well as the process to be followed if these resources need to be disturbed.

NEMA 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 addition, the NEMA (No 107 of 1998) and the GNR 982 (Government Gazette 38282, 14 December 2014) state that, "the objective of an environmental impact assessment process is to, … identify the location of the development footprint within the preferred site … focussing on the geographical, physical, biological, social, economic, cultural and heritage aspects of the environment" (GNR 982, Appendix 3(2)(c), emphasis added). In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive legally compatible HIA report is compiled.

## 5 RECEIVING ENVIRONMENT

The proposed Koa South Prospecting Project will be situated on Farm Kalkfontein A 131 Portion 1 and Portion 2; and Farm Roode Draai 134 Portion 3 and Portion 4; located in the Pixley ka Seme District in the Northern Cape Province. The proposed properties are situated approx.69.56 kilometres South of the town of Prieska and 376 km kilometres South East of the town of Aggeneys,

The proposed properties are situated between the R386 tar road from Carnavon to Prieska and the R403 tar road from Vosburg to Prieska. Several farm roads and servitude gravel roads cross these properties. Existing power lines are also situated across these properties.

## 5.1 Heritage Desktop Study

The high-level archival research focused on available information sources that were used to compile a general background history of the study area and surrounds.

### *5.1.1 Archival/historical maps*

Three editions of the relevant 1:50 000 historical topographic maps, dated 1969, 1988 and 2007, were available for utilisation in the background study. The maps were utilised to identify structures and features that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA. Many of the structures identified are farmsteads and kraals.

In total, seven potential heritage features were identified in the location of the study area as depicted on the topographical maps (**Figure 5** to **Figure 7**). Between 4-5 of these represent the same farmsteads depicted over the years. Most of the heritage features depicted are several groups of structures that likely indicate farmsteads, with occasional scattered single structures and kraals (yellow icons). No graves are depicted on any of the map sheets.

Since the first edition of the topographic maps for the area dates to 1969, some of the potential heritage features are likely to be 51 to 60 years or older. The identification of the features will have to be confirmed during the field work phase.

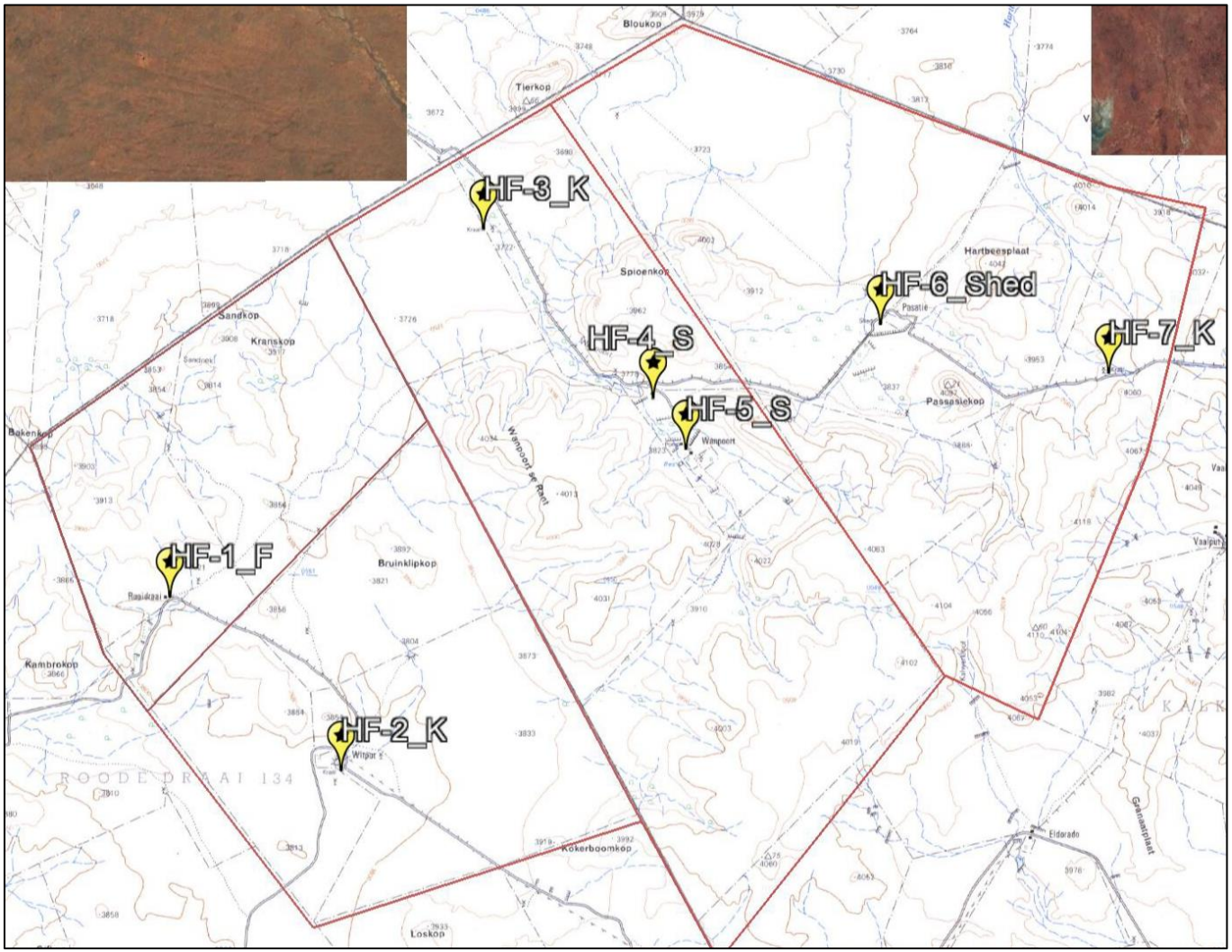


*Figure 5 - Enlarged section of the 3022BC 1st Ed 1969 map sheet for Area 7 – Koa South. showing the 7 possible heritage features (yellow icons)*

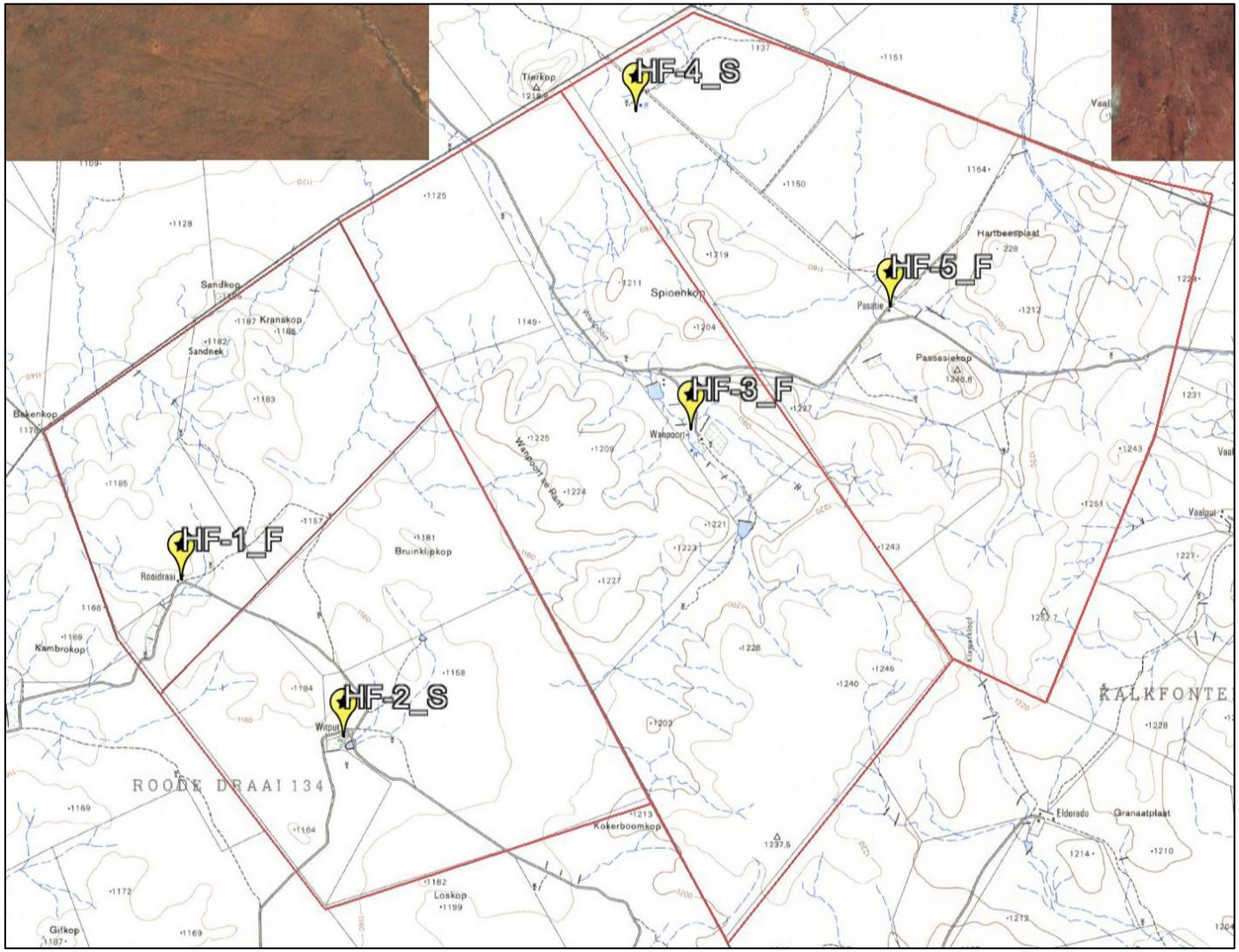


*Figure 6 - Enlarged section of the 3022BC 2nd Ed 1988 map sheet for Area 7 – Koa South. showing the 5 possible heritage features (yellow icons).*

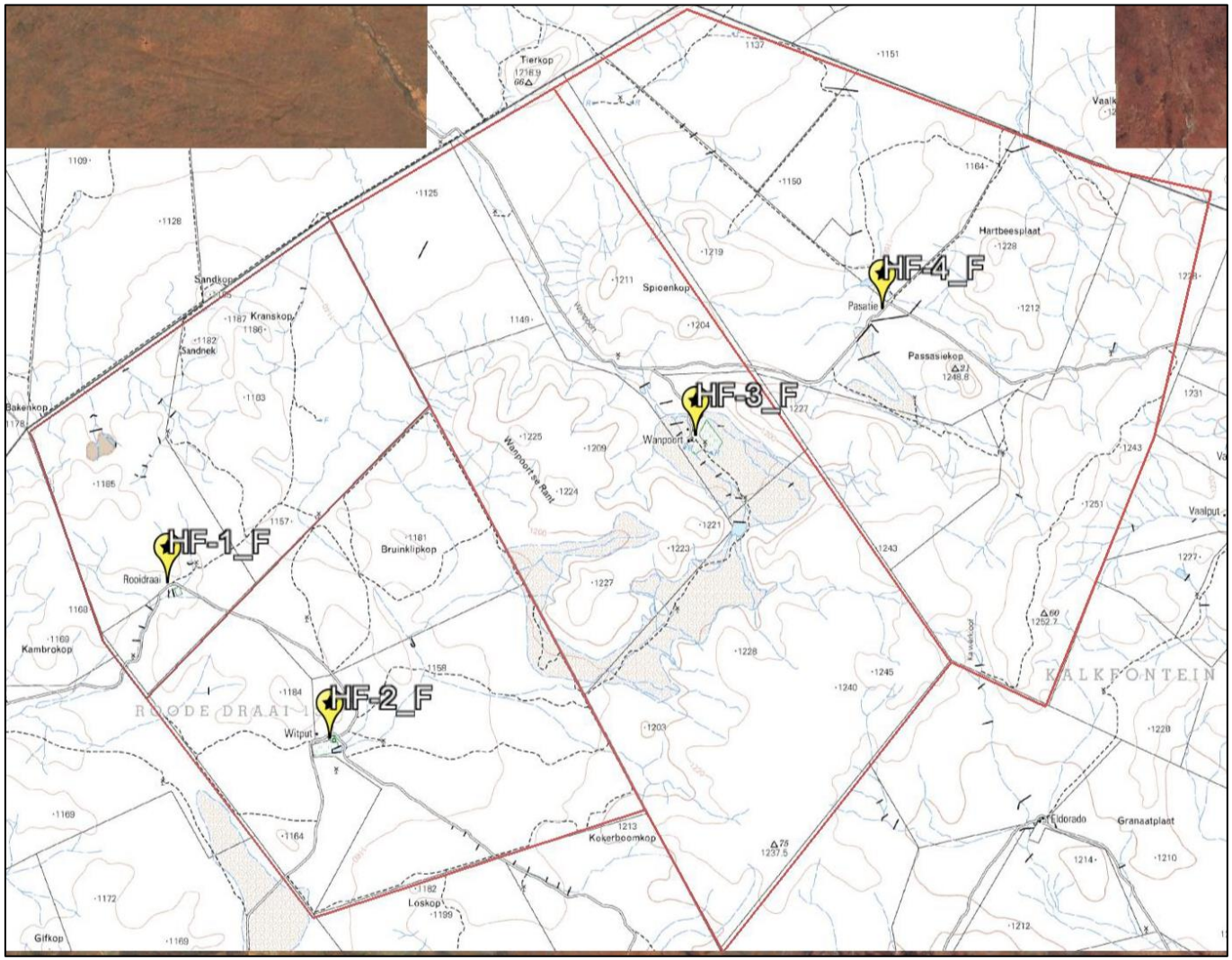


*Figure 7 - Enlarged section of the 3022BC 3rd Ed 2005 map sheet for Area 7 – Koa South. showing the 4 possible heritage features (yellow icons).*

### *5.1.2 Historical and Archaeological Overview of the Study Area and Surrounding Landscape*

*A review of the archaeological context of the Northern Cape (van der Ryst 2015)*

The Northern Cape is an arid region with limited surface water so that archaeological remains are often found near water (Mitchell 2002) and sources of lithics that have been used to produce stone tools. Palaeo- and current river systems, springs and pans and dominant geographical landscape features such as hills or shelters are important locales within any landscape.

The region abounds with the remains of prehistoric hunting and gathering groups. Numerous archaeological sites have been recorded, researched and published through archaeological impact and heritage assessments. Stone tools mostly mark areas of prehistoric occupations and these suggest a widespread presence for tool-producing Plio-Pleistocene hominins in southern Africa (Barham and Mitchell 2008). This important part of the prehistory of southern Africa, known as the Stone Age, is chronologically divided into the Earlier, Middle and Later Stone Ages (ESA, MSA and LSA). The ESA is characterized by the use of stone large cutting tools (LCT's) (McNabb et al. 2004), in particular hand axes, but also cleavers and tool types such as scrapers. Following on the ESA, the MSA typologies represent greater specialization in the production of stone tools, specifically flake, blade and scraper tools and also in a more extended range of specialized, formal tools. Regional lithic style, evidence for symbolic signalling, polished bone tools, portable art and decorative items are apparent during the MSA. ESA and MSA lithics occur widespread around water sources and previously favourable land settings that are now buried. During the LSA small (microlithic) tools, bone tools and weapon armatures and a range of decorative items as well as rock art were produced. Ceramics were used and/or manufactured by hunters and Khoekhoe herders towards the terminal phases of the LSA over a period of around 2000 year. The more recent occupations of LSA groups are abundant as surface finds and in sealed deposits in shelters (Beaumont et al. 1995).

Differences in stone artefact assemblages have been used in attempts to discern between late-Holocene hunter-gatherer and herder sites (Parsons (2003, 2004, 2007, 2008); Lombard and Parsons 2008) but this distinction is not generally accepted. Hunter-gatherer assemblages termed Swartkop may contain grass-tempered ceramics (Beaumont and Vogel 1989). Sites with engravings are often situated close to water sources. The Doornfontein herder sites contain ceramics that occasionally have lugs and/or spouts. Differences in the geographical spread indicate a preference for pastoral Doornfontein sites along rivers while Swartkop sites are usually found further from the river (Fauvelle-Aymar 2004). Substantial herder encampments were located along the Orange River floodplain. Hendrik Jacob Wikar during his travels in 1778 recorded the names of the various herder groups who had settlements on both sides of the river (Mossop 1935).

**Rock Art**

The rock art of the Northern Cape comprises paintings and, importantly, diverse categories of engravings (Morris 2012). By the beginning of the Later Stone Age, human behaviours were

undoubtedly modern (Huffman 2007). Uniquely human traits, such as rock art and purposeful burials with ornaments, became regular practice (Huffman 2007). These people were most likely the ancestors of the San, who are well known their fine-lined rock art and rock engravings. Engravings occur at Wildebeestkuil, near to Kimberley, and near to Britstown at Keurfontein, Wilde Als Put and Pienaars Pan in the Northern Cape (Morris 1988; Beaumont & Vogel 1989). Rock art is also found on several farms around Prieska – Kleindoring, Omdraaisvlei, Poortjie, Kleinfontein, Uitdraai and Wonderdraai. San rock art is also found on the farm Klein Springbokoog, near the town of Van Wyksvlei. (Erasmus 2014).

**Second South African War (Anglo-Boer War)**

During the Anglo Boer War Britstown was occupied by British armed forces dispatched by Lord Roberts to monitor the advance of the Boer Commandos led by Commandant Liebenberg. On the 6th March 1900 the British forces were attacked by the Commandos approximately 20-miles from the village and were forced to retreat back to Britstown, with the loss of 21 men. Additional reinforcements under the command of Lord Kitchener were dispatched to the district from Cape Town and the Boer Commandos in the district were forced to retreat across the Orange River. Britstown was placed under martial law by the British authorities, one of 14 districts placed under martial law across the Cape Colony. The superior number of British troops dispatched to the district resulted in the expulsion of the raiding Boer Commandos from the area by March 1901 (www.karoo-southafrica.com).

**Towns**

*Prieska*

The town of Prieska developed on the southern bank the Orange river at a fording place used by Koranna Khoe herdsmen and then European traders, travellers and hunters. Later, the area was used by migrating farmers (trekboers) who moved their cattle to the area when the pans were full after good rains. By the mid-1850s, the number of permanent white settlers and the volume of passing traffic, resulted in a village and church. The new Dutch Reformed Congregation of Prieska was formed in 1878 and the village gained municipal status in 1892. The name of the town is apparently derived from the Koranna word, “prieskab”, which means ‘place of the lost she-goat’ (Erasmus 2014; Raper 2014).

After the railway line from De Aar reached Prieska in 1905, the town became the focus of a large sheep farming district, salt was also produced from the surrounding pans. Until recently, a second important economic activity was copper-mining at Copperton, located 70km south-west of Prieska. The ore deposit was discovered in 1969 and mining began in 1970. However, mining ceased in the late 1990s following a downturn in the international copper price (Erasmus 2014).

*Carnavon*

This town developed on an early trading route between the Cape and Bechuanland (Botswana). The first settlements were mission stations established by the Rhenish Mission Society on the farms Schietfontein and harmsfontein between the 1940s and 1860s. The mission station at Harmsfontein developed into the village of Carnarvon, which was named after the British Colonial secretary Lord Carnarvon, in 1874. It became a municipality in 1882 (Erasmus 2014; Raper 2014).

*Vosburg*

This village was established in 1895 and named for the Vos and Van Rensburg families who owned the farm Processfontein on which the village was built. It became a municipality in 1897 (Erasmus 2014; https://www.karoo-southafrica.com/western-upper-karoo/vosburg/history-of-vosburg).

*Britstown*

Britstown is named after a farmer, Hans Brits, who accompanied Dr David Livingstone, the explorer and son-in-law of the Robert Moffat, on a journey into the interior of the sub-continent and decided to settle on the farm Gemsbokfontein in the Karoo. Thomas Philippus Theron settled on a portion of Hans Brits's farm as a school teacher in 1870 and was instrumental in the establishment of Britstown as a Dutch Reformed Church parish in 1876. In 1877, a village committee was established and a quarter portion of Gemsbokfontein farm was purchased to develop the village of Britstown. The administration of the village was administered by the Dutch Reformed Church until 1890 when a village management board was set up (Erasmus 2014; Raper 2014; www.karoo-southafrica.com).

West of Britstown on the R384 towards Vosburg, a major irrigation scheme, including the largest privately constructed reservoir, was established on the Ongers River by an organisation known as the Smartt Syndicate. The syndicate was formed was in 1895 by Dr Thomas Smart, the district medical officer who was also a farmer. The syndicate built two dams, planted lucerne and wheat and set up breeding and feeding programmes for sheep, karakul, goats and Clydesdale horses. The Smartt Syndicate Dam was built between 1908 and 1912 but its capacity had become severely reduced due to silting by 1936. In March, 1961, there was a massive flood in the catchment area of the Ongers River and the wall of the dam was destroyed. However, the dam wall was rebuilt by the Government in 1964 to ensure the continued viability of the irrigation scheme ((Erasmus 2014; www.karoo-southafrica.com).

**Mining History**

Van Schalkwyk (2015a) refers briefly to the history of the development of mining activities at Copperton. Although the existence of copper on the farm Vogelstruisbult was known since the early 20th century, little was done to exploit it. It was only during the late 1960s that the potential importance of the deposit was realised and a number of shafts were sunk: the Marais and Hutchings shafts. To house the workers at the mine a residential area was developed and named Copperton. The mine was closed down in 1991 (Van Schalkwyk 2015a).

## 5.2 Palaeontology

The proposed Prospecting Right Application area in the Northern Cape is completely underlain by basement bedrock of the Bushmanland Group of the Namaqua Metamorphic Province, igneous Karoo dolerite, as well as the Prince Albert, White Hill and Volksrust Formations (Ecca Group) of the Karoo Supergroup. Quaternary to Recent aeolian sediments of the Gordonia Formation (Kalahari Group) are also present (**Figure 8**). According to the SAHRIS PalaeoMap, the Palaeontological Sensitivity of the Kalahari Group is Moderate (green), the igneous rocks of the Bushmanland and Karoo Dolerite is insignificant or zero (grey) while the Prince Albert and Volksrust Formations has a High Palaeontological Sensitivity (orange) and the White Hill Formation a Very High Sensitivity (red) (Figure 10***)***.

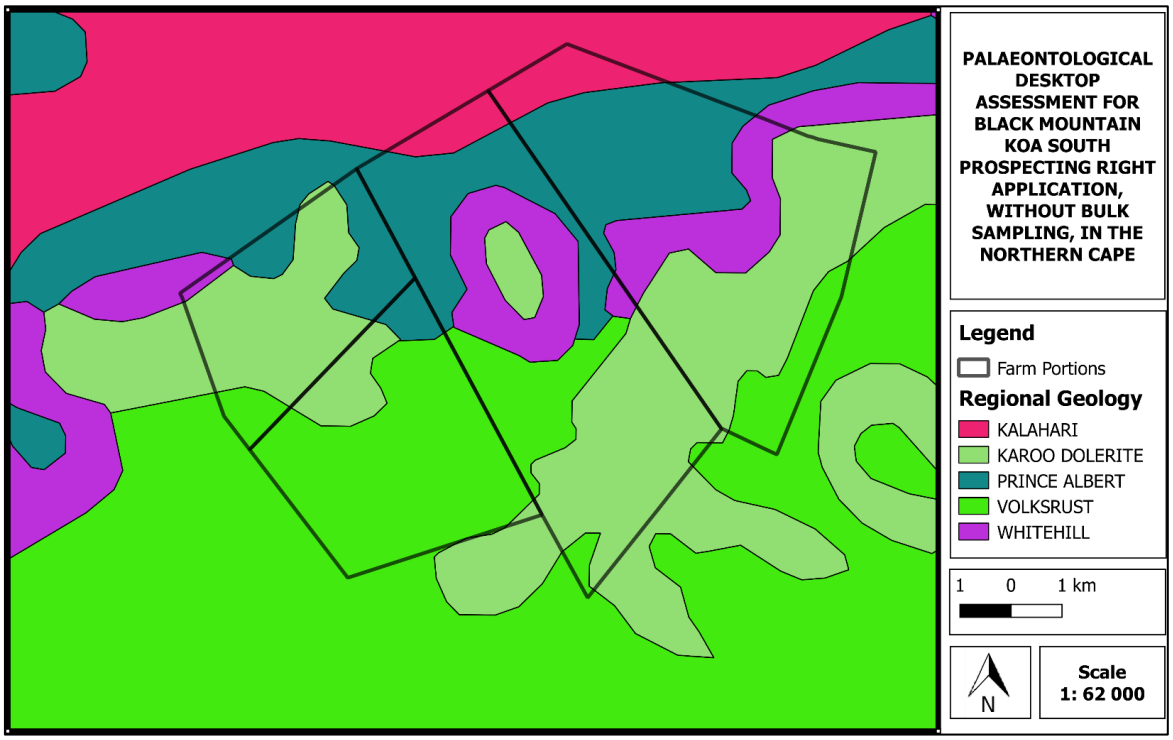


*Figure 8. Surface geology of the proposed Black Mountain Koa South Prospecting right Application. Map was drawn by QGIS 2.18.28.*

If fossil remains are discovered during any phase of prospecting, either on the surface or exposed by prospecting activities, the Chance Find Protocol (which is to be included in the Environmental Management Plan) should be implemented by the ECO in charge of these developments. These discoveries must be secured (in situ) and the ECO will have to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontological specialist. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

## 6 CONSIDERATION OF RELATED/SIGNIFICANT ASPECT MANAGEMENT PLANS IN THE AREA

### *6.1.1 Previous Heritage Studies in area*

A search on the South African Heritage Resources Information System database (SAHRIS) has identified Heritage Impact Assessments conducted in and around the study area. The three studies located closest to the proposed Koa South prospecting right area are Dreyer 2004 and 2006 and Rossouw 2015:

- **Dreyer, C. 2004. First Phase Heritage / Archaeological Assessment of the Borrow Pits on the R384 (Mr768) Road, Vosburg/Carnavon, Northern Cape.** The study examined several borrow pits to be affected by the proposed upgrading of the R384 (MR768) road between Vosburg and Carnavon, Some of the proposed borrow pit sites produced archaeological material in the form of Later Stone Age flakes scattered on the surface.

- **Dreyer, C. 2006. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Borrow Pit Sites along the MR 768 Road Between Britstown & Vosburg, Northern Cape.** Six borrow pits were investigated along the MR768 gravel road between Britstown and Vosburg. There is a general distribution of sparsely scattered highly patinated Middle Stone Age / Later Stone Age flakes at some of the sites. Source material occurs in the form of scattered outcrops of lydianite amongst banks of calcrete and dolerite boulders. The boulders are without any engravings.

- **Rossouw, L. 2015. Phase 1 Heritage Impact Assessment of a proposed new subsurface water pipeline between the Van Wyksvlei reservoir and Saaipoort, near Carnarvon, NC Province**. A Phase 1 heritage impact assessment was carried out the construction of a proposed new water pipeline between Van Wyksvlei and Saaipoort near Carnarvon. Only a few isolated, informal stone tools, as well as three isolated Ostrich Eggshell fragments, two weathered microliths and faint traces of several engraved lines were recorded at different localities along the route.

- **Van Schalkwyk, J. 2015a. Heritage Scoping Assessment for the Proposed Kronos-Aries 765kv Transmission Power Line and Substations Upgrade, Northern Cape Province.** This study was undertaken for a transmission power line for the "Proposed Northern Alignment 2 765kV Power Line Project". A section of this line was proposed to run from the existing Aries Substation southwest of Kenhardt to the Kronos Substation south of the town of Copperton in the Northern Cape Province. The following heritage sites were identified in the larger region: pre-colonial archaeological sites dating to the Stone Age and Colonial period or historic period heritage sites – farmsteads, infrastructure and cemeteries. This study notes that previous heritage studies in the Copperton area identified various Stone Age resources including: ESA with weathered handaxes and some MSA and LSA sites near pan environments. The MSA includes large flakes, radial and bipolar cores, points, end

scrapers, large utilized and retouched blade tools with utilized and retouched flakes on quartzite, hornfels, banded ironstone, haematite, gneiss and vein quartz. The LSA exhibits lower densities. This study notes that direct manufacturing activities for LSA lithics were recorded at exposures of quartzitic bedrock and on boulders of vein quartz by several previous studies in the general area and that significant MSA and LSA lithic occurrences and also lithic quarries were identified near Copperton. The LSA localities tend to focus on pan environments. An engraving site along the road between Copperton and Van Wyksvlei was recorded. The rock art comprises scraped engravings of eland and ostrich as well as very recent (historical) images of horses with riders, a chariot and some writing.

The colonial/ historic resources identified by previous studies include features such as farmsteads, windmills, mining areas and roads, as well as graves and cemeteries.

- **Van Schalkwyk, J. 2015b. Heritage Scoping Assessment for the Proposed Perseus-Kronos 765kv Transmission Power Line and Substations Upgrade, Northern Cape and Free State Provinces.** This study was undertaken for a transmission power line for the "Proposed Northern Alignment 2 765kV Power Line Project". A section of this line is to run from the existing Perseus Substation near Dealsville in the Free State Province to the Kronos substation south of the town of Copperton in the Northern Cape Province. The following heritage sites were identified in the larger region: Pre-colonial archaeological sites dating to the Stone Age and Colonial period or historic period heritage sites – farmsteads, infrastructure, cemeteries and battlefields. The types of resources identified in the area around Copperton were similar to those noted from the Proposed Kronos-Aries powerline project (above).

- **Cedar Tower Services (Pty) Ltd. 2016. Heritage Scoping Assessment Ska Phase 1 Project Integrated Report.** This report presented a high level scoping assessment of heritage resources (archaeological, palaeontological and other cultural resources including visual resources) and sensitivities of the area proposed for the SKA Phase 1 project. A total of 105 "heritage resources" were identified within the SKA Phase 1 SEA study area from the heritage screener and field survey. These heritage resources include Stone Age archaeological artefact scatters which are often located around water sources, rock engravings which are typically executed on dolerite boulders, several historical farmsteads which usually contain historical structures (farmhouses and corbelled buildings), formal and informal burial grounds and graves, stone walling and stone kraals and ruins.

## 7 SPATIAL SENSITIVITY MAPPING

The desktop-based screening assessment conducted by PGS of the proposed Koa South Prospecting Application area, identified several heritage features depicted on the historic

topographic maps, as well as further possible heritage features visible on the satellite imagery of the study area. These features are discussed below.

### 7.1 Heritage Sensitivities identified during Desktop Studies

Examination of various sources (historical topographical maps, satellite imagery and information from previous HIA reports covering the surrounding area, provided information on possible heritage resources existing in the study area. This information has been combined to produce a heritage sensitivity map for the project (

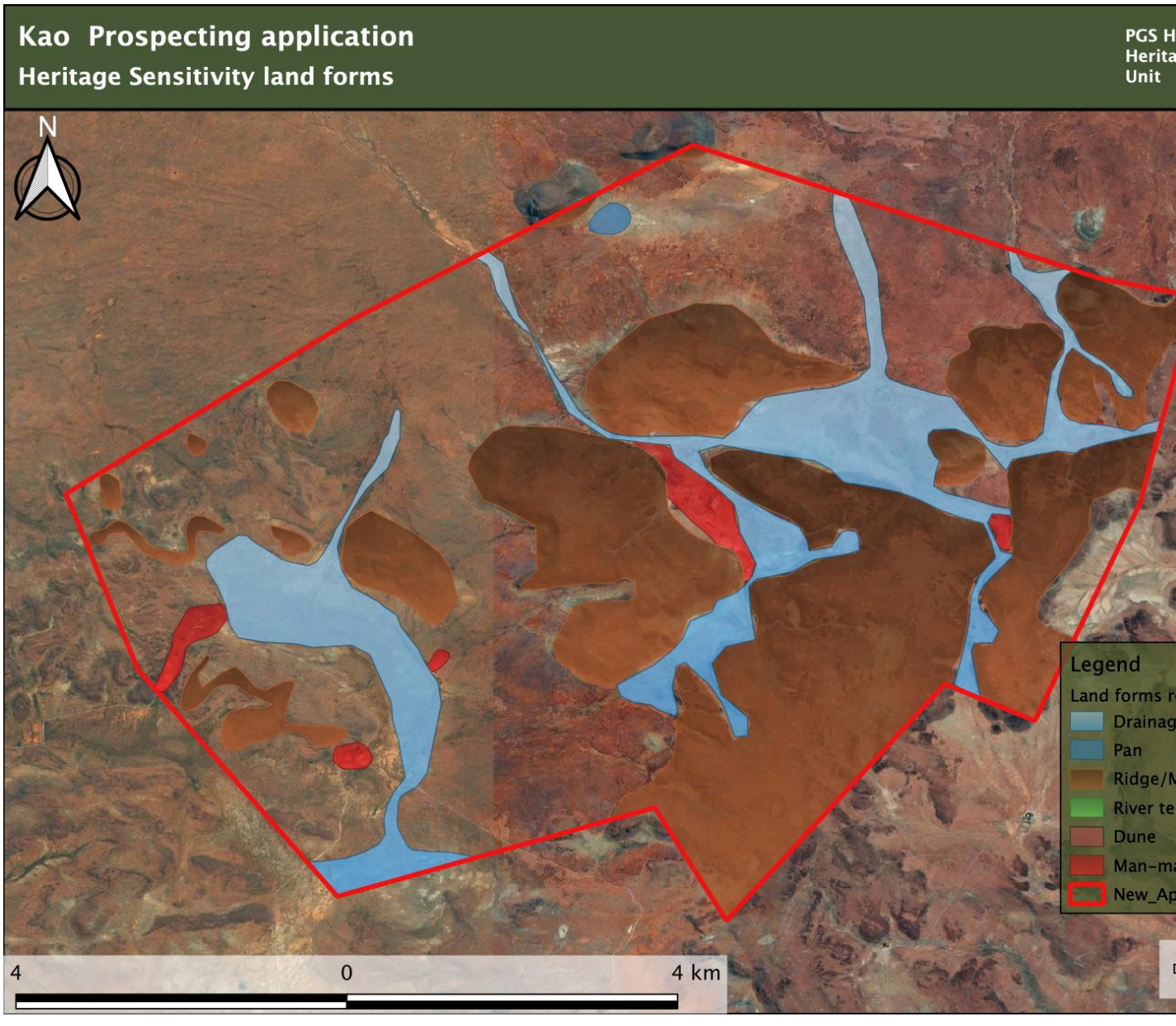


Figure 9).

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 1**.

Objects depicted include structures representing homesteads, farmsteads, kraals and possible graves. Observation of the previous heritage reports has shown that Stone Age artefact scatters are in quite common abundance in the surrounding areas. This factor needs to be held in consideration regarding the proposed prospecting activities.

*Heritage sensitivities*

The evaluation of the possible heritage resource types and their heritage significance together with mitigation requirements, was linked to types of landscape. This enabled the development of a heritage sensitivity map. These landforms do not indicate no-go areas, but the possibility of finding heritage significant sites that could require mitigation work.

Landforms include drainage areas, ridges and mountain areas, and pans and are in most cases associated with Stone Age finds and settlements.

*Possible finds*

Evaluation of satellite imagery has indicated areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the landform type to heritage find matrix in **Table 1**.

## 7.2 Archaeological and heritage potential

The information from previous heritage studies undertaken in the greater area of the Prieska-Carnavon-Britstown region in addition to the topographic map information, shows that the following types of heritage resources are possible within the Koa South Application Area.

### *7.2.1 Archaeological resources*

Most of the previous studies conducted in the general area identified artefacts associated with the Stone Age. The occurrences ranged from single artefact find spots (Dreyer 2004, Dreyer 2006, Rossouw 2015), to low or medium density artefact scatters (Van Schalkwyk 2015a, Van Schalkwyk 2015b). The occurrence of rock engravings on dolerite boulders was also identified in the CTS screening study for the SHA (2016). An engraving site along the road between Copperton and Van Wyksvlei was noted from a previous study. The rock art comprises scraped engravings of eland and ostrich as well as very recent (historical) images of horses with riders, a chariot and some writing (Van Schalkwyk 2015a).

### *7.2.2 Historical structures and graves or burial grounds*

Several previous heritage studies undertaken in the area did identify a few isolated historical structures or farmsteads and graves or burial grounds that date to the historical period (Van Schalkwyk 2015a, Van Schalkwyk 2015b, CTS 2016). This is in addition to the structures depicted on the historic topographic map sheets dating to 1969 and 1988, above.

*Table 1 - Tangible heritage sites in the study area*

| Name | Description | Legislative protection |
|---|---|---|
| Architectural Structures | Possibly older than 60 years | NHRA Sect 3 and 34 |
| Burial grounds | Graves | NHRA Sect 3 and 36 and MP Graves Act |
| Archaeological potential sites | Such as stone age sites | NHRA Sect 35 |

### 7.3 Identification of Areas of Potential Heritage Sensitivity (excluding palaeontology)

All the relevant sources of heritage information used in this study have been summarised in a heritage sensitivity map. This map provides a zoned depiction of the study area wherein areas of heritage sensitivity are indicated (See

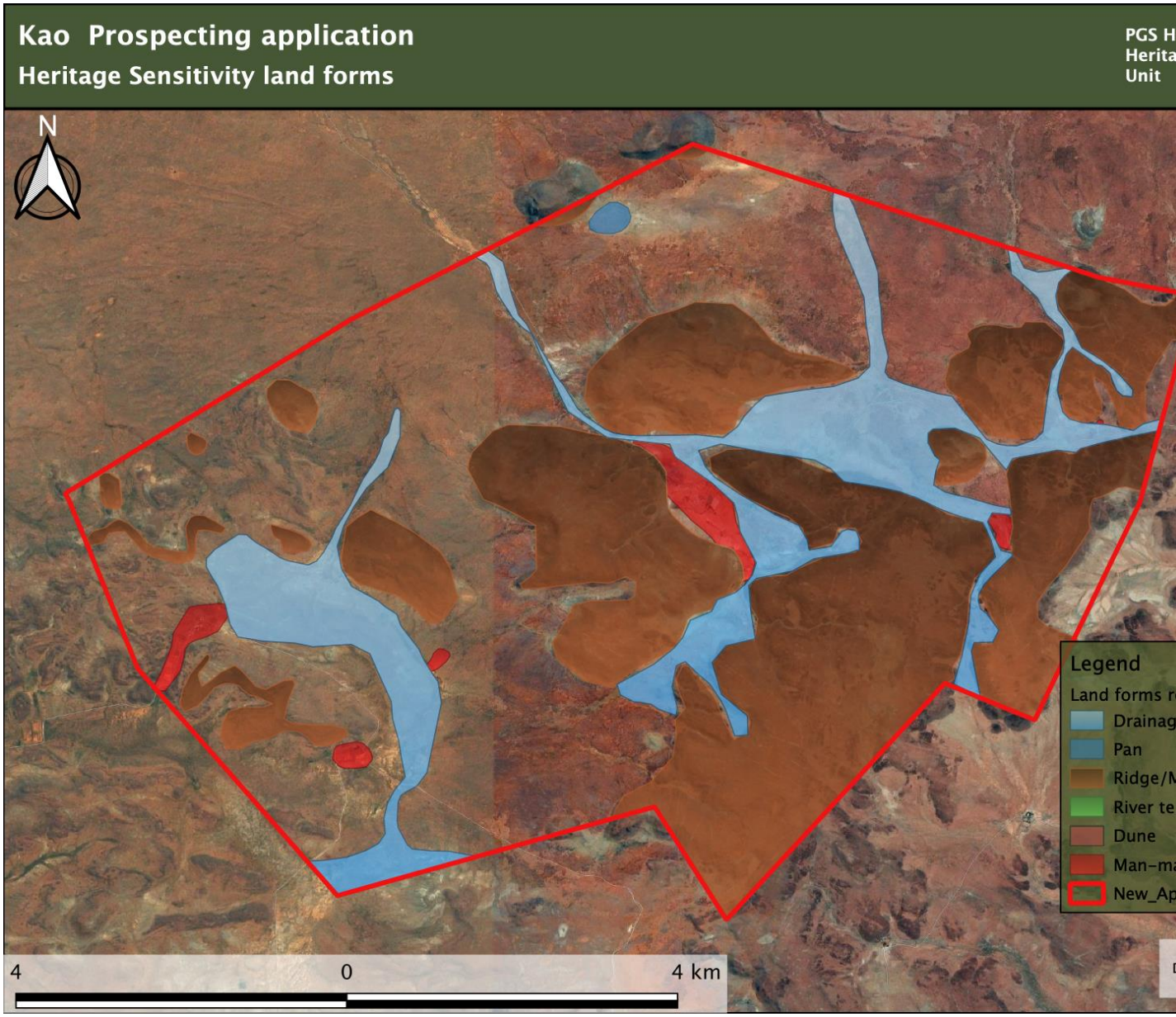


Figure 9).

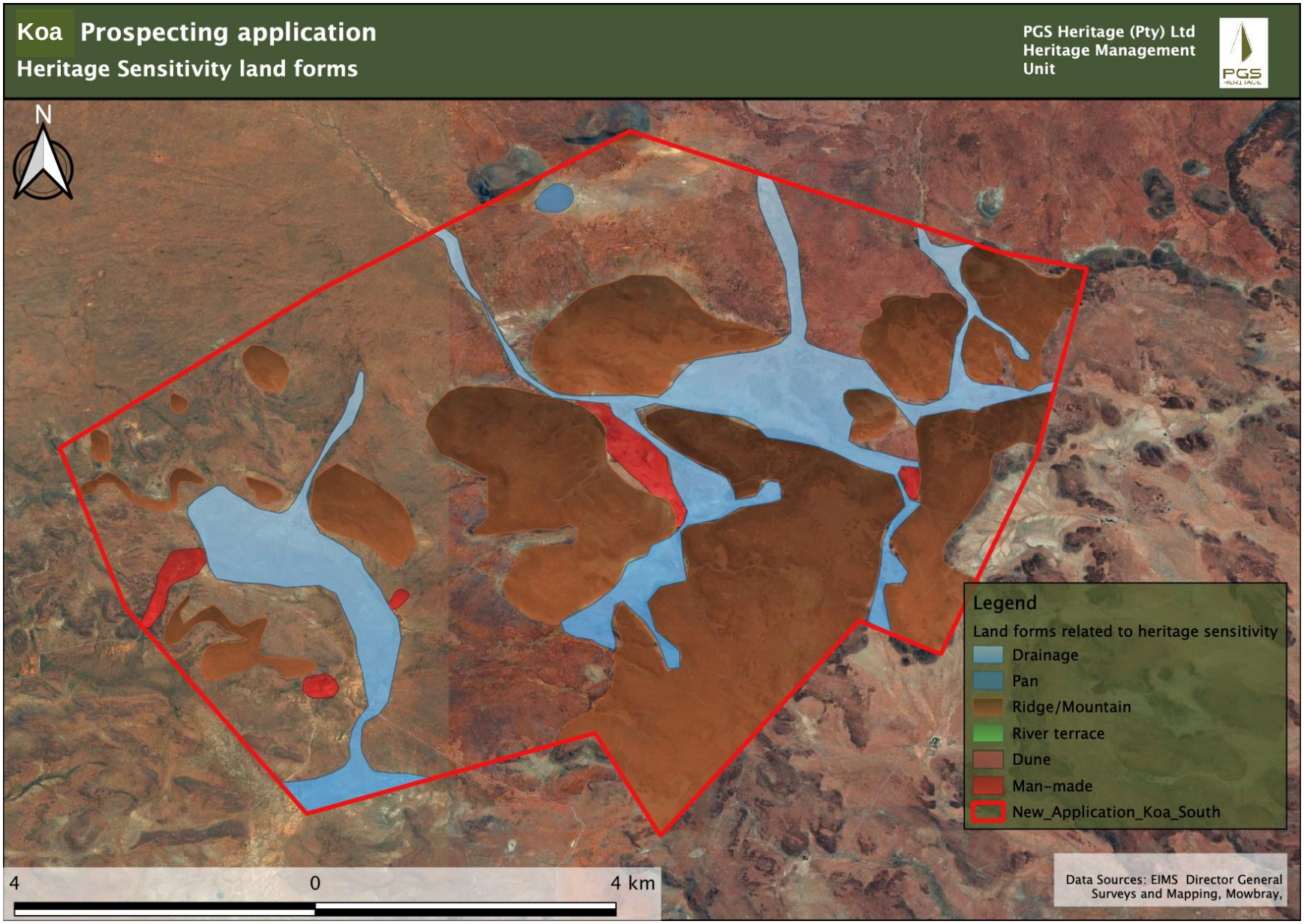


*Figure 9: Heritage sensitivity map showing Ridges, Drainage areas, Man-made structures*

### *7.3.1 Palaeontology*

According to the PalaeoMap on the South African Heritage Resources Information System database (SAHRIS) the Palaeontological Sensitivity of the Kalahari Group is Moderate (green), the igneous rocks of the Bushmanland and Karoo Dolerite is insignificant or zero (grey) while the Prince Albert and Volksrust Formations has a High Palaeontological Sensitivity (orange) and the White Hill Formation a Very High Sensitivity (red).

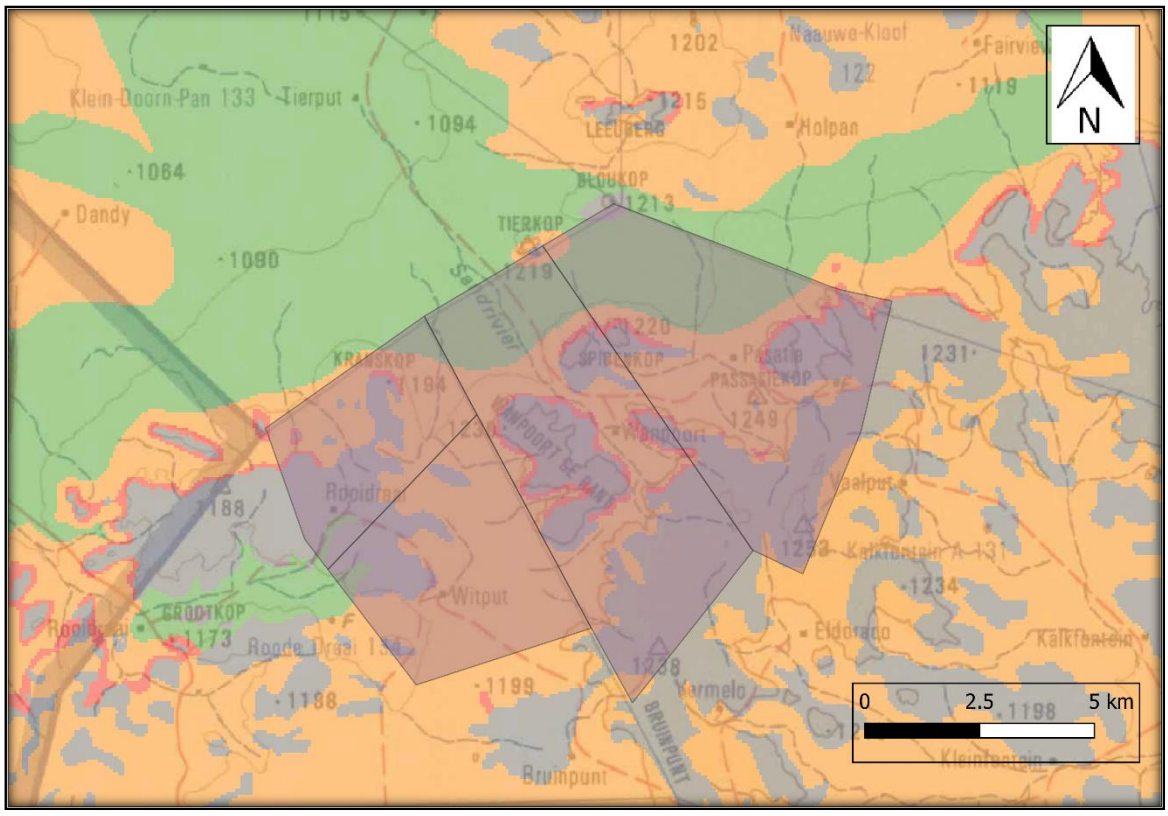


*Figure 10 - Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Black Mountain Koa South Prospecting right Application in the Northern Cape.*

## 8 TECHNICAL DETAILS OF THE PROJECT

### 8.1 Technical Project Description

The applicant, Black Mountain Mining (Pty) Ltd, is applying for a prospecting right in order to ascertain if economically viable mineral deposits exist within the application area for the following: Ferrous & base metals (Copper, Iron, Lead, Zinc, Manganese, Nickel and Molybdenum) and Precious metals (Silver and Gold) and all associated metals and minerals. Both non-invasive and invasive prospecting techniques will be utilized. The target geological formation is the Areachap Group. The application will follow a phased approach, and project is divided into several sequential

phases. The different phases and timeframes of the prospecting envisaged are, by their nature, dependent on the results obtained during the preceding phases of prospecting. The project will include the use of Non-Invasive and Invasive prospecting techniques.

- Non-Invasive Prospecting Techniques: The project will include the following non-invasive activities:
    - Desktop Study: Literature survey / review
    - Regional Airborne Geophysical Survey
    - Ground Geophysical Survey and Geological Field Mapping
    - Compilation, Interpretation and Modelling of Data
    - Detailed Ground Geophysical Survey on individual positively mineralized targets to define possible extent
    - Analytical Desktop Pre-Feasibility Study
- Invasive Prospecting Techniques: Invasive techniques that will be utilized during prospecting include the following:
    - Exploration Boreholes (6 RAB holes – 2400m; 4 DD holes – 2000m)
    - Boreholes to confirm continuity of mineralization & potential deposit size (20 DD holes – 8000m)
    - Resource definition drilling (40 DD holes – 16000m)

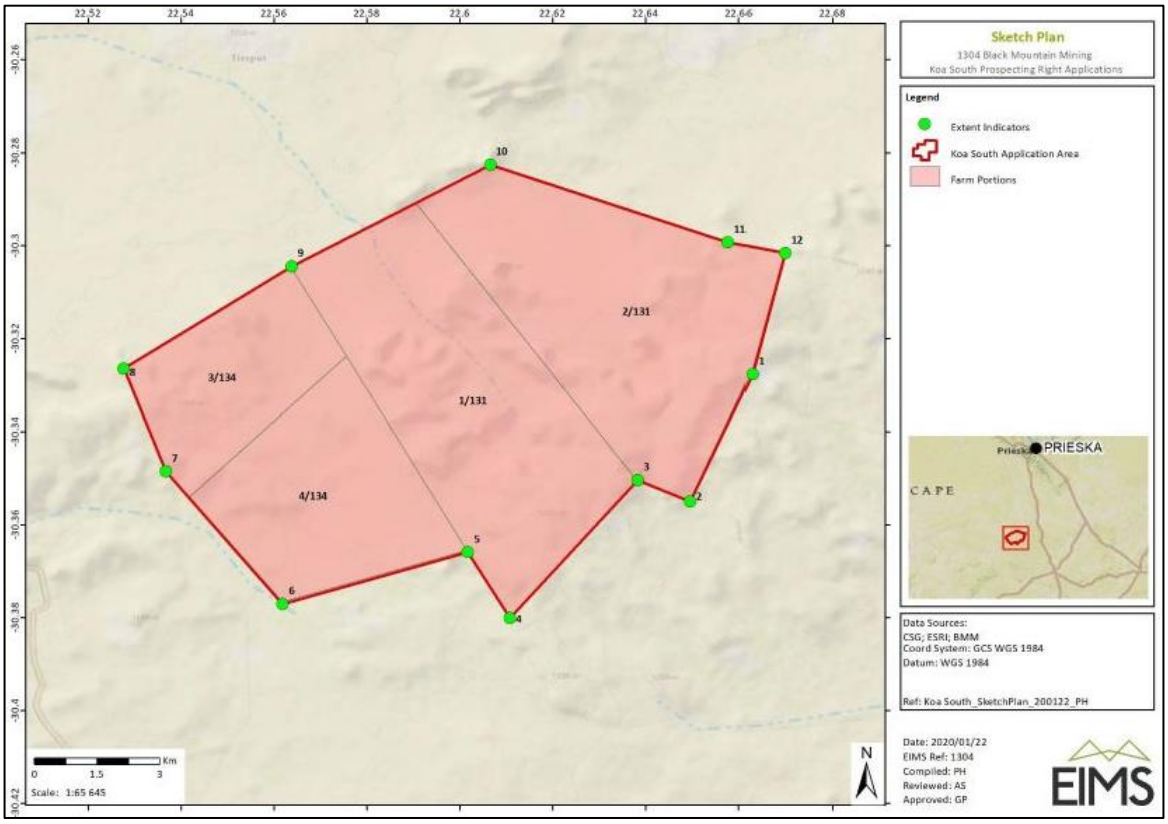


*Figure 11 - Plan showing the overall study area boundaries for the Koa South application area (from EIMS)*

# 9 ASSESSMENT METHODOLOGY

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

## 9.1 Methodology for Assessing Heritage Site significance

This desktop HIA report was compiled by PGS for the proposed Koa South Prospecting Right application. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of two steps:

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

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

Impacts on the potential heritage resources by the development will be evaluated in terms of the EIMS impact assessment methodology. The heritage significance assessment can only be undertaken at the level of a field-based study.

## 9.2 Methodology for Impact Assessment

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2010). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). Please note that the impact assessment must apply to the identified Sub Station alternatives as well as the identified Transmission line routes.

### *9.2.1 Determination of Environmental Risk*

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R)}{4} \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 2.

*Table 2: Criteria for Determining Impact Consequence*

| Aspect | Score | Definition |
|---|---|---|
| **Nature** | - 1 | Likely to result in a negative/ detrimental impact |
| | +1 | Likely to result in a positive/ beneficial impact |
| **Extent** | 1 | Activity (i.e. limited to the area applicable to the specific activity) |
| | 2 | Site (i.e. within the development property boundary), |
| | 3 | Local (i.e. the area within 5 km of the site), |
| | 4 | Regional (i.e. extends between 5 and 50 km from the site |
| | 5 | Provincial / National (i.e. extends beyond 50 km from the site) |
| **Duration** | 1 | Immediate (<1 year) |
| | 2 | Short term (1-5 years), |
| | 3 | Medium term (6-15 years), |
| | 4 | Long term (the impact will cease after the operational life span of the project), |
| | 5 | Permanent (no mitigation measure of natural process will reduce the impact after construction). |
| **Magnitude/ Intensity** | 1 | Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected), |
| | 2 | Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected), |
| | 3 | Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way), |
| | 4 | High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or |
| | 5 | Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease). |
| **Reversibility** | 1 | Impact is reversible without any time and cost. |
| | 2 | Impact is reversible without incurring significant time and cost. |
| | 3 | Impact is reversible only by incurring significant time and cost. |
| | 4 | Impact is reversible only by incurring prohibitively high time and cost. |
| | 5 | Irreversible Impact |

*Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/scored as per* Table 3.

*Table 3: Probability Scoring*

| | | |
|---|---|---|
| **Probability** | 1 | Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%), |
| | 2 | Low probability (there is a possibility that the impact will occur; >25% and <50%), |
| | 3 | Medium probability (the impact may occur; >50% and <75%), |
| | 4 | High probability (it is most likely that the impact will occur- > 75% probability), or |
| | 5 | Definite (the impact will occur), |

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

**ER= C x P**

*Table 4: Determination of Environmental Risk*

| | | | | | | |
|---|---|---|---|---|---|---|
| **Consequence** | 5 | 5 | 10 | 15 | 20 | 25 |
| | 4 | 4 | 8 | 12 | 16 | 20 |
| | 3 | 3 | 6 | 9 | 12 | 15 |
| | 2 | 2 | 4 | 6 | 8 | 10 |
| | 1 | 1 | 2 | 3 | 4 | 5 |
| | | 1 | 2 | 3 | 4 | 5 |
| | | **Probability** | | | | |

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 5.

*Table 5: Significance Classes*

| **Environmental Risk Score** | |
|---|---|
| **Value** | **Description** |
| < 9 | Low (i.e. where this impact is unlikely to be a significant environmental risk), |
| ≥9; <17 | Medium (i.e. where the impact could have a significant environmental risk), |
| ≥ 17 | High (i.e. where the impact will have a significant environmental risk). |

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

### *9.2.2 Impact Prioritisation:*

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in the Section above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.
In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

*Table 6: Criteria for Determining Prioritisation*

| | | |
|---|---|---|
| **Public response (PR)** | Low (1) | Issue not raised in public response. |
| | Medium (2) | Issue has received a meaningful and justifiable public response. |
| | High (3) | Issue has received an intense meaningful and justifiable public response. |
| **Cumulative Impact (CI)** | Low (1) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change. |
| | Medium (2) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change. |
| | High (3) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change. |
| **Irreplaceable loss of resources (LR)** | Low (1) | Where the impact is unlikely to result in irreplaceable loss of resources. |
| | Medium (2) | Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited. |
| | High (3) | Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions). |

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 6. The impact priority is therefore determined as follows:

**Priority = PR + CI + LR**

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (Refer to **Table 7**).

*Table 7: Determination of Prioritisation Factor*

| Priority | Ranking | Prioritisation Factor |
|---|---|---|
| 3 | Low | 1 |
| 4 | Medium | 1.17 |
| 5 | Medium | 1.33 |
| 6 | Medium | 1.5 |
| 7 | Medium | 1.67 |
| 8 | Medium | 1.83 |
| 9 | High | 2 |

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

*Table 8: Final Environmental Significance Rating*

| Environmental Significance Rating | |
|---|---|
| **Value** | **Description** |
| < 10 | Low (i.e. where this impact would not have a direct influence on the decision to develop in the area), |
| ≥10 <20 | Medium (i.e. where the impact could influence the decision to develop in the area), |
| ≥ 20 | High (i.e. where the impact must have an influence on the decision process to develop in the area). |

# 10 ASSESSMENT OF POTENTIAL HERITAGE IMPACTS UTILISING THE EIMS IMPACT ASSESSMENT METHODOLOGY

## 10.1 Impact assessment

The identified heritage resources are allocated a sensitivity buffer based on the recognised management buffers accepted by SAHRA in the past few years. No regulations in the NHRA provide guidelines on buffer zones. In the case of heritage sensitivity, a buffer of 30 – 50 meters is proposed based on the type of heritage resource. In the case of burial grounds and graves (BGG) a buffer of 50 meters is generally proposed and 30 meters for a heritage structure such as ruins and other built structure.

### *10.1.1 Impact assessment tables*

Implementing the impact assessment methodology as supplied by EIMS the following tables provide a quantitative assessment of the impacts of the proposed prospecting activities on the Koa South Prospecting Application area.

Note: Although the presence of burial grounds and graves is unknown at this stage, it is likely that such heritage resources will be present. The impact table therefore is based on this assumption.

*Table 9: Projected impact on Burial Grounds and Graves*

| **Impact Name** | **Impact on Burial Grounds and Graves** |
|---|---|
| **Alternative** | **0** |
| **Phase** | **Planning/prospecting** |

| Environmental Risk | | | | | |
|---|---|---|---|---|---|
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 4 | 2 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 5 | 5 |
| Duration of Impact | 5 | 5 | Probability | 3 | 2 |
| Environmental Risk (Pre-mitigation) | | | | | -11,25 |
| Mitigation Measures | | | | | |
| *Any graves or burial grounds that are identified should be demarcated and avoided with at least a 30m buffer zone adhering to the requirements of s36 of the NHRA and its regulations* | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -6,50 |
| Degree of confidence in impact prediction: | | | | | Low |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |
| Cumulative Impacts | | | | | 1 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.* | | | | | |
| Degree of potential irreplaceable loss of resources | | | | | 3 |
| *The impact may result in the irreplacable loss of resources of high value (services and/or functions).* | | | | | |
| Prioritisation Factor | | | | | 1,33 |
| **Final Significance** | | | | | -8,67 |

The impact of the proposed activities on burial grounds and graves is rated as MEDIUM negative significance before mitigation, but with the implementation of the required mitigation measures the post-mitigation impact would be LOW negative.

*Table 10: Projected impact on structures older than 60 years*

| **Impact Name** | **Impact on structures older than 60 years** | | | | |
|---|---|---|---|---|---|
| **Alternative** | **0** | | | | |
| **Phase** | **Planning/prospecting** | | | | |
| **Environmental Risk** | | | | | |
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 3 | 2 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 5 | 5 |
| Duration of Impact | 5 | 5 | Probability | 2 | 2 |
| Environmental Risk (Pre-mitigation) | | | | | -7,00 |
| Mitigation Measures | | | | | |
| *Any structures that could be 60 years or older should be avoided with a buffer zone of at least 30m to prevent any damage or destruction as required by s34 of the NHRA* | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -6,50 |
| Degree of confidence in impact prediction: | | | | | Medium |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |
| Cumulative Impacts | | | | | 1 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.* | | | | | |

| | |
|---|---|
| Degree of potential irreplaceable loss of resources | 2 |
| *The impact may result in the irreplaceable loss (cannot be replaced or subsitituted) of resources but the value (services and/or functions) of these resources is limited.* | |
| Prioritisation Factor | 1,17 |
| **Final Significance** | -7,58 |

The impact of the proposed prospecting activities on potential historical structures is rated as LOW negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

*Table 11: Projected impact on palaeontological resources*

| **Impact Name** | **Impact on palaeontological resources** | | | | |
|---|---|---|---|---|---|
| **Alternative** | **Alternative 1** | | | | |
| **Phase** | **Planning** | | | | |
| **Environmental Risk** | | | | | |
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 4 | 2 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 5 | 5 |
| Duration of Impact | 5 | 5 | Probability | 4 | 2 |
| Environmental Risk (Pre-mitigation) | | | | | -15,00 |
| Mitigation Measures | | | | | |
| *If fossil remains are discovered during any phase of prospecting, either on the surface or exposed by further excavations the Chance Find Protocol (which is to be included in the Environmental Management Plan) must be implemented by the ECO in charge of these developments. These discoveries must be secured (in situ) and the ECO will have to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontological specialist. The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.* | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -6,50 |
| Degree of confidence in impact prediction: | | | | | Medium |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |
| Cumulative Impacts | | | | | 1 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.* | | | | | |
| Degree of potential irreplaceable loss of resources | | | | | 3 |
| *The impact may result in the irreplaceable loss of resources of high value (services and/or functions).* | | | | | |
| Prioritisation Factor | | | | | 1,33 |
| **Final Significance** | | | | | -8,67 |

The impact of the proposed prospecting activities on potential palaeontological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

*Table 12: Projected impact on archaeological resources*

| **Impact Name** | **Impact on archaeological resources** |
|---|---|
| **Alternative** | **0** |
| **Phase** | **Planning** |

| Environmental Risk | | | | | |
|---|---|---|---|---|---|
| **Attribute** | **Pre-mitigation** | **Post-mitigation** | **Attribute** | **Pre-mitigation** | **Post-mitigation** |
| Nature of Impact | -1 | -1 | Magnitude of Impact | 3 | 2 |
| Extent of Impact | 1 | 1 | Reversibility of Impact | 5 | 5 |
| Duration of Impact | 5 | 5 | Probability | 3 | 2 |
| Environmental Risk (Pre-mitigation) | | | | | -10,50 |
| Mitigation Measures | | | | | |
| *If stone artefacts are discovered during any phase of the proposed prospecting activities, either on the surface or exposed by additional excavations the Chance Find Protocol (which must be included in the Prospecting Work Program) must be implemented by the ECO in charge of the activities. As required by s35 of NHRA.* | | | | | |
| Environmental Risk (Post-mitigation) | | | | | -6,50 |
| Degree of confidence in impact prediction: | | | | | Medium |
| **Impact Prioritisation** | | | | | |
| Public Response | | | | | 1 |
| *Low: Issue not raised in public responses* | | | | | |
| Cumulative Impacts | | | | | 2 |
| *Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.* | | | | | |
| Degree of potential irreplaceable loss of resources | | | | | 3 |
| *The impact may result in the irreplaceable loss of resources of high value (services and/or functions).* | | | | | |
| Prioritisation Factor | | | | | 1,50 |
| **Final Significance** | | | | | -9,75 |

The impact of the proposed project on potential archaeological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

## 11 HERITAGE MANAGEMENT PLAN

| NO. | MITIGATION MEASURES | PHASE | TIMEFRAME | RESPONSIBLE PARTY FOR IMPLEMENTATION | MONITORING PARTY (FREQUENCY) | TARGET | PERFORMANCE INDICATORS (MONITORING TOOL) |
|---|---|---|---|---|---|---|---|
| **Potential Heritage Resources to be implemented during invasive prospecting activities** | | | | | | | |
| **Burial Grounds and graves** | • If any such sites are found they should be demarcated with a 50-meter buffer and avoided.<br>• A "Chance Find Protocol" must be implemented during the proposed prospecting activities and incorporated in the PWP of this project. | Planning/ Prospecting | Planning/ Prospecting | Applicant<br>ECO | Applicant<br>ECO | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA | ECO Monthly Checklist/Report |
| **Historical structures** | • The sites should be avoided with at least a 30 m buffer if activities should occur near them.<br>• If any other heritage resources are identified SAHRA should be contacted and a qualified archaeologist appointed to evaluate the structures and make appropriate recommendation on mitigation | Planning/ Prospecting | Planning/ Prospecting | Applicant<br>ECO | Applicant<br>ECO | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34 and 38 of NHRA | ECO Monthly Checklist/Report |
| **Palaeontology** | • The EAP and ECO must be notified that the whole study area has a Moderate to High Palaeontological Sensitivity.<br>• A "Chance Find Protocol" must be implemented during the proposed prospecting activities and incorporated in the PWP of this project. | Planning/ Prospecting | Planning/ Prospecting | Applicant<br>ECO<br>Palaeontologist | Applicant<br>ECO | Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA | ECO Monthly Checklist/Report |
| **Archaeology** | • When physical prospecting is planned an archaeologist must first visit and assess the areas of impact and make | Planning/ Prospecting | Planning/ Prospecting | Applicant<br>ECO<br>Archaeologist | Applicant<br>ECO | Ensure compliance with relevant legislation and recommendations from SAHRA under | ECO Monthly Checklist/Report |

| NO. | MITIGATION MEASURES | PHASE | TIMEFRAME | RESPONSIBLE PARTY FOR IMPLEMENTATION | MONITORING PARTY (FREQUENCY) | TARGET | PERFORMANCE INDICATORS (MONITORING TOOL) |
|---|---|---|---|---|---|---|---|
| | recommendations on any finds made.<br>• A "Chance Find Protocol" must be implemented during the proposed prospecting activities and incorporated in the PWP of this project. | | | | | Section 35 and 38 of NHRA | |

## 12 CONCLUSIONS AND RECOMMENDATIONS

The desktop heritage impact assessment identified various potential heritage resources within the study area, including burial grounds and graves, historical structures, palaeontological resources and archaeological resources that could be impacted during invasive prospecting activities.

### 12.1 Burial grounds and graves

No burial grounds or graves are depicted on the historical topographic maps for the study area. However, it is likely that unknown burial grounds and graves are present. Burial grounds and graves have high heritage significance and are given a Grade IIIA significance rating in accordance with the system described in Section 9.1 of this document.

Assuming that unknown graves or burial grounds are present in the application area, the impact of the proposed activities on burial grounds and graves is rated as MEDIUM negative significance before mitigation, but with the implementation of the required mitigation measures the post-mitigation impact would be LOW negative.

### 12.2 Historical Structures

The impact of the proposed prospecting activities on potential historical structures is rated as LOW negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

Any identified historical structures should be avoided with a buffer of 30m to avoid damage during the prospecting activities.

### 12.3 Palaeontology

Banzai Environmental was appointed to do a Palaeontological Desktop Assessment and found that:
The proposed Prospecting Right Application area in the Northern Cape is completely underlain by basement bedrock of the Bushmanland Group of the Namaqua Metamorphic Province, igneous Karoo dolerite, as well as the Prince Albert, White Hill and Volksrust Formations (Ecca Group) of the Karoo Supergroup. Quaternary to Recent aeolian sediments of the Gordonia Formation (Kalahari Group) are also present. According to the SAHRIS PalaeoMap, the Palaeontological Sensitivity of the Kalahari Group is Moderate, the igneous rocks of the Bushmanland and Karoo Dolerite is insignificant or zero while the Prince Albert and Volksrust Formations has a High Palaeontological Sensitivity and the White Hill Formation a Very High Sensitivity.

The impact of the proposed activities on palaeontological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

If fossil remains are discovered during any phase of the proposed prospecting activities, the Chance Find Protocol must be implemented by the ECO in charge of these developments.

### 12.4 Archaeology

Previous studies conducted in the surroundings of the study area have identified a number of archaeological sites. These include Stone Age (ESA, MSA and LSA) sites including find spots, surface scatters and rock art sites.

The impact of the proposed project on potential archaeological resources is rated as MEDIUM negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to LOW negative.

When physical prospecting is planned an archaeologist must first visit and assess the areas of impact and make recommendations on any finds made.

If any archaeological artefacts are discovered during any phase of the proposed prospecting activities, the Chance Find Protocol must be implemented by the ECO in charge of these developments.

### 12.5 General

It is our considered opinion that the overall impact of the development, on the potential heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

If any heritage resources are discovered during site clearance, prospecting activities must stop, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

## 13 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

- This Heritage report is only applicable to the proposed Koa South Prospecting Application area as depicted in **Figure 4** and **Figure 4** above;

- This report only provides a high-level desktop / strategic screening of potential heritage risk areas;
- The recommendations and conclusions regarding the assessment of the potential impacts will require confirmation by a detailed field-based survey, which is still to be undertaken as part of the HIA/EIA process.
- Specifically, it should be noted that some of the heritage sites noted that are depicted on the historical topographic maps may no longer exist due to past disturbance and that there may be unknown grave and burial ground sites that are not depicted on the historic maps which will be identified only by the subsequent field study.
- Therefore, should any heritage features and/or objects be located or observed outside the identified heritage sensitive areas during the prospecting activities, a heritage specialist must be contacted immediately.
- 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.

## 14 REFERENCES


Barham, L. and Mitchell, P. 2008. The first Africans. African archaeology from the earliest toolmakers to most recent foragers. Cambridge: Cambridge University Press

Beaumont, P.B., Smith, A.B. and Vogel, J.C. 1995. Before the Einiqua: the archaeology of the frontier zone. In: Smith, A.B. (Ed.) Einiqualand: studies of the Orange River frontier. Cape Town: University of Cape Town Press, 236-264.

Beaumont, P.B. & Vogel, J.C. 1989. Patterns in the age and context of rock art in the Northern Cape. The South African Archaeological Bulletin 44(150): 73-81.

Butler, E. 2020. Palaeontological Desktop Assessment for Black Mountain Koa South Prospecting Right Application, Without Bulk Sampling, in the Northern Cape

Cedar Tower Services (Pty) Ltd. 2016. Heritage Scoping Assessment Ska Phase 1 Project Integrated Report.

Dreyer, C. 2004. First Phase Heritage / Archaeological Assessment of the Borrow Pits on the R384 (Mr768) Road, Vosburg/Carnavon, Northern Cape.

Dreyer, C. 2006. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Borrow Pit Sites along the MR 768 Road Between Britstown & Vosburg, Northern Cape.

Erasmus, B.P.J. 2014. On Route in South Africa. Third edition. Jonathan Ball Publishers: Johannesburg

Fauvelle-Aymar, F-X. 2004. Between the first herders and the last herders: are the Khoekhoe descendants of the Neolithic 'hunters-with sheep'? Before Farming [online version] 2004/4, article 5: 1-11.

Fourie, W. 2008. Archaeological Impact Assessments within South African Legislation. South African Archaeological Bulletin 63 (187): 77–85, 2008.

Huffman, T.N. 2007. Handbook to the Iron Age: The archaeology of Pre-Colonial Farming Societies in Southern Africa. University of KwaZulu-Natal Press, Scottsville.

Lombard, M. and Parsons, I. 2008. Blade and bladelet function and variability in risk management during the last 2000 years in the Northern Cape. The South African Archaeological Bulletin 63: 18-23.

McNabb, J., Binyon, F. and Hazelwood, L. 2004. The large cutting tools from the South African Acheulean and the question of social traditions. Current Anthropology 45(5):653-677.

Mitchell, P.J. 2002. The archaeology of southern Africa. Cambridge: Cambridge University Press.

Morris, D. 2008. Archaeological and Heritage Impact Assessment on Remainder of Carter Block 458, near Lime Acres, Northern Cape. McGregor Museum.

Morris, D. 2012. Rock art in the Northern Cape: the implications of variability in engravings and paintings relative to issues of social context and change in the precolonial past. PhD University of the Western Cape.

Mossop, E.E. 1935. The journals of Wikar, Coetsé and Van Reenen. The Van Riebeeck Society 15: Cape Town.

Mucina, L. & Rutherford, M.C. 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute. Pretoria.

Parsons, I. 2003. Lithic expressions of Later Stone Age lifeways in the Northern Cape. The South African Archaeological Bulletin 58: 33-37.

Parsons, I. 2004. Stone circles in the Bloubos landscape, Northern Cape. Southern African Humanities 16: 59-69.

Parsons, I. 2007. Hunter-gatherers or herders? Reconsidering the Swartkop and Doornfontein Industries, Northern Cape Province, South Africa. Before Farming 4: Article 3.

Parsons, I. 2008. Five Later Stone Age artefact assemblages from the interior Northern Cape Province. The South African Archaeological Bulletin 63: 51-60.

Raper, PE. 2014. Dictionary of Southern African Place Names. Jonathan Ball Publishers

Rossouw, L. 2015. Phase 1 Heritage Impact Assessment of a proposed new subsurface water pipeline between the Van Wyksvlei reservoir and Saaipoort, near Carnarvon, NC Province

Van der Ryst, M. 2015. Specialist Commentary on Stone Age sites identified in a survey of the Kolomela Mine property, Northern Cape.

Van Schalkwyk, J. 2015a. Heritage Scoping Assessment for the Proposed Kronos-Aries 765kv Transmission Power Line and Substations Upgrade, Northern Cape Province.

Van Schalkwyk, J. 2015b. Heritage Scoping Assessment for the Proposed Perseus-Kronos 765kv Transmission Power Line and Substations Upgrade, Northern Cape And Free State Provinces

www.karoo-southafrica.com

https://www.karoo-southafrica.com/western-upper-karoo/vosburg/history-of-vosburg

**ANNEXURE A – CVS**

**PROFESSIONAL CURRICULUM: JENNIFER KITTO**

**Professional Heritage Specialist: PGS Heritage (Pty) Ltd**

**EDUCATION:**

| | |
|---|---|
| **Name of University or Institution:** | Dorset Institute for Higher Education (now Bournemouth University), Poole, United Kingdom |
| **Degree obtained:** | **:**Higher National Diploma: Practical Archaeology |
| **Year** | **:**1989 |

| | |
|---|---|
| **Name of University or Institution** | **:** University of the Witwatersrand |
| **Degree obtained** | **:** BA |
| **Major subjects** | **:**Archaeology and Social Anthropology |
| **Year** | **:**1993 |

| | |
|---|---|
| **Name of University or Institution** | **:**University of the Witwatersrand |
| **Degree obtained** | **:** BA [Hons] |
| **Major subjects** | **:**Social Anthropology |
| **Year** | **:** 1994 |

**Professional Qualifications:**

Member - Association of Southern African Professional Archaeologists – Technical Member No. 444

**Languages:**

English First Language

Afrikaans - Speaking (Fair) Reading (Fair), Writing (Fair**)**

**KEY QUALIFICATIONS**

Cultural Resource Management and Heritage Impact Assessment Management, Historical and Archival Research, Archaeology, Anthropology, Applicable survey methods, Fieldwork and Project Management.

**SUMMARY OF EXPERIENCE**

Specialised expertise in Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, including *inter alia* -

**Involvement with various Heritage Impact Assessments, within South Africa, including -**

- Archaeological Walkdowns for various projects

- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Heritage Audits and subsequent Compilation of Heritage Management Policy for various projects

**HERITAGE ASSESSMENT PROJECTS**

**Below a selected list of Heritage Impact Assessments (HIA) and Heritage Audit and Management Projects completed:**

- Heritage Screening Reports for Various Road Routes: Bronkhorstspruit, Carletonville and Randfontein and Eikenhof-Vaal Dam regions, Gauteng Department of Roads and Transport, Gauteng Province
- Heritage Audit and Management Policy, Sibanye Gold, Beatrix Mining area, Lejweleputswa District Municipality, Free State Province
- Heritage Audit and Management Policy, Sibanye Gold, Kloof and Driefontein Mining areas, West Rand District Municipality, Gauteng Province
- HIA Report, Dolos-Giraffe Substation, Hopefield-Bultfontein, Free State Province
- HIA Report and Phase 2 Mitigation Report, AEL Mining Services, Decontamination of AEL Detonator Campus, Modderfontein Factory, Modderfontein, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Old Rand Leases Hostel redevelopment, Fleurhof Ext 10, Roodepoort, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Watershed Substation, North-West Province
- HIA Report, Solid Waste Landfill Facility, Rhodes Village, Eastern Cape
- HIA Report, Solid Waste Landfill Facility, Rossouw, Eastern Cape
- Phase 2 Mitigation Report, Cass Farmstead, Optimum Colliery, Mpumalanga
- HIA Report, Kusile Ash Disposal Facility, Witbank, Mpumalanga
- Report on Rand Steam Laundries Background History, City of Johannesburg Metropolitan Municipality, Gauteng
- New Cemetery, Barkly East, Senqu Municipality, Eastern Cape (desktop/archival research for HIA report)
- Lady Slipper Country Estates, Nelson Mandela Metro Municipality, Eastern Cape (desktop/archival research for HIA report)
- Exxaro Resources Paardeplaats Project, Belfast, Mpumalanga (field survey and archival research for HIA report)
- Copperleaf Mixed Use Development, Farm Knoppieslaagte 385/Knopjeslaagte 140, Centurion, Gauteng (field survey and archival research for HIA report)
- Isundu-Mbewu Transmission Line Project, Pietermaritzburg, Kwazulu Natal (Initial Heritage Scan (survey) for Corridor 3 Alternative 1)

**GRAVE RELOCATION PROJECTS**

**Below, a selection of grave relocation projects involvement:**

- Mitigation Report on previous Grave Relocation and Permit applications for Test Excavation of two possible graves, Nkomati Mine, Mpumalanga
- Relocation of two graves Olievenhoutbosch, Tshwane, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of graves HL Hall Family, Nelspruit, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of two possible graves Noordwyk Ext 63, Midrand, Johannesburg, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of informal cemetery (50+) and additional unknown graves (50+) at Fleurhof Extension 5, Roodepoort, Gauteng (desktop research and applications to SAHRA, Gauteng Health Department and Local Government for relevant permits in terms of the applicable legislation)
- Relocation of informal graves (9) at Tselentis Colliery, Breyten, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of various informal cemeteries at New Largo Mine, Balmoral, Mpumalanga (as above)
- Relocation of graves at Mookodi Power Station, Vryburg, North-West Province (initial social consultation)
- Relocation of graves at Hendrina Power Station, Hendrina, Mpumalanga (social consultation, permit applications, etc)

**EMPLOYMENT SUMMARY:**

**Positions Held**

- 2011 – to date: Heritage Specialist - PGS Heritage (Pty) Ltd
- 2008 – 2011: Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)
- 1998 – 2008: Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA

**WOUTER FOURIE**

**Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage**

**Summary of Experience**

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave “rescue” excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
- Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

**Key Qualifications**

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

Principal Investigator - Grave Relocations

Field Director – Iron Age

Field Supervisor – Colonial Period and Stone Age

Accredited with Amafa KZN

**Key Work Experience**

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng
1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique and the Democratic Republic of the Congo

## METHODOLOGY FOR IMPACT ASSESSMENT

Method of Assessing Impacts:

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2010). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). Please note that the impact assessment must apply to the identified Sub Station alternatives as well as the identified Transmission line routes.

Determination of Environmental Risk

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R)}{4} \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in .Table 1.

*Table 13: Criteria for Determining Impact Consequence*

| Aspect | Score | Definition |
|---|---|---|
| **Nature** | - 1 | Likely to result in a negative/ detrimental impact |
| | +1 | Likely to result in a positive/ beneficial impact |
| **Extent** | 1 | Activity (i.e. limited to the area applicable to the specific activity) |
| | 2 | Site (i.e. within the development property boundary), |
| | 3 | Local (i.e. the area within 5 km of the site), |
| | 4 | Regional (i.e. extends between 5 and 50 km from the site |
| | 5 | Provincial / National (i.e. extends beyond 50 km from the site) |
| **Duration** | 1 | Immediate (<1 year) |
| | 2 | Short term (1-5 years), |
| | 3 | Medium term (6-15 years), |
| | 4 | Long term (the impact will cease after the operational life span of the project), |

| Aspect | Score | Definition |
|---|---|---|
| | 5 | Permanent (no mitigation measure of natural process will reduce the impact after construction). |
| **Magnitude/ Intensity** | 1 | Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected), |
| | 2 | Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected), |
| | 3 | Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way), |
| | 4 | High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or |
| | 5 | Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease). |
| **Reversibility** | 1 | Impact is reversible without any time and cost. |
| | 2 | Impact is reversible without incurring significant time and cost. |
| | 3 | Impact is reversible only by incurring significant time and cost. |
| | 4 | Impact is reversible only by incurring prohibitively high time and cost. |
| | 5 | Irreversible Impact |

*Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/scored as per* ***Table 2.***.

*Table 2: Probability Scoring*

| | | |
|---|---|---|
| **Probability** | 1 | Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%), |
| | 2 | Low probability (there is a possibility that the impact will occur; >25% and <50%), |
| | 3 | Medium probability (the impact may occur; >50% and <75%), |
| | 4 | High probability (it is most likely that the impact will occur- > 75% probability), or |
| | 5 | Definite (the impact will occur), |

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

**ER= C x P**

*Table 3: Determination of Environmental Risk*

| | | | | | | |
|---|---|---|---|---|---|---|
| **Consequence** | 5 | 5 | 10 | 15 | 20 | 25 |
| | 4 | 4 | 8 | 12 | 16 | 20 |
| | 3 | 3 | 6 | 9 | 12 | 15 |
| | 2 | 2 | 4 | 6 | 8 | 10 |
| | 1 | 1 | 2 | 3 | 4 | 5 |
| | | 1 | 2 | 3 | 4 | 5 |
| | | **Probability** | | | | |

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 4.

*Table 4: Significance Classes*

| Environmental Risk Score | |
|---|---|
| **Value** | **Description** |
| < 9 | Low (i.e. where this impact is unlikely to be a significant environmental risk), |
| ≥9; <17 | Medium (i.e. where the impact could have a significant environmental risk), |
| ≥ 17 | High (i.e. where the impact will have a significant environmental risk). |

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

Impact Prioritisation:

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in the Section above it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition, it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.
In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

*Table 5: Criteria for Determining Prioritisation*

| | | |
|---|---|---|
| **Public response (PR)** | Low (1) | Issue not raised in public response. |
| | Medium (2) | Issue has received a meaningful and justifiable public response. |
| | High (3) | Issue has received an intense meaningful and justifiable public response. |
| **Cumulative Impact (CI)** | Low (1) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change. |
| | Medium (2) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change. |
| | High (3) | Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change. |

| | | |
|---|---|---|
| **Irreplaceable loss of resources (LR)** | Low (1) | Where the impact is unlikely to result in irreplaceable loss of resources. |
| | Medium (2) | Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited. |
| | High (3) | Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions). |

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5. The impact priority is therefore determined as follows:

**Priority = PR + CI + LR**

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (Refer to **Table 6**).

*Table 6: Determination of Prioritisation Factor*

| Priority | Ranking | Prioritisation Factor |
|---|---|---|
| 3 | Low | 1 |
| 4 | Medium | 1.17 |
| 5 | Medium | 1.33 |
| 6 | Medium | 1.5 |
| 7 | Medium | 1.67 |
| 8 | Medium | 1.83 |
| 9 | High | 2 |

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

*Table 7: Final Environmental Significance Rating*

| Environmental Significance Rating | |
|---|---|
| **Value** | **Description** |
| < 10 | Low (i.e. where this impact would not have a direct influence on the decision to develop in the area), |
| ≥10 <20 | Medium (i.e. where the impact could influence the decision to develop in the area), |
| ≥ 20 | High (i.e. where the impact must have an influence on the decision process to develop in the area). |