

A vertical image showing a window with raindrops. A rainbow is visible in the center, with colors transitioning from red at the top to purple at the bottom. The text 'Pulafel 4D Consulting' is overlaid in a bold, black, sans-serif font. A single water droplet icon is positioned below the text.

# ***Pulafel***

# ***4D***

# ***Consulting***



**\* Timeous service \* Professionalism \* Reliability \* Value for money**

**Heritage Impact Assessment for the proposed Prospecting  
Right Application and Environmental  
Authorisation (EA) Application for prospecting activities on  
Portion 32, Remaining Extent of Portion 59 and  
Portion 116 of the Farm 703, near Santoy, Northern Cape  
Province (NC 30/5/1/1/2/13295 PR).**

Prepared by Pulafel 4D Consulting (Pty) Ltd

Report prepared for M&S Consulting on behalf of Xhariep Plant and Mining (Pty) Ltd

**6 March 2023**

**Authors:**

Dr Joseph Chikumbirike Ph.D. (Wits). Professional Archaeologist and Heritage  
Management Specialist (ASAPA member)

&

Professor Jesmael Mataga Ph.D. (UCT) Professional Heritage Management Specialist  
(ASAPA546)

## EXECUTIVE SUMMARY

Pulafel 4D Consulting (Pty) Ltd. was commissioned by M & S Consulting to do a field based HIA for a prospecting rights application on Proposed Prospecting Right Application and Environmental Authorisation (EA) Application for prospecting activities on Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, near Santoy, Northern Cape Province (NC 30/5/1/1/2/13295 PR). The fieldwork conducted by our own team did not find any precolonial and historical sites in the project area. The project area is characterized by the Kalahari sands that, together with several ancient sand dunes, overlay the hard calcrete layers. The study area generally experiences poor water resources (except for the Kuruman river which is found outside the study area). The paucity of surface might have dissuaded pre-historical occupation because our surveys could not locate precolonial sites or isolated artefacts. Given the extent of the area to be covered, a combination of drive-through and field walking was conducted in the project area. The surveyed areas showed evidence of isolated scatters of Stone Age material culture. These were found in disturbed areas such as the gravel roads and at an abandoned homestead/ farmhouse belong to Mr De Klerk (Portion 59 of Farm 703). The Stone Age tools showed evidence of weathering and that they were brought into the area from somewhere, most probably from quarry sites or streams where sand soil was collected for construction purposes. The recorded lithics are of low impact (negligible) rating because of their isolated and secondary context nature. Therefore, from a heritage perspective, the proposed development by Xhariep Plant and Mining (Pty) Ltd is supported, with full cognizance that buried archaeological remains may still occur and chance findings report procedures must be followed when encountered.

Table 1: Project summary

<b>Item</b>	<b>Description</b>
Proposed development and location	<i>Proposed Prospecting Right Application and Environmental Authorisation (EA) Application for prospecting activities on Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, near Santoy, Northern Cape Province (NC 30/5/1/1/2/13295 PR).</i>
Purpose of the study	<i>To carry out a field-based Heritage Impact Assessment to determine the presence/absence of cultural heritage sites and the impact of the proposed project on heritage resources within the area demarcated for the prospecting activities.</i>
1:50 000 Topographic Map	<i>2622 DA, DB, DC and DD</i>
Municipalities	<i>Kuruman District, Northern Cape Province</i>
Predominant land use of surrounding area	<i>Agriculture (livestock keeping)</i>
Developer	<i>Xhariep Plant and Mining (Pty) Ltd</i>
Contact Person	<i>Tanja Jooste</i>
Contact Details	<i>Tel: 053 861 1765, Email: <a href="mailto:joostetanja@gmail.com">joostetanja@gmail.com</a></i>
Heritage Consultant	<i>Pulafel 4D Consulting</i>
Date of Report	<i>6 March 2023</i>

# Table of Contents

EXECUTIVE SUMMARY .....	3
ABBREVIATIONS .....	7
DOCUMENT INFORMATION .....	8
Periodisation .....	8
Definitions.....	9
Assumptions and disclaimer.....	11
Terms of Reference (ToR).....	11
INTRODUCTION AND BACKGROUND TO THE PROJECT .....	13
DESCRIPTION OF THE AFFECTED ENVIRONMENT .....	14
Vegetation and Current Land use.....	14
Geology of the Area.....	16
LEGISLATIVE REQUIREMENTS.....	21
Relevance of the current development.....	23
METHODOLOGY .....	25
Desktop Assessment.....	25
Field Survey .....	26
HERITAGE ASSESSMENT AND REPORT COMPILATION.....	30
Assessing significance .....	30
Type of Significance and definition.....	31
Site Grading and Summary Findings .....	31
Report compilation .....	32
BACKGROUND TO THE ARCHAEOLOGY AND HERITAGE OF THE STUDY AREA.....	34
The archaeology.....	34
THE FINDINGS .....	36
Buildings.....	36
Stone tools .....	39
Burial grounds and Graves.....	43
SITE SIGNIFICANCE, GRADING AND RATING.....	44
GRADING.....	44
RECOMMENDATIONS .....	44
CHANCE FINDINGS PROCEDURES .....	45

CONCLUSIONS.....	46
ACKNOWLEDGEMENTS .....	46
BIBLIOGRAPHY.....	47

## ABBREVIATIONS

AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
EIA	Environmental Impact Assessment
EIA	Early Iron Age ( <i>EIA refers to both Environmental Impact Assessment and the Early Iron Age but in both cases the acronym is internationally accepted. This means that it must be read and interpreted within the context in which it is used.</i> )
EIAR	Environmental Impact Assessment Report
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
ICOMOS	International Council of Monuments and Sites
LIA	Late Iron Age
LFC	Late Farming Community
LSA	Late Stone Age
MAA	Mineral Amendment Act, No 103 of 1993
MIA	Middle Iron Age
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
MSA	Middle Stone Age
NEMA	National Environmental Management Act 107 of 1998
NHRA	National Heritage Resources Act 25 of 1999
NID	Notice of Intention to Develop
PHRA	Provincial Heritage Resource Agency
SAHRA	South African Heritage Resources Agency
ToR	Terms of Reference

## DOCUMENT INFORMATION

### Periodisation

The archaeology of southern Africa is organized into periods. The different cultural epochs are divided according to the dominant material finds for the different time periods. This periodization is usually region-specific, such that the same label can have different dates for different areas (Kuman 2001; Dusseldorp et al., 2013). This makes it important to clarify and declare the periodization of the area one is studying. It's also important to note that these periods sometimes overlap. The following (See Table 2 below) are the relevant time periods in the project area studied:

Table 2: Archeological Periodization in Southern Africa

Early Stone Age	~ 2.6 million to 250 000 years ago
Middle Stone Age	~ 250 000 to 40-25 000 years ago)
Later Stone Age	~ 40-25 000, to recently, 100 years ago)
Early Iron Age	~ AD 200 to 1000)
Late Iron Age	~ AD1100-1840)
Historic	~ AD 1840 to 1950, (but as Per NHRA <sup>1</sup> , a Historic building is classified as any building over 60 years old)

---

<sup>1</sup> National Heritage Resources Act 25 of 1999, 34. (1)



## Definitions

Key terms employed in this study are defined here and most of the defined terms derive from South African heritage legislation and its ancillary laws, as well as international regulations and norms of best practice. The terms include the following:

*Cultural (heritage) resources* are all non-physical and physical human-made occurrences, and natural features that are associated with human activity. These can be singular or in groups and include significant sites, structures, features, ecofacts and artefacts of importance associated with the history, architecture, or archaeology of human development.

*Cultural significance* is determined means of aesthetic, historic, scientific, social or spiritual values for past, present or future generations.

*Value* is related to concepts such as worth, merit, attraction or appeal, concepts that are associated with the (current) usefulness and condition of a place or an object. Although significance and value are not mutually exclusive, in some cases the place may have a high level of significance but a lower level of value. Often, the evaluation of any feature is based on a combination or balance between the two.

*Isolated finds* are occurrences of artefacts or other remains that are not in-situ or are located apart from archaeological sites. Although these are noted and recorded, but do not usually constitute the core of an impact assessment, unless if they have intrinsic cultural significance and value.

*In-situ* refers to material culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

*Archaeological site/materials* are remains or traces of human activity that are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures. According to the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), no archaeological artefact, assemblage or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorization

from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority.

*Historic material* are remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

*Chance finds* means archaeological artefacts, features, structures or historical remains accidentally found during development.

A *grave* is a place of interment (variably referred to as burial) and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery (contemporary) or burial ground (historic).

A *site* is a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

*Heritage Impact Assessment (HIA)* refers to the process of identifying, predicting and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project which requires authorization of permission by law, and which may significantly affect the cultural and natural heritage resources. Accordingly, a HIA must include recommendations for appropriate mitigation measures for minimizing or circumventing negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

*Impact* is the positive or negative effects on human well-being and / or on the environment.

*Mitigation* is the implementation of practical measures to reduce and circumvent adverse impacts or enhance beneficial impacts of an action.

*Mining heritage sites* refer to old, abandoned mining activities, underground or on the surface, which may date from the prehistorical, historical or the relatively recent past.

*Study area* or 'project area' refers to the area where the developer wants to focus its development activities (refer to plan).

*Phase I studies* refer to surveys using various sources of data and limited field walking to establish the presence of all possible types of heritage resources in any given area.

### Assumptions and disclaimer

Researchers and consultants in this project note that absence of evidence does not mean evidence of absence; hence human burials can occur in unpredictable locations beneath the earth's surface. It should be remembered that archaeological deposits (including graves and paleontological remains) usually occur below the ground level. If these materials are revealed during construction, such activities should be stopped immediately, and a competent heritage practitioner and SAHRA must be notified for an investigation and evaluation of the find(s) to take place [cf. NHRA (Act No. 25 of 1999), Section 36 (6)]. Pursuant to this, the developer is encouraged to comply with any national, provincial and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA. Pulafel 4D Consulting assumes no responsibility for compliance with conditions that may be required by the PHRA or SAHRA in terms of this report.

### Terms of Reference (ToR)

Pulafel 4D Consulting Pty Ltd was engaged to do a field-based Heritage Impact Assessment over Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, Kuruman District, Northern Cape Province.

The objectives for doing a HIA were to:

- Review applicable legislative requirements, identify all objects, sites, occurrences, and structures of an archaeological or historical nature (cultural heritage sites) are located on the property,
- Assess the significance of the cultural resources in terms of their archaeological, historical scientific, social religious, aesthetic, and tourism,

- Describe the possible impact of the proposed development on these cultural remains, according to standard set conventions,
- Where there is a need, recommend suitable mitigation measures.

## INTRODUCTION AND BACKGROUND TO THE PROJECT

Pulafel 4D Consulting (Pty) Ltd was appointed by M & S Consulting to carry out an Archaeological and Heritage Impact Assessment of the proposed Prospecting Right application for Cobalt, Diamond, Gold, Iron, Manganese, Platinum Group Metals and Zinc over Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, Kuruman District, Northern Cape Province.

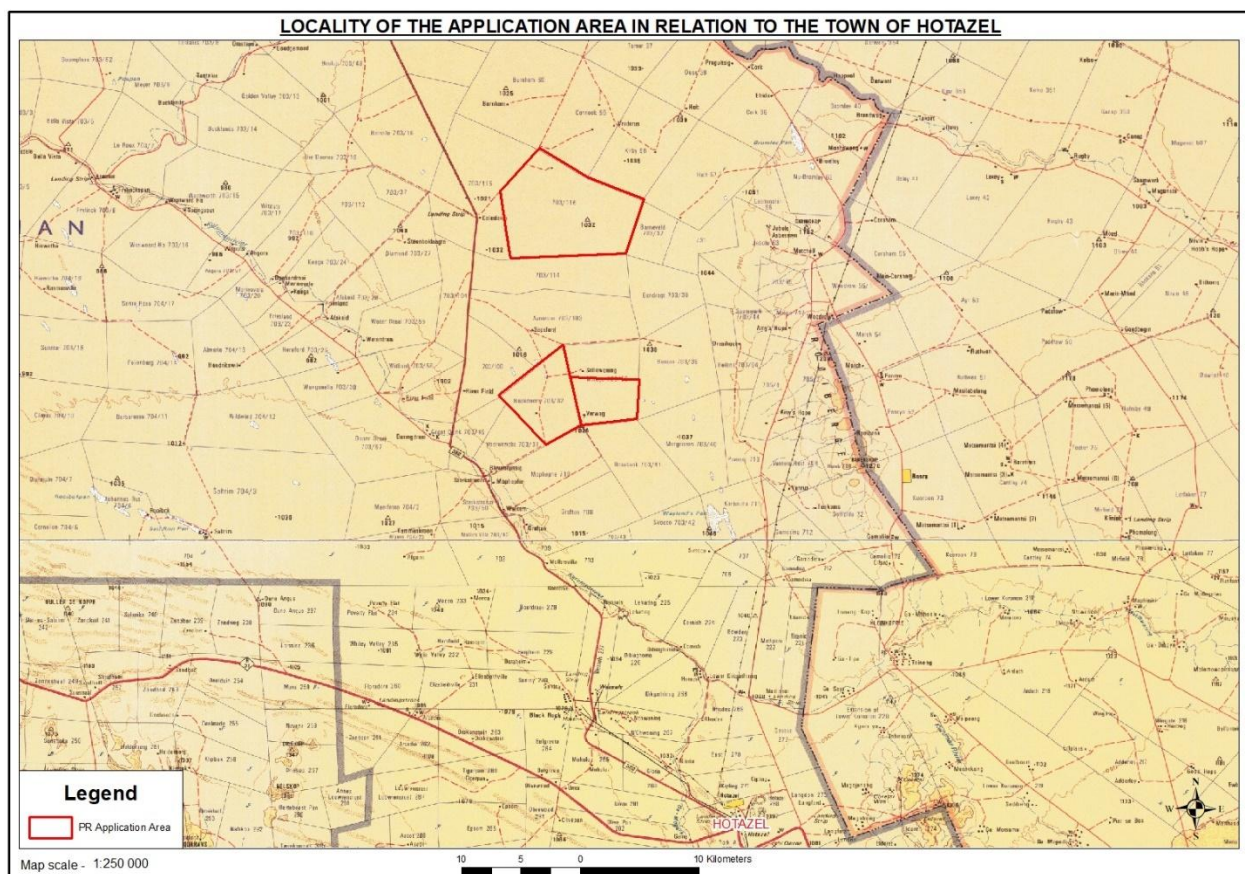


Figure1: Location map of the study area.

## DESCRIPTION OF THE AFFECTED ENVIRONMENT

### Vegetation and Current Land use

The terrain in the project area is predominantly flat. Shallow pans and ancient sand dunes very common. The vegetation in the study area is characterized by grassy dwarf shrubland with some sparse low shrubs and grassy areas. Some of the tree species found in the area include *Acacia erioloba*, *Terminalia sericea* and *Acacia Melifera*. The national vegetation map indicate that the project area is home to the type of vegetation called the Kathu Bushveld (Mucina & Rutherford, 2006 and SANBI, 2018). Apart from the above dominant trees, other common woody species present in the proposed project area include *Zizyphus mucronate*. In the immediate area the *Kuruman Thornveld* occurs. The main form of land use in the project area are cattle, sheep ranching and game farming.

Figure 2 below shows the general physiography. In terms of soils, the vegetation type is associated with aeolian red sand and surface calcrete and deep sandy soils of the Hutton and Clovelly soil forms.



Figure 2 and 3 (above): Vegetation and physiography of the study area: Photo by Pulafel 4D (2023)

### Geology of the Area

The geology of the area around and to the southeast of Hotazel is outlined on the 1: 250 000 scale geological map 2722 Kuruman. The project area is generally being entirely underlain by Pleistocene to Recent aeolian sands of the Gordonia Formation (Kalahari Group). The geological map as well as recent field studies in the region (Almond 2011, 2012, 2013) show that the Kalahari sands here are extensively underlain by hardpan calcretes, some of which at least can be assigned to the Mokalanen Formation of the Kalahari Group. Subdued linear sand dunes trending NW-SE as well as pale calcrete exposures along the Ga-Mogara River and nearby pans are clearly visible within and outside the present project area on satellite images.



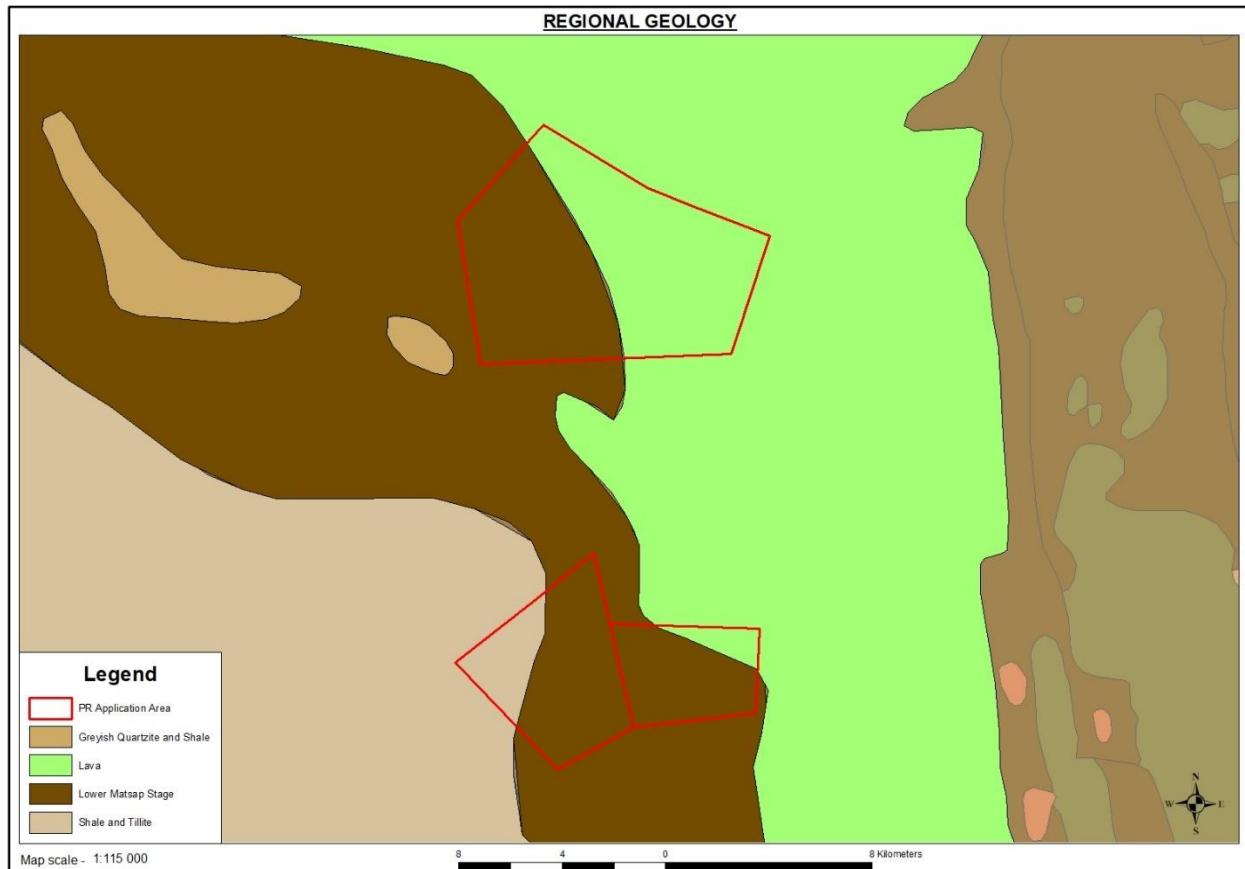


Figure 3: Geology Map of the project area

The 1:250,000 Geological Map 2622 describes the geology as follows: Karoo System. The Dwyka Series which consists mainly of dark shale and tillite has a wide distribution beneath the Kalahari Beds in the west. The thickness is not known but 610m were penetrated in a borehole on Bristol without reaching the base of the succession. According to gravity measurements the total thickness may be about 660m west of Heuningvlei. In the eastern area, south-east of Morokweng several outliers occur on the granite. According to borehole data the thickness on Pepani may exceed 300m. The outlier on the banded ironstone on Woodrow is about 120m thick. Dolerite sheets are intrusive into Dwyka strata on Moorcroft's Pan, De Dwaal, Uitkyk and Botley.

The Transvaal system is characterised by The Tillite Sub-stage of the Daspoort Stage of the Pretoria Series which lies unconformably on the jaspilite of the Banded Iron-stone Stage and crops out in the south, between Gamodisa and Pioneer and farther north in the Kgokgole River. Rocks of this sub-stage have been struck in boreholes as far north as Exeter and are mainly tillite and with subordinate quartzite and conglomerate. The total thickness is about 90m in the south. The quartzite and conglomerate are nowhere more than 24m thick. The Waterberg System also constitutes the geology of the project area. The Waterberg System: only outcrops of the Lower Matsap Stage are on Skimmel Koppies south of Severn and on Lover's Leap on the Molopo River. They consist of white and gray quartzite, reddish shale, interbedded lava bands and a basal conglomerate. The shale, lava and conglomerate are known only from boreholes and lie unconformably on the Daspoort Stage. The Stage was struck beneath shale of the Dwyka Series in boreholes as far north as Lester, north-west of Severn. The upper contact on the map is very approximate. The Lower Matsap Stage is correlated with the clastic sediments (upper part) of the old Upper Griquatown Stage and those of the Loskop System. Later, in the Annals of the Geological Survey they were included in the Magaliesberg Series. The Upper Matsap Stage does not crop out and is encountered only in boreholes in the south-eastern part of the area. It consists mainly of brown, purplish and gray quartzite.



Figure 4: View of the hardpan calcretes in a disturbed quarry site (Pulafel 4D 2023).

Within the proposed project area and its surroundings are pans. These are seen on satellite images. Calcretes are expected here at depth beneath the cover sands within the project area and they can be observed on riverbanks and road cutting outside the current project area. A study of Palaeontological Impact Assessments (PIA) reports carried out in the project area provided information about the geology of the proposed project area. Reports generated by Almond (2103, 2016) largely contributed vast amount of information about the geology in the proposed project area. Through the study of PIA it was revealed that ancient bedrocks of the Transvaal Supergroup and other Precambrian sediments in the Hotazel area are mantled by a thick succession of superficial sediments of probable Late Cenozoic (i.e. Late Tertiary or Neogene to Recent) age, most of which are assigned to the Kalahari Group. The Late Cretaceous to Recent Kalahari Group geology was reviewed by Thomas (1981), Dingle et al. (1983), Thomas & Shaw 1991, Haddon (2000) and Partridge et al. (2006). Calcretes or surface

limestones in the southern Kalahari Region are pedogenic limestone deposits and they are discussed by Truter et al. (1938) as well as Visser (1958) and Bosch (1993). Surface limestones that are found in the area may reach thicknesses of approximately 20 m or more, but are often much thinner, and are locally conglomeratic with clasts of reworked calcrete as well as exotic pebbles. The older, Pliocene - Pleistocene calcretes in the broader Kalahari region are characterized by sandy limestones and calcretised conglomerates and they have been assigned to the Mokalanen Formation of the Kalahari Group (Partridge et al. 2006).

Unconsolidated, reddish-brown to grey aeolian sands that were wind-blown, and they belong to the Quaternary Gordonia Formation (Kalahari Group) are found in the southern Kalahari region. Bosch (1983) states that the Gordonia sands in the Kimberley area reach thicknesses of up to eight meters and consist of up to 85% quartz associated with minor feldspar, mica, and a range of heavy minerals. The Gordonia dune sands are considered to belong to the Late Pliocene / Early Pleistocene to Recent, dated in part from enclosed Middle to Later Stone Age stone tools (Dingle et al., 1983: 291). Almond (2013) and Groenewald (2013) provide the palaeontological record of the rock units represented in the Hotazel region. The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species (Figure 6). Porous dune sands are not generally conducive to fossil preservation. Almond (2008) and Almond & Pether (2008) describe the fossil remains that may be found within this unit include calcretized rhizoliths such as root casts and termitaria like *Hodotermes* and the harvester termite, ostrich eggshells (*Struthio*) and shells of land snails (e.g., *Trigonephrus*) (Almond and Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (e.g., *Corbula*, *Unio*) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands (Du Toit 1954, Dingle et al., 1983). These Kalahari fossils (or subfossils) can be

expected to occur sporadically but widely, and the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low. Underlying calcretes of the Mokolanen Formation might also contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. The fossils may also include mammalian bones, teeth, and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings such as pans).

## LEGISLATIVE REQUIREMENTS

Archaeological patrimony is finite as it is non-renewable and hence it needs to be sustainably utilized. This ensured by putting in place protective legislations. Numerous Acts are incorporated into legislation to provide for the protection of archaeological and heritage resources in South Africa. Overarching these is the Constitution of South Africa Act No 108 of 1996. The National Heritage Resources Act (NHRA), Act 25 of 1999, the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA), the National Environmental Management Act (NEMA) 107 of 1998 section 39 (3) (b) (iii) the National Environment Management Protected Areas Act No 57 of 2003 (NEMPAA), and the Human Tissues Act (HTA) 65 of 1983 as amended. The Environment Management Biodiversity Act of 2004, Act No 10 of 2004, is one of the pieces of legislation that help in the protection of the various forms of the South African heritage. The National Heritage Resources Act (NHRA) no 25 of 1999 is the most relevant of these as it provides for the protection of the following resources:

- a) palaeontological and archaeological deposits, objects, and sites,
- b) built structures older than 60 years,
- c) burial grounds and graves which include graves younger than 60 years; graves older than 60 years; graves of victims of conflict and or graves of individuals of royal descent, as well as
- d) cultural landscapes.

The NHRA (No. 25 of 1999) legislation defines heritage resources of cultural significance or other special value for the present community and for the posterity that are considered part of the national estate such as “places, buildings, structures and equipment of cultural significance; places that are associated with oral traditions are attached, historical settlements, and townships landscapes and natural features of cultural significance; geological sites of scientific or cultural importance; archaeological and palaeontological sites; or graves and burial grounds, including ancestral graves; royal graves and graves of traditional leaders; graves of victims of conflict; graves of individuals designated by the Minister by notice in the Gazette; historical graves and cemeteries; and other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983); sites of significance relating to the history of slavery in South Africa; movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects”

According to NHRA Act 1999, developments which alter the character of a site, and, which exceed prescribed limitations require specialist assessment. These activities trigger the need for Heritage Impact Assessments (HIA) and are listed in sections 34, 35 and 38. The limitations are listed below:

Section 34(1) No person may alter or demolish any structure or part of a structure which is more than 60 years old without permission by the relevant provincial heritage resources authority.

Section 35(4) No person may, without a permit issued by the responsible heritage resources authority, destroy, damage, excavate, alter, deface, or otherwise disturb any archaeological or palaeontological site.

Section 36(3) No person may, without a permit issued by SAHRA or the responsible provincial heritage resources authority, destroy, damage, alter exhumate, remove from its original position or otherwise disturb any grave or burial ground older than 60 years

which is situated outside a formal cemetery administered by a local authority; or bring onto or use at a burial ground or grave any excavation equipment or any equipment which assists in detection or recovery of metals.

Section 38 (1) of the National Heritage Resources Act, 1999: Requirements of heritage impact assessment Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as – (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (b) the construction of a bridge or similar structure exceeding 50m in length; (c) any development or other activity which will change the character of a site (i) exceeding 5 000 m<sup>2</sup> extent; or (ii) involving three or more existing erven or subdivisions thereof; or (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or (iv) the cost of which exceed a sum set in terms of regulations b SAHRA or a provincial heritage resources agency; (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources agency, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”

#### Relevance of the current development

The proposed Prospecting Right Application and Environmental Authorization (EA) Application for prospecting activities on Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, near Santoy, Northern Cape Province (NC 30/5/1/1/2/13295 PR) when fully implemented may impact on the archaeology, cultural and natural heritage. It is against this background that an Archaeological and Heritage Impact Study must be conducted. The proposed project has phases that include preliminary exploration work, exploratory drilling, based on the results of the geophysics and loam sampling. Currently several existing roads and tracks traverse the proposed project area and where practicable, these roads will be used. It is envisaged that more

temporary access roads will be established for access to the activity and operation sites.

Table 2: Evaluation of the proposed development as guided by the criteria in NHRA, MPRDA and NEMA

<b>ACT</b>	<b>Stipulation for developments</b>	<b>Requirement details</b>
NHRA Section 38	Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
	Construction of bridge or similar structure exceeding 50m in length	No
	Development exceeding 5000 sq. m	No
	Development involving three or more existing erven or subdivisions	No
	Development involving three or more erven or divisions that have been consolidated within past five years	No
	Rezoning of site exceeding 10 000 sq. m	No
	Any other development category, public open space, squares, parks, recreation grounds	No
NHRA Section 34	Impacts on buildings and structures older than 60 years	Subject to identification during Phase 1



NHRA Section 35	Impacts on archaeological and paleontological heritage resources	Subject to identification during Phase 1
NHRA Section 36	Impacts on graves	Subject to identification during Phase 1
NHRA Section 37	Impacts on public monuments	No
Chapter 5 (21/04/2006) NEMA	HIA is required as part of an EIA	Yes
Section 39(3)(b) (iii) of the MPRDA	AIA/HIA is required as part of an EIA	Yes

## METHODOLOGY

### Desktop Assessment

Various methods and techniques were applied in the proposed project area to meet the requirements field based HIA. A desktop study was conducted, and it involved going through academic literature, South African Heritage Resources Authority (SAHRA) impact assessment reports on the region, South African Heritage Resources Information System (SAHRIS) map. The South African Genealogical society database, South African archives database, McGregor Museum archives/databases, the Africana libraries archive, available digital collections, as well as previous HIA reports in the Northern Cape and specifically in the Hotazel area. Following this, a field survey was conducted next to identify, record and analyze cultural and archaeological heritage places in the project area.

## Field Survey

On 28 January 2023, a field survey was conducted in the three areas (farms), targeted for prospecting. The field study involved foot a survey and traversing the areas by car. Various environmental parameters such as geology, soils, and types of vegetation, river valleys and hills / mountains guided us on the areas to investigate for archaeological and heritage sites. The survey was undertaken by the consulting archaeologists, Dr J Chikumbirike and Professor J Mataga. The two archaeologists were assisted by landowners (Mr L Hauman, Mr Du Plessis and Mr de Klerk) in the project area, all of whom have intimate knowledge of the natural, cultural, and historic aspects of the area. The visibility was varying, but it was good. Paddocks that were grazed year presented very good visibility whilst those paddocks which were not grazed at all/regularly were covered with grass and presented reduced visibility.

Animal-dug burrows and borrow-pits excavated for gravel road construction within the farms gave a visual idea about the potential of buried archaeological or palaeontological materials. Ordinarily human activities such as quarrying or soil excavation and Animal burrows usually target areas with cultural material but in this case, no archaeological materials were found (Figure 5).



**Figures 4 and 5:** Animal burrows and borrow-pits for road construction did not yield cultural material (Portion 32 of Farm 703). Photo by Pulafel 4D Consulting (2023).

A high-resolution camera was used for recording artifacts and structures in the project area. A GPS was used to take coordinates of the recorded artifacts and structures in the project area. GIS and remote sensing are other tools that were used together with digital aerial photographs (Google Earth) to locate archaeological sites. GIS is based on spatial graphical representations of contextual in the sense of integrating many different data types and by being analytical. It is not just descriptive it also at the same time enhances visualization. The survey path was also tracked using this GPS (see Table 3 below).

S- Coordinates	E- Coordinates	Comments/ Description	Portion
<b>Farm 703: Portion 116</b>			
S 26° 45. 470'	E022° 49.583'	Track road	
26° 45.507'	22° 50.717'	Trig Beacon- pebbles around	Beacon possibly constructed late 1900s as per the personal communication with farm owner.
26° 44.737	022° 51.747'	Track/road, drinking point water point	
26° 45.955'	022° 51.999'	Water point/ fence-paddock	
26° 46.733'	022° 51.467'	Point/ paddock with stone pebbles /scraper/hammer	
26° 46.505'	022° 49.134'	Gate/track/fence for paddocks	
26° 46.513'	022° 48.224'	Water point	Cattle drinking water
26° 46. 352'	022° 48.248'	Water point	Cattle Drinking Point
26° 44.963'	022° 47.211'	Water point/fence	Windmill erected probably 1970
26° 43.181'	022° 48.979'	Farmhouse	Modern homestead consisted in early 1990s
<b>Duplessis Farm 703: Portion 32</b>			
26° 51.920'	022° 48.702'	Gate/ fence	
26° 52.197'	022° 48. 815'	Boreholes sunk approximately 10 years ago for mineral prospection	Several prospecting licenses offered in the farm and several drill sites identified, scattered across the farm (See Figure 12)
26° 52.706'	022° 48.946'	Quarry site. Check coordinates on the phone	Quarry site for extraction of possible road, and other infrastructure construction over time
26° 52.622'	022° 49.306'	Prospecting holes 80m deep approximately 100m apart	Several prospecting licenses offered in the farm and several drill sites identified, scattered
26° 52.836'	022° 48.879'	Exploration holes	Several prospecting licenses

			offered in the farm and several drill sites identified, scattered
26° 54.281'	022° 48.600'	Quarry site	Quarry site for extraction of possible road, and other infrastructure construction over time
26° 54.278'	022° 48.587'	Old borehole=1940s, concrete blocks	Old style borehole, with rudimentary water-cooling system for cattle and domestic consumption.
26° 54.285'	022° 48.547'	Old homestead 1960, concrete blocks, old houses	Worn out lithic, scattered across the area, possibly from construction materials dug in nearby quarries or the Kuruman riverbed.
<b>De Klerk Farm 703: Portion 59</b>			
26° 55.405'	022° 51.512'	Water point,	Photo 5792
26° 52.631'	022° 49.964'	De Klerk Farm	Farm boundary, fireguard
26° 54.787'	022° 50.672'	Borehole covered in blue	To the southwest is a trig beacon
26° 54.277'	022° 50.636'	Windmill and storage tank	Borehole working, dilapidated house, old house foundations built using calcrete and mudbricks
26° 54.334'	022° 50.628'	Old farmhouse	Scatters of lithic tools including cores, scrapers, context disturbed
26° 54.358'	022° 50.651'	Ancient sand dune	No visible surface based lithics
26° 54.340'	022° 50.673'	Corner of a paddock	No visible archeological materials

Table 3: Survey tracks generated during the fieldwork.

A common feature in all the farms was the presence of sand dunes that would have masked any surface material that may have been on the ground (Figure 6)



Figure 6: Ancient sand dunes identified during surveys: Photo by Pulafel 4D Consulting (2023).

## HERITAGE ASSESSMENT AND REPORT COMPILATION

### Assessing significance

The types of significances or values below are in accordance with SAHRA which is the national heritage authority in South Africa. Significance assessments is a process conducted to determine the value or worthiness of a heritage place, landscape, or object within various stake holders. It is based on the importance that people attach to a physical object, or abstract concept attached to an event, landscape, or people. Below are the various significances that can be associated by heritage in accordance with SAHRA:

## Type of Significance and definition

*Aesthetic:* the site or object are significant in exhibiting aesthetic characteristics valued by a community or cultural group.

*Historical:* Is its importance in the community, or pattern of history. It also reflects a strong or special association with the life or work of a person, group, or organization of importance in history. According to SAHRA heritage may demonstrate significances relating to the history of slavery.

*Rarity:* is when heritage possess uncommon, rare, or endangered aspects of natural or cultural heritage.

*Representivity:* shows the principal characteristics of a particular class of natural or cultural places or objects, whether they indicate a range of landscapes or environments, the attributes of which identify it as being characteristic of its class. The other factor is that is whether it shows principal characteristics of human activities that include the way of life, philosophy, custom, process, land-use, function, design or technique in the environment of the nation, province, region or locality.

*Scientific/Technical:* is the potential to yield information that will contribute to an understanding of natural or cultural heritage. It shows a high level of creative or technical achievement at a particular time period.

*Social:* this when the heritage has a strong or special association with a particular community or cultural group for social, cultural, or spiritual purposes

*Tourism:* this when the site or object carries a commercial value that is associated with tourism, thus the heritage does possess the potential to be used for education/economic benefits.

## Site Grading and Summary Findings

Site grading is informed by assessment for heritage significances. Site grading or weighting is contingent on the geographical extent (local/provincial/national) and the

importance (low/medium/high) of the value. Based on these two elements, possible recommendations on future action on the sites are prescribed. These recommendations may include no further action, mitigation measures or destruction of a site. It is important to note that SAHRA is the one that approves to developers or any other interested and or affected parties the destruction of any heritage site. This may only take place upon SAHRA issuing a permit. The permit may also be issued by a provincial heritage resources authority (PHRA).

Table 4: Recommended grading as well as associated recommendation measures<sup>2</sup>..

South African Legislation (National Heritage Resources Act) Ranking	Sites within the study area	Sites immediately outside study area
National Heritage Sites (Grade 1)	None	None
National Heritage Sites (Grade 1), Grade 2 (Provincial Heritage Sites), burials	None	None
Grade 3a	None	None
Grade 3b	None	None
Grade 3c	None	1 (None) <sup>3</sup>

### Report compilation

The desktop analysis and physical surveys were employed to identify and locate possible heritage sites and their associated significance and impacts as reflected in the next section.

<sup>2</sup> In all the scenarios approval will be required from SAHRA

<sup>3</sup> ) No material culture was recorded in the project study area. However, there exists LIA archaeological footprint northeast of Hotazel which is primarily represented by stone wall remnants of the early 19th century BaTlaping capital Dithakong. Dithakong is located near the modern village of Dithakong (Morris 1990). These extensive stone wall enclosures were built during the 15th century AD and possibly by sedentary Khoi groups. Also, in the adjacent areas in Tswalu Game Reserve are remnants of this possible creolized LSA/LIA stone building culture.





## BACKGROUND TO THE ARCHAEOLOGY AND HERITAGE OF THE STUDY AREA

The South African pre-history follows a complex sequence of stratigraphic deposition, which is preserved in the deep layers underground. There are three progressive phases, namely the Palaeontological phase, the Archaeological phase, and the Colonial/historical periods. The present study deals with the last two.

### The archaeology

- The archaeological phase of South Africa and in Southern Africa is generally subdivided into four categories (Kuman 2001; Dusseldorp et al., 2013) followed by the colonial/historical period:
- the Earlier Stone Age (ESA), (3 Ma to 300 000ya)
- the Middle Stone Age (MSA), (c300 000 to 30 000 ya)
- the later Stone Age (LSA) (c30 000 to 2000 ya), and
- The Iron Age (AD200 and AD 1654)

**Earlier Stone Age (ESA):** The South African Earlier Stone Age (ESA) is dated between 2My and 200ky. According to Kuman (2001) and Dusseldorp *et al.* (2013) the ESA is preserved in a variety of contexts, both as 'sites' in the traditional sense, as extensive surface and geological assemblages, and even as buried deflated assemblages. The proposed study falls outside much of the documented ESA sites such as sites are Kanteen Kopje in Barkly West and Kathu Pan 1, where large stone implements (Hand axes, Cores, flakes) are found (Beaumont 1990; Beaumont et al. 2006; Chazan et al. 2012).

**The Middle Stone Age (MSA):** dates around 250 000 years ago. There are debates on the MSA centered around the emergence of *Homo sapiens* and the so-called the modern human behaviour (McBrearty & Brooks 2000). According to Wadley (1993), the MSA is characterized by the presence of points, blade technology, basal thinning; blade tools, denticulates, unifacial and bifacial points as well as prepared cores. There are

various industries such as the Howiesons Poort, Pietersburg, Mossel Bay that are a characteristic of the MSA. Lombard (2012) classified these into MSA 1-V. Once again, the study area lies outside the core of MSA sites, with Wonderwerk Cave (near Kuruman) and Khatu Pan1-4 (near Kathu) being some of the best examples from further afield. Beaumont (1973, 1983, 1990); Beaumont et al. (1974, 1984, 2006); Humphrey et al. 1983; Thackery et al. 1981; Wilkins et al. 2012) did extensive research in the Northern Cape province and describe the Middle Stone Age in detail.

***The Later Stone Age (LSA):*** Deacon (1984) gives dates of the LSA as between  $\pm 40\,000$  BP and  $\pm 2000$  BP. The LSA consists of technological implements that more 'complex' in terms of socio-economic behaviours compared to the MSA period. The LSA stone implements become smaller and function specific. They include specialised equipment for fishing and hunting, formal scrapers, and microlithics or micro-stone tools (Deacon 1984; Klein 2000). Some of the prominent LSA sites located outside the project area include Canteen Kopje; and Wonderwerk Cave. Typical LSA lithics such as end and side scrapers, as well as bladelets were reported at these sites. Within the study area, scatters of heavily weathered Stone Age material culture were recorded some on the gravel roads, water points and farmstead. These were clearly out of context as they were part of gravel quarried for road construction or house construction. The LSA is also recorded at sites much further afield from the study area in places such as Blinkklipkop and Doornfontein, where there is evidence of LSA mining practices and the introduction in the region was present by 1200 BP, of domesticated ovicaprids and possibly cattle as well as pottery.

***The Iron Age:*** According to Huffman (1982, 1996, 2007), the Iron Age of South Africa records a prehistoric period where the Bantu farmer groups migrated from the West African region of the continent through and around eastern Africa into southern African region. Their movement or migration from the lacustrine region is dated between AD200 and AD 1654 (Huffman 1982, 1996, 2007). Huffman (1982, 1996, 2007) states that the Bantu people were farmers using metal who, by 500 years before present had occupied

the eastern escarpment of southern Africa (Maggs 1972; 1976). Huffman (1982) further argues that these groups varied from the Khoi-San hunter-gatherer communities in that they cultivated crops such as sorghum, millet, and beans, lived in semi-permanent settlements, smelted, and foraged iron and produced pottery.

LIA sites in general are characterized by the presence of clay pots, bones metals and a settlement pattern which demonstrates organization associated with the Central Cattle Pattern (Dreyer 1992). No LIA material culture was recorded in the project study area. However, there exists LIA archaeological footprint northeast of Hotazel which is primarily represented by stone wall remnants of the early 19th century BaTlaping capital Dithakong. Dithakong is located near the modern village of Dithakong (Morris 1990). These extensive stone wall enclosures were built during the 15th century AD and possibly by sedentary Khoi groups. Also, in the adjacent areas in Tswalu Game Reserve are remnants of this possible creolized LSA/LIA stone building culture.

***The Colonial/historical phase (c1500-1994):*** it is the period that is associated with the arrival of European settlers up to the period of the emergence of democracy in South Africa. This period is characterized by various wars which led to the displacement of many in South Africa. The only possible historical material relates to the old farmhouses, Trigonometric Beacons and the early water holes drilled by the farmers as part of the 20<sup>th</sup> century occupation of the area under study. These are distributed across the landscape in which the project area is located (See Figures 7 and 8).

## THE FINDINGS

### Buildings

The three farms in which the study was conducted show evidence of the old farmhouses and boreholes. However, these historical heritage sites are less likely to be

impacted by the prospecting activities. However, if mining is to commence, they may need specific mitigation. Figures 7 and 8 below, of abandoned farmhouses, and dilapidated water supply infrastructure, such as remnants of windmills and boreholes, show the possible historical structures identified in the study area.

Table 5: Possible historical structures documented during surveys.

<b>S-Coordinates</b>	<b>E-Coordinates</b>	<b>Comments/ Description</b>
26° 45.507'	22° 50.717'	Trig Beacon- pebbles around
26° 44.963'	022° 47.211'	Windmill erected probably 1970
26° 54.278'	022° 48.587'	Old borehole=1940s, concrete blocks
26° 54.285'	022° 48.547'	Old homestead 1960, concrete blocks, old houses
26° 54.277'	022° 50.636'	Windmill and storage tank, Borehole working, dilapidated house, old house foundations built using calcrete and mudbricks
26° 54.334'	022° 50.628'	Old farmhouse, Scatters of lithic tools including cores, scrapers, context disturbed



Figure 7: Possible Historical structures in Portion 32 of the Farm 703 and Portion 59 of Farm 703. Photo by Pulafel 4D (2003).



Figure 8: Possible Historical structures in Portion 116 of Farm 703. Photo by Pulafel 4D (2023).

These sites are of low significance rating since they will not be directly impacted on by the drilling activities during prospecting.

### Stone tools

While the project area revealed very few historic buildings, no other objects or sites of heritage significance were identified during the field survey. This is probably due to the sand dunes that may have buried material culture. However, in the few areas where animals burrowed or where people dug for material to construct roads, there was still

nothing to suggest a proliferation of buried archaeological material. The only portable finds recorded in this study are two end-and side scrapers that occur in secondary context as part of gravel used to construct the road in the study area (Figure 8).



Figure 9: Gravel Road and the only two lithics documented in the present study. Photo by Pulafel 4D (2023).





Figure 10: Sites documented in this study exhibiting lithic materials (Pulafel 4D 2023).



Figure 11: Windmills and water storage concrete on Portion 59 of Farm 703 (Photo by Pulafel 4D 2023).



Figure 12: Some of the drilled sites on Portion 32 of Farm 703 (Photo by Pulafel 2023).

### Burial grounds and Graves

The field survey, and oral interviews with farm owners in study area did not find any visible or identifiable burial grounds nor graves. However, some graves maybe subsurface sites and it is probable that they are not identifiable above the ground, thus should they be encountered during the mining construction process, or any other activity related to mining, the developer is advised that the NHR Act 25 of 1999 prohibits destruction or alteration of historical graves. The legislation further states that any alteration or destruction of graves can only be undertaken through a permit issued by SAHRA or the Northern Cape Heritage Authority. To get such a permit, the authorities will have to be satisfied that the applicant has followed due diligence for such an action to be approved.

## SITE SIGNIFICANCE, GRADING AND RATING

### GRADING

Generally, the most visible material remains in the areas under study were the abandoned old farm buildings/water infrastructure, most of whose dates of construction are indeterminate. Notwithstanding this, the significance rating for these historical buildings is Moderate, and given the nature of the prospecting activities, they are not going to be directly affected by the project development. Due to this no mitigation is required.

**Table 6. Significance rating for the historical buildings and archaeological materials**

Site	Description	Period	Rating/Impact
Site 1	Farmhouses built in the 1940s	Historical	<b>Low</b>
Site 2	Farmhouse built in the 1940s	Historical	<b>Low</b>
Site 4	Old bores	Historical	<b>Low</b>
Site 5	Trigonometrical Beacon	Historical	<b>High</b>
Site 6	Scatters of lithic tools	MSA/LSA	<b>Low</b>
Site 7	Scatters of lithic tools	LSA	<b>Low</b>
Site 8	Scatters of lithic tools	MSA	<b>Low</b>

### RECOMMENDATIONS

The stone tools discovered within the study area require no further action as they are heavily weathered and out of context. The possible historical structures such as old farmhouses built in the 1940s (estimated) is dilapidated and possibly being dismantled by the owner is abandoned and occurs close to a water point. It is of **LOW SIGNIFICANCE** since it has already been damaged and in a state of neglect. The Trigonometrical Beacon is of **High Significance**, and it is protected in terms of Act No. 8. 1997 (Land Survey Act. 1997). According to **Section 41 (2)**, any person who for the purpose of carrying out any work which he or she may lawfully perform, desires to

remove or disturb any beacon erected in connection with the survey of land shall appoint a land surveyor personally to effect or supervise the removal or disturbance and subsequent replacement of that beacon in accordance with the regulations. Should the prospecting activities directly affect the Trigonometrical beacon, the developer is strongly advised to observe Act No. 8. 1997.

Therefore, based on the study presented in this assessment, the proposed prospecting activities are supported.

## CHANCE FINDINGS PROCEDURES

There is a possibility that archaeological materials maybe lying hidden under the surface and where not located during the field surveys conducted in the project area. This therefore does not mean that absence (during surface survey) is not evidence of absence all together. The following monitoring and reporting procedures must be followed in the event of a chance find, to ensure compliance with heritage laws and policies for best practice. Should any archaeological materials be revealed from the subsurface, the following procedure should be followed, everyone working on the site must be properly inducted to ensure they are fully aware of the procedures regarding chance finds.

- If during the drilling operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- The senior on-site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing SAHRA/PHRA.
- If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and SAHRA or PHRA are informed. If the

burial is deemed to be over 60 years old and no foul play is suspected, an emergency exhumation permit may be issued by SAHRA for an archaeologist to exhume the remains.

## CONCLUSIONS

Pulafel 4D Consulting (Pty) Ltd. was commissioned by M & S Consulting to do a field based HIA for a prospecting rights application on Proposed Prospecting Right Application and Environmental Authorisation (EA) Application for prospecting activities on Portion 32, Remaining Extent of Portion 59 and Portion 116 of the Farm 703, near Santoy, Northern Cape Province (NC 30/5/1/1/2/13295 PR).

No significant cultural material was found on the development footprint, except for historical structures (an old farmhouse and foundations)-on and Portion 116 of the Farm 703, From the Desktop survey, no sites of archaeological, historical, or cultural importance are recorded for the area under study. From the field survey, the recorded Stone Age material culture was heavily weathered and out of context and considered **LOW**. In view of this, there is therefore, no heritage grounds to halt the prospecting activities. Chance findings are still possible and reporting procedures have been outlined to the developer.

## ACKNOWLEDGEMENTS

Pulafel 4D Consulting Pty Ltd would like to thank S and M Consulting Pty Ltd for our appointment as the specialist in the project. Pulafel 4D Consulting also acknowledges the assistance provided by Mr Louis Hauman, Mr Du Plessis and Mr de Klerk who are the landowners in the proposed project area. Their patience and hospitality are greatly appreciated. Finally thank you Tanja for your assistance in organizing access and many more to the proposed project area.

## BIBLIOGRAPHY

Almond, J.E. 2011. *Proposed Solar Thermal Energy Power Park on Farm Arriesfontein, near Danielskuil, Potsmasburg District, Northern Cape Province*. Palaeontological specialist study: desktop assessment, 14pp. Natura Viva cc, Cape Town.

Almond, J.E. 2012. *Proposed westerly extension of Sishen Iron Ore Mine near Kathu, Kalagadi District Municipality, Northern Cape*. Palaeontological specialist desktop study, 18 pp. Natura Viva cc, Cape Town.

Almond, J.E. 2013. *Palaeontological specialist assessment: desktop study. Proposed 16 MTPA Expansion of Transnet's existing manganese ore associated infrastructure between Hotazel and the Port of Ngqura, Northern and Eastern Cape*

Almond, J.E. & Pether, J. 2008. *Palaeontological heritage of the Northern Cape. Interim SAHRA technical report*, 124 pp. Natura Viva cc., Cape Town.

Beaumont, P. 1990. Kathu Pan. Guide to archaeological sites in the Northern Cape. *Southern African Association of Archaeologists Post-Conference Excursion: 9-13 September 1990*.

Beaumont, P.B. 1990. Kathu Townlands 1, in: Beaumont, P.B. & Morris, D. (Eds.), *Guide to archaeological sites in the Northern Cape*. McGregor Museum, Kimberley, pp. 96-97.

Beaumont, P.B., 1983. Dithakong. *South African Archaeological Soc. Newsletter* 6 (2).

Beaumont, P.B., 1990. Kathu Pan. In: Beaumont P.B., Morris D. (Eds.). *Guide to the Archaeological Sites in the Northern Cape*. McGregor Museum, Kimberley, pp. 101-134.

Beaumont, P.B., 1990. Wonderwerk cave; Kathu. In: Beaumont, P.B., Morris, D. (Eds.), *Guide to Archaeological Sites in the Northern Cape*. McGregor Museum, Kimberley, pp. 75–101.

- Beaumont, P.B., Van Zinderen Bakker, E.M., Vogel, J.C., 1984. Environmental changes since 32,000 BP at Kathu Pan, Northern Cape. In: Vogel, J.C. (Ed.), *Late Cenozoic Palaeoclimates of the Southern Hemisphere*. Balkema, Rotterdam, pp. 329– 338.
- Beaumont, P.B., Vogel, J.C., 2006. On a timescale for the past million years of human history in central South Africa. *South African Journal of Science* 102, 217–228.
- Beaumont. P. and Boshier. A. 1974. Report on test excavations in a prehistoric pigment mine near Postmasburg. Northern Cape. *South African Archaeological Bulletin* 29(113/114): 41-59.
- Beaumont. P. B. 1973. The ancient pigment mines of Southern Africa. *South African Journal of Science* 69: 140-146.
- Bosch, P.J.A. 1983. *Die geologie van die gebied Kimberley. Explanation to 1:250 000 geology Sheet 2824 Kimberley*, 60 pp. Council for Geoscience, Pretoria.
- Chazan, M., et al. 2012. The Oldowan horizon in Wonderwerk Cave (South Africa): archaeological, geological, paleontological and paleoclimatic evidence. *Journal of Human Evolution* 63(6):859-66.
- Chazan, M., Wilkins, J., Morris, D. & Berna, F., 2012. Bestwood 1: a newly discovered Earlier Stone Age living surface near Kathu, Northern Cape Province, South Africa, *Antiquity* 86: 331.
- Deacon, J. (1984). The Later Stone Age of Southernmost Africa. *Cambridge Monographs in African Archaeology* 12. Oxford: BAR
- Dusseldorp, G., Lombard, M. and Wurz, S. 2013. Pleistocene Homo and the updated Stone Age sequence of South Africa. *South African Journal of Science* 109: 01-07.
- Dingle, R.V., Siesser, W.G. & Newton, A.R. 1983. *Mesozoic and Tertiary geology of southern Africa*. viii + 375 pp. Balkema, Rotterdam.
- Du Toit, A. 1954. *The geology of South Africa*. xii + 611pp, 41 pls. Oliver & Boyd, Edinburgh



Groenewald, G. 2014. *SAHRA Palaeotechnical Report*. Palaeontological Heritage of Northwest.

Haddon, I.G. 2000. Kalahari Group sediments. In: Partridge, T.C. & Maud, R.R. (Eds.) *The Cenozoic of southern Africa*, pp. 173-181. Oxford University Press, Oxford.

Huffman, T. 1982. Archaeology and ethno history of the African Iron Age. *Annual Review of Anthropology* 11: 133-50.

Humphreys, A.J.B. & Thackeray, A. I. 1983. Ghaap and Gariep: Later Stone Age studies in the Northern Cape. *The South African Archaeological Society Monograph Series No 2*. Cape Town.

Humphreys, A.J.B. 1976. Note on the Southern Limits of Iron Age Settlement in the Northern Cape. *South African Archaeological Bulletin* 31(121&122): 54 – 57.

Humphreys, A.J.B. 1978. The re-excavation of Powerhouse Cave and an assessment of Frank Peabody's work on Holocene Deposits in the Taung area. *Ann. of the Cape Prov. Museums* 2 (12): 217 – 244.

Klein, R. 2000. Archeology and the evolution of human behavior. *Evolutionary Anthropology* 9: 17-36.

Kuman, K. 2001. An Acheulean factory site with prepared core technology near Taung, SA. *South African Archaeological Bulletin* 56(173&174): 8 – 22.

Lombard, M. 2012. Thinking through the Middle Stone Age of sub-Saharan Africa. *Quaternary International* 270: 140–155

Maggs, T.C. 1976. Iron Age communities of the southern Highveld. *Occasional Papers of the Natal Museum* No. 2.

Maggs, T.M. O'C. 1972. Bilobial dwellings: a persistent feature of Southern Tswana settlements. *SA Archaeological Soc. Goodwin Series* 1, 54 – 64.

McBrearty, S. and Brooks, A. S. 2000. The revolution that wasn't: A new interpretation of the origin of modern humans. *Journal of Human Evolution* 39: 453–563.

- Morris, D. 1990. Blinkklipkop and Doornfontein: Specularite Mines. Guide to archaeological sites in the Northern Cape. *Southern African Association of Archaeologists Post-Conference Excursion*: 65-73. September 1990.
- Morris, D. 1990. Dithakong: "the place of ruins". In P. Beaumont and D. Morris (comp.) *Guide to Archaeological Sites in the Northern Cape*. McGregor Museum, Kimberley, pp. 148 – 154.
- Mucina, L. & Rutherford, M.C., 2006, *The vegetation of South Africa, Lesotho and Swaziland*, South African National Biodiversity Institute, Pretoria.
- Parsons, I. 2008. Five Later Stone Age artefact assemblages from the interior Northern Cape Province. *South African Archaeological Bulletin* 63 (187):51-60.
- Partridge, T.C., Botha, G.A. & Haddon, I.G. 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) *The geology of South Africa*, pp. 585-604. Geological Society of South Africa, Marshalltown.
- Thackeray, A.I., Thackeray, J.F., Beaumont, P.B., Vogel, J.C., 1981. Dated rock engravings from Wonderwerk Cave, South Africa. *Science* 214, 64-67.
- Thomas, M.J. 1981. *The geology of the Kalahari in the Northern Cape Province (Areas 2620 and 2720)*. Unpublished MSc thesis, University of the Orange Free State, Bloemfontein, 138 pp.
- Thomas, D.S.G. & Shaw, P.A. 1991. *The Kalahari environment*, 284 pp. Cambridge University Press, Cambridge.
- Visser, D.L.J. 1958. *The geology and mineral deposits of the Griquatown area, Cape Province*. Explanation of to 1:250 000 geology sheet 175 Griquatown, 72 pp. Council for Geoscience, Pretoria.
- Wadley, L. 1993. The Pleistocene Later Stone Age south of the Limpopo River. *Journal of World Prehistory* 7: 243–296.

Webley, L. & Halkett, D. 2008. *Phase 1 Heritage Impact Assessment: Proposed prospecting on the farms Adams 328 and Erin 316*, Kuruman, Ga-Segonyana Municipality in the Northern Cape.

Wilkins, J. & Chazan, M., 2012. Blade production ~500 thousand years ago at Kathu Pan 1, South Africa: support for a multiple origins hypothesis for early Middle Pleistocene blade technologies, *Journal of Archaeological Science* 39, 1883-1900