

A background image showing a window covered in raindrops. A vibrant rainbow is visible through the rain, creating a colorful and atmospheric scene. The text is overlaid on this background.

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Heritage Impact Assessment for proposed iron and manganese ore prospecting activities

Prepared by Pulafel 4D Consulting (Pty) Ltd

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

09 June 2021

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EXECUTIVE SUMMARY

Table 1: Project summary

Item	Description
Proposed development and location	<i>Prospecting for iron and manganese on the Farm 703 – Portions 18, 19, 115 and the Remaining Extent of Portion 27, approximately 50km north-west of Hotazel in John Taolo Gaetsewe District of the Northern Cape Province.</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>Ga-Segonyana Local Municipality in John Taolo Gaetsewe District Municipality</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: joostetanja@gmail.com</i>
Heritage Consultant	<i>Pulafel 4D Consulting</i>
Date of Report	<i>09 April 2021</i>

Pulafel 4D Consulting (Pty) Ltd. was commissioned by M & S Consulting to do a field-based HIA for a prospecting rights application on Farm Portion 18 (Die Doorns), 19 (Bellville), Remaining Extent of Portion 27 (Diamond) and Portion 115 (Caledonia) of the Farm 703 in John Taolo Gaetsewe District in Northern Cape Province (NC 30/5/1/1/2/12528 PR). This followed SAHRA's request for a field-based report after an

August 2020 desktop-based HIA of the same project was submitted by G&A Heritage. The G&A Heritage report, and our own desktop studies suggested that no precolonial sites were to be expected in the study area. The area falls within the Kalahari sands that, together with several ancient sand dunes, overlay the hard calcrete layers of the study area. This, coupled with the general paucity of water (except for the Kuruman river that lie outside the study area), may 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 Farms Bellville, Caledonia and Diamond. The smaller Die Doorns farm was not accessed but it was partially covered by surveys on the neighbouring Bellville farm and it is expected that the findings from the three farms generally mirror the archaeology of this farm. In all the surveyed areas, the precolonial archaeology is represented by two LSA lithic small scrapers that occur about 20km outside the study area as part of gravel used to surface the road. Even so, the lithics are of low impact (negligible) rating because of their isolated and secondary context nature. About three other possible historical structures also occur next or within the current farms houses in Caledonia and Bellville farms, but these are not threatened at all by the proposed development. 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.

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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

Archaeologists divide the different cultural epochs 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. This makes it important to clarify and declare the periodization of the area one is studying. These periods are nothing a little more than convenient time brackets because their terminal and commencement are not absolute and there are several instances of overlap. In the present study, relevant archaeological periods are given below;

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 a Historic building is classified as over 60 years old)

Definitions

Just like periodisation, it is also critical to define key terms employed in this study. Most of these terms derive from South African heritage legislation and its ancillary laws, as well as international regulations and norms of best-practice. The following aspects have a direct bearing on the investigation and the resulting report:

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 in order to establish the presence of all possible types of heritage resources in any given area.

Assumptions and disclaimer

The investigation has been influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in

establishing intangible heritage values. Human burials can occur in unpredictable locations. It should be remembered that archaeological deposits (including graves and paleontological remains) usually occur below the ground level. Should this material be revealed during construction, such activities should be halted immediately, and a competent heritage practitioner and SAHRA must be notified in order for an investigation and evaluation of the find(s) to take place [cf. NHRA (Act No. 25 of 1999), Section 36 (6)]. Recommendations contained in this document do not exempt the developer from complying 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. The objectives for doing a HIA are to:

- Review applicable legislative requirements, identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) 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 and

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 iron and manganese ore prospecting activities on the Farm Portion 18, 19, Remaining Extent of Portion 27

and Portion 115 of the Farm 703 in John Taolo Gaetsewe District in Northern Cape Province (NC 30/5/1/1/2/12528 PR).

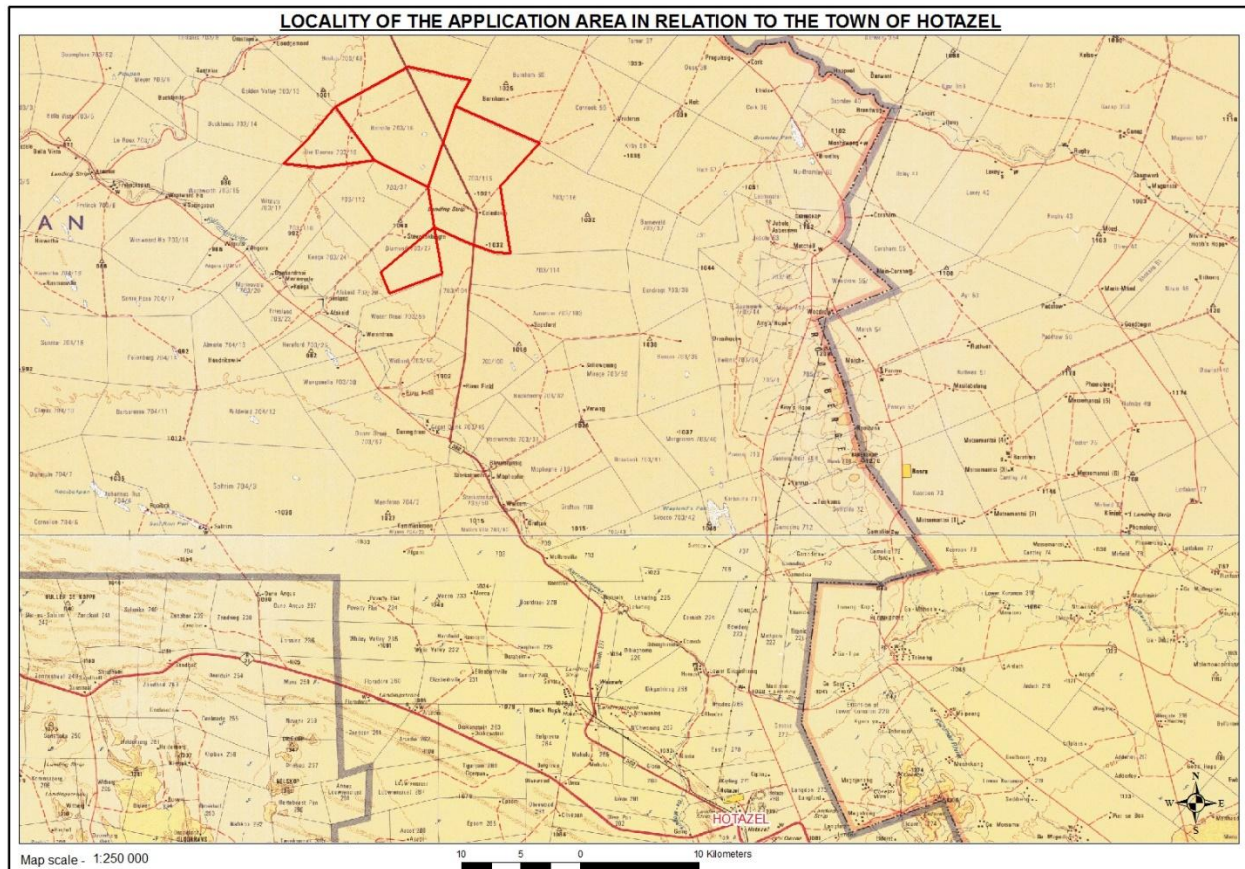


Figure1: Location map of the study area.

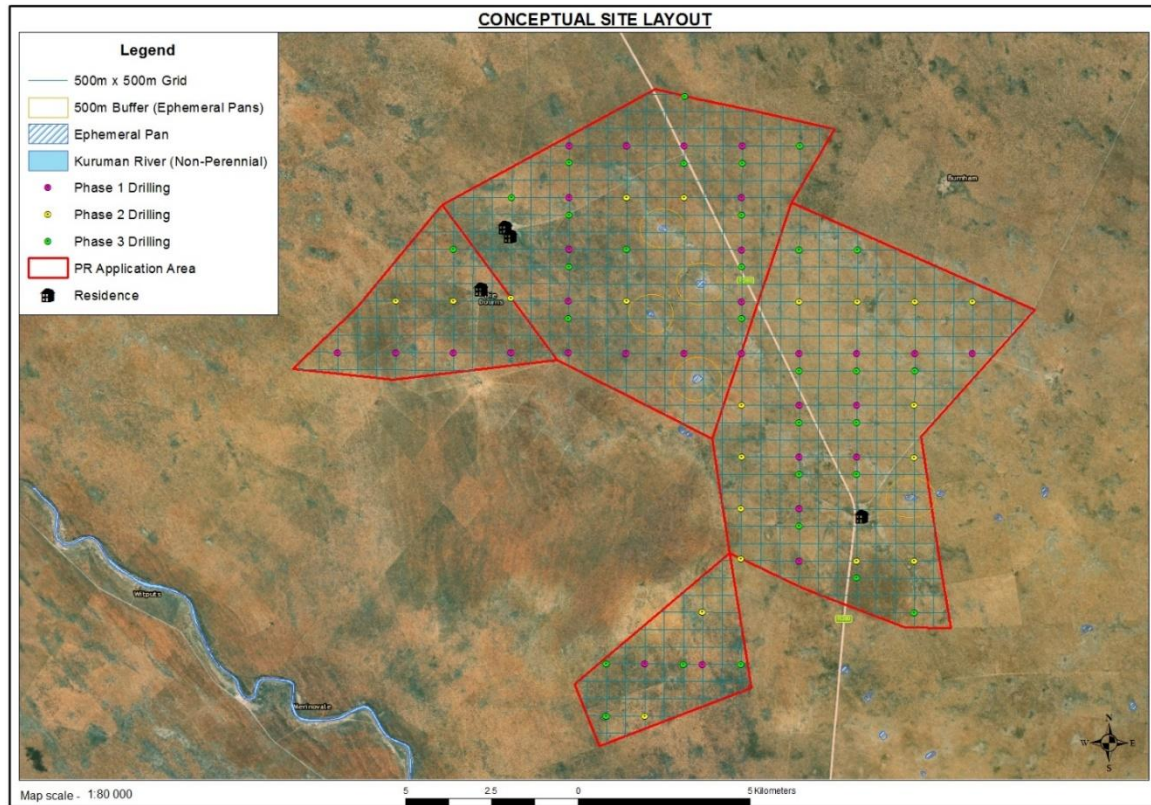


Figure 2: location of the study area and the proposed drilling areas

Vegetation and Current Land use

The project area is predominantly flat terrain with shallow pans and ancient sand dunes. The vegetation is mainly a grassy dwarf shrubland with some sparse low shrubs and grassy areas. The vegetation is comprised of *Acacia erioloba* and *Acacia Melifera*. There are also portions with *Terminalia sericea*. The farms are currently being used for cattle ranching and game farming. They are divided into several paddocks.

According to the national vegetation map (Mucina & Rutherford, 2006 and SANBI, 2018), the project areas are restricted to the Kathu Bushveld vegetation type. 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. Other vegetation types that occur in the immediate area include Kuruman Thornveld. The vegetation in the

proposed project area consists of Bushveld with a well-developed grass layer and a variable-density tree layer. The *Senegalia mellifera* subsp. *detinens* bush clumps, *Vachellia erioloba* and *Vachellia haematoxylon* are also dominant species across large parts of the property. Apart from the above dominant trees, other common woody species present in the proposed project area include *Zizyphus mucronata*. Figure 3 below shows the general physiography.



Figure 3: Vegetation and physiography of the study area: Photo by Pulafel

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 4).

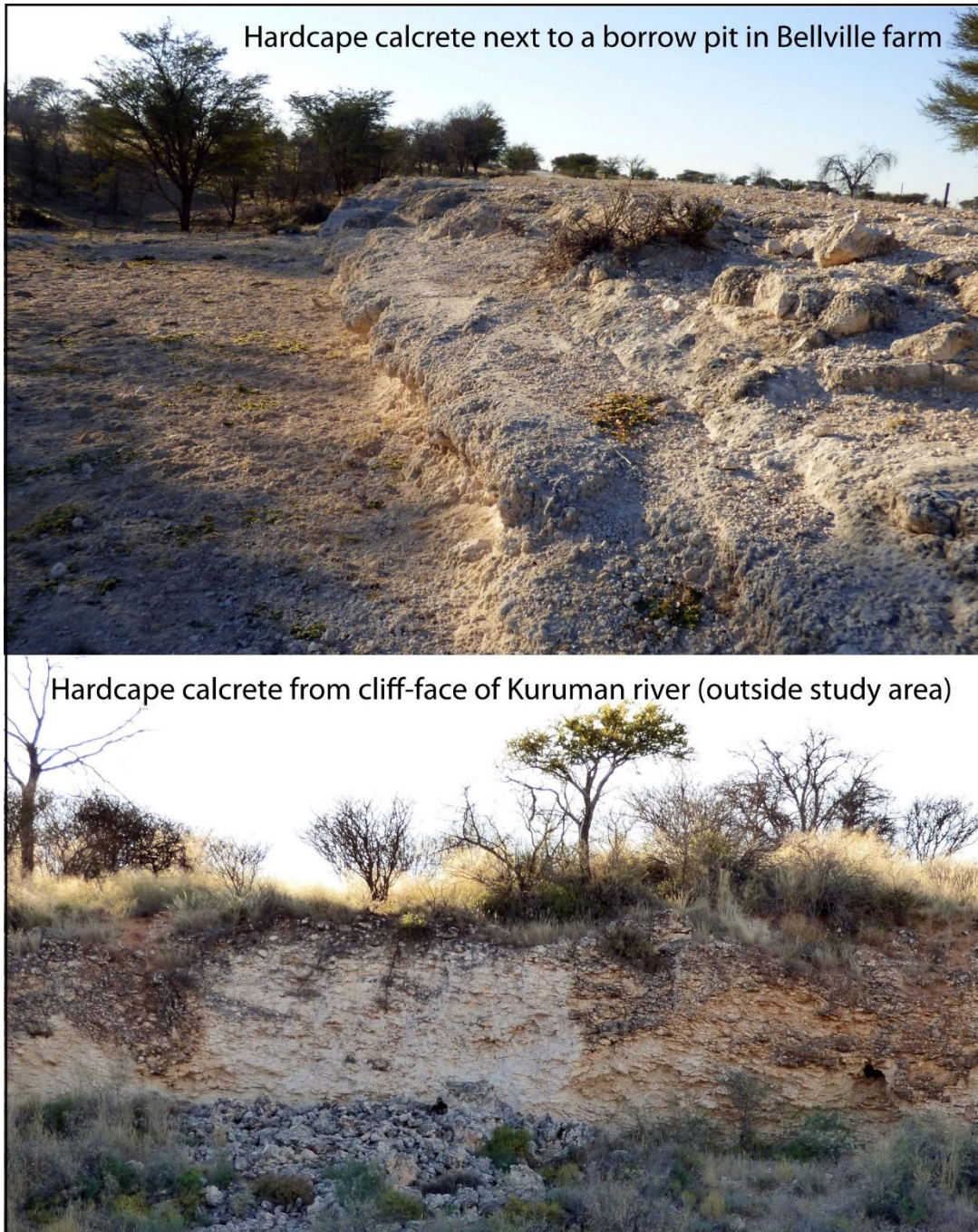


Figure 4: Cross-sectional view of the hardpan calcretes.

The Kuruman River is the only major drainage line closest to the project area. It runs to the west of the project area. Pans too are present within the proposed project area and are visible on satellite images. Within the proposed project area, calcretes are expected

here at depth beneath the cover sands and they can be observed on river banks and road cutting. Previous Palaeontological Impact Assessments (PIA) reports were used to inform the geology of the proposed study area which is located in Hotazel. This has largely been informed by reports generated by Almond (2103, 2016). 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 Caenozoic (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. According to Bosch (1983) 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, p. 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. 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 egg shells (*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) is a piece of legislation that 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 m² 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 by SAHRA or a provincial heritage resources agency; (d) the re-zoning of a site exceeding 10 000 m² 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 development of at Farm Portion 18, 19, Remaining Extent of Portion 27 and Portion 115 of the Farm 703 in John Taolo Gaetsewe District in Northern Cape Province (NC 30/5/1/1/2/12528 PR) prospecting and mining when fully implemented may impact on the archaeology and cultural heritage and natural heritage as well, therefore the need for an Archaeological and Heritage Impact Study. The proposed project has phases that include preliminary exploration work, exploratory drilling, based on the results of the geophysics and loam sampling. They proposed include 80 percussion boreholes (10m x 10m each), access tracks and chemical toilets. Currently a number of 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 repeated access to the drilling sites if the identified drill sites cannot be access via existing roads and tracks.

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

ACT	Stipulation for developments	Requirement details
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

The HIA study for the proposed project area was implemented through the various methods. Firstly a desktop study was conducted to gain access to the following

literature sources: academic literature, South African Heritage Resources Authority (SAHRA) impact assessment reports on the region, South African Heritage Resources Information System (SAHRIS) map, Genealogical society database, South African archives database, McGregor, Africana libraries, digital collections, as well as previous HIA reports in the Northern Cape and specifically in the Hotazel area of the John Taolo Gaetsewe District. The second method involved a field survey.

Field Survey

The field study was undertaken on 16 May 2021 on foot and by car. Environmental parameters such as geology, soils, and types of vegetation, river valleys and hills / mountains were taken into consideration when deciding the areas to investigate for archaeological and heritage sites. The survey was undertaken by the consulting archaeologists, Dr J Chikumbirike and Dr F Bandama. The two archaeologists were assisted by land owners (Mr Pieter Grove, Mr Johan Piennar and Mr Andrew Bothma) the project area. On the day of the survey, the weather was bright and sunny, with clear visibility. The visibility was varying, but it was fairly good. Paddocks that were grazed this year presented very good visibility whilst those paddocks which were not grazed at all this year were covered with grass and reduced visibility.

All the same, in areas where animals had dug burrows, as well as the borrow-pits for gravel road construction, we were able to get an idea about buried material. Animal burrows usually target areas with cultural material but in this case, no archaeological materials were visible (Figure 5).



Figure 5: Animal burrows and borrow-pits for road construction did not yield cultural material. Photo by Pulafel 4D Consulting.

A camera was used to take photographs of artifacts and structures. 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 location of points of interest were recorded on the Global Positioning System (GPS) using a handheld Garmin eTrex® 20x device. The survey path was also tracked using this GPS (see Figure 6 below);

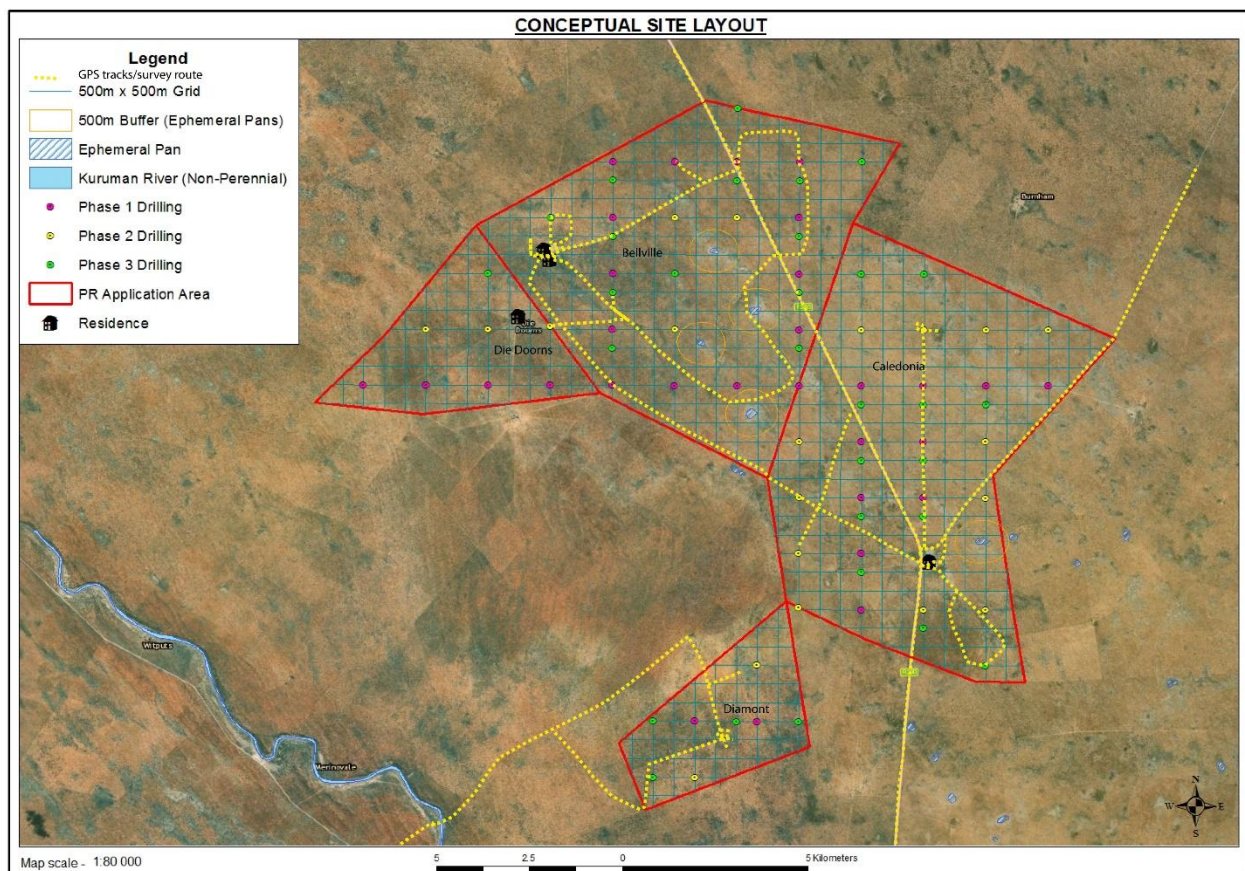


Figure 6: Survey tracks followed during fieldwork.

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 7)



Figure 7: Ancient sand dunes identified during surveys: Photo by Pulafel 4D consulting

HERITAGE ASSESSMENT AND REPORT COMPILATION

Assessing significance

The assessment of the heritage significance is the measure of value that the heritage carries to 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. The heritage significance is its worthiness to different stake holders. The intrinsic worth of cultural, or natural patrimony (sites and object) is linked to various sectors of the local, national and global population. The types of significances or values below are in accordance with SAHRA which is the national heritage authority in South Africa.

Type of Significance and definition

Aesthetic: the site or object are significant in exhibiting particular 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 organisation 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

Assessment for heritage significances paves way for site grading. 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 3: Recommended grading as well as associated recommendation measures. In all the scenarios approval will be required from SAHRA.

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 (one)

Report compilation

The desktop analysis and physical surveys were employed identity and locate possible heritage sites and their associated significance and impacts.

BACKGROUND TO THE ARCHAEOLOGICAL AND HERITAGE HISTORY 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, followed by the colonial/historical period:
- the earlier Stone Age (ESA), (3 Ma to 300 000 ya)
- 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 (Handaxes, 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): According to Deacon (1984), the LSA dates between $\pm 40\,000$ BP and ± 2000 BP. The technology is consistent with implements that more 'complex' socio-economic behaviours compared to the MSA populations. The stone implements become smaller and function specific. The implements include specialised equipment for fishing and hunting, formal scrapers, and microlithics or micro- stone tools (Deacon 1984; Klein 2000). Prominent LSA sites are also located outside the study area (e.g. Canteen Kopje; and Wonderwerk Cave) where typical LSA lithics such as end and side scrapers, as well as bladelets were reported. About 20km south of the study area, we located 2 end and side scrapers next to the gravel road. These were clearly out of context as they were part of gravel quarried for road 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 by 1200 BP, of domesticated ovicaprids and possibly cattle as well as pottery.

The Iron Age: 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 AD 200 and AD 1654 (Huffman 1982, 1996, 2007). According to Huffman (1982, 1996, 2007), 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) 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.

The LIA archaeological footprint northeast of Hotazel is primarily represented by stone wall remnants of the early 19th century BaTlaping capital Dithakong, located near the modern village of Dithakong (Morris 1990). Extensive stone wall enclosures are found on the adjacent hills and archaeological investigations during the 1980's have revealed that the ruins were built during the 15th century AD and possibly by sedentary Khoi groups. None of these stone walls occur in the study area where the geology would have posed an additional challenge in terms of finding the stones for building. Nonetheless, adjacent areas in Tswalu Game Reserve hosts remnants of this possible creolized LSA/LIA stone building culture. LIA sites in general are characterized by the presence of clay pots, bones metals and a settlement pattern which demonstrates organisation associated with the Central Cattle Pattern (Dreyer 1992).

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 farm houses and the early water holes drilled by the farmers as part of the 20th century occupation of the area under study. These are located further afield from the proposed drilling points and would most likely be less impacted by the prospecting. However, if mining is to commence, they may need specific mitigation. Figure 7 below, shows the possible historical structures identified in the study area.

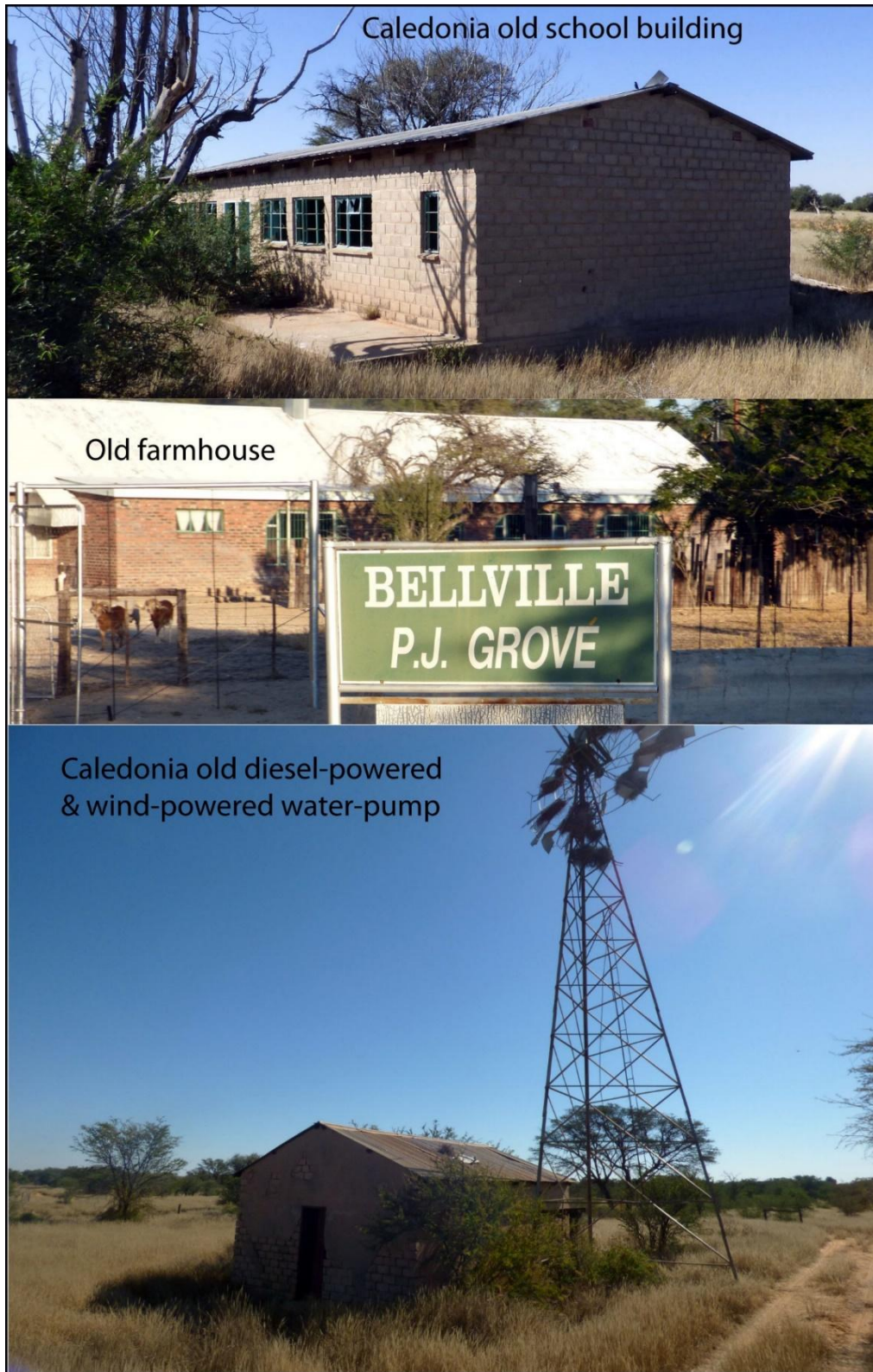


Figure 8: Possible Historical structures in Caledonia and Bellville farms. Photo by Pulafel 4D.

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

DESCRIPTION OF THE AFFECTED ENVIRONMENT

The project study area is characterised by low terrain with pans and ancient sand dunes. The vegetation is mainly a grassy dwarf shrub land with some sparse low shrubs. The farms are covered by the thick deposit of Karoo sands approximately thirty meters in some areas. The current land use in the project proposed areas is cattle, sheep, and goats farming, as well game farming (Figure 9).



Figure 9: Livestock farming activities in the study area.

THE FINDS

Stone tools

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 outside the study area (Figure 10).



Figure 10: Gravel road over a collapsed sand dune and the only two lithics documented in the present study. Photo by Pulafel 4D Consulting.

Historical structures

Table 4: Possible historical structures documented during surveys (also see Figure 8).

Site	Coordinates	Description	Period	Material
Site 1	26° 41' 5.226" S 22° 40' 21.5904" E	Farm house built in the 1940s. Modern, structure in good condition. Structure in use	Historical	Metal, plastic, cement blocks and bricks
Site 2	27 1'59.912" S 22 50'1.773" E	Old School built in the 1960s. Modern building structures still looking good. The window panes are broken	Historical	Metal, cement blocks and bricks
Site 3	26 42'8.522" S 22 45'58.765" E	Old building pump house. Modern dilapidated structures with a huge crack, the area around used as a water and feeding point for cattle	Historical	, cement blocks and bricks

Figure 11 below, shows the locational map of the documented sites.

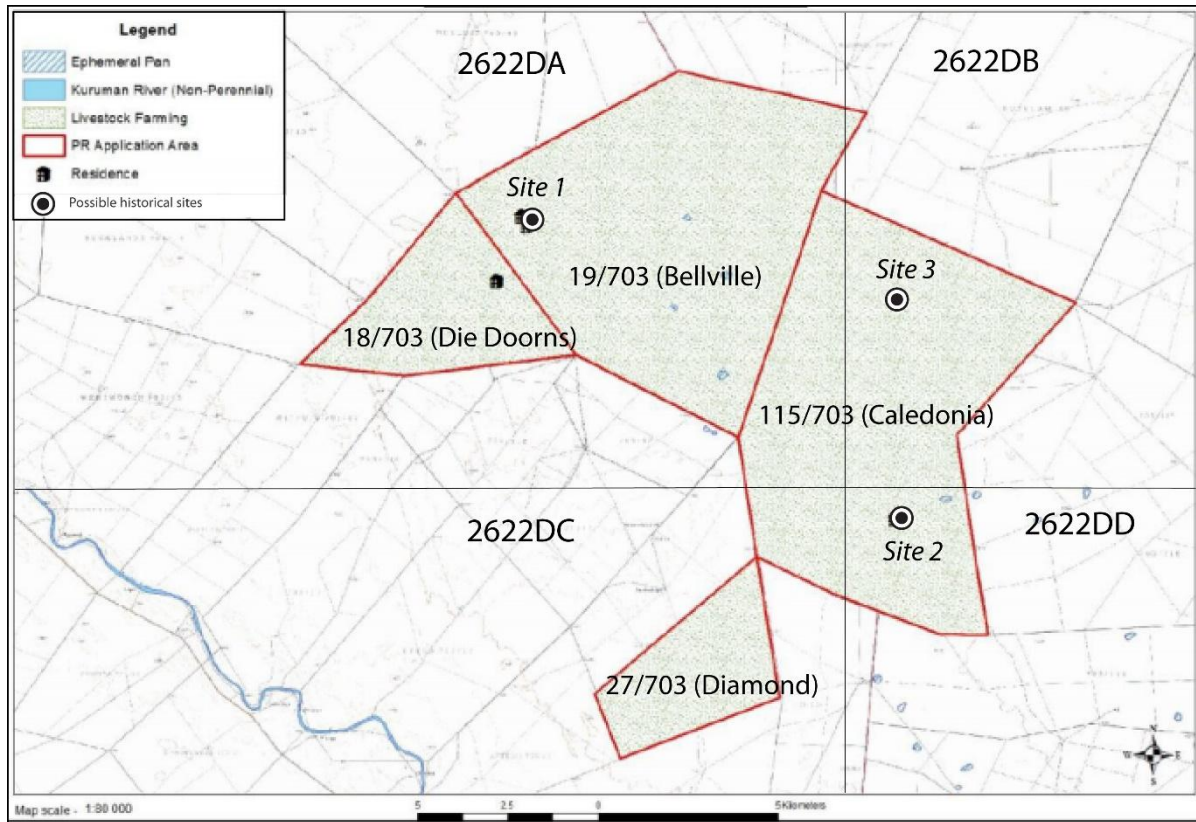


Figure 11: Sites documented in this study.

Burial grounds and Graves

No burial grounds nor graves were found in the project area. Some graves maybe subsurface sites and it is probable that they are not identifiable above the ground. Therefore, should they be encountered during the mining construction process or any other activity related to mining, the developer is advised that according to the NHR Act 25 of 1999, destruction or alteration of historical graves is prohibited by law. Any alteration or destruction of graves can only be undertaken through a permit issued by SAHRA or the Northern Cape Heritage Authority. However, the authorities will have to be satisfied that the applicant has followed due diligence for such an action to be approved.

SITE SIGNIFICANCE

GRADING

The significance rating for these historical buildings is Moderate, however, they are not going to be directly affected by the project development. Due to This no mitigation is required.

Table 5. Significance rating for the historical buildings

Site	Description	Period	Rating
Site 1	Farm house built in the 1940s	Historical	3b. Low (locally significant sites)
Site 2	old School built in the 1960s	Historical	3b. Low (locally significant sites)
Site 3	old building pump house	Historical	3b. Low (locally significant sites)

RECOMMENDATIONS

The stone tools discovered outside the study area require no further action. The historical structures mostly occur on current homesteads and do not mean to be threatened by the prospecting activities. Therefore, based on the study presented in this assessment, the proposed prospecting is supported.

Chance findings procedures

It has already been highlighted that sub-surface materials may still be lying hidden from surface surveys. Therefore, 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, in order to ensure compliance with heritage laws and policies for best-practice. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. Accordingly, all

construction crews 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 to undertake a field-based Heritage Impact assessment on Farm Portion 18, 19, Remaining Extent of Portion 27 and Portion 115 of the Farm 703 in John Taolo Gaetsewe District in Northern Cape Province (NC 30/5/1/1/2/12528 PR). No significant cultural material was found on the development footprint, except of three historical structures that lie outside the drilling holes for prospecting activities. Without identifiable cultural material, 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.

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