

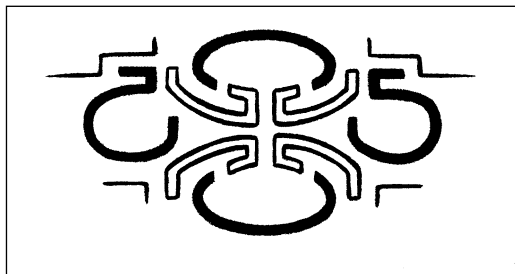
Cultural Heritage Impact Assessment:

Phase 1 Investigation for the Proposed Prospecting Right application combined with a Waste License Application for the Prospecting of Diamonds Alluvial (DA), Diamonds in Kimberlite (DK), Diamonds General (D) & Diamonds (DIA) on the remaining extent of the farm Kameeldrift 285, near Hopetown, Thembelihle Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province



For

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Executive Summary

This report contains a comprehensive heritage impact assessment investigation in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (Act No. 25 of 1999) (NHRA) and focuses on the survey results from a cultural heritage survey as requested by Milnex CC. The Scoping and EIA process for a Prospecting Right application combined with a Waste License Application for the Prospecting of Diamonds Alluvial (DA), Diamonds in Kimberlite (DK), Diamonds General (D) & Diamonds (DIA) on the remaining extent of the farm Kameeldrift 285, near Hopetown, Thembelihle Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province. The property is located approximately 30 km from Douglas, towards Hopetown in the Northern Cape Province. The Orange River is bordering the north-eastern boundary of the survey area. The Scoping and EIA process for Environmental Authorisation for the proposed diamond prospecting is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). Application reference number: (NC30/5/1/1/2/12632PR).

Site No	Site Type	Field Rating of Significance	Direct Impacts	Significance of Impact before Mitigation	Significance of Impact after Mitigation	Proposed Mitigation
1	Rock Art Site	Local/Grade 3A	None	80 (High)	5 (Low)	<ul style="list-style-type: none"> 100 metres buffer zone
2	Historical house	Generally Protected C: Low Significance	None			<ul style="list-style-type: none"> None

The survey yielded a total of two heritage sites which includes a rock art site (Site 1) and a historic house (Site 2). The rock art site includes at least two large boulders with at least three animal engravings on the one boulder and a single rhinoceros on the other. The historical house structure falls outside the active mining zone and there will be no impact on the structure. However, Site 1 is located near the river where most of the mining activities are taking place. As a result the following recommendations and mitigation measures are proposed:

- Site 1 should be fenced off (either a palisade or other physical barrier) and an entrance gate installed;
- A buffer zone of 100 metres should be maintained along its periphery; and
- Care should be taken during the mining phase to prevent any impact on the site.

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective that the proposed mining activities may proceed.

Also, please note:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum 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)).

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Definitions and abbreviations

Midden:	Refuse that accumulates in a concentrated heap.
Stone Age:	An archaeological term used to define a period of stone tool use and manufacture
Iron Age:	An archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture
LIA:	Late Iron Age sites are usually demarcated by stone-walled enclosures
NHRA:	National Heritage Resources Act (Act No. 25 of 1999)
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
PHRA-G:	Provincial Heritage Resources Authority - Gauteng
GDARD:	Gauteng Department of Agriculture and Rural Development
HIA:	Heritage Impact Assessment
DMR:	Department of Mineral Resources
I&APs:	Interested and Affected Parties

I, Francois Coetzee, hereby confirm my independence as a cultural heritage specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of the listed environmental processes, other than fair remuneration for work performed on this project.



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1. Introduction and Terms of Reference

Milnex CC an independent environmental consultant was contracted by the client to undertake the Scoping and EIA process for a Prospecting Right application combined with a Waste License Application for the Prospecting of Diamonds Alluvial (DA), Diamonds in Kimberlite (DK), Diamonds General (D) & Diamonds (DIA) on the remaining extent of the farm Kameeldrift 285, near Hopetown, Thembelihle Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province. The property is located approximately 30 km from Douglas, towards Hopetown in the Northern Cape Province. The Scoping and EIA process for Environmental Authorisation for the proposed diamond prospecting is conducted in terms of the National Environmental Management Act (Act 107 of 1998)(NEMA). A Cultural Heritage Impact Assessment (HIA) was requested by Milnex CC on behalf of the client to evaluate the potential impact of the proposed diamond prospecting activities.

2. Objectives

The general objective of the cultural heritage survey is to record and document cultural heritage remains consisting of both tangible and intangible archaeological and historical artefacts, structures (including graves), settlements and oral traditions of cultural significance.

As such the terms of reference of this survey are as follows:

- Identify and provide a detailed description of all artefacts, assemblages, settlements and structures of an archaeological or historical nature (cultural heritage sites) located on the study area,
- Estimate the level of significance/importance of these remains in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value,
- Assess any impact on the archaeological and historical remains within the area emanating from the development activities, and
- Propose recommendations to mitigate heritage resources where complete or partial conservation may not be possible and thereby limit or prevent any further impact.

3. Description of Physical Environment of Study Area

The property is located approximately 30 km south from Douglas, towards Hopetown in the Northern Cape Province. The Orange River borders the north-eastern boundary of the survey area.

Farm Name(s) and Portions	Kameeldrift 285 • remaining extent
Size of Survey Area	3749.61 hectares
Magisterial District	Thembelihle Local Municipality Pixley ka Seme District Municipality
1:50 000 Map Sheet	2923BD
1:250 000 Map Sheet	2922
Central Coordinates of the Development	23.847155°E 29.347129°S

Table 1: Physical Environment

The southern section of the survey area falls within the Nama-Biome, particularly the Upper Karoo Bioregion and more specifically the Northern Upper Karoo Vegetation (NKu3). This

veld type occurs in the Northern Cape and Free State Provinces: Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Philipstown, Petrusville and Petrusburg in the east. Bordered in the north by Niekerkshoop, Douglas and Petrusburg and in the south by Carnarvon, Pampoenpoort and De Aar. A few patches also occur in Griqualand West. *Prosopis glandulosa*, regarded as one of the 12 agriculturally most important invasive alien plants in South Africa, is widely distributed in this vegetation type. *Prosopis* occurs in generally isolated patches, with densities ranging from very scattered to medium (associated with the lower Vaal River drainage system and the confluence with the Orange River) to localised closed woodland on the western border of the unit with Bushmanland Basin Shrubland (Mucina & Rutherford 2006).

In addition, a section on the north of the survey footprint falls within the Savanna Biome, particularly the Eastern Kalahari Bushveld Bioregion and more specifically the Kimberley Thornveld (SVk4) and Vaalbos Rocky Shrubland (SVk5). The Kimberley Thornveld occurs in North West, Free State and Northern Cape Provinces: Most of the Kimberley, Hartswater, Bloemhof and Hoopstad Districts as well as substantial parts of the Warrenton, Christiana, Taung, Boshof and to some extent the Barkly West Districts. Also includes pediment areas in the Herbert and Jacobsdal Districts. The Vaalbos Rocky Shrubland occurs in Northern Cape and Free State Provinces. It also extends along solitary hills and scattered ridges east of the confluence of the Orange and Vaal Rivers, mainly in the Kimberley and Herbert Districts and west of a line bounded by the western Free State towns of Luckhoff, Petrusburg, Dealesville, Bultfontein and Hertzogville. The northern-most section along the Orange River falls within the Azonal Vegetation Biome, particularly the Alluvial Vegetation Bioregion and more specifically the Upper Gariep Alluvial Vegetation (AZa4) which occurs in the Free State and Northern Cape Provinces as well as broad alluvia of the Orange River, lower Caledon as well as lower stretches of the Vaal, Riet and Modder Rivers as far as Groblershoop. These river stretches are surrounded by vegetation units of broad transitional regions between the dry facies of the Savanna and Grassland and northern regions of the Nama-Karoo Biome (Mucina & Rutherford 2006).

Infrastructure consists of the R357 (north west of the survey area) and several dirt roads that provide access to the area, as well as power lines, fences, extensive agricultural fields (both used and fallow), cattle farming and diamond mining. The survey footprint is mostly open and flat dominated by red Kalahari sands with intermittent limestone ridges, resulting in extensive open grasslands. Along the Orange River most of the surface has been extensively disturbed by mining activities during the last 100 years.

Douglas normally receives about 211 mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (lower left) shows the average rainfall values for Douglas per month. It receives the lowest rainfall (0 mm) in June and the highest (57 mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Douglas range from 18.4°C in June to 32.9°C in January. The region is the coldest during July when the mercury drops to 1°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures (SAexplorer 2018).

Current Zoning	Agricultural land
Economic activities	Farming and mining
Soil and basic geology	The region is part of the Karoo Supergroup with the Dwyka Formation – (Diamictite and boulder shale; subordinate sandstone and varved shale)

	<p>with limestone lenses). The Quaternary Era (include: Calcrete and Aeolian sand). The Jurassic Era (include: Dolerite).</p> <p>The Karoo Supergroup is the most widespread stratigraphic unit in Africa south of the Kalahari Desert. The supergroup consists of a sequence of units, mostly of nonmarine origin, deposited between the Late Carboniferous and Early Jurassic, a period of about 120 million years. The proposed prospecting area covers the Dwyka Formation of the Karoo Supergroup. During the Late Carboniferous the lithosphere underlying what is now the Karoo Basin migrated over the South Polar Region. This resulted in southern Gondwana being covered by a major ice sheet. As the ice sheet and subsequent glaciers melted, the sediments of the Dwyka Group were deposited in the newly formed basin. These glacial deposits include diamictite, varved shale and mudstone with dropstones, fluvio-glacial gravel and conglomerates. The total thickness of the group ranges from 600 m to 750 m. The Dwyka Formation is considered to be Permo-Carboniferous in age, but due to ambiguities in the fossil record, more precise dating is not available. Maximum age inferred from fossils found in underlying strata is Late Devonian or Early Carboniferous, and minimum age inferred from fossils in the upper glacial deposits is Early Permian.</p> <p>Surface drainage in the area is affected through the Orange river. Although alluvium is largely restricted to the river, the river has resulted in the creation of a large floodplain immediately to the west, which comprises alluvium that is largely covered by windblown sand. Of additional interest in this area are the presence of alluvial gravels some of which are covered by alluvium and windblown sand.</p>
Prior activities	<p>Livestock and agriculture Mining (Diamonds and sand)</p>
Socio Economic Environment	<p>According to the 2011 Census Siyancuma LM has a total population of 37 076 people. The majority of the population in the municipality are coloured at 57.5%, 33.3% are black African, 7.5% are white, 0.7% are Indian/Asian and with the other population groups making up the remaining 1.4%. Of those aged 20 years and older 7.2% have completed primary school, 30.3% have some secondary, 16.9% have completed matric and 5.4% have some form of higher education. Of the mentioned age group, 16.8% have no form of schooling. There are 9 578 households in the municipality and of those households 35% have access to piped water either in their dwelling or in the yard. While 82.2% of the households have access to electricity for lighting. There are 11 064 people that are economically active (employed or unemployed but looking for work), and of these 28.2% are unemployed. Of the 5 800 economically active youth (15-34 years) in the area, 35.2% are unemployed</p>
Evaluation of Impact	<p>An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits NHRA (Act No. 25 of 1999, Section 38(3d)): Positive</p>

Table 2: Socio-economic environment

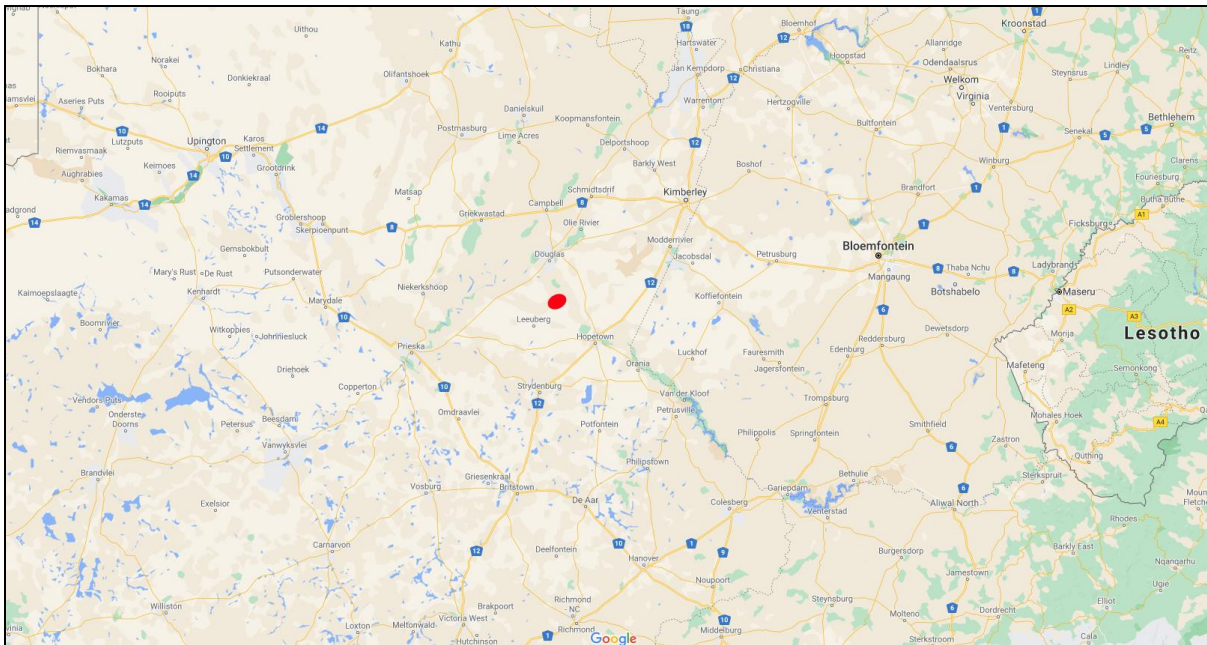


Figure 1: Regional context of the survey footprint located south south-west of Kimberley (indicated by the red area)

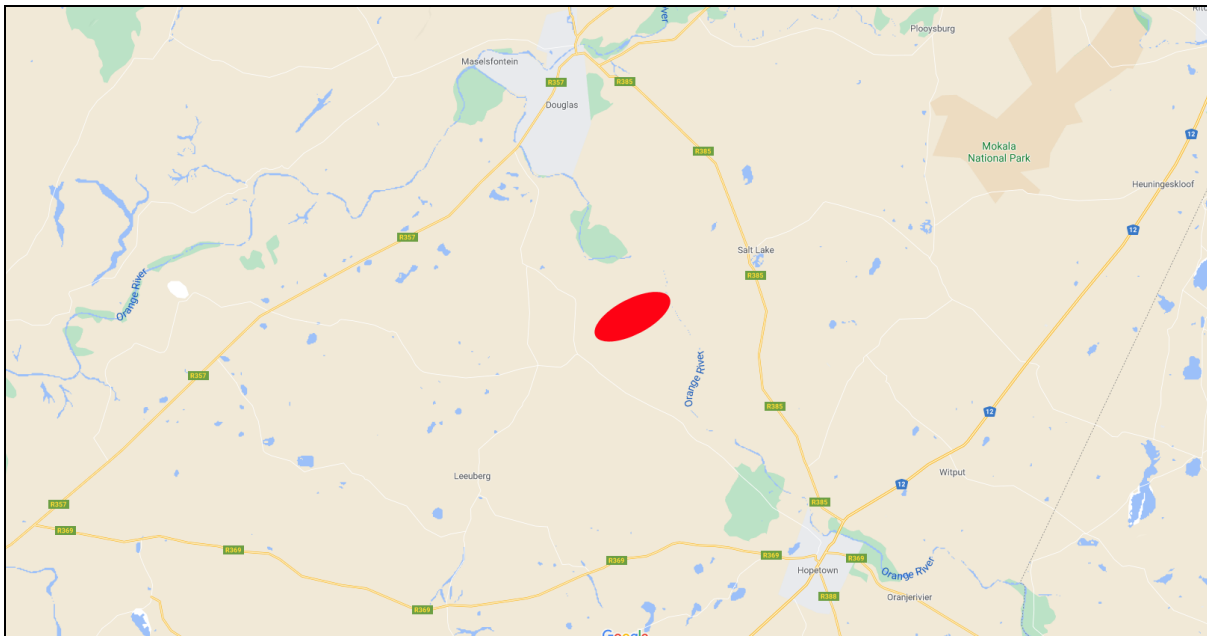


Figure 2: Local context of the survey area located south-east of Douglas (indicated by the red area)

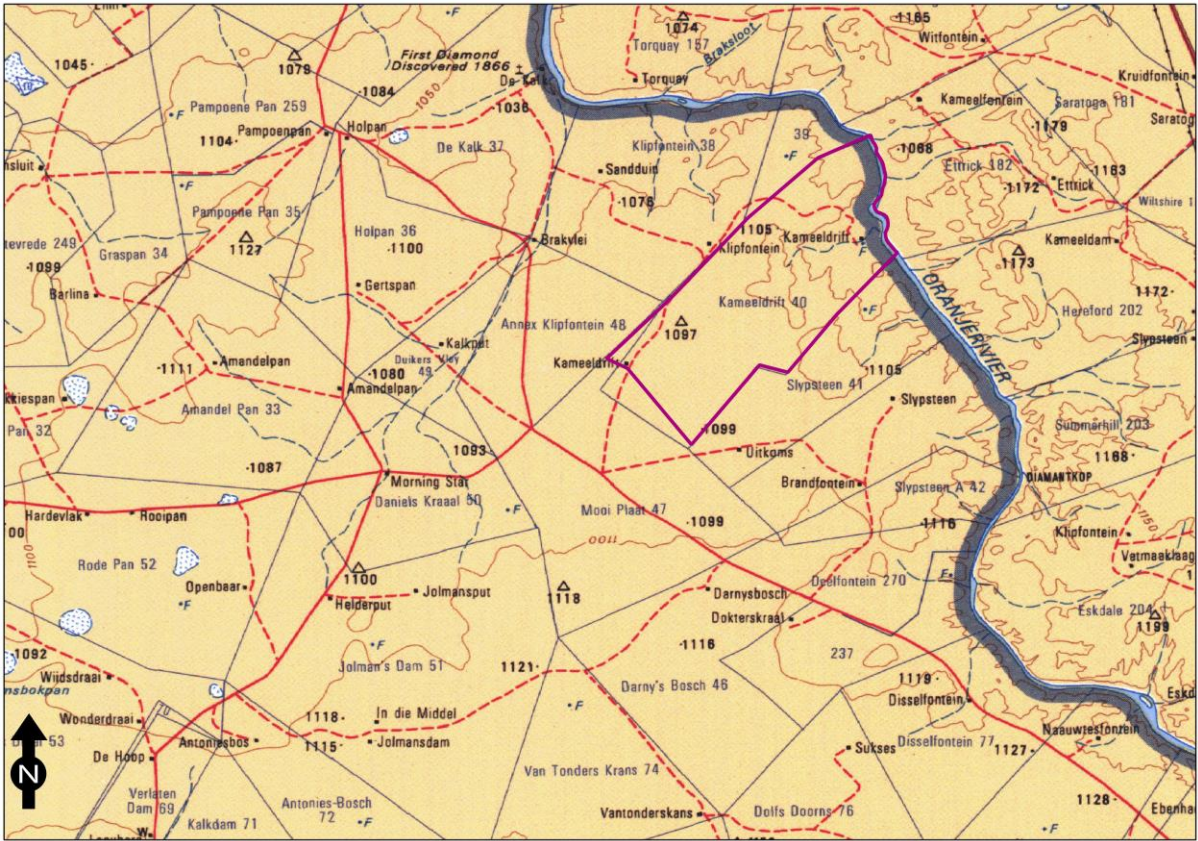


Figure 3: Local context of the survey footprint (1:250 000 Map 2922)

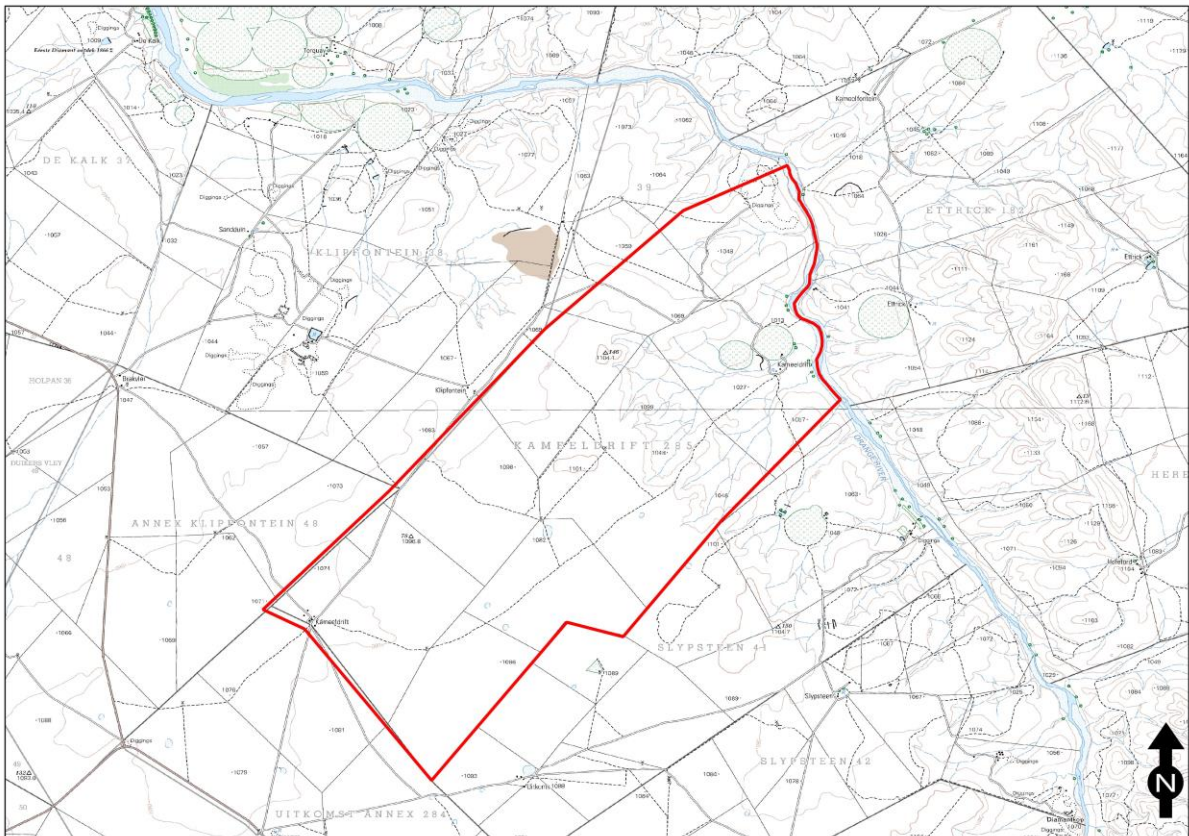


Figure 4: The survey area as indicated on the 1:50 000 topographic map 2923BD (2005)

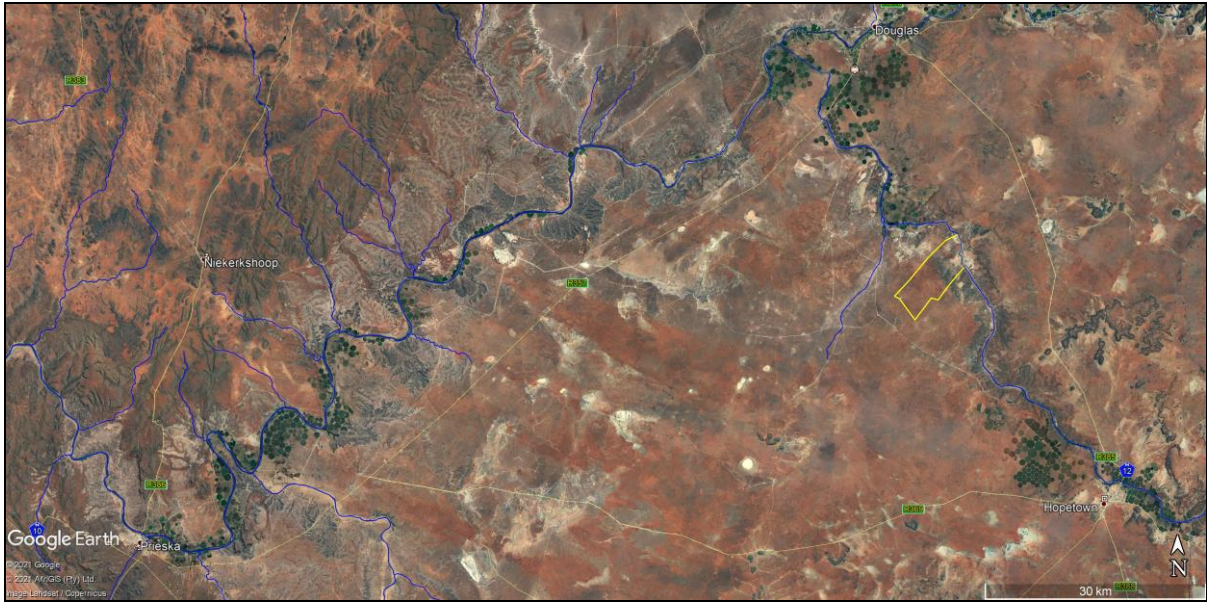


Figure 5: Survey area within a regional context (Google Earth Pro 2021)

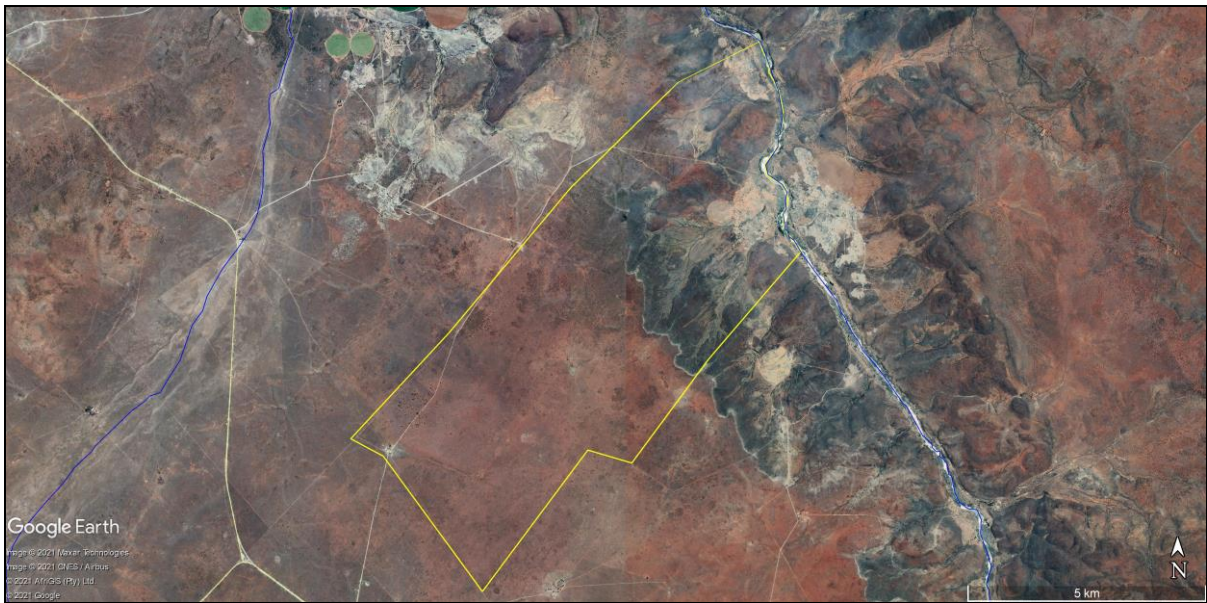


Figure 6: Survey area within a local context (Google Earth Pro 2021)



Figure 7: Detail of survey area as indicated on Google Earth Pro (along the Orange River) (2021)

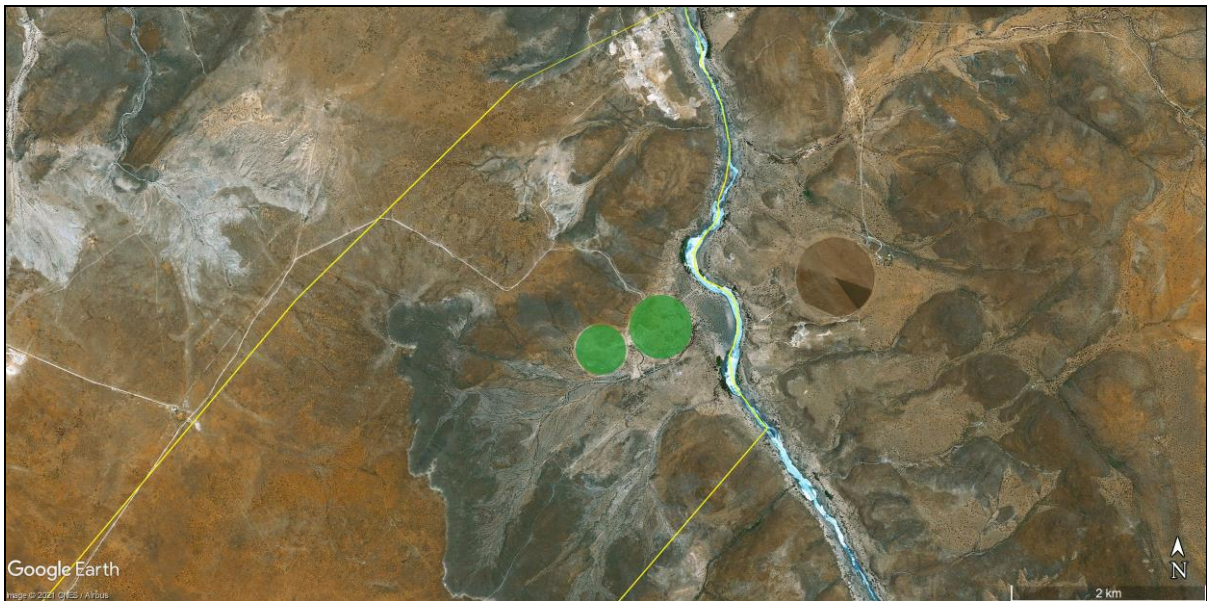


Figure 8: Detail of survey area indicating old agricultural pivots on Google Earth Pro (2021)



Figure 9: General view of the southern section of the survey footprint



Figure 10: General view of the cattle watering trough in the central eastern section of the survey footprint



Figure 11: General view of the vegetation and surface lime in the southern central section of the survey footprint



Figure 12: General view of the central section of the survey footprint



Figure 13: General view of the north central section of the survey footprint



Figure 14: General view of the north section (old mining activities) of the survey footprint



Figure 15: General view of the north section (current mining activities) of the survey footprint



Figure 16: General view of the north section (existing infrastructure) of the survey footprint



Figure 17: General view of the north section (mining activities) of the survey footprint



Figure 18: General view of the north section (main mining area) of the survey footprint



Figure 19: General view of the north section (current mining activities) of the survey footprint



Figure 20: General view of the north section (old mining dumps along the river) of the survey footprint

4. Proposed Project Description

The proposed mining activities will include the following:

Pitting

A trial pit/test pit or inspection pit investigation is a highly effective way of obtaining data on the sub surface soil and rock conditions which underlie a prospecting sight. It allows for the various soils and rock types to be locked, the soil to be sampled and a preliminary assessment to be made. Pits will be dug, locked, sampled and backfilled. To dig the pits the applicant will make use of the systems of Pierre de Jager, the appointed project geologist. The applicant will at the end of the pitting process have locked the pits with the following information:

- A description of the soil and rock types from ground level to the base of the pits;
- Record of rock head depth and refusal depth, a list of where the samples will be taken, a record of where ground water seepage will be recorded;
- A general note of the geology and conditions in the vicinity of the test pits;
- Pitting will be done within the period of 24 months once the prospecting right has been granted.

It is planned that 100 pits will be dug (it may be less depending on the results) at an extent of 5 m (length) x 5 m (breadth) x 5 m (depth).

- $(100 \text{ pits} / 24 \text{ months}) \times 12 \text{ months} = 50 \text{ pits dug per year}$
- $\text{Total area to be disturbed per year} = 50 \text{ pits} \times (5 \text{ m} \times 5 \text{ m}) / 10\,000 = 0.125 \text{ Ha disturbed per year}$
- $\text{Total area disturbed for 24 months} = 100 \text{ pits} \times (5 \text{ m} \times 5 \text{ m}) / 10\,000 = 0.25 \text{ Ha disturbed for 24 months}$

Trenches

Due to nature of the alluvial diamond deposit, samples are not taken for assay as would be normal practice to evaluate hard rock precious or base-metal prospects. The diamond distribution pattern grade of alluvial diamonds is also of such a nature that there is no repeatability of sample results, even from adjacent samples. Bulk samples will have to be taken to determine the average sample grade. By taking of the bulk samples, the applicant foresees to determine the grade of the diamond deposits as the number of carats contained in 100 tons (cpht) of gravel and to determine the average diamond sizes.

During these activities the applicant will then find out the size and value distribution of trenches. Diamond distribution patterns of alluvial deposits varies to such a nature that there is no repeatability of sample results even from adjacent samples. Alluvial diamond deposits can only be sampled through bulk sampling comprising thousands of cubic meters of gravel. Given the extent of the area and the grades expected to be very low, the applicant will have to process bulk samples of approximately 660 000 tonnes.

The appointed geologist will advise where the samples will be taken. Bulk samples will not be taken along a systematic grid as in the case of drilling. As the anticipated mining plan for the properties will be based on high volumes (low grades), the bulk samples will have to address average recovery. As indicated, the bulk sampling exercise has to be conducted to determine the grades (cpht), the diamond size distribution and thereafter to sell the diamonds to determine the diamond values.

The plant/ bulk sampling technique will be that of a typical South African alluvial diamond mining operation. The method is a strip mining process with oversize material and tailings recovered from the plant will be used as backfill material prior to final rehabilitation. Gravels are excavated, loaded and transported to the treatment facility using dump trucks. The bulk sampling operation will be conducted using a fleet of conventional open pit mining equipment comprising of dump trucks supported by appropriate excavators and front-end-loaders. All equipment is planned to be diesel driven.

Before excavation commences vegetation will be cleared from the proposed bulk sampling block. These will be done as per environmental regulations. Top soil will then be removed and stored separately for later used for rehabilitation. The bulk samples will be made in the form of box cuts the dimensions of these individual box cuts will on average be 60m long x 50m wide. It is estimated that the bulk samples will be 5 m in depth. Gravel will be removed by excavators and will be loaded directly into dump trucks. Ore will be hauled to the screening plant. The material will be screened where after the screened material will be moved to the processing plant where the gravel will be processed. Concentrate will be moved to the sorting plant where the concentrate will be sorted.

It is estimated that pitting and trenching will take approximately 48 months.

- $(50 \text{ trenches} / 24 \text{ months}) \times 12 \text{ months} = 25 \text{ trenches dug per year}$
- $\text{Total area to be disturbed per year} = 25 \text{ trenches} \times (60 \text{ m} \times 50 \text{ m}) / 10000 = 7.5 \text{ Ha disturbed per year}$

- Total area to be disturbed for 24 months = 50 trenches x (60 m x 50 m) / 10 000 = 15 Ha disturbed for 24 months

5. Legal Framework

- Listing notice 1 GNR327: Activity 9: The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;
- Listing notice 1 GNR 327: Activity 10: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;
- Listing Notice 1: GNR 327, Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from: (i) a watercourse;
- Listing Notice 1, GNR 325, Activity 20: “Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] (b) the primary processing of a petroleum resource including winning, extraction, classifying, concentrating or water removal;
- Listing Notice GNR 325, Activity 15: "The clearance of an area of 20 hectares or more, of indigenous vegetation." – Random indigenous vegetation clearance of over a 3749.6090 hectares area;
- Listing Notice GNR 325, Activity 19: “The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including— (a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource [,]; or (b) [including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)] the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;
- Listing Notice 3: GNR 324, Activity 12 (g): Northern Cape; The clearance of an area of 300 square metres or more of indigenous vegetation; ii) Within critical biodiversity areas identified in bioregional plans.

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE APPLIED
The Constitution of the Republic of South Africa (Act No. 108 of 1996)	
The National Environmental Management Act (Act No. 107 of 1998)	Section 24(1) Section 28(1)
The National Water Act (Act No. 36 of 1998)	Section 21 a-k
Air Quality Act (Act No. 39 of 2004)	Section 2
National Forests Act, Act of 84 of 1998	Chap 3 (Part 1), Section 12(1), Section 15(1), Section 58(1)

The National Heritage Resources Act (Act No. 25 of 1999)	Section 38, 34, 35, 36
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	NEM:WA 59 of 2008 Category A: (15)
The National Water Act (Act No. 36 of 1998);	Section 21
Mine Health and Safety Act (Act No. 29 of 1996) (MHSA)	
Biodiversity Act (Act 10 of 2004)	
National Infrastructure Plan	
Thembelihle Local Municipality Integrated Development Plan (IDP)	
Pixley ka Seme District Municipality Integrated Development Plan (IDP)	

Table 3: Legal framework

- Section 38 of the NHRA (Act No. 25 of 1999) stipulates that the following activities trigger a heritage survey:

Development criteria in terms of Section 38(1a-e) of the NHRA (Act No. 25 of 1999)	Yes/No
Construction of road, wall, powerline, 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 m ² in extent	Yes
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 m ²	Yes
Any other development category, public open space, squares, parks, recreation grounds	No

Table 4: Activities that trigger Section 38 of the NHRA

- Field rating system as recommended by SAHRA:

Field Rating	Grade	Significance	Recommended Mitigation
National Significance	Grade I	High significance	Conservation by SAHRA, national site nomination, mention any relevant international ranking. No alteration
Provincial Significance	Grade II	High significance	Conservation by provincial heritage authority, provincial site nomination. No alteration whatsoever without permit
Local Significance	Grade III-A	High significance	Conservation by local authority, no alteration whatsoever without permit from provincial heritage authority. Mitigation as part of development process not
Local Significance	Grade III-B	High significance	Conservation by local authority, no external alteration without permit from provincial heritage authority. Could
Generally Protected A	Grade IV-A	High/medium significance	Conservation by local authority. Site should be mitigated before destruction. Destruction permit required from
Generally Protected B	Grade IV-B	Medium significance	Conservation by local authority. Site should be recorded before destruction. Destruction permit required from provincial heritage authority.
Generally Protected C	Grade IV-C	Low significance	Conservation by local authority. Site has been sufficiently recorded in the Phase 1 HIA. It requires no further recording before destruction. Destruction permit

Table 5: Field rating system to determine site significance

- Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and they are valuable, finite, non-renewable and irreplaceable.

- All archaeological remains, features, structures and artefacts older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the **National Heritage Resources Act (NHRA) (Act No. 25 of 1999, Section 34 & 35)**. The Act makes an archaeological impact assessment as part of an EIA and EMPR mandatory (see **Section 38**). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the **South African Heritage Resources Agency (SAHRA)**. Full cognisance is taken of this Act in making recommendations in this report.
- Cognisance will also be taken of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002) and the National Environmental Management Act (Act No 107 of 1998) when making any recommendations.
- Human remains older than 60 years are protected by the NHRA, with reference to Section 36. Human remains that are less than 60 years old are protected by the Regulations Relating to the Management of Human Remains (GNR 363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003 as well as local Ordinances and regulations.
- With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise.
- The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3, and the Australian ICOMOS (International Council on Monuments and Sites) Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.
- A copy of this report will be submitted on SAHRIS as stipulated by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), Section 38 (especially subsection 4) and the relevant Provincial Heritage Resources Authority (PHRA).
- Note that the final decision for the approval of permits, or the removal or destruction of sites, structures and artefacts identified in this report, rests with the SAHRA (or relevant PHRA).

6. Study Approach/Methodology

Geographical information (ESRI shapefiles) on the proposed prospecting areas was supplied by Milnex CC. The most up-to-date Google Earth images and topographic maps were used to indicate the survey area. Topographic maps were sources from the Surveyor General. Please note that all maps are orientated with north facing upwards (unless stated otherwise).

The strategy during this survey was to survey a representative sample of the footprint that forms part of the application. The area is very homogeneous with large areas covered with red Kalahari sand and limestone outcrops, and erosion and mining areas along the Orange River. Existing access tracks were used with selected areas surveyed more intensely using pedestrian survey techniques.

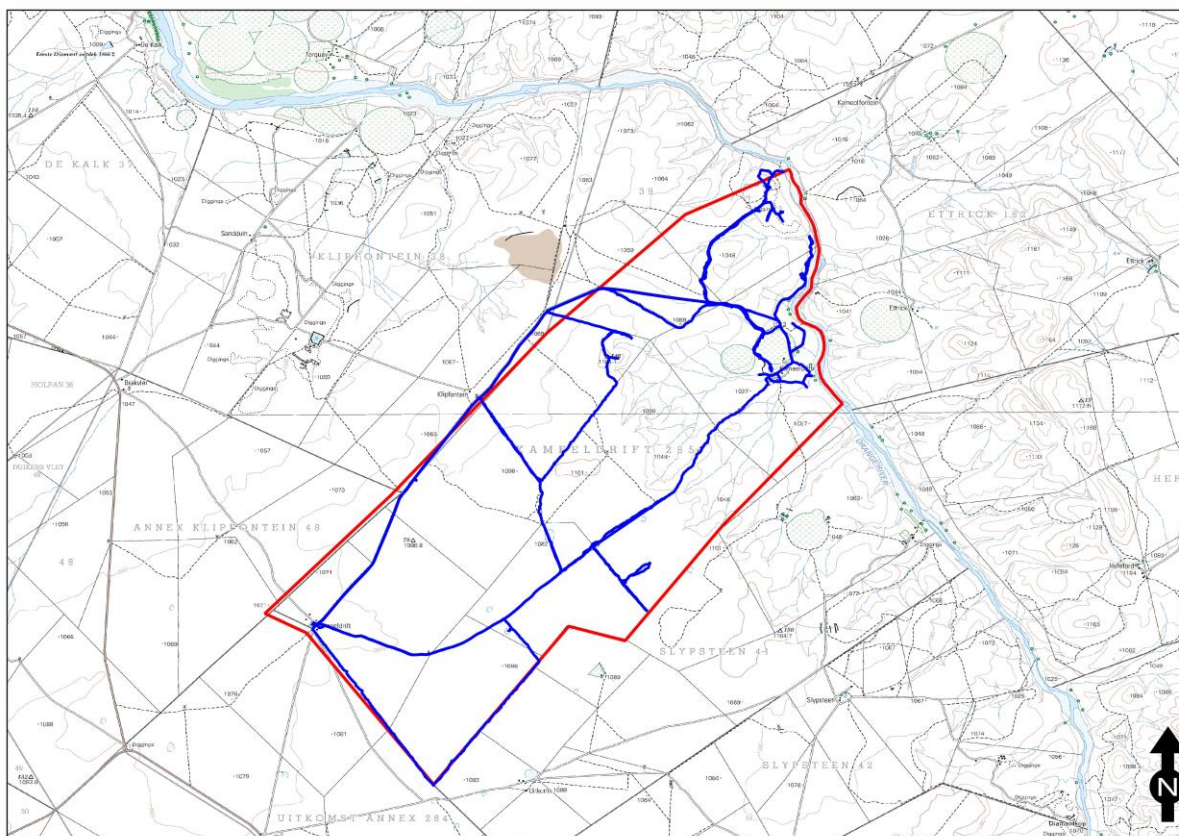


Figure 21: Recorded survey tracks for the project

6.1 Review of existing information/data

Additional information on the cultural heritage of the area was sourced from the following records:

- National Mapping Project by SAHRA (which lists heritage impact assessment reports submitted for South Africa);
- Environmental Potential Atlas (ENPAT);
- Online SAHRIS database;
- National Automated Archival Information retrieval System (NAAIRS);
- Maps and information documents supplied by the client; and
- Several heritage surveys have been conducted in the vicinity of the survey area (published and unpublished material on the area) (Beaumont 2006, Coetzee 2018, De Wit 2017, Dreyer 2008, Engelbrecht & Fivaz 2018, Higgett & Nel 2014, Morris 2005a, 2005b and 2007, Van Ryneveld 2005a, 2005b, 2013)
- McGregor Museum, Kimberley: Archaeology Department (Beaumont & Morris 1990, 2004; Morris 2011).

Several heritage surveys and research projects have been completed outside the project footprint during the last few decades (Breuil 1948; Goodwin 1928 & Söhngge et al 1937; Van Hoepen 1927). Please note that the well-known rock art site Driekopseiland is situated roughly 200 km to the east of the survey footprint (Morris 2002).

Several heritage impact assessments have been completed in the general vicinity of the survey footprint (Morris 2005a, 2005b and 2007) which yielded mostly Early and Middle Stone Age sites as well as rock art (engravings). On the farm De Kalk 37 a plaque marks the

1866 discovery of the Eureka diamond (erected by the then National Monuments Council) and several Middle Stone Age scatters were recorded (Van Ryneveld 2005a). In 1867 the first diamond was discovered by Erasmus Jacobs near Hopetown on De Kalk. The ruins of the Jacobs family residence are declared a Grade II Provincial Heritage Site (GN 1705, 1980). The discovery of diamonds near Hopetown and in Kimberley led in part to the conflicts of the First and Second Anglo Boer Wars. Significant events associated with the Second Anglo-Boer War or South African War, took place in the region. A survey was also conducted of portions of the farm Ettrick 182 where a large low density Middle Stone Age site was recorded (Van Ryneveld 2005b). A survey on the farm Disselfontein 77 yielded small numbers of Later Stone Age and Early Stone Age lithics including a handaxe, bifaces as well as over 100 Middle Stone Age scatters (De Wit 2017). A survey on the remainder of the farm Tullochgorum No. 158 and the Remainder of Farm Kameeldrift No. 285 recorded a historical livestock enclosure and a MSA scatter (van Ryneveld 2013). A larger study near Hopetown also recorded six Middle Stone Age lithic scatters and a grave site (Engelbrecht & Fivaz 2018). A survey on the farm Sleepsteen 21 yielded two Early Stone Age and three Middle Stone Age lithic scatters and isolated finds (Higgett & Nel 2014). A heritage assessment was completed in selected areas within the current survey footprint on the farm Kameeldrift 285 (40) (Dreyer 2008) and although no heritage sites were recorded several isolated Stone Age flakes, pebbles and cores were noted (no coordinates are listed).

Several glacial pavements are known in the region, especially further to the north east of the survey footprint.

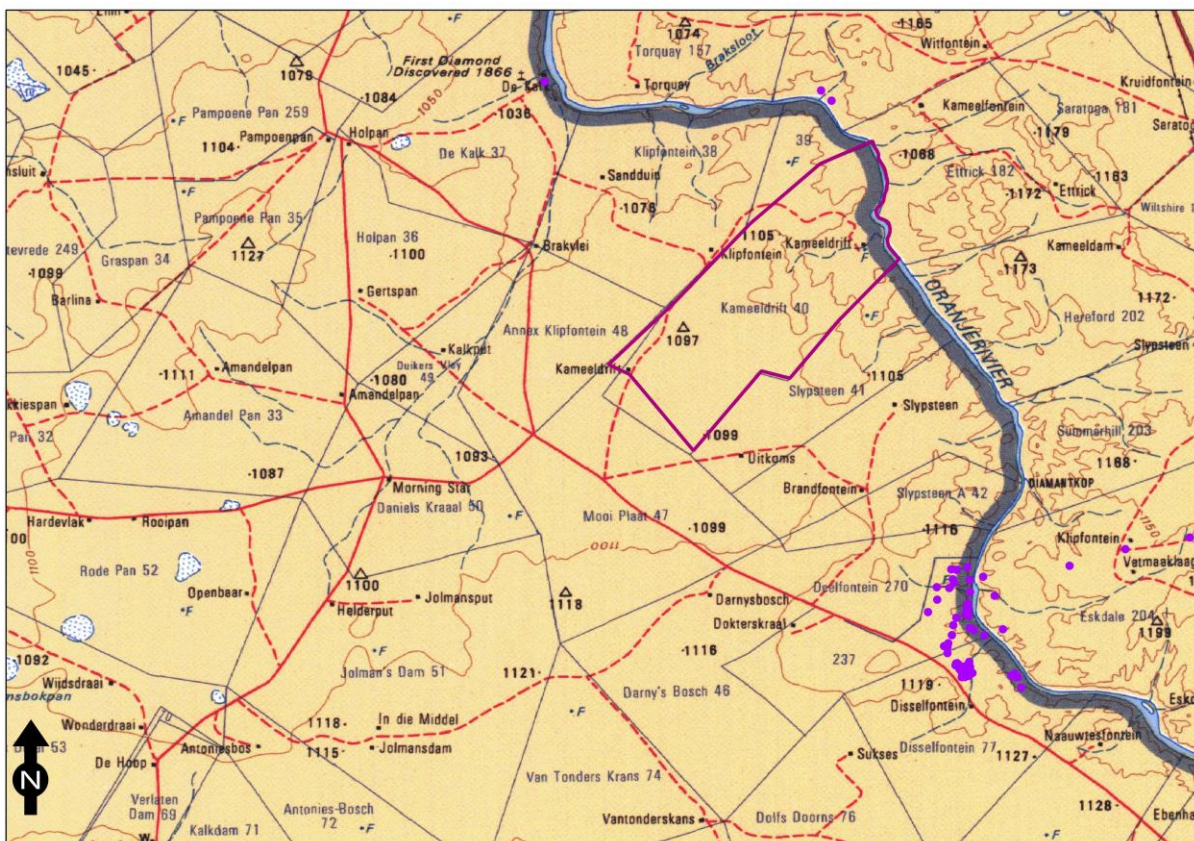


Figure 22: Recorded sites near the survey footprint, and surrounding areas (SAHRIS 2021)

The Surveyor General's map of the farm Kameeldrift 285 indicates that the farm was first surveyed in 1860 (also see Addendum 2). It should also be noted that one of the roads

connecting Douglas and Hopetown is also indicated on the survey map. However, today no trace of this road remains.

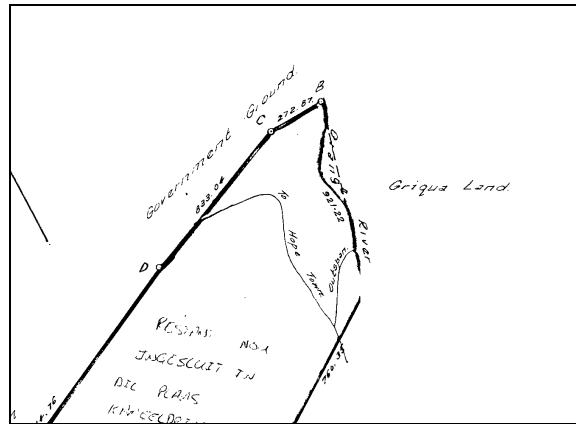


Figure 23: Historical road leading to Hopetown indicated on the Surveyor Generals map of 1860

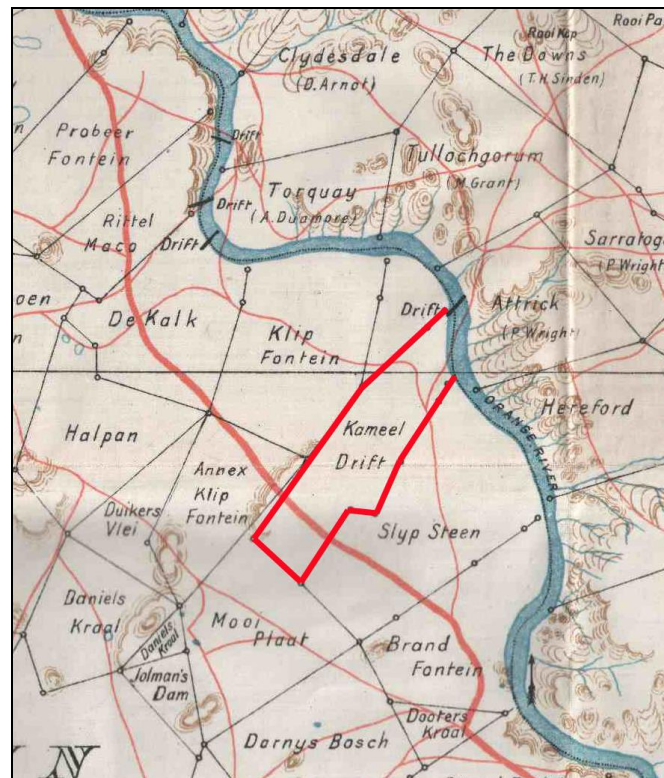


Figure 24: Indicating the survey area on a Field Intelligence Department map of Hopetown and surrounds, dating to 1900

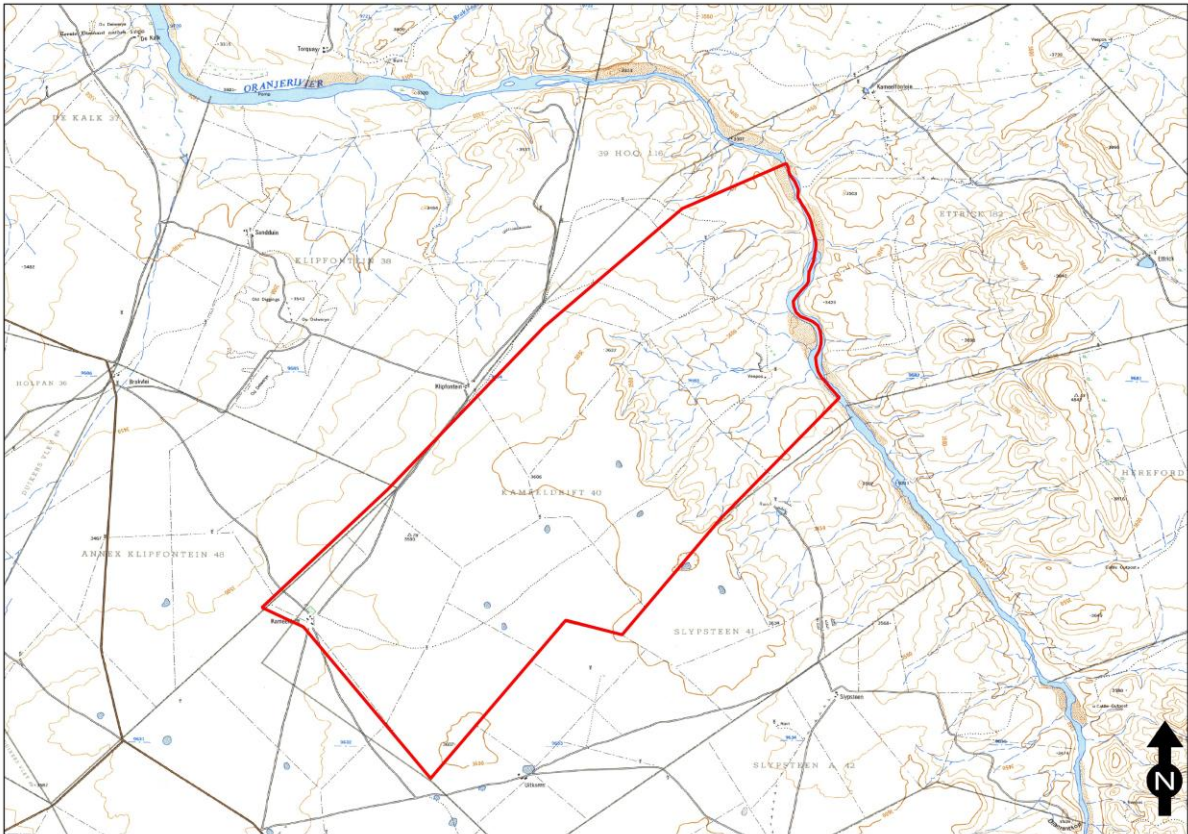


Figure 25: The survey area as indicated on the 1:50 000 topographic map 2923BD (1964)

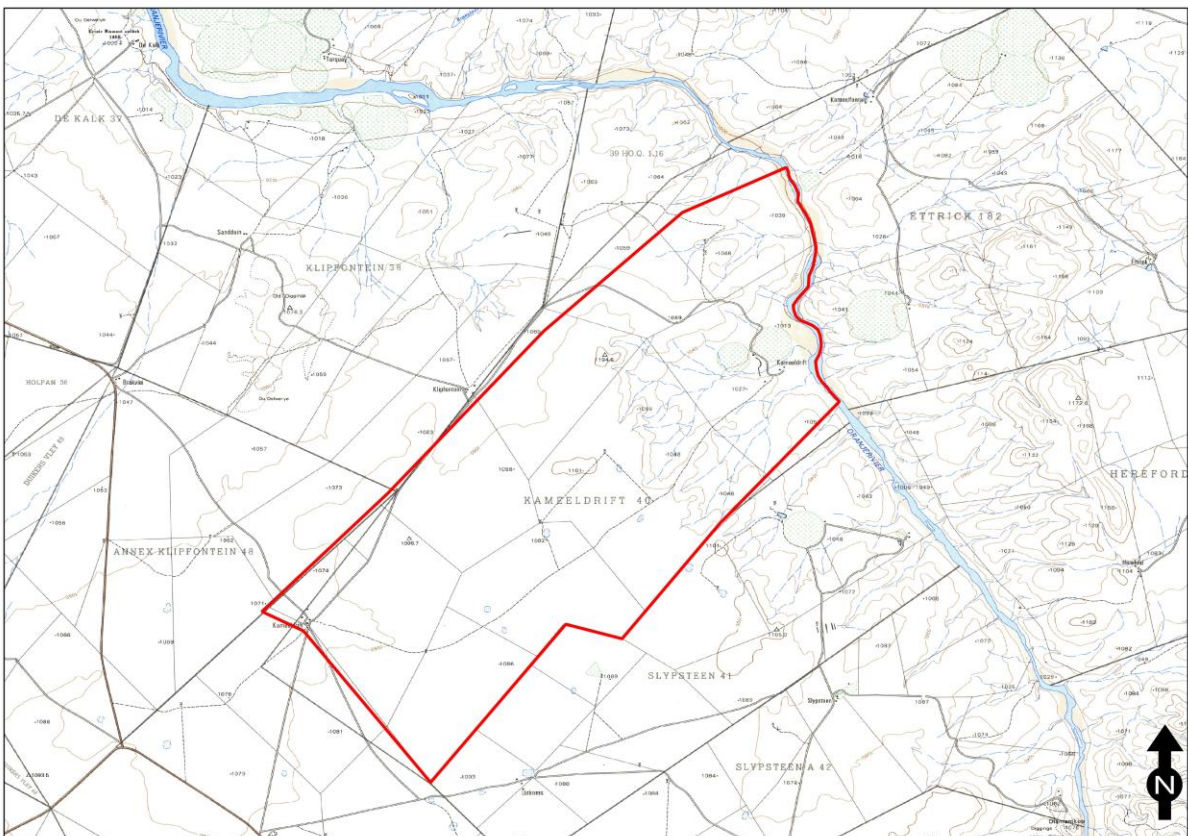


Figure 26: The survey area as indicated on the 1:50 000 topographic map 2923BD (1988)

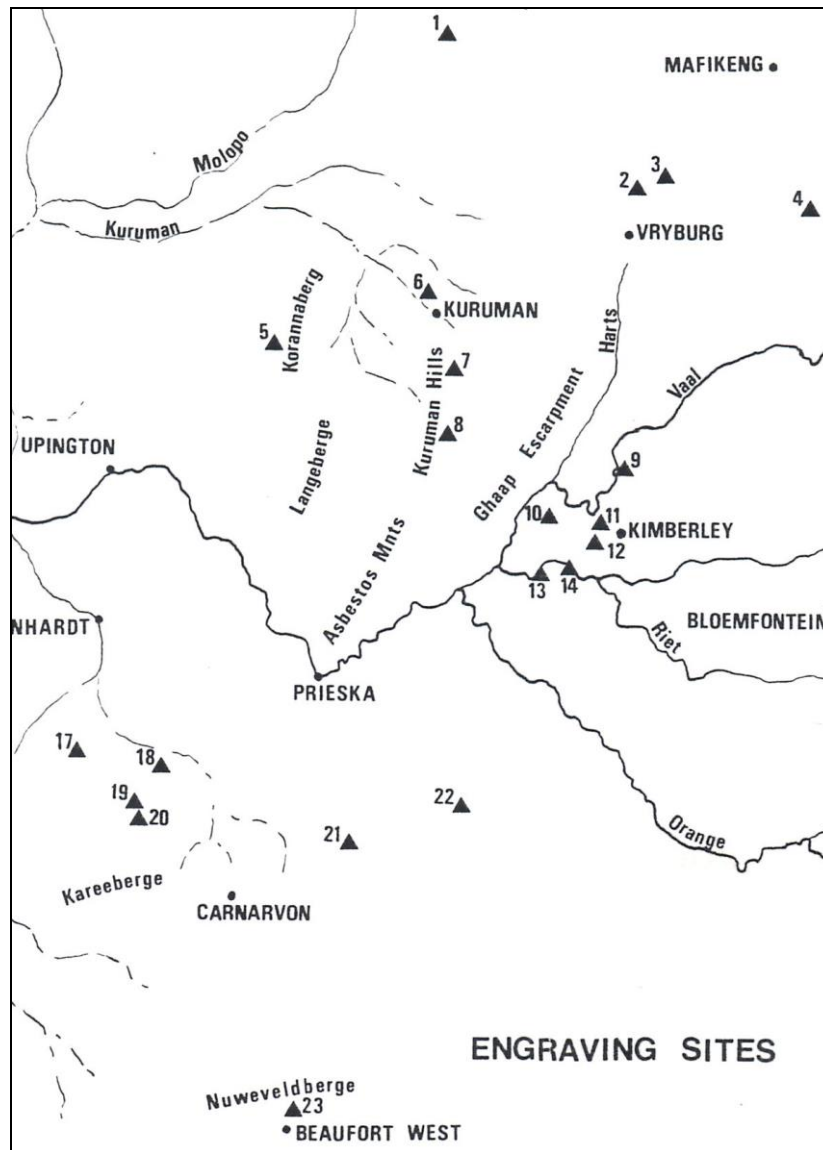


Figure 27: Rock art sites in the general region near the survey area (after Morris 1988)

6.2 Palaeontological sensitivity

The original mineralogy of the lava consisted of lath-like feldspar and pyroxene set in a glassy groundmass, but this composition has been fundamentally changed to mineralogy comparable to that of a greenschist. The feldspars have been partly or completely saussuritised. The pyroxene, which probably consisted of augite has been uralitised and the glassy groundmass has been devitrified. Thus the rocks now chiefly consist of secondary minerals such as chlorite, epidote, clinozoisite, calcite, sericite and uralite. The Gordonia Formation comprises red and yellow fine-grained sand. Although the formation is an Aeolian deposit no dunes are present in the area. Any dunes that might have been present must have become destroyed during reworking of the sand.

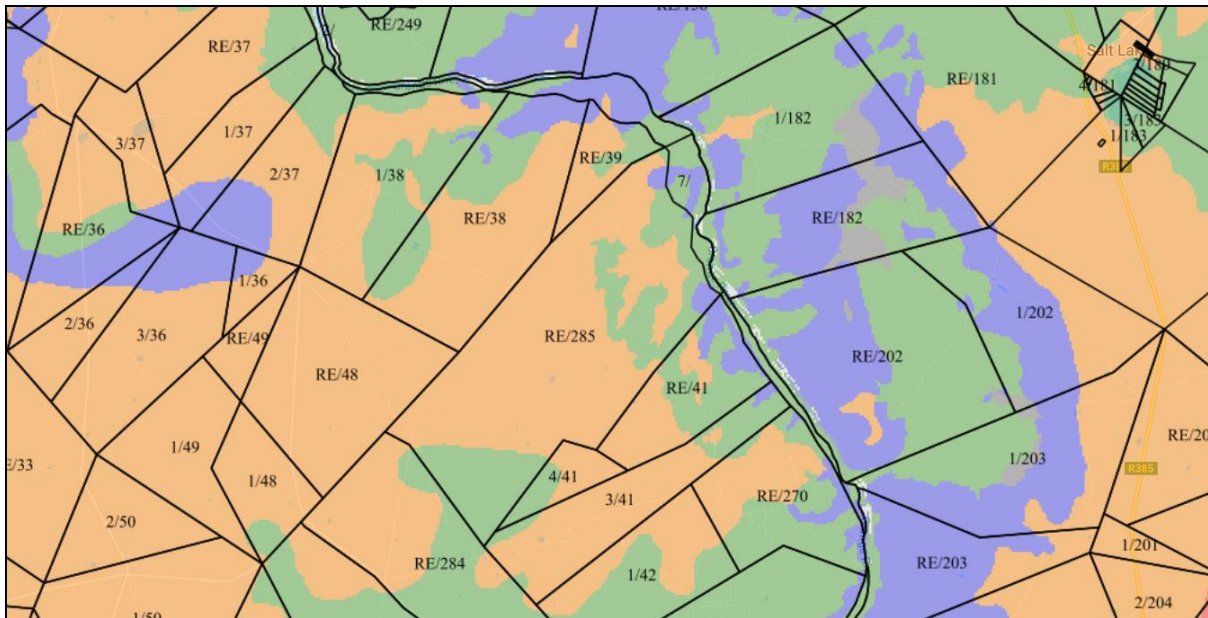


Figure 28: Palaeontological sensitivity zones as indicated for the survey footprint (285) (SAHRIS 2021)

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	Will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The palaeontological sensitivity map was extracted from the SAHRIS database and clearly shows most of the survey footprint as Orange/Yellow (HIGH) sensitivity, while along the northern sections Green (MODERATE) and Blue (LOW). As a result a desktop study assessment and protocol for finds will be required for the survey footprint.

6.3 Site visits

The field survey was conducted on 9 and 10 March 2021.

6.4 Social interaction and current inhabitants

The farm owners were consulted on the history of the farm and the location of possible graves or graveyards.

6.5 Public Consultation and Stakeholder Engagement

An advertisement was placed in English in the local newspaper (Noordkaap Bulletin) on the 14th of January 2021 advertisement notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Milnex CC. I&APs were given the opportunity to raise comments within 30 days of the

advertisement. Identified I&APs, including key stakeholders representing various sectors, are directly informed of the proposed development and the availability of the Scoping Report via registered post on 10 December 2020 and were requested to submit comments by 31 January 2021. A copy of the report is also available at the Milnex offices in Schweizer-Reneke, 4 Botha Street, Schweizer-Reneke and Potchefstroom (Waterberry Street, Waterberry Square, 1st floor, Office 5B, Potchefstroom), between 7:30AM and 5PM, Monday to Thursday & between 7:30AM and 4PM on a Friday.

6.6 Assumptions, restrictions, gaps and limitations

No severe physical restrictions were encountered as the survey area was fairly accessible. The survey area is however severely disturbed due to mining activities.

6.7 Methodology for assessment of potential impacts

All impacts identified during the EIA stage of the study will be classified in terms of their significance. Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected and how it will be affected;
- The **physical extent**, wherein it is indicated whether:
 - 1 - the impact will be limited to the site;
 - 2 - the impact will be limited to the local area;
 - 3 - the impact will be limited to the region;
 - 4 - the impact will be national; or
 - 5 - the impact will be international.
- The **duration**, wherein it is indicated whether the lifetime of the impact will be:
 - 1 - of a very short duration (0–1 years);
 - 2 - of a short duration (2-5 years);
 - 3 - of a medium-term (5–15 years);
 - 4 - of a long term (> 15 years); or
 - 5 - permanent.
- The **magnitude** of impact, quantified on a scale from 0-10, where a score is assigned:
 - 0 - small and will have no effect;
 - 2 - minor and will not result in an impact;
 - 4 - low and will cause a slight impact;
 - 6 - moderate and will result in processes continuing but in a modified way;
 - 8 - high, (processes are altered to the extent that they temporarily cease); or
 - 10 - very high and results in complete destruction of patterns and permanent cessation of processes;
- The **probability** of occurrence, which describes the likelihood of the impact actually occurring and is estimated on a scale where:
 - 1 - very improbable (probably will not happen);
 - 2 - improbable (some possibility, but low likelihood);
 - 3 - probable (distinct possibility);
 - 4 - highly probable (most likely); or
 - 5 - definite (impact will occur regardless of any prevention measures);
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- The **status**, which is described as either positive, negative or neutral;

- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and
- The degree to which the impact can be mitigated.

The significance is determined by combining the criteria in the following formula:

$S = (E+D+M) \times P$; where:
 S = Significance weighting
 E = Extent
 D = Duration
 M = Magnitude
 P = Probability

Points	Significance Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 point	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated.
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area.

7. The Cultural Heritage Sites

7.1. Isolated occurrences

Isolated occurrences are artefacts or small features recorded on the surface with no contextual information. No other associated material culture (in the form of structures or deposits) was noted that might provide any further context. This can be the result of various impacts and environmental factors such as erosion and modern developments. By contrast archaeological sites are often complex sites with evidence of archaeological deposit and various interrelated features such as complex deposits, stone walls and middens. However, these isolated occurrences are seen as remains of erstwhile complex or larger sites and they therefore provide a broad indication of possible types of sites or structures that might be expected to occur or have occurred in the survey footprint.

Throughout the survey area several isolated occurrences were recorded usually associated with the Middle Stone Age. These surface finds were recorded near open areas in the southern section of the survey area. As such a general A°/m² index for the survey footprint is 0 – 5 artefacts per m² which is low.

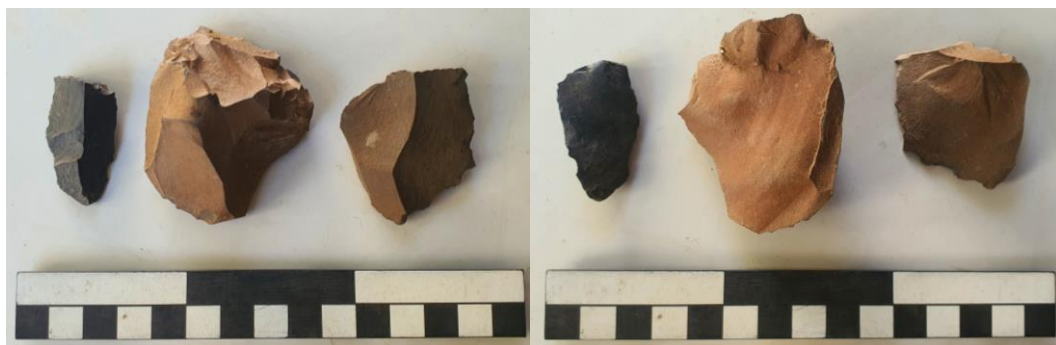


Figure 29: Surface scatter of Middle Stone Age artefacts recorded in the survey footprint

7.2 Heritage sites

A total of two heritage sites were recorded during the survey which includes a rock art site (Site 1) and a historic house (Site 2). The rock art site includes at least two large boulders with at least three animal engravings on the one boulder and a single rhinoceros on the other. The historical site consists mainly of a multi-room brick and cement building with a corrugated iron roof. The interior of the building has been damaged and some of the fittings have been removed.

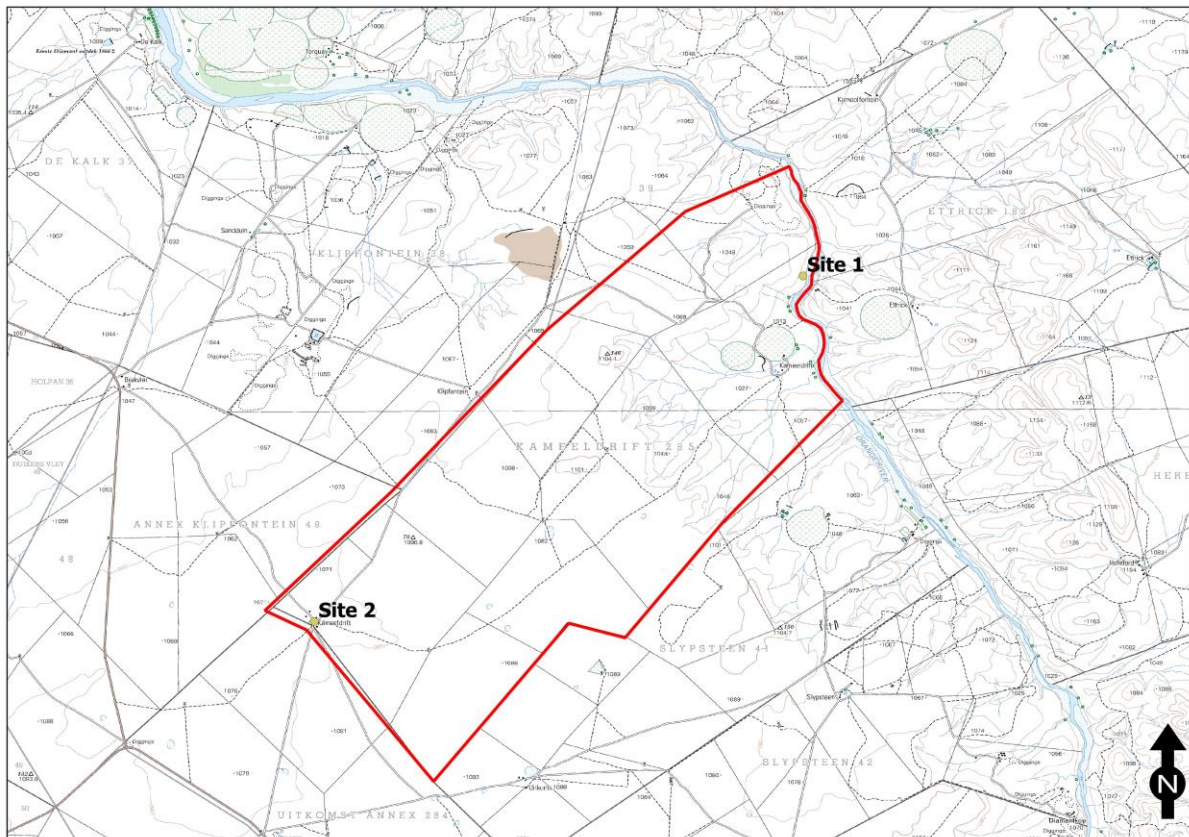


Figure 30: Location of the heritage sites recorded during the survey

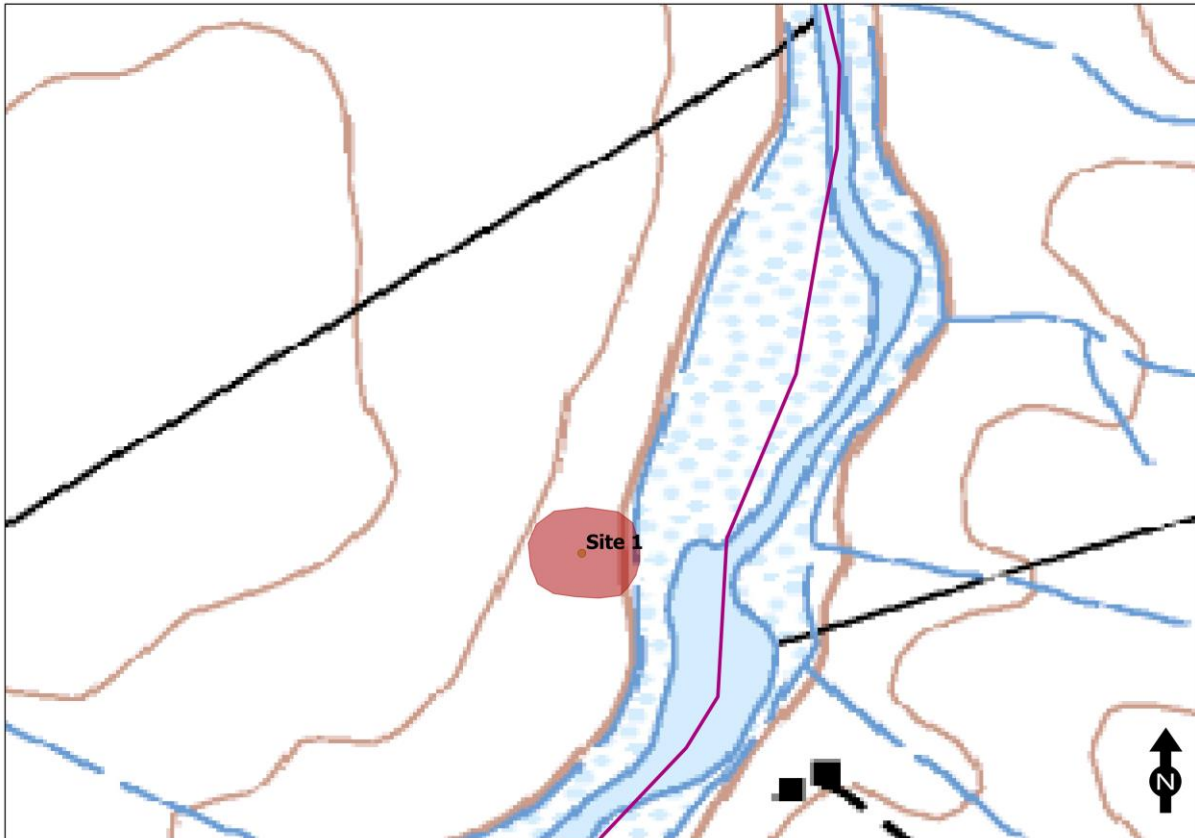


Figure 31: Location of Site 1 with buffer zone indicated

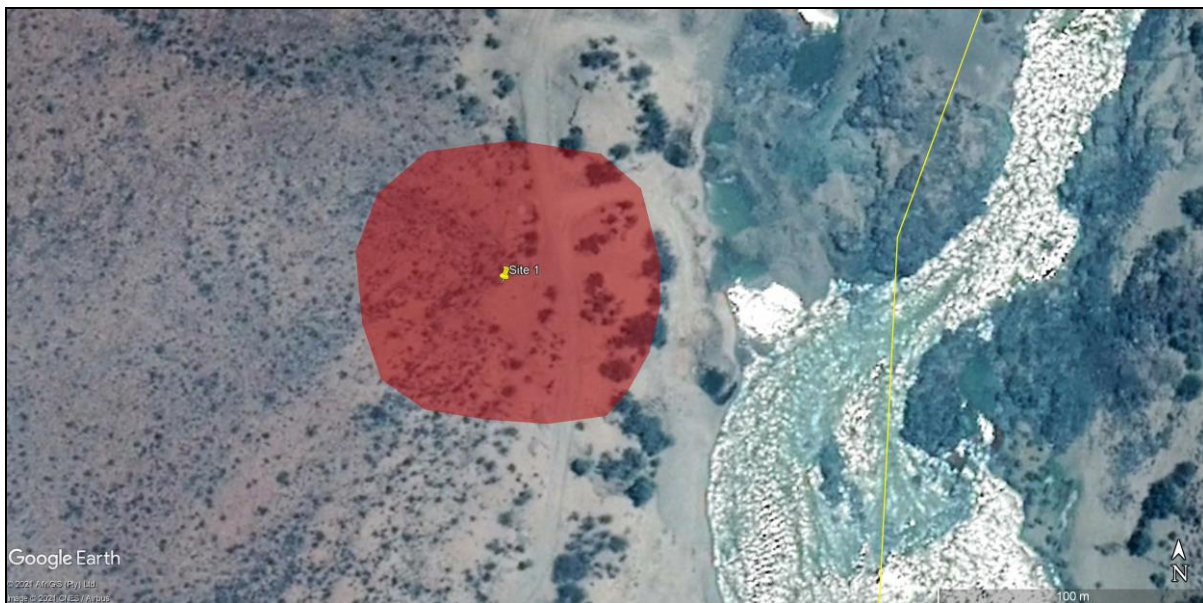


Figure 32: Location of Site 1 with buffer zone indicated (100 metres)

The recommended buffer zone for Site 1 is indicated by the following coordinates:

- 29.318243°S; 23.884032°E
- 29.318679°S; 23.883412°E
- 29.319190°S; 23.883991°E
- 29.318725°S; 23.884582°E

8. Locations and Evaluation of Sites

Site No	Coordinates	Site Type	Field Rating of Significance	Impact	Proposed Mitigation
1	29.318729°S 23.883975°E	Rock Art (engravings)	Local/Grade 3A	None	• Buffer of 100 metres
2	29.376762°S 23.801832°E	Historical building	Generally Protected C Low significance	None	• None

Table 6: Location and evaluation of sites

9. Management Measures

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

9.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).

9.2 Control

In order to achieve this, the following should be in place:

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.

- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

10. Recommendations and Conclusions

The survey yielded a total of two heritage sites which includes a rock art site (Site 1) and a historic house (Site 2). The rock art site includes at least two large boulders with at least three animal engravings on the one boulder and a single rhinoceros on the other. The historical house structure falls outside the active mining zone and there will be no impact on the structure. However, Site 1 is located near the river where most of the mining activities are taking place. As a result the following recommendations and mitigation measures are proposed:

- Site 1 should be fenced off (either a palisade or other physical barrier) and an entrance gate installed;
- A buffer zone of 100 metres should be maintained along its periphery; and
- Care should be taken during the mining phase to prevent any impact on the site.

No Stone Age or Iron Age settlements, structures, features or assemblages were recorded during the survey.

It is therefore recommended, from a cultural heritage perspective that the proposed mining activities may proceed.

Nature: Rock art site		
	Without mitigation	With mitigation
Operational (Mining) Phase		
<i>Probability</i>	Definite (5)	Very Improbable (1)
<i>Duration</i>	Permanent (5)	Short term (2)
<i>Extent</i>	Limited to the site (1)	Limited to the site (1)
<i>Magnitude</i>	Very High (10)	Minor (2)
Significance of Impact	80 (High)	5 (Low)
<i>Status (positive or negative)</i>	Negative	Positive
Reversibility	Low	Low
<i>Irreplaceable loss of resources?</i>	Yes	None
<i>Cumulative impacts and indirect impacts</i>	Mining activities result in extensive heavy vehicle traffic, extraction of deposits, movements of heavy machinery which culminate in vibrations and dust.	
<i>Can impacts be mitigated?</i>	Yes, a 100 metres buffer zone	

Table 7: Significance of the impact

Also, please note:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should

be halted, and a university or museum 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)).

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Addendum 1: Archaeological and Historical Sequence

The table provides a general overview of the chronological sequence of the archaeological periods in South Africa.

PERIOD	APPROXIMATE DATES
Earlier Stone Age	more than 2 million years ago to >200 000 years ago
Middle Stone Age	<300 000 years ago to >20 000 years ago
Later Stone Age (Includes hunter-gatherer rock art)	<40 000 years ago up to historical times in certain areas
Early Iron Age	c. AD 200 - c. AD 900
Middle Iron Age	c. AD 900 – c. AD 1300
Late Iron Age (Stonewalled sites)	c. AD 1300 - c. AD 1840 (c. AD 1640 - c. AD 1840)

< = less than; > = greater than

Archaeological Context

Stone Age Sequence

Concentrations of Early Stone Age (ESA) sites are usually present on the flood-plains of perennial rivers and may date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as handaxes and cleavers. The earliest hominins who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore kill sites.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

The following chronological sequence was recently established by prominent Stone Age archaeologists (Lombard et al 2012):

Later Stone Age

- Age Range: recent to 20-40 thousand years ago

- General characteristics: expect variability between assemblages, a wide range of formal tools, particularly scrapers (microlithic and macrolithic), backed artefacts, evidence of hafted stone and bone tools, borers, bored stones, upper and lower grindstones, grooved stones, ostrich eggshell (OES) beads and other ornaments, undecorated/decorated OES fragments, flasks/flask fragments, bone tools (sometimes with decoration), fishing equipment, rock art, and ceramics in the final phase.
 - **Ceramic or Final Later Stone Age**
 - Generally < 2 thousand years ago
 - MIS 1
 - Contemporaneous with, and broadly similar to, final Later Stone Age, but includes ceramics
 - Economy may be associated with hunter-gatherers or herders

Technological characteristics

- Stone tool assemblages are often microlithic
- In some areas they are dominated by long end scrapers and few backed microliths; in others formal tools are absent or rare
- Grindstones are common, ground stone artefacts, stone bowls and boat-shaped grinding grooves may occur
- Includes grit- or grass-tempered pottery
- Ceramics can be coarse, or well-fired and thin-walled; some times with lugs, spouts and conical bases; sometimes with decoration; sometimes shaped as bowls
- Ochre is common
- Ostrich eggshell (OES) is common
- Metal objects, glass beads and glass artefacts also occur
- **Final Later Stone Age**
 - 100 – 4000 years ago
 - MIS 1
 - Hunter-gatherer economy

Technological characteristics

- Much variability can be expected
- Variants include macrolithic (similar to Smithfield [Sampson 1974]) and/or microlithic (similar to Wilton) assemblages
- Assemblages are mostly informal (Smithfield)
- Often characterised by large untrimmed flakes (Smithfield)
- Sometimes microlithic with scrapers, blades and bladelets, backed tools and adzes (Wilton-like)
- Worked bone is common
- OES is common
- Ochre is common
- Iron objects are rare
- Ceramics are absent
- **Wilton**
 - 4000 – 8000 years ago

- MIS 1
- At some sites continues into the final Later Stone Age as regional variants (e.g. Wilton Large Rock Shelter and Cave James)

Technological characteristics

- Fully developed microlithic tradition with numerous formal tools
 - Highly standardised backed microliths and small convex scrapers (for definition of standardisation see Eerkens & Bettinger 2001)
 - OES is common
 - Ochre is common
 - Bone, shell and wooden artefacts occur
- **Oakhurst**
 - 7000 – 12 000 years ago
 - MIS 1
 - Includes Albany, Lockshoek and Kuruman as regional variants

Technological characteristics

- Flake based industry
 - Characterised by round, end, and D-shaped scrapers and adzes
 - Wide range of polished bone tools
 - Few or no microliths
- **Robberg**
 - 12 000 to 18 000 years ago
 - MIS 2

Technological characteristics

- Characterised by systematic bladelet (<26mm) production and the occurrence of outils ecailles or scaled pieces
 - Significant numbers of unretouched bladelets and bladelet cores
 - Few formal tools
 - Some sites have significant macrolithic elements
- **Early Late Stone Age**
 - 18 000 – 40 000 years ago
 - MIS 2-3
 - Informal designation
 - Also known as transitional MSA-LSA
 - Overlapping in time with final Middle Stone Age

Technological Characteristics

- Characterised by unstandardised, often microlithic, pieces and includes the bipolar technique
- Described at some sites, but not always clear whether assemblages represent a real archaeological phase or a mixture of LSA/MSA artefacts

Middle Stone Age

- Age Range: 20 000 – 30 000 years ago
- General characteristics: Levallois or prepared core techniques (for definitions see Van Peer 1992; Boeda 1995; Pleurdeau 2005) occur in which triangular flakes with convergent dorsal scars, often with faceted striking platforms, are produced. Discoidal systems (for definition see Inizan et al. 1999) and intentional blade production from volumetric cores (for definition see Pleurdeau 2005) also occur; formal tools may include unifacially and bifacially retouched points, backed artefacts, scrapers, and denticulates (for definition see Bisson 2000); evidence of hafted tools; occasionally includes marine shell beads, bone points, engraved ochre nodules, engraved OES fragments, engraved bone fragments, and grindstones.
- In the sequence below we highlight differences or characteristics that may be used to refine interpretations depending on context.
- **Final Middle Stone Age**
 - 20 000 – 40 000 years ago
 - MIS 3
 - Informal designation partly based on the Sibudu sequence

Technological characteristics

- Characterised by high regional variability that may include, e.g. bifacial tools, bifacially retouched points, hollow-based points
- Triangular flake and blade industries (similar to Strathalan and Melikane)
- Small bifacial and unifacial points (similar to Sibudu and Rose Cottage Cave)
- Sibudu point characteristics: short, stout, lighter in mass compared to points from the Sibudu technocomplex, but heavier than those from the Still Bay
- Can be microlithic
- Can include bipolar technology
- Could include backed geometric shapes such as segments, as well as side scrapers

Sibudu

- 45 000 – 58 000 years ago
- MIS 3
- Previously published as informal late Middle Stone Age and post-Howieson's Poort at Sibudu
- Formerly known post-Howieson's Poort, MSA 3 generally, and MSA III at Klasies River

Technological characteristics

- Most points are produced using Levallois technique
- Most formal retouch aimed at producing unifacial points
- Sibudu unifacial point (type fossil) characteristics: faceted platform; shape is somewhat elongated with a mean length of 43.9 mm), a mean breadth of 26.8 mm and mean thickness of 8.8 mm (L/B ratio 1.7); their mean mass is 11.8 g (Mohapi, 2012)
- Some plain butts
- Rare bifacially retouched points
- Some side scrapers are present
- Backed pieces are rare

- **Howieson's Poort**
- 58 000 – 66 000 years ago
- MIS 3-4

Technological characteristics

- Characterised by blade technology
- Includes small (<4 cm) backed tools, e.g. segments, scrapers, trapezes and backed blades
- Some denticulate blades
- Pointed forms are rare or absent

- **Still Bay**

- 70 000 – 77 000 years ago
- MIS 4-5a

Technological characteristics

- Characterised by thin (<10 mm), bifacially worked foliate or lanceolate points
- Semi-circular or wide-angled pointed butts
- Could include blades and finely serrated points (Lombard et al. 2010)

- **Pre-Still Bay**

- 72 000 – 96 000 years ago
- MIS 4-5

Technological characteristics

- Characteristics currently being determined / studied

- **Mossel Bay**

- 77 000 to —105 000 years ago
- MIS 5a-4
- Also known as MSA II at Klasies River or MSA 2b generally

Technological characteristics

- Characterised by recurrent unipolar Levallois point and blade reduction
- Products have straight profiles; percussion bulbs are prominent and often splintered or ring-cracked
- Formal retouch is infrequent and restricted to sharpening the tip or shaping the butt

- **Klasies River**

- 105 000 to —130 000 years ago
- MIS 5d-5e
- Also referred to as MSA I at Klasies River or MSA 2a generally

Technological characteristics

- Recurrent blade and convergent flake production
- End products are elongated and relatively thin, often with curved profiles
- Platforms are often small with diffused bulbs
- Low frequencies of retouch
- Denticulate pieces

- **Early Middle Stone Age**
 - Suggested age MIS 6 to MIS 8 (130 000 to —300 000 years ago)
 - Informal designation

Technological characteristics

- This phase needs future clarification regarding the designation of cultural material and sequencing
- Includes discoidal and Levallois flake technologies, blades from volumetric cores and a generalised toolkit

- **Earlier Stone Age**

- Age range: >200 000 to 2 000 000 years ago
- General characteristics: early stages include simple flakes struck from cobbles, core and pebble tools; later stages include intentionally shaped handaxes, cleavers and picks; final or transitional stages have tools that are smaller than the preceding stages and include large blades.
- In the sequence below we highlight differences or characteristics that may be used to refine interpretations depending on context.

- **ESA-MSA transition**

- 200 to —600 thousand years ago
- MIS 7-15

Technological characteristics

- Described at some sites as Fauresmith or Sangoan
- Relationships, descriptions, issues of mixing and ages yet to be clarified
- Fauresmith assemblages have large blades, points, Levallois technology, and the remaining ESA components have small bifaces
- The Sangoan contains small bifaces (<100 mm), picks, heavy and light-duty denticulated and notched scrapers
- The Sangoan is less well described than the Fauresmith

- **Acheulean**

- 300 thousand to —1.5 million years ago
- MIS 8-50

Technological characteristics

- Bifacially worked handaxes and cleavers, large flakes > 10 cm
- Some flakes with deliberate retouch, sometimes classified as scrapers
- Gives impression of being deliberately shaped, but could indicate result of knapping strategy
- Sometimes shows core preparation
- Generally found in disturbed open-air locations

- **Oldowan**

- 1.5 to >2 million years ago
- MIS 50-75

Technological characteristics

- Cobble, core or flake tools with little retouch and no flaking to predetermined patterns
- Hammerstones, manuports, cores
- Polished bone fragments/tools

Iron Age Sequence

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the **Early Iron Age** (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as **Happy Rest** (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of **Diamant** is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the **Eiland** tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water.

The Late Iron Age (LIA) settlements are characterised by stone-walled enclosures situated on defensive hilltops c. AD 1640 - AD 1830). This occupation phase has been linked to the arrival of ancestral Northern Sotho, Tswana and Ndebele (Nguni-speakers) in the northern regions of South Africa with associated sites dating between the sixteenth and seventeenth centuries AD. The terminal LIA is represented by late 18th/early 19th century settlements with multichrome Moloko pottery commonly attributed to the Sotho-Tswana. These settlements can in many instances be correlated with oral traditions on population movements during which African farming communities sought refuge in mountainous regions during the processes of disruption in the northern interior of South Africa, resulting from the so-called difaqane (or mfecane).

Ethno-historical Context

Kimberley and surrounds

The diamonds originated some 60 million years ago with volcanic activity which blew up groups of pipes through the earth's crust. Many of the kimberlite pipes were entirely eroded away and the diamond content dispersed along the beds of rivers such as at Hopetown and Barkley West. The first diamond rush took place at Hopetown which was followed by a much greater discovery in 1870 in the gravels of the Vaal River at Barkley West. The Bultfontein Mine resulted, the farm first owned by Cornelius du Plooy. In December 1870 diamonds were discovered at Du Toit's Pan on the farm Dorstfontein. In May 1871 a new discovery was made on the farm Vooruitzicht which resulted in Colesberg Koppie known as the 'New Rush'. This diamond rush eventually resulted in what became known as the 'Big Hole' of Kimberley Mine, the largest man-made hole in the world.

Kimberley, named after the Secretary of State for Colonies, the Earl of Kimberley, grew quickly together with its twin, Beaconsfield (named after Benjamin Disraeli, the Earl of Beaconsfield). Beaconsfield served as the centre for Bultfontein, Wessel and Du Toit's Pan Mines. The two towns eventually amalgamated to form one city in 1912.

Kimberley became a municipality in 1877. By 1882 a tramway connected Kimberley with Beaconsfield and the streets were illuminated with the first electric lights in Southern Africa. All the smaller diggings were eventually taken up in the amalgamation that took place between Cecil Rhodes's De Beers Mine and Barney Barnato's Kimberley Central Mining Company in 1888.

Various alluvial diamond digging was going on in the region, but it seems Canteen Kopje was one of the first and started in 1869 and continued until 1927. It was declared a National Monument in 1948. The site also yielded extensive Stone Age deposits that were excavated by Peter Beaumont of the McGregor Museum. The site is famous for containing Later Stone Age, Middle Stone Age and Earlier Stone Age (Acheulian) stone tools (Beaumont & Morris 1990).



Figure 33: Canteen kopje in the 1870s (Sketch by A. A. Anderson)

A study of archival information however indicates the presence of the redoubts and encampments of the Boer forces during the South African war of 1899-1902 present just outside the study area. During the South African War, also referred to as the Anglo Boer war, Kimberley was besieged by Boer forces from 14 October 1899 to 15 February 1900. For four months the Boer forces placed a total lock down on the town of Kimberley and besieged it until the town was relieved by General French on 15 February 1900. For the siege to be of any success the Boer forces needed to construct numerous redoubts and encampments around the town to control access in and out of town. The British military had to change its strategy for the war as public opinion demanded that the sieges of Kimberley, Ladysmith and Mafeking be relieved before the Boer capitals were assaulted. The first attempt at relief of Kimberley under Lord Methuen was stopped at the battles of Modder River and Magersfontein. The 124-day siege was finally relieved on 15 February 1900 by a cavalry division under Lieutenant-General John French, part of a larger force under Lord Roberts. The battle against the Boer general Piet Cronjé continued at Paardeberg immediately after the town itself was relieved.

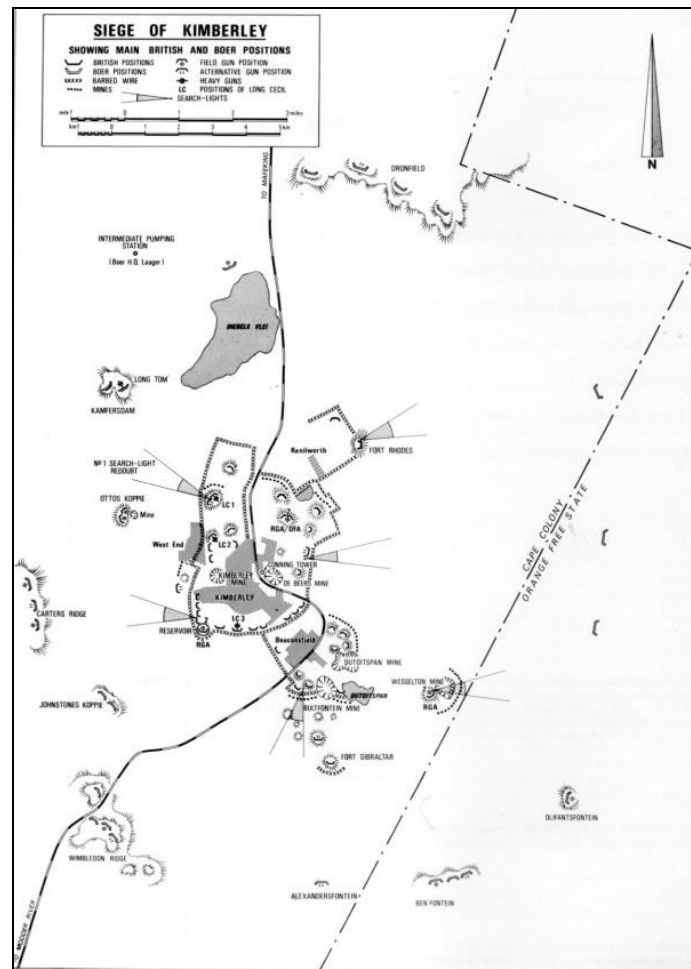


Figure 34: The siege of Kimberley (R.H. Wishart)

The extension of the line to Kimberley was as a direct result of the discovery of diamonds in that area in 1869. The line from De Aar to the Orange River was officially opened in November 1884. Due to a world-wide economic slump the Cape Colony was in a recession and it was only after the British Government advanced £400 000 the line to Kimberley could be completed. The 121km track between the Orange River and Kimberley was opened on 28 November 1885. The history of the construction of the railway line between Kimberley and Hotazel seems to have been as a direct result of the discovery of various minerals in this region. The line was built in various sections first from Kimberley to Barkly West and then from Barkly West to Koopmansfontein. The line was then extended from Koopmansfontein to Postmasburg and from Postmasburg to Lohathla. As more mining development was earmarked it necessitated the extension of the line from Lohathla to Sishen and at a later stage from Sishen to Hotazel. It seems from archival documents that a proposal was submitted for the establishment of a railway line from Kimberley to Barkly West with its terminus at Borrelskop, a railway siding between Longlands and Delportshoop in 1922. The line between Kimberley, Barkly West and Koopmansfontein thus had to be completed between 1922 and 1930 although the precise date on which the extension of the railway line was inaugurated could not be established.

For both wars, Kimberley was the main centre for mustering and training the Cape Corps which was served by a hospital and a convalescent depot. During the Second World War, Number 21 Air School of the Empire Air Training Scheme was based at Alexanderfontein just outside the city. Kimberley (Dutoitspan) Cemetery contains two Commonwealth burials

of the First World War and 14 from the Second World War. The cemetery lies on the eastern outskirts of Kimberley, to the northern side of Dutoits Pan mine.

Douglas

Douglas is an agricultural and stock farming town situated near the confluence of the Orange and Vaal Rivers in the Northern Cape province of South Africa. Notably the rural town has a diverse population, with mostly state institutions and the anchor private employer, GWK, an agricultural company.

The town was founded in 1848 as a mission station on the farm Backhouse by the Reverend Isaac Hughes. In 1867, a group of Europeans from Griquatown signed an agreement giving them the right to establish a town. The town was named after General Sir Percy Douglas, Lieutenant Governor of the Cape Colony.

Douglas lies almost halfway between Kimberley and the town of Prieska. Douglas is regarded as somewhat of an oasis - the town lies where the Orange and Vaal rivers meet, hence farm land is fertile.

Douglas is also an historic town, with years of diamond digging and the missionaries to thank for some of its quaint little houses. More excitingly, it has a series of glacial pavements that date back 290 million years and a number of rock engravings made from stone tools. You will need permission to see these from the McGregor Museum in Kimberley, which is only 100 kilometres away from Kimberley, making it an obvious stop over en route to view the Big Hole and other exciting tourist attractions.

Hopetown

Hopetown was founded in 1850 when Sir Harry Smith extended the northern frontier of the Cape Colony to the Orange River. A handful of settlers claimed ground where there was a natural ford over the Orange River, and by 1854 a frontier town had developed. Hopetown was named after William Hope, Auditor-General and Secretary of the Cape Colony Government at the time. Hopetown was a quiet farming area until several large diamonds, most notable the Eureka Diamond and the Star of South Africa, were discovered there between 1867 and 1869 (<https://en.wikipedia.org/wiki/Hopetown>).

Addendum 2: Description of the Recorded Sites

A system for grading the significance of heritage sites was established by the NHRA (Act No. 25 of 1999) and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

Site 1

A. GENERAL SITE DESCRIPTION					
Site type	Rock Art Site (engravings)				
Site Period	Later Stone Age				
Physical description	The site comprises two large boulders with rock engravings. The site is located on a rocky outcrop situated on the southern banks of the Orange River. The one building contains a depiction of a rhinoceros and the other boulder contains depictions of at least 3 antelope. All the engravings were made using the pecking technique, which was used to outline the shape of the animals. One antelope displayed secondary pecking used to fill the front (head) section of the antelope. There are also two depressions in the main boulder. The current outcrop is stable and is some 40 metres from the nearest access road. A low-density scatter of Middle Stone Age tools were noted in the area. No large-scale Later Stone Age tools were recorded on the surface.				
Integrity of deposits or structures	None				
Site extent	3 m x 2 m				
B. SITE EVALUATION					
B1. HERITAGE VALUE			Yes	No	
Historic Value					
It has importance to the community or pattern of South Africa's history or precolonial history.				X	
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.				X	
It has significance relating to the history of slavery in South Africa.				X	
Aesthetic Value					
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			X		
Scientific Value					
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			X		
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			X		
It has importance to the wider understanding of the temporal change of cultural landscapes, settlement patterns and human occupation.			X		
Social Value					
It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			X		
Tourism Value					
It has significance through its contribution towards the promotion of a local sociocultural identity and can be developed as tourist destination.			X		
Rarity Value					
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.				X	
Representative Value					
It is importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			X		
B2. REGIONAL CONTEXT					
Other similar sites in the regional landscape.			X		
C. SPHERE OF SIGNIFICANCE		High	Medium	Low	


International		X	
National	X		
Provincial	X		
Local	X		
Specific community	X		
D. FIELD REGISTER RATING			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			X
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
E. GENERAL STATEMENT OF SITE SIGNIFICANCE			
Low			
Medium			
High			X
F. RATING OF POTENTIAL IMPACT OF DEVELOPMENT			
None			X
Peripheral			
Destruction			
Uncertain			
G. RECOMMENDED MITIGATION			
<ul style="list-style-type: none"> • Maintain a 100 metres buffer zone during all mining activities • The site should be demarcated and protected by a fence 			
H. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS			
<ul style="list-style-type: none"> • National Heritage Resources Act (Act No. 25 of 1999, Sections 36) 			
I. PHOTOGRAPHS			
			
<p>Figure 35: The cluster of boulders containing the engravings</p>			



Figure 36: The placement of the engravings on the boulders



Figure 37: The engraving depicting a rhinoceros



Figure 38: The boulder with at least 3 engravings depicting antelope



Figure 39: Detail of one of the engravings depicting an antelope

Site 2

A. GENERAL SITE DESCRIPTION					
Site type	Historical house				
Site Period	Early 19 th century				
Physical description	The site comprises a main historical house. The structure is a multi-room brick and cement house with a corrugated roof. The interior walls are at least 1 foot (30 centimetres) thick, confirming that house probably built during the early 1900s. The interior of the building has been damaged and some of the fittings have been removed. Extensions and alterations were also done to the building over time. Additional outbuildings (shed) and other secondary buildings were also added later. No midden was recorded at the site.				
Integrity of deposits or structures	House and outbuildings No middens recorded				
Site extent	30 m x 20 m				
B. SITE EVALUATION					
B1. HERITAGE VALUE			Yes	No	
Historic Value					
It has importance to the community or pattern of South Africa's history or precolonial history.				X	
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.				X	
It has significance relating to the history of slavery in South Africa.				X	
Aesthetic Value					
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.				X	
Scientific Value					
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			X		
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.				X	
It has importance to the wider understanding of the temporal change of cultural landscapes, settlement patterns and human occupation.				X	
Social Value					
It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).				X	
Tourism Value					
It has significance through its contribution towards the promotion of a local sociocultural identity and can be developed as tourist destination.				X	
Rarity Value					
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural				X	


heritage.				
Representative Value				
It is importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			X	
B2. REGIONAL CONTEXT				
Other similar sites in the regional landscape.			X	
C. SPHERE OF SIGNIFICANCE		High	Medium	Low
International				X
National				X
Provincial				X
Local				X
Specific community				X
D. FIELD REGISTER RATING				
National/Grade 1 [should be registered, retained]				
Provincial/Grade 2 [should be registered, retained]				
Local/Grade 3A [should be registered, mitigation not advised]				
Local/Grade 3B [High significance; mitigation, partly retained]				
Generally Protected A [High/Medium significance, mitigation]				
Generally protected B [Medium significance, to be recorded]				
Generally Protected C [Low significance, no further action]				X
E. GENERAL STATEMENT OF SITE SIGNIFICANCE				
Low				X
Medium				
High				
F. RATING OF POTENTIAL IMPACT OF DEVELOPMENT				
None				X
Peripheral				
Destruction				
Uncertain				
G. RECOMMENDED MITIGATION				
<ul style="list-style-type: none"> None 				
H. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS				
<ul style="list-style-type: none"> National Heritage Resources Act (Act No. 25 of 1999, Sections 34) 				
I. PHOTOGRAPHS				
				
<p>Figure 40: The southern (Main) façade of the building</p>				



Figure 41: The eastern facade of the building



Figure 42: An outbuilding (shed) probably added later

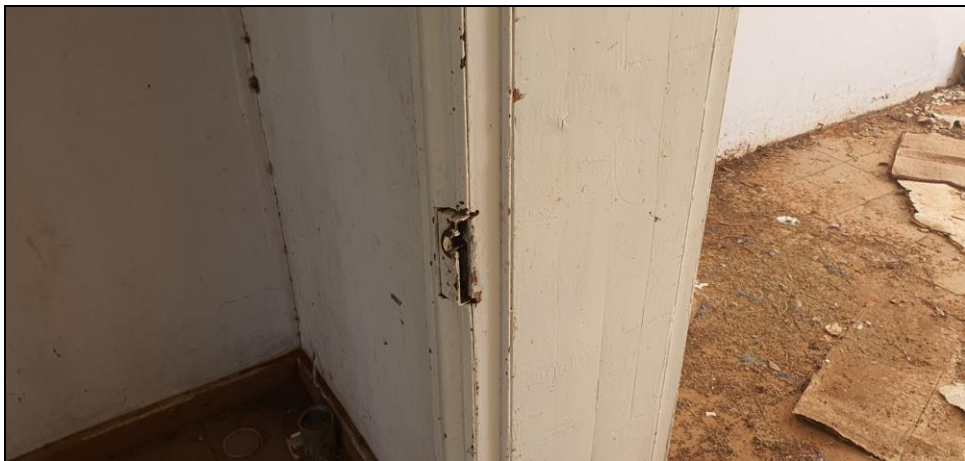


Figure 43: Inner walls of the building is over a foot (30 cm) thick and clad with wooden fittings

Addendum 3: Surveyor General Farm Diagram

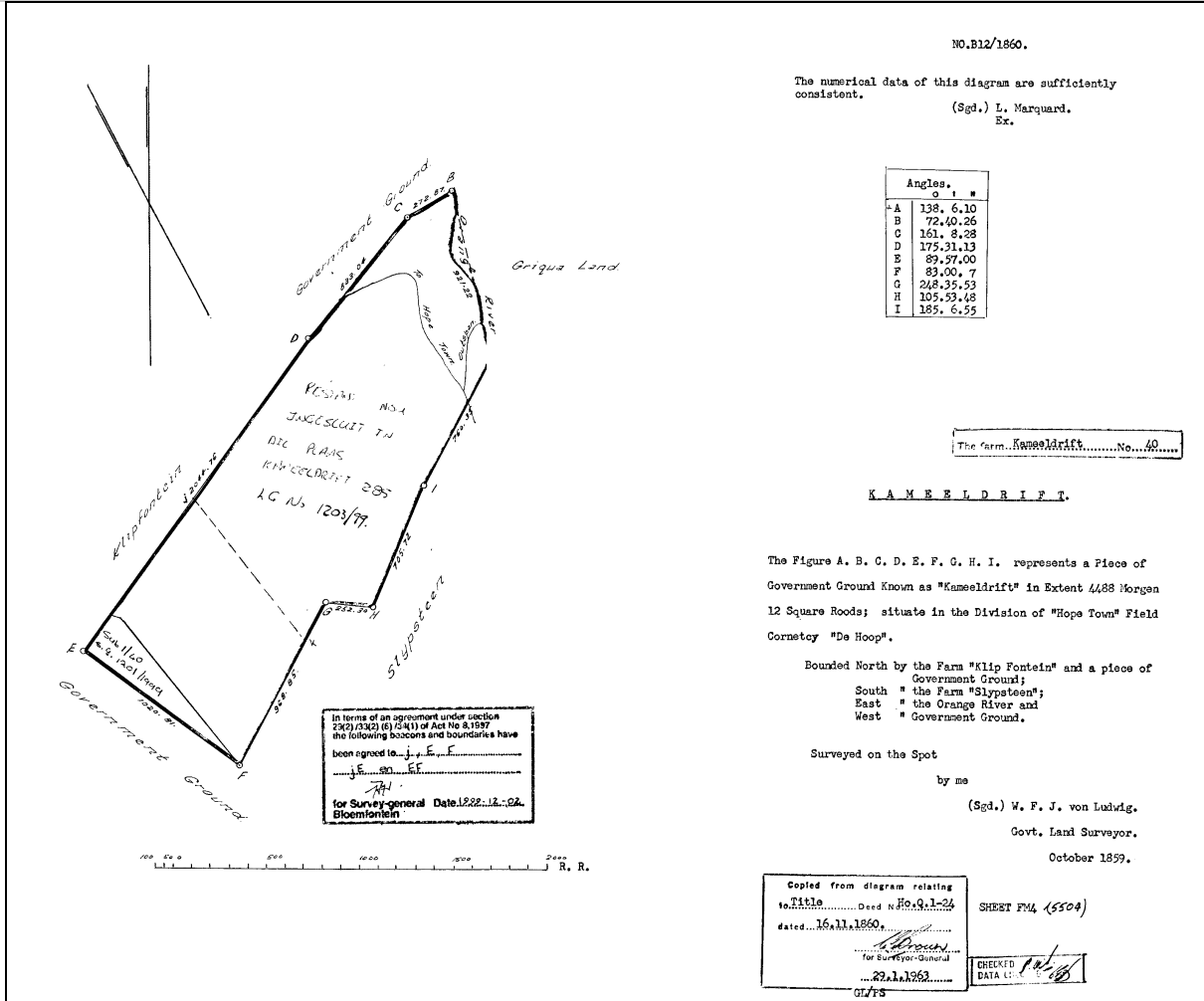


Figure 44: Surveyor General’s map of the farm Kameeldrift 285 which was first surveyed in 1860

Addendum 4: Relocation of Graves

Marked graves younger than 60 years do not fall under the protection of the NHRA (Act No. 25 of 1999) with the result that exhumation, relocation and reburial can be conducted by an undertaker. This will include logistical aspects such as social consultation, purchasing of plots in cemeteries, procurement of coffins, etc. Other legislative measures which may be pertinent include the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), Regulations Relating to the Management of Human Remains (GNR 363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003, Ordinance on Exhumations (Ordinance No. 12 of 1980) as well as any local and regional provisions, laws and by-laws that may be in place.

Marked graves older than 60 years are protected by the NHRA (Act No. 25 of 1999) as a result an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. Note that unmarked graves are by default regarded as older than 60 years and therefore also falls under the NHRA (Act No. 25 of 1999, Section 36).

The relocation of graves entails the following procedure:

- Notices of intent to relocate the graves must be put up at the burial site for a period of 60 days. This should contain contact information where communities and family members can register as interested and affected parties. All information pertaining to the identification of the graves must be documented for the application of a SAHRA permit. All notices must be in at least 3 languages, of which English is one. This is a requirement by law.
- These notices of intention must also be placed in at least two local newspapers and have the same information as above.
- Local radio stations can also be used to try contact family members. This is not required by law, but can be helpful.
- During this time (60 days) a suitable cemetery must be identified near to the development or otherwise one specified by the family of the deceased.
- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account.
- Once the 60 days have passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- Once the permit has been issued, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any remains and any additional objects found in the grave.

Information needed for the SAHRA permit application

- The permit application must be done by an archaeologist.
- A map of the area where the graves have been located.
- A survey report of the area prepared by an archaeologist.
- All the information on the families that have identified graves.
- A letter of permission from the landowner granting permission to the developer to exhume and relocate the graves.

- A letter (or proof of purchase of the plots) from the new cemetery confirming that the graves will be reburied there.
- Details of the farm name and number, magisterial district and GPS coordinates of the gravesite.

Graves are generally be classified into four categories. These are:

- Graves younger than 60 years;
- Graves older than 60 years, but younger than 100 years;
- Graves older than 100 years; and
- Graves of victims of conflict or of individuals of royal descent.