

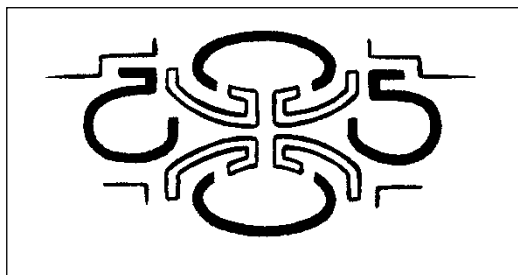
Cultural Heritage Impact Assessment:

Phase 1 Investigation for a Proposed Mining Right combined with a Waste License Application to Mine for Copper, Zinc, Sulphur, Iron and Associated Minerals within the Orebody, on Portion 2 and the Remaining Extent on the Farm Areachap 426, Gordonia, near Upington, ZF Mgcawu 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. Milnex CC was contracted by Synchroplex (Pty) Ltd as the independent environmental consultant to undertake the Scoping and EIA study for a proposed Mining Right combined with a Waste License application to mine for copper, zinc, sulphur, iron and associated minerals within the orebody, on Portion 2 and the Remaining Extent on the Farm Areachap 426, Gordonia, near Upington, ZF Mgcawu District Municipality, Northern Cape Province. The Scoping study is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended).

Site No	Site Type	Field Rating of Significance	Direct Impacts	Significance of Impact before Mitigation	Significance of Impact after Mitigation	Proposed Mitigation
1	Graveyard	Generally protected A: High significance	Low	80 (High)	5 (Low)	<ul style="list-style-type: none"> Maintain a buffer zone of 50 metres during mining

A single graveyard was recorded during the survey (Site 1). The graveyard is possibly associated with the early mining activities on the farm and probably dates to the early 20th century.

No historical or archaeological (both Stone Age and Iron Age) artefacts, assemblages, features, structures or settlements were recorded during the survey of the project footprint.

It is therefore recommended, from a cultural heritage perspective that the proposed mining activities may proceed, taking into account the mitigation measures.

Also, please note:

If the exhumation and reburial of the graveyards are envisaged it will entail social consultation and permit application. 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. Note that unmarked graves are by default regarded as older than 60 years and therefore falls under the NHRA (Act No. 25 of 1999, Section 36).

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)).

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.



Francois P Coetzee
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1. Introduction and Terms of Reference

Milnex CC was contracted by Synchroplex (Pty) Ltd as the independent environmental consultant to undertake the Scoping and EIA study for a proposed Mining Right combined with a Waste License application to mine for copper, zinc, sulphur, iron and associated minerals within the orebody, on Portion 2 and the Remaining Extent on the Farm Areachap 426, Gordonia, near Upington, ZF Mgcawu District Municipality, Northern Cape Province. The Scoping study is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended). The property is located approximately 25 km north west of Upington. A Cultural Heritage Impact Assessment (HIA) was requested by Milnex CC on behalf of the client to evaluate the potential impact of the proposed mining activities. Reference number for the project: NC30/5/1/2/2/10218MR.

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 heritage survey focussed on areas situated approximately 25 km north west of Upington along the R360, Northern Cape Province.

Farm Name(s) and Portions	Areachap 426 <ul style="list-style-type: none"> • Remaining Extent • Portion 2
Size of Survey Area	512 hectares ±50 ha (extent of the area required for infrastructure)
Magisterial District	ZF Mgcawu District Municipality Dawid Kruiper Local Municipality
1:50 000 Map Sheet	2821AC
1:250 000 Map Sheet	2820
Central Coordinates of the Development	21.045755°E 28.296297°S

Table 1: Physical Environment

The survey area falls within the Nama-Karoo Biome, particularly the Bushmanland Bioregion and more specifically the Kalahari Karroid Shrubland (NKb 5). This vegetation type occurs mostly occur forming belts alternating with belts of Gordonia Duneveld on plains northwest of Upington through Lutzputs and Noenieput to the Rietfontein/Mier area in the north. Other patches occur around Kakamas and north of Groblershoop. The unit is also found in the neighbouring Namibia. The vegetation is characterised by low karroid shrubland on flat, gravel plains. Karoo-related elements (shrubs) meet here with northern floristic elements, indicating a transition to the Kalahari region and sandy soils (Mucina & Rutherford 2006).

The survey footprint is characterised by open and flat plains and slightly undulating plains. Small Trees include: *Acacia mellifera* subsp. *detinens* (d), *Parkinsonia africana* (d), *Boscia foetida* subsp. *foetida*. Tall Shrub include: *Rhigozum trichotomum* (d). Epiphytic Semiparasitic Shrub: *Tapinanthus oleifolius*. Low Shrubs: *Hermannia spinosa* (d), *Limeum aethiopicum* (d), *Phaeoptilum spinosum* (d), *Aizoon schellenbergii*, *Aptosimum albomarginatum*, *A. lineare*, *A. marlothii*, *A. spinescens*, *Barleria rigida*, *Hermannia modesta*, *Indigofera heterotricha*, *Leucosphaera bainesii*, *Monechma genistifolium* subsp. *genistifolium*, *Phyllanthus maderaspatensis*, *Polygala seminuda*, *Ptycholobium biflorum* subsp. *biflorum*, *Sericocoma avolans*, *Solanum capense*, *Tephrosia dregeana*. Infrastructure consists of the several gravel roads that provide access to the area, as well as power lines, fences (grazing camps). Note that the survey footprint has been extensively mined and there are several areas with evidence of surface (trenches) and subsurface (shaft) mining as well as extensive mining dumps (stockpiles).

In the ZF Mgcawu District Municipality rainfall ranges from about 100–200 mm per annum and most rain falls in late summer and early autumn. Winters are particularly dry, with lowest winter relative humidity compared to other Nama-Karoo types. Mean maximum and minimum monthly temperatures in Upington are 39.5°C and –4.2°C for January and July, respectively. Solar radiation is high and in winter is higher than in any other vegetation type of the Nama-Karoo.

Current Zoning	Sheep and goat (pastoralism)
Economic activities	Farming, tourism and mining
Soil and basic geology	Cenozoic Kalahari Group sands and small patches also on calcrete outcrops and screes on scarps of intermittent rivers (mekgacha). In places Dwyka Group tillites outcrop. The soils are deep (>300 mm), red-yellow, apedal, freely drained, with a high base status, typical of Ae land type.
Prior activities	Livestock farming and agriculture Mining
Socio Economic Environment	Demographic data indicate that the population of the Dawid Kruiper Local Municipality increased from 100 498 in 2011 to 107 161 in 2016. The coloured population is in the majority, followed by Africans and then the white population. The unemployment rate decreases significantly from 34% in 2001 to 22.1% in 2011. There was a huge decline in the youth unemployment rate too from 42.3% in 2001 to 29% in 2011, but the youth unemployment rate is still very high in comparison with the overall unemployment rate of the municipality. Although about 44.7% of the Dawid Kruiper population are between 14 and 35 years old, youths remains relatively marginalised.

Evaluation of Impact	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
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Table 2: Socio-economic environment

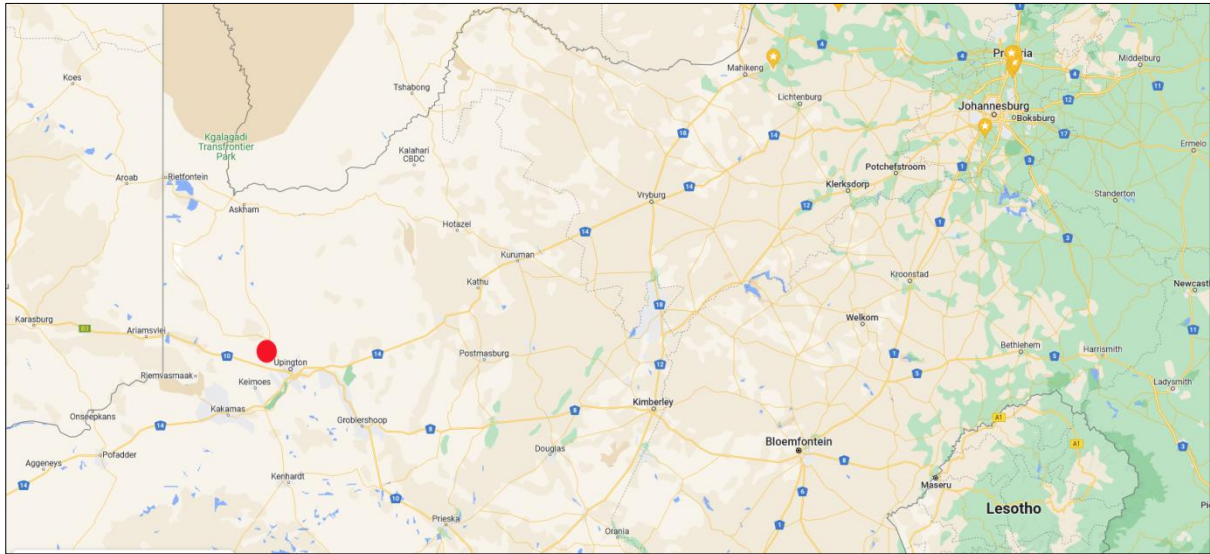


Figure 1: Regional context of the survey footprint located northwest of Upington (indicated by the red area)



Figure 2: Local context of the survey area located northwest of Upington (indicated by the red area)

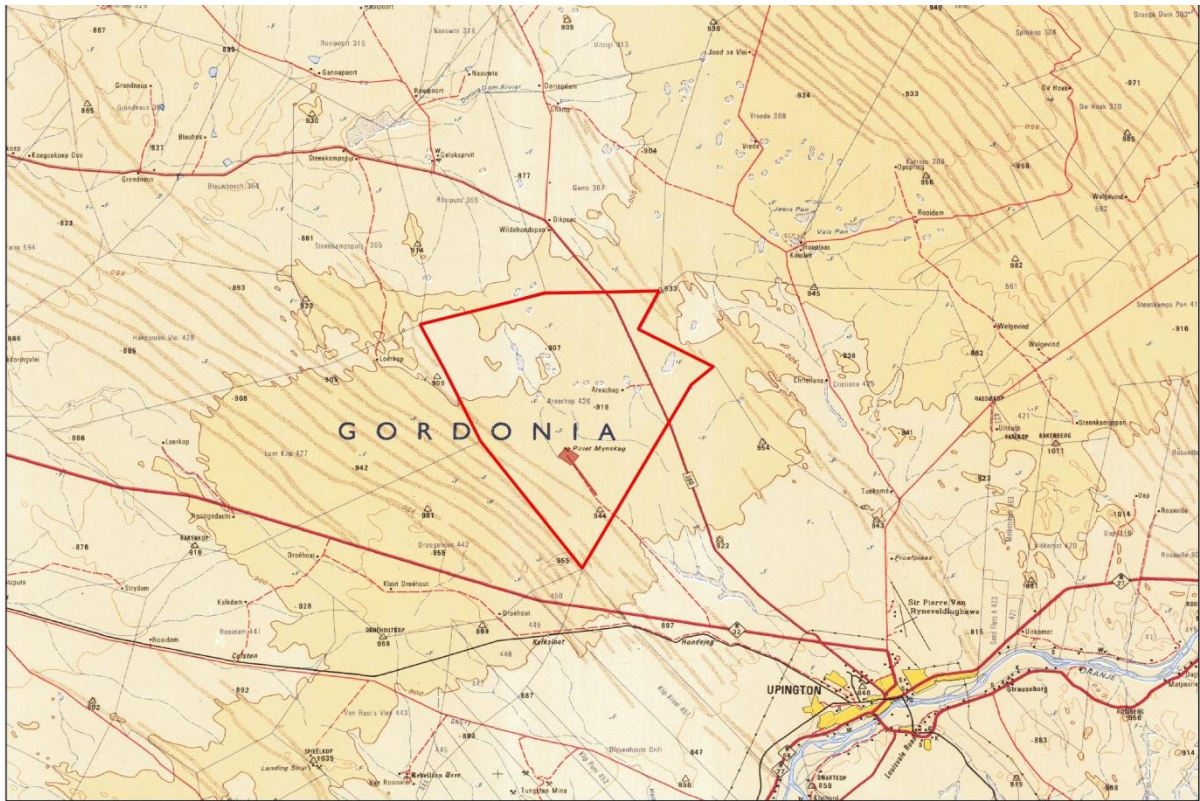


Figure 3: Local context of the survey footprint (1:250 000 Map 2820)

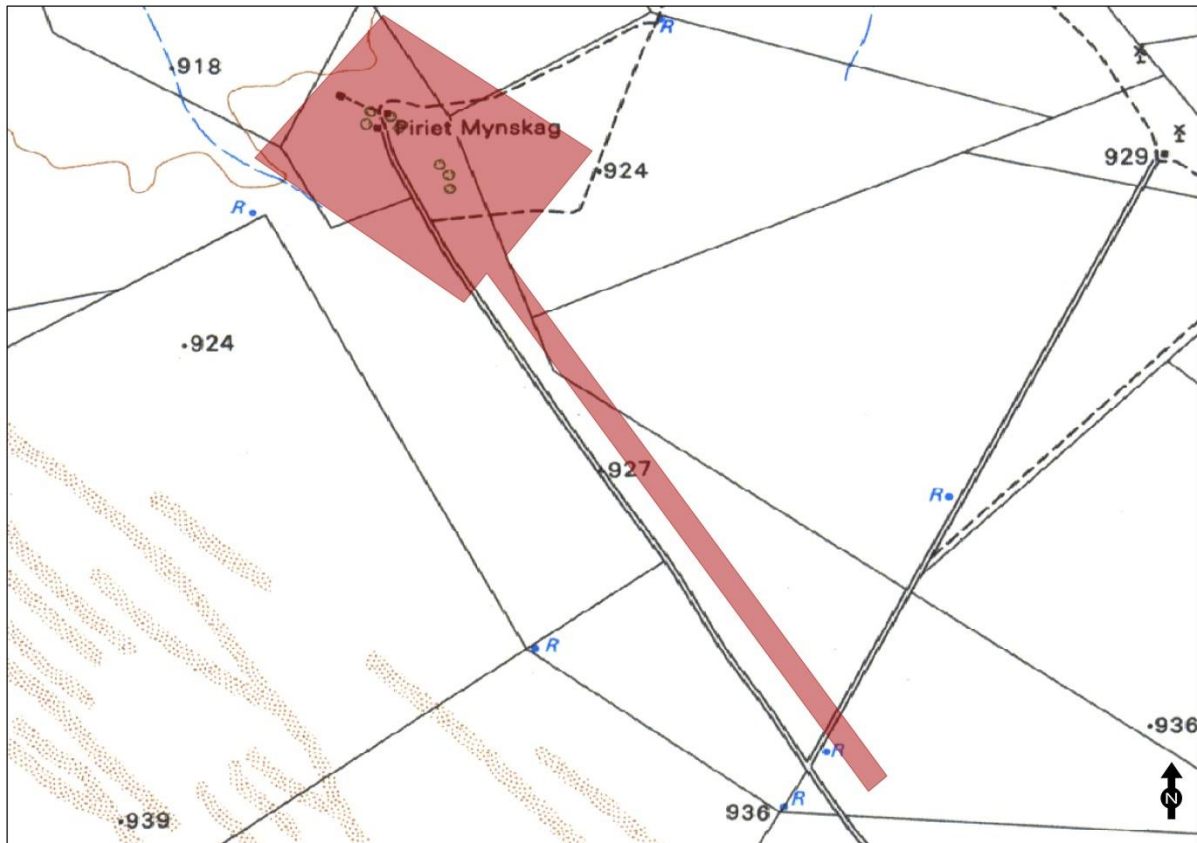


Figure 4: The survey area as indicated on the 1:50 000 topographic map 2821AC (1990)

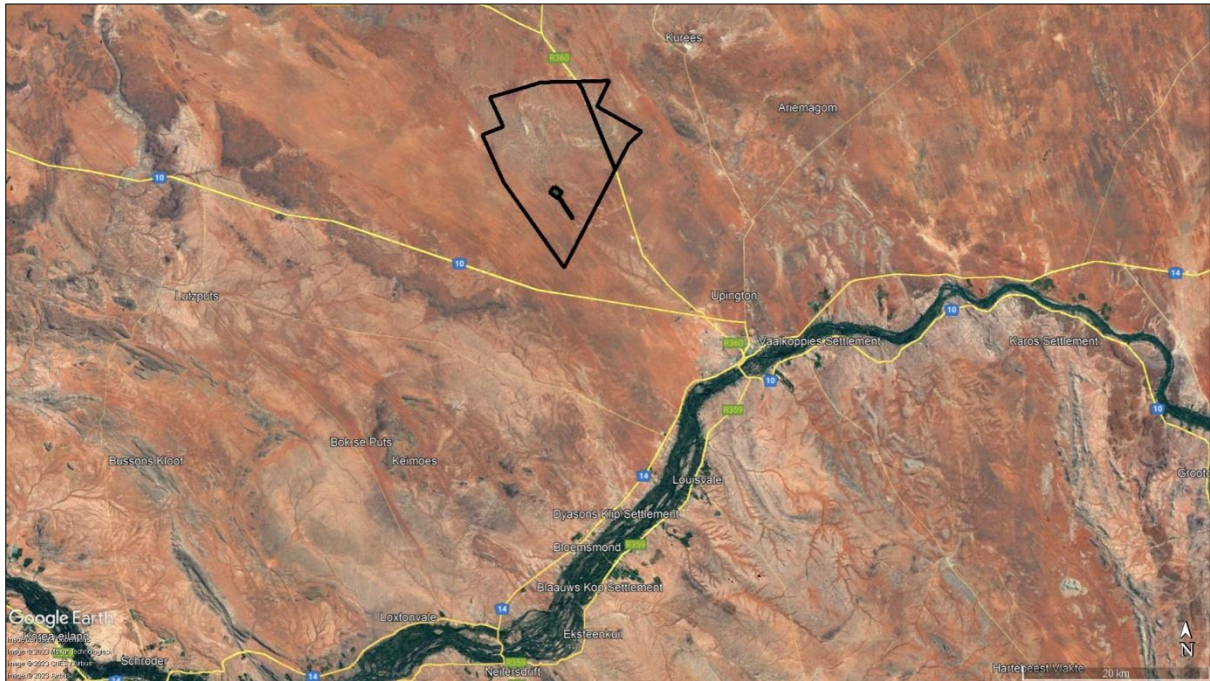


Figure 5: Detail of survey area as indicated on Google Earth Pro (2023)



Figure 6: Detail of survey area indicating the parameters of the mine area (Google Earth Pro: 2023)



Figure 7: Detail of survey footprint indicating the mined areas (shaft and dumps (top) and opencast trenches (bottom)) (Google Earth Pro: 2023)



Figure 8: General view of the existing infrastructure in the survey footprint (northern section)



Figure 9: General view of the existing infrastructure in the survey footprint (northern section)



Figure 10: General view of the existing infrastructure in the survey footprint (northern section)



Figure 11: General view of the existing trenches and dumps in the survey footprint (southern section)



Figure 12: General view of the previous mining activities in the southern section the survey footprint



Figure 13: General view of the previous mining activities in the southern section of the survey footprint



Figure 14: General view of the southern section of the survey footprint



Figure 15: General view of the eastern section of the survey footprint



Figure 16: General view of existing infrastructure western section of the survey footprint



Figure 17: General view of the central section of the survey footprint



Figure 18: General view of the existing infrastructure in the central section of the survey footprint



Figure 19: General view of the western section of the survey footprint

4. Proposed Project Description

Open-pit mining

The surface mining operation will be conducted by surface mining methods with a truck and shovel operation by an outsourced mining contractor, specifically due to the short duration of this operation. The mining method entails the following process:

- The historic surface area where historic mining activities and infra-structure occurred will be cleaned properly and will be removing sufficient material to expose stable and safe geological conditions.
- As a result of the limited size of the orebody it is imperative to remove as little as possible waste from a cost perspective.
- It is therefore intended to remove the waste material and orebody in the upper oxidized zone by means of strip-mining methodology with drilling and blasting to 70 meters in depth maximum.
- An 8° decline ramp will provide access to the orebody but ensuring that as little as possible waste will be mined during this process. This same ramp system will continue into the underground operation and will be used as well.
- A benching operation will ensure safety benches are intact for strata protection purposes, developed and planned according to rock engineering practitioner specifications.
- Once the desired depth is reached, preparation for the underground access will be developed a surface blasting operation with roll-over mining technology.

Underground mining

The underground mining operation will be conducted by mine-own mining personnel with underground mechanized mining equipment and technology as well as drilling and blasting equipment. The mining method to be used for the underground exploitation process is a total block-caving mining technique which encompasses the following process:

- An 8° decline spiral ramp system will provide access to close proximity to the +85° dipping orebody at 15-meter vertical intervals, which will form each consecutive production level.
- Each production level will thus consist of 15 meters of ore between levels.
- Crosscuts, developed in waste, will be blasted towards the orebody out of the decline ramp system for production level access purposes.

- Once the orebody is intersected, a development drive along the full strike of the orebody, in the ore (on-reef to explain it more simplistically), towards the full width of the orebody, some 400 meters away.
- The size of the development drive is planned at 3 meters wide x 3 meters in height and will be supported.
- Once the main development along the complete strike of the orebody is developed and supported, crosscuts, 16 in total will be developed into the width of the orebody (6 m to 15 m in width). The size of the orebody crosscuts will be 5 meters wide by 5 meters high.

Ablution

Chemical toilets shall be used, no french drains and pits shall be permitted.

Storage of dangerous goods

During the mining activities, limited quantities of diesel and fuel, oil and lubricants will be stored on site. These goods should be placed in a bounded area one and a half times the volume of the total amount of goods to be stored. The amount of dangerous goods stored on site will not exceed 500m³.

General infrastructure

These may include roads, rail, electricity and water supply.

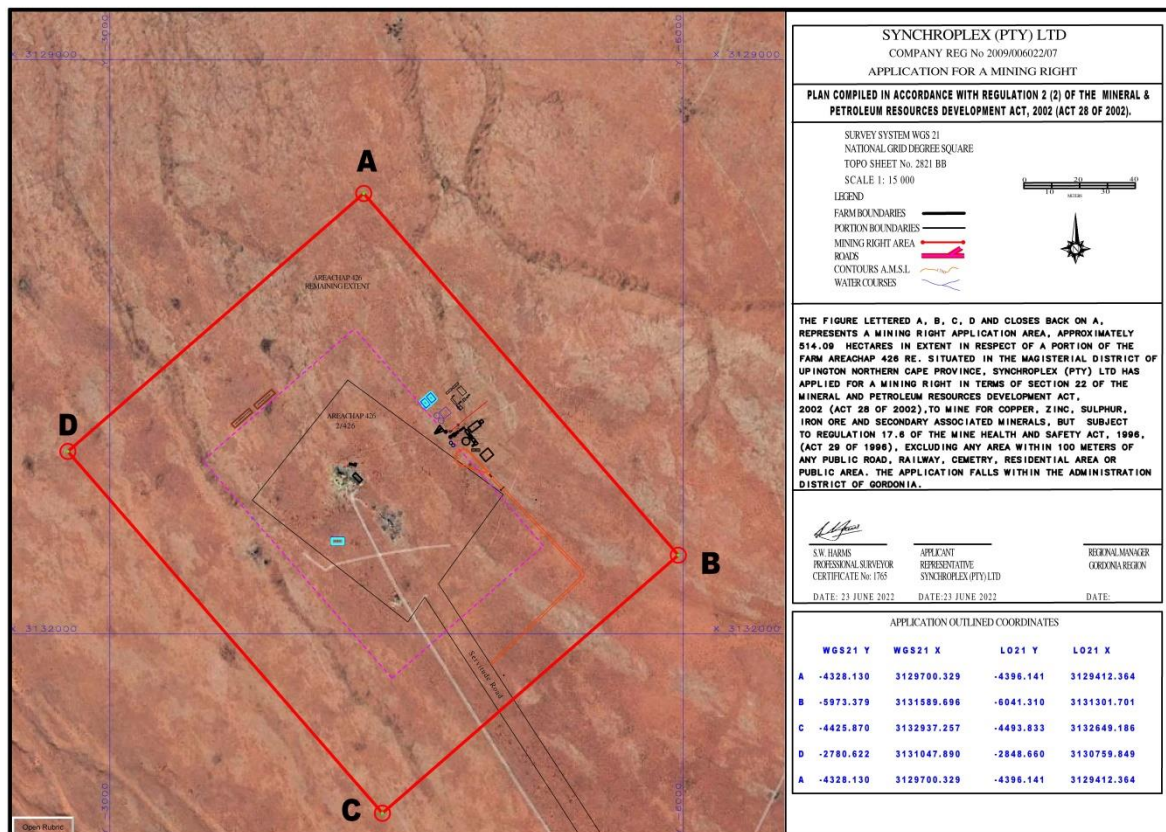


Figure 20: Proposed mining plant layout and location

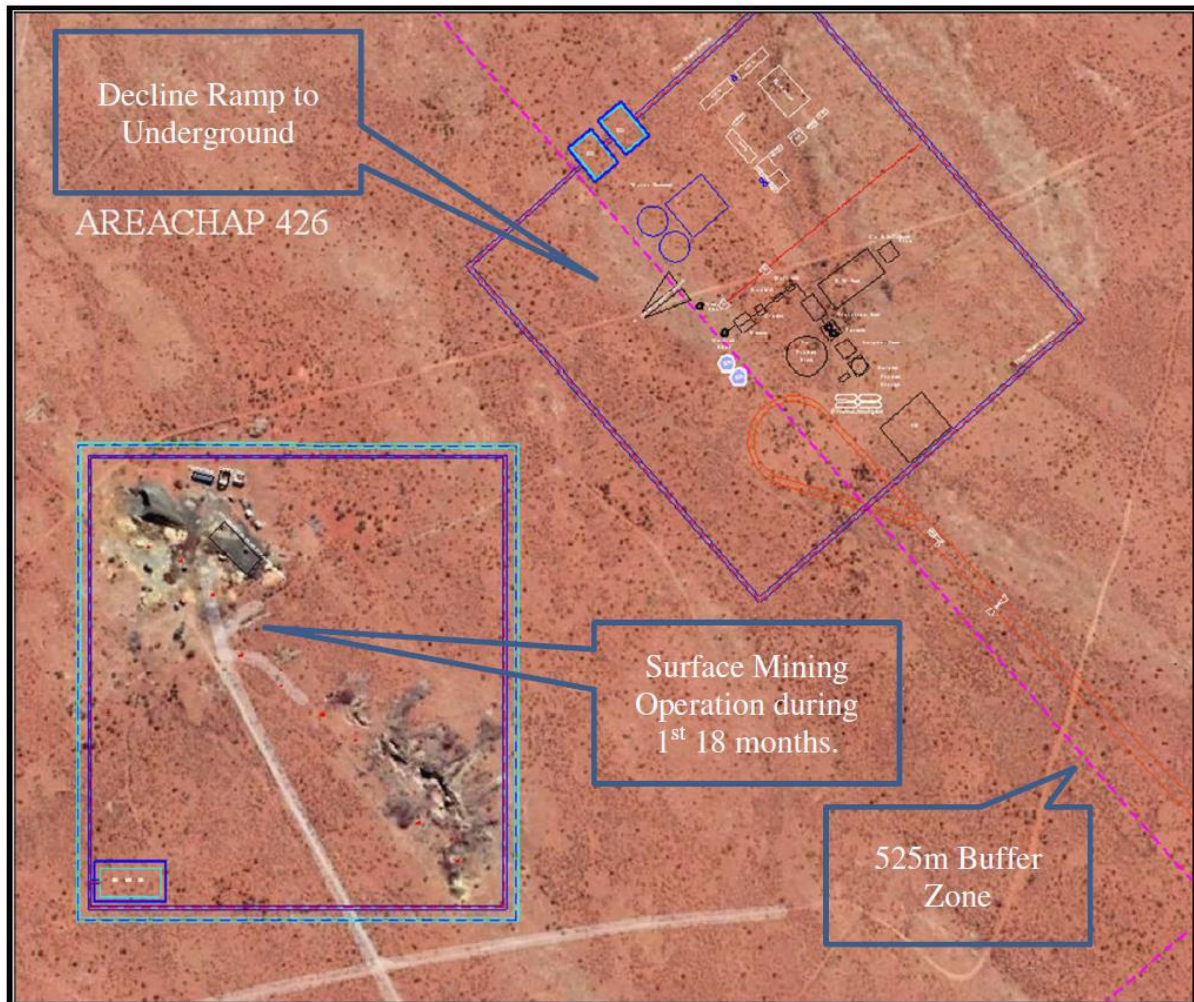


Figure 21: Proposed mining plant layout and location

5. Legal Framework

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 Section 28
Water Use Licence Application (WULA) Act No 59 of 2008)	Section 21 (a)(b)(g)(j)
Regulation 2, Appendix 2 of Governmental Notice Regulation (GNR) 982	
Air Quality Act (Act No. 39 of 2004)	
National Forests Act, Act of 84 of 1998	
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)	
Mine Health and Safety Act (Act No. 29 of 1996) (MHSA)	
Biodiversity Act (Act 10 of 2004)	
National Infrastructure Plan	
ZF Mgcawu District Municipality IDP (2021-2022)	

Table 3: Legal framework

Description of the overall activity. (Indicate Mining Right, Mining Permit,	Listing Notice 1 (GNR 327), Activity 9: <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</i>
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<p>Prospecting right, Bulk Sampling, Production Right, Exploration Right, Reconnaissance permit, Technical co-operation permit, Additional listed activity)</p>	<p>(i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;</p> <p>Listing Notice 1 (GNR 327), Activity 10: <i>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> (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;</p> <p>Listing Notice 1 (GNR 327), Activity 19: <i>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 a watercourse;</i></p> <p>Listing Notice 1 (GNR 327), Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p> <p>Listing Notice 1 (GNR 327), Activity 24: The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</p> <p>Listing Notice 2 (GNR 325), Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent,</p> <p>Listing Notice 2 (GNR 325), Activity 15: "The clearance of an area of 20 hectares or more, of indigenous vegetation." Listing Notice 2 (GNR 325), Activity 17 (Amended GNR 517: 2021): "Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right."</p> <p>Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021): "The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission"</p> <p>Listing Notice 3 (GNR 324), Activity 10: <i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (g) Northern Cape, (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland,</i></p> <p>Mining right for the mining of Copper, Zinc, Iron and associated minerals within the ore body & including associated infrastructure, structure and earthworks.</p> <p>NEM:WA 59 of 2008 Storage of hazardous waste 1. Category B: (1) The storage of general waste in lagoons.</p> <p>Treatment of waste</p>
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	<p>2. Category B: (5) The treatment of hazardous waste in lagoons, excluding the treatment of effluent, wastewater or sewage.</p> <p>Disposal of waste on land:</p> <p>3. Category B: (7) The disposal of any quantity of hazardous waste to land.</p> <p>4. Category B: (8) The disposal of general waste to land covering an area in excess of 200 m² and with a total capacity exceeding 25 000 tons.</p> <p>5. Category B: (9) The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.</p> <p>Construction of facilities and associated structures & infrastructure:</p> <p>Category B: (10) The construction of a facility for a waste management activity listed in Category B of this Schedule</p>
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Table 4: Listing Notices: 2017 Regulations

NAME OF ACTIVITY (E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc E.g. for mining,- excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)	Aerial extent of the Activity Ha or m ²	LISTED ACTIVITY Mark with an X where applicable or affected.	APPLICABLE LISTING NOTICE (GNR 324, GNR 325 or GNR 326)
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 Pipelines will be established for the mine infrastructure.			Listing Notice (GNR327), Activity 9
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 Pipelines will be established for the mine infrastructure, including for the pumping and transportation of sewage, tailings, and process water.			Listing Notice (GNR 327), Activity 10
The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. This includes explosives, diesel etc			Listing Notice (GNR 327), Activity 14
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 a watercourse;			Listing Notice 1 (GNR 327), Activity 19

<p>The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; These will include access & haul roads</p>			Listing Notice (GNR 327), Activity 24
<p>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding— (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day. The mining operation will require a water use licence as per the NWA.</p>			Listing Notice (GNR 325), Activity 6
<p>Clearance of indigenous vegetation: "The clearance of an area of 20 hectares or more, of indigenous vegetation." – Random indigenous vegetation clearance. Approximately 512 ha of indigenous vegetation is planned to be removed for the development of the mine.</p>	Extent of the area required for Mining: Approximately 512ha Application area: 19 250 hectares	X	Listing Notice (GNR 325), Activity 15
<p>“Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including — (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.” Mining right for the mining of Copper, Zic, Sulfur, Iron and associated minerals within the ore body</p>		-	Listing Notice (GNR 325), Activity 17

The removal and disposal of minerals which requires permission contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002, as well as any other applicable activity as contained in this Listing Notice, Listing Notice 1 of 2014 or in Listing Notice 3 of 2014, required to exercise the permission.			Listing Notice 2 (GNR 325), Activity 19 (Amended GNR 517: 2021)
The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (g) Northern Cape, (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland, This includes explosives, diesel etc that is stored within 100m of any water course or wetland			Listing Notice 3 (GNR 324), Activity 10
Storage of hazardous waste: The storage of general waste in lagoons. Tailings storage facility.			NEM:WA 59 of 2008 (Category B: (1))
Treatment of waste 6. Category B: (5) The treatment of hazardous waste in lagoons, excluding the treatment of effluent, wastewater or sewage.			NEM:WA 59 of 2008 (Category B(5))
Disposal of waste on land: (7) The disposal of any quantity of hazardous waste to land.			NEM:WA 59 of 2008 (Category B: (7))
Disposal of waste on land: (8) The disposal of general waste to land covering an area in excess of 200m ² and with a total capacity exceeding 25 000 tons.			NEM:WA 59 of 2008 (Category B: (8))
Disposal of waste on land: (9) The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.			NEM:WA 59 of 2008 (Category B: (9))
Construction of facilities and associated structures and infrastructure: The construction of a facility for a waste management activity listed in Category B of this Schedule			NEM:WA 59 of 2008 (Category B: (10))

Table 5: Listing notices

- 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	Yes
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	No
Any other development category, public open space, squares, parks, recreation grounds	No

Table 6: 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 7: 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 189 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 cover the section that is part of the mining application. The intension was therefore to conduct a detailed pedestrian (foot) and predictive survey of the survey footprint. The area is very homogeneous with large areas covered with red Kalahari sand and limestone outcrops. Existing access tracks were used with selected areas surveyed more intensely using pedestrian survey techniques.

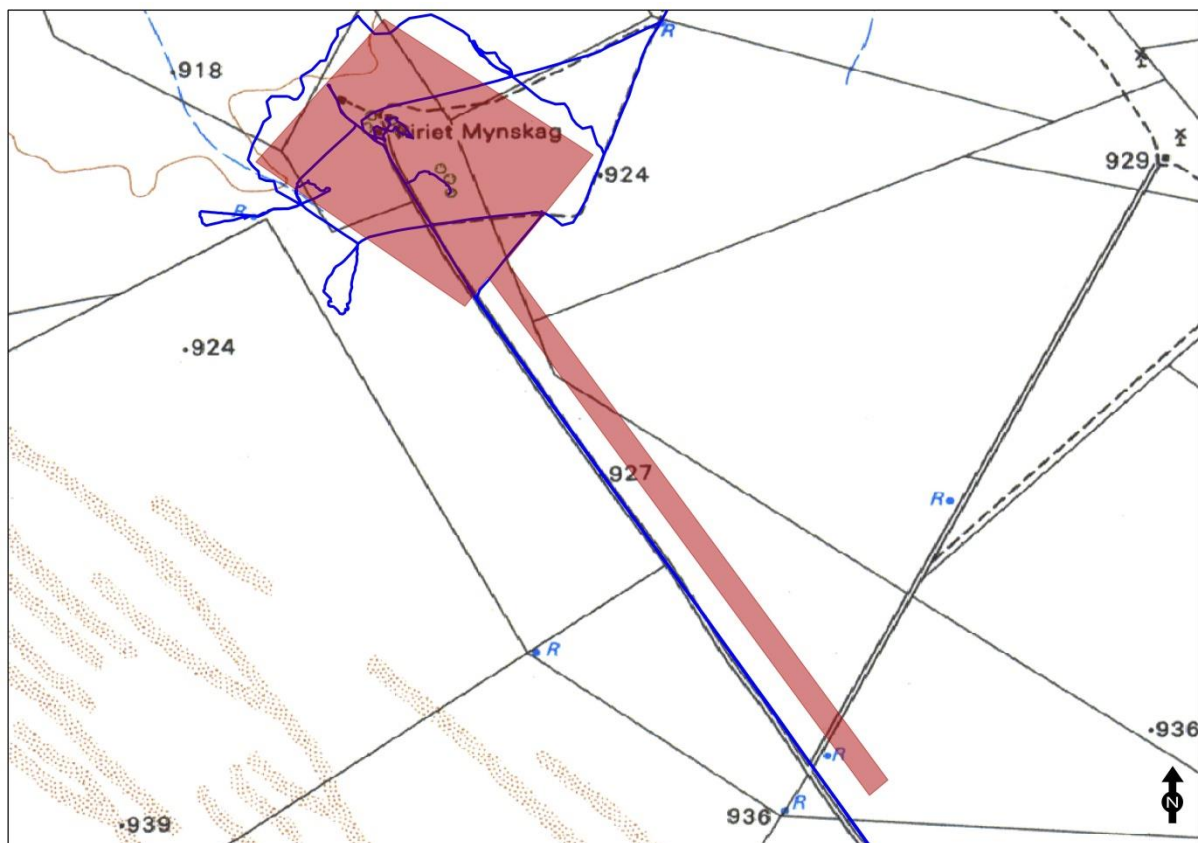


Figure 22: Recorded survey tracks for the project

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 (Parsons 2003; Beaumont 2005; Gaigher 2012; Van Ryneveld 2005)

Although several heritage impact assessments have been completed in the general vicinity of the survey area, however one survey was conducted within the current survey footprint. Several low density MSA scatters were recording, these the author noted as ‘find spot’ and were not recorded as sites (see van Ryneveld 2005). A general overview of the heritage in the Upington region is also provided by CTS Heritage (2019) in which they list most of the sites indicated in the SAHRIS database. A survey conducted in a quartzite quarry on the farm Droogehout 442 yielded low density open Late Acheulean and Middle Acheulean (Early Stone Age) sites on a pan (Beaumont 2005). A large survey for a proposed powerline by Gaigher (2012), also show results that are consistent with small, low density MSA scatters within the larger region. A master’s research project also looked at small localised open air LSA sites in the area (Parsons 2003). Of importance is that Morris (2021) clearly defines a widespread surface ‘background scatter’ of Middle Stone Age artefacts throughout the Northern Cape. This he recognises to be the case over the entire area surveyed that is artefacts lacking assemblage coherence or integrity, subject to erosion and/or secondary deposition, being parts of palimpsests with mixing of material of possibly differing age. This has also been defined and clearly characterised by Orton (2016).

According to the Surveyor General’s database the farm Areachap 428 was originally surveyed in 1896 (also see Addendum 3).

Archival documents confirm the discovery of copper ore in 1908 (KAB 3/2/1/42, KAB 8344). This operation started as a surface excavation and over time developed into a large trench or pit. The New Areachap Copper Mines Ltd company was already operating by 1916 (SAB 000/00, 1277) and an inspection of the mine was conducted in 1919 (KAB 61/01 (142/19)). It seems that iron pyrites containing both sulphur and copper were mined. This opencast-type mining is still evident today, however subsequent mining activities have expanded and altered most of the original sections of the trench and stockpiles.

Early maps indicate that an underground mining operation for the mining of Pyrite, which is an iron sulphide (FeS_2), was started approximately 300 metres northwest of these earlier trenches. It is unclear when the shaft was sunk, probably in the late 1960s early 1970s. Single quarters for the mining staff were erected in 1972 (SAB 2774) Evidence suggests that the shaft operation was probably equipped with a headgear, vents and even a crusher to process the ore for transport to a furnace. A concrete slab with a date confirms that the shaft was sealed off and this section of the mine closed by ISCOR in June 1977.

An interesting event also took place on the farm Areachap in the early 19th century. An armed insurrection was led by General Maritz twelve years after the Second Anglo-Boer War (South African War (1899- 1902)). Martial Law was declared on 12 October 1912 with Generals Louis Botha and Jan Smuts that proceeded to defeat the rebels as General Maritz and later also General Beyers, Kemp and de Wet were all defeated. It seems that the section of the Maritz Rebellion under Generals Kemp and Maritz laid down their arms on the farm Areachap on 2 February 1915. There is a stone cross near the northern border of the farm commemorating this event.



Figure 23: The farm indicated on the Field Intelligence Department Map of 1900

Note that declared National/Provincial Heritage Sites have been recorded in Upington and surrounds:

- Dutch Reformed Church in Schroder Street was declared in October 1982 (Ref no: 9/2/032/0019 [Site ID: 28779])
- Cathedral of St Augustine in Le Roux Street was declared in March 1979 (Ref no: 9/2/032/0017 (Site ID: 28782])
- Museum Complex in Schroder Street was declared in February 1985 (Ref no: 9/2/032/0018 [Site ID: 28783])
- Palm Tree Avenue, The Island was declared in October 1982 (Ref no: 9/2/032/0015 [Site ID: 28784])
- Old watermill was declared in February 1991 (Ref no: 9/2/032/0016 [Site ID: 28785])
- Grave and memorial of Magriete Jantjies in Kameelboom cemetery was declared in December 2020 (Site ID: 130121)

According to the SAHRIS database no heritage sites are recorded near the survey footprint, although a number of historical buildings are indicated in Upington and further to the west.

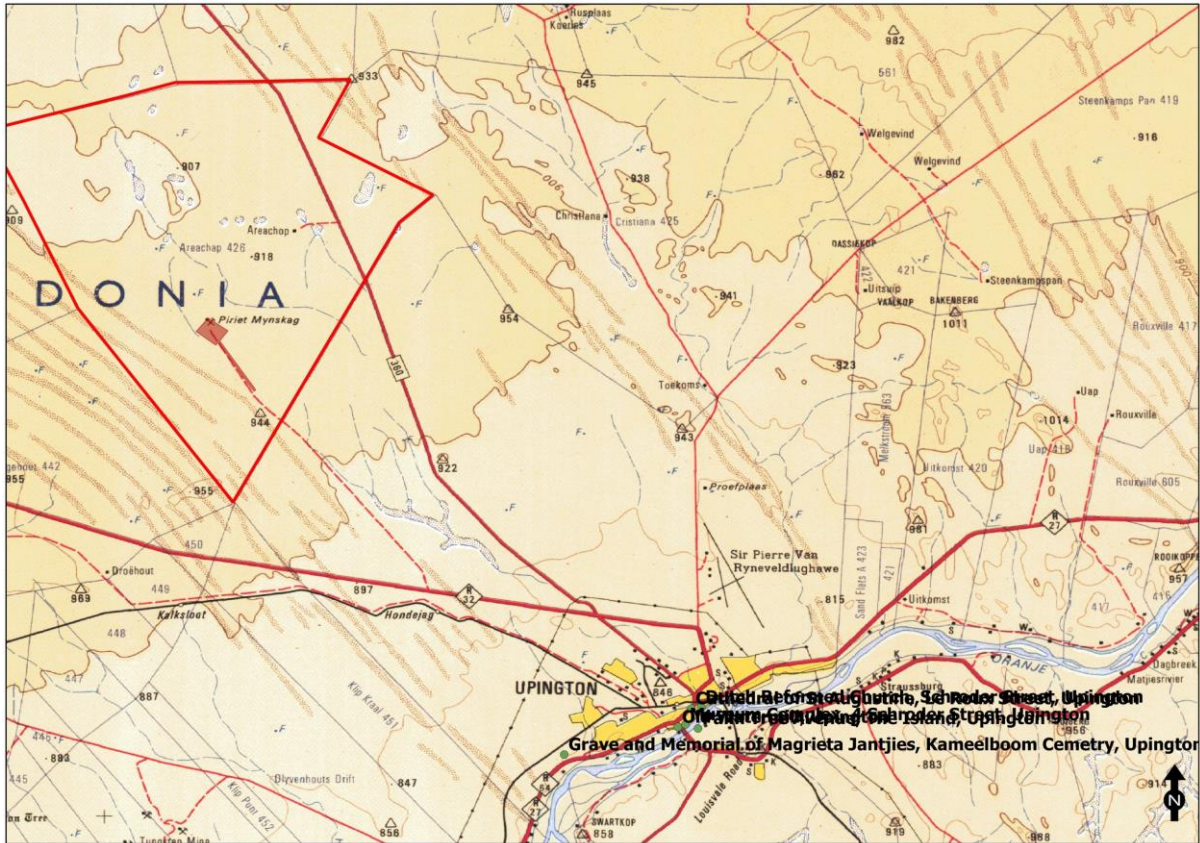


Figure 24: Declared heritage near the survey footprint (SAHRIS as at February 2023)

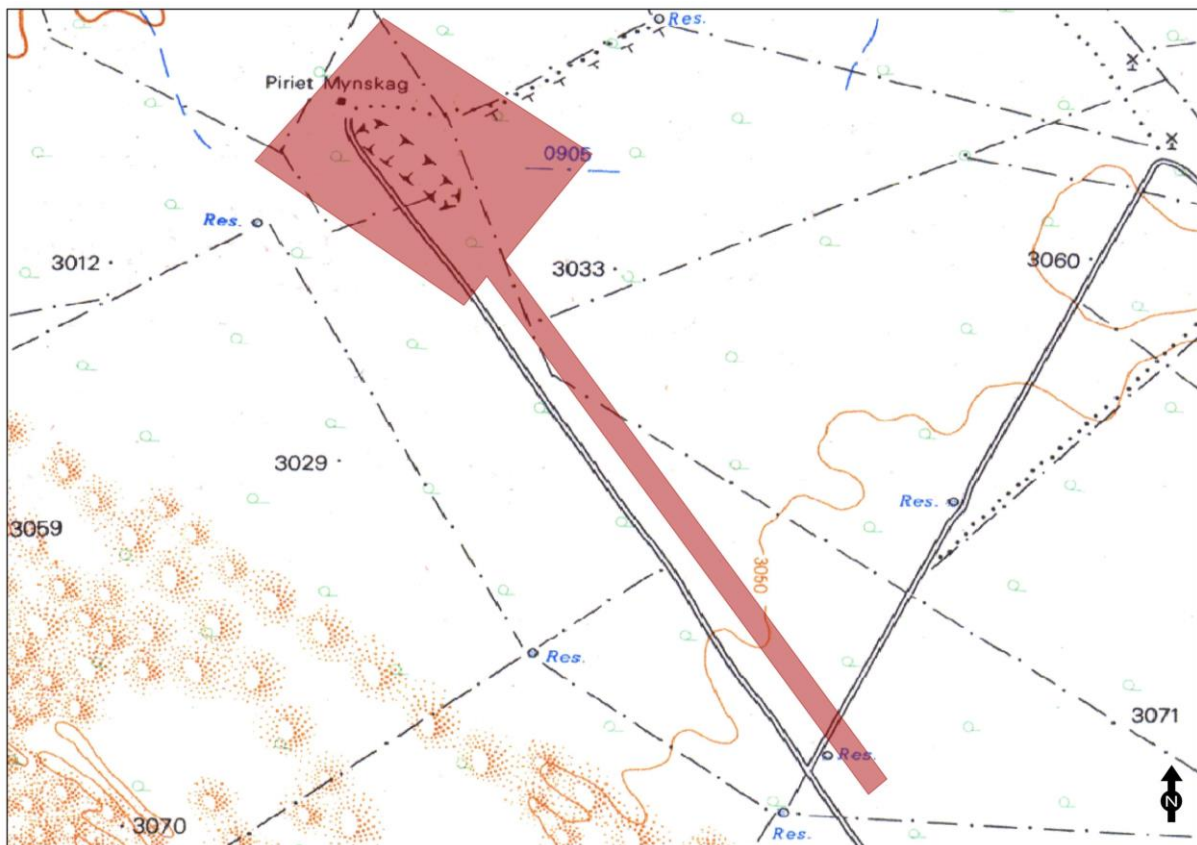


Figure 25: The survey area as indicated on the 1:50 000 topographic map 2821AC (1971)

6.2 Palaeontological sensitivity

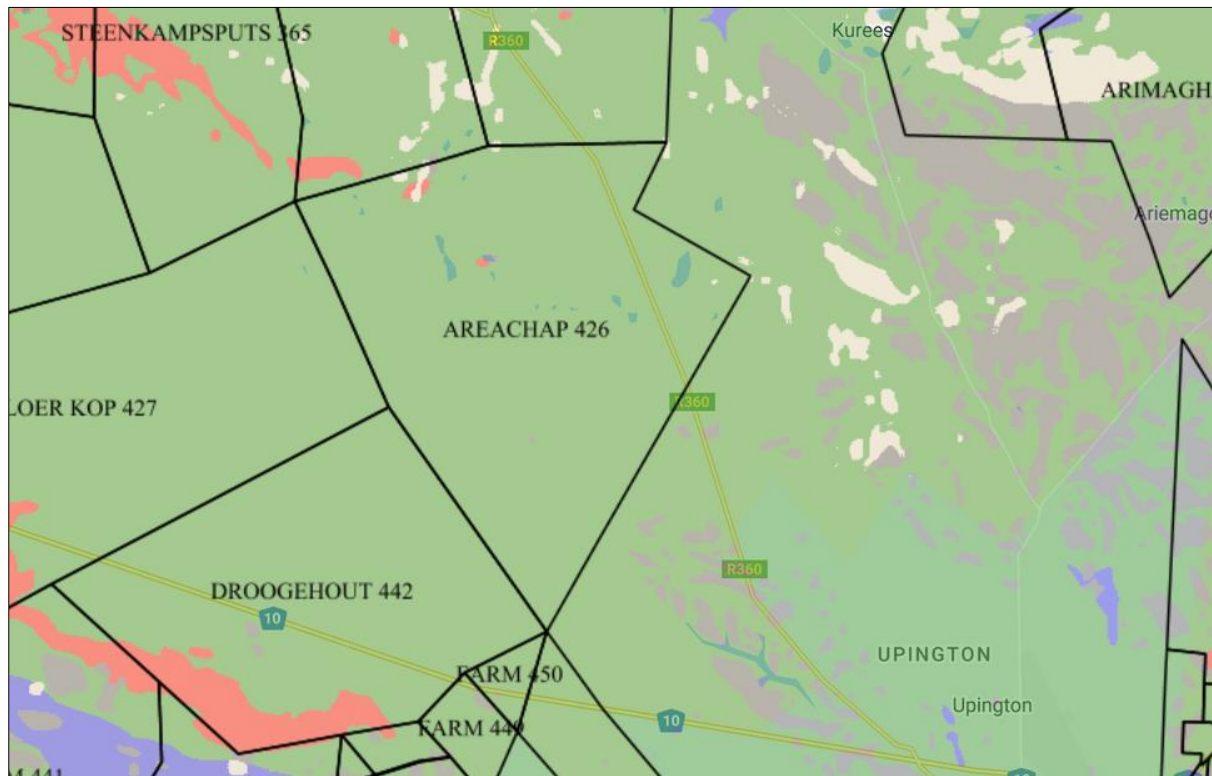


Figure 26: Palaeontological sensitivity zones as indicated for Zevenfontein 240 HO (SAHRIS 2023)

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 indicates a green (moderate) sensitivity for the farm Zevenfontein 240 HO. As a result a desktop palaeontological study will be required for the respective survey footprints.

6.3 Site visits

The field survey was conducted on 12 March 2023.

6.4 Social interaction and current inhabitants

Please note that the local farmer and mine manager were consulted during this survey.

6.5 Public Consultation and Stakeholder Engagement

An advertisement was placed on 13 October 2022 in English in the local & provincial newspaper (Noordkaap Bulletin) 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. Site notices were placed on site in English to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs will be given the opportunity to raise comments.

6.6 Assumptions, restrictions, gaps and limitations

No severe physical restrictions were encountered as the survey area was accessible.

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.

As discussed above, please note that widespread surface ‘background scatter’ of Middle Stone Age artefacts throughout the survey footprint. This phenomenon has also been defined and clearly characterised by Orton (2016).

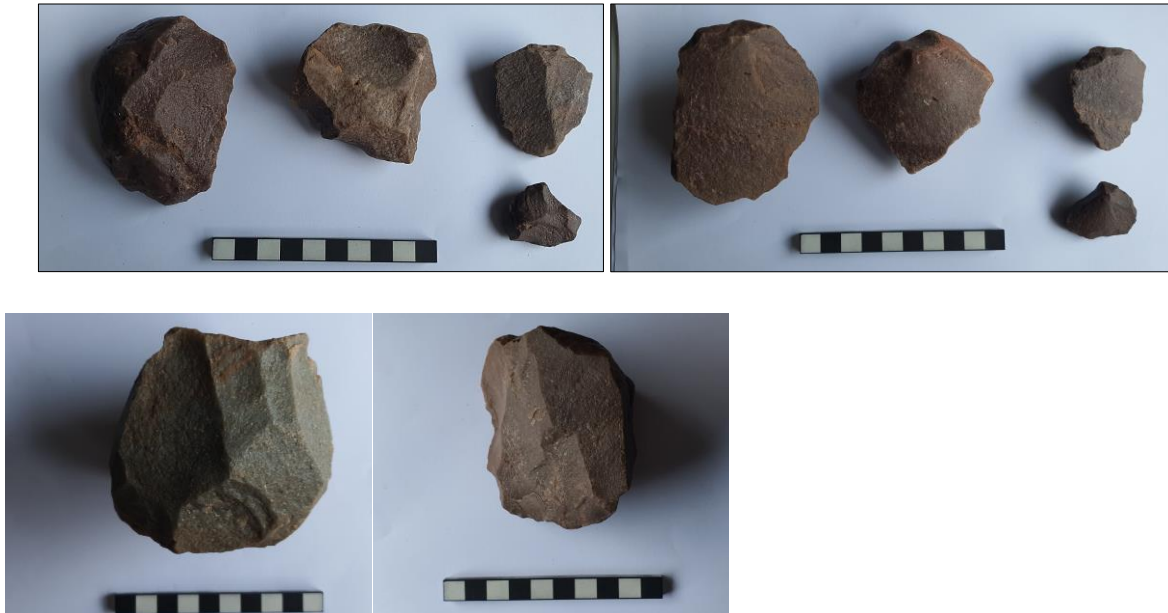


Figure 27: Middel Stone Age (MSA) flakes and cores recorded on the surface

7.2 Heritage sites

A total of one site was recorded during the survey, which include one graveyard (Site 1) The graveyard is probably associated with the early mining activities on the farm and probably dates to the early 20th century.

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

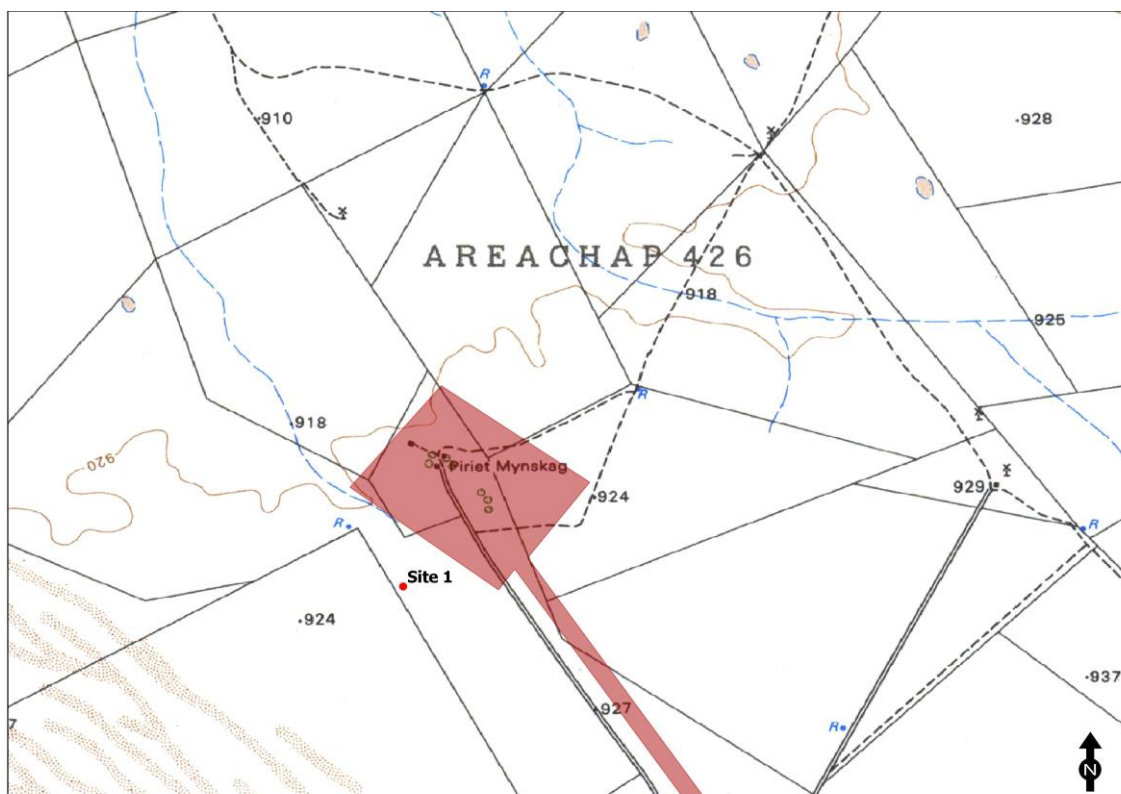


Figure 28: Location of the recorded heritage site

8. Locations and Evaluation of Sites

Site No	Coordinates	Site Type	Field Rating of Significance	Impact	Proposed Mitigation
1	28.302055°S 21.041148°E	Graveyard	Generally protected A: High significance	Low	<ul style="list-style-type: none"> Maintain a buffer zone of 50 metres during mining operations

Table 8: Location and evaluation of the site

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

A single graveyard was recorded during the survey (Site 1). The graveyard is possibly associated with the early mining activities on the farm and probably dates to the early 20th century.

No historical or archaeological (both Stone Age and Iron Age) artefacts, assemblages, features, structures or settlements were recorded during the survey of the project footprint.

Nature: Graveyard (Site 1)		
	Without mitigation	With mitigation
Prospecting 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 and blasting activities could cause excessive vibrations.	
<i>Can impacts be mitigated?</i>	Yes, buffer zones (50 metres) should be maintained during mining,	

Table 9: Significance of the impact

It is therefore recommended, from a cultural heritage perspective that the proposed mining activities may proceed, taking into account the mitigation measures.

Also, please note:

If the exhumation and reburial of the graveyards are envisaged it will entail social consultation and permit application. 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. Note that unmarked graves are by default regarded as older than 60 years and therefore falls under the NHRA (Act No. 25 of 1999, Section 36).

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

Upington


Upington (Nama: //Khara hais) is a town founded in 1873 and located in the Northern Cape province of South Africa, on the banks of the Orange River. The town was originally called Olijvenhoutsdrift ('Olive wood drift'), due to the abundance of olive wood trees in the area, but later renamed after Sir Thomas Upington, Attorney-General and then Prime Minister of the Cape. It originated as a mission station established in 1871 and run by Reverend Christiaan Schröder. The mission station now houses the Kalahari Orange Museum. The museum is also the home of a donkey statue, which recognises the enormous contribution that this animal made to the development of the region during the pioneering days of the 19th century.

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	Graveyard			
Site Period	Early 20 th Century			
Physical description	The site comprises a graveyard which consists of at least four graves. The graves are demarcated with packed stones. The graves have an east-west orientation with the headstone on the western side. The headstones do not have inscriptions. Please note that unmarked graves are by default regarded as older than 60 years and are therefore protected by the NHRA (Act No 25 of 1999, Section 36).			
Integrity of deposits or structures	Stable			
Site extent	Approximately 5 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]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			X
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"> Fenced off and gate installed Maintain a buffer zone of 50 metres during mining activities 			
H. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS			
<ul style="list-style-type: none"> National Heritage Resources Act (Act No. 25 of 1999, Section 36) Regulations Relating to the Management of Human Remains, in terms of the National Health Act No. 61 of 2003 Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925) Ordinance on Exhumations (Ordinance No. 12 of 1980) Local and regional provisions, laws and by-laws 			
I. PHOTOGRAPHS			
			
<p>Figure 29: General view of one of the graves in the graveyard</p>			

Addendum 3: Surveyor General Farm Diagram

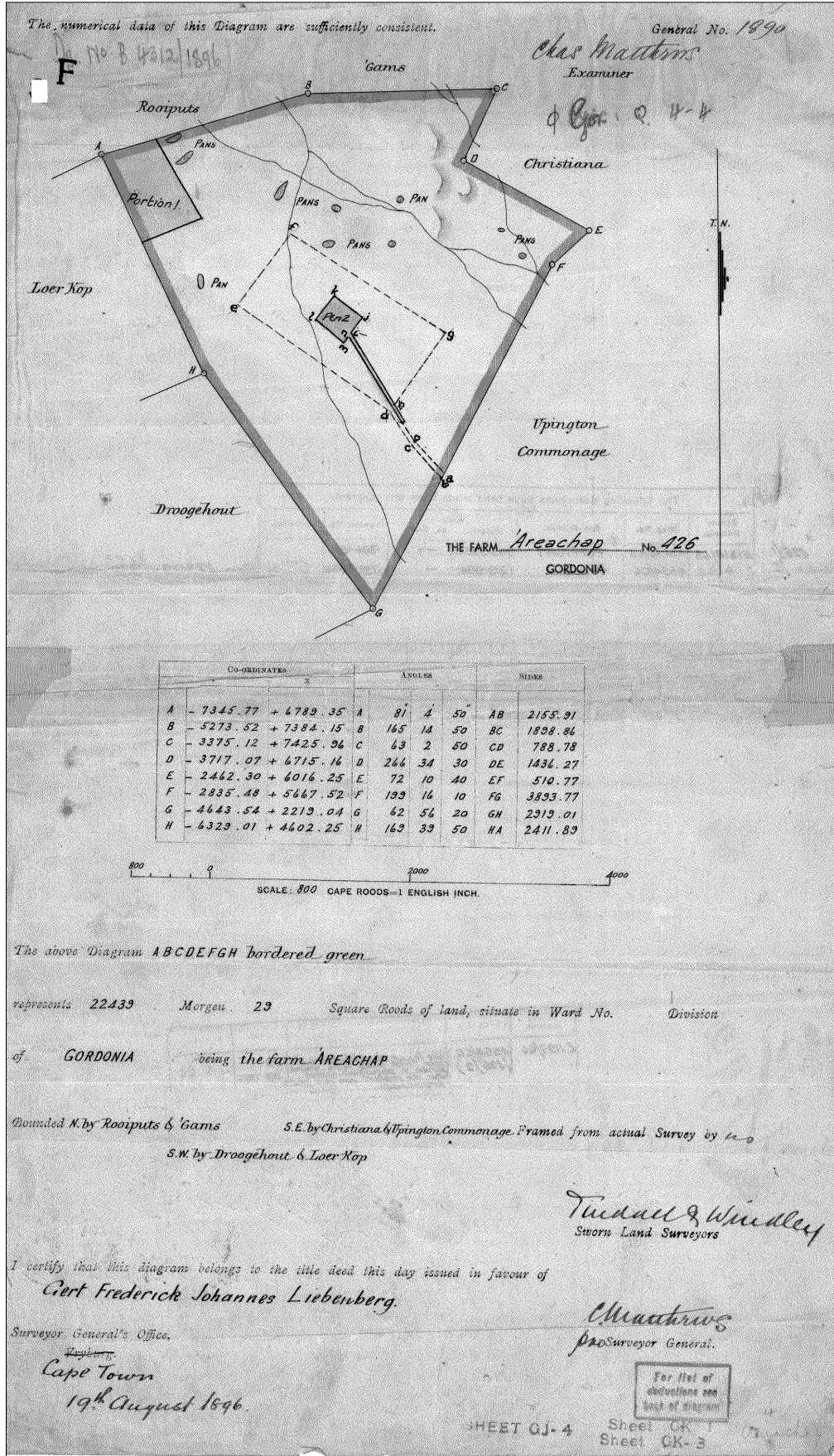


Figure 30: Surveyor General's sketch of the farm Areachap 426 indicates it was surveyed in 1896

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.