



COZA IRON ORE PROJECT

Proposed Mining Activities

Remainder of the farm Driehoekspan 435 located north of Postmasburg in the Northern Cape Province

Heritage Impact Assessment

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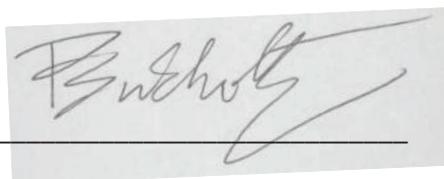
Declaration of Independence

The report has been compiled by PGS Heritage an appointed Heritage Specialist for Synergistics Environmental Services. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes.

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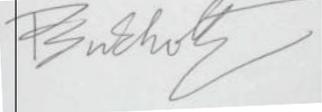
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Report Title	<i>Proposed mining activities on the Remainder of the farm Driehoekspan 435, north of Postmasburg, Northern Cape Province</i>		
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Input by Specialists:

- **Dr Maria van der Ryst** was commissioned as Stone Age specialist to carry out a site visit to the identified Stone Age sites and provide an assessment of these sites and outline whether any mitigation measures would be required. Her assessment and recommendations of these Stone Age sites are included in this report.
- **Dr Gideon Groenewald** was commissioned as Palaeontologist to carry out a Palaeontological Desktop Study of the proposed development. This desktop study is attached under Annexure A and its observations and findings are discussed in the report.

EXECUTIVE SUMMARY

PGS Heritage was appointed by Synergistics Environmental Services to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed mining activities located on the Remainder of the farm Driehoekspan 435, north of Postmasburg, Northern Cape Province.

Archival and Historical Desktop Study

The work commenced with an archival and historical desktop study. This study comprised an assessment of the available archival and historical maps as well as a compilation of a historic overview of the study area and surroundings.

The following observations can be made as a result of the archival and historical study:

- In 1911 the study area was entirely undeveloped and was likely characterised by farming activities.
- By 1928 a farmhouse had been built on Driehoekspan. However, based on the information available on an archival map, this farmhouse represented the only man-made feature within the study area at the time. Although the exact age of the farmhouse is not known, it would have been built between 1911 and 1928. As such the farmhouse can be anything from 85 years to 102 years old. This farmhouse is located to the south and south-east of the present study area.
- By 1970 considerable development has taken place within the study area and direct surroundings. This includes mining as well as infrastructural development such as the construction of the railway line between Postmasburg and Lohatla which had been completed in 1936.
- Two additional buildings appear on the farm Driehoekspan on a map that was compiled in 1970. These buildings are located to the south-east of the present study area. The locality of these two buildings in close proximity to the abovementioned railway line, suggests that they may have been associated with railway activities at the time. These two buildings would have been constructed between 1928 and 1970, and as such would be between 85 years and 43 years old, with a stronger

likelihood for these buildings to be closer to the 43 year mark. These buildings are located outside of the present mining development footprint.

- With the establishment of the Griqualand West in 1871 and the proclamation of British Bechuanaland in 1885, the boundary between these areas was defined as passing directly to the north of the study area. In fact, the northern boundary of the farm Driehoekspan formed part of this boundary line between Griqualand West and British Bechuanaland.
- In 1897 a fence was erected on the boundary line between Griqualand West and British Bechuanaland as an attempt to halt the spread of the dreaded Rinderpest from the north into Griqualand West. This fence would have been erected along the northern boundary of the farm Driehoekspan as well.
- The railway line extension between Postmasburg and Lohatla was constructed across the western end of the farm Driehoekspan during 1936. A large section of the siding from this line to Manganore was also constructed within the farm Driehoekspan.

Previous Archaeological Research and Studies

Previous studies conducted in the surroundings of the study area have identified a number of archaeological sites. These include Stone Age (ESA, MSA and LSA) sites including find spots, surface scatters and rock art sites; pre-colonial specularite mining sites; historic structures and buildings; historic mining sites as well as graves and cemeteries.

Due to the arid nature of the surroundings of the study area, it seems likely for many of the archaeological site types (with the possible exception of pre-colonial and historical mine sites) to be concentrated in proximity to water sources such as riverine edges and pans. However, as no fieldwork has yet been undertaken, this cannot be stated as fact.

This study has highlighted the archaeological potential of the study area and the need for archaeological fieldwork to be undertaken of the proposed development footprint area. During the fieldwork a total of eight sites were identified, with three sites previously identified during an archaeological impact assessment on a section of the present study area carried out in 2010 (see Webley & Halkett, 2010). This means that a total of 11 heritage sites

were identified within the study area. Of these 11 sites, a total of nine could clearly be identified as archaeological sites. The fieldwork findings are discussed in more detail below.

Palaeontology

The study areas are underlain by chemical and clastic sedimentary sequences of the Campbell and Postmasburg Groups of the Transvaal Supergroup. These sedimentary sequences are associated with BIFs in the Postmasburg region where mining is envisaged. The dolomite sequences can contain good examples of stromatolite structures that are of medium palaeontological significance.

It is recommended that the developer and the ECO of the development be made aware of the possible presence of stromatolites. If these structures are present, a qualified palaeontologist must be informed and a representative sample of at least 1m³ must be collected for future reference. Photographic recording of the structures must form part of the Environmental Management Plan of the mining development.

Fieldwork Findings

A total of 11 heritage sites were identified which comprises eight sites identified during the two fieldwork activities of 2013 and 2015 by PGS Heritage and three sites (see DRHP 8, DRHP 9 and DRHP 10) originally identified during the Archaeological Impact Assessment conducted by L. Webley and D. Halkett in 2010 (2010). The table below provides an overview of all 11 these identified heritage sites.

Site	Latitude	Longitude	Description	Significance
DRHP 1	28° 8' 59.66"S	23° 2' 21.55"E	Ox wagon remains associated with a low density surface scatter of historic material	Low
DRHP 2	28° 8'57.19"S	23° 2'21.07"E	LSA findspot	Low
DRHP 3	28° 8'54.96"S	23° 2'3.01"E	Low density surface scatter of MSA / LSA lithics	Low
DRHP 4	28° 8'52.00"S	23° 1'50.53"E	ESA findspot	Low

DRHP 5	28° 8'50.26"S	23° 2'5.10"E	Low density surface scatter of predominantly MSA lithics	Low
DRHP 6	28° 8'39.69"S	23° 2'6.58"E	Low density surface scatter of MSA / LSA lithics	Low
DRHP 7	28° 8'31.42"S	23° 2'11.12"E	Low density surface scatter of predominantly MSA lithics	Low
DRHP 8	28° 8'29.10"S	23° 1'44.60"E	Structure	Low
DRHP 9	28° 8'29.10"S	23° 1'44.60"E	ESA findspot	Low
DRHP 10	28° 8'19.50"S	23° 1'35.90"E	Low density surface scatter of LSA lithics	Low
DRHP 11	28° 8'25.70"S	23° 2'28.20"E	Low density surface scatter of MSA lithics	Low
DRHP 12	28° 8'27.90"S	23° 2'29.60"E	Low density surface scatter of historic material	Low

An overlay of these 11 heritage sites was made over the available mining development layout plan. From this it is evident that only sites DRHP 5, DRHP 6, DRHP 7, DRHP 11 and DRHP 12 will be directly impacted upon by the proposed mining development.

Impact Assessment and Mitigation

Assessments were made of the impact risk of the proposed mining development on these five heritage sites. These calculations have revealed that the impact risk of the proposed development on the five heritage sites mentioned above, fall within Impact Class 2, which represents a Low Impact Risk. As a result no mitigation would be required for any of the sites.

Conclusions

On the condition that the mitigation measures outlined for paleontology are undertaken, the development is not expected to have any significant impact on heritage sites. As such no heritage reasons can be given for the development not to continue.

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1 INTRODUCTION

PGS Heritage was appointed by Synergistics Environmental Services to carry out a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed Coza Iron Ore Project located on the Remainder of the farm Driehoekspan 435. The proposed mining area is situated north of Postmasburg, in the Northern Cape Province.

1.1 Scope of the Study

The HIA aims to inform the EIA in the development of a comprehensive EMP to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

This Heritage Impact Assessment Report was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 42 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Polke Birkholtz, the Project Manager, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited with the CRM Section of ASAPA. He has 18 years experience in the heritage assessment and management field and holds a B.A. (cum laude) from the University of Pretoria specialising in Archaeology, Anthropology and History as well as a B.A. (Hons.) in Archaeology (cum laude) from the same university.

Dr Maria van der Ryst acted in advisory capacity as specialist for the Stone Age. She has undertaken extensive and in-depth research at several Stone Age and rock art localities. She has also conducted several Phase 2 Archaeological Impact Assessments with a focus on the Iron Age and the Stone Age and specialist studies on the Stone Age.

Dr Gideon Groenewald, the appointed Palaeontologist for this project, holds a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

1.3 Assumptions and Limitations

The following assumptions and limitations are relevant to this study:

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.
- Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.
- The findings of this report is based on an intensive walkthrough of that section of the Remainder of Portion 1 of the farm Driehoekspan 435 located west of the gravel road between Postmasburg and Glosam as well as an intensive walkthrough of the footprint areas provided at a later stage which are located to the east of this gravel road, including an access road linking the mine to the R325 tar road. Furthermore, the findings of this report are also based on the development footprint areas that were provided by the client to the author of this report and were used to assess the

impact of the proposed development on the identified heritage resources. Should these footprint areas change, or should the nature or extent of the proposed mining and related activities change from what is proposed in this report, a heritage specialist must be contacted to assess whether any additional fieldwork or studies would be required.

- The available Environmental Scoping Report (Synergistics, 2015) indicates that the *“...existing gravel access roads linking to the R325 will be upgraded to cater for operational phase traffic. Upgrading activities will include widening and lengthening of gravel roads.”* These widening and lengthening activities did not form part of the present scope of work, and should these be implemented an assessment by a heritage specialist would be required to ensure that no detrimental impact to the heritage fabric of the area.

1.4 Legislative Context

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

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

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

- i. National Environmental Management Act (NEMA) Act 107 of 1998
 - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
 - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
 - c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
 - d. Environmental Management Plan (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38
- iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)
- iv. Development Facilitation Act (DFA) Act 67 of 1995

- a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”.

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

Terminology and Abbreviations

Archaeological resources

This includes:

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

Cultural significance

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

Development

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

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

Early Stone Age

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

Fossil

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

Heritage

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

Heritage resources

This means any place or object of cultural significance

Holocene

The most recent geological time period which commenced 10 000 years ago.

Late Stone Age

The archaeology of the last 20 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

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

Middle Stone Age

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

Palaeontology

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

The table below provides a description of the abbreviations which are used in this report:

<i>Abbreviations</i>	<i>Description</i>
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
BIF	Banded Iron Formations
CCS	Cryptocrystalline Silica
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LIA	Late Iron Age
LSA	Later Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PGS	PGS Heritage and Grave Relocation Consultants
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

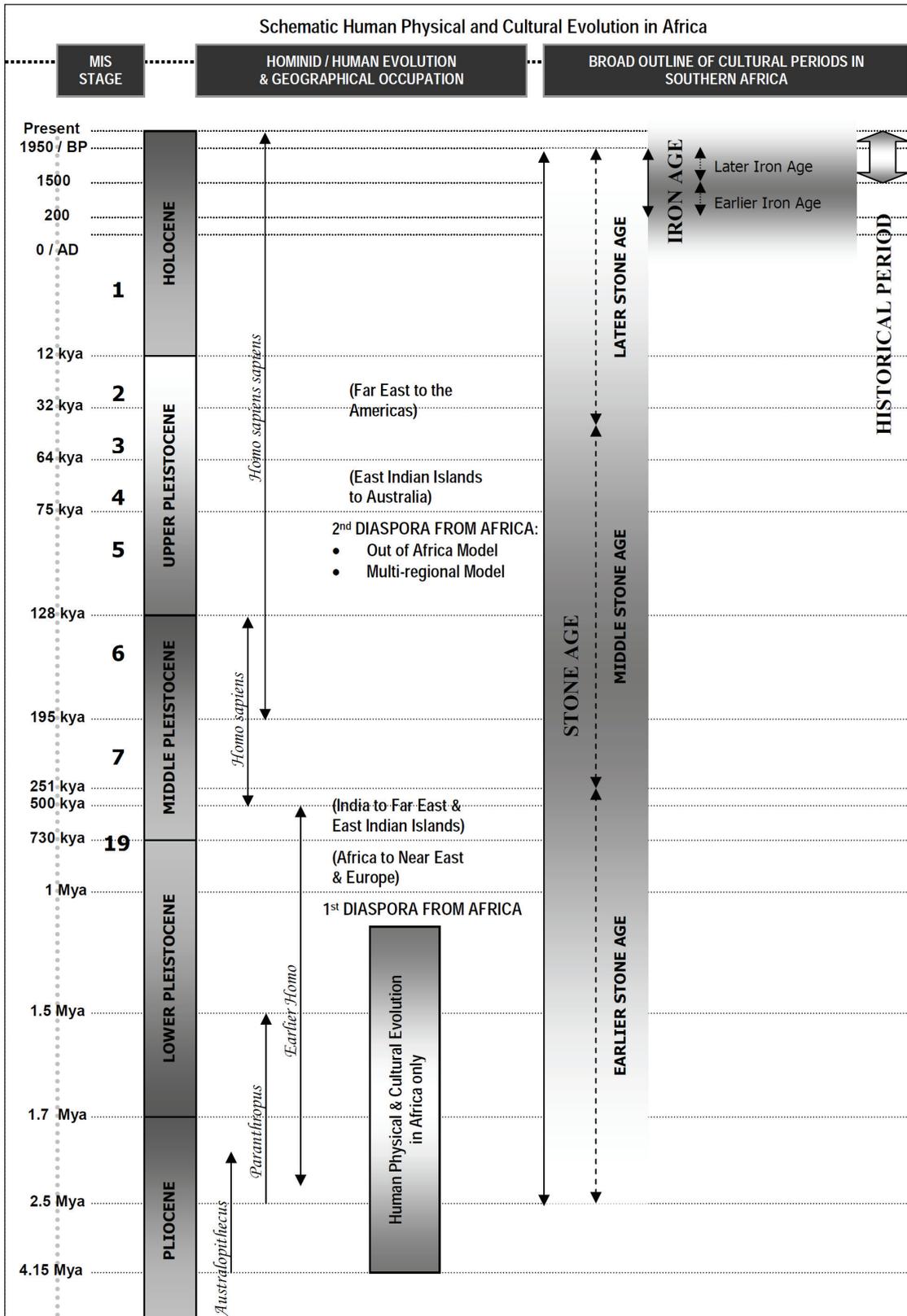


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

Coordinates	Approximate Centre of Proposed Development: S 28° 08' 30.77" E 23° 02' 02.29"
Property	Remainder of Portion 1 of the Farm Driehoekspan 435.
Location	The study area is located roughly 15.3 km north of Postmasburg. The gravel road between Postmasburg and Glosam runs through the study area.
Extent	The development footprint is roughly 175 hectares in extent.
Land Description	<p>The land description that follows was for the most part obtained from the Environmental Scoping Report of Synergistics (2015).</p> <p>According to available topographic maps, the general topography within the study area is flat to undulating with an average surface elevation of approximately 1 370 m above mean sea level (mamsl). On the western edge of Farm Driehoekspan is a hill with an elevation of approximately 1 445 mamsl. Mining activities are proposed to occur east of this hill. There are ephemeral drainage lines on the west of the property.</p> <p>According to the vegetation classification of South Africa by Mucina & Rutherford (2006, Biodiversity GIS vegetation map), there are two vegetation types present in the study areas – Kuruman Thornveld and Kuruman Mountain Bushveld. The two vegetation types are described in more detail below.</p> <p>The Kuruman Thornveld occurs on flats from the vicinity of Postmasburg and Danielskuil (west of the Kuruman Hills) in the south extending via Kuruman to Tsineng and Dewar in the north (Mucina & Rutherford 2006). This thornveld is typified by flat rocky plains and some sloping hills with a very well developed, closed shrub layer and well developed open tree stratum consisting of camel thorn (<i>Acacia erioloba</i>). Smaller trees in this vegetation unit include Blackthorn (<i>Acacia mellifera subsp. Detinens</i>) and Shepherd's tree (<i>Boscia albitrunca</i>). Taller shrubs are Velvet Brandybush (<i>Grewia flava</i>), River Honeythorn (<i>Lycium hirsutum</i>), Camphor Bush (<i>Tarchonanthus camphoratus</i>) and Common Spike-Thorn (<i>Gymnosporia buxifolia</i>). Small shrubs present are Besembossie (<i>Gnidia polycephal</i>), <i>Helichrysum</i> species (e.g. Golden Everlasting), <i>Hermannia</i> species (e.g. Doll's Rose) and <i>Plinthus sericeus</i>. Common grasses are Arrowfeather Threawn (<i>Aristida meridionalis</i>), <i>A. stipitata</i> and Lehmann Lovegrass (<i>Eragrostis lehmanniana</i>).</p> <p>The Kuruman Mountain Bushveld covers the hills with generally gentle to moderate slopes and hill pediment areas, with an open to closed shrubveld. The grass layer is fairly well developed. Common large shrubs include Blackthorn (<i>Acacia mellifera ssp. Detinens</i>), common <i>Guarri</i>, <i>Euclea</i> undulate, Bloubos <i>Diospyros lycioides</i>, <i>Searsia tridactyla</i>, Yellow Pomegranate (<i>Rhigozum obovatum</i>) and Vaalbos (<i>Tarchonanthus camphoratus</i> and <i>T. obovatus</i>). Shepherd's trees (<i>Boscia albitrunca</i>) are occasional. Several rock figs (<i>Ficus cordata</i>) grow on the peaks of the hills where large boulders or sheer rock outcrops are a feature. Common grasses include Black Spear Grass (<i>Heteropogon contortus</i>, <i>Enneapogon sp.</i>, <i>Eragrostis sp.</i>), Koperdraadgras (<i>Aristida diffusa</i>) and Oxtail Buffalo Grass (<i>Cenchrus ciliaris</i>). Dwarf shrubs and herbaceous species</p>

include (*Hermannia species*, *Eriocephalus sp.*, *Helichrysum*) species and a variety of small legume species such as *Indigofera sp.*

According to the palaeontological desktop carried out by Dr Gideon Groenewald (2013) the farm Driehoekspan is underlain by rocks of the Gamagara Formation of the Postmasburg Group as well as rocks of the Lime Acres Member of the Ghaap Plato Formation of the Campbell Group. The rocks of the Gamagara Formation underlie the Western Corner of the farm. This formation consists of quartzites, conglomerates, flagstones and shales and constitutes the base of the Postmasburg Group. The formation lies upon the Ghaap Plateau and Asbesberge Formations. Lenticular basal conglomerates contain pebbles of jasper and banded iron stone and are completely ferruginised in places. The shales contain lenses of conglomerate and are also locally ferruginised or manganised. Ferruginous flagstone and white, purple and brown quartzites form the top of the formation. Rocks of the Lime Acres Member of the Ghaap Plateau Formation of the Campbell Group consist of dolomitic limestone with subordinate coarsely crystalline dolomite and chert with lenses of limestone. Stromatolitic puckered limestone consisting of alternating dark and light bands can be found. Lenticular bodies of limestone occurring in the dolomite are probably the result of irregular dolomitisation of the original limestone.



Figure 2 – Location of the Study Area within its Regional Context.

2.2 Technical Project Description

2.2.1 Introduction

The section that follows was obtained from the Environmental Scoping Report of Synergistics (June 2015).

COZA Mining (Pty) Ltd is proposing to develop the COZA Iron Ore Project located approximately 10 km north-northwest of Postmasburg Town in the Tsantsabane Local Municipality of the Northern Cape Province. The proposed development is a green-fields project that will involve the mining of iron ore from an open pit on the farm Driehoekspan 435 (Remaining Extent). The open pit mining will be undertaken by means of truck and shovel. Mined ore will be crushed, screened and blended on site prior to being transported via rail for further processing off site.

A preliminary layout plan has been developed for the Driehoekspan mining area (refer Figure 3). It is important to note that apart from the surface infrastructure listed below, the scope of work for the present study also included an assessment of an access road between the mine and the R325 tar road. This access road is depicted as a thin black line in Figure 3 and is shown running diagonally from the mine to the northern boundary of the farm from where it follows this boundary line all the way to the main tar road.

2.2.2 Description of the Surface Infrastructure associated with each Development Phase

Construction Phase Surface Infrastructure

Temporary construction facilities will be established on site during the initial development of the mine. These facilities could include:

- Workshops, stores, washbays, lay-down areas, fuel handling and storage area, offices, ablution facilities
- Handling and storage area for construction materials (paints, solvents, oils, grease) and wastes
- Generator/s for temporary power supply
- Construction camp.

These facilities would either be removed at the end of the construction phase or incorporated into the layout of the operational mine.

Operational Phase Surface Infrastructure

Surface infrastructure is envisaged to include:

- An open pit
- Topsoil stockpiles
- Waste rock dump
- Run of mine (ROM) stockpile
- Product stockpile
- Crushing/screening plant
- Haul roads
- Weighbridge
- Change house and ablution facilities
- Fire detection and fighting facilities
- Water storage facilities and surface water control measures: in compliance with Regulation 704
- Lighting and communication infrastructure
- Ore, fuel, chemical, material and explosive storage facilities
- Waste handling station
- A medical first aid facility
- Administration office block
- Parking areas
- A washbay and workshop.

Decommissioning And Closure

The conceptual plan at this stage is to remove surface infrastructure and rehabilitate the disturbed areas. The open pit will be backfilled to approximately resemble the pre-mining landscape. The closure objective will be to return the land to pre-mining potential.

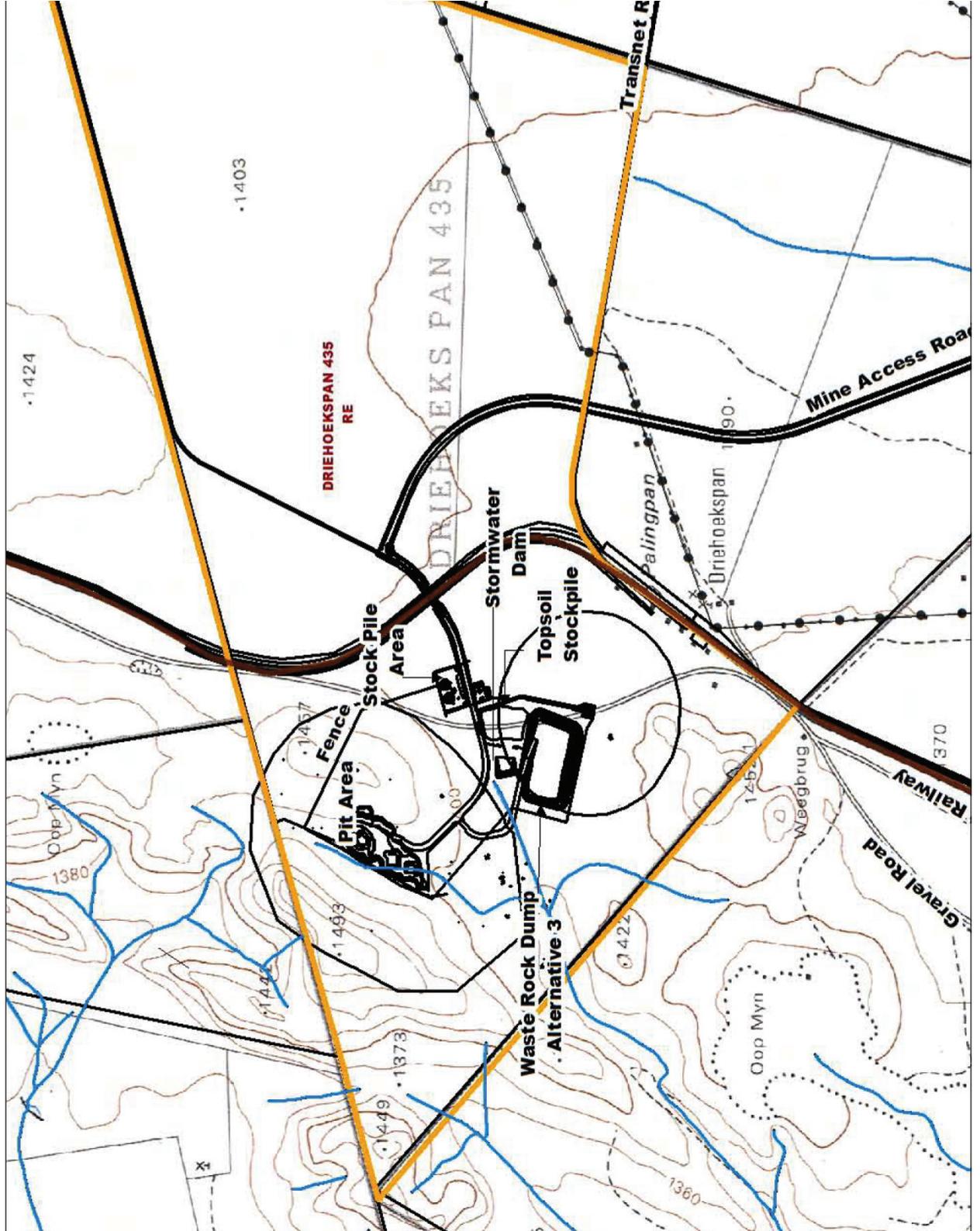


Figure 3 – Preliminary Mining Development Footprints and Layout. From a map supplied by Synergistics.

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

PGS Heritage compiled this report for proposed mining activities. The applicable maps, tables and figures are included as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Desktop Study: The background information to the field survey leans greatly on the archival and historical cartographic material assessed as part of the study as well as a study of the available literature. The desktop study also included a detailed historical overview of the study area and surrounding landscape as well as a palaeontological desktop study that was carried out by Dr Gideon Groenewald.

Step II – Field Survey: Physical field surveys comprising intensive walkthroughs of the proposed footprint areas were conducted on Tuesday, 14 May 2013, Wednesday, 15 May 2013 and Thursday, 16 May 2015. Due to the fact that changes had been made to the proposed mining development layout that was surveyed in 2013, additional fieldwork was undertaken on Thursday, 30 July 2015. The original fieldwork was undertaken by a team comprising a professional archaeologist (Polke Birkholtz) and field assistant (Derrick James). The more recent fieldwork was undertaken by two professional archaeologists (Polke Birkholtz and Heidi James-Birkholtz). On Thursday, 20 August 2015 the author of this report accompanied Stone Age specialist Dr Maria van der Ryst to the Stone Age sites identified during the fieldwork. Her assessments and recommendations with regard to these sites are included in this report.

Step III – Report: The final step involved the recording and documentation of relevant heritage resources, as well as the assessment of resources regarding the heritage impact assessment criteria and report writing, as well as mapping and recommendations.

The significance of heritage sites was based on five main criteria:

- site integrity (i.e. primary vs. secondary context),
- amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
 - Low - <10/50m²

- Medium - 10-50/50m2
- High - >50/50m2
- uniqueness and
- potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development position

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report (see **Table 1**).

Table 1: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium	Recording before destruction
Generally Protected C (GP.C)	Grade 4D	Low	Destruction

3.2 Methodology for Impact Assessment

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 2**.

Table 2: Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	<i>Isolated corridor / proposed corridor</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

Significance Assessment

The significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these, since their importance in the rating scale is very relative. For example, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the

impact will be considered to be HIGH to VERY HIGH. A more detailed description of the impact significance rating scale is given in **Table 3** below.

Table 3: Description of the significance rating scale

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a system.

Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 4**.

Table 4: Description of the spatial significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site / corridor.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the boundary of the study area.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

Temporal/Duration Scale

In order to accurately describe the impact, it is necessary to understand the duration and persistence of an impact in the environment.

The temporal or duration scale is rated according to criteria set out in **Table 5**.

Table 5: Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium-term	The environmental impact identified will operate for the duration of life of the project.
4	Long-term	The environmental impact identified will operate beyond the life of operation of the project.
5	Permanent	The environmental impact will be permanent.

Degree of Probability

The probability or likelihood of an impact occurring will be outlined in **Table 6** below.

Table 6: Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very likely
5	It's going to happen / has occurred

Degree of Certainty

As with all studies, it is not possible to be 100% certain of all facts, and for this reason a standard “degree of certainty” scale is used, as discussed in **Table 7**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making.

Table 7: Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner, in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale, as described below:

$$\text{Impact Risk} = \frac{(\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

3

5

An example of how this rating scale is applied is shown below:

Table 8: Example of Rating Scale

	Low	Local	Medium Term	Could Happen	Low
Impact on heritage structures	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the table below.

Table 9: Impact Risk Classes

0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore, with reference to the example used for heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

4 CURRENT STATUS QUO

4.1 Description of Study Area

The proposed activity comprises mining activities on the Remainder of the Farm Driehoekspan 435, north of Postmasburg, Northern Cape Province.

The study area is primarily located on a reasonably level valley (with an average surface elevation of 1 370 meters above mean sea level) flanked between two ridges, with its western end tapering toward the Gamagara Ridge (approximately 1445 meters above mean sea level). A gravel road between Postmasburg and Gloucester cuts through a section of the study area. While sections of the study area are largely undisturbed, clear evidence for historic to recent mining activities abound. These include prospecting pits, excavations, rock mounds and so forth. The entire eastern slope of the Gamagara Ridge is dotted with more recent prospecting boreholes.

The study area contains two two vegetation types namely the Kuruman Thornveld and Kuruman Mountain Bushveld.

According to the palaeontological desktop carried out by Dr Gideon Groenewald (2013) the farm Driehoekspan is underlain by rocks of the Gamagara Formation of the Postmasburg Group as well as rocks of the Lime Acres Member of the Ghaap Plato Formation of the Campbell Group. The rocks of the Gamagara Formation underlie the Western Corner of the farm. This formation consists of quartzites, conglomerates, flagstones and shales and constitutes the base of the Postmasburg Group. The formation lies upon the Ghaap Plateau and Asbesberge Formations. Lenticular basal conglomerates contain pebbles of jasper and banded iron stone and are completely ferruginised in places. The shales contain lenses of conglomerate and are also locally ferruginised or manganised. Ferruginous flagstone and white, purple and brown quartzites form the top of the formation. Rocks of the Lime Acres Member of the Ghaap Plateau Formation of the Campbell Group consist of dolomitic limestone with subordinate coarsely crystalline dolomite and chert with lenses of limestone. Stromatolitic puckered limestone consisting of alternating dark and light bands can be found. Lenticular bodies of limestone occurring in the dolomite are probably the result of irregular dolomitisation of the original limestone. The surface geology of the study area comprises red sands and dolomite outcrops with haematite nodules eroding from the matrix.

The wider surroundings of the study area is characterised by both mining activities as well as limited farming activities.



Figure 4 - General view of the study area from its southern end looking toward the north-east.



Figure 5 – General view across a section of the valley area where most of the mining development is planned.



Figure 6 – This view of reasonably dense vegetation was taken to the east of the grave road.



Figure 7 – General view of a section of the study area along the lower slopes of the northern ridge.



Figure 8 – Evidence for historic to recent mining activities were frequently found across the study area.



Figure 9 – The access road from the R325 to the mine is proposed to cross over the railway line.

5 ARCHIVAL AND HISTORICAL MAPS OF THE STUDY AREA

5.1 Griquatown Sheet of the Cape of Good Hope Reconnaissance Series, 1914

The figure below depicts a section of the Griquatown Sheet of the Cape of Good Hope Reconnaissance Series (National Archives, Maps, 3/652). The sheet was surveyed in 1911 by Captain R.B. Hopkins (Manchester Regiment) and Lieutenant J.L. Lockhart (Hampshire Regiment) under the direction of the Staff Captain in charge of Reconnaissance Surveys, Cape of Good Hope. The sheet was drawn and printed by the War Office in 1914. The approximate position of the boundary of the farm Driehoekspan is marked in red on the depicted section. The following observations can be made:

- No heritage sites are depicted within (or in close proximity to) the study area.
- Although a number of farms (with farmsteads) are depicted within the general vicinity, none of these are located within the study area.
- The bold stippled line forming the northern boundary of the farm Driehoekspan represents the old boundary between Griqualand West and British Bechuanaland.

5.2 Geology Map of the Postmasburg Manganese Deposits, 1927 - 1928

The figure below depicts a section of the map titled "*The Geology of the Postmasburg Manganese Deposits and Surrounding Country*" that was surveyed by L.T. Nel (with assistance provided by A.K. Parrott) during 1927 and 1928. This work was undertaken by the Geological Survey of the Union of South Africa's Department of Mines and Industries under the directorship of A.W. Rogers (National Archives, Maps, 3/709). The boundary of the farm Driehoekspan is marked in red. The following observations can be made from the map:

- One building is depicted on the farm Driehoekspan (see white circle) and appears to be a farmhouse. This building is shown some distance to the south-east of the present mining development.
- This building is not depicted on the 1911 map. As a result it is evident that the building was constructed between 1911 and 1928. If the building still exists today, it would be between 102 years and 85 years old.
- It is evident from the surrounding landscape that no railway lines have yet been constructed in this area.
- No evidence for mining activities is depicted within the study area on the map.

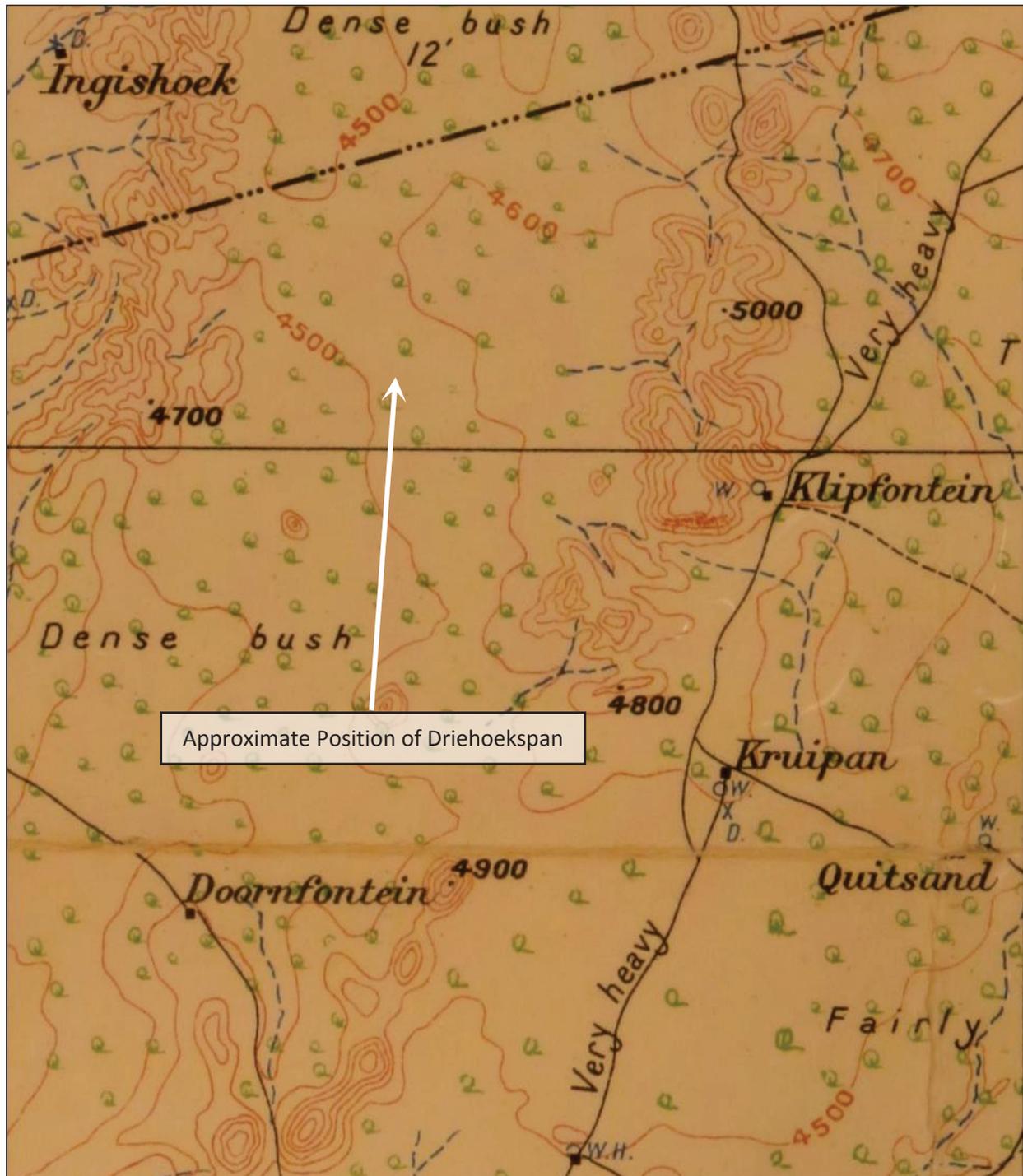


Figure 10 – Section of the Griquatown Sheet of the Cape of Good Hope Reconnaissance Series, dated to 1911 (National Archives, Maps, 3/652).



Figure 11 – Section of the Geology Map of the Manganese Deposits of Postmasburg that was surveyed during 1927 and 1928 (National Archives, Maps, 3/709).

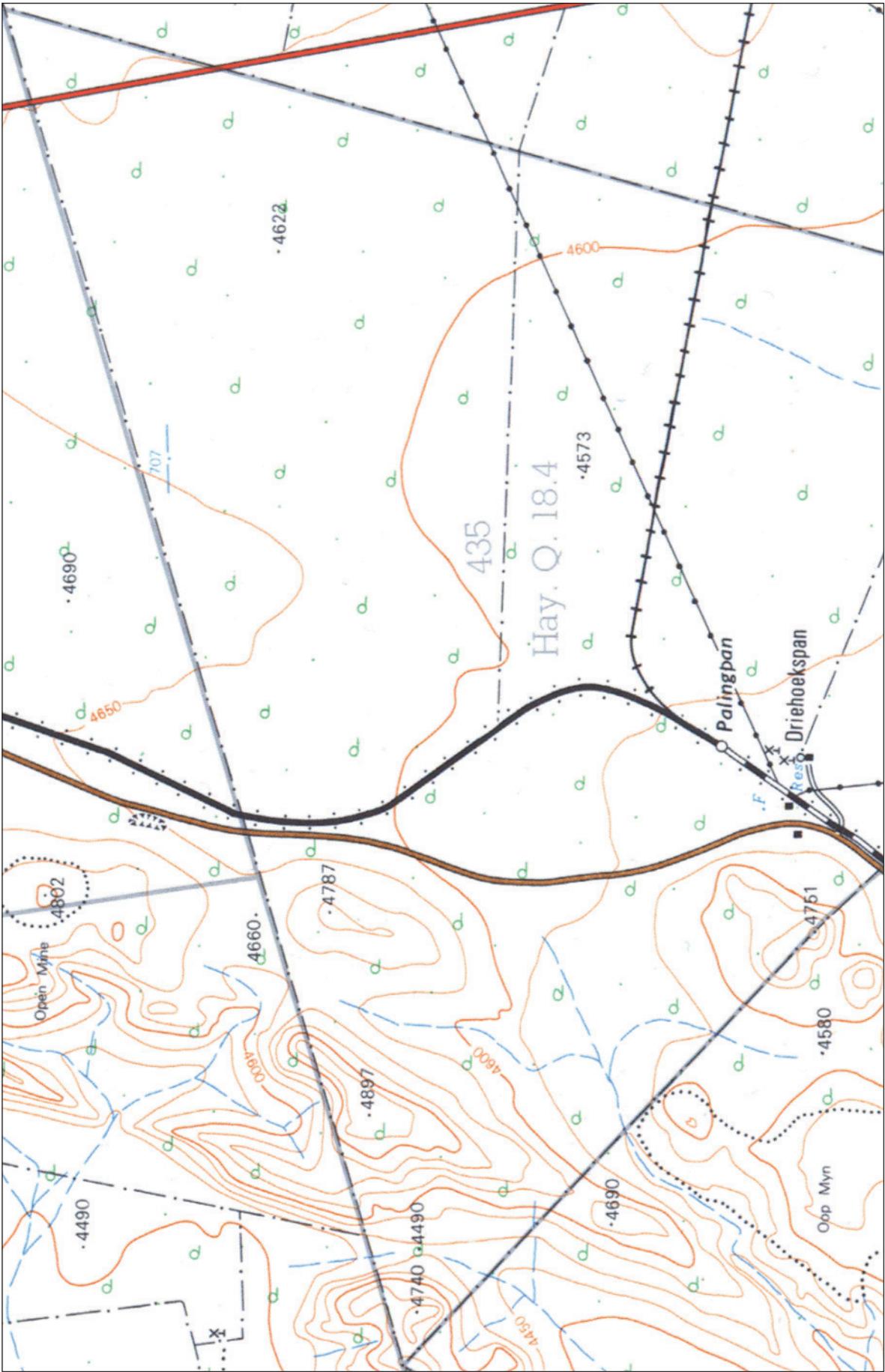
5.3 First Edition of the 2823AA Topographical Sheet, 1970

The figure below depicts sections of the First Edition of the 2823AA Topographical Sheet. The sheet was based on aerial photography undertaken in 1967. It was surveyed in 1970 and drawn by the Trigonometrical Survey Office in 1971.

The following observations can be made in terms of the proposed mining development footprints located on the farm Driehoekspan:

- A farmstead comprising at least one building (with associated windmills) is depicted on Driehoekspan. See blue circle. It is highly likely for the farmstead depicted on the 1928 map to be the same building as the one depicted here. As such, if this building still exists today it would be at least 85 years old, and possibly even as much as 102 years old. This building is located outside of the present mining development footprint.
- Two buildings are depicted to the west of the railway line and are separated by a road. These buildings might be associated with the railway line. See purple circle. If any of these two buildings is still located within the study area, they would be at least 43 years old and possibly even 85 years old as well. These buildings are also not located within the present mining development footprint areas.
- The railway line that was built in 1936 between Postmasburg and Lohatla is depicted. A halt with the name Palingpan is also depicted. The siding which leads to Manganore on the farm Kapstewel is also shown. This siding was also completed in 1936. With the exception of the proposed access road to the mine, which would (if it was built) be constructed across the railway line, none of the proposed mining development footprints would have any immediate impact on the railway lines or siding.

*Figure
12
-
First
Edition
of
the
28
23
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5.4 Findings in terms of the Archival and Historical Maps

The following observations can be made as a result of the study of archival and historical maps of the study area:

- In 1911 the study area was entirely undeveloped and was likely characterised by farming activities.
- By 1928 a farmhouse had been built on Driehoekspan. However, based on the information available on the map, this farmhouse represented the only man-made feature within the study area at the time. Although the exact age of the farmhouse is not known, it would have been built between 1911 and 1928. As such the farmhouse can be anything from 85 years to 102 years old.
- By 1970 considerable development has taken place within the study area and direct surroundings. This includes mining as well as infrastructural development such as the construction of the railway line between Postmasburg and Lohatla which had been completed in 1936.
- Two additional buildings appear on the farm Driehoekspan on the 1970 map. The locality of these two buildings in close proximity to the abovementioned railway line, suggests that they may have been associated with railway activities at the time. These two buildings would have been constructed between 1928 and 1970, and as such would be between 85 years and 43 years old, with a stronger likelihood for these buildings to be closer to the 43 year mark. These buildings are located outside of the present mining development footprint.

6 ARCHAEOLOGICAL OVERVIEW AND FINDINGS

6.1 Overview of the Archaeological Fabric of the Study Area and Surroundings

A number of archaeological surveys and research projects have been undertaken in the vicinity of Postmasburg and the study area. The reason for this focus in archaeological work in the surrounding area particularly is most likely due to the large scale manganese and iron ore mining activities taking place and the resulting requirement for archaeologists to assess the proposed mining areas as well as the well-known presence of pre-colonial mining sites, rock art sites as well as Stone Age sites from the surroundings of Postmasburg and the study area.

With this as background, two main types of archaeological reports and publications were used to compile this overview. The first of these are reports that were all accessed from the SAHRA electronic database known as SAHRIS, and which for the most part came about due to the requirement for archaeological and heritage impact assessments to be undertaken for mining (and other development) activities. The second source of information on the archaeology of the area was the use of published literature. It is important to note that the information listed here do not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area.

Archaeological Sites as Revealed Through a Study of Published Literature

The following sites were identified by studying archaeological journals and books. The sites are grouped according to their respective farm names. At the end of each description the approximate distance between the site and the present study area is provided.

- **Blinkklipkop**

This site is arguably the most significant archaeological and historical site in the vicinity of Postmasburg. It is a pre-colonial specularite mine located in a hill known as Blinkklipkop (or Gatkoppies) roughly 5km north-east of the town of Postmasburg. Specularite is a “...*crystalline form of hematite that is steel grey/iron-black in colour with a silvery sparkle...*” (Thackeray et.al., 1983:17) and which was much prized as a cosmetic by the different pre-colonial cultures of the area.

The presence of the site had been known since the early historical times, and European explorers and travellers such as Lichtenstein and Burchell visited the site

in 1805 and 1812 respectively. At the time the specularite mine was interpreted by these and other visitors as associated with Kora and Tswana groups. However, the archaeological research undertaken by A.I. Thackeray, J.F. Thackeray and P.B. Beaumont between 8 and 25 April 1980 provided much older origins for the site (Thackeray et.al., 1983).

The archaeological excavations revealed a large number of lithics (stone artefacts) which included mining tools as well as scrapers; ostrich eggshell fragments and beads; pottery; glass beads as well as faunal remains (Thackeray et.al., 1983).

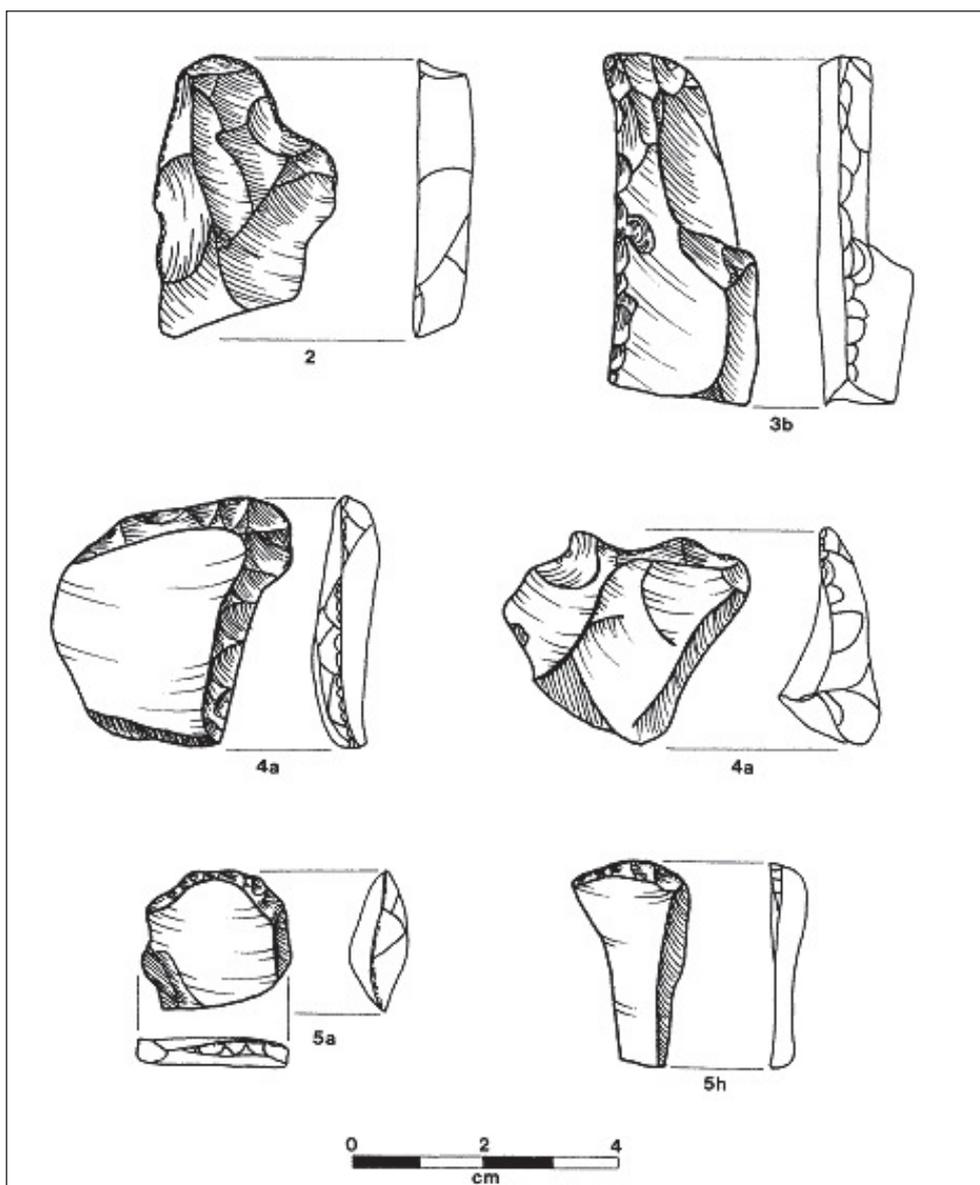


Figure 13 – Examples of scrapers excavated from Blinkklipkop (Thackeray et.al., 1983:20).

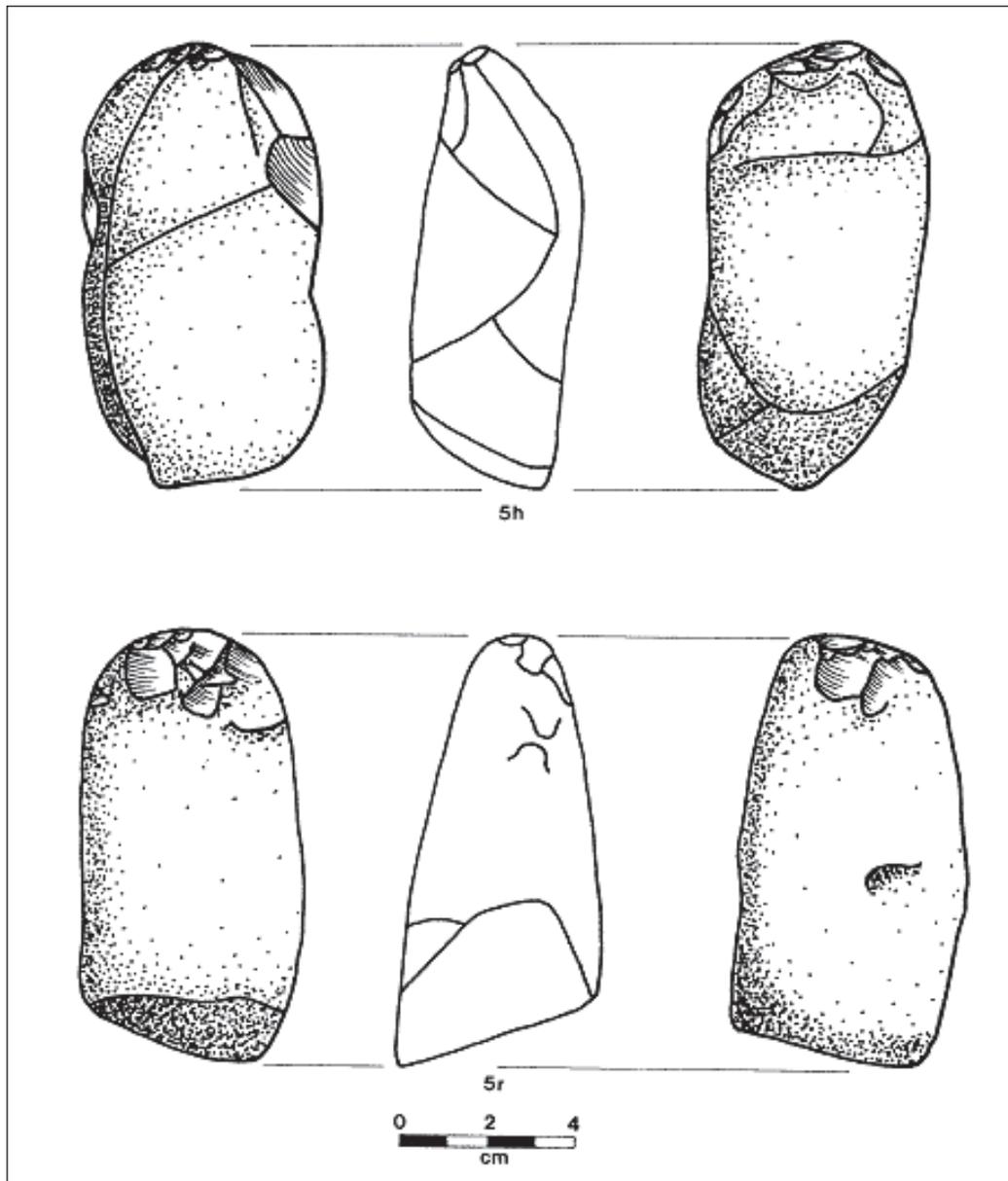


Figure 14 – Examples of mining-related lithics from Blinkklipkop (Thackeray et.al., 1983:20).

The archaeological research have revealed that mining activities at the site likely commenced before roughly 800 AD, and that before the 17th century these mining activities were undertaken by Khoi herders and possibly San hunter gathers with Late Iron Age Tswana pastoralists also in all likelihood involved thereafter (Thackeray et.al., 1983).

Blinkklipkop is located 10.3km south-east of the present study area.

- **Doornfontein**

During 1973 archaeological research was undertaken by P.B. Beaumont and A.K. Boshier on a pre-colonial specularite mine located in a slight rise in an area known as Jonas Vlake on the farm Doornfontein 446. The farm is located 6.8km north-west of Postmasburg (Beaumont & Boshier, 1974).

The archaeologists identified four chambers at the site, and excavated two trenches located within Chamber 3. The archaeological collection excavated from the site included a large number of lithics of which typical mining tools such as hammer stones were particularly evident; ostrich eggshell fragments and beads; decorated and undecorated pottery, metal artefacts which included an iron spear head and a copper strip bead; bone artefacts such as an arrow point and possible pendant as well faunal remains. Interestingly, human remains were also excavated from the site (Beaumont & Boshier, 1974).

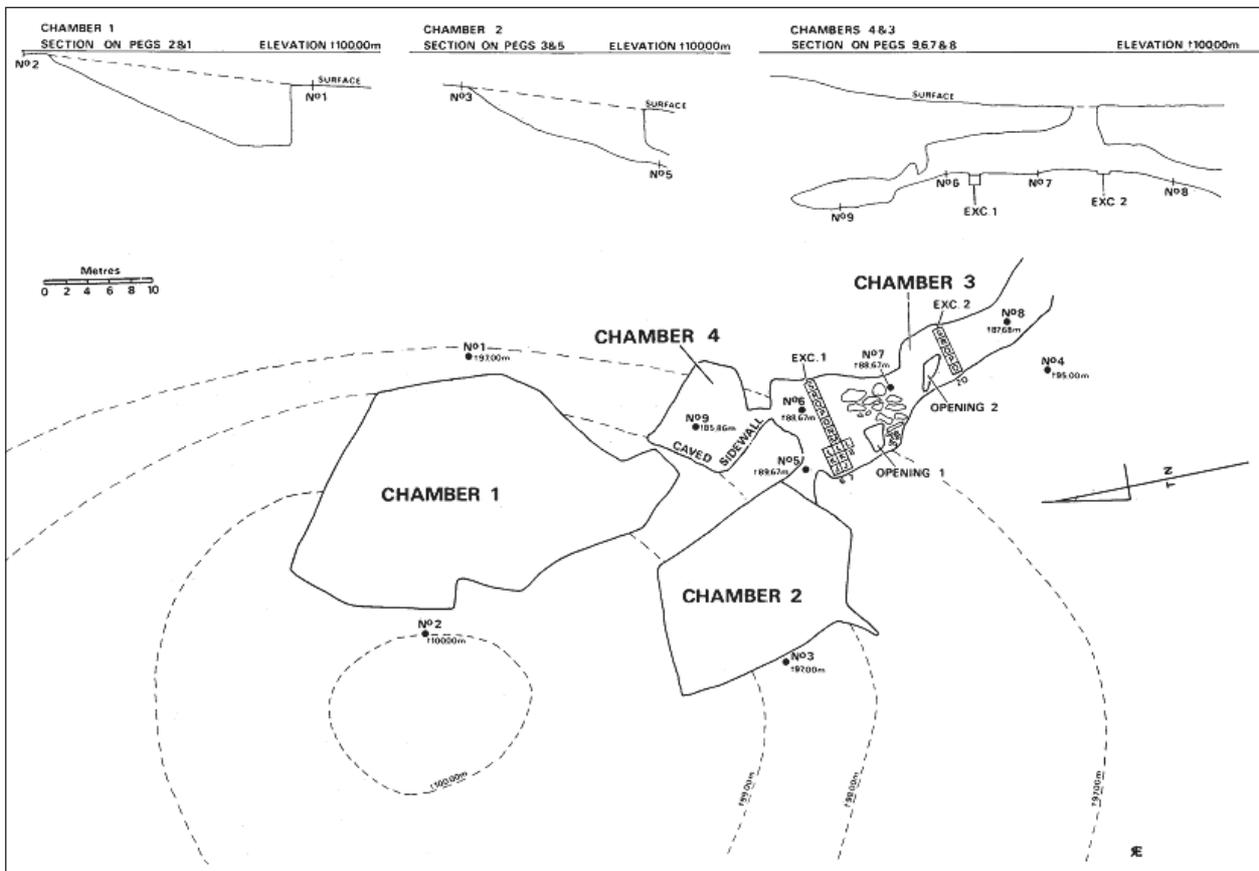


Figure 15 – Site layout plan of the specularite mine at Doornfontein (Beaumont & Bashier., 1983:42).

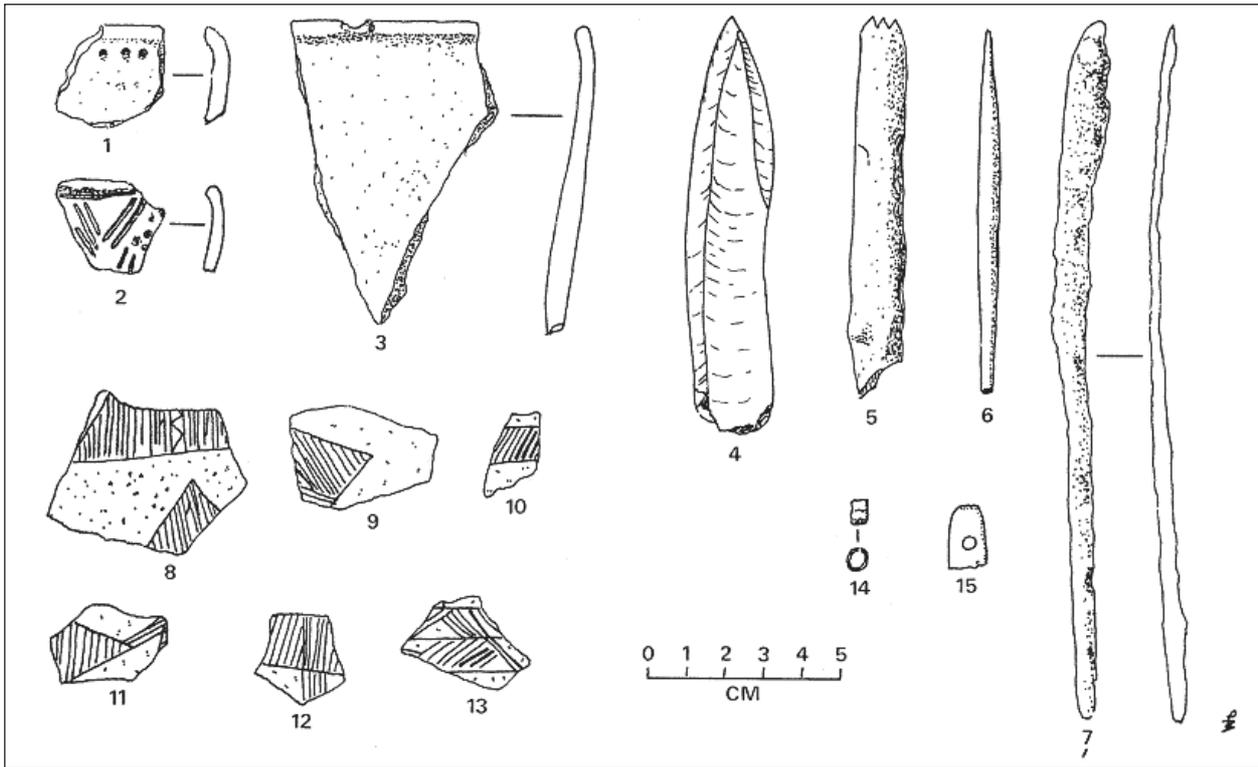


Figure 16 – Non-lithic artefacts from the excavations at Doornfontein (Beaumont & Bashier., 1983:42). Caption numbers 1, 2 and 3 are potsherds; numbers 4, 5 and 6 are bone artefacts (including a bone arrow point); number 7 is a iron spear head; numbers 8, 9, 10, 11, 12, and 13 are decorated ostrich eggshell fragments with numbers 14 and 15 interpreted as a copper strip bead and possible broken bone pendant.

Radiocarbon dates obtained from the excavations indicated that mining activities at this site commenced in approximately 830 AD (Beaumont & Boshier, 1974) which is roughly contemporary with the dates obtained from Blinkklipkop.

The Doornfontein site is located roughly 3.9km south-west of Driehoekspan.

- **Beeshoek**

The farm is located 5.4km north-west of Postmasburg. The rock art at Beeshoek had been known from some time (Wilman, 1933) (Fock, 1969) (Judner & Judner, 1969) and comprises petroglyphs of various animals such as giraffe, ostrich, elephant, kudu as well as some animal foot prints. A number of examples of geometric symbols are also found at the site (Judner & Judner, 1969).

While the exact position of the rock art site at Beeshoek is not presently known, the site is located approximately 10.5km south-west of the present study area.



Figure 17 – Photograph depicting some of the rock engravings at Beeshoek (Cairncross et al., 1997:31).

- **Paling**

The farm is located 12km north-west of Postmasburg. Beaumont and Boshier (1974) refer to the presence of both a rock art site as well as a pre-colonial specularite mining site on this farm. Although no further information with regard to the mining site is provided, Beaumont and Boshier (1974) state that the rock art site comprises geometric and naturalistic depictions which includes a giraffe. Furthermore, graffiti from the 1920s were also observed here.

While the exact position of the rock art site at Paling is not presently known, the farm is located directly south of the farm Driehoekspan.

- **Gloucester**

The farm is located 22km north of Postmasburg. Beaumont and Boshier (1974) refer to the presence of a pre-colonial specularite mine here.

While the exact position of the pre-colonial mining site at Gloucester is not presently known, the farm is located directly north of Driehoekspan.

- **Mount Huxley**

The farm is located 24.6km north-east of Postmasburg. Beaumont and Boshier (1974) refer to the presence of a pre-colonial specularite mine here.

While the exact position of the pre-colonial mining site at Mount Huxley is not presently known, the farm is located 4.8km north-east of Driehoekspan.

Archaeological Sites as Revealed Through a Study of the SAHRIS Database

The reports discussed here were all accessed from the SAHRA electronic database known as SAHRIS. It is important to note that the reports listed here do not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area. An attempt was made to locate reports on the database dealing with farms located either within the present study area, or directly adjacent to it. The archaeological reports with located sites are grouped according to the respective farms on which these studies were undertaken. At the end of each description the approximate distance between these sites and the present study area is provided.

- **Driehoekspan**

The Archaeological Impact Assessment undertaken by Lita Webley and David Halkett in terms of proposed prospecting activities on the farm Driehoekspan (Webley & Halkett, 2010). A total of three sites were identified, which included one Quartzite Early Stone Age core, a historic structure of unknown function as well as a possible Later Stone Age knapping site comprising three flakes and a core.

These three archaeological sites are all located included in this report and will be discussed in more detail below.

- **Paling**

The Archaeological Impact Assessment undertaken by Anton van Vollenhoven and Anton Pelsler in terms of proposed manganese and iron ore mining activities on the farm Paling (Pelsler & Van Vollenhoven, 2010). A total of seven sites were identified, which included one findspot comprising a Middle Stone Age lithic (Site 1), another findspot containing a single Middle Stone Age / Later Stone Age lithic (Site 2), a cemetery comprising roughly eight graves (Site 3), a historic ash heap dating to the late 19th and early 20th centuries (Site 4), a historic mining-related structure (Site 5), a Stone Age site comprising a number of Middle Stone Age and Later Stone Age lithics (Site 6) as well as another historic ash heap dating to the late 19th and early 20th centuries (Site 7).

These seven archaeological sites are distributed across the farm Paling, and as such they are at varying distances from the study area. In terms of the Driehoekspan section of the study area, the sites are between 81m (Site 1) to 4.8km (Site 5) away. In terms of the Doornpan section of the study area, the sites are between 3.6km (Site 1) and 4.7km (Site 4) away.

- **Kapstewel**

The Heritage Impact Assessment undertaken by Anton van Vollenhoven and Anton Pelsler in terms of proposed mining activities on portions of the farm Kapstewel (Pelsler & Van Vollenhoven, 2009). A total of seven sites were identified, which included the remains of an old mining area (Site 1), a site containing low stone walls which could be associated with either the Late Iron Age or Later Stone Age (Site 2), a possible grave in the form of a rectangular stonepacked structure (Site 3), circular stone-lined depressions which may have been associated with historic mining activities (Site 4), a farmstead (Site 5), the mine offices and complex of the old Manganore mining area (Site 6) as well as a site associated with historic mining activities and which includes features such as an old railway line and conveyor belt (Site 7).

These seven archaeological sites are distributed across the farm Kapstewel, and as such they are at varying distances from the study area. In terms of the Driehoekspan

section of the study area, the sites are between 2.6km (Site 7) to 3.9km (Site 1) away. In terms of the Doornpan section of the study area, the sites are between 3.8km (Site 7) and 6.9km (Site 1) away.

6.2 Findings in terms of the Archaeological Overview

The archaeological overview provided above clearly shows that the study area is located in a landscape with a wide array of archaeological resources. As such, the study area has the potential to contain any of a number of archaeological and heritage sites, including the following:

- Early Stone Age findspots and sites
- Middle Stone Age findspots and sites
- Later Stone Age findspots and sites
- Rock Art Sites
- Pre-colonial Specularite Mines
- Historic Mining Sites
- Historic Farmsteads
- Graves and Cemeteries

In fact, the use of the SAHRIS database has revealed three known sites from within the Driehoekspan section of the study area. These three sites comprise two Stone Age sites and a historic structure of unknown function. All three these known and identified sites are included in this report.

7 HISTORICAL OVERVIEW AND FINDINGS

7.1. Historical Overview

DATE	DESCRIPTION
2.5 million to 250 000 years ago	<p>The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.</p> <p>A number of Early Stone Age sites are known from the general vicinity, though mostly in the form of Early Stone Age findspots. A very significant Early Stone Age site is located at Kathu Pan, some 47.1km north of the study area. Research here was undertaken by P.B. Beaumont and the site is believed to contain millions of Early Stone Age artefacts (Mitchell, 2002).</p>
250 000 to 40 000 years ago	<p>The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.</p> <p>MSA find spots and sites were identified in the direct vicinity of the study area.</p>
40 000 years ago to the historic past	<p>The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths.</p> <p>A number of LSA sites are known from the direct vicinity of the study area. Significant examples include the specularite mines at Blinkklipkop and Doornfontein, as well as the rock engraving sites at Beeshoek and Paling.</p>
800 AD – 820 AD	<p>The archaeological excavations undertaken by Beaumont and Bashier (1974) and Thackeray et.al. (1983) have revealed that the mining of specularite at Doornfontein and Blinkklipkop commenced during this time. During this initial period the mining activities would have been undertaken by San hunter-gatherers and Kora pastoralists. Only after the 17th century were such mining activities likely also undertaken by the Iron Age Tswana groups.</p>
Early 1600s	<p>The Tswana groups known as the Thlaping and Thlaro moved southward into the area presently known as the Northern Cape. A century later they were settled in areas as far south as Majeng (Langeberg), Tsantsabane (Postmasburg) and Tlhaka le Tlou (Danielskuil) (Snyman, 1986). In terms of the Thlaro specifically, Breutz (1963) states that after they broke away from the Hurutshe during the period between 1580 and 1610, the Thlaro travelled along the Molopo River and the Southern Kalahari before arriving at the confluence of the Kudumane, Mosaweng and Molopo. From here they established themselves at Tsowe (west of Morokweng), Gatlhose (34km north-east of the study area), Majeng (Langberg) (roughly 35km to the north-east), Khoiise (Khuis on the Molopo River) and Tlhaka-la-Tlou (present day Danielskuil).</p> <p>It is evident that the study area and surrounding landscape would be been located on the southern periphery of the overall settlement area of these</p>

	<p>two Tswana groups at the time. In fact, the surroundings of the study area were to become the southern edge of Late Iron Age expansion into the Northern Cape, a fact which was later signified by the establishment of the boundary between Griqualand West and British Bechuanaland directly north of the present study area.</p>
c. 1770	<p>During this time the Kora moved into the area. Due to their superior firearms they applied increasing pressure on the Thlaping and Thlaro groups. In the end the Thlaping moved into a north-eastern direction to settle in the general vicinity of Dithakong, north-east of present-day Kuruman. The Thlaro settled in areas to the west and north-west of the Thlaping (Snyman, 1986).</p>
c. 1786 – c. 1795	<p>During this time a German deserter by the name of Jan Bloem established himself at Tsantsabane (Blinkklip) (Legassick, 2010). This place is located 5km north-east of the present-day town of Postmasburg. The settlement of Jan Bloem at the specularite mine may have been a way in which to control the valuable site and any trading activities associated with it.</p>
c. 1795	<p>Legassick (2010) confirms the presence of the Thlaping, Thlaro and Kora in the general vicinity of the study area during this time. This said the study area and surrounding landscape would have represented a southern peripheral area of the overall landscape occupied by especially the Thlaping and Thlaro groups at the time. From a map depicted in Legassick (2010:338) it is evident that at the time the Kora started moving in north-eastern direction from the areas along the central Orange river to the banks of the Harts River.</p>
Early 1800s	<p>After the threat of the Kora became less intensive, the Thlaping moved to the vicinity of present-day Kuruman. The Thlaro returned to the Langeberg, establishing them on a permanent basis there during the 1820s (Snyman, 1986).</p> <p>The settlement of the Thlaping in the vicinity of Kuruman occurred during the reign of Molehabangwe. This period in the history of the Thlaping was seen as a period of wealth and power, and at the time they even had control of the <i>sibello</i> quarry near Blinkklip (Legassick, 2010), some 100km to the south-west.</p>
1801	<p>The first known visit to this area by European explorers (i.e. excluding European renegades and fugitives such as Jan Bloem) took place in 1801. The journey was undertaken by P.J. Truter and Dr. W. Somerville. They crossed over the Orange River in the vicinity of Prieska, and passed Blinkklip on their way to present-day Kuruman (Bergh, 1999).</p>
1802 - 1813	<p>During this year William Anderson and Cornelius Kramer, both of the London Missionary Society, established a mission station at a place called Leeuwenkuil. The focus of their work was a group known as the Bastards (Erasmus, 2004). This group could be described as a cultural conglomeration descending not only from relationships between different cultures and races (i.e. European and Khoi), but also comprised remnants of Khoi and San groups as well as freed slaves. The particular group later became known as the Griqua.</p> <p>Due to the problems caused by the presence of lions at Leeuwenkuil, the</p>

	<p>mission station was moved in 1805 to a place higher up called Klaarwater. On 7 August 1813 the name of the settlement which had sprung up at Klaarwater was renamed Griquatown. This came about as a result of a number of proposals made by Reverend John Campbell, the Director of the London Missionary Society who was visiting the mission stations from this area at the time. He suggested that “...the Bastards change their name to ‘Griqua’ and that Klaarwater became Griquatown. This was because ‘on consulting among themselves they found a majority were descended from a person of the name Griqua’...” (Legassick, 2010).</p> <p>Griquatown is located 68km south of the present study area.</p>
1805	<p>During this year German explorer Martin Hinrich Carl Lichtenstein travelled through the general vicinity of the study area. After crossing the Orange River in the vicinity of present-day Prieska, Lichtenstein’s party visited present-day Danielskuil, and by June 1805 they were at Blinkklip (Postmasburg), a well-known source for obtaining specular haematite. Archaeological investigations at Blinkklipkop (also known as Nauga) established a date of AD 800 for the utilization of this particular rich source (Thackeray, et al 1983). From here they travelled further north and reached the Kuruman River where they met Tswana-speaking people. They followed the river downstream for three days, after which they followed a tributary to reach Lattakoe. From here they turned south and reached the Orange River on 11 July 1805.</p> <p>While on their way to the Kuruman River (and to the south thereof), Lichtenstein and his fellow travellers visited a small settlement consisting of “...about thirty flat spherical huts.” Although the people who stayed here were herdsmen who looked after the cattle of richer people living on the Kuruman River, they indicated that San (Bushmen) were also present in the area (Lichtenstein, 1930).</p> <p>Although Lichtenstein was certainly not the first European explorer to travel through this area (the Truter & Somerville expedition had for example passed through this area in 1801), or for that matter the last (Burchell travelled through the area in 1811 followed by John Campbell in 1813) (Bergh, 1999), Lichtenstein did leave behind a written record of this journey providing a valuable glimpse into the early history of the general surroundings of the study area.</p>
1811 - 1813	<p>During this period the famous English explorer and artist William Burchell visited the general vicinity of the study area. Accompanied by missionary Anderson, Burchell crossed over the Orange River at Little Bend from where they travelled to Klaarwater. Using the settlement as a temporary base, Burchell undertook numerous journeys which included one which passed through Blinkklip (Bergh, 1999).</p>
1813	<p>During 1813 John Campbell of the London Missionary Society also visited the general vicinity of the study area. He arrived at Klaarwater on 9 June 1813, where he rested for a few days before continuing in a northern direction toward present-day Kuruman, passing through Blinkklip on the way (Bergh, 1999).</p>



Figure 18

Reverend John Campbell (Campbell, 1815). He paid a visit to Blinkklip during the second half of 1813.

<p>20 December 1820</p>	<p>On this day Andries Waterboer was elected as leader of Griquatown in the place of Berend Berends (Legassick, 2010). This period saw fission within the Griqua community, and it is not surprising that two long-term leaders moved away from Griquatown to establish autonomous settlements away from their former town. Berend Berends for example moved to Danielskuil (41km east of the study area), whereas Adam Kok II established himself in the vicinity of Campbell (85km south-east of the study area) (Legassick, 2010).</p>
<p>1820s</p>	<p>Barend Barends and his followers moved from their settlement at Danielskuil to Boetsap (roughly 136km north-east of the study area). At the same time Thlaping ruler Mothibi, the brother of Mahura, settled in the vicinity of Boetsap before moving to Griquatown (Legassick, 2010). The first settlement of Blinkklip by the Griqua also took place during this time (Legassick, 2010).</p>
<p>Early 1830s</p>	<p>During this time Andries Waterboer stationed a number of Griqua families at a fountain north of Tsantsabane (Blinkklip) as well as at Danielskuil. Shortly thereafter, a missionary of the London Missionary Society by the name of John Baillie was transferred from the mission station at Kuruman to Tsantsabane. He was to work among the Sotho-Tswana living in and around Tsantsabane at the time. Baillie subsequently left the mission station and resigned from the London Missionary Society in 1836 (Legassick, 2010).</p>

22 April 1842	<p>On this day a treaty was signed between Griqua leader Andries Waterboer and Thlaping leader Mahura at Mahura’s settlement near Taungs. The agreement included a definition of the boundary between the two groups. The section of the agreed upon boundary closest to the study area ran from “...the northerly point of the Langeberg and extending a little south of Nokaneng, and further half-way between Maremane and Klipfontein...” (Legassick, 2010:291). While the exact location of Nokaneng is not currently known, the farm Klipfontein 437 is situated adjacent and north of the farm Doringpan, whereas the farm Maremane 678 is located 10km to the north-east. This suggests that the present study area was located a short distance south of the boundary line between the Griqua and the Thlaping as defined in the treaty. As such, the study area was defined within this treaty as forming part of the land of the Griqua. However, it must be noted that this boundary line was not cast in stone. This boundary was very similar to an earlier one that was thought to have been agreed to during the 1820s as a boundary between the Griqua and the Thlaping (Legassick, 2010).</p>
1850	<p>During this time a Thlaro leader by the name of Molete and his baThlaro бага Keakopa followers moved away from the Korannaberg and established themselves at Gathlose, roughly 34km north-east of the study area. Breutz (1963) states that the land around Gathlose and Maremane used to belong to the Kora (Koranna) people and that they gave permission to Molete to settle here. After his death between 1885 and 1890, Molete was succeeded by Holele who ruled until his death during the Langberg Rebellion of 1897. Holele was succeeded by Kebiditswe John Holele and filled the post until 1912 when he was succeeded by his younger brother Kgosieng. Kgosieng ruled until he was pensioned on 28 February 1937, and was succeeded by Kebiditswe’s son, Kgosietsiele Smous. Kgosietsiele died on 30 June 1956 and was succeeded by his son Frank Motsewakgosi Holele (Breutz, 1963).</p> <p>At roughly the same time (likely between 1850 and 1860) the area known as Maremane (located directly north of Gathlose) was an outpost grazing area of the BaThlaro chief Makgolokwe and his son Toto. The first designated leader of this area was Isaak Thupane Thupane, followed by Toto’s son Robanyane who fled to present-day Namibia after the Langberg Rebellion of 1897. He was succeeded by his father’s brother Jan Molebane Toto. However, the government only recognised him as chief in 1912 up to which point John Holele of the Gathlose Reserve was appointed by the government to act for the Maremane area as well. Molebane was dismissed in 1925 and was succeeded in 1926 by his brother David Makgolokwe. David Makgolokwe remained at his post until his death in 1942 when he was succeeded by Puso Togelo who remained as leader until his death in 1954. He in turn was succeeded by Felix Kgosithebe Toto (Breutz, 1963).</p>
1850 – 1855	<p>During this period a Thlaro chief by the name of Isaak Thupane Thupane established himself at Logageng (Gatkoppies) near Postmasburg. He subsequently moved with his followers to Groenwater 453.</p> <p>During the time that Thupane was living at Logageng, Kgangeng discovered the fountain at Metsematale. Subsequently, the land was ceded by Waterboer to the Thlaro and Kgangeng and his followers settled at Groenwater as well. Kgangeng was succeeded by Piet Selo in 1897, followed by Sebuli Daniel Selo on 7 February 1908, Leu Motshabeng in 1921 and</p>

	<p>Sebopelo Cornelius Kweetsane in 1927, Steenbok Kgangeng in 1935 and David Mosimanethebe Kweetsane in 1959 (Breutz, 1963).</p> <p>The farm Groenwater 453 is located 15km east of the present study area.</p>
13 December 1852	<p>After the death of Andries Waterboer, his son Nicolaas Waterboer became the leader of Griquatown. He ruled Griquatown until the annexation of the area by the British in 1871 (see below) (Legassick, 2010). It was during the rule of Nicolaas Waterboer that diamonds were discovered in the area which led to a period of claims and counter-claims between the Griqua, the Orange Free State as well as the Zuid-Afrikaansche Republiek and which eventually led to the annexation of the area.</p>

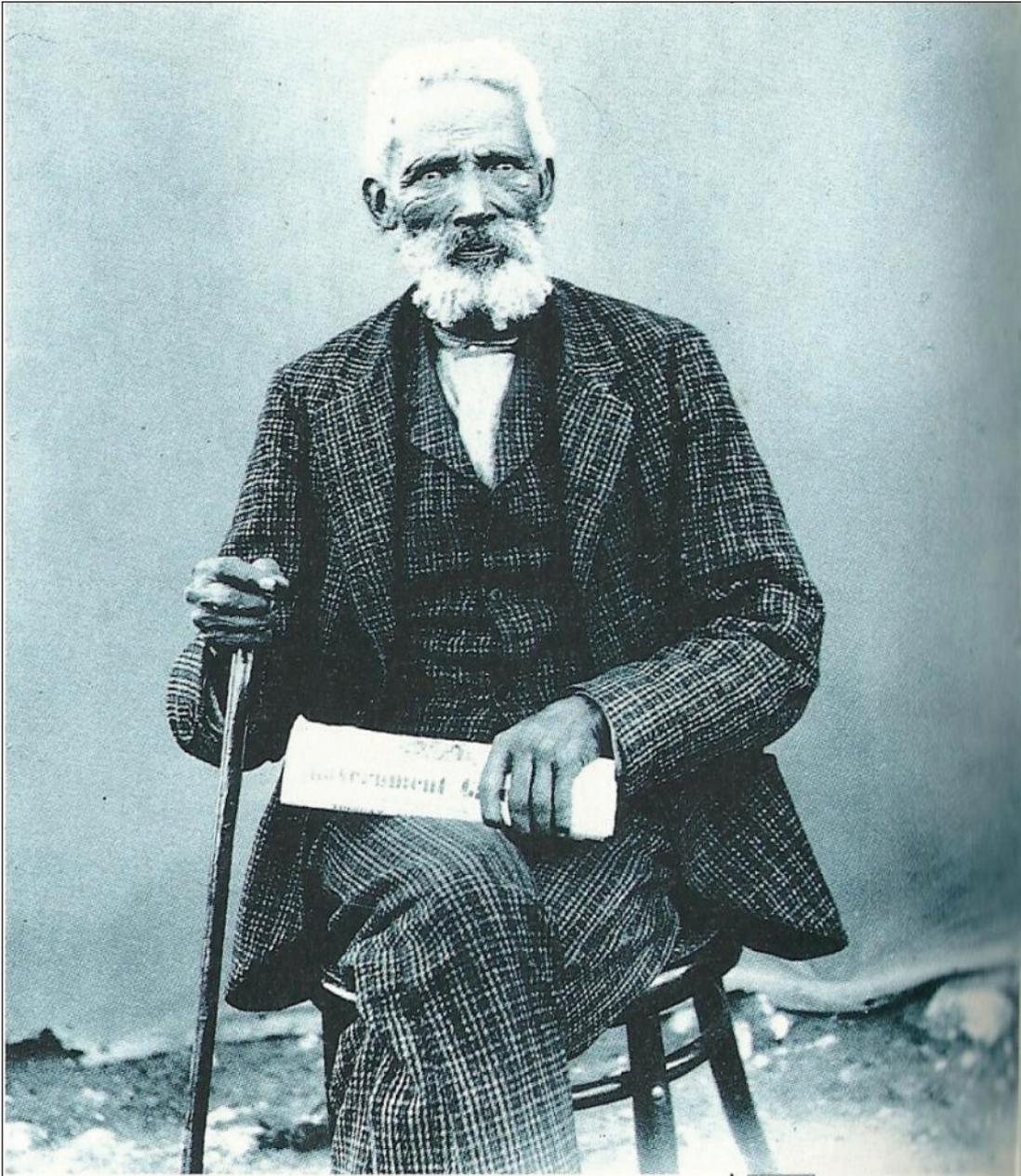


Figure 19

Nicolaas Waterboer, who succeeded as leader of Griquatown in 1852 after the death of his father Andries Waterboer (Reader's Digest, 1994:168).

<p>Before 1856</p>	<p>During the period before 1856 the Thlaro leader Masibi occupied the area known as Skeyfontein (also Skeynfontein or Dikeing). After Masibi left the area, Mpokwe (c. 1837 – 1909) succeeded as leader of the Thlaro at Skyfontein, and in turn was succeeded by Andries Mpokwe (1870 – 1919), Jan Mpokwe, Hendrik Mpokwe and John Diemeng Gaseitsiwe (Breutz, 1963). The farm Skeyfontein 536 is located 16.3km south-east of the present study area.</p>
<p>1867</p>	<p>Diamonds were discovered for the first time in South Africa near Hopetown. Alluvial diamonds were also discovered along both banks of the Orange River in the vicinity of the confluence of the Vaal and Harts Rivers (Van Staden, 1983). This resulted in large numbers of fortune seekers streaming into the wider vicinity of the study area from overseas. This factor would have had a profound impact on the social-dynamics of the landscape.</p>
<p>27 October 1871</p>	<p>The area located in general terms between the Orange and Vaal Rivers and south of Kuruman was proclaimed as British Territory and named Griqualand West. This proclamation came as a result of ownership disputes between the Griqua, the Boer Republic of the Orange Free State and the Boer Republic of the Zuid-Afrikaansche Republiek in terms of the newly discovered diamond diggings (www.wikipedia.org). The study area fell within this territory at the time.</p>

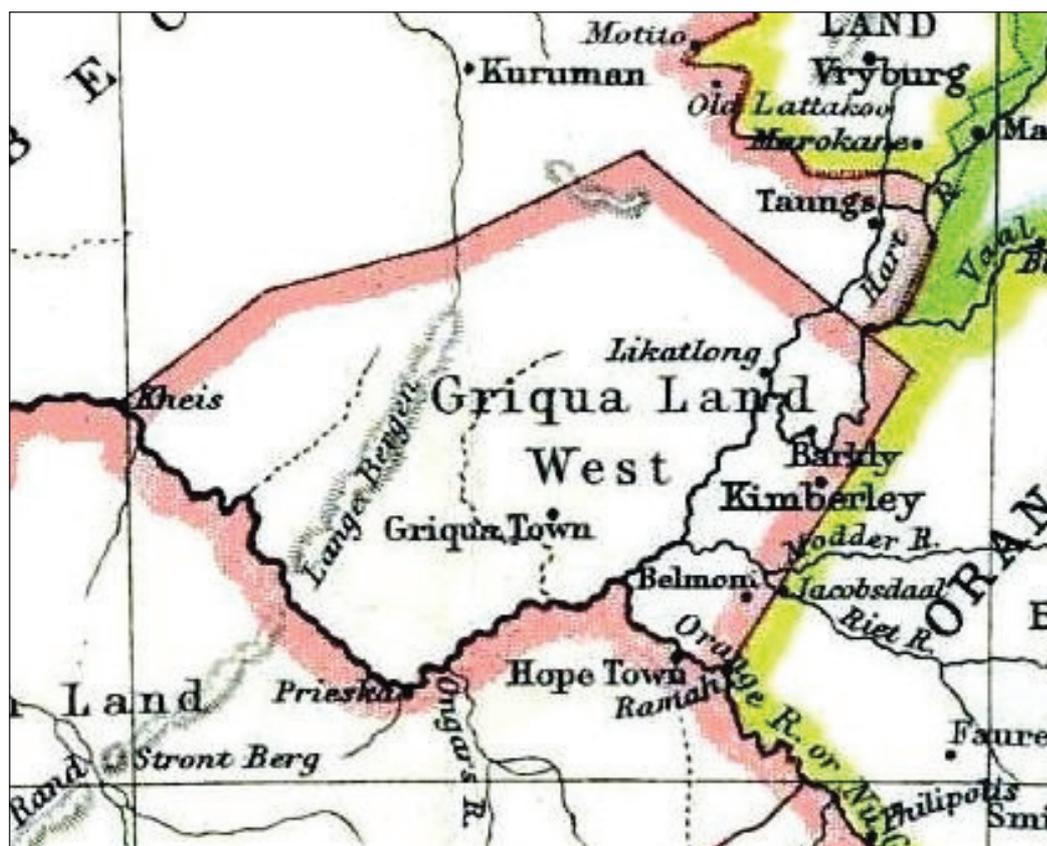


Figure 20

Section of a map titled “Sketch Map of South Africa showing British Possessions”. The map is dated to July 1885. (www.wikipedia.com). The boundaries and position of Griqualand West is depicted on this figure. The approximate position of the present study area is shown.

1873 - 1876	<p>After the province of Griqualand West came into existence in 1873, the study area now fell within the Griquatown (later Hay) District of Griqualand West. Subsequently, three government surveyors namely M.P. Auret, F.H.S. Orpen and J. Mintern were sent out to survey the whole district into individual farms (Snyman, 1983).</p>
1876 - 1878	<p>During this period the first farms in the vicinity of Blinkklip were bought by white farmers. These included the farms Pensfontein (bought by C. And G. Harrison), Kappies (bought by John Ryland), Soetfontein (bought by Henry Immuell) as well as the farms Vlakplaats, Abelsvlakte, Blouboskuil, Bloubosputs and Geelputs (all bought by R. Attwell). At the time farms such as Matsap, Klipfontein, Olynfontein, Kalkfontein, Gazip, Ploegfontein, Goedgedacht, Lukasdam, Vaalpan, Rooipoort and Klipbanksfontein had Griqua owners (Snyman, 1983).</p>
1878	<p>A rebellion broke out amongst some of the Tswana communities living in Griqualand West. This rebellion, which was a response to British expansion and colonialism, spread to the Langberg. A force under Colonel Charles Warren left Griqualand West during October 1878 and defeated the “rebels” at the Langberg (Snyman, 1986).</p>
1880 - 1892	<p>During this period a number of events took place which led to the establishment of the town of Postmasburg.</p> <p>One of these events occurred during February 1880 when a troop of the Griqualand West Border Police was stationed at Blinkklip. The reason for this decision was that Blinkklip was situated strategically close to the Bechuanaland border (Snyman, 1983).</p> <p>Another event was the inclusion of Griqualand West in the Cape Colony during 1880, which resulted in higher numbers of permanent white settlement in the area (Snyman, 1983).</p> <p>That the Blinkklip area was seen from government side as favourable for the establishment of a town, can be deduced from the fact that during 1881 a government surveyor by the name of J. Mintern had surveyed the whole Blinkklip valley between Olynfontein and Vinci into agricultural stands. During the same year as many as 38 whites were staying on farms at Blinkklip (Snyman, 1983).</p> <p>During 1882 a number of Reformed Church congregates arrived in the area between Griquatown and Blinkklip. In May 1884 the congregation agreed to establish a church place on the farm Ploegfontein (located 5km south of Postmasburg) for a period of five years. When the period of five years ended, the church council undertook an investigation to find a suitable place for a new church as well as a new town.</p> <p>On 30 November 1889 the congregation finally decided to establish the new town and church at Blinkklip. They submitted an application to the authorities, but it was turned down.</p> <p>On 2 March 1891 their religious leader Dominie Martinus Postma submitted a petition which had been signed by 51 people in favour of the establishment of a town at Blinkklip, to the authorities. This application was approved and during April 1891 a government surveyor by the name of J.A. Thwaites surveyed 82 stands around the police camp. As it took more than a year for</p>

the stands to be allocated, a second petition was organised during September 1891. The petition asked for the rapid allocation of stands, as well as for the renaming of the settlement from Blinkklip to Postmasburg in honour of Professor Dirk Postma, the founder of the Reformed Church of South Africa. Although the authorities were in favour of the establishment of a town, they did not agree with the proposed name change.

In January 1892 Dominie Martinus Postma again asked for the name change and indicated that all the white residents of area were in favour of this. On 14 April 1892 the Assistant-Commissioner of Crown Lands reported as follows: *"...in view of the unanimous request of the inhabitants, instructions have been issued for the necessary arrangements to be made for the change of the name of the township from 'Blink Klip' to 'Postmasburg' (Snyman, 1983:10).*

The town's stands were eventually only sold on 12 August 1892 (Snyman, 1983).



Figure 21

Historic portraits of the two members of the Postma family associated with early development of Postmasburg. On the left is Professor Dirk Postma in whose honour the town of Postmasburg was named, with Dominie Martinus Postma on the right. He was the person driving the establishment and naming of the town (Snyman, 1983:9).

30 September 1885	<p>Sir Charles Warren proclaims British Bechuanaland. This area comprised the land between Griqualand West and the Molopo River (Snyman, 1986).</p> <p>As mentioned elsewhere, the boundary between British Bechuanaland and Griqualand West was established directly north of the study area. In fact, the northern boundary of the farm Driehoekspan formed part of this boundary line.</p>
1886	<p>As a result of the work of a commission appointed by the British rulers of the Crown Colony of British Bechuanaland, a number of so-called “native reserves” were established in this area. These included the Gatlhose Reserve and the Maremane Reserve (Snyman, 1986).</p>
c. 1890	<p>During roughly this time the Griqua mined iron at Gatkoppies near Postmasburg (Breutz, 1963).</p>
September 1896	<p>During this time a viral disease affecting cattle (and some other species of even-toed ungulates) known as Rinderpest swept through Southern Africa (www.wikipedia.org).</p> <p>Although attempts were made to halt the spread of the disease from the north by erecting a fence between the boundaries of Griqualand West and Bechuanaland, this proved unsuccessful. Incidentally, only three gates were placed in this fence, namely at Gatlhose, Nelsonsfontein and Blikfontein (Snyman, 1988). Of these three places, Gatlhose is the closest and is situated 30km north-east of the study area.</p> <p>Furthermore, it is worth noting that a section of the Rinderpest fence erected between Griqualand West and British Bechuanaland during this time would have been placed along the northern boundary of the farm Driehoekspan.</p>



Figure 22 An everyday scene in Griqualand West during the Rinderpest Epidemic: large numbers of destroyed cattle (Snyman, 1983:20).

1897

The Rinderpest epidemic did not only have a massive socio-economic impact on the landscape, it also resulted in the Langberg Rebellion of 1897. During this time conflict broke out between the authorities and a Thlaping leader from Taung, Galeshiwe. The conflict arose after some of Galeshiwe's cattle that were infected by Rinderpest were destroyed by representatives of the government as a way of curbing the spread of the disease. After killing an officer, Galishewe fled to the Thlaro leader Toto of the Langberg. Subsequently, a full-scale rebellion broke out that was eventually suppressed (Breutz, 1963).

Although most of the activities associated with the rebellion took place some distance to the west and north-west of the study area, the impact of the rebellion was felt throughout the surrounding landscape. For example, farms located to the west and south-west of the study area such as Lukasdam (16.5km south-west of the study area), Mount Temple (27.7km west of the study area) and Vlakfontein (located directly west of the study area) came under attack from stock thieves during this time. After the farms Mount Temple and Groenkloof were physically attacked, a police post which had been established on the farm Vlakfontein was reinforced (Snyman, 1983).

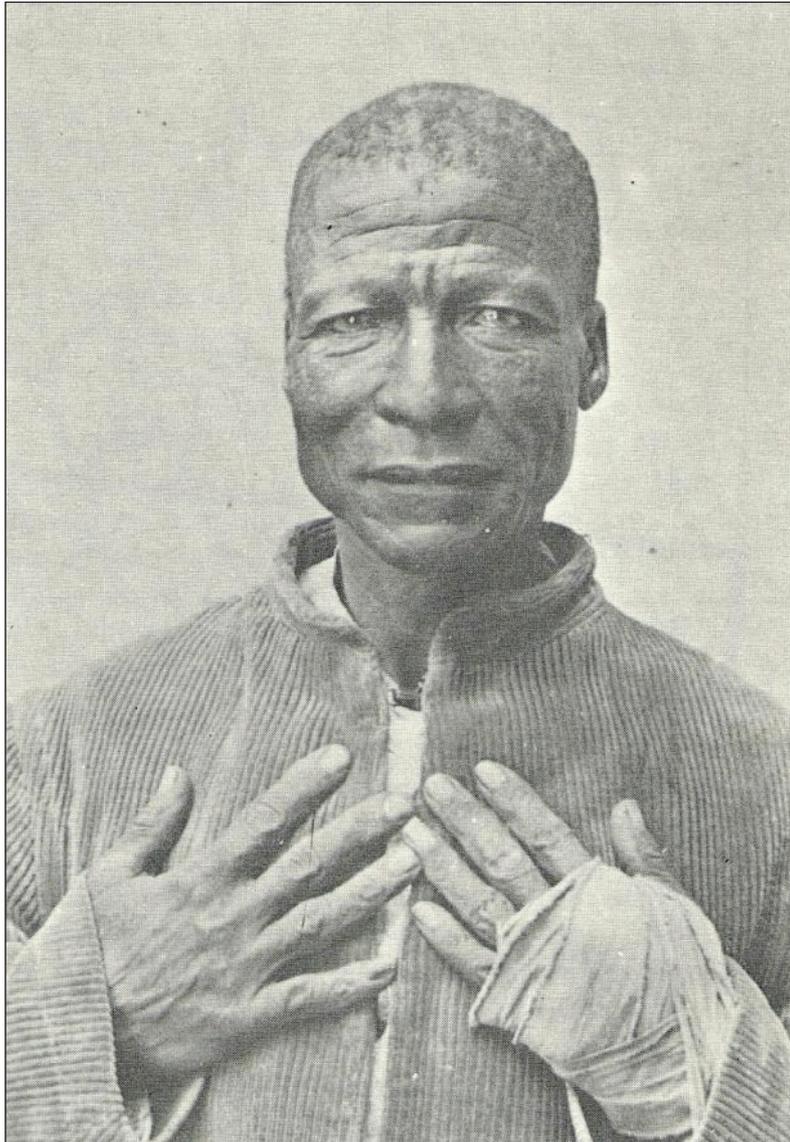


Figure 23

Toto, leader of the Thlaro along the Langberg (Snyman, 1986:17)

<p>1899 - 1902</p>	<p>The South African War (also known as the Anglo Boer War) was fought between Great Britain and the Boer republics of the Zuid-Afrikaansche Republiek and Orange Free State.</p> <p>After the outbreak of hostilities on 11 October 1899, the military commander of Griqualand West and British Bechuanaland Lieutenant-Colonel R.P. Kekewich issued a proclamation whereby all residents of these areas were considered British subjects and as such had to refrain from assisting the Boer forces.</p> <p>However, when a Free State Commando under Kommandant Jan Jordaan and Judge J.B.M. Hertzog occupied Postmasburg on 18 November 1899, a large number of Postmasburg residents took up arms and joined the commando. These rebels formed part of the force under the command of P.J. de Villiers which by March 1900 was in command of the entire Griqualand West. The rebels were under the direct command of Kommandant Jan Vorster and Veldkornet Piet Venter (Snyman, 1983).</p> <p>In April 1900 Sir Charles Warren received the order to retake Griqualand West and British Bechuanaland. Apart from a short delay caused by a skirmish at Fabersput (near Campbell), Warren occupied the towns from within the area (including Postmasburg) within a short period of time. This had a devastating effect on the morale of the rebel forces, who for the most part surrendered. However, fifty rebels under the command of General De Villiers joined the Transvaal forces under the command of General J.H. de la Rey in the western part of the Zuid-Afrikaansche Republiek (Snyman, 1983).</p> <p>In June 1901 General De Villiers attacked the region again to act as a link between General J.H. de la Rey in the Western Transvaal and General J.C. Smuts in the North-Western Cape. On 10 August 1901 the town of Postmasburg was occupied by Boer forces under the command of Kommandant E. Conroy.</p> <p>A number of victories for the Boer forces in this area followed, including the attack on 10 August 1901 of Veldkornet Van Aswegen at Kareepan which resulted in the taking of 110 horses. The farm Kareepan 450 is located directly adjacent and to the south of the study area. Other successes took place at Griquatown and Rooikoppies.</p> <p>These victories resulted in almost the entire white population of Postmasburg taking up arms on the Boer side during August and September 1901. After a battle at Kalkfontein (south of Postmasburg) on 15 September 1901, the town was retaken by the British. However, during January and February 1902 General De Villiers was again in control of Postmasburg and used it as his headquarters during this period (Snyman, 1983).</p> <p>During the last few months of the war, the Boer forces focussed their attention on attacking the British convoys operating between Griquatown and Danielskuil. This resulted in skirmishes and battles at places such as Dirkspan and Doornfontein (not to be confused with the farm Doornfontein located directly south and south-west of the present study area), both located east of the study area (Snyman, 1983).</p> <p>The war ended on 31 May 1902 with the British as victors. The effects of the war were felt for years after the hostilities had actually ended.</p>
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Figure 24 A group of Boer rebels from Postmasburg (Snyman, 1983:16).



Figure 25

Captain T.L.H. Shone, who not only discovered a Kimberlite pipe near Postmasburg, but who is also regarded as the first person to mine manganese in the vicinity of the study area (S.A. Manganese, 1977:24)

1913	In this year the so-called “Native Locations” of Skeyfontein and Groenwater were established by Proclamation 131 of 1913 (Breutz, 1963).
1918	During this period the Influenza Pandemic arrived in South Africa. Although the Postmasburg area was seemingly not seriously affected by the disease (Snyman, 1983), the situation on the diamond diggings toward Lichtenburg and Bloemhof were much worse and hundreds of people died there during this period (Van Onselen, 1996).
1918 - 1920	<p>During 1918 a prospector by the name of Casper Venter and his assistant Plaatjie discovered a Kimberlite pipe on the townlands of Postmasburg. The following year T.L.H. Shone discovered a second Kimberlite pipe which became the Postma’s Diamond Mine.</p> <p>Venter sold his discovery rights to Oliver Daniel, and during May 1920 the West End Diamond Mine was established. In the same year Daniel and his partners sold the mine to Sir Abe Bailey for an amount of £80,000.00 (Snyman, 1983).</p> <p>Although the discovery of the Kimberlite pipe brought large numbers of fortune seekers to Postmasburg in the hope that the town would become the new Kimberley, it was only the West End Mine as well as the Postma’s Mine which proceeded with the mining of diamonds (S.A. Manganese, 1977).</p>
1919 - 1930	Mine activities at the West End Diamond Mine continued during this period, until work was ceased due to the financial crisis associated with the Great Depression. During this time the mine retrieved 182, 955 carats of diamonds (Snyman, 1983).
1920 - 1921	The Kimberlite pipe which had been discovered by Shone was mined during this time by Postma’s Diamond Prospect Limited (Snyman, 1983).
1922	<p>In this year T.L.H. Shone (who had discovered the Kimberlite pipe at Postma’s Mine three years earlier) discovered manganese on the farm Doornfontein. Although the presence of manganese in the surrounding landscape had been known before this discovery Shone was the first person to actually mine manganese in this area and was also responsible for focussing the attention of those interested in manganese on the surroundings of Postmasburg (Snyman, 1983).</p> <p>The farm Doornfontein 446 is located approximately 3.9km south-west of the farm Driehoekspan.</p>
1922 - 1923	After the cessation of activities by the Postma’s Diamond Prospect Limited, mining activities were undertaken during this time by the Diamond Fields of Africa Exploration Company Limited (Snyman, 1983).
1925	With partners Reg Saner and John Dale-Lace, T.L.H. Shone established the first manganese mining company in South Africa, namely Union Manganese Mines and Minerals Limited. The company obtained options on a number of farms in the Postmasburg district (Snyman, 1983).
1925 - 1926	In an attempt to create awareness about the newly discovered manganese fields as well as his company, Shone approached the government for

assistance. They responded by sending the Assistant Director of the Geological Survey, Dr A.L. Hall, to carry out an intensive geological survey of the newly discovered manganese deposits in proximity to Postmasburg.

Dr Hall commenced with his work in December 1925 and found small prospecting workings all along the range of hills known as the Gamagara Hills, and especially so on a number of farms on all sides of Driehoekspan. These farms included Gloucester (north of the study area), Paling (south of the study area), Doornfontein (a short distance south-west of the study area) and Magoloring (directly north-west of the study area). These prospecting workings observed by Hall were for the most part the result of the prospecting activities carried out by Shone and his partners during the early 1920s.

Dr Hall's report published in 1926 provided a very favourable view of the manganese fields and indicated that the "...Postmasburg area holds deposits of manganese ore in large quantities comparable to the scale on which well established sources in other parts of the world are exploited." (Cairncross et al., 1997: 16).

The only concern raised by Dr Hall in his report was the lack of suitable transport methods such as a railway linking the manganese deposits with the markets and coastal harbours. His report recommends as follows: "*It is in any rate certain that with large tonnages of high-grade ore available, the extension of railway facilities to Postmasburg would go a long way towards the establishment of an important South African manganese industry*" (Cairncross et al., 1997:17).



Figure 26 This photograph was taken in 1929 and depicts an exploration pit on the farm Paling. The two individuals shown in this photograph are not identified (Cairncross, 1997:16).

1924 - 1927	Mining activities were taken over by the Postma's Diamond Syndicate in 1934 after the cessation of activities by Diamond Field (Snyman, 1983).
22 December 1926 – May 1927	<p>On 22 December 1926 a second manganese mining company was established by Niels Langkilde and A.J. Bester. The company was named South African Manganese Limited (Snyman, 1983).</p> <p>During 1927 the company appointed two experienced prospectors to investigate the properties of the company. These two prospectors were S. Griffiths and W.J. Marais. Their work focussed on the four most important farms owned by the company, namely Kapstewel (located directly adjacent to the study area), Thaakwanene (located directly north-east of the study area), Knoffelfontein (unknown location) and Doornput (seemingly located either directly adjacent to or within the study). Although the results of the prospecting activities were deemed to be very positive, the lack of a railway link between the market and these properties was a serious hurdle (S.A. Manganese, 1977).</p>
1929	A company by the name of the Postma's Diamond Mine undertook mining activities at the Postma's Mine (Snyman, 1983).
4 November 1930	On this day the extension of the railway line from Koopmansfontein to Postmasburg was officially opened by the Minister of Railways, C.W. Malan. This meant that Postmasburg was now one of the few towns in the Northern Cape which boasted a direct rail link. The railway extension to Beeshoek was built by the Manganese Corporation, whereas the further extensions of the line to Lohatla and Manganore (1936), Sishen (1953) and Hotazel (1961) were undertaken by the South African Railways (Snyman, 1983).
1930 - 1932	During 1930 an Englishman by the name of Pringle-Smith was appointed by S.A. Manganese to devise and execute a "...thorough prospecting programme of S.A. Manganese's properties..." (S.A. Manganese, 1977:46). This meant that the prospecting work undertaken in 1927 and which had been halted due to the poor financial climate and the lack of a railway link could now be proceeded with. Within a relatively short spate of time Pringle-Smith started opening up the beds on the farms Kapstewel and Doornput. However, the company did not have the market which for example the Manganese Corporation possessed at the time, and as a result the ore was stockpiled at these two farms. Pringle-Smith left the Postmasburg area in 1932 after the financial implications of the Great Depression worsened the situation for S.A. Manganese to such an extent that he was asked to agree to a much lower salary (S.A. Manganese, 1977).
1930 - 1931	The activities at the Postma's Mine were continued during this time by the company Postma's Mine (Snyman, 1983).
1931 -1939	During this time the dumps at the West End Diamond Mine were mined by F. Bernhardt, R.A. Dunsford and T. Begbie. However, this proved unsustainable and this work was ceased in 1939 (Snyman, 1983).
Early 1930s	Due to the financial impacts of the Great Depression, a number of smaller manganese mining companies were closed down. A period of amalgamation followed which resulted in the South African Manganese Limited as well as

	the Associated Manganese Miners of South Africa Limited becoming the leaders in the manganese mining industry (Snyman, 1983).
1935	The Postmasburg Diamond Mine was the last company to undertake mining activities at the Postma's Mine. All activities at the mine were halted when the mine became flooded during this year. The different mining companies operating at the Postma's Mine during the period from 1919 to 1935 retrieved a total of 5,155 carats of diamonds (Snyman, 1983). The Mancorp Mine village was established during this year (Snyman, 1983).
c. 1936	<p>After the willingness of the South African Railways Administration to extend the railway line from Postmasburg to Kapstewel and Lohatla became known, the entire manganese industry north of Postmasburg changed for the better. An example of this was that S.A. Manganese stepped up operations on the farm Kapstewel. The work here was overseen by none other than Captain T.L.H. Shone (S.A. Manganese, 1977).</p> <p>The promise of railway extensions to this area also resulted in other mining activities such as the establishment of a mining company by the name of Gloucester Manganese. This company was established to mine the manganese deposits on the farm Gloucester (located directly north of the Driehoekspan section of the study area). Shortly thereafter an amalgamation took place between Gloucester Manganese and the Manganese Corporation which resulted in the formation of the Associated Manganese Mines of South Africa Limited (Ammosal). Ammosal re-erected the old ore handling plant from Beeshoek on the farm Gloucester and the operations here represented a large portion of the total manganese production of 250,000 tons (S.A. Manganese, 1977).</p>



Figure 27 Prospecting activities on the farm Kapstewel during 1937 (S.A. Manganese, 1977:59).

1937	The farm to the east of Gloucester, named Lohatla, was now being viewed more favourably by S.A. Manganese. During this year they reached an agreement with the owner, which eventually resulted in the acquisition of the farm (S.A. Manganese, 1977). During the same year the company bought the freehold of the farm Klipfontein (located directly north of Doringpan) and also bought 600 morgen of the farm Kapstewel in order to build a staff village. This village was named Manganore (S.A. Manganese, 1977). The Lohatla mine village was also established during this time (Snyman, 1983).
1948	The production of iron ore came to the foreground during this time with the mining of iron ore by S.A. Manganese at Manganore and by the Associated Manganese Miners of South Africa at Beeshoek (Snyman, 1983).
1953	In this year Iscor commenced iron production at Sishen (Snyman, 1983).
1958 - 1978	Iron ore (and manganese) mining activities were undertaken by Consolidated African Mines on the farms Pensfontein (3.2km south of study area), Kapstewel (directly adjacent study area) and Rooinekke. These activities were halted when the market for iron disappeared in 1978 (Snyman, 1983).
1959 - 1966	Iron ore mining activities were started at the so-called Springbok Mine during 1959. These activities took place around a low hill situated south-west of Postmasburg. The work on the town end of the property was undertaken by the Springbok Industrial and Mineral Ventures Limited and the work undertaken on the other end (toward the farm Koeispeen 475) were undertaken by Griqualand Iron Ore (Pty) Ltd. The mining activities of the companies at Springbok Mine ceased in 1966 (Snyman, 1983). The Springbok Mine is situated 11.8km south-west of the study area.
Early 1960s	The residents of Skeyfontein and Groenwater were forcibly removed from their land as part of the system of Apartheid (BAO, 2390, D188/1235/1).
1963	F.M. Mangan discovered iron ore deposits on the farm Kareepan (Snyman, 1983). This farm is situated adjacent to Doringpan.
1963 - 1977	During this time mining activities were renewed on the original prospecting land of West End Diamond Mine. Mining activities included the sinking of two shafts as well as the working of the old mine dumps. Due to financial losses, all activities here were ceased in 1977 (Snyman, 1983).
c. 1966 - 1978	During this time Springbok Industrial started mining the iron ore deposits which had been discovered on Kareepan in 1963. By 1978 all activities were halted as there was no more market for iron ore (Snyman, 1973).
1976 - 1977	During this time the Gatlhose and Maremane Communities were removed from their land and taken to the Shipton Farms in the then homeland of Bophutatswana. After their removal, the South African Government decided to establish a Battle School here. As the Khosis Community was still staying on the land, they were moved to a section of the original land roughly 14 000 hectares in extent. The Lohatla Battle School was subsequently established (www.lrc.org.za/Docs/Judgments/khosis.doc).

7.2 Findings from Historic Overview

Although the historic overview of the study area and surroundings has revealed a long and significant history for this area, almost none of the historical events highlighted in this report can be positively linked to the study area itself. This said, in a number of cases, mention is made to properties and localities located adjacent or very close to the study area. For the most part these include aspects relating to the history of manganese and iron mining.

The following events from the historic overview can be linked to the farm Driehoekspan itself:

- With the establishment of the Griqualand West in 1871 and the proclamation of British Bechuanaland in 1885, the boundary between these areas was defined as passing directly to the north of the study area. In fact, the northern boundary of the Driehoekspan section of the study area formed part of this boundary line between Griqualand West and British Bechuanaland.
- In 1897 a fence was erected on the boundary line between Griqualand West and British Bechuanaland as an attempt to halt the spread of the dreaded Rinderpest from the north into Griqualand West. This fence would have been erected along the northern boundary of the Driehoekspan section of the study area as well.
- The railway line extension between Postmasburg and Lohatla was constructed across the Driehoekspan section of the study area during 1936. A large section of the siding from this line to Manganore was also constructed within the farm Driehoekspan.

Apart from these aspects, the historic study also highlighted some of the historical and archaeological sites which might potentially be located within the study area. These include Stone Age sites, Iron Age sites associated with the histories of the Thlaro and Thlaping (likely in the form of old homesteads with or without stone walling), sites associated with the Kora and Griqua periods (graves, buildings and middens), sites associated with the early and later settlement of white farmers in the area (graves, farmsteads and middens) as well as mining-related sites (shafts, trenches and discard dumps as well as abandoned mine machinery and mine buildings).

8 PALAEOLOGICAL OVERVIEW AND FINDINGS

Refer Annexure A for the complete Palaeontological Report. Please note that this palaeontological desktop study was conducted for both the farms Driehoekspan 435 and Doornpan 445, and as a result this section will reflect this.

8.1 Geology of the Study Area

The proposed development site is underlain by low to medium grade metamorphic rocks of the Transvaal Supergroup in the Griqualand West Sequence. Rocks of both the Vaalian-aged Postmasburg (clastic sedimentary and volcanic rocks) and Campbell (chemical sedimentary rocks) Groups have been affected by the stacking of thrust packages as can be seen in the Maremane Dome Region North of Postmasburg.

Banded Iron Formations (BIF) are the result of chemical sedimentary cycles starting with carbonates, followed by sideritic iron-stones and cherts and ending with silicic iron-stones. Iron precipitation was seen as occurring in a bar-basin or lagoon in the most marginal zones of the basin (Eriksson et. al., 1976 in: Johnson et.al., 2009). The interpretation of Banded Iron Formation deposition is further complicated by the Maremane Dome Structure North of Postmasburg, where the Kuruman BIF has a unique setting (Johnson et. al., 2009) leading to the development of rich Sishen-type iron ores.

The farm Driehoeks Pan 435 is underlain by rocks of the Gamagara Formation (Vg) of the Postmasburg Group as well as rocks of the Lime Acres Member of the Ghaapplato Formation (Vgl) of the Campbell Group. The rocks of the Gamagara Formation underlie the Western Corner of the Farm. This formation consists of quartzites, conglomerates, flagstones and shales and constitutes the base of the Postmasburg Group. The formation lies unconformably upon the Ghaapplato and Asbesberge Formations. Lenticular basal conglomerates contain pebbles of jasper and banded iron stone and are completely ferruginised in places. The shales contain lenses of conglomerate and are also locally ferruginised or manganised. Ferruginous flagstone and white, purple and brown quartzites form the top of the formation. Rocks of the Lime Acres Member of the Ghaapplato Formation of the Campbell Group consist of dolomitic limestone with subordinate coarsely crystalline dolomite and chert with lenses of limestone. Stromatolitic puckered limestone consisting of alternating dark and light bands can be found. Lenticular bodies of limestone occurring in the dolomite are probably the result of irregular dolomitisation of the original limestone (Moen HFG, 1977).