Phase 1 Heritage Impact Assessment Report

Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Northern Cape Province.

Prepared By:

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CREDIT SHEET

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Disclaimer; *Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

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As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

SIGNED OFF BY: STEPHAN GAIGHER

MANAGEMENT SUMMARY

Site name and location: Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

Municipal Area: Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

Developer: Vedanta Zinc International – Black Mountain Mining / Gamsberg.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.
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Date of Report: 24 April 2018

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

This study encompasses the heritage impact investigation. A preliminary layout has been supplied to lead this phase of this study.

Scope of Work
A Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Basic Paleontological Assessment) to determine the impacts on heritage resources within the study area.

The following are the required to perform the assessment:

- A desk-top investigation of the area;
- A site visit to the proposed development site;
- Public participation with Interested and Affected Parties (IAP's)
- Identify possible archaeological, cultural, historic, built and paleontological sites within the proposed development area;
- Evaluate the potential impacts of construction and operation of the proposed development on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical, built and paleontological importance.

The purpose of this study is to determine the possible occurrence of sites with cultural heritage significance within the study area. The study is based on archival and document combined with fieldwork investigations.

Findings & Recommendations
The area was investigated during a field visit and through archival studies. It is recommended that obscured, subterranean sites be managed, if they are encountered.

The site at Gamsberg contained some Stone Age artifacts. No deposit or manufacturing sites were evident in the areas surveyed.

Provided the activities stays with prospecting boreholes and these positions are checked before drilling commences no higher resolution studies are needed. Should mining activities be considered, the areas should be submitted to a full Heritage Impact Assessment.

The majority of previous work at Gamsberg was done by David Morris. He also noted the clear absence or very low concentration of any Stone Age sites. The sites identified by him on the northern parts of the Gamsberg slopes have been mitigated in part by the work of Orten. There is however reference to certain historically important events (such as the San massacre) which is associated with the Gamsberg. Unfortunately, all of the previous studies and this study as well has failed to identify the exact location of this site. It is recommended that the mining area be subjected to an updated heritage management plan that focus specifically on the identification and management of these sites. The attention being given to sites of *victims of conflict* throughout South Africa makes this need evident.

Fatal Flaws
No fatal flaws were recorded.

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List of Abbreviations

Bp ..... Before Present

DoT ..... Department of Transport

EIA ..... Early Iron Age

ESA ..... Early Stone Age

Fm ..... Femtometre (10^{-15}m)

GPS ..... Geographic Positioning System

HIA ..... Heritage Impact Assessment

LIA ..... Late Iron Age

LSA ..... Late Stone Age

MYA ..... Million Years Ago

MSA ..... Middle Stone Age

NHRA ..... National Heritage Resources Act no 22 of 1999

SAHRA ..... South African Heritage Resource Agency

S&EIR ..... Scoping & Environmental Impact Reporting

Um ..... Micrometre (10^{-6} m)

WGS 84 ..... World Geodetic System for 1984

Chapter 1

Project Resources

Heritage Impact Report

Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Northern Cape Province.

1. Introduction

Legislation and methodology

G&A Heritage was appointed by Endemic Vision to undertake a Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

(a) Construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
(b) Construction of a bridge or similar structure exceeding 50 m in length; and
(c) Any development, or other activity which will change the character of an area of land, or water –
(1) Exceeding 10 000 m^2 in extent;
(2) Involving three or more existing erven or subdivisions thereof; or
(3) Involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or
(d) The costs of which will exceed a sum set in terms of regulations; or
(e) Any other category of development provided for in regulations.

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

(8) *The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

(3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2) (a): Provided that the following must be included:
(a) The identification and mapping of all heritage resources in the area affected;
(b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7;
(c) An assessment of the impact of the development on such heritage resources;

(d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
(e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
(f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
(g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.
(1) Ancestral graves,
(2) Royal graves and graves of traditional leaders,
(3) Graves of victims of conflict (iv) graves of important individuals,
(4) Historical graves and cemeteries older than 60 years, and
(5) Other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
(h) Movable objects, including ;
(1) Objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
(2) Ethnographic art and objects;
(3) Military objects;
(4) Objects of decorative art;
(5) Objects of fine art;
(6) Objects of scientific or technological interest;
(7) Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
(8) Any other prescribed categories, but excluding any object made by a living person;
(i) Battlefields;
(j) Traditional building techniques.

A '**place**' is defined as:
(a) A site, area or region;
(b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
(c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'**Structures**' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'**Archaeological**' means:
(a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(b) Rock art, being a 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 is older than 100 years including any area within 10 m of such representation; and
(c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Paleontological' means 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.
'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by Endemic Vision is accurate.
- We assumed that the public participation process performed as part of the Basic Assessment process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	No	N/A
	35	Archaeological, paleontological and meteor sites	No	N/A
	36	Graves and burial sites	No	N/A
	37	Protection of public monuments	No	N/A
	38	Does activity trigger a HIA?	Yes	HIA

Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	No	N/A
Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m^2	Yes	Gamsberg (approximately 3300 ha)
Development involving more than 3 erven or sub divisions	No	N/A

Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	No	N/A
Re-zoning of site exceeding 10 000 m^2	No	N/A
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

2. Background Information

2.1 Project Description

Vedanta Zinc International has applied for a Prospecting Right: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

The prospecting will involve several sample drill lines to investigate the substrate. No large-scale disturbance of either the surface or sub-surface areas are expected.

"An initial survey of the literature on the Pofadder-Aggeneys area had shown that minimal work had been undertaken in the region prior to the project (Beaumont et al. 1995), although in the 1990's a few specialist inspections were carried out for Eskom and Black Mountain mine. While by no means in-depth, these latter surveys together with the work of Morris & Beaumont (1991), Beaumont et al, (op cit.) and Smith (1995), had provided some regional context to the study and an indication of what to expect from an archaeological perspective at Gamsberg. Aspects of the resulting work at Gamsberg itself had supplemented existing data in significant ways providing new insights into the archeological and cultural heritage of the region." (Morris, D. 2009).

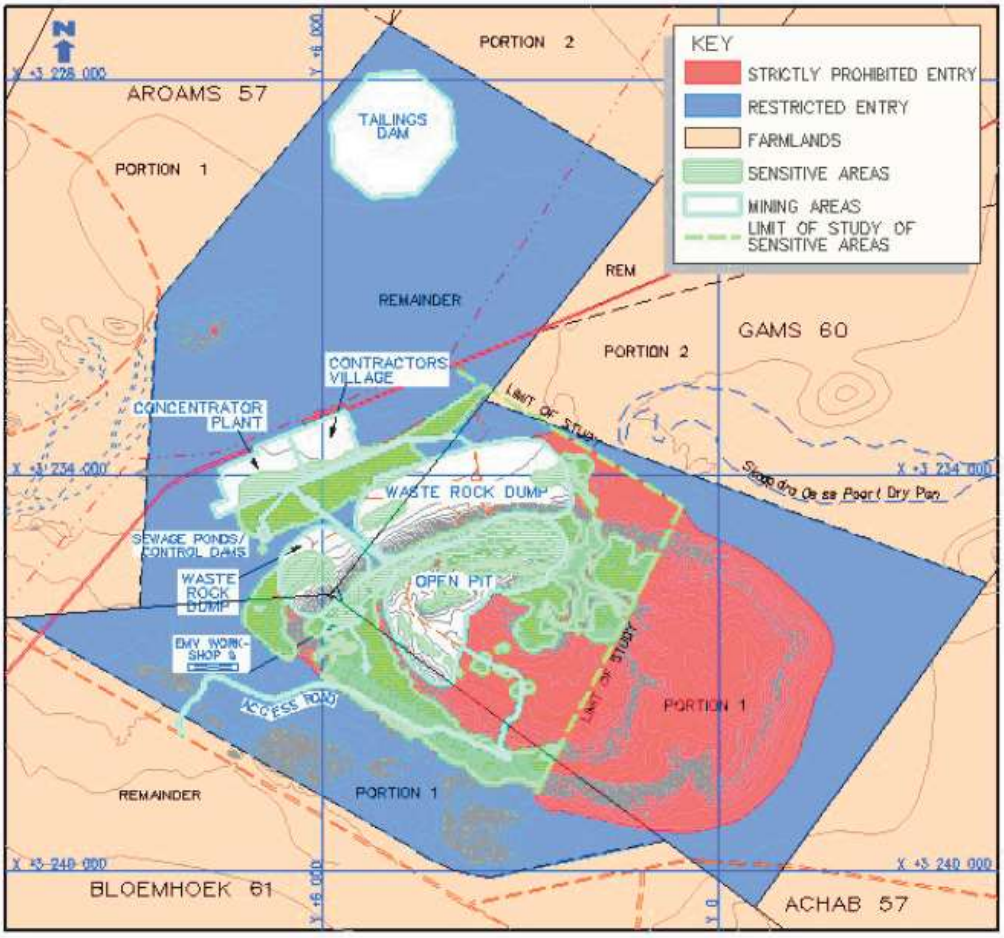

Figure 1. This vegetation map indicates the farm boundaries and the limit which constrained previous studies (Morris, D. 2009)

Reference: Morris, D. 2009. Cultural Heritage Assessment Gamsberg Supplementary Observations to a Previous Specialist Report on Archaeological Resources.

2.2 Project Location

Located on the Farm Gams 60 and Bloemhoek 61 near the mining town, Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

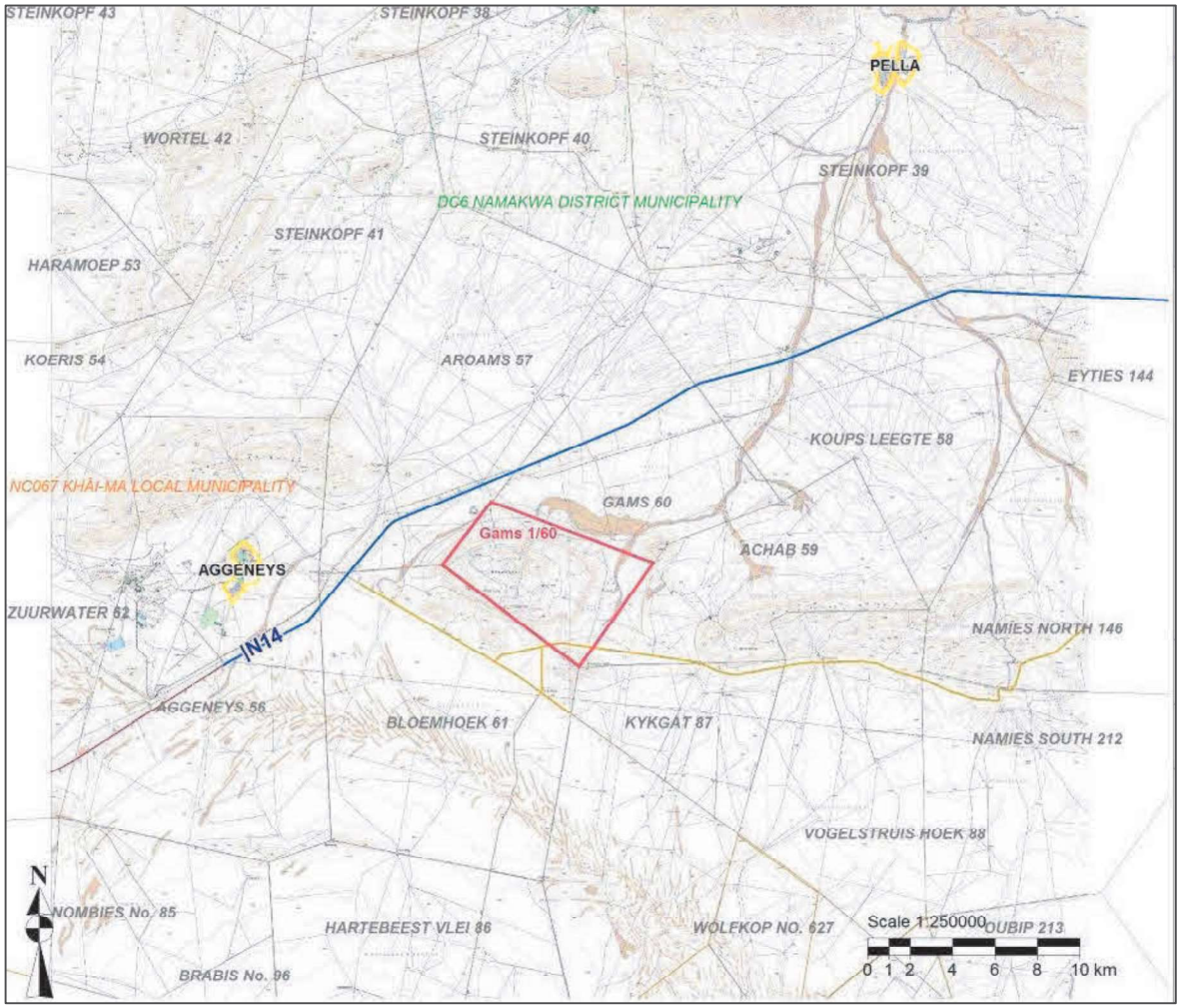

Figure 2. Location Map of the Study Area

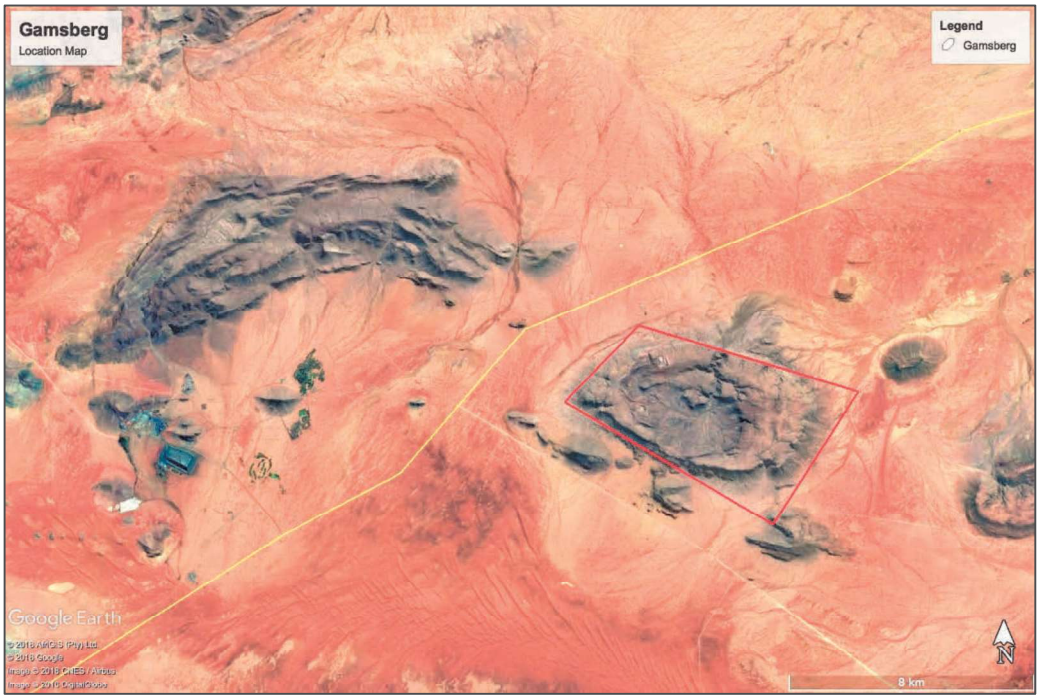

Figure 3. Google Earth Image of the Study Area

2.3 GPS Track

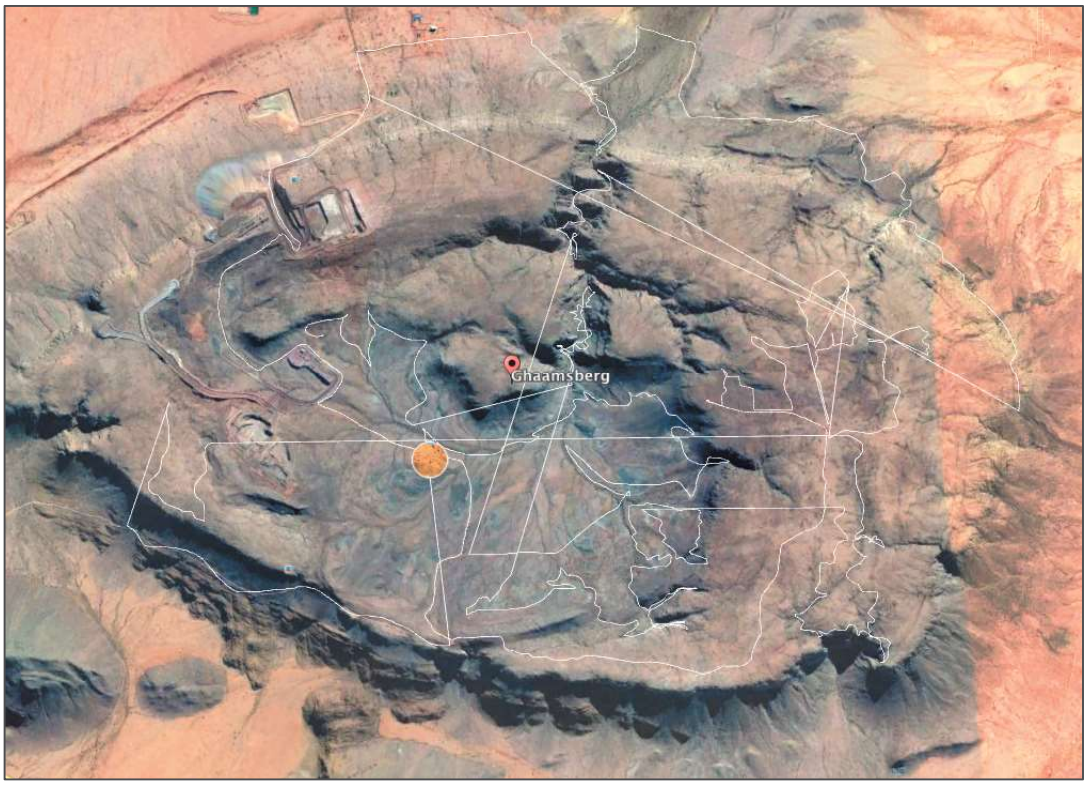

Figure 4. GPS Track Paths

Chapter 2

FINDINGS

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

3. REGIONAL CULTURAL CONTEXT

3.1 PALEONTOLOGY

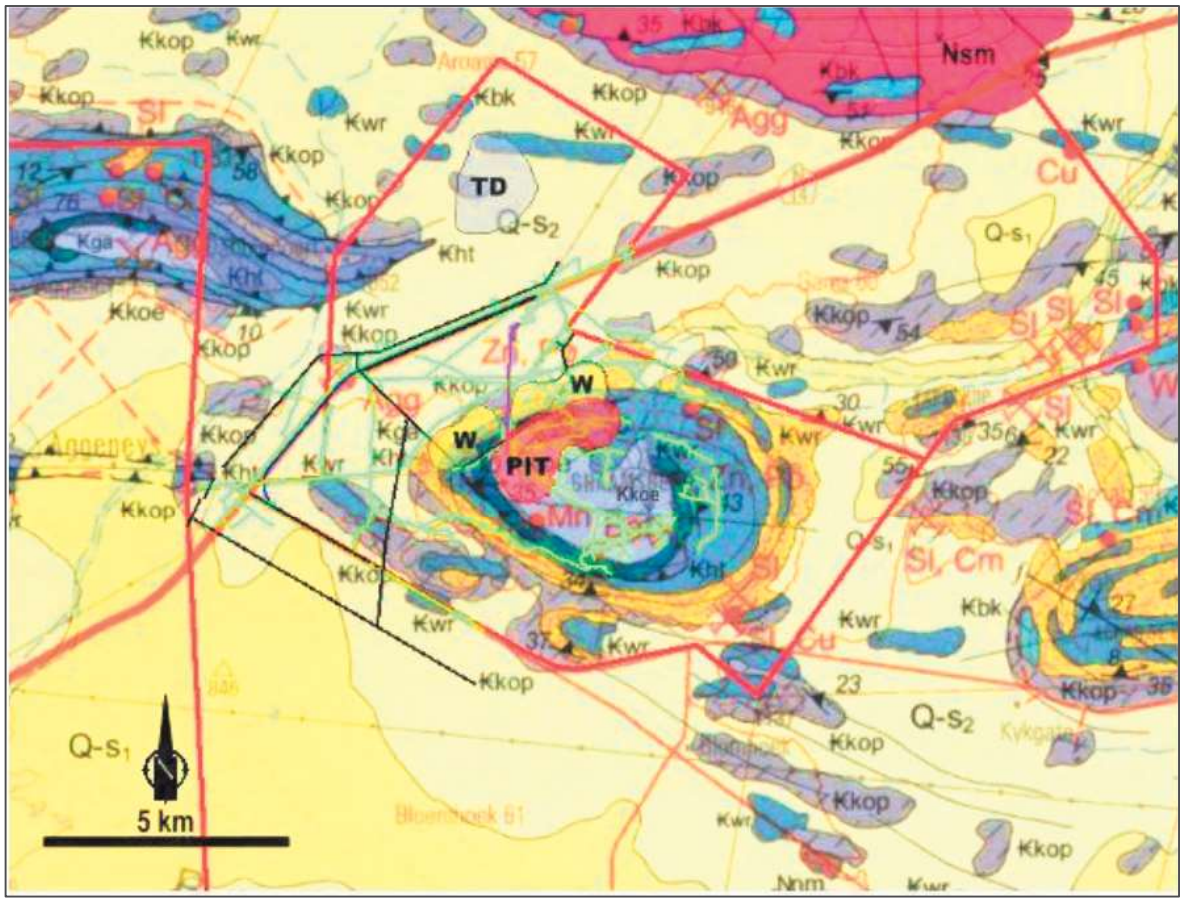

Figure 5. Geological map of study area

The study area underwent a detailed Paleontological Impact Assessment in 2013 by John Pether for the Black Mountain Mine. The study is titled: "*Project Reference Number 0164903. Environmental and Social Impact Assessment (ESIA) for the Gamsberg Zinc Mine and Associated Infrastructure, Northern Cape. Palaeontological Impact Assessment, Desktop Study. By John Pether, M.Sc., Pr.Sci.Nat. (Earth Sci.)*"

The report is available from the SAHRIS website and will not be reproduced here due to copyright requirements.

3.2 Stone Age

This area is home to all three of the known phases of the Stone Age, namely: The Early- (2.5 million – 250 000 years ago), Middle- (250 000 – 22 000 years ago) and Late Stone Age (22 000 – 200 years ago). The Late Stone Age in this area also contains sites with rock art from the San and Khoi San cultural groups. Early to Middle Stone Age sites are less common in this area, however rock-art sites and Late Stone Age sites are much better known (Clark 1959).

*Archaeological and historical evidence show that the Middle Orange River and Bushmanland regions have been populated more or less continuously during prehistoric times and that the region was extensively occupied by Khoi herders and San hunter-gatherers during the last 2000 years (Morris & Beaumont 1991; Beaumont et al. 1995; Smith 1995). According to Beaumont (1986) archaeological visibility in the region was high during the Last Glacial Maximum, a viewpoint that is in contrast to that indicated for southern Africa as a whole (Deacon and Thackeray 1984). Beaumont et al. 1995 also noted that MSA artifact occurrences are widespread in the Bushmanland area, but are mainly preserved as low density surface scatters on the landscape. Morris (2010, 2013a, 2013b) noted very sparse localized scatters of MSA stone tools at the top of Gamsberg, including a MSA knapping site, and ESA material, including a Victoria West core on quartzite within the Gamsberg basin. … (*Rossouw, L. 2015).

Archaeological and heritages studies in the Northern Cape indicate that the area is of high Stone Age archaeological and heritage significance. It is in fact a cultural landscape where Stone Age, Iron Age and Historical period sites contribute the bulk of the cultural heritage of the region (also see Hart, 2005; Kaplan, 2010; Kiberd, 2006; Morris, 1990; Orton, 2011). A study conducted by Schalkwyk (2011) for the establishment of a mainstream renewable solar power in Prieska region revealed that most sites in this region belong to the Stone Age that are the Early Stone Age (ESA), Middle Stone Age (MSA) and Late Stone (LSA). Similar observations were made by Morris (2000). Kiberd (2001, 2006) who also excavated Budu Pan 25 -30 km northwest of Coppertonwhere ha profile ESA, MSA and LSA deposits was recorded. Several LSA sites in the northwest and south of the Prieska region were also investigated by Beaumont et al., (1995), Smith (1995a), and Parsons (2003, 2004, 2007). Rock engraving sites are also found in the Prieska region. Kuil and Driekopseiland are some of the rock engraving sites in the region (Beaumont et al., 1995, Beaumont and Vogel 1989, Rudner and Rudner 1968, Rush and Parkington 2010, Wilman 1933). Orton (2012) found scrapped engravings between Copperton and Vanwyksvlei. Stone circles belonging to the LSA were also recorded further along the Orange River by Orton (2012) in addition to what Sampson (1968) had earlier recorded. Cave sites also exist in the landscape eastern Northern Cape regions with MSA deposits. A British fort at Prieska is one of the heritage sites that is ruminant of the late 19-century Anglo-Boer war. In addition, there are also war graves in the region (Orton, J. 2012).

Most archaeological material in the Northern Cape is found near water sources such as rivers, pans and springs, as well as on hills and in rock shelters. Sites usually comprise of open sites where the majority of evidence of human occupation is scatters of stone tools (Parsons 2003).

The survey found that Stone Age archaeological material was present throughout the study area though in very low densities and usually as single occurances. The vast majority of it was considered to be background scatter, the “low density lithic scatter” of Beaumont et el. (1995:240).

During the Middle Stone Age, 200 000 years ago, modern man or Homo sapiens emerged, manufacturing a wider range of tools, with technologies more advanced than those from earlier periods (Deacon 1984). This enabled skilled hunter-gatherer bands to adapt to different environments. From this time onwards, rock shelters and caves were used for occupation and reoccupation over very long periods of time.

The Late Stone Age, considered to have started some 20 000 years ago, is associated with the predecessors of the San and Khoi Khoi. Stone Age hunter-gatherers lived well into the 19th century in some places in SA. Stone Age sites may occur all over the area where an unknown number may have

been obliterated by mining activities, urbanisation, industrialisation, agriculture and other development activities during the past decades.

Specifically, the Wonderwerk Cave in the Kururman hills has provided much Stone Age information (Beaumonth 1984, 2006).

Specularite mining is noted by Beaumont and Bashier (1974) at Doornfontein and Blinkklipkop between 800AD – 820AD.

A limited number of Rock-Art sites are located in this area, mostly due to the lack of suitable shelter sites.

3.4 Iron Age

Although there is documentary evidence of a large Iron Age Tswana village – Dithakong, located in the general area the occurrence of this is still hotly contested and the findings of Cobbing have been largely discredited (Cobbing 1988, SAHRA ARC pers. comm).

More recent research by Jacobs shows occupational Tswana sites to occur during the later "Bantu Expansion" and "Proto-Difiqane between c1750 and 1830 in the study area. Specifically, the TIhaping and TIharo chiefdoms are referred to here (N. J. Jacobs, 199). It is even suggested that some Sotho-Tswana people might have preceded the TIhaping and TIharo in this region. This is however not a recent postulation since Ellenberger and MacGregor already proposed earlier Iron Age communities in these areas as early as 1912 (Ellenberger & MacGregor, 1912).

Tswana Industry groups might have continued the specularite mining noted in the Stone Age during the Iron Age in this area from 1600 on.

According to Breutz (1963) Iron Age settlements could be found as far south as Gatlhose and Majeng, which are both within 25km of the study area. Such sites have also been identified at Danielskuil (Snyman, 1986). These groups were eventually driven from the area by the Kora (Snyman, 1986).

3.5 The Historic Era

The importance of Gamsberg area as an archaeological/historical focal point is further alluded to in early 19th century records (Penn 2005) as a place of refuge and conflict during the colonial frontier period and by the meaning of its name, which is derived from the Khoikhoi word Gaams, meaning 'grassy spring'. The principal Khoikhoi inhabitants of the Middle Orange River were the Einiqua who belonged to the same language group as the Namaqua and Korana, namely the Orange River Khoikhoi (Penn 2005).

*The Einiqua occupied the area around and east of the Augrabies Falls while the Korana occupied the Middle-Upper Orange River further to the east. A large number of burial cairns were excavated near the Orange River in the Kakamas area and appear to be related to Korana herders (Morris 1995). It is pointed out that while Bushmanland sites in the surrounding area appear to be ephemeral occupations by small hunter-gatherer groups, substantial herder encampments found along the Orange River itself indicate that the banks and floodplains of the river were more intensely exploited (Morris & Beaumont 1991; Beaumont 1995). Hinterland sites are mainly restricted rock shelters near mountainous terrain sand dune deposits, or around seasonal pans and springs (Beaumont 1995). Herder sites with ample pottery have been recorded near Aggeneys and, east of Pofadder, at Schuitdrift South (Morris 1999) and historical records show that herder groups settled at the stronger springs such as Pella (Thompson 1827). … (*Rossouw, L. 2015).

The first known references to the area date from the late 1770's when the farm, now Pella was called Cammas Fonteyn. The grazing rights were granted to Jacobus Bierman, though in 1776 it belonged to Coenraad Feijt.

The name was changed to Pella in 1812, when Christiaan Albrecht of the London Missionary Society settled there after having been driven out of the Warmbad are of South West Africa by the notorious Jager Afrikaner. The name is derived from the ancient town Pella in Macedonia, which became

a refuge from the persecuting Romans for the early Christians of Jerusalem. This settlement, however, was short-lived and was abandoned before 1824 after one of the missionaries was killed by Bushmen.

In approximately 1872 the first references are made to a farm at Aggeneys. It had become important with the arrival of the "Trekboere" as the first watering point reached after the Kweekfontein in the Springbok area. The old wells can still be seen in the canyon behind the present farmhouse. A certain Mr Hayes, a Catholic, and his family farmed cattle at Aggeneys. He was also responsible for the first Catholic settlement at Pella – the earlier ill-fated mission being Lutheran.

He invited Father Gaudeul to establish the mission after the abandonment of the Copper mine at Springbok and the dispersal of the Father's former parishioners. The Mission was granted to the Roman Catholic Church in 1875 and the church built in the same year.

Mr Hayes left the Aggeneys farm in 1900 and moved to Pella where he died in 1905 at the age of 85. The farm was taken over by the Harridge or Herridge family. Edward Herridge was a former British soldier. The ruins of the original farmhouse are still there today and the original orchard, started by Mrs Harridge still flourishes. They left the farm after the Boer War for Klein Pella.

The Burger family, who were trekboere, probably from the Williston area, passed through the region immediately prior to the Boer War and while near Aggeneys, some 720 of their cattle were seized by the British troops, at the time camped at Aggeneys. The old fortifications can still be seen on the valley sides. The reasons for the seizure of the cattle may have been – food for the troops, the scorched earth policy or in retaliation for the presence of the trekkers in the Boer forces. Anyway, a Boer unit including some of the Burgers, under the command of Major Froneman, made an attack on the British encampment from the front and rear, but Froneman disappeared and the necessary orders were never given, the attack failed with the loss of two Boer troops.

After the war in 1904, the Burger family returned to Aggeneys and made applications to hire the State ground, at a nominal yearly rental. Barend and Willem were granted Aggeneys East and West respectively, the other brothers (there were 6 brothers and 5 sisters in all) hired grazing from these two.

In 1908 right of property was granted to Barend and Willem. Barend died in 1941 and Wikkie his youngest son inherited the farm. The adjacent portions of Zuurwater and Koeris, purchased by Barend, were left to his sister and another brother and Wikkie bought these out later. It was from Wikkie Burger that the farms were purchased.

The first known investigation of the mineral potential of the area was in 1928 when a German, Mr Horneman, who appears to have been some sort of local official, asked permission from Barend Burger to prospect in the area.

The following year he hired a qualified blaster, Abraham Maas, to sink a shaft on Swartberg. However, his interpretation of the geology was incorrect and the shaft was sunk in the poorly mineralised area of the ore body and was stopped after 20m, with little mineralisation. Some samples were taken and it is reported that the O'Kiep Copper Company made an offer to Horneman but this was refused.

Several times between then and the late 1960's a number of companies and individuals looked at the area or at samples and for varying reasons turned it down. Some of them came tantalisingly close to signing options but it never materialised.

This chequered period culminated when a Geologist, Ben Brock, representing Phelps Dodge, decided to recommend the prospect at Swartberg (Black Mountain) to his principals.

While this was being done and an exploration company formed, the mineral rights were obtained from Wikkie Burger by David Graaf Interests.

The Exploration Manager for Phelps Dodge, Dr P Ryan visited the outcrop area of the Black Mountain and realised for the first time the true structure of the outcrop and the localisation of the

mineralisation in a synformal fold plunging east north east. Despite the previous unfavourable reports on the economic potential of the ore body, it was decided to reach an agreement on the options with the D.G.I. This was finalised in May 1971 and two months later the first borehole was sited and drilling commenced, intersecting disseminated mineralisation over some 80m. Exploration continued and then spread to Broken Hill and Gamsberg during the next two years.

The Broken Hill ore body on the hill known as Nuniepoort-se-kop was found to be of higher grade and was selected to be the first mining target and emphasis shifted there in 1973, with a comprehensive drilling programme. Followed in 1974 by the development of an adit to take a bulk sample for metallurgical test work. The initial plan had been for an open cast mine but it became increasingly apparent that selective underground mining would be economically more attractive. In 1976 this feasibility study was completed and Phelps Dodge decided to look for a partner in a joint venture. On 11th May 1977 it was announced that Gold Fields of S.A. had reached an agreement in principle and later on that year G.F.S.A. acquired 51% of the interest in Black Mountain Mineral Development Company (Pty) Ltd and would manage the project.

The remoteness of the site required major infrastructure and development and the new village and amenities were introduced over the next few years including the pump station and pipeline from the Orange River near Pella.

The mine came on stream at the end of 1979 and has to date produced some 5,5 million tons of ore. The ore is treated in a metallurgical plant on the site, in a complex sequential-flotation system. The concentrate produced is road hauled to Loop 10 on the Sishen-Saldanha railway line – some 170 km, if for export to Saldanha.
(http://www.aggeneys.com/history)

Originally a Roman Catholic mission station, Pella lies about 28 km northwest of Pofadder. Established by the London Missionary Society about 1806, it was taken over by the Rhenish Missionary Society until 1869, and then in turn by the Roman Catholics in 1874. The town of Pofadder was named after Klaas Pofadder, a Korana chief. The town was founded in 1917 and a village management board was instituted in 1937. Originally named Theronsville, the name Pofadder was restored in 1936. Grinding grooves have been found on rock outcrops in the Gamsberg area (Morris 2011) and rock paintings, grinding surfaces and cupules sites are known from the Black Mountain Mining property at Aggeneys and at the foot of the Swartberg on Zuurwater 62 (Morris 2013a).

Gamsberg
In 1824 Thomson noted the name of this area as t'Kams, meaning "tufted grass" in the Nama dialect. Nienaber and Raper refer a local farmer, A.J. van Jaarsveld, who said that the origin of Gams or Gaams was in the word Tha-aams which was pronounced with a click, where Tha means "grass" and aams means "mouth". The Nama ǀGâ-ams literally means "Grasmond" or "Grasfontein". The grass in question is most likely to be Aristida brevifolia (Nienaber & Raper 1977, 1980).

Aggeneys
A variety of interpretations exist for Aggeneys/Aggeneis. The name appeared first in written form as Achenijs in 1859. In a "Brief history of Aggeneys" published in The Cape Argus in July 1973 (Nienaber & Raper 1977:173) the following story is given:

"Aggeneys is the name of a kloof on Vickie Burger's farm … Long before the turn of the century, the Bushmen had several strongholds in the mountains between Pofadder and Springbok and from these they carried out raids on the farmers. Finally the farmers could no longer tolerate the marauding Bushmen and formed a commando which followed the spoor of the Bushmen and the livestock that they had stolen to the kloof, which is today known as Aggeneys. Near the kloof they split into three parties which surrounded and trapped the Bushmen at a spring near the confluence of three ravines. The Bushmen were wiped out and the kloof became known as 'The Place of Blood'. The Nama Coloureds have always known the kloof as 'The Place of Water', as there were several natural springs there, but to this day no-one is quite certain of the origin of the name Aggeneys…" (Nienaber & Raper 1977:173).

Other interpretations are cited by Nienaber and Raper, including the possibility that it

means 'Place of Red Clay' or that it is associated with reeds (riete) (reviewed in Morris 2000a:10).

An important further source not accessed previously comes in the form of C.R. Burger's (1986) thesis, 'n Ondersoek na die Oorsprong en Betekenis van Plek- en Plaasname in die Landdrosdistrik Namakwaland, which cites A.J. Burger, a retired farmer, in commentary given in a letter written in 1982 which contradicts the above and links the incident of the killing of Bushmen rather with Gamsberg than with Aggeneys.

"Daar was beslis riete, ook nounog, en daar was ook een of meer fonteine toe my oorlede vader die plaas in 1910 gekoop het. Daar was en is ook nog rooi klei. Ek kan onthou hoe die meide hulle gesigte besmeer het – eintlik 'n rooi sagte klip. Die laaste vesting waar die Boesmans doodgeskiet is deur die Boere, was nie Aggeneys nie, maar baie beslis aan die suiderkant van Gamsberg – so 'n lelike kloof in die berg. Jy kan dit sien as jy met die ou gryspad ry." (Burger 1986 :147-148). (Emphasis added).

["There were certainly reeds, even now, and there were also one or more springs when my late father purchased the farm in 1910. There was also and still is red clay. I can remember the Coloured women [meide] smearing their faces with it – actually a red soft stone. The last place where the Bushmen were shot dead by the farmers was not at Aggeneys, but very definitely on the southern side of Gamsberg – a dreadful kloof in the mountain. You can see it if you drive along the old gravel road"] (Emphasis added).

C.R. Burger thus rejects the meaning 'Place of Blood' for Aggeneys, on the one hand, and is inclined to opt for 'Place of Reeds' – from the Nama ǂa meaning riet and !keis meaning place. On the other hand he is quite emphatic and specific about Gamsberg being a site where Bushmen were killed.

Important insights into the pre- and protocolonial adaptation of seasonal/opportunistic aggregation and dispersal by herders in this harsh environment are given by George Thompson who camped at t'Kams (Gams) on 24 August 1824 – where in fact the missionary Bartlett of Pella was then temporarily stationed. He remarked that "severe droughts, and consequent failure of pasturage, forced them [Nama herders of Pella] occasionally to disperse themselves in divisions over the country wherever a spring of water exists with grass in the vicinity for their flocks … the nature of the country is such, that a people like the Namaquas must be nomadic … as soon as rain falls, the pastures of Pella will instantly spring up, and the scattered divisions of the people will again be reassembled" (Thompson 1827:284).

Reference: Morris, D. 2009. *Cultural Heritage Assessment Gamsberg Supplementary Observations to a Previous Specialist Report on Archaeological Resources.*

No Iron Age sites are expected to be found in this area as it falls outside the southwestern periphery of distribution of Iron Age settlement in the region.

3.6 Cultural Landscape

3.6.1 Existing land use and surrounds

Most of the areas investigated has been subjected to extensive alterations by decades of mining. The eastern and western side of the mountain is however still relatively intact.

Figure 6. Wall created by mining activities

Figure 7. Mining activities

Figure 8. View from the bowl to the west

Figure 9. View towards the old Anglo American mining area

Figure 10. New roads being cleared within the bowl

Figure 11. View from the southern rim (Weather station on the right)

Figure 12. View towards the mining area across the bowl

Figure 13. View of the bowl from the southern edge with road cleared or rocks

Figure 14. Mining area across the bowl

Figure 15. Cleared rocks for road building

Figure 16. View towards the kloof across the bowl

Figure 17. New mining roads in the bowl

Figure 18. Ridgeline

Figure 19. Old prospecting site

Figure 20. Area cleared for previous prospecting

Figure 21. Previous prospecting areas

Figure 22. Old prospecting core borehole

Figure 23. Deep kloof on the northern side of the mountain

Figure 24. View from edge of kloof

Figure 25. Water pools at base of kloof

Figure 26. Klipspringer path leading into kloof

Figure 27. Very high concentrations of quartzite at prospecting site

Figure 28. Previous prospecting site

Figure 29. Succulents

Figure 30. Klipspringers on mountain

Figure 31. View towards the north

Figure 32. Natural Landscape

Figure 33. Quiver Trees

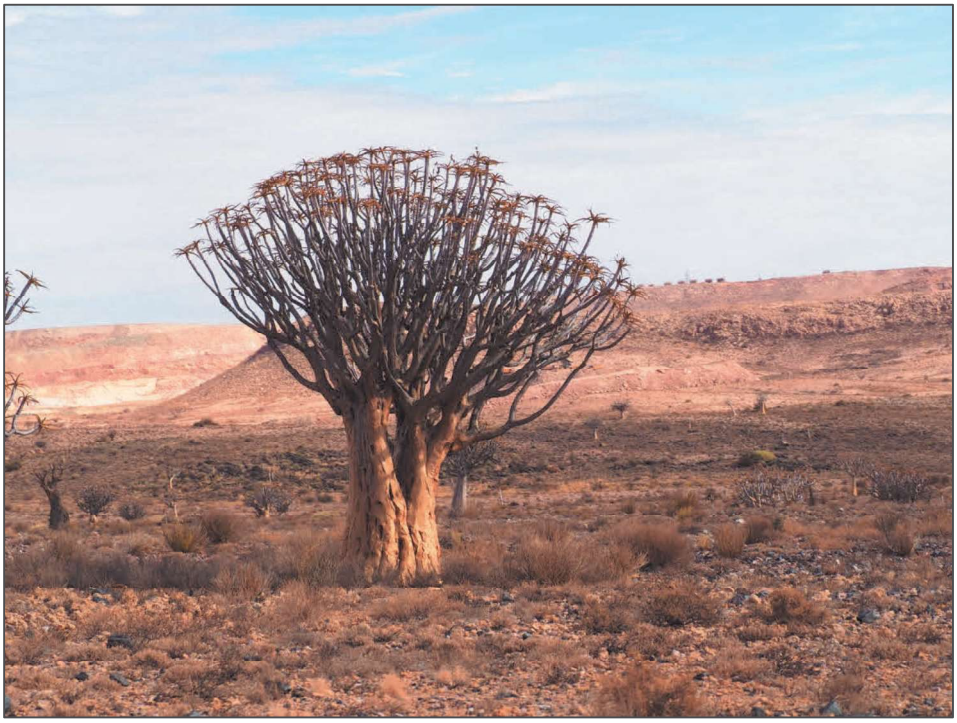

Figure 34. Quiver Trees

Figure 35. Layered geological formations

Figure 36. Shelters at isolated hills (also inspected by Morris)

Figure 37. Sandveld at base of the mountain

Figure 38. Isolated layered rocky outcrop

Figure 39. Sandveld

3.7 Previous Studies

"An initial survey of the literature on the Pofadder-Aggeneys area had shown that minimal work had been undertaken in the region prior to the project (Beaumont et al. 1995), although in the 1990s, a few specialist inspections were carried out for Eskom and Black Mountain mine. While by no means in-depth, these latter surveys together with the work of Morris & Beaumont (1991), Beaumont et. al, (op cit.) and Smith (1995), had provided some regional context to the study and an indication of what to expect from an archaeological perspective at Gamsberg. Aspects of the resulting work at Gamsberg itself had supplemented existing data in significant ways providing new insights into the archaeological and cultural heritage of the region."
Reference: Morris, D. 2009. Cultural Heritage Assessment Gamsberg Supplementary Observations to a Previous Specialist Report on Archaeological Resources.

An extensive research into the SAHRIS database resulted in the identification of the following heritage related studies that have been performed over the last decade in the study area. Only studies within a radius of 50km from the study area were considered.

- Morris, D. 2010. Cultural Heritage AssessmentL Gamrberg – Supplementary Observations to a Previous Specialist Report on Archaeological Resources.
- Pether, J. 2013. Environmental and Social Impact Assesssment (ESIA) for the Gamsberg Zinc Mine and Associated Infrastructure Northern Cape Province Palaeontological Impact Assessment Desktop Study.
- Morris, D. 2013. Archaeological and Cultural Heritage Investigation for the Environmental and Social Impact Assessment (ESIA) for the Gamsberg Zinc Mine and Associated Infrastructure Northern Cape, South Africa.
- Dreyer, C. 2005. Archaeological Investigation of the Proposed Alterations to the Telkom Lattice Mast at Gamsberg (Ghaamsberg) near Aggeneys, Northern Cape.
- Morris, D. 2000. Gamsberg Zinc Project: Environmental Impact Assessment Specialist Report: Archaeology.
- Morris, D. 2013. Heritage Impact Assessment: Proposed Aggeneys Photovoltaic Solar Energy Facility at Bloemhoek near Aggeneys, Northern Cape Province.
- Pether, J. 2012. Brief Palaeontological Impact Assessment Proposed Orlight SA Development of a Solar Photovoltaic Power Plant near Aggeneys, Northern Cape Province. Portion 1 of Farm Aroams 57 RD.
- Webley, L., Halkett, D. 2012. Heritage Impact Assessment: Proposed Aggeneys Photo-Voltaic Solar Power Plant on Portion 1 of the Farm Aroams 57, Northern Cape Province.
- Morris, D. 2013. AES Solar PV Installation on the property Dabenoris 44 near Aggeneys, Northern Cape: Scoping Phase Heritage Input.
- Morris, D. 2013. Heritage Impact Assessment Report for the Proposed Farm Bloemhoek 61 PV Solar Energy Facility in Aggeneys, Northern Cape.
- Pether, J. 2012. Note in support of Exemption from Desktop Palaeontology Impact Assessment Environmental Management Plan for the Proposed Extension of Existing Raumix Aggregates (Pty) Ltd. Quarry near Aggeneys, Northern Cape. Portion of Portion 2 of the Farm Aroams 57, Namaqualand.
- Webley, L. 2012. Desktop Heritage Impact Assessment: Proposed 1.5 ha Extension of Gravel Mine, Portion 2 of the Farm Aroams 57, near Aggeneys, Northern Cape Province.
- Smith, A.B. 2012. Archaeological Report Proposed 75MW Solar Facility on Farm 62 Zuurwater, Aggeneys, Northern Cape Province.
- Morris, D. 2013. Heritage Impact Assessment for Four Solar Energy Facilities on the Farm Zuurwater, near Aggeneys, Northern Cape Province.
- Almond, J. 2015. Palaeontological Heritage Desktop Assessment – Proposed Sol Invictus Solar PV Development on Portion 5 of Farm out Taaibosmond 66 near Aggeneys, NC Province.
- Birkholtz, P. 2016. Prospection Work Programme: Submitted for a Prospecting Right Application without Bulk Sampling, various farm Portions near Aggeneys, Nama Khoi Local Municipality, district Namakwaland, Northern Cape Province.
- Van Schalkwyk, J. 2011. Heritage Impact Assessment for the Proposed Eskom 400 KV Electricity Transmission Line, Aggeneys to Helios substations, Northern Cape Province.

- Almond, J. 2012. Recommended Exemption from Further Specialist Palaeontological Studies or Mitigation Proposed 75 MW Solar Facility on Farm Zuurwater 62 (Portions 2 & 3) near Aggeneys, Northern Cape Province.
- Almond, J. 2011. Recommended Exemption from Further Palaeontological Mitigation Proposed Photovoltaic Project at Black Mountain near Aggeneys, Northern Cape Province.
- Almond, J. 2011. Recommended Exemption from Further Specialist Palaeontological Studies or Mitigation Proposed Sato Energy Holdings (Pty) Ltd Photovoltaic Project on Portion 3 of the Farm Zuurwater near Aggeneys, Northern Cape Province.
- Morris, D. 2011. Sato Energy Holdings Zuurwater Photovoltaic Energy Generation Facility near Aggeneys, Northern Cape.
- Orton, J. 2014. Heritage Impact Assessment for the Proposed Namies Wind Energy Facility near Aggeneys, Northern Cape.
- Rossouw, L. 2015. Phase 1 Heritage Impact Assessment for proposed drilling in the Gamsberg area on the farm Aggeneys 56 Portion 01, Khai-ma local Municipality, NC Province.
- Rossouw, L. 2016. Phase 1 Heritage Impact Assessment for the proposed expansion of prospecting drilling on the Remaining Extent and Portion 1 of the Farm Aggeneys 56 and Portion 4 of the Farm Zuurwater 62, Khai-Ma Local Municipality, NC Province.
- Webley, L. 2017. Heritage Impact Assessment: Proposed Construction of Enamandla PV 1 Solar Facility on the Remaining Extent of the Farm Hartebeest Vlei 86, near Aggeneys, Northern Cape.
- Webley, L. 2017. Heritage Impact Assessment: Proposed Construction of the Letsoai CSP 1 Solar Facility on the Remaining Extent of the Farm Hartebeest Vlei 86, near Aggeneys, as well as Waterpipeline to Orange River, Northern Cape.
- Webley, L. 2017. Heritage Impact Assessment: Proposed Construction of Letsoai and Enamandla 400 kV Powerline and Substation Facilities, near Aggeneys, Northern Cape.
- Van Ryneveld, K. 2017. Koa Valley Prospecting Right Application (without Bulk Sampling), Portions of the Farms Haramoep 53, Oonab-Noord 609, Amam 46 and Nooisabes 51, near Springbok / Aggeneys, Namakwa District Municipality, Northern Cape.

3.8 Historical Maps

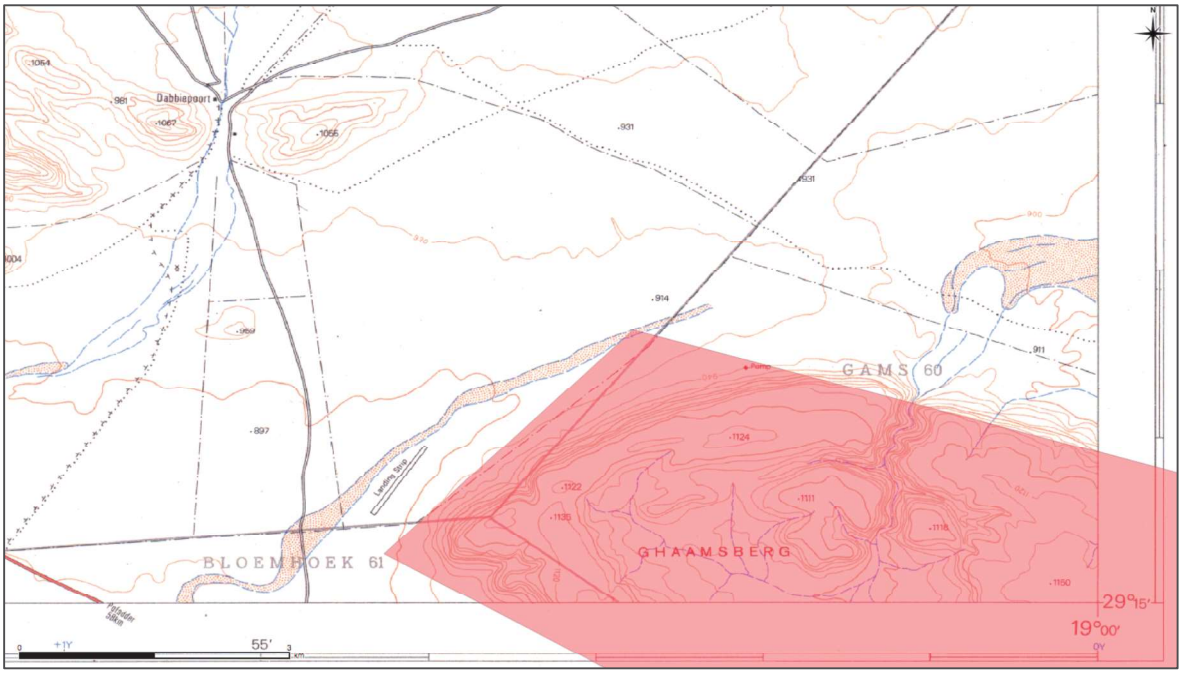

Figure 40. Topographical Map 2918 BB 1973

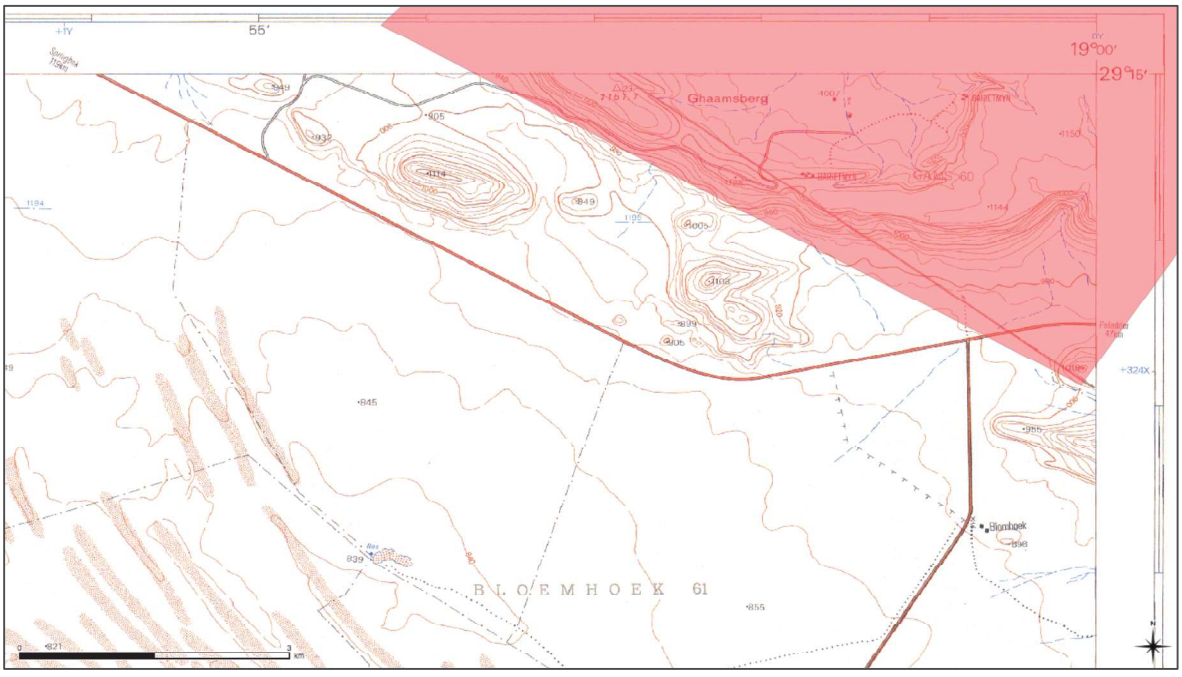

Figure 41. Topographical Map 2918 BD 1973

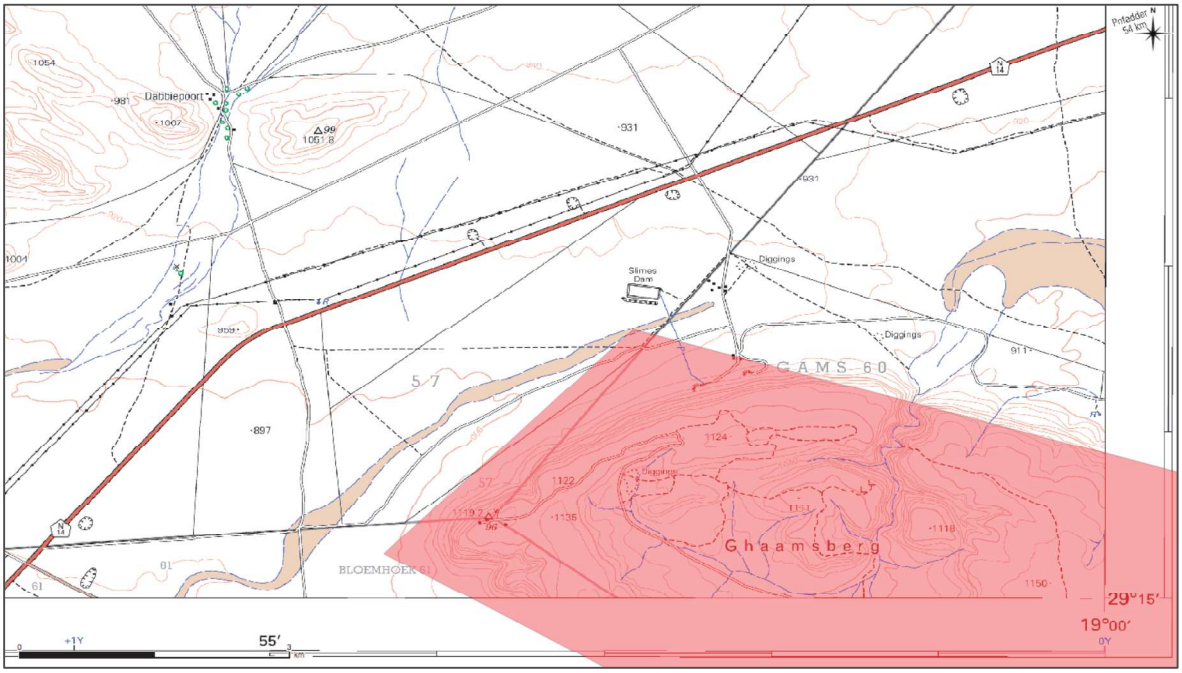

Figure 42. Topographical Map 2918 BB 2003

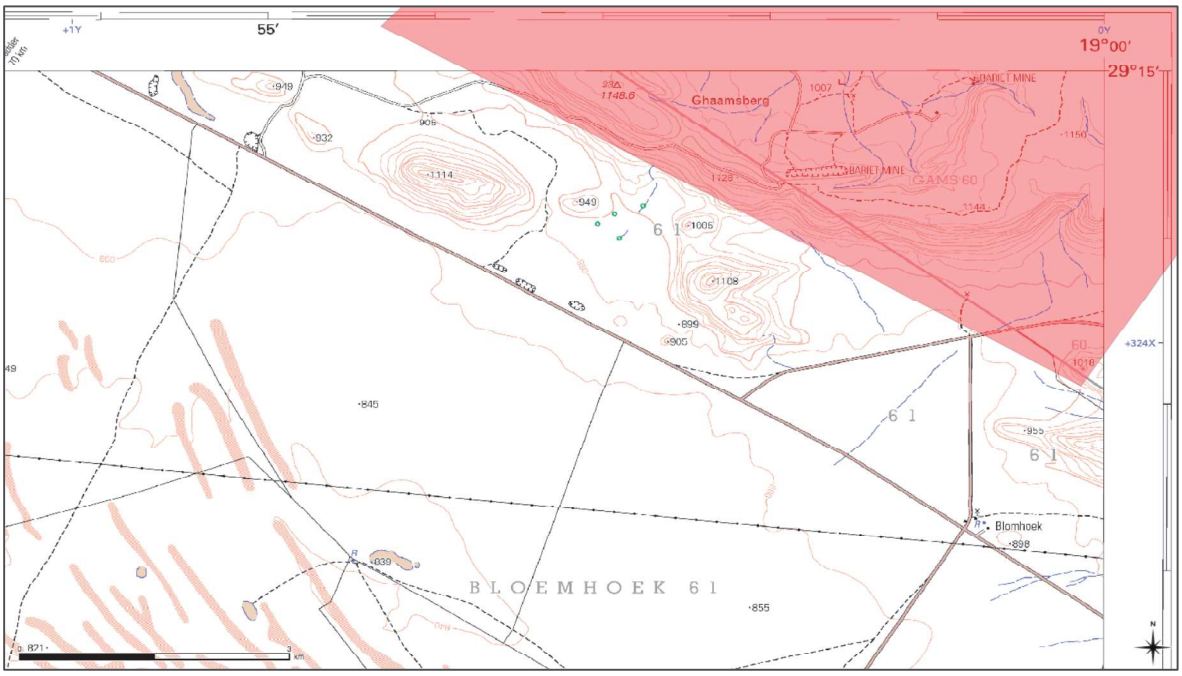

Figure 43. Topographical Map 2918 BD 2003

4. Findings

Previous Studies

Morris (2010) identified five sites of possible heritage value. One, on the northern rim of the inselberg and four within the basin (Sites 2 - 5). These sites were all limited to the northern edge of the inselberg. The reason for this is explained by Morris as "*…undoubtedly the fairly localize occurrence of desired raw materials for stone tools*." Taking into account that Morris was familiar with the whole of the Gamsberg Inselberg it can be inferred that only this area was found to be suitable for tool manufacture. This was corroborated by the findings of this study which identified the majority of other rock material to be of quarts of sandstone, neither of which is conducive to tool manufacture. It can therefore be assumed that useful sources of stone are limited to the northern side of the Gamsberg.

Morris also states the unexpected scarceness of archaeological remains in his report: "*The survey revealed a remarkable paucity of tangible archaeological or heritage traces on the inselberg itself and within the basin. The terrain is, in general, highly eroded: it is extremely rocky, often with minimal or no topsoil, making it a hostile environment for preservation of archaeological traces, and indeed for human occupation in the first instance. The outer rim of the Gamsberg and the broader eastern plateau was found on the whole to have extremely minimal archaeological traces, with occurrences being mostly in the form of occasional isolated flakes*…." (Morris, 2009)

Morris also rated the 5 sites he identified as follows;

- Site 1. A rich Middle Stone Age workshop
- Site 2. An Acheulean (ESA) workshop
- Site 3. An Acheulean (ESA) workshop
- Site 4. Scatters of both Acheulean and MSA material
- Site 5. A small cave with ephemeral LSA occupation.

In 2014 Orton performed a second phase mitigation of the sites documented by Morris. Although corroborating the findings of Morris on some levels, overall the work showed significant departures from the findings of Morris.

At Site 1 the findings of Morris were substantiated in that large amounts of stone tools were recovered from the site, however for some reason the mitigation work was not completed to the satisfaction of the researcher and as a result it was recommended that further work (presumably a third phase) needs be carried out.

The finds at Site 2 differs significantly from those of Morris. Orton reports extensive evidence of human occupation, both prehistoric and modern at this site, while Morris's initial findings were that there is nearly no indicators of human occupation and he only reports a single quartz tool. Further work is here also being recommended by Orton especially in regard to a possible human burial in the shelter. No evidence is however given for this proposition.

Site 3 was found by Orton not to be of mitigation value and Site 4 was not re-located at all.

Site 5 was mitigated to acceptable levels and it is presumed that no further work here will be needed.

From the above it is evident that very little archaeological remains are located within the study area and that even those identified turns out to be of little scientific value.

Earlier studies identified some open area sites to the west of the inselberg; however, these would not form part of the current study.

Literature Review

The most prominent historic component identified through the literature study was the occurrence of a San massacre by European Settlers somewhere within one of the valleys of the Inselberg. Morris records a local farmer referring to the site and "kloof" as *Inkruip*, however there does not seem to be any record of such a kloof. *C.R. Burger* in his 1986 thesis recalls a conversation with a local farmer *A.J.*

Burger who described the massacre of the San (Bushmen) by local farmers within a kloof in the Gamsberg as relayed to him by his father. *Burger* refers to the kloof as: "…-*so 'n lelike kloof in die berg. Jy kan dit sien as jy met die ou gruispad ry*…". For some reason Morris is of the opinion that this kloof lies on the southwestern side of the berg. A small rather insignificant kloof shown to him at some stage by a local farmer;

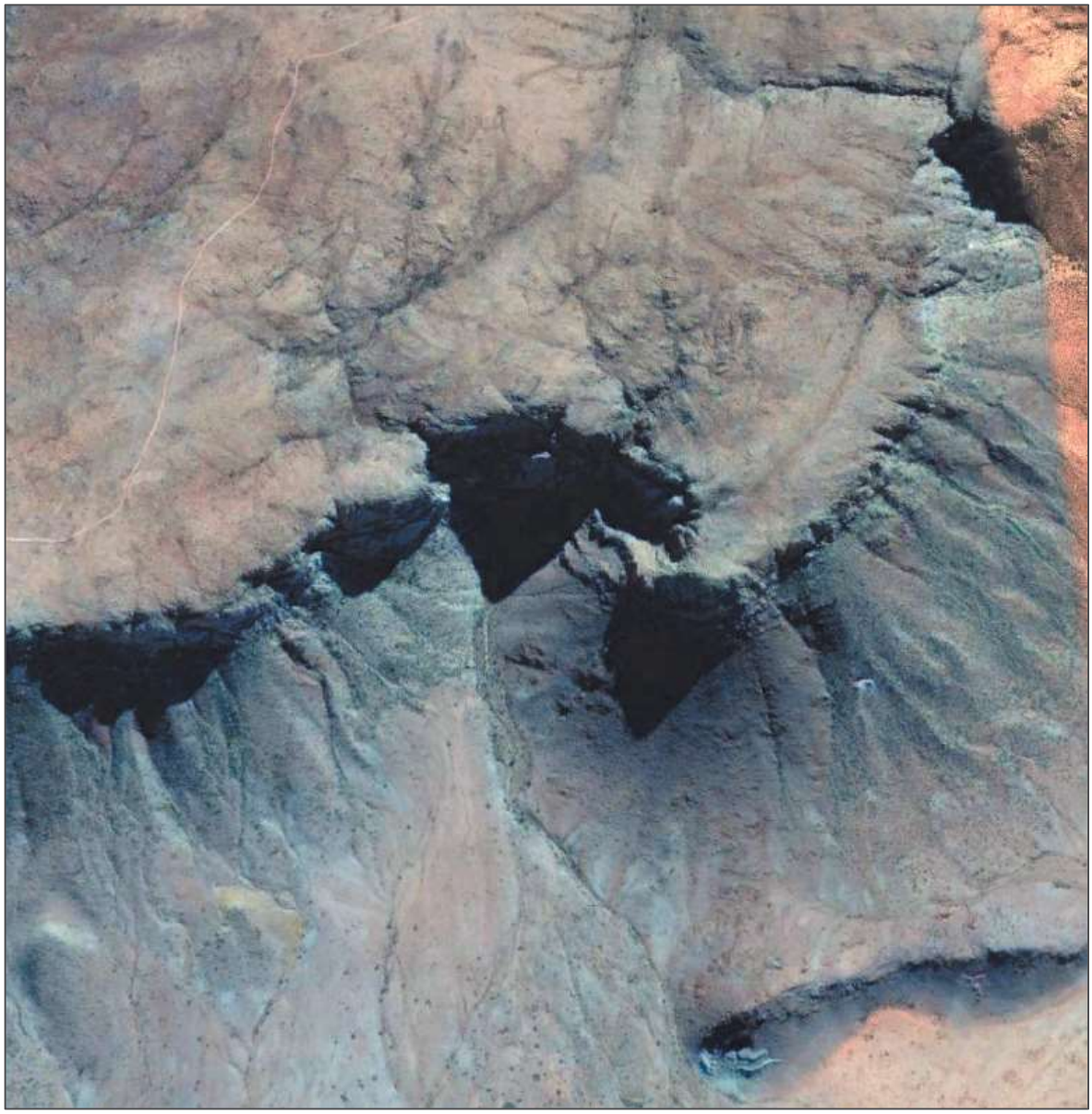

Figure 44. The site suggested by Morris

There is however only one prominent kloof which is distinctly "...an ugly gash in the mountain…" as described by Burger and this lies on the northeastern side of the berg. This is also the only kloof that is accessible from the plains, without having to ascend the mountain side. Inspection of the kloof during this field visit showed pools of water (as described by witnesses) and local informants indicated that these often survive throughout the year. The kloof narrows quickly and would be exceedingly difficult terrain for a mounted party to penetrate. This site logically makes much more sense as the location of the massacre than any of the other options postulated to date.

Figure 45. The site currently proposed

Figure 46. Pools of semi-permanent water

Historic Maps

No heritage significant sites could be identified on the historic map sets.

4.1 Fieldwork Results

The field work was conducted on the 28th of March 2018. The area was accessed by vehicle and investigated on foot.

The higher lying areas were found to be almost exclusively rocky. Large amounts of quartzite and some huge quartz boulders were evident. Due to the rocky nature of the sediment, very little plant growth was evident with Quiver Trees (Aloidendron dichotomum) being the only prominent plants. The fieldworkers were taken by mine vehicle along the existing paths both through the basin and around the edge of the Inselberg, later the foot of the mountain was also accessed by vehicle and by foot. GPS track paths were recovered from the vehicle mounted GPS. In several areas investigations were further performed on foot, however these readings were inadvertently not documented.

No indications of any heritage related structures or artefacts were identified within the study areas. Taking the small footprint of the proposed prospect drilling it is not anticipated that any heritage sites will be impacted upon. Sub-surface finds are also unlikely.

Although the specific position of the drill sites is not yet determined it is thought that the existing sites will be used. The drill rig has very little impact on the surface and the borehole is a very small footprint of around 50cm x 50cm. Existing access roads will be used.

Chapter 3

IMPACT ASSESSMENT

5. METHODOLOGY

This study defines the heritage component of the EIA process being undertaken for the for the Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province. It is described as a Heritage Impact Assessment Report.
This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

5.1 INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984)*.

5.2 EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the site on a GPS the areas were accessed using suitable combinations of vehicle access and access by foot.

Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum.

Further techniques (where possible) included interviews with local inhabitants, visiting local museums and information centers and discussions with local experts. All this information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA (South African Heritage Resource Agency) provincial databases.

This Heritage Impact Assessment relies on the analysis of written documents, maps, aerial photographs and other archival sources combined with the results of site investigations and interviews with effected people. Site investigations are not exhaustive and often focus on areas such as river confluence areas, elevated sites or occupational ruins.

The following documents were consulted in this study;

- South African National Archive Documents
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Internet Search
- Historic Maps
- 1973 and 2003 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2018 imagery
- Published articles and books
- JSTOR Article Archive

5.3 Fieldwork

Fieldwork for this study was performed on the 28th of March 2018. Most of the areas were found to be accessible by vehicle or on foot. The survey was tracked using GPS and a track file in GPX format is available on request.

Where sites were identified it was documented photographically and plotted using GPS with the WGS 84 datum point as reference. GPX files are available on request from G&A Heritage.

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore, GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a ***Garmin Colorado*** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

5.4 Public Participation

People encountered on site were interviewed however no-one could be found who lived on site permanently. There were also no structures of community importance.

Further public participation will be included in the broader public participation process of the project (ESIA).

6. Measuring Impacts

In 2003 the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

6.1 Type of Resource

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

6.2 Type of Significance

6.2.1 Historic Value

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organization of importance in history

- Importance for close associations with individuals, groups or organizations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

6.2.2 Aesthetic Value

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

6.2.3 Scientific Value

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

(a) Does the site contain evidence, which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas
- tool types indicative of specific socio-economic or religious activity
- cultural features such as burials, dwellings, hearths, etc.
- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?
- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

6.2.4 Social Value / Public Significance
- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?
- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.5 Ethnic Significance
(a) Does the site presently have traditional, social or religious importance to a particular group or community?
- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

6.2.6 Economic Significance
(a) What value of user-benefits may be placed on the site?
- visitors' willingness-to-pay
- visitors' travel costs

6.2.7 Scientific Significance
(a) Does the site contain evidence, which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?
(b) Does the site contain evidence, which can make important contributions to other scientific disciplines or industry?

6.2.8 Historic Significance
(a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?

(b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?
(c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?
(d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

6.2.9 Public Significance

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- visibility and accessibility to the public
- ability of the site to be easily interpreted
- opportunities for protection against vandalism
- economic and engineering feasibility of reconstruction, restoration and maintenance
- representativeness and uniqueness of the site
- proximity to established recreation areas
- compatibility with surrounding zoning regulations or land use
- land ownership and administration
- local community attitude toward site preservation, development or destruction
- present use of site

(b) Does the site receive visitation or use by tourists, local residents or school groups?

6.2.10 Other

(a) Is the site a commonly acknowledged landmark?
(b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?
(c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?
(d) Is the site representative of a particular architectural style or pattern?

6.3 Degrees of Significance

6.3.1 Significance Criteria

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information, which, if properly recovered, will enhance understanding of Southern African human history, is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population *(Smith, L.D. 1977)*.

6.3.2 Rarity

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

6.3.3 Representivity

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

7. Assessment of Heritage Potential

7.1 Assessment Matrix

7.1.1 Determining Archaeological Significance

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 4 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Table 3. Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deaon, NMC as used in Morris)

Class	Landform	Type 1	Type 2	Type 3
L1	Rocky Surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near features such as hill/dune	On old river terrace
L4	Sandy ground, coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Loping floor or small area	Flat floor, high ceiling
Class	Archaeological traces	Type 1	Type 2	Type 3
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell of bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5m thick	Deposit >0.5 m thick

Table 4. Site attributes and value assessment (adopted from Whitelaw 1997 as used in Morris)

Class	Landforms	Type 1	Type 2	Type 3
1	Length of sequence /context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte / ecofacts
2	Presence of exceptional items (incl. regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

7.2 Assessing site value by attribute

Table 5 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general

archaeological significance of a site, with Type 3 attributes being those of highest significance.

7.3 Impact Statement

7.3.1 Assessment of Impacts

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.
Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.
More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:
(a) destruction or alteration of all or part of a heritage site;
(b) isolation of a site from its natural setting; and
(c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.
Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.
Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

7.4 Indicators of Impact Severity

Magnitude
The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity
The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

Duration
The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range
The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency
The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity
The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect
A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change
The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. *(Zubrow, Ezra B.A., 1984).*

7.5 Paleontological sites

The Palaeontology Sensitivity Map published by SAHRA on the South African Heritage Resources Information System (SAHRIS) gives guidelines for the management of paleontological sensitive areas.

Table 5. Palaeontological Sensitivity

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

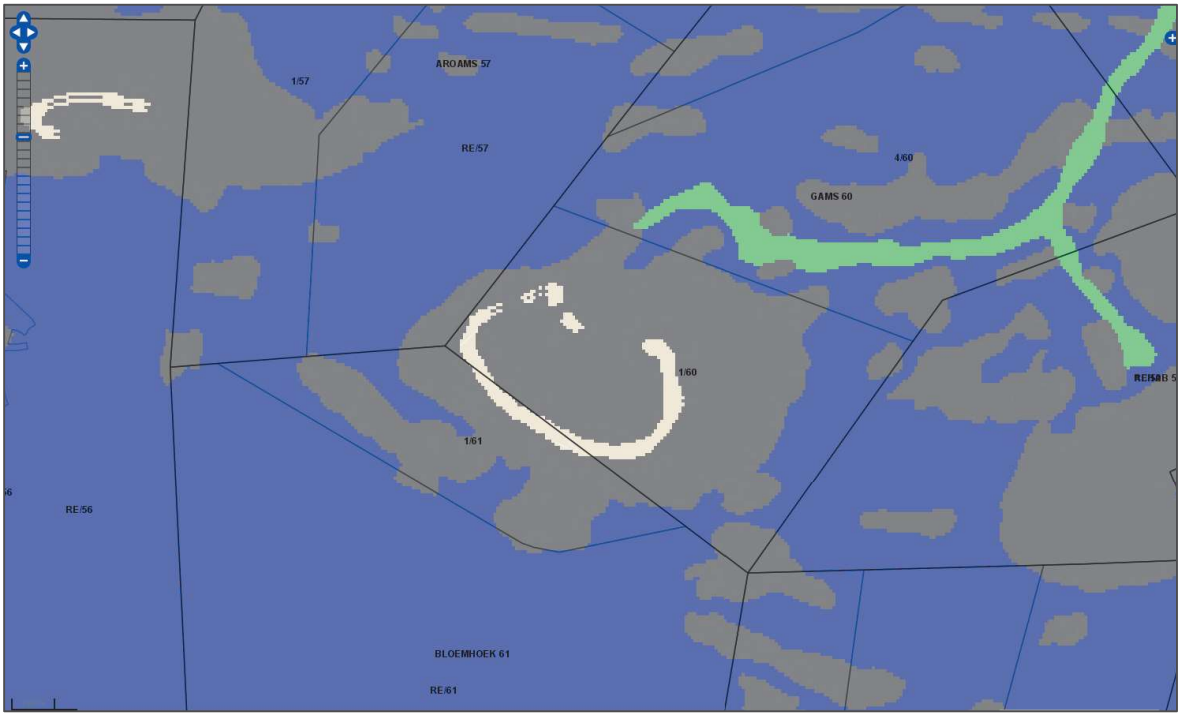

Figure 47. PalaeoSensitivity Map

The study area falls within the blue (No Palaeontological studies are required however, a protocol for finds is required), grey (No Palaeontological studies are required) and white (These areas will require a minimum of a desktop study. A comprehensive previous PIA study has already been completed and logged with SAHRIS.

7.6 Post-Contact Sites

No sites associated with the post-contact era will be affected by the proposed development.

7.7 Built Environment

Some unimportant structures such as dirt roads and footpaths were noted on site, however none of these had any heritage or architectural value.

7.8 Historic Significance

No	Criteria	Significance Rating
1	***Are any of the identified sites or buildings associated with a historical person or group?*** No	N/A
2	***Are any of the buildings or identified sites associated with a historical event?*** No	N/A
3	***Are any of the identified sites or buildings associated with a religious, economic social or political or educational activity?*** No	N/A
4	***Are any of the identified sites or buildings of archaeological significance?***	

	No	N/A
5	***Are any of the identified buildings or structures older than 60 years?*** No	N/A

7.9 Architectural Significance

Table 6. Architectural Significance

No	Criteria	Rating
1	***Are any of the buildings or structures an important example of a building type?*** No	N/A
2	***Are any of the buildings outstanding examples of a particular style or period?*** No	N/A
3	***Do any of the buildings contain fine architectural details and reflect exceptional craftsmanship?*** No	N/A
4	***Are any of the buildings an example of an industrial, engineering or technological development?*** No	N/A
5	***What is the state of the architectural and structural integrity of the building?*** No	N/A
6	***Is the building's current and future use in sympathy with its original use (for which the building was designed)?*** N/A	-
7	***Were the alterations done in sympathy with the original design?*** N/A	-
8	***Were the additions and extensions done in sympathy with the original design?*** N/A	-
9	***Are any of the buildings or structures the work of a major architect, engineer or builder?*** No.	N/A

7.10 Spatial Significance

Even though each building needs to be evaluated as a single artefact the site still needs to be evaluated in terms of its significance in its geographic area, city, town, village, neighbourhood or precinct. This set of criteria determines the spatial significance.

No	Criteria	Rating
1	***Can any of the identified buildings or structures be considered a landmark in the town or city?*** No	-
2	***Do any of the buildings contribute to the character of the neighborhood?*** No	-
3	***Do any of the buildings contribute to the character of the square or streetscape?*** No	-
4	***Do any of the buildings form part of an important group of buildings?*** No	-

8. Impact Evaluation

This HIA Methodology assists in evaluating the overall effect of a proposed activity on the heritage environment. The determination of the effect of a heritage impact on a heritage parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the heritage practitioner through the process of heritage impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

8.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics, which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity if the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

8.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the heritage environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

8.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 7. Classification of Impacts

NATURE		
Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.

4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which heritage resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the heritage parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct

		human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects.
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects.
3	Medium Cumulative impact	The impact would result in minor cumulative effects.
4	High Cumulative Impact	The impact would result in significant cumulative effects.
INTENSITY / MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the heritage parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

9. Anticipated Impact of the Development

9.1 Obscured or Buried Heritage sites of significance Including Palaeontology

Table 8. Mitigation of Impacts

IMPACT TABLE FORMAT	
Heritage component	*Heritage sites of significance including Palaeontology*
Issue/Impact/Heritage Impact/Nature	*Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.*
Extent	*Local*
Probability	*Unlikely*
Reversibility	*Partly reversible*

Irreplaceable loss of resources	*Insignificant loss of resources*	
Duration	*Medium term*	
Cumulative effect	*Low cumulative effect*	
Intensity/magnitude	*Low*	
Significance Rating of Potential Impact	*39 points. The impact will have a medium negative impact rating.*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	1	1
Reversibility	4	2
Irreplaceable loss	1	1
Duration	2	2
Cumulative effect	1	1
Intensity/magnitude	2	1
Significance rating	20 (low negative)	8 (low negative)
Mitigation measure	*Once the exact location of the proposed percussion boreholes is available these should be investigated individually. This should be done by a qualified archaeologist.*	

9.2 Assessing Visual Impact

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV Architects and The Department of Environmental Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.

9.3 Assumptions and Restrictions

- It is assumed that the South African Heritage Resources Information System (SAHRIS) database locations are correct.
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the social impact assessment and public participation process of the Basic Assessment will result in the identification of any intangible sites of heritage potential.

9.3.1 Cultural Landscape

The following landscape types were evaluated during the study.

Table 9. Cultural Landscape

Landscape Type	Description	Occurrence still possible?	Identified on site?
1 Paleontological	Mostly fossil remains. Remains include microbial fossils such as found in Barberton Greenstones	Yes, sub-surface	No

2 Archaeological	Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites	Yes, sub-surface	No
3 Historic Built Environment	- Historical townscapes/streetscapes - Historical structures; i.e. older than 60 years - Formal public spaces - Formally declared urban conservation areas - Places associated with social identity/displacement	No	No
4 Historic Farmland	These possess distinctive patterns of settlement and historical features such as: - Historical farm yards - Historical farm workers villages/settlements - Irrigation furrows - Tree alignments and groupings - Historical routes and pathways - Distinctive types of planting - Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.	No	No
5 Historic rural town	- Historic mission settlements - Historic townscapes	No	No
6 Pristine natural landscape	- Historical patterns of access to a natural amenity - Formally proclaimed nature reserves - Evidence of pre-colonial occupation - Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages - Historical structures/settlements older than 60 years - Pre-colonial or historical burial sites - Geological sites of cultural significance.	No	No
7 Relic Landscape	- Past farming settlements - Past industrial sites - Places of isolation related to attitudes to medical treatment - Battle sites - Sites of displacement,	No	No
8 Burial grounds and grave sites	- Pre-colonial burials (marked or unmarked, known or unknown) - Historical graves (marked or unmarked, known or unknown) - Graves of victims of conflict - Human remains (older than 100 years) - Associated burial goods (older than 100 years) - Burial architecture (older than 60 years)	Yes	No
9 Associated Landscapes	- Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes - Sites associated with displacement & contestation - Sites of political conflict/struggle - Sites associated with an historic event/person	No	No

	- Sites associated with public memory		
10 Historical Farmyard	- Setting of the yard and its context - Composition of structures - Historical/architectural value of individual structures - Tree alignments - Views to and from - Axial relationships - System of enclosure, e.g. defining walls - Systems of water reticulation and irrigation, e.g. furrows - Sites associated with slavery and farm labour - Colonial period archaeology	No	No
11 Historic institutions	- Historical prisons - Hospital sites - Historical school/reformatory sites - Military bases	No	No
12 Scenic visual	- Scenic routes	No	No
13 Amenity landscape	- View sheds - View points - Views to and from - Gateway conditions - Distinctive representative landscape conditions - Scenic corridors	No	No

9.4 Mitigation

It is recommended that the development designs take into account the positive and negative characteristics of the existing cultural landscape type and that they endeavor to promote the positive aspects while at the same time mitigating the negative aspects.

10. Resource Management Recommendations and Chance Finds Protocol

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.

- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

11. Conclusion

Heritage Impact Assessment Report for the Prospecting Rights Application: Gamsberg near Aggeneys in the Khâi-Ma Local Municipality, Namakwa District of the Northern Cape Province.

The client is proposing the further prospecting of the Inselberg through percussion boreholes. The exact placement of these boreholes is not yet known; however, they have such a small footprint and their impact is so low that there is very little chance of them impacting on any sites of heritage significance. The area, through this and several other studies, have been proved to be of low heritage value. Due to the limited impact of the proposed activity the study does not warrant a very high-resolution surface survey. It will be much more practical to ensure that no prominent sites are affected and once the exact placement of the boreholes are determined these can be inspected individually to ensure that no heritage sites are affected.

In conclusion it is recommended that a historic study be performed specifically focused on clarification of the location of the *Inkruip* San massacre at Gamsberg. This is an important event that should be documented properly, and the information should be made available to the general public as a remembrance of the genocide of a nonviolent people.

The area was investigated during a field visit and through archival studies.

No sites of heritage significance could be identified on site. Some small possible quartzite microliths were identified but not enough to constitute a site.

Provided the recommendations in this report is followed there is no reason, from a heritage point of view, why this development cannot continue.

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