

**HERITAGE IMPACT ASSESSMENT: PROPOSED PROSPECTING ON FARMS
BITTERFONTEIN, WESTERN CAPE PROVINCE**

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act as part of an EIA.)

Draft 1 Prepared for:

Minerano Resources
March 2017



Prepared by:

Tim Hart
ACO Associates
8 Jacobs Ladder
St James
7945
admin@aco-associates.com
www.aco-associates.com

EXECUTIVE SUMMARY

ACO Associates cc were appointed by Minerano Resources to carry out an HIA in response to a prospecting application on farms Bitterfontein 4/46, 52/47 and RE53/47. The proposed activities involve prospecting for a variety of rare earths and minerals. This prospecting will take the form of:

- Desktop assessment
- Remote sensing
- Following from the above, drilling of 10 boreholes.

The activity itself has a very low impact, being limited to drilling rig sites (4x4 sqm) and support vehicles at the invasive phase. The actual bore hole is very small being approximately 10 cm wide. The machinery will be on site temporarily and will be moved off when the work is finished. Depending on the grade of the ore further prospecting or bulk sampling may take place (which will be a separate application). Hence the impact of the proposed first phases of prospecting is likely to be very low, and the proposed activity is considered acceptable.

This assessment has identified the following potential heritage indicators:

Palaeontology: No paleontological issues expected. The *Collection Protocol (appendix A)* should be implemented in the event of any un-anticipated finds.

Archaeology: The proposed study area is within the granite and gneiss bed rock areas of southern Namaqualand which is characterised by rolling hills and granite outcrops. While different farms that make up the project area have varying landscape forms, all granite boulder mazes and outcrops proved positive for archaeological material of all ages. Clearly these areas were important to prehistoric people as boulders (some with sheltered areas underneath) provided escape from wind, heat and provided water occasionally that collected in natural depressions. Quartz vein exposures almost all contained archaeologically modified quartz flakes, however establishing cultural affiliation was difficult due to the ad hoc nature of modification. A large Middle Stone Age contribution is suspected to have played a role in these impromptu "quarries".

Impacts: Even if the project area were archaeologically rich the proposed activity is on such a small scale that the likelihood of significant impacts occurring is small.

Mitigation:

Indications are that the distribution of archaeological sites is quite spatialized with the result that avoidance of granite hilltops, granite boulder clusters and quartz vein exposures will suffice. A 50 m radius buffer zone around such places is suggested.

Built Environment: No conservation-worthy structures were encountered. All the farm houses on the project area are contemporary to late-mid 20th century. Farms were first formally surveyed in the 1920's or later. No impacts are expected.

Cultural Landscape: The quality of the cultural landscape is that of an open and dominant natural or precolonial landscape of rolling hills and granite *koppies* overlain by a thin veneer of colonial settlement and wheat cultivation which is mostly quite recent. In those parts of the study area where the landscape is relatively flat or mildly undulating wheat fields have been established which farmers will sow and cultivate if winter rains are adequate. Other than this, the main agricultural activity is small stock keeping.

Impacts: The scale of the proposed activity is so small in extent and so temporary in duration that no significant impacts will occur.

Mitigation: No mitigation is recommended.

General recommendations

There are no reasons in heritage terms to indicate that the proposed activity is not acceptable. The proposed activity is of such low duration and has such a small footprint that the character of the area will not be affected and that impacts to archaeology can largely be avoided through the implementation of a 50 m exclusion radius around granite outcrops, boulders and boulder clusters.

Declaration:

Mr Tim Hart is an independent specialist consultant who is in no way connected with the proponent, other than delivery of consulting services.

Tim Hart (MA) has been involved in heritage impact assessment and applied research for 30 years. Tim Hart is accredited with Principal Investigator status with the Professional Association of Archaeologists and is a full member of the Association of Professional Heritage Practitioners.

Tim Hart, abbreviated Curriculum Vitae

After graduating from UCT with my honours degree in 1984 I joined the Southern Methodist University (SMU Dallas Texas) team undertaking Stone Age research in the Great Karoo. After working in the field for a year I registered for a MA degree in pre-colonial archaeology with support from SMU (National Science Foundation supported). On completion of this degree in 1989 I commenced working for the ACO when it was based at UCT. This was the first formal unit of its kind in RSA.

In 1991 I took over management of the unit with David Halkett. We nursed the office through new legislation and were involved in setting up the professional association and assisting SAHRA with compiling regulations. The office developed a reputation for excellence in field skills with the result that ACO was contracted to provide field services for a number of research organisations, both local and international. Since 1987 in professional practise I have has been involved in a wide range of heritage related projects ranging from excavation of fossil and Stone Age sites to the conservation of historic buildings, places and industrial structures. To date the ACO Associates CC (of which I am co-director) has completed more than 2000 projects throughout the country ranging from minor assessments to participating as a specialist in a number of substantial EIA's as well as international research projects. Some of these projects are of more than 4 years duration

Together with my colleague Dave Halkett I have been involved in heritage policy development, development of the CRM profession, the establishment of 2 professional bodies and development of professional practice standards. Notable projects I have been involved with are the development of a heritage management plan and ongoing annual mitigation for the De Beers Namaqualand Mines Division, heritage management for Namakwa Sands and other west coast and Northern Cape mining firms. Locally, I was responsible for the discovery of the "Battery Chavonnes" at the V&A Waterfront (now a conserved as a museum), the discovery of a massive paupers burial ground in Green Point (now with museum and memorial), the fossil deposit which is now the subject of a public display at the West Coast Fossil Park National Heritage Site as well as participating in the development of the Robben Island Museum World Heritage Site. I have teaching experience within a university setting and have given many public lectures on archaeology and general heritage related matters.

GLOSSARY

Archaeology: *Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.*

Early Stone Age: *The archaeology of the Stone Age between 700 000 and 2500 000 years ago.*

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

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

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

Late Stone Age: *The archaeology of the last 20 000 years associated with fully modern people.*

Microlith: *A very small stone artefact which can be a small blade, scraper or segment. Dating to the Late Stone Age these tiny artefacts are often made from fine grained rock or crystal quartz.*

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

National Estate: *The collective heritage assets of the Nation*

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

Pleistocene: *A geological time period (of 3 million – 20 000 years ago).*

SAHRA: *South African Heritage Resources Agency – the compliance authority which protects national heritage.*

Structure (historic) *Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.*

Wreck (protected): *A ship or an aeroplane or any part thereof that lies on land or in the sea within South Africa is protected if it is more than 60 years old.*

Acronyms

DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency

Contents

1	INTRODUCTION.....	9
1.1	The proposed activity	10
1.2	Terms of reference	11
1.3	Restrictions and assumptions	11
1.4	Method	12
2	Legislative Context	12
3	RECEIVING ENVIRONMENT	13
3.1	Heritage context	14
4	Potential heritage indicators	16
4.1	Palaeontology	16
4.2	Archaeology	16
4.3	Built environment	19
4.4	Graves and graveyards	19
4.5	Landscape.....	19
4.6	Visual concerns.....	19
5	Assessment of Impacts	20
5.1	Archaeology	20
5.2	Colonial period heritage	21
5.3	Cultural landscape and sense of place.....	21
5.4	Accumulative Impacts	22
5.5	Public Participation	22
6	MITIGATION AND CONSERVATION	24
6.1	Palaeontological Heritage	24
6.2	Archaeological Heritage	24
6.3	Un-identified archaeological material and graves.....	25
6.4	Built Environment	25
6.5	Cultural landscape and sense of place.....	26
7	Conclusion	26
7.1	Suitability of the site for the proposed activity	26
8	REFERENCES	27
9	Appendix A Palaeontological assessment	29
10	Appendix B Archaeological Assessment.....	41
11	Appendix C Comments and responses	48

1 INTRODUCTION

ACO Associates cc have been appointed by Menar Holding (Pty) Ltd to conduct a Heritage Impact Assessment in response to a prospecting rights application situated on farms in the Bitterfontein area, Matzikama Municipality, in the South Western Cape. The following study which has been undertaken in terms of section 38.8 of the National Heritage Resources Act 25 of 1999, illustrates the findings and the likely impact of the proposed activity. The competent compliance authority for the application is the Department of Mineral and Energy Affairs (DME).

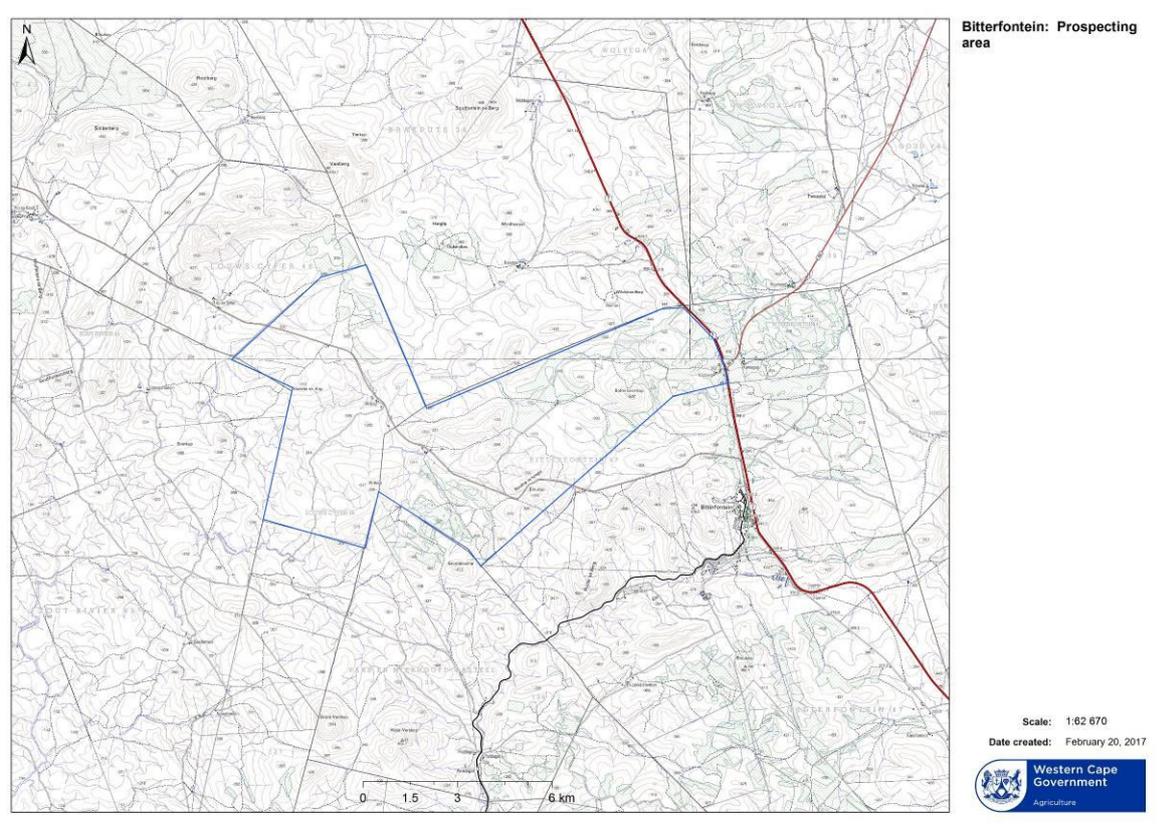


Figure 1 The locality of the proposed prospecting area on a number of farms situated to the north west of Bitterfontein

The proposed activity will take place on the farms Bitterfontein 4/46, 52/47 and RE/53/47 (Figure 2). The project area is approached by travelling northwards on the N7 Cape Namibia route, entering Bitterfontein and then taking the gravel road to Rietpoort which passes directly through the project area. All the land is farmed and is zoned agricultural 1.

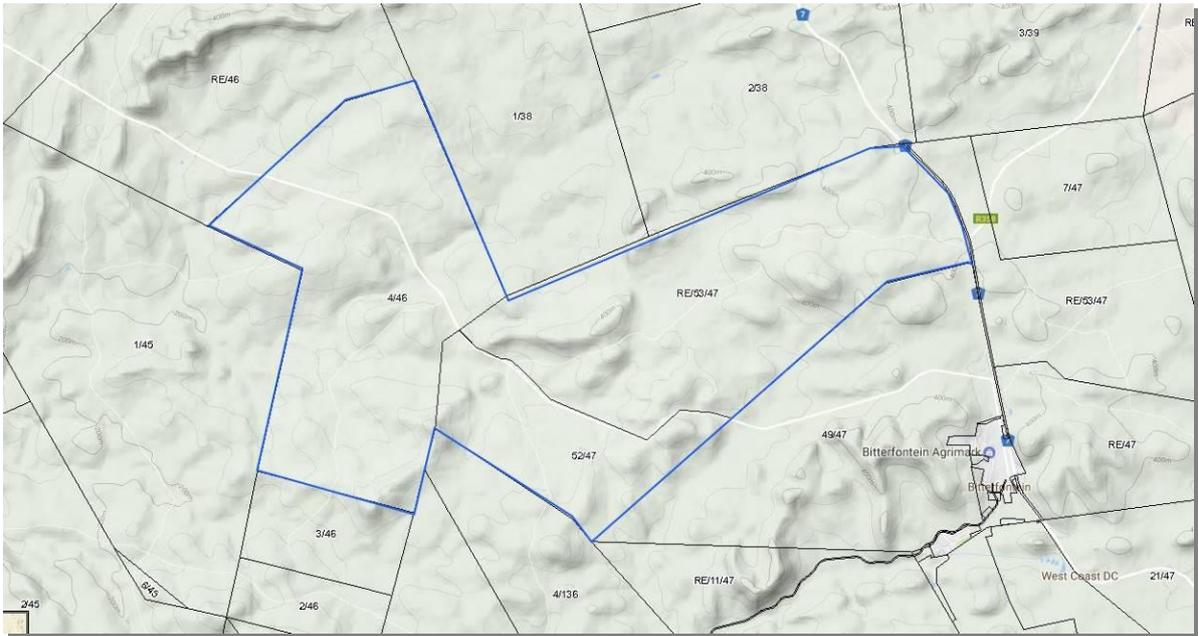


Figure 2 The land portions.

1.1 The proposed activity



Minerano Resources (Pty) Ltd, formerly known as Jamistax (Pty) Ltd, ("Minerano") submitted a Prospecting Right Application to the Department of Mineral Resources (DMR) on 27 May 2016. The application has since been accepted by the DMR, and Minerano has been instructed to proceed with the relevant environmental processes. The proposed Prospecting Right area is approximately 5351.98 Ha and is located 7.5km North West of Bitterfontein

The National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998) requires that the proposed activity must be preceded by the relevant impact assessment, in this case for palaeontology and archaeology

Figure 3 Typical drilling rig (courtesy of Lauren Wellar, Menar Holdings).

The proposed activity will involve prospecting for rare earths and minerals (Garnet, Rutile, Zircon, Silica sands, Illmentite, Montmorillorite, Dimension stone, Leucoxene, Kaolin, Gypsum, Monazite and Kyanite) initially by desktop and non-invasive remote sensing and thereafter the drilling of boreholes at selected target areas (to be determined). Certain rare earths are increasingly sought after for the construction of electronic components and modern televisions. The proposed sites for boreholes are not finalised and dependent on further research.

The boreholes will be drilled with small rigs, which typically can be track or vehicle mounted or hoisted off a truck at the drilling site. The general footprint of the activity seldom exceeds 16 sqm (see Figure 3). The rig will drill a small diameter borehole (core) which will be used for assessing subsurface conditions. The amount of tailings cast up by small diameter drilling operations is small – seldom more than a few cubic meters of soil and crushed stone.

It must be noted that prospecting does not necessarily lead to mining, however companies need to know the quality (or presence or absence) of ore as the viability of future mining is dependent on a balance of ore quality, demand, price and the anticipated cost of mining.

1.2 Terms of reference

A notification of intent to develop form was submitted to HWC by Menar Holding who reverted to them with a comment requiring a Heritage Impact Assessment. The NID comment from the heritage compliance authority forms the basis of the terms of reference. This involves conducting an HIA that includes:

- An assessment of archaeology
- An assessment of palaeontology

The comment also required that the report contain an integrated set of recommendations. The archaeological assessment has been conducted by ACO Associates CC while the palaeontological assessment has been undertaken by Professor Marion Bamford of University of Witwatersrand (Centre for Evolutionary Studies). The detailed findings of the archaeology and palaeontological assessments are contained in Appendices A and B, while an interim public comments and response Table is included in Appendix C.

1.3 Restrictions and assumptions

- Ground surface visibility was excellent in this arid environment.
- The owner of RE 53/47 did not give us permission to survey his land although the team crossed a stretch of it in order to call in at his farm house. Hence an extrapolation has been made from known areas and landscape character to identify potential areas of sensitivity on RE 53.47
- At the request of Menar Holding, ACO did not inspect any riverine areas or drainages because these will automatically be excluded due to biodiversity constraints.

- ACO focussed wherever possible on untransformed land and targeted likely areas for pre-colonial settlement, in particular sheltered spots and granite outcrops and boulder clusters.
- Intense heat experienced during the survey limited the distance that team members were able to walk in the field.

1.4 Method

The author of this report has relied on records contained with the ACO, SAHRIS and his own 30 years of experience in archaeological fieldwork.

In terms of archaeology, the project area is not that well known. Research projects are relatively few and the lack of development activity means that heritage impact assessments with a radius of 30 km of the project area are fairly scarce. For this reason it was decided that there was not enough data available to inform a desktop study so a fieldtrip and site inspection was undertaken by ACO Associates. The project area was deemed unlikely to be paleontologically sensitive (due to its volcanic geology) therefore the palaeontological assessment is based on desktop data and existing geological surveys.

The ACO team used an off-road vehicle in the project area which is quite large. During this time the environment within the project area was sample surveyed. The team of two archaeologists carried Garmin GPS units and photography equipment. Any archaeological and other heritage sites that were identified were plotted and recorded (Appendix B).

2 LEGISLATIVE CONTEXT

The basis for all heritage impact assessment is the National Heritage Resources Act 25 (NHRA) of 1999, which in turn prescribes the manner in which heritage is assessed and managed. The National Heritage Resources Act 25 of 1999 has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms. In South Africa the law is directed towards the protection of human made heritage, although places and objects of scientific importance are covered.

As this development is the subject of an EIA, heritage is dealt with under section 38 (8) of the NHRA. This requires that aspects of the NHRA are addressed as part of the EIA. The Provincial Heritage Authority (HWC) is a commenting authority and must determine if the EIA process has adequately addressed heritage issues as required by the NHRA.

The National Heritage Resources Act also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage which must be considered in any heritage assessment includes:

- Buildings and structures (greater than 60 years of age)
- Archaeological sites (greater than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and grave yards
- Cultural Landscape

In terms of Section 3 (2)(d) of the NHRA, No 25 of 1999, the national estate may include "landscapes and natural features of cultural significance". While not specifically mentioned in the NHRA, No 25 of 1999, Scenic Routes are recognised by DEA&DP as a category of heritage resources. In the DEA&DP Guidelines for involving heritage specialists in the EIA process, Baumann & Winter (2005) comment that the visual intrusion of development on a scenic route should be considered a heritage issue. This is also often given recognition in the Notice of Intent to Develop (NID) application which is used by Heritage Western Cape.

3 RECEIVING ENVIRONMENT

The project area is situated in southern Namaqualand on the edge of the landscapes underlain by Namaqualand gneiss and granites. This is in effect the southern margins of the Kamiesberg range. The area is characterised by low hills and granite outcrops (Figure 4). It is extremely arid, very hot in summer and cool in the winter months.



Figure 4 *The rolling landscape of the project area. In lower lying ground there is cultivated land.*

3.1 Heritage context

Archaeological research in Namaqualand is relatively recent compared to many other parts of South Africa. The main early impetus was through the work of Lita Webley (1984, 1986, 1992a, 1992b). This work focused on the mountains and its foothills but also investigated Spoeg River Cave on the coast 6 km north of the present study area. Also in that area, archaeological surveys and mitigation excavations have been carried out for the coastal diamond mines, with the result that the archaeology of the northern Namaqualand coastline is now very well understood (Halkett 2003; Halkett & Dewar 2007; Orton 2007, Orton & Halkett 2005, 2006). Two large research projects have emerged from this work (Dewar 2008; Orton 2012). In summary, these projects have shown that the northern coastline has many thousands of Later Stone Age shell middens dating to the last 6000 years and that these middens contain collections of stone tools, ostrich eggshell fragments and beads, pottery and animal bones that inform on the lives of the earlier inhabitants of the region. Further inland the coastal plain has few archaeological sites with those that are present often focused in deflation hollows. In this inland zone only the area around the Buffels River (close to Kleinzee) has been reasonably well studied.

Work has also been undertaken in the south at Brandsebaai where a number of shell middens have been excavated (Hart & Halkett 1994; Hart & Lanham 1997). Although

surveys have been more limited than to the north, it appears that shell middens are less frequent along the coast of southern Namaqualand where the study area is situated. A similar range of ages to the coastal sites is expected.

In both northern and southern Namaqualand there are scatters of Early and Middle Stone Age artefacts. These are generally associated with deflated areas, where the underlying hardpan is exposed, or with silcrete outcrops associated with palaeo-marine terraces.

Some 40 to 90 km inland there are a few rock shelters containing deposits and sometimes rock art (Webley 1992b; Orton 2012, 2013). In other areas artefact scatters are located close to rivers, on granite hills or, once over the mountains towards Bushmanland, along the margins of pans. In the Knersvlakte in the far south of Namaqualand it is commonplace to find scatters of artefacts associated with heuweltjies (Orton et al. 2011). However, this relationship has not been shown to hold true to the north. These artefacts are predominantly from the Middle Stone Age (MSA) but some Early Stone Age (ESA) and Later Stone Age (LSA) artefact scatters are also present. Very close to the project area Kaplan (2002, 2008) conducted surveys for pipeline and borrowpits along the Rietpoort Road. He noted the presence of almost ubiquitous scatters of late and Middle Stone Age archaeological material, but most of this was in an eroded context on sheet-washed slopes and considered by him to be of low significance. Webley and Orton (pers comm) reported the presence of rock art sites associated with large granite boulder close to Rietpoort. These were mostly abstract forms associated with pastoralist period of the Late Stone Age. Orton and Hart (2014) working in the Kotzesrus area, noted that the vast majority of Late Stone Age archaeological sites were associated with the coastline and very much more dispersed inland, generally associated with granite landscape features.

Colonial heritage is present in Namaqualand countryside, predominantly in the form of farm houses and outbuildings. Most are relatively recent, dating to the last century but there are occasional older buildings and ruins in places. Because the colonial history of the area is generally not very old (no more than about 120 years) and the landscape is quite harsh for farming, historical archaeological remains are relatively rare. Rietpoort, which is quite close to the project area is a Catholic mission station established at the beginning of the 20th century to provide for religious needs of the relic Khoikhoi population. It is well known for its Cathedral set among the large granite domes that are characteristic of the area, and its stepped pediment vernacular houses.

The agricultural imprint on the landscape is of two forms. One is the grazing of small livestock which leaves almost no trace, just the barely visible fences that criss-cross the landscape. Historically Khoikhoi herdsmen maintained flocks of sheep and goats throughout Namaqualand, however transhumant pastoralism is now only practiced in the

community lands of the Richtersveld and Kamiesberg. Trekboere penetrated Namaqualand in the early 19th century whereafter formal granting of farms took place. Where good winter rainfalls allowed, farmers cultivated cereals for home use, however this was seldom sustainable over consecutive seasons. Stock keeping is the main means of livelihood.

The towns in the study area, Kotzesrus, Lepelsfontein and Rietpoort and Bitterfontein are rural and isolated. All roads are graveled and the buildings are modest, yet many of them enjoy general protection under the NHRA.. During the spring months tourists come to the area to see the wild flowers and enjoy the tranquillity of the relatively unspoiled natural environment. Nearby Bitterfontein owes its existence to the Railway line which terminated there in the 1920's. It has been used for the shipping of copper ore, granite blocks and goods. In recent years the railway line use has dropped and the town has seen significant economic decline.

4 POTENTIAL HERITAGE INDICATORS

4.1 Palaeontology

According to Bamford (Appendix A), the underlying rocks of the project area are igneous (volcanic) Late Cretaceous- Early Tertiary ones that do not as a rule, contain fossils. There are also some outcrops of Neoproterozoic sedimentary rocks of the Nama and Vanrhynsdorp Sub Groups ca 570-530 Ma. These could potentially contain algae and invertebrate fossils of the Vendobionta and Nama types but they have only been reported in Namibia and to the far west of the proposed site. There is a very small chance that fossils could be discovered when excavations or drilling commences so a Chance Find protocol and monitoring programme has been added to the report. It is concluded that the project may continue as far as the paleontology is concerned. Palaeontology is therefore excluded as a heritage indicator of consequence and the likely significance of any impacts will be low-very low.

4.2 Archaeology

Given its aridity, the archaeological heritage of the project area is surprisingly rich. Almost every outcrop of eroded vein quartz appears to have served as a quarry to some degree for prehistoric people. The artefactual material associated with the quartz scatters consists of mostly occurrences of quartz detritus of a variety of ages, indications are that there is generally a significance Middle Stone Age presence. The contents of a number of discrete archaeological sites associated with granite outcrops reveal that people were quite focused on the selection of chunks of clear or crystal quartz, particularly during the Late Stone Age when manufacture of quartz microliths was culturally important. Recent work by Orton (2012) has revealed the microlith

construction from crystal quartz continued into the proto-historic period in the Brandsebaai area.

Granite outcrops are obvious foci of human settlement. Boulder clusters on the tops of hills often form small rock shelters that attracted settlement. Natural dips or hollows in granite domes that collected rain water exerted a strong influence over settlement patterns influencing where people lived on the landscape. Every granite boulder, boulder cluster and hilltop visited during the project was positive for archaeological material. Some of the sites found were of high quality, in good context with low levels of disturbance (unlike the open quartz scatters and quarry sites) and worthy of a high field grading (3B-3A). At one site associated with a large rock shelter on the side of Bloukop (52/47) there was evidence of quartz microlith production from crystal quartz. Surprisingly no sites were found that contained ceramics and no rock paintings were found on any granite surface despite the team paying particular attention to this factor. The implication of this is that most of the archaeological sites that were identified are greater than 2000 years of age. Fragments of ostrich eggshell were quite frequent as were fragments of animal bone in the sheltered areas.

The best archaeological sites are situated on farm 52/47 where a number of granite outcrops exist. Similar and more numerous outcrops occur to the east on 53/47 which area likely to be archaeologically interesting, however access to this farm was not permitted. Farm 4/46 has a very different landscape quality being characterized by sandy flatlands with boulder outcrops. Very little archaeological material was found here. The granite boulder and outcrop archaeological settlement pattern is the strongest heritage indicator in the study area as it is here that the most conservation-worthy and academically interesting archaeological sites exist.

4.3



Figure 6 Granite boulder clusters such as this which give rise to sheltered areas, are sensitive in terms of archaeological sites.



Figure 5 A granite rock shelter on Bloukop which contains an archaeological deposit.

Built environment

Farm houses in the project area are all mid-late 20th century and not protected or have heritage significance.

4.4 Graves and graveyards

No graves were noted within the project area, however their presence cannot be excluded. Precolonial graves can exist anywhere, however often sandy river banks and valley bottoms were preferred. These areas lay outside the terms of reference for the study. The Bitterfontein cemetery lies close to the edge of the project area but will not be affected. This cemetery contains the grave of Worsie Visser – a popular Afrikaans singer who enjoyed fame on the West Coast in the 1990's.

4.5 Landscape

The quality of the cultural landscape is that of an open and dominant natural or precolonial landscape of rolling hills and granite *koppies* overlain by a thin veneer of colonial period cultivation which is mostly quite recent. In those parts of the study area where the landscape is relatively flat or mildly undulating wheat fields have been established which farmers will sow and cultivate if winter rains are adequate. Other than this, the main agricultural activity is small stock keeping. The granite Koppies and outcrops are iconic to this area and contribute significantly to its identity. It is with some distress that it is noted that indiscriminate small scale granite mining has occurred on a number of outcrops.

European occupation compared with other parts of RSA is very late. Farms in the project area were first surveyed in 1920, while Louws Cyfer 4/46 (known locally as Witklip) was only surveyed in 1954 (Elsenberg Cape Farm Mapper: Surveyor General Office.) The lack of historical archaeological sites on the landscape can therefore be explained.

4.6 Visual concerns

The proposed activity has such a small temporary footprint in the project area that changes to the character of the site are not considered a likely impact worth consideration. Tracks to drilling sites will not detract from the landscape quality in any major way. These are common features of rural farms in normal operation.

5 ASSESSMENT OF IMPACTS

5.1 Archaeology

Although the archaeology of the area is quite rich, it is also highly patterned and easily avoided. This, combined with the very small scale of the proposed activity means that the likelihood of disturbance of significant archaeological material is low. Archaeology is the primary heritage indicator in the project area.

Nature of impacts

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. In the case of the proposed activity the main source of impact is likely to be surface disturbance caused by the preparation of drilling sites, and vehicles travelling on the landscape.

Extent of impacts

It is expected that impacts will be limited (local). The physical survey of the study area has shown that archaeological material is restricted to certain land forms, which means that the extent of impacts is likely to be highly localised (if at all), with no regional implications for heritage of this kind.

Significance of impacts

In terms of the information that has been collected, indications are that impacts to pre-colonial archaeological material will be limited. In terms of buried archaeological material, one can never be sure of what lies below the ground surface, however indications are that if any impacts did occur, they would be limited to the area of a small borehole – less than 100 cm² per drilling site.

Status of impacts

The destruction of archaeological material is usually considered to be negative; however, opportunities for the advancement of science and knowledge about a place can result provided that professional assessments and mitigation is carried out in the event of an

unexpected find. In this case the physical impact of the proposed activity is so small that the impact will largely be neutral.

5.2 Colonial period heritage

Colonial period heritage – that is buildings and historical sites of significance have not been identified within the boundaries of the study area.

Nature of impacts

Historic structures are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape will affect their significance.

Extent of Impacts

Direct or indirect impacts are not expected.

Significance of impacts

Given that there are no structures or historical sites within the study area that are likely to be physically impacted, the significance of any impacts is neutral.

Status of impacts

Within the boundaries of the proposed project area, there will be no impacts.

5.3 Cultural landscape and sense of place

Nature of impacts

Cultural landscapes are highly sensitive to cumulative impacts and large scale development activities that change the character and public memory of a place. In terms of the National Heritage Resources Act, a cultural landscape may also include a natural landscape of high rarity value, aesthetic and scientific significance. The construction of a large facility can result in profound changes to the overall sense of place of a locality, if not a region. In the case of the proposed activity the scale of change to a landscape is miniscule and temporary. The sense of change or diminishment of the significance of the landscape will be indiscernible.

Extent of impacts

The likely impact on landscape is highly localized and temporary.

Significance of impacts

The impact of the proposed activity is expected to be very low.

Status of impacts

The status of the impact is neutral (without mitigation).

5.4 Accumulative Impacts

Inland Namaqualand is a vast area of South Africa that remains archaeologically unexplored with most research having taken place within the last 10 years. Given this paucity of information the accumulative impact cannot be determined until there is a better understanding of the range and density of archaeological sites in the area. Nonetheless, the proposed activity will have a very small impact (if at all) on the population of archaeological in the project area and even less so on the region.

5.5 Public Participation

The first round of public participation has been carried out by Menar Holdings. In this part of the world which consists of private farm lands and a few small towns, heritage issues were not raised by any member of the public. There are no registered heritage conservation bodies in the area. A comments and response table is included in Appendix C.

Table 2 Significance rating for archaeological heritage

Activity	Impact	Scheduled Activities	Applicable Mine Phase	STATUS	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (pre-mitigation)	Mitigation	Standard to be achieved	Magnitude	Extent	Duration	Reversibility	CONSEQUENCE	PROBABILITY	SIGNIFICANCE (post-mitigation)	Compliance with standards	Time periods for implementation	Functional requirements for monitoring	Roles & responsibilities	Frequency for monitoring and reporting		
Aspect: Archaeological heritage																											
Drilling of boreholes	Localised minor disturbance or archaeological material.		Prospecting rights only	Neg	1	1	5	4	1	1	11	Y	-	REMEDY Keep drilling areas away from granite boulder outcrops. 50m buffer is suggested.	No disturbance of archaeological material.	1	1	2	3	7	1	7	As per comment by HWC issued for section 38 activities.	Duration of drilling.	Inspect drill sites to ensure that they are clear of granite outcrops.	Environmental manager.	.n/a

6 MITIGATION AND CONSERVATION

6.1 Palaeontological Heritage

No specific measures required. The finds protocol which is included in the paleontological assessment (Appendix A) must be observed as there is a low possibility that unanticipated finds could occur.

6.2 Archaeological Heritage

Mitigation or elimination of damage to archaeological sites is easily achieved. During the study it was determined that:

- Archaeological occupation sites were associated with boulder clusters,
- Archaeological quarry sites were associated with outcrops of vein quartz,
- and in all likelihood drainage channels and streams would have attracted archaeological occupation.

The most interesting sites are associated with boulder outcrops. It is suggested that a 50 m radius no-go buffer zone be implemented around boulder outcrops (Figure 8). Open quartz scatters are less sensitive as they tend to be sheet-washed and disturbed. It is suggested that where vein quartz outcrops are visible, these areas should be avoided as a rule. Again a 50 m radius buffer should be implemented. Riverine areas and drainages will be automatically avoided for prospecting due to other environmental constraints.

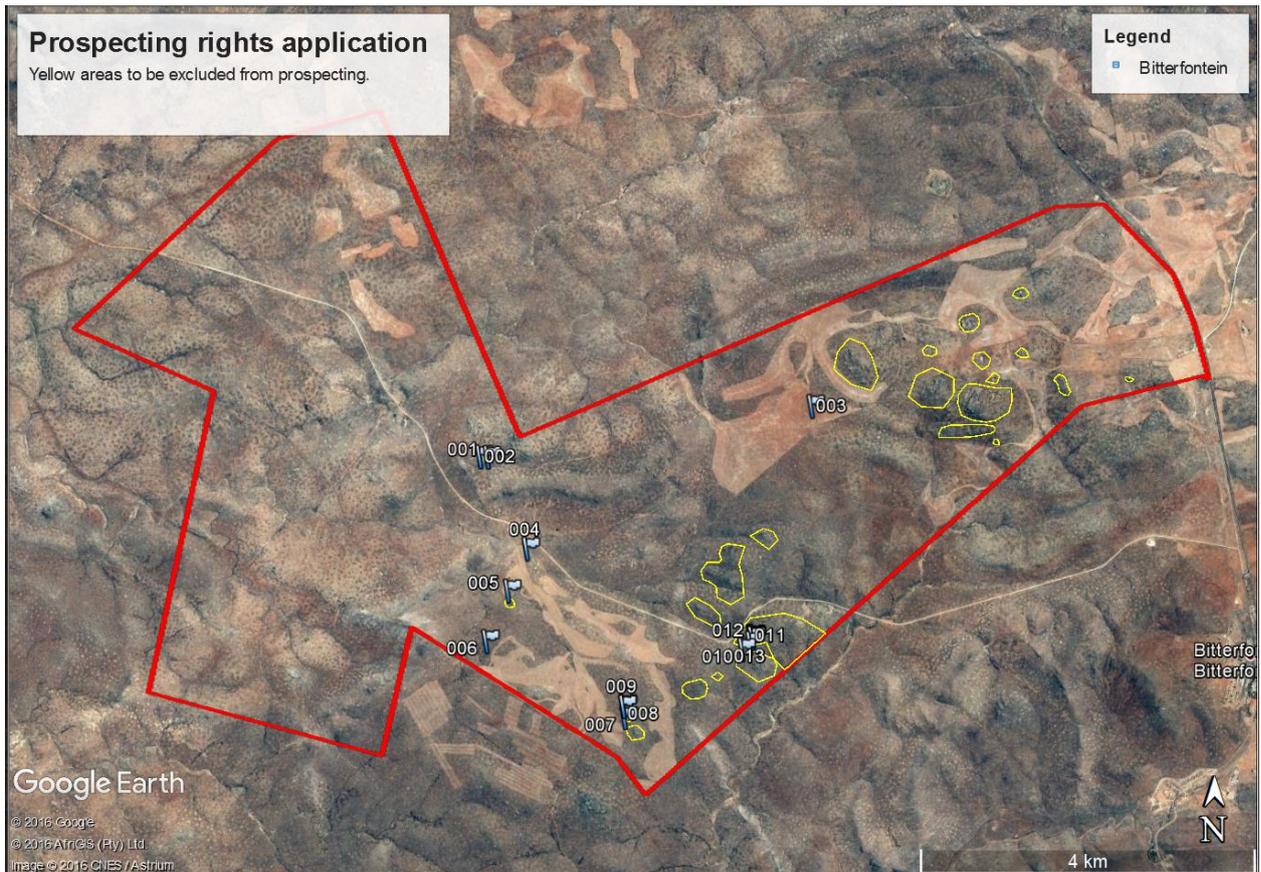


Figure 7 The areas with yellow outlines are granite boulder clusters that should be avoided during prospecting.

6.3 Un-identified archaeological material and graves

All archaeological material is protected by Section 38.5 of the National Heritage Resources Act and it is an offence to destroy material. Archaeological material may only be altered or removed from its place of origin under a permit issued by the South African Heritage Resources Agency. If archaeological material (including graves) is uncovered, all work must cease in that area, while the relevant heritage authorities are notified. Rescue mitigation may be required, for the cost of the developer. Human graves can occur anywhere on the landscape. It is best that these are not disturbed. In the event of an accidental disturbance, the find site must be left as undisturbed as possible (i.e. treated as a forensic site) and an archaeologist contacted immediately. The archaeologist will invoke the necessary procedure for exhumation if needed.

6.4 Built Environment

No mitigation will be required.

6.5 Cultural landscape and sense of place

In the interests of landscape conservation, the proponent is encouraged to use existing farm tracks as much as possible and make new tracks only if there are no other alternatives. No other mitigation measures are required.

7 CONCLUSION

It is questionable that this study should have been required as it arguably does not trigger an HIA in terms of the NHRA. The proposed activity will not change the character of the site, does not involve rezoning or consolidation and the combined area of the landscape that will be affected is less than 5000 sqm. It must be understood that that the proponent is applying for prospecting rights only. Application for rights to mine or bulk sample triggers an entirely new application and EIA process and must therefore be treated separately.

If the prospecting application is approved, and this does in time lead to a more intensive activity (such as bulk sampling) or mining a renewed application will be required. This impact assessment is an overall appraisal of the entire project area in response to a very limited and essentially non-invasive intervention. In contrast mining, if it does happen will be limited to a specific target or mining areas where the intervention on the landscape will be both destructive and invasive with the potential for significant impacts on heritage. In this event focussed heritage impact assessments must be carried out on the mining application areas that involve as near as possible saturation surveys and assessment of impacts.

7.1 Suitability of the site for the proposed activity

Indications are that the proposed activity is acceptable. Impacts will be of low significance in almost every aspect of heritage.

8 REFERENCES

- Dewar, G. (2008). *The archaeology of the coastal desert of Namaqualand, South Africa: a regional synthesis*. Oxford: British Archaeological Reports International Series 1761.
- Halkett, D. (2003). A report on the archaeological mitigation program at De Beers Namaqualand Mines March 2002 to June 2003. Unpublished report prepared for De Beers Namaqualand Mines. University of Cape Town: Archaeology Contracts Office.
- Halkett, D. and Dewar, G. (2007). Mitigation of archaeological sites in the Buffels Marine and Koingnaas complexes, Namaqualand, July to October 2006. Unpublished report prepared for De Beers Consolidated Mines NM. University of Cape Town: Archaeology Contracts Office.
- Halkett, D and Webley, L. (2010) Archaeological Impacts Assessment: Proposed Prospecting on portion 2 and remainder portion of the farm Zandkopsdrift 537, Garies, Northern Cape. Prepared for Sedex minerals.
- Hart, T.J.G. & Halkett, D (1994). Report on Phase 2 archaeological excavations at the Namakwasands project (first phase) Vredendal District Namaqualand. 430 Unpublished report prepared for Namakwa Sands Ltd. University of Cape Town: Archaeology Contracts Office.
- Hart, T. & Lanham, J. (1997). Phase 2 archaeological excavations at two Late Stone Age sites in the Phase II (WOB) mining area, Namakwa Sands, Vredendal District, Western Cape. Unpublished report prepared for Namakwa Sands Ltd. University of Cape Town: Archaeology Contracts Office.
- Kaplan, J. 2002. Phase 1 archaeological study of the Bitterfontein-Rietpoort water supply scheme. Prepared for Enviroafrica.
- Kaplan, J. 2007. Phase 1 archaeological assessment assessment of 6 Borrowpits, DR2231, Rietpoort and Bitterfontein. Prepared for Megan Anderson.
- Orton, J. (2007). Mitigation of archaeological sites within the Buffels Marine, Buffels Inland and Koingnaas Complexes, Namaqualand, August to September 2007. Unpublished report prepared for De Beers Consolidated Mines NM. University of Cape Town: Archaeology Contracts Office.
- Orton, J.D. J. (2012). Late Holocene archaeology in Namaqualand, South Africa: hunter-gatherers and herders in a semi-arid environment. Unpublished D. Phil. thesis. Oxford: University of Oxford.
- Orton, J. (2013). Geometric rock art in western South Africa and its implications for the spread of early herding. *South African Archaeological Bulletin* 68: 27-40.
- Orton, J. & Halkett, D. (2005). A report on the archaeological mitigation program at De Beers Namaqualand Mines, August to September 2004. Unpublished report 447 prepared for De Beers Consolidated Mines NM. University of Cape Town: Archaeology Contracts Office.

Orton, J. & Halkett, D. (2006). Mitigation of archaeological sites within the Buffels Marine and Koingnaas Complexes, Namaqualand, September 2005 to May 2006. Unpublished report prepared for De Beers Consolidated Mines NM. University of Cape Town: Archaeology Contracts Office.

Webley, L.E. (1984). Archaeology and ethnoarchaeology in the Leliefontein Reserve and surrounds, Namaqualand. Unpublished MA Dissertation, University of Stellenbosch.

Webley, L. (1986). Pastoralist ethnoarchaeology in Namaqualand. In: Hall, M. & Smith, A.B. (eds) Prehistoric pastoralism in southern Africa. *South African Archaeological Society Goodwin Series* 5: 57–61.

Webley, L.E. (1992a). Early evidence for sheep from Spoeg River Cave, Namaqualand. *Southern African Field Archaeology* 1: 3–13.

Webley, L.E. (1992b). The history and archaeology of pastoralism and hunter-gatherer settlement in the north-western Cape, South Africa. Unpublished PhD thesis, University of Cape Town.

9 APPENDIX A PALAEOLOGICAL ASSESSMENT

Palaeontological Impact Assessment for the area for Prospecting rights on the farm Bitterfontein 47, Western Cape Province.

Desktop Study

For

Menar Holdings

03 March 2017

Prof Marion Bamford
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant is: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 30 years research; 20 year PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Menar Holdings, Johannesburg, South Africa. The views expressed in this report are entirely those of the author and Menar Holdings and no other interest was displayed during the decision making process for the project.

Specialist: Prof Marion Bamford.....

Signature: 

Executive Summary

The desktop Palaeontological Impact Assessment for the area for prospecting rights for Rare Earth and associated minerals on portions 52 and 53 (remaining extent) of the farm Bitterfontein 47 and portion 4 of Louws Cyfer 46. The underlying rocks are igneous Late Cretaceous- Early Tertiary ones that do not contain fossils. There are also some outcrops of Neoproterozoic sedimentary rocks of the Nama and Vanrhynsdorp Sub Groups ca 570-530 Ma. These could potentially contain algae and invertebrate fossils of the Vendobionta and Nama types but they have only been reported in Namibia and to the far west of the proposed site. There is a very small chance that fossils could be discovered when excavations or drilling commences so a Chance Find protocol and monitoring programme has been added to the report. It is concluded that the project may continue as far as the paleontology is concerned.

Palaeontological Impact Assessment for the area for Prospecting rights on the farm Bitterfontein 47, Western Cape Province.

Background

Minerano Resources (Pty) Ltd, Formerly known as Jamistax (Pty) Ltd, (“Minerano”) submitted a Prospecting Right Application to the Department of Mineral Resources (DMR) on 27 May 2016. The application has since been accepted by the DMR, and Minerano has been instructed to proceed with the PPP and relevant environmental processes.

The Prospecting Right application has been submitted to prospect for Rare Earth and associated minerals on portions 52 and 53 (remaining extent) of the farm Bitterfontein 47 and portion 4 of Louws Cyfer 46. The proposed Prospecting Right area is approximately 5351.98 Ha and is located 7.5km North West of Bitterfontein

The National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998) requires that the proposed development must be preceded by the relevant impact assessment, in this case for palaeontology.

This report complies with the requirements of the NEMA and environmental impact assessment (EIA) regulations (GNR 982 of 2014). The table below provides a summary of the requirements, with cross references to the report sections where these requirements have been addressed.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014)

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 must contain:	Relevant section in report
Details of the specialist who prepared the report	Prof Marion Bamford
The expertise of that person to compile a specialist report including a curriculum vitae	Palaeontologist (PhD Wits 1990) CV attached
A declaration that the person is independent in a form as may be specified by the competent authority	Page 2
An indication of the scope of, and the purpose for which, the report was prepared	Section 1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	n/a Seasons make no difference to fossils
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	See table 2
An identification of any areas to be avoided, including buffers	n/a
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	n/a

A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 6, page 8
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	n/a
Any mitigation measures for inclusion in the EMPr	n/a
Any conditions for inclusion in the environmental authorisation	n/a
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, page 8
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and	n/a
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	n/a
A description of any consultation process that was undertaken during the course of carrying out the study	Section 3 page 6
A summary and copies if any comments that were received during any consultation process	n/a
Any other information requested by the competent authority.	n/a

Methods and Terms of Reference

1. In order to determine the likelihood of fossils occurring in the affected area geological maps, literature, palaeontological databases and published and unpublished records must be consulted.
2. If fossils are likely to occur then a site visit must be made by a qualified palaeontologist to locate and assess the fossils and their importance.
3. Unique or rare fossils should either be collected (with the relevant South African Heritage Resources Agency (SAHRA) permit) and removed to a suitable storage and curation facility, for example a Museum or University palaeontology department or protected on site.
4. Common fossils can be sacrificed if they are of minimal or no scientific importance but a representative collection could be made if deemed necessary.

The published geological and palaeontological literature, unpublished records of fossil sites, catalogues and reports housed in the Evolutionary Studies Institute, University of the Witwatersrand, and SAHRA databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.



Figure 1: Locality of proposed area to be surveyed/explored for rare earth minerals, Bitterfontein. Google Earth map supplied by Menar Holdings

Consultation Process

No consultations were carried out during the desktop study. Apart from reviewing interested and/or affected party (IAP) comments received by the EIA consultant during the EIA process, no other consultation took place as part of the paleontological study.

Geology and Palaeontology

Project location and geological setting

The site has been selected for the potential occurrence of rare earth elements as these commonly occur in igneous provinces. Although the company mentions that the geology of the prospecting area includes the Quaternary System, Kliphoek Granite, Kamieskroon Gneiss and Bitterfontein FM Hardeveld Super group, only the Kliphoek Granite (part of the Spektakal Suite) and the Bitterfontein Subgroup (not Formation) could be found in the literature. The two missing ones could be informal terms.

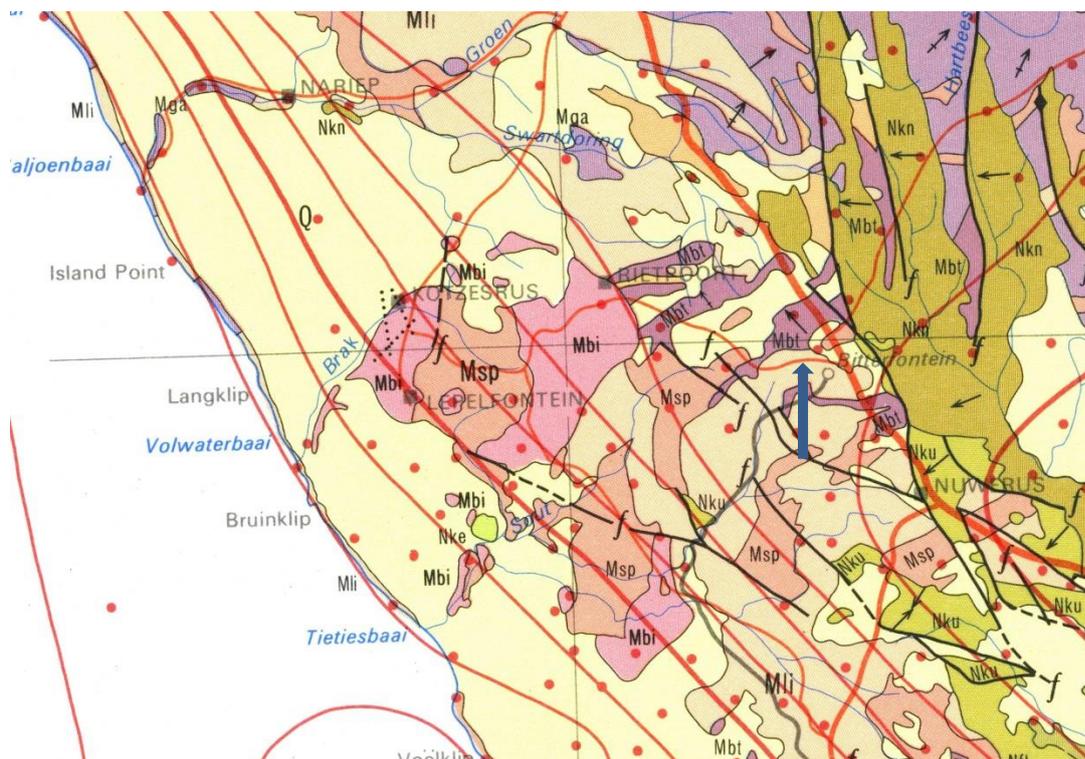


Figure 2: Geological map of the area around the proposed area of the farm Bitterfontein and Louw's Cypher for rare earth elements, etc.. The approximate location of the proposed project is indicated with the arrow. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 2: Explanation of symbols for the geological map and approximate ages (Vervoerd and de Beer, 2006; Anhaeusser, 2006; Brandl et al., 2006; Duncan and Marsh, 2006). SG = Supergroup; Fm = Formation.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Aeolian sands	Last 2.5 Ma
Mbi	Biesjes Fontein Suite	Olivine melilitite and olivine nephelinite plugs	Late Cretaceous-Paleocene 59-77Ma
Nkn	Knersvlakte SG, Vanrhynsdorp Group	Marine mudstones, siltstones, sandstones and conglomerates	Ediacaran to Cambrian
Nku	Kuibis SG; Nama Group		Early Cambrian ca 550-540 Ma
Mli	Little Namaqualand Suite	Sheets of mesocratic quartz-microcline-biotite augen gneiss	Ca 1200 Ma
Msp	Spektakel Suite intrusions	Granite, varying type and many intrusions	

Geology

The town of Bitterfontein is on Pre-tectonic supra crustal rocks of the Bushmanland Terrane. There were at least two series of intrusions in this tectonically active area, the circa 1200 Ma sheet-like intrusions (the Little Namaqualand Suite) circa 1100 Ma granitic pluton intrusions of the Spektakel Suite (Cornell et al., 2006). Another group of igneous rocks occur in the area and they are associated with rifting phase that preceded opening of the South Atlantic Ocean and separation of Africa from South America. Then the Late Cretaceous –Early tertiary events are seen numerous mafic dykes as well as clusters of kimberlite pipes, For example the Koegel Fontein complex, between Bitterfontein and the coast, has the Rietpoort Granite at 133.9 Ma and the younger Biesjes Fontein Suite (Verwoerd and de Beer, 2006).

Amongst these igneous rocks there are outcrops of the Nama foreland basin where sedimentation was linked to orogenic events in the marginal thrust belts, which led to the deposition of synorogenic flysch-like deposits in the adjacent Vanrhynsdorp Basin (Gresse et al., 2006). The Knersvlakte Subgroup is an example of this and it comprises an upward coarsening succession of marine mudstones, siltstones, sandstones and conglomerates

Palaeontology

The Kuibis Subgroup, the lowermost part of the Nama Group (ca 550-540 Ma) comprises shallow marine to braided fluvial siliciclastic to coastal limestones and contains some of the oldest shelly invertebrate fossils in the world (*Cloudina*, *Namaclathus*; Gresse et al., 2006) there are also conical stromatolites in limestones and algal mat wrinkle structures in intertidal quartzites. The slightly younger Vanrhynsdorp Group, has four subgroups of which the Knersvlakte Subgroup outcrops in this region. It comprises shallow to offshore marine siliciclastics with rare carbonates and has abundant trace fossils such as horizontal burrows (*Oldhamia*, *Treptichnus*, *Monomorphichnus*). Also present are columnar stratomites, microbial mats and possible vendobiontan tooth marks (Almond and Pether, 2009). Most of these fossil records are from Namibia and there is no available information on the occurrence in South Africa. Gresse et al. (2006) note that there are a variety of fossils in these two Groups, but no localities are provided.

Impact assessment

Using the criteria in the table below, the impact of the two proposed camps has been assessed.

TABLE 3: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.

	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	H	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

The surface activities would not impact on the fossil heritage as the rocks are ancient and volcanic so there are no fossils present. The IMPACT is nil (according to the scheme in Table 3).

Excavation for the roads to drill sites would penetrate only a few metres below ground surface but borehole cores would go down into the basement rocks so there would be minor deterioration of the surface of site and an impact on any potential fossils. Therefore, the SEVERITY/NATURE of the environmental impact would be L.

DURATION of the impact would be permanent: H.

Since only the possible fossils within the area would have been washed in SPATIAL SCALE will be localised within the site boundary: L.

There is a very small chance of finding fossils on the surface as these may have been washed in from the Karoo sediments far to the east, but these would be transported and weathered. However, the PROBABILITY of affecting any fossils is unlikely or seldom: L

Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the basement rocks, dolomites, basaltic lavas, and granites and deposits in the country and not contain any fossil material. The sediments of the Nama and Vanrhynsdorp Groups could contain stromatolites, algal mats, trace fossils and invertebrates, however, they have yet to be recorded from the proposed site for prospecting.

Recommendation

It is unlikely that any fossils occur in the sites for the proposed prospecting on Bitterfontein and Louws Cypher because mostly the rocks are much too old and volcanic in origin. There is a very small chance that there are unexplored exposures of the Nama and Vanrhynsdorp Groups on the site. As there is a chance find, a monitoring protocol is recommended.

As far as the palaeontology is concerned the proposed development can go ahead. Any further palaeontological assessment would only be required after excavations and drilling have commenced and if fossils are found by the geologist or environmental personnel. The procedure can be added to the EMP.

Monitoring Programme for Palaeontology – to commence once the excavations begin.

The following procedure is only required if fossils are seen on the surface and when excavations commence.

When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the construction activities will not be interrupted.

Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figure 4). This information will be built into the EMP's training and awareness plan and procedures.

Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.

On a regular basis, to be agreed upon by the developer and the qualified palaeontologist sub-contracted for this project, the palaeontologist should visit the site to inspect the selected material and check the dumps where feasible. The frequency of inspections should be monthly. However, if the onsite designated person is diligent and extracts the fossil material then inspections can be less frequent.

Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

If no good fossil material is recovered then the site inspections by the palaeontologist can be reduced to annual events until construction has ceased. Annual reports by the palaeontologist must be sent to SAHRA.

If no fossils are found and the excavations have finished then no further monitoring is required.

9. References

Almond, J., Pether, J., 2009. Palaeontological Heritage of the Northern Cape. SAHRA Palaeotechnical Report. 115 pages.

Cornell, D.H., Thomas, R.J., Moen, H.F.S., Reid, D.L., Moore, J.H., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. pp 325 – 380.

Gresse, P.G., von Veh, M.W., Frimmel, H.E., 2006. Namibian (Neoproterozoic) to Early Cambrian Succession. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 395 – 420.

Vervoerd, W.J., de Beer, C.H., 2006. Cretaceous and Tertiary igneous events. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 573-587.

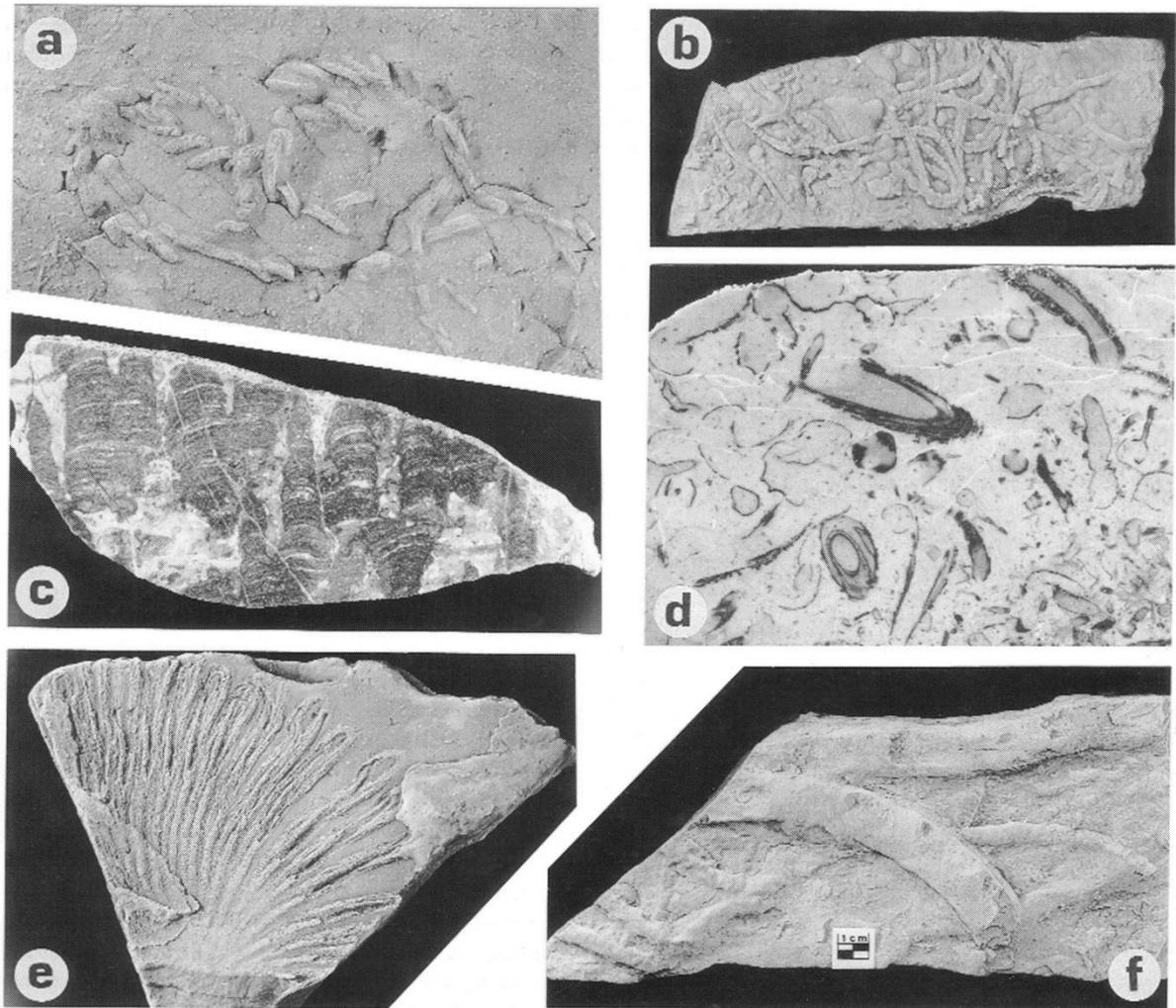


Fig. 15 Trace fossils and stromatolites of the Nama and Vanrhynsdorp Groups. (a) *Phycodes/Trichophycus pedum*, Kalk Gat Formation (Vanrhynsdorp Group), north of Vanrhynsdorp (x 0.5); (b) *Neonereites*, Kuibis Subgroup (Nama Group), near Nababeep (x 0.5); (c) Micro-columnar substructure of large domal stromatolite, Huns Member (Nama Group), near Violsdrif (x 0.8); (d) *Cloudina* and other unnamed shelly fossils, Mooifontein Member (Nama Group), near Violsdrif (x 1.5); (e) *Oldhamia*, Besonderheid Formation (Vanrhynsdorp Group), near Vanrhynsdorp (x 1.25); (f) *Planolites*, Gannabos Formation (Vanrhynsdorp Group), near Bitterfontein (x 0.5). (Photographs supplied by J.E. Almond.)

Figure 3: Examples of fossils that could be found in the Nama and Vanrhynsdorp sediments. Plate copied from Gresse et al., 2006.

10 APPENDIX B ARCHAEOLOGICAL ASSESSMENT

Archaeological Assessment prepared by Tim Hart, ACO Associates.

Introduction

The site inspection focussed on the western side of the proposed prospecting area. Farm 52/47 has the most interesting landforms in terms of archaeology in that it is here that the Granite outcrops occur. Land to the western most farm was by contrast uninteresting and archaeologically depleted. Here the granites are not present, the country is more open and sandy. Regrettably the area to the east of the Rietpoort Road which makes up half the project area was not made available by the owner. This landscape contains the best granite outcrops and is likely to be archaeologically most interesting. Hence an assumption has been made that the “granite boulder settlement pattern” repeats itself across the landscape.



Figure 8 *The western side of the project area is open rolling landscape with few granite outcrops.*

Findings

Given its aridity, the archaeological heritage of the project area is surprisingly rich. Almost every outcrop of eroded vein quartz appears to have served as a quarry to some degree for prehistoric people. The artefactual material associated with the quartz scatters consists of mostly occurrences of quartz detritus of a variety of ages, indications are that there is generally a significance Middle Stone Age presence. The contents of a number of discrete archaeological sites associated with granite outcrops reveal that people were quite focused on the selection of chunks of clear or crystal quartz, particularly during the Late Stone Age when manufacture of quartz microliths was culturally important. Recent work by Orton (2012) has revealed the microlith construction from crystal quartz continued into the proto-historic period in the Brandsebaai area.

Granite outcrops are obvious foci of human settlement. Boulder clusters on the tops of hills often form small rock shelters that attracted settlement. Natural dips or hollows in granite domes that collected rain water exerted a strong influence over settlement patterns influencing where people lived on the landscape. Every granite boulder, boulder cluster and hilltop visited during the project was positive for archaeological material. Some of the sites found were of high quality, in good context with low levels of disturbance (unlike the open quartz scatters and quarry sites) and worthy of a high field grading (3B-3A). At one site associated with a large rock shelter on the side of Bloukop (52/47) there was evidence of quartz microlith production from crystal quartz. Surprisingly no sites were found that contained ceramics and no rock paintings were found on any granite surface despite the team paying particular attention to this factor. The implication of this is that most of the archaeological sites that were identified are greater than 2000 years of age. Fragments of ostrich eggshell were quite frequent as were fragments of animal bone in the sheltered areas.

The best archaeological sites are situated on farm 52/47 where a number of granite outcrops exist. Similar outcrops occur to the east on 53/47 which area likely to be archaeologically interesting, however access to survey this farm was not permitted. Farm 4/46 has a very different landscape quality being characterized by sandy flatlands with boulder outcrops. Very little archaeological material was found here. The granite boulder and outcrop archaeological settlement pattern is the strongest heritage indicator in the study area as it is here that the most conservation-worthy and academically interesting archaeological sites exist.

Table of findings

Site No	Co-ordinates	Description	Grade
001	18.171368,-31.015557,296.69	Eroded exposure and scatter of natural vein quartz that contains a number of MSA quartz artefacts. Very dispersed and eroded.	No grade
002	18.170404,-31.015498,291.16	Eroded exposure and scatter of natural vein quartz that contains a number of MSA quartz artefacts. Very dispersed and eroded.	No grade
003	18.211908,-31.010284,346.2	Small stock post with a shed. Made from modern materials.	No Grade.
004	18.176172,-31.025455,272.66	Dispersed and partially disturbed quartz scatter. No clear affinities but likely to be MSA.	No Grade
005	18.173798,-31.029977,285.88	A granite outcrop with sheltered areas that is surrounded by a palimpsest of archaeological scatters with both MSA and LSA components. Fragments of OES and some tortoise shell was noted in the lee of a big boulder with likely LSA occupation.	Grade 3. (avoid)
006	18.171028,-31.035394,288.52	Scatter of quartz flakes exposed in a farm road, most emanating from a quartz outcrop.	No grade.
007	18.188292,-31.04374,335.14	An interesting stone age scatter dispersed around and on the west side of a boulder cluster. A variety of quartz dominated artefacts but also a number of fragments of fragments of silcrete and chert. A number of worked and retouched pieces, as well as some ESA flakes made	Grade 3b (avoid)

		from an exotic quartzite similar to that found at Brandsebaai. Sheltered area behind boulder shows LSA occupation, some eggshell fragments.	
008	18.188134,-31.042527,330.82	Points 8 and 9 may be part of the same quartz scatter associated with a prominent boulder cluster that provides shelter from wind and sun. LSA. Some Ostrich egg fragments noted (Figure 11)	Grade 3c. (avoid)
009	18.188172,-31.042442,329.13	As above	Grade 3c (avoid)
010	18.203069,-31.036466,347.64	An entire granite outcrop that contains many archaeological sites including a rock shelter with archaeological deposit. Quartz scatters include formal artefacts (adze, scraper) as well as numerous very small flakes and chips of clear quartz which indicates microlith production (Figure 12). Exotic materials were such as silcrete and chert were noted as well as a few ESA/MSA fragments on an exotic quartzite.	Grade 3a (avoid)
011	18.204064,-31.035766,363.02	The farm track and surround contains an extensive scatter of conflated quartz archaeological material which extends up the slopes of Bloukop.	Grade 3c (avoid)
012	18.204297,-31.035231,371.91	As above	Grade 3c (avoid)
013	18.204272,-31.035171,372.39	As above	Grade 3c (avoid)
014	18.20426,-31.035166,372.15	As above	Grade 3c (avoid)
015	18.204257,-31.035156,372.15	As above.	Grade 3c (avoid)

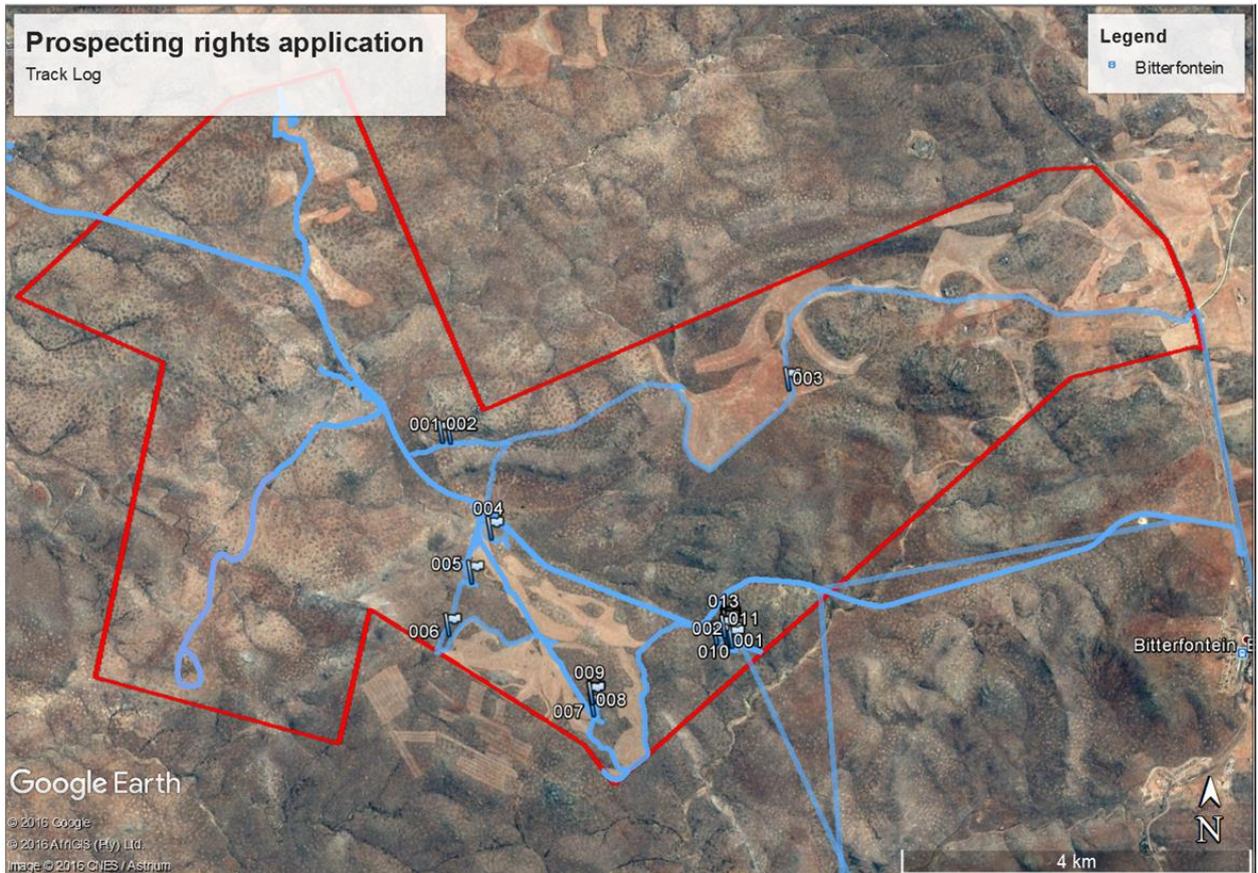


Figure 9 Track log and sites recorded.



Figure 10 Site 7 is associated with a granite outcrop. On the large quartz scatter is a scraper made from exotic quartzite.

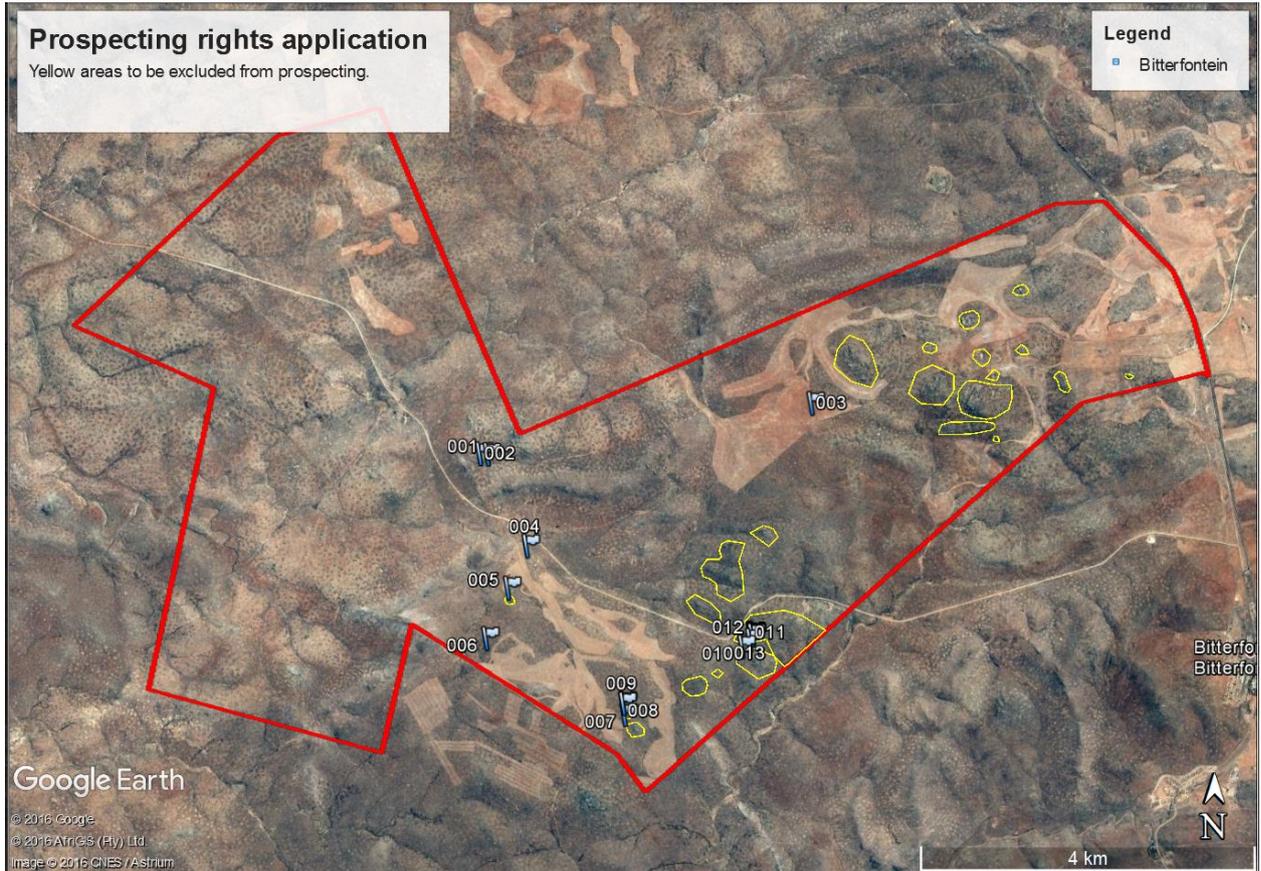


Figure 12 Granite boulder areas which should be excluded from the proposed activity.



Figure 11 Left: Site 10 (Bloukop). A flake of crystal quartz. Right a retouched silcrete artefact.

11 APPENDIX C COMMENTS AND RESPONSES, I&APS.

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
AFFECTED PARTIES					
Landowner/s	X				
Maruis Visser	X	15-07-2016	No comments received to date.		
Koos Louw	X	15-07-2016	No comments received to date.		
Jan Boonzaaier	X	15-07-2016	No comments received to date.		
Carel Louw	X	19-08-2016	Requested that a meeting be organized to discuss the Prospecting Right Application.	Unfortunately a meeting in person cannot take place before the submission date due to the fact that the submission date is next week. A telephonic conference can be organized to answer any questions and any comments will be included before submission. Should a right be granted, and prior to any activities taking place on site, Minerano commits to have a meeting with Mr Louw to discuss any concerns.	
Lawful occupier/s of the land					
Same as land owners					
Landowners or lawful occupiers on adjacent properties	X				
N/A	X				
Municipal councillor	X				
Christoffel van der Westruis	X	20-07-2016	No comments received to date		
Municipality	X				
Johan Smit (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Beulah Julies (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Elias Mqingqi (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Yolande Cloete (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
William Fortuin (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Andrew Julies (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Andreas Sindyamba (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Rhenda Stephan (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Maria Witbooi (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Frans Barn (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
Jacon Botha (Matzikama LM Ward Councillor)	X	20-07-2016	No comments received to date.		
westcoastdm@wcdm.co.za	X	20-07-2016	No comments received to date.		
Henry Prins – Municipal Manager, West Coast District Municipality	X	12-08-2016	No comments received to date.		
Doretha Kotze	X	20-07-2016	Raised concern over impacts on Ground Water Suggested Minerano apply for a Land Use Application.	Noted. Please refer to the section on groundwater and mitigation measures in the Full Impact Table located in Appendix 4 , the table (i) “Assessment of Each Identified Potentially Significant Impact and Risk” in Part A and table b – “Impact Management Outcomes” and table f – “Impact Management Actions” in Part B. The current land uses will continue in	Please see Appendix 4 for the full impact tables

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
			conjunction with prospecting. Should a mining right be applied for in the future a land use application will be done.	
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA e				
M Mxi (Department of Water Affairs & Sanitation)	X	20-07-2016	No comments received to date.	
S Maschicla (Department of Water Affairs & Sanitation)	X	20-07-2016	No comments received to date	
A Petersen (Department of Water Affairs & Sanitation)	X	20-07-2016	No comments received to date	
South Africa Heritage Resources agency	X	13-07-2016	No comments received to date	
Communities				
N/A	X			
Dept. Land Affairs				
Vuyani Nkasayi (Department of Rural Development & Land Reform)	X	20-07-2016	No comments received to date.	
Traditional Leaders				
N/A	X			
Dept. Environmental Affairs				
Western Cape Department of Agriculture	X	20-07-2016	No comments received to date.	
Western Cape Department of Environmental Affairs	X	20-07-2016	No comments received to date	

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Other Competent Authorities affected				
Alana Duffell-Canham (Cape Nature)	14-07-2016	<p>Concerned that the size of the prospecting area was too large, making it difficult to provide a detailed comment.</p> <p>Whilst CapeNature understands that this is prospecting application and that the environmental impacts will be limited it does not believe that the application should be viewed in isolation from mining activities.</p> <p>Requested confirmation on the number and location of the boreholes.</p> <p>Requested more maps representing Critical Biodiversity Areas and Ecological Areas as well as their associated buffers.</p> <p>CapeNature requested that special attention be paid to the Flora of the area as there may be special habitats within the study area.</p>	<p>Due to the nature of prospecting and mining the area needs to be large and cannot be broken down into smaller sections.</p> <p>Noted. As this is a Prospecting Right Application and not a Mining Right Application it should be processed and assessed as such. The purpose of prospecting is to identify if any mining activities are feasible for the area as not enough information exists. It also is required to determine the type and scope of mining activities should mining be deemed feasible. It is for this reason that the legislation makes provision for separate and discrete processes for mining and prospecting. Prospecting is limited in disturbance and extent by nature thus a Basic Assessment is required. Mining Activities require a full EIA and extended public consultation to consider the impacts thereof. The impacts, motivations and outcomes of prospecting are not equal to that of mining. It would be economically unsound to require the two to be viewed as a single activity.</p> <p>Noted and incorporated.</p> <p>Noted and incorporated.</p>	
Western Cape Government	09-01-2016	Sent general Comments regarding general BAR and EMP practices that need to be followed during invasive prospecting	Noted and Incorporated	See Appendix I

Name of interested and affected party	Date consulted/notified	Organisation	Method of notification	Comments	Response
Mnr Visser	25-07-2016	Farm Owner	Emailed	No comments received to date	-
Mr Castens	27-02-2017	Farm Owner	Telephone conversation and email	Correspondence is ongoing	The owner of Bitterfontein 47 (ptn 53) were incorrectly identified during the initial PPP process. Mr Casten's was informed of the project on 27-02-2017. We have been in contact with his lawyers. In addition to the 30-day comment period Mr Casten's has been given additional time (including the 30-day comment period) to comment on the documentation.
Jan Boonzaaire	15-07-2016	Farm Owner	Handed over BIDs during initial site visit	No comments received to date	-
M Mxi	20-07-2016	Department of Water Affairs and Sanitation	Email	No comments received to date	-
S Maschicla	20-07-2016	Department of Water Affairs and Sanitation	Email	No comments received to date	-
A Petersen	20-07-2016	Department of Water Affairs and Sanitation	Email	No comments received to date	-
Duduzile Kunene	20-07-2016	Department of Mineral Resources	Email	No comments received to date	-
Busisiwe Magazi	20-07-2016	Department of Mineral Resources	Email	No comments received to date	-
Niklikha Soyizwaqhi	20-07-2016	Department of	Email	No comments received	-

		Mineral Resources		to date	
Thabelo Nempumbuluni	20-07-2016	Department of Mineral Resources	Email	No comments received to date	-
Johan Smit	20-07-2016	Matzikama Ward Councillor	Email	No comments received to date	-
Beulah Julies	20-07-2016	Matzikama Councillor (Ward 6)	Email	No comments received to date	-
Elias Mqingqi	20-07-2016	Matzikama Councillor (Ward 3)	Email	No comments received to date	-
Yolande Cloete	20-07-2016	Matzikama Councilor (Ward 3)	Email	No comments received to date	-
William Fortuin	20-07-2016	Matzikama Ward Councilor	Email	No comments received to date	-
Andrew Julies	20-07-2016	Matzikama Ward Councillor	Email	No comments received to date	-
Andreas Sindymba	20-07-2016	Matzikama Councilor (Ward 5)	Email	No comments received to date	-
Rhenda Stephan	20-07-2016	Matzikama Councilor (Ward 7)	Email	No comments received to date	-
Maria C Witbooi	20-07-2016	Matzikama Ward Councilor	Email	No comments received to date	-
Christoffel van der Westruis	20-07-2016	Matzikama Councilor (Ward 8)	Email	No comments received to date	-
Frans Bam	20-07-2016	Matzikama Councilor (Ward 1)	Email	No comments received to date	-
Jacob Botha	20-07-2016	Matzikama Ward Councilor	Email	No comments received to date	-
Vuyani Nkasayi	20-07-2016	Department of Rural Development and Land Reform	Email	No comments to date	-
Alana Duffell-Canham	14-07-2016	Cape Nature	Delivered to Cape Nature Offices	Concerned that the size of the prospecting area was too large, making it difficult to large to provide detailed comment. Whilst CapeNature	

				<p>understands that this is prospecting application and that the environmental impacts will be limited it does not believe that the application should be viewed in isolation from mining activities. Requested confirmation on the number and location of the boreholes. Requested more maps representing Critical Biodiversity Areas and Ecological Areas as well as their associated buffers. CapeNature requested that special attention be paid to the Flora of the area as there may be special habitats within the study area.</p>	
westcoastdm@wcdm.co.za	20-07-2016	West Coast District Municipality	Email	No comments to date	-
info@elsenburg.com	20-07-2016	Western Cape Department of Agriculture	Email	No comments to date	-
enquiries.eadp@westerncape.gov.za	20-07-2016	Western Cape Department of Environmental Affairs	Email	No comments to date	-
service@westerncape.gov.za	20-07-2016	Western Cape Government	Email and BA document delivered	No comments to date	-
transport.publicworks@westerncape.gov.za	20-07-2016	Department of	Email	No comments to date	-

		Roads and Transportation			
Doretha Kotze	20-07-2016	West Coast District Municipality	Email	Concerned about the impacts on groundwater and mentioned land use application	
Henry Prins	12-08-2016	West Coast District Municipality Municipal Manager	Email	No comments to date	-