DESKTOP HERITAGE IMPACT ASSESSMENT:

PROPOSED PROSPECTING ON VARIOUS PORTIONS OF FARM NABABEEP 134 AND PLOT 2086, OKIEP, NAMAKWALAND MAGISTERIAL DISTRICT, NORTHERN CAPE

Required under Section 38(8) of the National Heritage Resources Act (No. 25 of 1999) as part of a Heritage Impact Assessment.

Report for:

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SUMMARY

ASHA Consulting (Pty) Ltd was appointed by N.J. van Zyl to conduct an assessment of the potential impacts to heritage resources that might occur through proposed prospecting activities on Portions 3, 10, 13, 14, 15, 16 and 21 of the farm Nababeep 134 and Plot 2086, Okiep in the Namakwaland Magisterial District. The centre of the study area is at about S29° 33' 35" E17° 48' 30". An existing mining right is held over parts of some of these properties and the prospecting right is sought for the remainder of the land outside of the mining right boundary. It should be noted that two separate prospecting applications will be lodged for different minerals and this report applies equally to both applications.

The project involves various methods, the vast majority of which are of no concern to this study (e.g. desktop research, remote sensing, geological mapping). The only aspect that may cause physical damage to heritage resources is drilling. Each drill hole would require a cleared area of 160 m^2 and drilling would occur through use of a truck-mounted drill rig.

The study area lies within the granite hills of the northernmost Kamiesberg and has been the site of many copper mining ventures since the mid-19th century. The mountains have much exposed granite while the valleys tend to be filled with alluvium and generally sparse vegetation. Traces of earlier mining are abundant in the landscape all around Nababeep.

No site visit was carried as drilling locations have yet to be determined.

The desktop research revealed that Stone Age resources appear to be very sparse. Traces of historical use of the landscape other than mining are known to occur widely throughout the local area and have been documented in various places. These traces relate to use of the landscape during the last two centuries since the establishment of mission stations in the area. Although not intrinsically significant, these resources reflect the living heritage of the area since they are the result of transhumant behaviour. Historical mining traces are usually the most important aspect of heritage encountered in the area but they only occur in specific places on the landscape. These traces include historical excavations, ruins and built structures. There are also many traces of mid-late 20th century copper mining and, although part of the region's mining history, these do not constitute heritage resources. A few early 20th century mines are present within he study area though. Because of the very sparse distribution of heritage resources, it is concluded that impacts to such resources are likely to be minimal.

It is recommended that SAHRA allow the prospecting project to proceed as planned, but subject to the following recommendations:

- Once the drilling locations are known, a map should be provided to an archaeologist for desktop analysis. If any potentially sensitive areas cannot be avoided then a brief site visit should be carried out to confirm sensitivity and, in consultation with the prospecting geologists, propose alternative nearby drill sites. An opinion should then be expressed in a letter that should be submitted to SAHRA confirming whether or not drilling may proceed;
- Regardless of the above archaeological opinion, all drill sites should be carefully inspected by project staff to ensure that no heritage features are present;
- A fossil Chance Finds Procedure must be included in the project EMPr and implemented in the event of any chance finds of fossils, and

- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Glossary

Background scatter: Artefacts whose spatial position is conditioned more by natural forces than by human agency.

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Holocene: The geological period spanning the last approximately 10-12 000 years.

Hominid: a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

Later Stone Age: Period of the Stone Age extending over the last approximately 20 000 years.

Middle Stone Age: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BA: Basic Assessment

CRM: Cultural Resources Management

DMR: Department of Mineral Resources

EA: Environmental Authorisation

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

NEMA: National Environmental Management Act (No. 107 of 1998)

NHRA: National Heritage Resources Act (No. 25) of 1999

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by N.J. van Zyl to conduct an assessment of the potential impacts to heritage resources that might occur through proposed prospecting activities on Portions 3, 10, 13, 14, 15, 16 and 21 of the farm Nababeep 134 and Plot 2086, Okiep in the Namakwaland Magisterial District (Figure 1). The centre of the study area is at about S29° 33' 35" E17° 48' 30". An existing mining right is held over parts of some of these properties and the prospecting right is sought for the remainder of the land outside of the mining right boundary (Figure 2). It should be noted that two separate prospecting applications will be lodged for different minerals and this report applies equally to both applications.

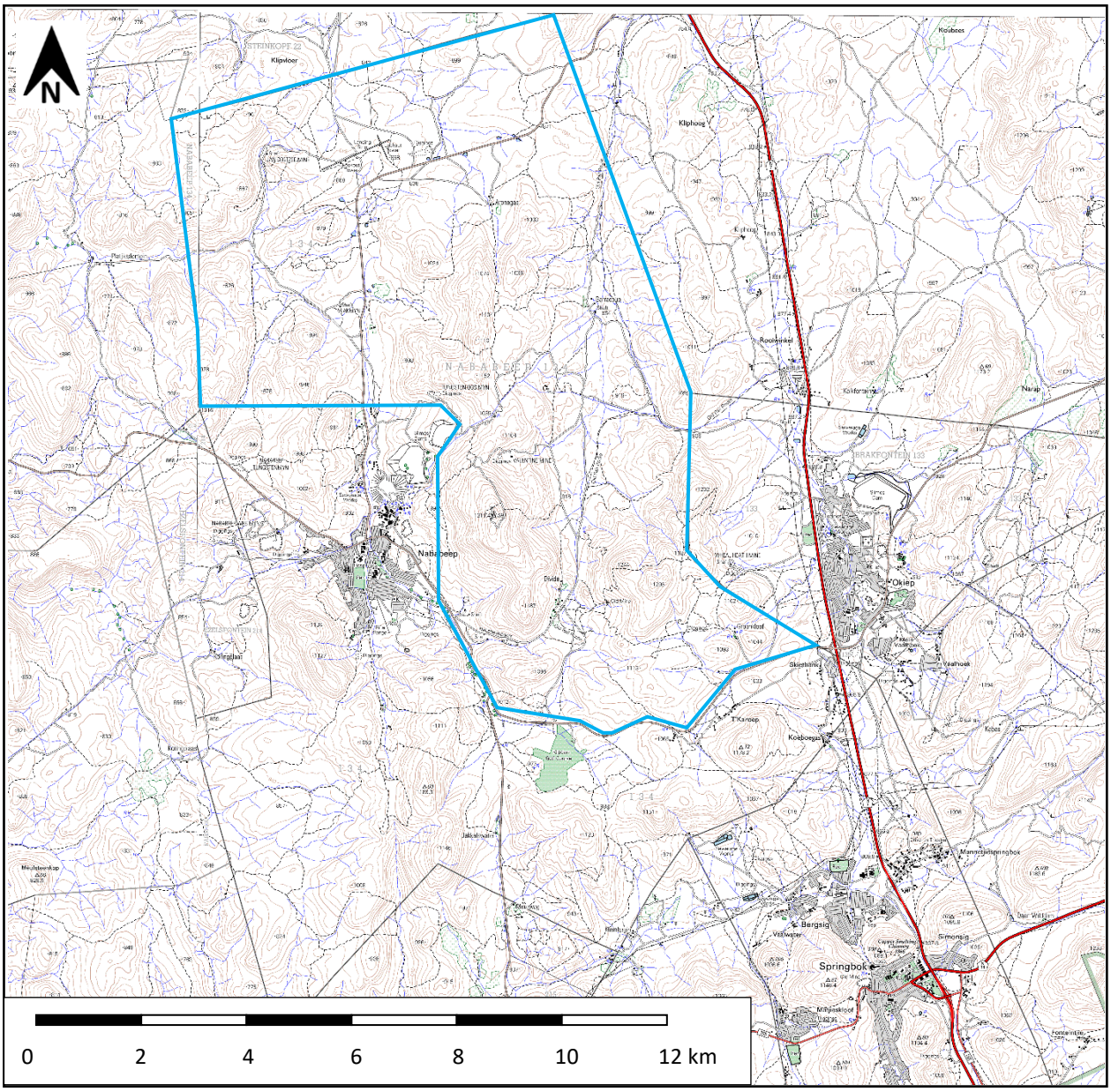

Figure 1: *Extract from 1:50 000 topographic mapsheets 2917DA and 297DB showing the location of the site (blue polygon). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

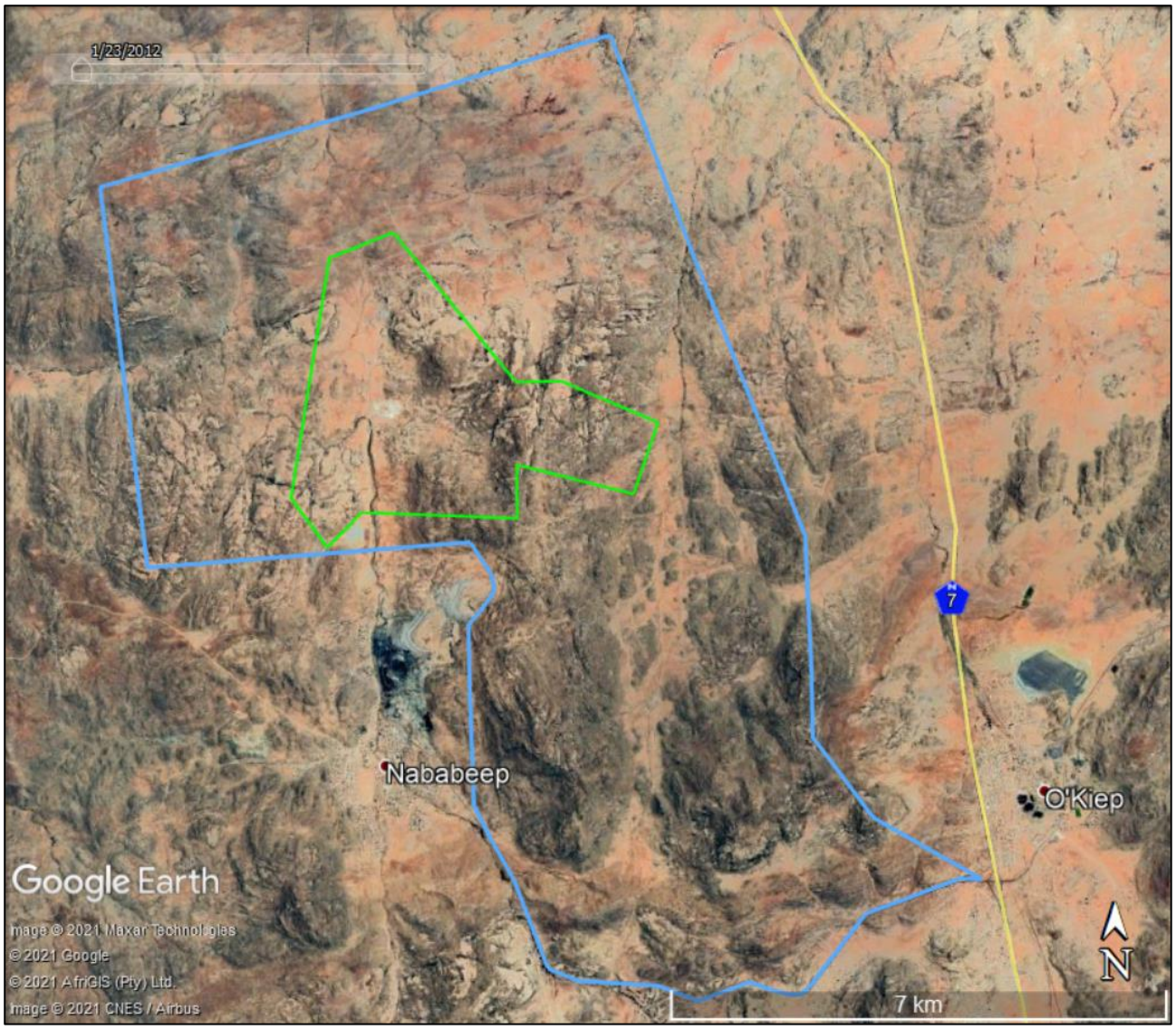

Figure 2: *Aerial view of the study area (blue polygon) showing the existing mining right area (green polygon). Proposed prospecting will be outside the green polygon.*

1.1. The proposed project

1.1.1. Project description

The project description for both prospecting applications is effectively the same. The first application (DMRE ref no.: 12755PR) involves prospecting for copper and tungsten. The second application (DMRE ref no.: 12848PR) will be for various additional minerals. The prospecting work will occur in three phases as follows:

<u>Phase 1</u>
Desktop work, surface surveys and geophysical surveys by drone, surface geological mapping, geochemical surveys from stream sediments and soils as well as from underground where historical excavations are available, drilling with a truck-mounted drilling rig (Figure 3) and laboratory assays. It should be noted that the locations of the drilling sites are as yet unknown and will only be determined based on the early research undertaken at the start of Phase 1.

Phase 2
Geological resource modelling, metallurgical test work, mining and engineering design & layout, data processing and interpretation of results.

Phase 3
Pre-feasibility report, resource statement and Application for Mining Right.

A laydown and storage area will be required but no other infrastructure, accommodation, etc will be developed as part of this prospecting project and no processing plant or other related services will need to be developed. Existing roads and tracks will be used as far as possible but from time to tie the drilling rig will need to cross undisturbed ground to reach drill sites. All damaged areas will be rehabilitated after drilling.

Figure 3: *Example of the type of drilling rig to be used. Source: Basic Assessment Report Figure 4.*

1.1.2. Identification of alternatives

There are no alternatives for this project. The project location, technology and layouts are all suited to the prospecting as proposed and no feasible alternatives exist. As such, this assessment proceeds on the basis of a preferred alternative and the No-Go alternative only.

1.1.3. Aspects of the project relevant to the heritage study

The only aspect of concern to this study is the drilling stage. Other samples will be too small to be of concern and will not result in significant impacts. However, the drilling will require bringing a

drilling rig onto the site and this could result in damage to heritage resources, especially archaeological resources that are not readily identifiable by lay people.

1.2. Terms of reference

ASHA Consulting was asked to compile a heritage impact assessment (HIA) that assessed all relevant heritage resources and made recommendations to minimise impacts to such resources during implementation of the project. Because physical intervention sites for drilling cannot be identified until after the project has commenced, the work was to be done from the desktop.

1.3. Scope and purpose of the report

An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the Department of Mineral Resources and Energy (DMRE) who will review the Basic Assessment (BA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

1.4. The author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

1.5. Declaration of independence

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

2. LEGISLATIVE CONTEXT

2.1. National Heritage Resources Act (NHRA) No. 25 of 1999

The NHRA protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;

- Section 35: prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old, palaeontological material and meteorites;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: "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";
- Palaeontological material: "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";
- Archaeological material: a) "material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures"; b) "rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation"; c) "wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation"; and d) "features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found";
- Grave: "means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place"; and
- Public monuments and memorials: "all monuments and memorials a) "erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government"; or b) "which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual."

Section 3(3) describes the types of cultural significance that a place or object might have in order to be considered part of the national estate. These are as follows:

a) its importance in the community, or pattern of South Africa's history;
b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;

g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
i) sites of significance relating to the history of slavery in South Africa.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list "historical settlements and townscapes" and "landscapes and natural features of cultural significance" as part of the National Estate. Furthermore, some of the points in Section 3(3) speak directly to cultural landscapes.

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA OR BA. The present report provides the heritage component. Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the DMRE.

3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. Dr Lita Webley as commissioned to assist with this aspect. The information sources used in this report are presented in Table 1. Data were also collected via a field survey.

Table 1: *Information sources used in this assessment.*

Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates

Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

3.2. Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system[1] for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.3. Consultation

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of a Basic Assessment (BA) which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP.

3.4. Assumptions and limitations

The study was carried out from the desktop. This was because the locations of drill sites have yet to be determined which means that a ground survey cannot yet be planned. While this is a restriction in terms of the locations of actual heritage resources that might be present, enough work has been done in the general area to allow an appraisal of the types of heritage to be expected on site, and for appropriate recommendations to be formulated.

[1] The system is intended for use on archaeological and palaeontological sites only.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The study area lies to the west of the N7 and is generally at least 2 km distant. However, in one place – adjacent to Okiep – it extends to within about 200 m of the N7. Much of the study area is a natural environment, although traces of mining are visible on aerial photography in several areas in and around the study area (the region in general is well known for its copper mines). The town of Nababeep lies to the southwest and is accompanied by extensive mining activity. Occasional small farmsteads are evident and an airstrip lies in the northern part of the study area, just north of the mining right boundary.

4.2. Site description

The site lies in the far north of the Kamiesberg Mountains of Namaqualand. The mountains are granite and are characterised by plenty of exposed rock with occasional large bare domes surrounded by tumbled blocks occurring in places. Between the hills the land tends to form relatively flat fine gravel/sandy plains. Figures 4 and 5 show simulations of the landscape to give an idea of its mountainous nature. Since no site visit has been undertaken, no site photographs are provided.

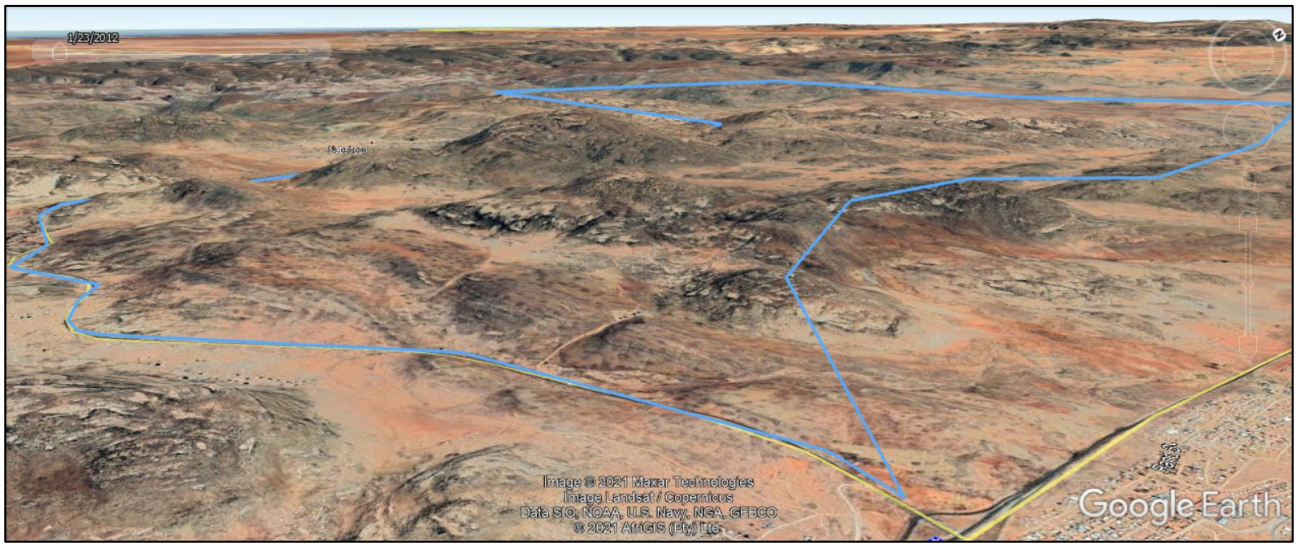

Figure 4: *Oblique aerial view of the study area looking towards the northwest. Source: Google Earth.*

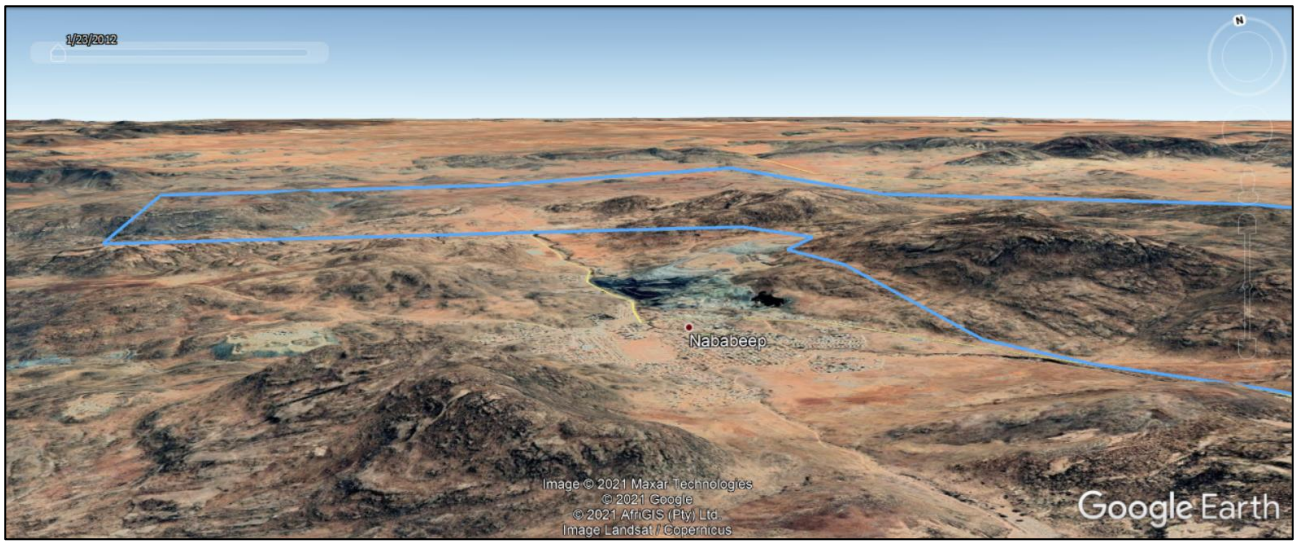

Figure 5: *Oblique aerial view of the study area looking towards the north and showing the town of Nababeep on one of the larger level plains between the granite mountains. A large mine can be seen behind the town (dark area). Source: Google Earth.*

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project.

5.1. Palaeontology

The SAHRIS Palaeosensitivity map shows the study area to be of largely zero palaeontological sensitivity (Figure 6). This is because it is underlain by "granites and gneisses of the Namaqua Metamorphic Province that are between one and two billion years old and do not contain fossils" (Almond & Pether 2009). However, valley fills in between the granite hills can contain rare fossils and these zones are rated as being of low palaeontological sensitivity (Figure 6). Dr John Almond (2019:3) has recently considered these valley fills and plains deposits for a project at Concordia and had the following to say:

> The overall palaeontological sensitivity of the sandy to gravelly, and locally calcretised, Late Caenozoic superficial deposits in the Namaqualand region is generally low. The predominantly porous, sandy superficial deposits in the study area, including the alluvial and aeolian sands and gravels, are unlikely to contain substantial fossil remains (De Beer et al., 2002, Almond & Pether 2008, Almond in Macey et al. 2008). Fossil land snails have been recorded from yellowish to reddish terrestrial sands and overlying calcretes in the Springbok sheet area (Marais et al., 2001, p70). Among the limited range of other fossils that might be encountered within Late Caenozoic surface sediments in the study area are calcretized rhizoliths (root casts), termitaria and other burrows, freshwater molluscs, ostrich egg shells, sparse bones, teeth and horn cores of mammals, and tortoise remains. Finer-grained river, stream and pan sediments might contain fossils of fish, frogs, molluscs, crustaceans (crabs, ostracods, phyllopods such as conchostracans) as well as microfossils such as diatoms, palynomorphs and macroplant remains (e.g. wood, peats). Such fossil remains are likely to occur only sporadically.

Bamford (2018:8) has recently considered the mining application that occurs within the boundaries of the presently proposed prospecting area and stated that "quaternary alluvial sands do not

preserve fossils because of their friable and transported nature." Although the two authors provide variable comments, it is clear that the sensitivity of these sand and fine gravel deposits is low with a very minimal chance of locating any fossils.

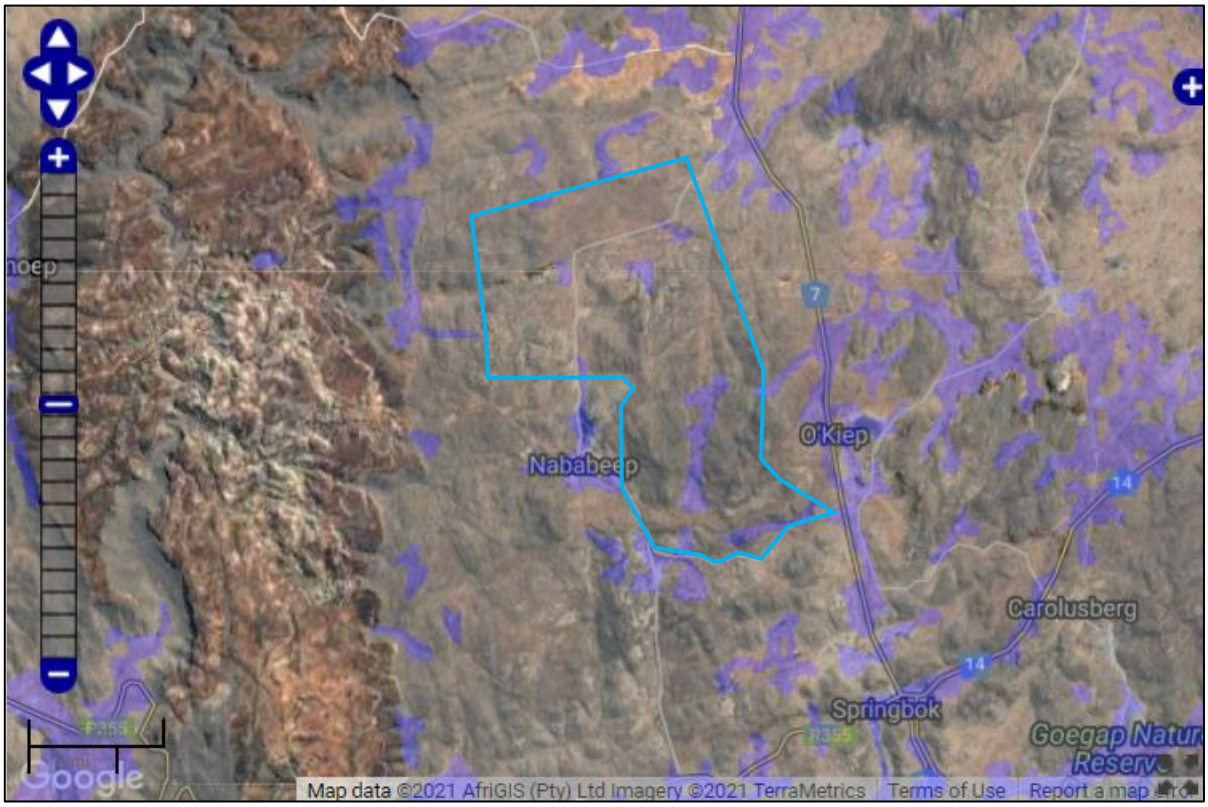

Figure 6: *Extract from the SAHRIS Palaeosensitvity map showing the study area to be of low (blue shading) and zero (grey shading) palaeontological sensitivity.*

5.2. Archaeology

5.2.1. Desktop study

Archaeological research in Namaqualand has been focussed on the coast (Dewar 2007; Orton 2012), the Kamiesberg mountains (Webley 1992) and the Richtersveld, especially along the Orange River (Orton & Halkett 2010; Robertshaw 1978; Webley 1992). Archaeological occurrences in some areas have been rich and varied (Morris 2018) and range from the ESA to the LSA, the latter being more common. While some chronological frameworks have been developed for certain areas, as Kaplan (2016) points out, there have been no academic studies in the Springbok area. There have, however, been a number of CRM studies which form the basis of the review below.

Isolated artefacts or very low density background scatters from the Early (ESA), Middle (MSA) and Late Stone Ages (LSA) have been reported from various areas (e.g. Kaplan 2016; Morris 2018; Smith 2013). They tend to occur on the sandy sediments of the valleys and plains and not on the rocky hills which are largely devoid of Stone Age archaeological traces. LSA sites and occurrences are the most predominant significant pre-colonial heritage resources noted in surveys in the area. They are nevertheless sparsely distributed and tend to be concentrated on water sources and where some possibilities of shelter occur. Pans, springs, rock shelters and in the lee of koppies are likely locations.

Kaplan (2010) surveyed an area between Okiep and Carolusberg noting some adiagnostic quartzite flakes and a rock shelter with faded rock art and some artefacts. The rock art site has been revisited by the present author with many more details being recorded. The site lies beneath the overhanging east face of a large boulder at the foot of a granite hill (Figure 7). The wall of the boulder has several geometric finger paintings on it (Figures 8 & 9) and a low stone wall has been constructed around the floor of the shelter. Some of the rocks have been used as lower grindstones and there is an extensive assemblage of stone artefacts and other materials, including a few historical items, both within and outside of the walling (Orton, own data). Rock art is rare in Namaqualand and the next nearest site on record lies more than 25 km to the southwest of Springbok. It was recorded by Rudner and Rudner (1968) but no precise location was given.

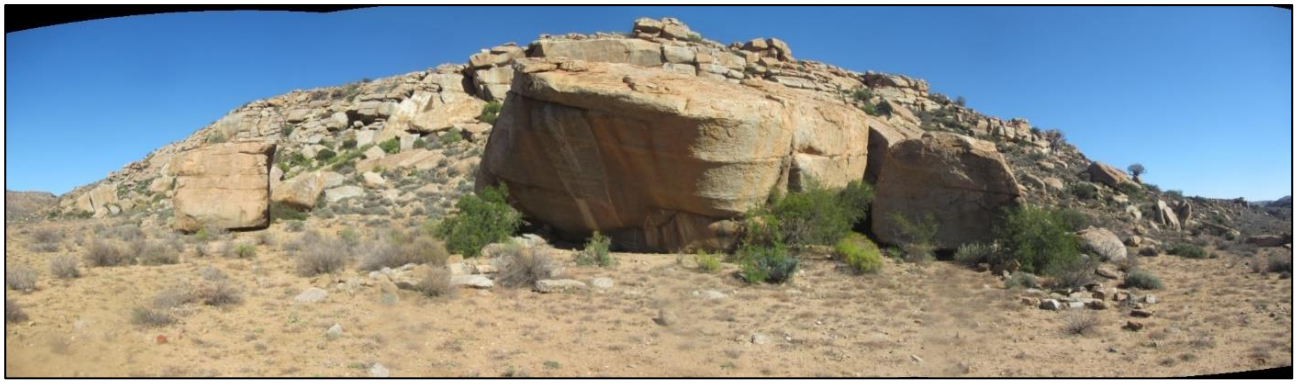

Figure 7: *A site with geometric rock art, stone walling and many artefacts.*

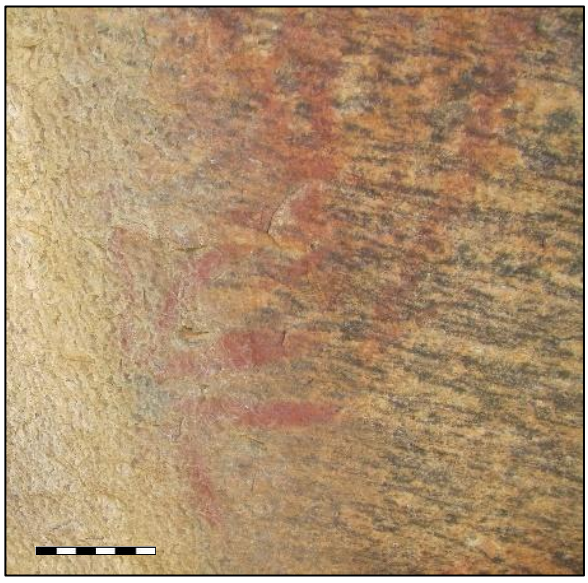

Figure 8: *Geometric rock art. Scale in cm.*

Figure 9: *Geometric rock art. Scale in cm.*

Historic accounts refer to the Little Namaqua Khoekhoen, a pastoralist group who were spread out across the Namaqualand landscape in the 19th century but who seem to have been concentrated in the Kamiesberg and along the Orange River. Research into pastoralist archaeology has recorded evidence for early sheep and cattle bones from the Namaqualand coastal areas. If any significant pastoralist sites are identified around Okiep and Nababeep, this would provide the potential to contribute to our understanding of the origins and spread of the Khoekhoen into southern Africa. The geometric rock art site reported above, may be one such site, since geometric art has been

linked by several authors to the Khoekhoen (Eastwood & Smith 2005; Smith & Ouzman 2004; Van Rijssen 1994).

5.3. Graves

Most graves are likely to occur within formal graveyards and such sites would not be harmed during prospecting. However, there are two possible aspects of concern. The first is that historical graves from the last approximately 200 years can be present singly or in small clusters related to stockposts and farmsteads. These graves will almost always be identifiable at the surface through the presence of stone-packed mounds and/or head and footstones. The second aspect is the possibility of unmarked precolonial burials being present. Such graves are not readily identified because grave markings such as lower grindstones are generally placed below the ground surface. Their locations can never be predicted and they can only be dealt with at the time of discovery. Such finds are expected to be extremely unlikely though.

5.4. Historical aspects and the Built environment

COPPER MINING

Given that the present project deals with prospecting for copper, the history of early copper mining in the region is highly relevant. In 1682, some Namaqua Khoekhoen visited the Fort of Good Hope with some pieces of copper that the Commander, Simon van der Stel, thought to be of good quality and he presumed that it was abundant in their country although it appeared that they did not know how to refine it.

In 1685, the Commander of the Garrison at the Fort of Good Hope, Simon van der Stel, set out with a party of men in search of the source of the copper. After reaching the Koperberge (Copper Mountains), his men set about sinking three shafts into the mountains, extracting some copper ore. He also visited the vicinity of Okiep. Despite the optimism of the foreman miner regarding the quality and quantity of the ore, the samples sent to the Netherlands for assay were found to be low-grade. This, together with the distance from the Cape, the difficulty of transporting the ore to the coast, and the difficulty of processing it locally due to a lack of fuel and water, resulted in the venture being abandoned.

It was another 180 years after van der Stel's visit, before copper mining commenced in earnest in Namaqualand.

The first company to be registered was *South African Mining Company* formed by Thomas Fannin in 1846 but it did not find viable deposits in the Richtersveld and Fannin sold out his interest in 1847, but not before the Colonial Government had annexed the land between the Buffalo River and Orange River taking place in December 1847. By 1854, between 200 to 300 mining leases had been issued by the Government for the copper mines but it was Phillips and King who had the rights to Brakfontein, Melkboschkuil and Lelyke Pad (Nababeep). The first registered owner of Nababeep was Pieter Van Zyl in 1850. He referred to it as Lelike (Lelyke in Dutch) Pad alias Nababeeb – only in 1863 was the beeb changed to a beep. The original name referred to the poor condition of the road through the farm (Burger 1986: 448). The survey diagram for the farm shows a public road running from south to north through the farm and a pubic outspan along this road about 2 km southeast of the town of Nababeep. By 1855 the copper mining bubble had burst but the mines of Phillips and

King remained profitable. Phillips and King sold their company and assets to the *Cape of Good Hope Copper Mining Company Ltd* in 1862.

Nababeep was purchased by Phillips & King in 1852. By 1857, it was reported that three openings had been made and copper extracted from the western end (Smalberger 1975: 94). There is conflicting information on this, as the centenary booklet on Namaqualand Copper noted that the grade was low, and it was only in 1883, that mining began in earnest (Okiep Copper Company 1952). The period 1888-1927, under the Cape Copper Company, is considered the height of operations. Smalberger (1975) claims that work was rather spasmodic, and various trial excavations were being undertaken up until 1899. By 1902, it was finally recognised as the second most important producing mine of the Cape Copper Company. Figures 10 and 11 show the mine during this period.

Figure 10: *Nababeep Mine shaft c. 1900 (Moffat Collection, South African Library). Source: Smalberger (1975).*

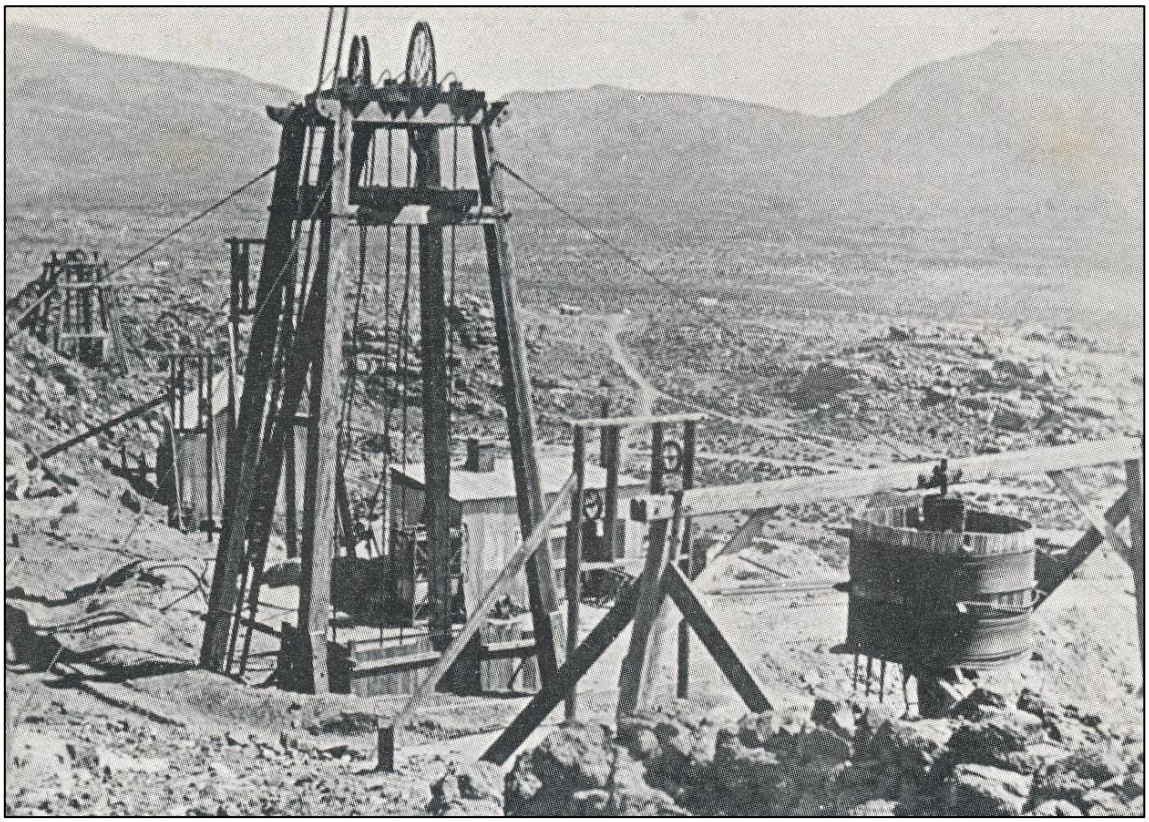

Figure 11: *The new shaft at Nababeep circa 1905 (H.R. Moffat Collection, South African Library, Cape Town) from Smalberger (1975).*

After a period of closure, the mines of Okiep and Nababeep were pumped out and re-opened in 1938 in order to mine the low-grade ore which the proceeding owners had abandoned as unprofitable. In 1952 the following was noted: "Where once Bruinkop (Brown Hill) stood is now a hole of 600 by 300 feet wide and 450 feet deep. As the road curves up to the mine gate you will notice the laboratory and mine office with Mill and Smelter against the hill slope. Above a prominent koppie is the new Stack, where you can see the layout of the town" (Okiep Copper Company 1952). Unfortunately, relates Smallberger (1975) since Nababeep was a company town, its only history was written up in the documents of the Cape Copper Company and these were all destroyed.

The Jan Coetzee Mine (located in the north-western part of the study area) became famous in 1966 when a "crystal cave" was opened underground at the mine. The mine was initially opened by the Cape Copper Company in 1888 and subsequently abandoned in 1907. It was reopened by the O'Kiep Copper Company in 1964 and finally closed in 1971 (Cairncross 2004). Flat Mine (located between Nababeep and Jan Coetzee) was also an early mine as evidenced by its name being present on a 1907 map.

<u>PROVINCIAL HERITAGE SITES</u>

There are four Provincial Heritage Sites (PHSs) in the area. These all relate to historic copper mining and are as follows (Figure 12 & 13):

- The copper smelting chimney at Springbok;
- The smoke stack at Okiep;

- The Cornish Beam pump at Okiep; and
- Simon van der Stel's original 17th century mine at Carolusberg.

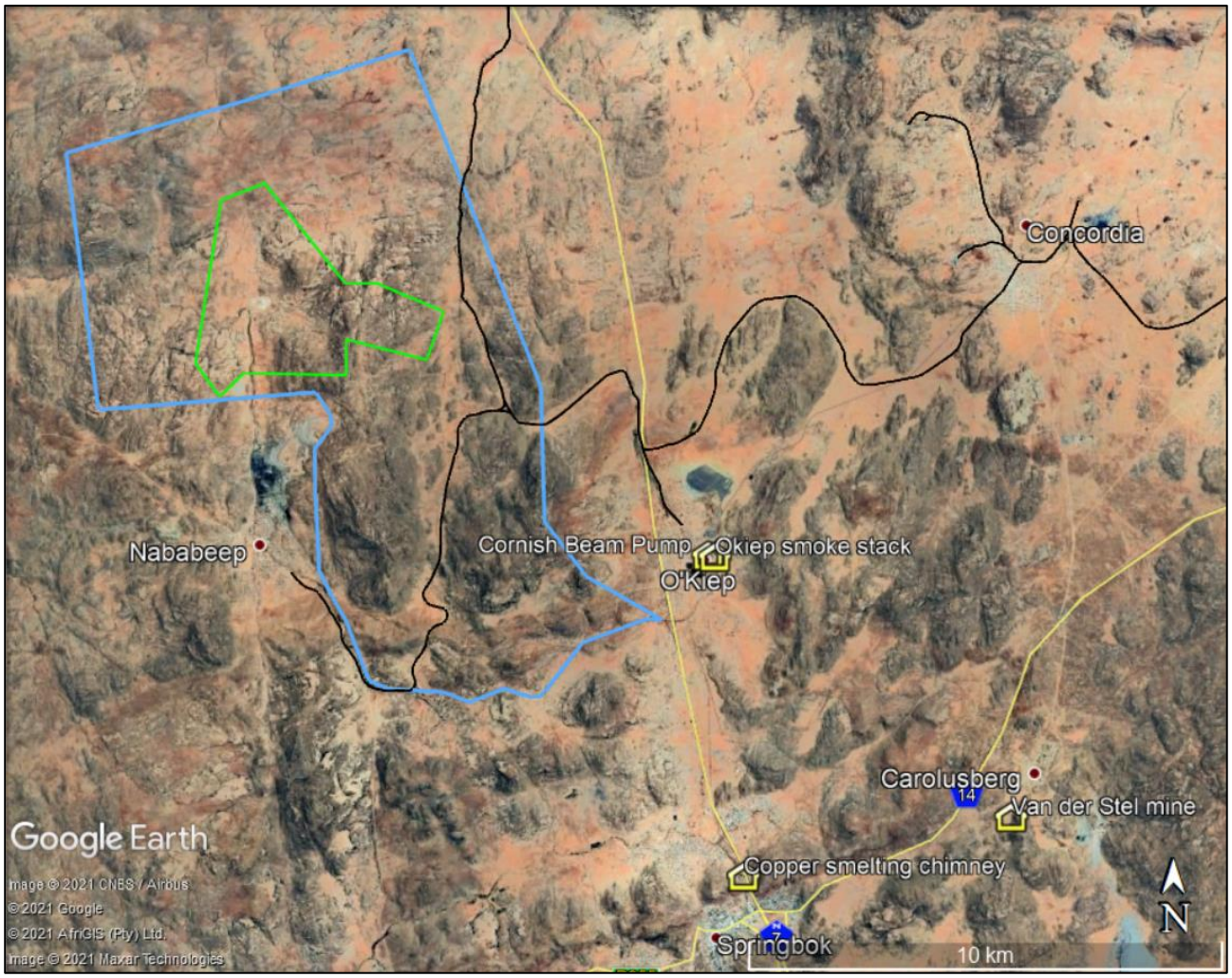

Figure 12: *Aerial view of the study area showing the locations of the four local PHSs (yellow house symbols). The layout of the historic copper railway is also shown (black lines).*

Figure 13: *Provincial heritage sites related to copper mining in the region. Top left: smelting furnace at Springbok. Top right: Smoke stack with Cornish Beam Pump in the background at Okiep. Bottom: Simon van der Stel mine with mining symbol.*

In addition, the historic steam locomotive known as Clara (Figure 14), currently located at the entrance to the museum at Nababeep, has been declared a heritage object (Government Gazette No 6873, 7 March 1980). Its historical and architectural interest is described thus: "Clara is one of the last remaining steam locomotives used for conveying copper ore on the historic rail section from Okiep and Nababeep to Port Nolloth. The locomotive was used from 1890 to 1941".

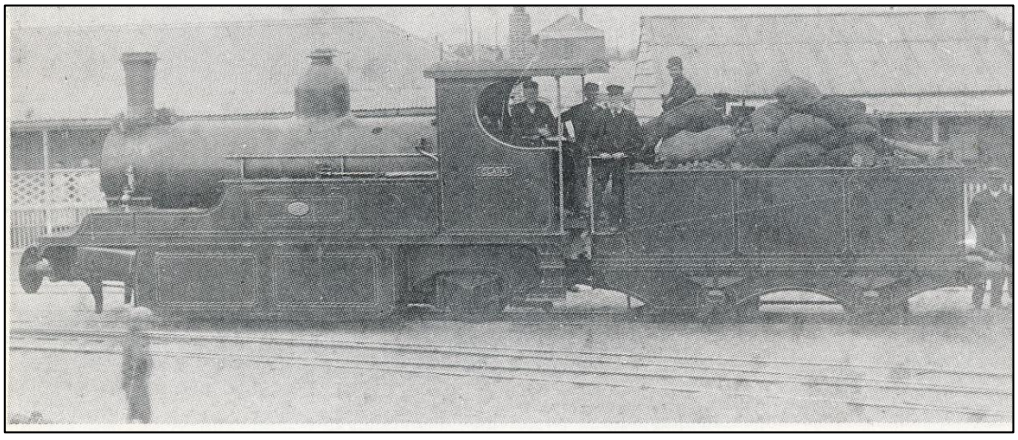

Figure 14: *Clara, one of the 'mountain type' locomotives introduced in 1890 (H.R. Moffat Collection). Source: Smalberger (1975).*

COPPER RAILWAY LINE

Initially the copper ore was transported by ox wagon to Hondeklip Bay for shipment to Swansea. In 1862 the Cape of Good Hope Copper Mining Company appointed a Cornishman, Richard Thomas Hall, to engineer a 150 km-long (91 miles) narrow-gauge railway from the mines around Okiep to Port Nolloth. Hall studied the terrain carefully and decided on the narrow gauge as it was best suited to carrying mineral ore (Burke 1995). Once the train reached the highest point, it could run down by gravitation to Okiep and the terminal of the line. Hall designed the line to follow the shortest route, with the minimum of cut and fill and the most gradual of gradients. The line had a curving and undulating character and Hall had a realistic view of drainage structures, believing it was cheaper to replace a length of track than to build substantial bridges. With respect to culverts, he had a "repair-if-washed-away" principle. Culverts and embankments were built of packed stone with no mortar (Ross 1998).

The first line was a tramway for animal-drawn traffic and was constructed on the 30-inch gauge with light rails. According to Burke (1995: 206), Hall used iron rails for each section. The tramway was a big success. The line was completed in stages, reaching Okiep in 1876. Up to 1876 the entire line was operated by animal drawn (mules) traffic. One of the major drawbacks of steam locomotives was the shortage of water. The light rail construction, however, did not favour the use of steam and for many years the line remained a tramway. The light rails were replaced with steel rails in order to replace the animal drawn tram with a steam service, with engines sourced at the Kitson Works in Yorkshire. However, the mountain section remained mule-operated until the arrival of a specially built mountain engine in 1890. Steam traction was finally extended to Okiep in 1893. Concordia was linked with the Okiep line at the Brakputs junction in 1889.

The eight-mile branch line from Garracoup Junction (on the main line) to Nababeep was constructed in 1899 (Hodge 1908; Ross 1998). According to Burger (1986) Garacoup (or Garracoup), was the name of the station between Nababeep and Okiep, and the word can be translated as "meerkat faeces". The station is further along the line, and it is not clear if there were any buildings at the junction itself. Figure 12 shows the railway lines in the area. Some 12.9 km of this railway alignment fall within the study area and include several stone bridges and culverts.

Although the main railway line between Port Nolloth and Okiep survived until 1945 when its new owners sold most of the line as scrap, the section between Nababeep and Okiep via Garracoup Junction remained in service until the construction and permanent surfacing of the Nababeep to Okiep road in 1950, when this section was decommissioned, and the rails uplifted (Figures 15 & 16).

The railway is considered "a feat of Victorian engineering" (Mining Heritage Trust of Ireland 2012: 8). Although the railway tracks and sleepers have been removed, the position of the line is still indicated by a raised earthen packed ridge. Various stone bridges and culverts are still present in the vicinity of the mines.

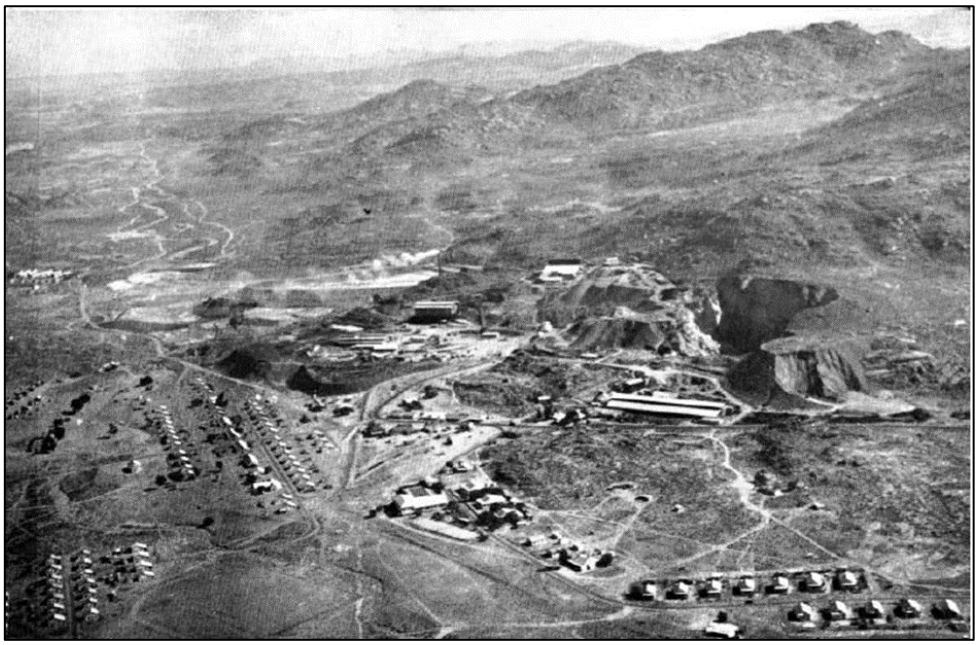

Figure 15: *This photograph of Nababeep dates to 1952, just after the tarring of the access road to the town. Source: Okiep Copper Company (1952).*

Figure 16: *1958 aerial photograph showing the historic railway berm entering the town (red arrows). The red dashes show its presumed continuation into the town.*

5.5. Cultural landscapes and scenic routes

There are three aspects of concern in terms of cultural landscapes. The first aspect of the cultural landscape is the archaeological one. It is expected that the area will contain many archaeological and more recent (i.e. <100 years old) features related to the historical occupation of the area by local herders and their ancestors. Such features were documented by Morris and Henderson (2018) in the Nababeep mining area they assessed, and also by Orton's (2019) recent survey of areas around Concordia. Although many of these features are less than 100 years of age and thus not legally archaeological, they all tell a similar story that extends back to the early 19th century when, owing to the influence of the missionaries, the Namakwa started to settle for longer periods close to the mission stations. They started to grow crops and to build stone structures and the landscape became far more marked by their presence than had been the case during precolonial times when the Namakwa were fully transhumant and left only very ephemeral traces of their passing. This cultural landscape is tied directly to living heritage which is addressed in Section 5.6.

The second aspect is the mining landscape. At the scale of individual mines this landscape can appear 'messy' and a detraction from the natural beauty of the region. This is because of the unsightly mine dumps present around the mines. The large mine dumps around Nababeep town are an obvious example (Figure 17). However, some mine dumps and some of the associated structures where these occur are all part of another historical landscape related to early copper mining in the area. This early copper mining landscape was for a number of years on the tentative list for declaration as a World Heritage Site. The declaration was never carried through, but four separate PHSs related to this copper mining landscape do exist in the wider area as noted above. Also an important part of this landscape is the historic copper railway which is represented only by its supporting berm and various related built features as noted above.

Proposed for PHS declaration, but never carried through, is the well-known Blue Mine in Springbok which was the first commercial copper mine in South Africa. It was opened in 1852 by Philips and King, a company based in Cape Town (Cairncross 2004).

The degree to which this copper mining landscape has changed over time can be established (to some degree) through an examination of aerial photography. The earliest series available for the area dates to 1958. Figure 17 shows comparative 1958 and modern images of Nababeep and the associated mining area. While it is clear that the town has grown over the last 60 years, the mine actually covers a very similar area but the dumps do appear far larger. A short distance to the north, one of the small mining areas visible on modern aerial photography (Wheal Flat Mine) is completely absent from the equivalent 1958 view (Figures 18). Likewise, a small mine (Jan Coetzee Southwest Mine) to the northwest of Nababeep was also not present in 1958 (Figure 19). Although mining activity was ongoing in the wider area 60 years ago, the overall degree of landscape scarring was far less due to the smaller number of mining areas opened. It is clear that much mining has occurred in the last 60 years and that the mining landscape has undergone much transformation.

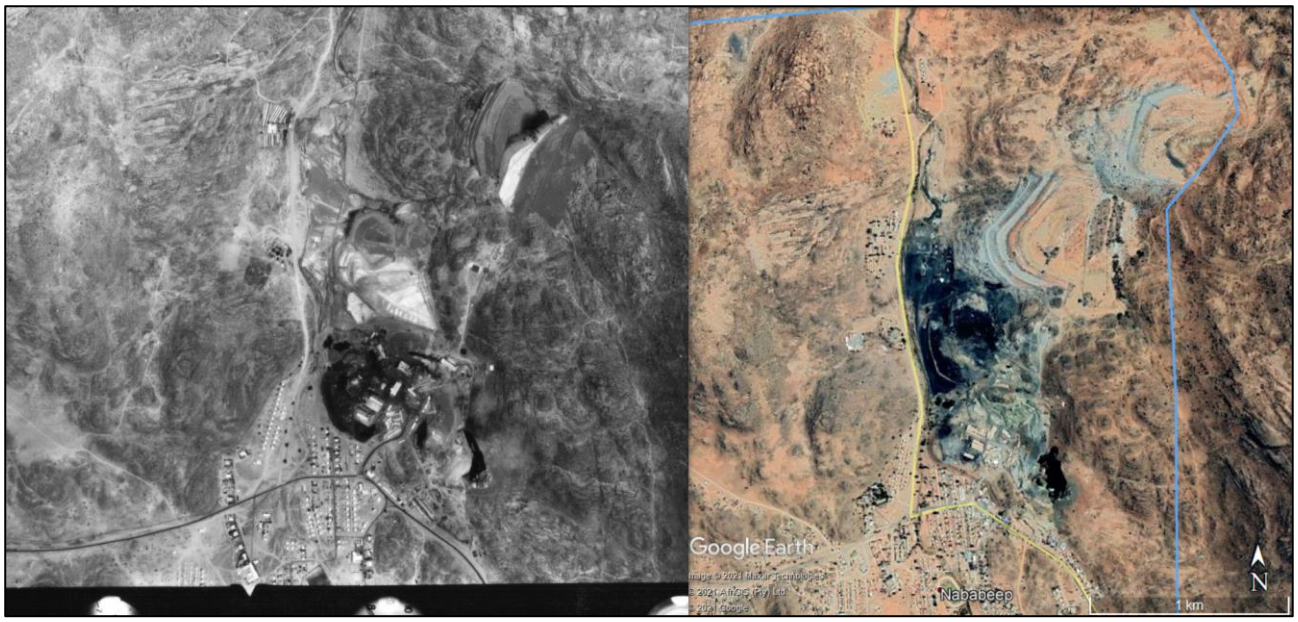

Figure 17: *1958 (408_009_08642) and modern aerial views of Nababeep (visible in the south) and the mining area to its north.*

Figure 18: *1958 (408_008_08697) and modern aerial views of Wheal Flat Mine located 6.2 km north of Nababeep town and within the approved mining area.*

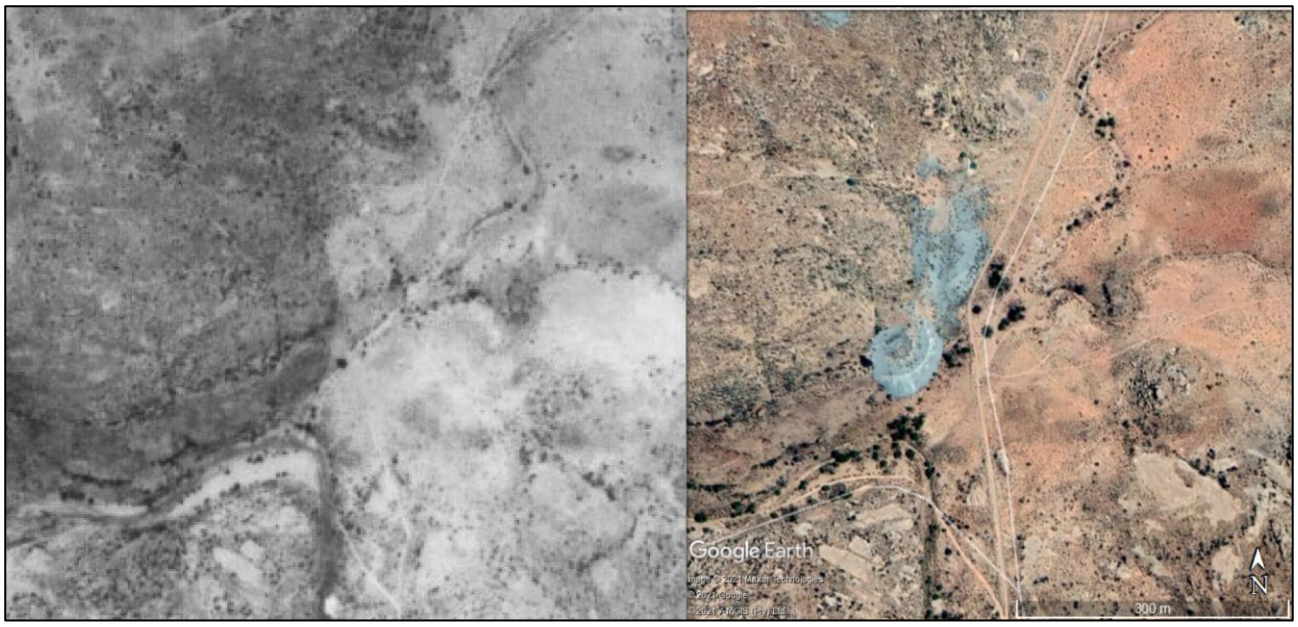

Figure 19: *1958 (408_008_08697) and modern aerial views of Jan Coetzee Southwest Mine located 6.3 km northwest of Nababeep town and within the present prospecting study area.*

The third component of the cultural landscape is the natural landscape that has scenic beauty and, during flower season, great tourism value to the surrounding area. Namaqualand is very well-known for its natural beauty and in this regard the N7 is seen as an important scenic route. Springbok and Okiep, both of which lie along the N7, are major destinations during the flower season. Nababeep is off this route, but people certainly do travel the minor roads of the region in search of spring flowers. The dry plains and rocky mountains with their granite domes create a primeval landscape with considerable aesthetic qualities.

5.6. Living heritage

There is a direct historical link between the small stock farmers in the Steinkopf, Concordia and Richtersveld Communal Lands and the Namaqua Khoekhoen who were encountered by early travellers in the 17th century. Many of the residents of the Concordia, Steinkopf and Richtersveld Communal Reserves are descended from these Nama-speaking pastoralists who at one time practised a transhumant lifestyle across most of Namaqualand. The Trekboer encroachment into the region from the mid-18th century resulted in the Namaqua losing access to their traditional grazing lands and they eventually gravitated towards the mission stations that were established at Leliefontein, Steinkopf, Komaggas, Concordia and the in Richtersveld during the 19th century. Residents were granted a “Ticket of Occupation” in the mid-19th century and the Mission Stations and Communal Reserves Act of 1909 placed the communal land under government control.

The mission stations provided a form of social support for the Namaqua, but the establishment of schools and churches in the reserves meant that the inhabitants started practicing a more limited transhumant cycle using the villages as one permanent point in their seasonal cycle. Steinkopf residents were still practicing a limited form of transhumance in 1986 (Webley 2009) but many of the old stockposts have now become semi-permanent settlements.

Stockpost locations are typically situated next to a rocky hill or koppie, where the rock provides some shelter from the elements. Stockposts often have one or more kraals nowadays often enclosed by wire fences, whereas in the past they were constructed of stone. In the past the inhabitants would stay in Matjies houses made of a lathe framework covered in rush mats, an architectural tradition that dates back to at least the 17th century and was first documented in the illustrations of early travellers to the Cape. However, these have now been supplanted with corrugated iron houses. Food is often cooked in a separate shelter near the Matjieshuis, known as a "kookskerm". Other associated elements at the stockpost may include an outside oven made of stone and clay, and a threshing floor ("trapvloer") for threshing of wheat. There is a great deal of similarity between stockposts found in Steinkopf, Concordia and the Richtersveld. They are a tangible example of a rapidly disappearing pastoralist way of life in the communal lands of Namaqualand and a very good example of "living heritage" as defined in the NHRA. The continuation of traditional practices, for example the outdoor cooking shelters sometimes seen outside houses and the rock and earth ovens, shows that, although life has changed considerably for the local populations, their living heritage remains alive in the area.

Many features related to this living heritage, such as kraals, house floors, threshing floors and other related features have been recorded in the general area, though these are most frequently located in surveys closer to the historical mission stations (Gaigher 2012; Kaplan 2010; Orton 2018, 2019; Smith 2013).

5.7. Statement of significance and provisional grading

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ''cultural significance'' means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined Section 3(3) of the NHRA (see Section 2 above).

The palaeontological resources are deemed to have low cultural significance for their scientific value, although a very small possibility of finding higher significance materials does exist in the region. Although difficult to grade as yet undiscovered fossils, the potential palaeontological resources of the region can be regarded as being GPA.

Although Stone Age archaeological traces are very rare in this landscape and more recent historical archaeological resources are considered to have medium cultural significance for their historical and social values, the archaeological remains of 19th century mining are far more common and are deemed to have high cultural significance for their architectural, historical, scientific, social and technological values. Although the proposed declaration as a World Heritage Site has fallen through, there are mining-related PHSs in the area and Grade II is certainly applicable to the industrial archaeological mining landscape as a whole. The vast majority of other archaeological resources likely to occur in the area would probably have low significance and are generally considered to be GPC.

Although none were found, graves could still be present within the study area and are deemed to have high cultural significance for their social value and would be graded IIIA.

The built heritage of the wider area is generally of no more than medium cultural significance for its architectural, historical and social values. Although four PHSs do occur in the area and are thus Grade II resources, they are all outside of the resent study area.

The cultural landscapes of the area are considered to be of high significance. The archaeological landscape has historical, scientific, social and spiritual significance, the mining landscape is considered to have historical, scientific, social and technological significance, and the natural landscape has aesthetic and scientific significance.

6. ASSESSMENT OF IMPACTS

Impacts to fossils, archaeological resources and built heritage are possible and are assessed here. Due to the nature of the proposed drilling, no impacts to the wider cultural landscape are expacted since the landscape will remain as before with no perceivable changes. Despite the very high cultural significance of the landscape, this aspect is thus of no further concern and is not assessed here.

6.1. Impacts to palaeontological resources

Direct impacts to fossils could occur during the operation phase of any drilling that takes place. However, the chances of intersecting fossils are considered to be extremely small and this aspect if heritage is of no further concern. The significance both before and after mitigation is considered to be **low negative** (Table 2). No specific mitigation measures are required but a Chance Finds Procedure should be included in the Environmental Management Program (EMPr) so that in the event that a fossil is found workers will know what to do. A Chance Finds Procedure is appended to this report. Because the chances of impacting fossils are so low, the cumulative impacts are also considered to be of low significance. There are no fatal flaws in terms of palaeontology.

Table 2: *Assessment of palaeontological impacts.*

Potential impacts on palaeontological resources	
Nature and status of impact:	Direct, Negative
Extent and duration of impact:	Local, Permanent
Intensity	Low
Probability of occurrence:	Improbable
Degree to which the impact can be reversed:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be mitigated:	Low
Proposed mitigation:	Application of a chance finds procedure
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low

6.2. Impacts to archaeological and built heritage resources

Direct impacts to archaeological and built heritage resources could occur during the operation phase of any drilling that takes place. However, archaeological resources are generally rare on the landscape. Although unlikely, there could also be isolated buildings still associated with some of the more remote historical mines in the area. The impact significance before and after mitigation is thus rated as **low negative** (Table 3). The only mitigation measures that can be applied are to ensure that all historical features are avoided during drilling. Advice should be sought from an archaeologist once the drill sites are known in order to assist with this. Because such prospecting does not typically impact on heritage, the cumulative impacts are similarly of low significance. There are no fatal flaws in terms of archaeology.

Table 3: *Assessment of archaeological and built heritage impacts.*

Potential impacts on archaeological resources	
Nature and status of impact:	Direct, Negative
Extent and duration of impact:	Local, Permanent
Intensity	Low
Probability of occurrence:	Improbable
Degree to which the impact can be reversed:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be mitigated:	High
Proposed mitigation:	Avoid any historical features, seek specialist archaeological advice
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low

6.3. The No-Go alternative

Implementation of the No-Go alternative would mean that the status quo is retained and no impacts would occur. It should be noted that the no-go alternative would be detrimental to future mining in the area and would thus potentially reduce the inflow of investment into the local economy. Mining could also be a way of protecting, upgrading and promoting mining heritage. The No-Go option could, therefore, not be the best option for heritage resources.

6.4. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect fossils, rock art and archaeological materials.

6.5. Cumulative impacts

Due to the nature of the proposed prospecting, cumulative impacts are not expected to be of any concern for this project. They are considered to be of low significance.

6.6. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many vantage points is undesirable. Because of the nature of the proposed development, such an impact is not envisaged.

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The only points for inclusion in the EMPr are as follows:

- Once the drilling sites are determined, a map should be sent to an archaeologist to consider from the desktop and advise whether any potentially significant areas are to be impacted and whether any survey or avoidance should be effected;
- Project staff must carefully inspect each proposed drilling site for any signs of historical materials or fossils before work starts. If anything of possible concern is seen then it should simply be avoided; and
- In the event that any fossils are uncovered during prospecting, the attached fossil chance Finds Procedure should be applied.

8. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. There presently is a need for copper to support the renewable energy industry and without prospecting for new ore it will not be possible to establish new mining ventures. This would be a negative socio-economic impact both in terms of the ultimate provision of clean energy to South Africa and in terms of reducing the chances of economic investment into the area. Prospecting is, in the long term, thus beneficial to the local economy.

9. CONCLUSIONS

This report has found that palaeontological and Stone Age resources are rare on the landscape and are of little to no concern. More recent archaeological remains relate to the use of the landscape after the advent of mission stations in the area and, although not of high significance in and of themselves, such traces are also related to living heritage in the area which is significant. Of greater significance is the historical mining landscape which is comprised of industrial archaeological features and some buildings and which has been poorly protected.

In the words of the Mining Heritage Trust of Ireland, who visited the Copper Mining Landscape in Namaqualand in 2012 prior to its withdrawal from the UNESCO Tentative World Heritage Listing: “The Namaqualand mining landscape is superlative, but it has fallen victim to unsympathetic environmental remediation and has not escaped the attention of recyclers who have stripped

everything of mercantile value from mines. If this area wishes to achieve World Heritage status, it will need to demonstrate valorisation of the widely dispersed elements of its extant heritage and how these are to be managed, conserved and protected in the future". In the event, formal proclamation of the Namaqualand Copper Mining Landscape (NCML) did not take place and in 2015, the NCML was removed from the World Heritage Listing. In the absence of formal proclamation, it is suggested that the NCML tentatively enjoys at least a Grade II or IIIA significance.

The nature of the proposed prospecting and very small number of surface heritage traces means that impacts to significant resources are highly unlikely to occur. For precautionary reasons, a desktop evaluation of the drill sites will help to further reduce the chances of any impacts and allow for a site inspection if necessary.

No specific buffers are required anywhere, but this is subject to re-evaluation once the drilling locations are known.

9.1. Reasoned opinion of the specialist

Given the very limited chances of any heritage impacts occurring, it is the opinion of the heritage specialist that the proposed prospecting project may proceed.

10. RECOMMENDATIONS

It is recommended that SAHRA allow the prospecting project to proceed as planned, but subject to the following recommendations:

- Once the drilling locations are known, a map should be provided to an archaeologist for desktop analysis. If any potentially sensitive areas cannot be avoided then a brief site visit should be carried out to confirm sensitivity and, in consultation with the prospecting geologists, propose alternative nearby drill sites. An opinion should then be expressed in a letter that should be submitted to SAHRA confirming whether or not drilling may proceed;
- Regardless of the above archaeological opinion, all drill sites should be carefully inspected by project staff to ensure that no heritage features are present;
- A fossil Chance Finds Procedure must be included in the project EMPr and implemented in the event of any chance finds of fossils, and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

11. REFERENCES

Almond, J.E. 2019. Proposed re-opening of the Rietberg, Jubilee and Houmeep disused copper mines near Concordia, Namakwaland Magisterial District, Northern Cape. Report prepared for ASHA Consulting (Pty) Ltd. Cape Town: Natura Viva cc.

Almond, J.E. & Pether, J. 2009. Palaeontological heritage of the Northern Cape. SAHRA palaeotechnical report. Cape Town: Natura Viva cc & Kommetjie: John Pether.

Bamford, M. 2018. Palaeontological Impact Assessment for the proposed mining operation near Nababeep and Springbok, Northern Cape Province. Report prepared for Southern African Tantalum Mining (Pty) Ltd. Johannesburg: Marion Bamford.

Burke, P. 1995. *The Siege of O'Okiep: Guerilla campaign in the Anglo-Boer War*. War Museum of the Boer Republics: Bloemfontein.

Burger, CR. 1986. 'n Ondersoek na die Oorsprong en Betekenis van plek- en plaasname in die Landdrosdistrik Namakwaland. Unpublished PhD at the University of Stellenbosch.

Cairncross, B. 2004. History of the Okiep Copper District Namaqualand, Northern Cape, South Africa. *The Mineralogical Record* 35: 289-317.

De Beer, C.H., Gresse, P.G., Theron, J.N. & Almond, J.E. 2002. The geology of the Calvinia area. Explanation to 1: 250 000 geology Sheet 3118 Calvinia. Council for Geoscience, Pretoria.

Dewar, G. 2007. *The archaeology of the coastal desert of Namaqualand, South Africa: a regional synthesis*. Unpublished DPhil thesis: University of Cape Town.

Eastwood, E.B. & Smith, B.W. 2005. Fingerprints of the Khoekhoen: geometric and handprinted rock art in the Central Limpopo Basin, southern Africa. *South African Archaeological Society Goodwin Series* 9: 63–76.

Hodge, E. 1908. Reminiscences of Edward Hodge, Chief Mining and Railway Engineer, Cape Copper Company, 1877 to 1905. Manuscript in the Cape Archives, Reference A 2320, (47F).

Kaplan, J. 2010. Archaeological Impact Assessment of a proposed wind energy facility near Springbok, Northern Cape. Unpublished report for DJ Environmental Consultants.

Kaplan, J. 2016. Heritage Impact Assessment: Namaqualand Regional Water Supply Scheme – upgrade of the water supply pipeline from Okiep to Concordia and Carolusberg, Northern Cape Province. Unpublished report for Enviroafrica.

Macey, P.H., Siegfried, H.P., Minnaar, H., Almond, J. & Botha, P.M.W. 2011. The geology of the Loeriesfontein area. Explanation to 1: 250 000 geology sheet 3018. Council for Geoscience, Pretoria.

Marais, J.A.H., Agenbacht, A.L.D., Prinsloo, M. & Basson, W.A. 2001. The geology of the Springbok area. Explanation to 1: 250 000 geology Sheet 2916 Springbok. Council for Geoscience, Pretoria.

Morris, D. 2018. Heritage Impact Assessment for the proposed prospecting at Spektakel, Namakwa District Municipality, Northern Cape.

Okiep Copper Company. 1952. *Namaqualand Copper: 100 years of progress*. Cape Town: R. Beerman Publishers. Accessed online from "Namaqualand Geology & Archaeology" on 5 June 2021 at: https://www.facebook.com/groups/572343416862762?_rdc=1&_rdr.

Orton, J.D. 2012. Late Holocene archaeology in Namaqualand, South Africa: hunter-gatherers and herders in a semi-arid environment. Unpublished D Phil thesis: University of Oxford.

Orton, J. 2018. Heritage Feasibility Study, Concordia Wind Energy Facility, Northern Cape. Report prepared for juwi Renewable Energies (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. 2019. Heritage Impact Assessment: proposed reopening of three copper mines at Concordia, Namakwaland Magisterial District, Northern Cape. Report prepaed for N.J. van Zyl. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. & Halkett, D. 2010. Stone tools, beads and a river: two Holocene microlithic sites at Jakkalsberg in the northwestern Richtersveld, Northern Cape. *South African Archaeological Bulletin* 65: 13-25.

Robertshaw, P.T. 1978. The archaeology of an abandoned pastoralist camp-site. *South African Journal of Science* 74: 29-31.

Ross, G. 1998. Richard Thomas Hill and the Little Railway of Namaqualand. *SA Rail & Harbours* July-September 1998: 142-147.

Rudner, J. & Rudner, I. 1968. Rock-art in the thirstland areas. *South African Archaeological Bulletin* 23: 75–89.

SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

Smalberger, J.M. 1975. *A history of Copper Mining in Namaqualand*. C. Struik (Pty) Ltd: Cape Town & Johannesburg.

Smith, A.B. 2013. Proposed Solar PV Facility: Klipdam Farm 134/17 Springbok: A heritage impact assessment. Unpublished report for Footprint Environmental Services.

Smith, B.W. & Ouzman, S. 2004. Taking stock: identifying Khoekhoen herder rock art in southern Africa. *Current Anthropology* 45: 499–526.

Van Rijssen, W.J. 1994. Rock art: the question of authorship. In: Dowson, T.A. & Lewis-Williams, D. (eds) *Contested Images: Diversity in Southern African Rock Art Research*: 159–175. Johannesburg: Witwatersrand University Press.

Webley, L. 1992. The history and archaeology of pastoralist and hunter-gatherer settlement in the North-Western Cape, South Africa. Unpublished DPhil thesis: University of Cape Town.

Webley, L. 2009. The Namaqualand stockpost. Vernacular Architecture Society of South Africa 21: 21-35.

APPENDIX 1 – Curriculum Vitae

Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 23 Dover Road, Muizenberg, 7945
Telephone: (021) 788 1025
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Birth date and place: 22 June 1976, Cape Town, South Africa
Citizenship: South African
ID no: 760622 522 4085
Driver's License: Code 08
Marital Status: Married to Carol Orton
Languages spoken: English and Afrikaans

Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)
  Stone Age archaeology (awarded 2007)
  Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)
  Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP) membership number: 43

- Accredited Professional Heritage Practitioner

- ***Memberships and affiliations:***

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 –
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –
Kalk Bay Historical Association	2016 –
Association of Professional Heritage Practitioners member	2016 –

Fieldwork and project experience:

Extensive fieldwork and experience as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

Feasibility studies:

- Heritage feasibility studies examining all aspects of heritage from the desktop

Phase 1 surveys and impact assessments:

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 archaeological test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda, Namaqualand
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

Awards:

Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.

APPENDIX 2 – Fossil Finds Procedure

<table>
<tr><td colspan="3">APPENDIX: CHANCE FOSSIL FINDS PROCEDURE: Diamond prospecting on Farm 21 near Pampierstad, Northern Cape</td></tr>
<tr><td>Province & region:</td><td colspan="2">NORTHERN CAPE: Frances Baard District Municipality (Dikgatlong Local Municipality)</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za).</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Campbell Rand Subgroup (Ghaap Group) carbonate bedrocks, possible Cretaceous fluvial gravels, Cretaceous kimberlite intrusions, Late Caenozoic calcretes, other superficial sediments.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Well-preserved stromatolites within Precambrian carbonate bedrocks. Petrified wood and other fossil remains within Cretaceous fluvial gravels. Mammalian remains (bones, teeth, horncores), calcretised trace fossils etc within calcrete hardpans and karstic fissure infills.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>