

**HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED
KOKERBOOM 4 WIND ENERGY FACILITY ON
FARM 213/REM, NORTH OF LOERIESFONTEIN,
CALVINIA MAGISTERIAL DISTRICT, NORTHERN CAPE**

Required under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999).

SAHRA Case No.: TBC

Report for:

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On behalf of:

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EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by Zutari (Pty) Ltd (formerly Aurecon South Africa (Pty) Ltd) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a wind energy facility on a site some 61 km north of Loeriesfontein in Northern Cape. The study area is located on the remainder of Aan de Karee Doorn Pan 213. It is centred on S30° 24' 42" E19° 32' 30".

The project will entail the construction of up to 8 wind turbines with a hub height of up to 150 m and a rotor diameter of up to 180 m, as well as associated roads, power lines, substation, battery energy storage system and support infrastructure. Two other operational wind energy facilities occur to the south and east of the proposed site, namely Khobab and Loeriesfontein Wind Farms respectively, while other renewable energy projects have been granted environmental authorisations in close proximity.

The study area is comprised of gently undulating topography with low, scrubby vegetation. The ground is variably sandy or gravelly.

Heritage resources were found to be generally scarce in the study area, but a few archaeological finds were located. One site of medium significance was the only significant site. The landscape is also considered to be a heritage resource but its cultural component is very limited and a new layer of electrical infrastructure is starting to dominate the landscape around the site.

Because the layout has been designed to avoid all known significant heritage resources on the site, it is proposed that the project be allowed to proceed. However, the following conditions should be included as part of the authorisation should one be issued:

- The final layout must be examined in the field by an archaeologist prior to construction with recommendations made for mitigation as required; and
- If any archaeological material or human burials are uncovered during the course of development then the find should be protected from further disturbance and work in the immediate area should be halted if necessary. 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.

Brakdak: A flat roofed house made with beams overlaid by sticks and then reeds and all with a mud/clay layer on the top.

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

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

Late 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.

Muurkas: A cupboard built into a wall.

Patinated: having a weathered surface indicative of having been exposed to the elements for a long period of time.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

CCS: Cryptocrystalline silica

CRM: Cultural Resources Management

DEFF: National Department of Environment, Forestry and Fisheries

EIA: Environmental Impact Assessment

EMPr: Environmental Management Programme

ESA: Early Stone Age

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Late Stone Age

MSA: Middle Stone Age

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

Contents

1. INTRODUCTION	1
1.1. The proposed project	2
1.1.1. Project description	2
1.1.2. Identification of alternatives	3
1.1.3. Aspects of the project relevant to the heritage study	3
1.2. Terms of reference	3
1.3. Scope and purpose of the report	4
1.4. The author	4
1.5. Declaration of independence	4
2. HERITAGE LEGISLATION	4
3. METHODS	5
3.1. Literature survey and information sources	5
3.2. Field survey	6
3.3. Specialist studies	7
3.4. Impact assessment	7
3.5. Grading	7
3.6. Consultation	7
3.7. Assumptions and limitations	7
4. PHYSICAL ENVIRONMENTAL CONTEXT	8
4.1. Site context	8
4.2. Site description	8
5. FINDINGS OF THE HERITAGE STUDY	9
5.1. Archaeology	11
5.1.1. Desktop study	11
5.1.2. Site visit: Stone Age archaeology	12
5.2. Historical aspects and the built environment	14
5.2.1. Desktop study	14
5.2.2. Site visit	15
5.3. Graves	15
5.4. Cultural landscape	15
5.5. Statement of significance and provisional grading	15
5.6. Summary of heritage indicators	16
6. ASSESSMENT OF IMPACTS	17
6.1. Impacts to archaeological resources	17
6.1.1. Management and mitigation requirements	17
6.2. Impacts to the cultural landscape	17
6.3. The No-Go alternative	18
6.4. Existing impacts to heritage resources	18
6.5. Cumulative impacts	18
6.6. Levels of acceptable change	18
7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME	20
8. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS	20

9. CONCLUSIONS 20
 9.1. Reasoned opinion of the specialist.....20

10. RECOMMENDATIONS 21

11. REFERENCES 21

APPENDIX 1 – Curriculum Vitae 24

APPENDIX 2 – Site Sensitivity Verification..... 26

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Zutari (Pty) Ltd (formerly Aurecon South Africa (Pty) Ltd) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a wind energy facility on a site some 61 km north of Loeriesfontein in Northern Cape (Figures 1 & 2). The study area is located on the remainder of Aan de Karree Doorn Pan 213. It is centred on S30° 24' 42" E19° 32' 30" and is to be known as the Kokerboom 4 wind energy facility (WEF). The operational Khobab and Loeriesfontein WEFs occur on neighbouring farms to the south and east respectively.

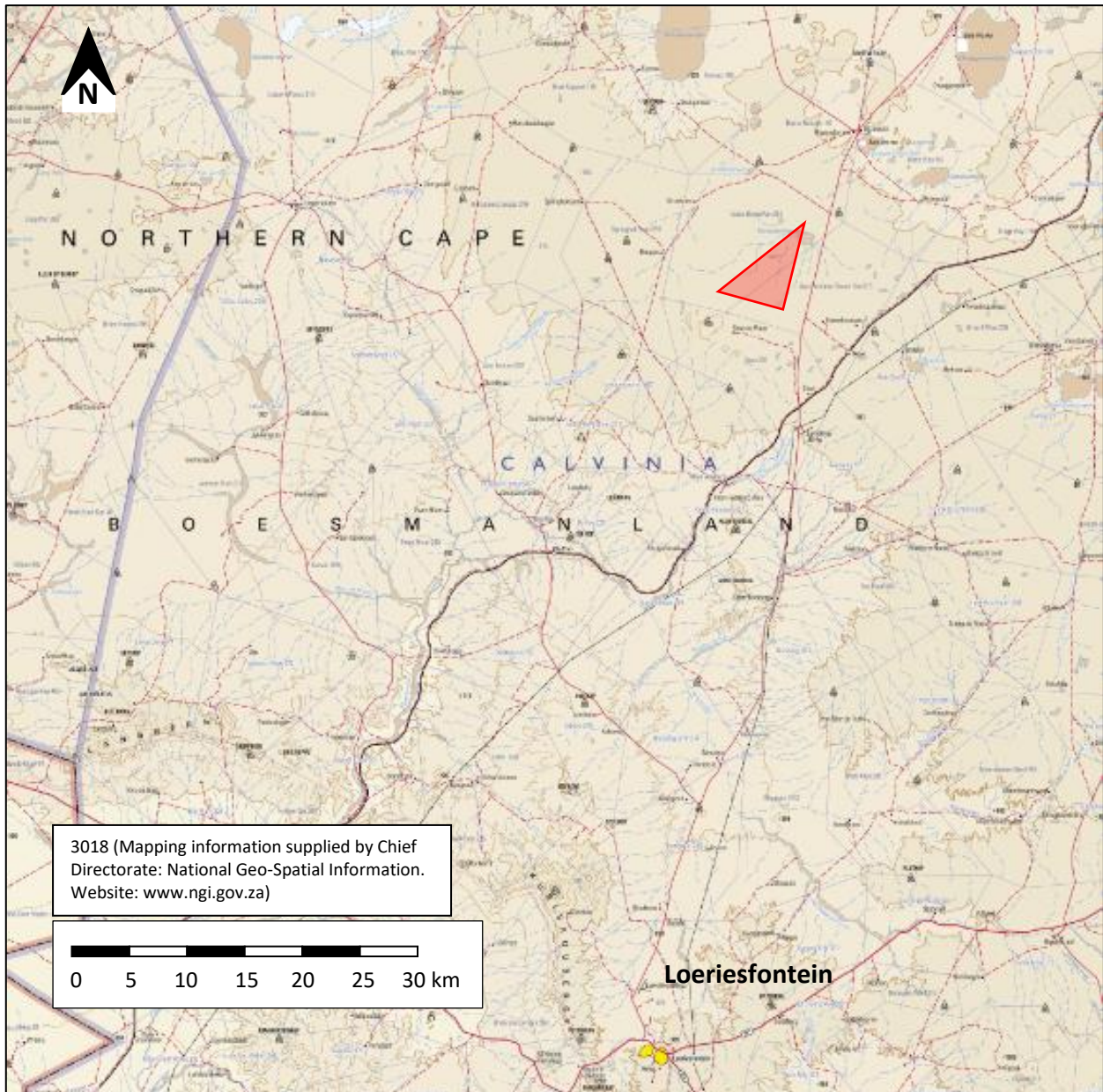


Figure 1: 1:250 000 topographic map showing the location of the Kokerboom 4 site (red shaded polygon) relative to the town of Loeriesfontein in the south. The bold wavy line passing from southwest to northeast is the Sishen-Saldanha Railway.

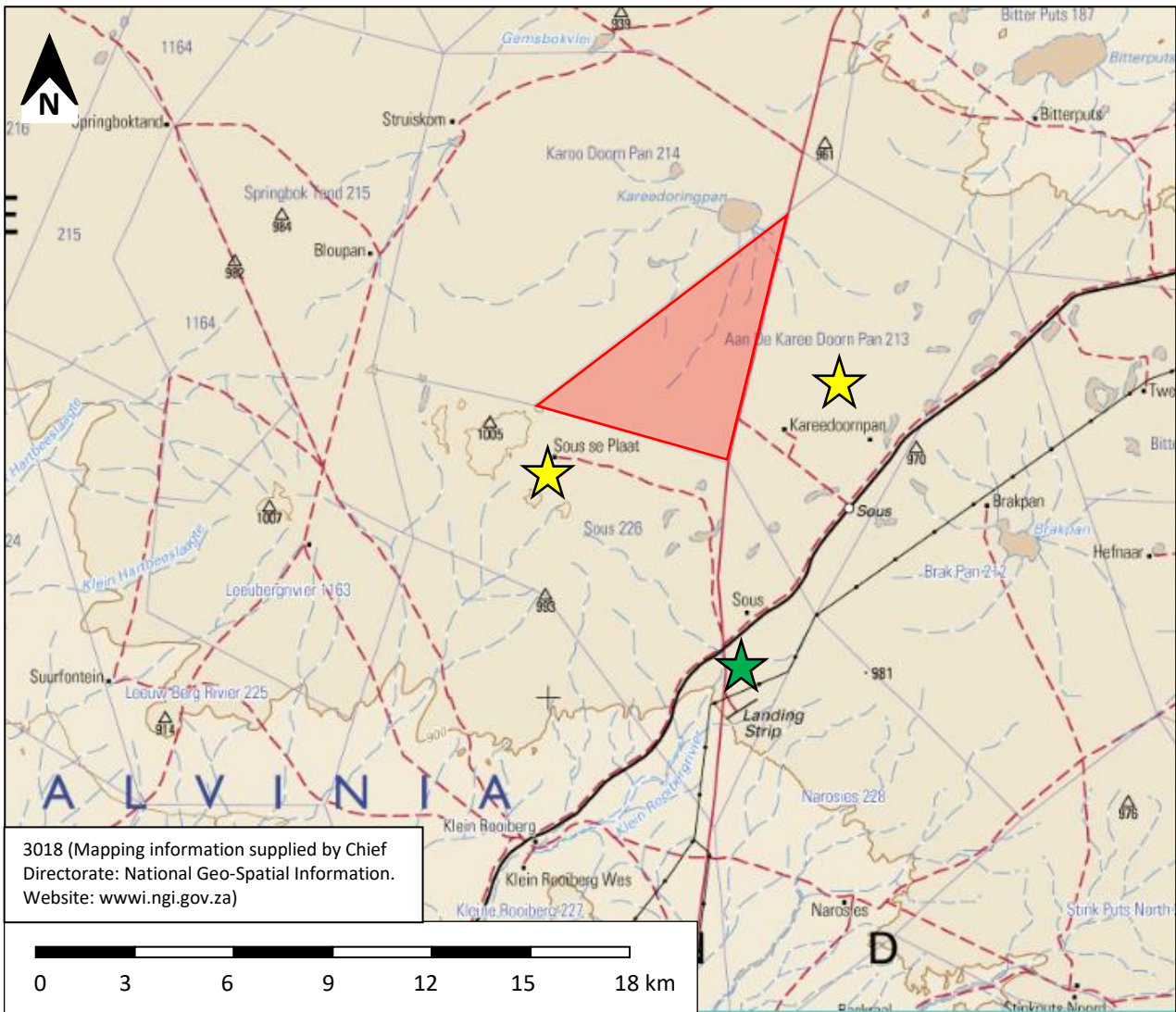


Figure 2: 1:250 000 topographic map of the immediate vicinity of the study area (red shaded polygon = site). Other wind farm developments already constructed in the vicinity are indicated by the yellow stars, while the green star denotes the position of the Eskom Helios Substation.

1.1. The proposed project

1.1.1. Project description

The proposed project would have a generating capacity of up to 40 MW and would comprise of the following components:

- Up to 8 wind turbines with a hub height of up to 150 m and a rotor diameter of up to 180 m (maximum tip height 240 m);
- Hard standing surfaces of approximately 150 m x 100 m and laydown/assembly areas of 150 m x 15 m alongside each turbine;
- Internal access roads with reserves of 20 m width. The actual roads will be 6 m in width with a 1 m wide drain on either side while the remaining 12 m will be for burial of electrical cabling (the 12 m will be rehabilitated after construction with the 8 m road and drain width remaining present during operation);

- A substation (1 ha), operation and maintenance building (0.5 ha), oil storage (0.1 ha), battery energy storage facility with a capacity of up to 70 MWh (2 ha);
- Medium voltage underground powerlines linking the turbines to the substation and following the roads;
- Two temporary laydown and site camp areas of 15 ha each (one would be near the entrance and one near the substation and it is not yet known whether one or both will be utilised); and
- A centralised concrete batch plant will be erected for the concrete works required during construction. An area of approx. 100m x 100m is required for the batch plant. The batch plant area will include aggregate stockpile areas, cement silos, truck parking areas and the batch plant itself. Where possible, the batch plant will be located within one of the construction laydown areas.

1.1.2. Identification of alternatives

- Although it makes no difference from a heritage point of view, two alternative battery technology types are proposed:
 - Lithium-ion; and
 - Redox flow.

No other alternatives are proposed. Specialist field data were used to develop a layout with the minimum possible overall impact. As such, the only alternative for assessment is the No-Go alternative.

1.1.3. Aspects of the project relevant to the heritage study

All aspects of the proposed development are relevant since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

1.2. Terms of reference

ASHA was asked by Zutari to compile a heritage impact assessment (HIA) that would meet the requirements of the heritage authorities and deal with all aspects of heritage except palaeontology which has been considered by another specialist. In this regard, ASHA was asked to:

- Undertake a site investigation to determine the *status quo* and identify any sensitive features or no-go areas;
- Provide shapefiles of all sensitive features;
- Make use of the Zutari Impact Assessment Methodology when assessing impacts for all alternatives proposed as part of the Kokerboom 3 Wind Farm as well as cumulative impacts;
- Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts and improve positive impacts for each phase of the project, where required, and the significance of impacts pre- and post-mitigation;
- Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of Environmental Authorisation requirements, should the development be authorised;
- Comply with the content requirements for specialist reports listed in Appendix 6 of the 2014 EIA Regulations (GN R982 of 2014, as amended); and

- Provide a site sensitivity verification report using the Screening Tool map.

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 National Department of Environment, Forestry and Fisheries (DEFF) who will review the Environmental Impact Assessment (EIA) 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 the Western Cape and Northern Cape provinces of South Africa 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) 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. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old;
- 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.”

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, Section 3(3) describes the reasons a place or object may have cultural heritage value; some of these speak directly to cultural landscapes.

Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. 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 DEFF.

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. This literature included published material, unpublished commercial

reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:250 000 map was sourced from the Chief Directorate: National Geo-Spatial Information.

3.2. Field survey

The southernmost part of the site was surveyed on 20 and 21 February 2017, and 28 February 2020. Two archaeologists conducted the surveys. The surveys were during late summer but, in this relatively dry area with only low vegetation, seasonality makes no difference to the visibility of heritage materials on the landscape. During the surveys the positions of finds were recorded on a hand-held GPS receiver set to the WGS84 datum (Figure 3). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

It should be noted that amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report because of the stability of the landscape.

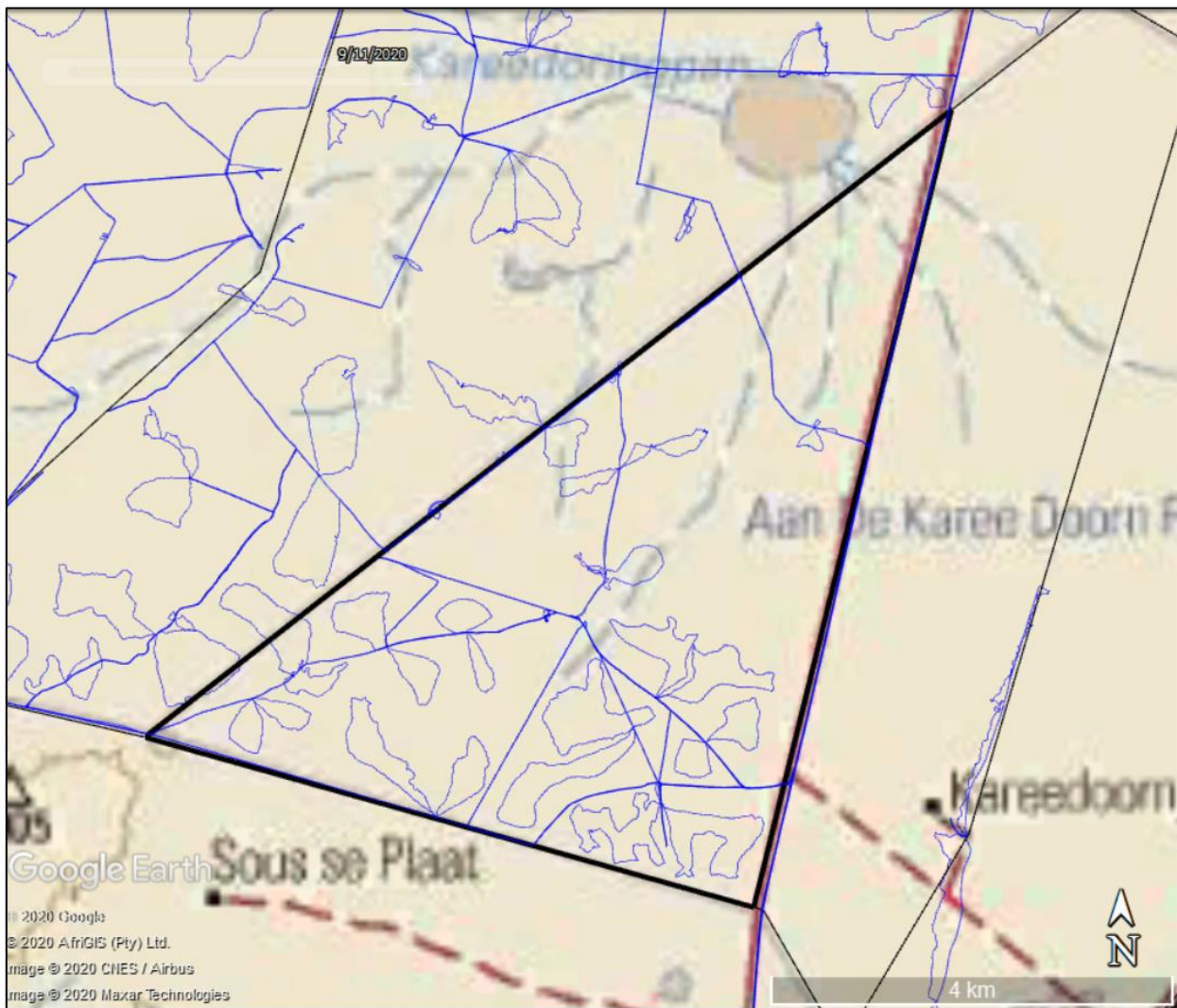


Figure 3: Map of the Kokerboom 4 study area (the bold black polygon denotes the relevant farm portion) showing the drive and walk paths created during the survey (blue lines). Note that blue lines outside the study area relate to other surveys by the present author.

3.3. Specialist studies

No specialist studies were commissioned for the present report, although palaeontological heritage resources have been assessed by another specialist (Dr John Almond) and reported on separately¹.

3.4. Impact assessment

For consistency, the impact assessment was conducted through application of a scale supplied by the Environmental Assessment Practitioner, Zutari.

3.5. 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 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' and rated with an A (high/medium significance, requires mitigation), B (medium significance, requires recording) or C (low significance, requires no further action).

3.6. Consultation

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA 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.

3.7. Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. Given the very large area of the site and the nature of wind energy projects (which are prone to layout alterations), it was not practical to survey the entire site in detail, but the southern area where the project is proposed was quite well covered. Because the survey was carried out during the scoping phase in order to identify areas to be avoided, the actual turbine and road layout itself has not been surveyed. However, these are not deemed to be

¹ Almond, J. 2020. Palaeontological heritage assessment: site sensitivity report & letter of exemption from further specialist studies. Proposed Kokerboom 3 and Kokerboom 4 Wind Farms near Loeriesfontein, Namaqua District Municipality, Northern Cape. Report prepared for Zutari (Pty) Ltd.

serious limitations because the survey was able to establish the typical distribution and frequency of archaeological and other heritage resources in the study area.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The site is in a very remote location on land that is used for livestock grazing. A precedent has already been set for the development of wind energy facilities with two already constructed to the south and east of the present study area (see Figure 2) and several wind energy facilities and a solar energy facility having been authorised nearby. Other applications in the area have included both wind and solar energy projects. A large Eskom Substation (Helios) lies 9 km south of the present study area, alongside the gravel road that leads northwards from Loeriesfontein. Between the substation and the study area, the Sishen-Saldanha Railway bisects the landscape.

4.2. Site description

The site is generally flat (Figure 4), but, broadly, the southern part is somewhat higher-lying than the north. The flatter ground tends to be sandy and grassed, while on the higher ground erosion has resulted in the surfaces being gravelled (Figure 5). A number of ephemeral pans were evident in the southern part of the study area, generally associated with calcrete gravel (Figure 6).



Figure 4: View towards the north showing the endless grassy of the study area.



Figure 5: View towards the southwest showing the gravel substrate on a low hill in the northern part of the study area.



Figure 6: View towards the southwest across one of the ephemeral pans in the south-eastern part of the study area. The Khobab WEF was in the process of construction and the turbine bases are very faintly visible just below the skyline towards the left of the photograph.

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Table 1 lists all heritage resources recorded during the field surveys in the Kokerboom 4 wind energy facility study area. An indication of the heritage significance and the amount of time required on site for adequate mitigation (where necessary) is also provided. The locations of the finds in the Kokerboom 4 study area are mapped in Figure 7.

Table 1: List of heritage resources recorded during the survey. Under ‘Significance’ an indication is given of the amount of time required on each site to carry out archaeological mitigation where appropriate². Field Ratings are in terms of the grades described in Section 3.5.

Waypoint	GPS	Description	Significance [mitigation]	Field rating
653	S30 25 23.2 E19 31 25.3	Ephemeral background scatter of heavily weathered stone artefacts, probably pertaining to the MSA. One fresh artefact that must be LSA. Covers quite a wide area between the two waypoints.	Very low	GP C
	S30 25 19.6 E19 31 20.4			
654	S30 24 43.7 E19 30 35.6	Widespread LSA artefact scatter with a few higher density clusters on the northern edge of the high ground. The site affords a commanding view of the plains stretching to the north. Artefacts almost exclusively of cryptocrystalline silica (CCS), but rare quartzite flakes also seen.	Medium [8 hours]	GP A
655	S30 24 23.3 E19 32 08.8	Very light but widespread scatter of historical material on a small hill. There were ceramics, glass and metal fragments present. The metal includes fish cans from Great Britain and Norway and a one gallon petrol can. The scatter is early 20 th century in age.	Low	GP C
	S30 24 25.8 E19 32 09.7			
656	S30 24 48.1 E19 31 48.2	Light scatter of LSA artefacts including an 11 x 3 cm hornfels blade. Also nearby was a fragment of green bottle glass with ‘Ohlsson’s Cape Breweries’ embossed on it.	Low	GP C
657	S30 25 33.4 E19 32 26.5	Ephemeral background scatter of heavily weathered stone artefacts, probably pertaining to the MSA.	Very low	GP C
713	S30 24 10.5 E19 32 29.6	An ephemeral LSA CCS scatter on the northwest edge of a hill. There is also a large MSA blade that is part of the background scatter.	Very Low	GPC
714	S30 23 25.4 E19 33 08.7	An ephemeral scatter of CCS, hornfels and ostrich eggshell on a hilltop. Also some metal – a flat piece, two nails and a button with “BEST – RING – EDGE-“ embossed on it.	Very Low	GPC
715	S30 23 25.3 E19 33 09.5	A small hornfels artefact scatter on the eastern end of the summit of a hill. There is also a small scatter of ostrich eggshell a few meters away.	Very Low	GPC
716	S30 23 05.3 E19 32 37.4	A light scatter (c. 10 artefacts) of dark chert (?) artefacts on the summit of a hill.	Very Low	GPC

² Mitigation is required only in instances where direct disturbance is proposed at the location of an archaeological site. Note that in the current site layout all recorded heritage resources have been suitably buffered and avoided and thus no direct mitigation is required. Refer to section 8.

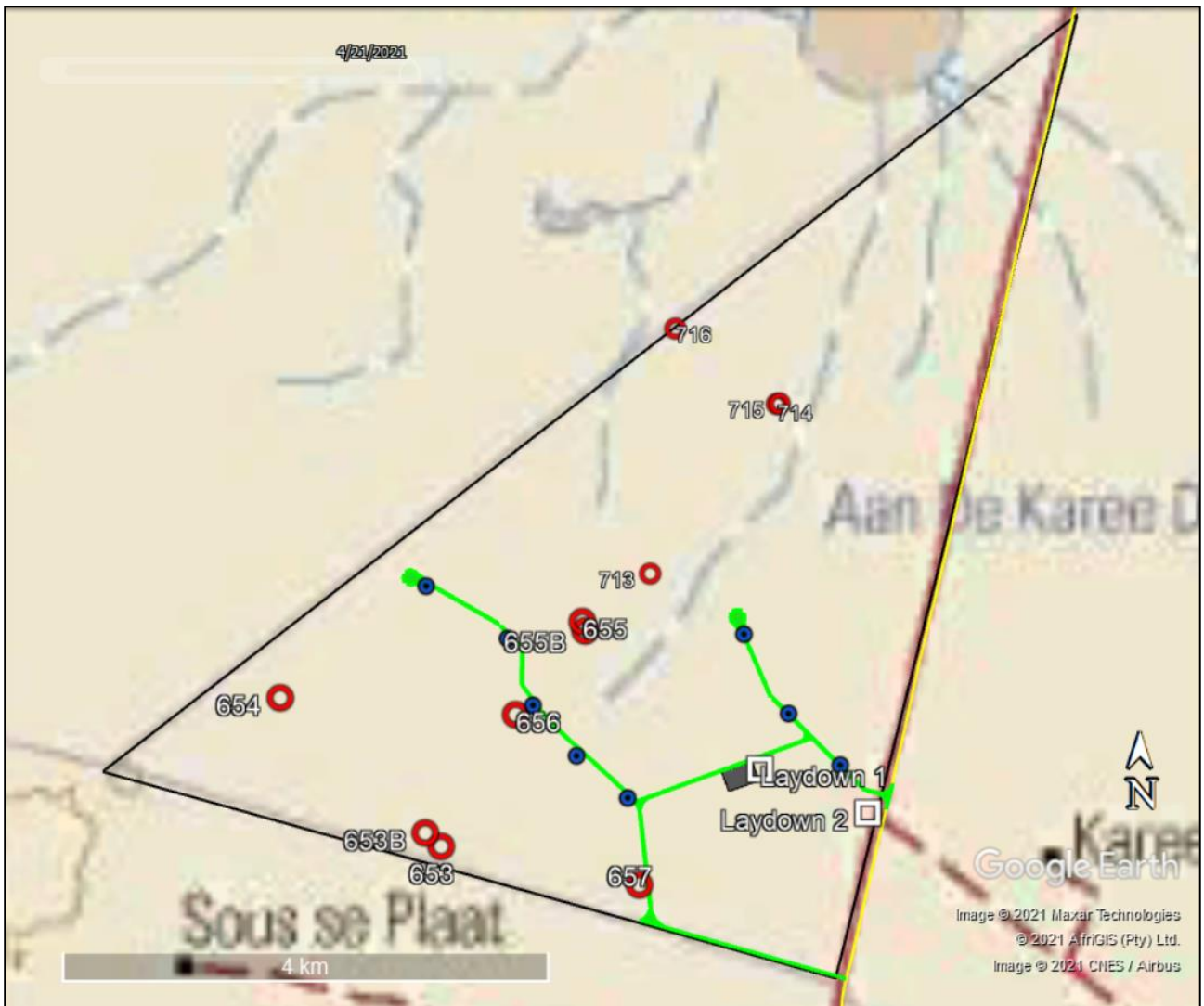


Figure 7: Map of the entire Kokerboom 4 study area showing the locations of all finds (red numbered symbols) relative to the proposed infrastructure (circles with central dots = turbines, green lines = proposed roads, small grey rectangle = substation and O&M building, white squares = laydown areas).

5.1. Archaeology

5.1.1. Desktop study

Beaumont *et al.* (1995:240) have stated that “Thousands of square kilometres of Bushmanland are covered by a low density lithic scatter”. Many impact assessments have found this to be true, although it can be stated that the scatter tends to be more noticeable in northern Bushmanland than in the south. The artefacts include material dating to the Early (ESA), Middle (MSA) and Late (LSA) Stone Ages.

In the general vicinity of the present study area Van Schalkwyk (2011) found Stone Age sites to be associated with hills – they were either located on the crests or at the foot of the hills and were from both the MSA and the LSA. In contrast, Orton (2017a, 2017b, 2017c) found MSA material to be more frequent on the lowlands and generally attributable to background scatter, while LSA sites were focused on hills. Orton (2013) found a few small LSA artefact scatters associated with both hill

tops and the margins of the Klein Rooiberg River to the southeast. In addition to widespread but low density MSA artefacts forming part of the background scatter, Webley and Halkett (2012) also reported small LSA sites located on the crests of low hills a short distance to the south of the present study area. These sites revealed primarily stone artefacts and ostrich eggshell, although one had pottery and a bead on it. They found another site, located close to a stream bed, which had a number of grooved grindstones on it.

Beaumont and Morris (1985 in Morris 2013) found dense LSA sites around pans to the west of Brandvlei (well to the east of the present study area). The finds included scatters of stone artefacts, pottery and ostrich eggshell, the latter perhaps having originated from water containers. A later survey by Morris (1996) near Calvinia yielded further similar sites on dunes associated with pans; he also recorded ostrich eggshell beads there.

Also to the east, Rudner and Rudner (1968) recorded engravings on dolerite outcrops as well as occupation sites dating to the LSA. These sites included stone artefacts, pottery, ostrich eggshell beads and stone features that may have been the remnants of hut circles and/or kraals.

Fourie (2011), who found nothing during his survey, reports the oral testimony of a Loeriesfontein farmer regarding the presence of rock art and engravings in the area and also that a cache of ostrich eggshell flasks had been found on his farm. Such caches have been reported from various parts of western South Africa (Henderson 2002; Jerardino *et al.* 2009; Morris 1994; Morris & Von Bezing 1996; Parkington 2006) and date to the LSA. Similar flasks are on display in the Fred Turner Museum in Loeriesfontein along with several bored stones and soapstone pipes from farms in the general region.

Other surveys have yielded low density scatters of stone artefacts of varying age (Kaplan 2008; Morris 2007, 2013), while some, quite surprisingly, found nothing at all (Fourie 2011; Van der Walt 2012, 2013).

The only historical archaeological material reported came from the farm Kleine Rooiberg, a short distance south of the present study area (see Figure 2). It consisted of ceramic, glass and metal fragments thought to date to the early 20th century (Webley & Halkett 2012).

5.1.2. Site visit: Stone Age archaeology

Although archaeological was fairly widespread in the study area, only one significant site was located (at waypoint 654) and this was on high ground in the western part of the study area (very close to the existing wind measuring mast). The site consisted of a fairly large surface scatter of LSA artefacts, largely made in CCS (Figure 8). There were a few clusters of slightly greater density scatter with lower density scatter in between. LSA material was seen at one other location (waypoint 656) but there was too little of it to be of concern. An unusual artefact present there, though, was a very long hornfels blade (Figure 9).



Figure 8: Artefacts from the Later Stone Age site found near the wind mas (waypoint 654). All are in CCS except the upper right which is quartzite. Scale in 10 mm intervals.



Figure 9: Hornfels cortical blade (left) and CCS flake from waypoint 656. The blade is c. 30 x 105 mm in size.

Other points recorded were related to what could be termed background scatter. These are artefacts that have been present on the landscape for a long period of time and have likely moved to a degree because of natural forces. Isolated artefacts of varying age are included here. Such artefacts are widespread with very low densities, although occasionally a slightly higher density area will be located and recorded. Figures 10 and 11 show examples. Figure 10 includes a single unpatinated artefact that is relatively recent, dating to the LSA, while the remaining artefacts were all quite well worn and patinated suggesting that they date to the MSA.



Figure 10: Artefacts relating to the background scatter from waypoint 653. All are in CCS and all are likely to pertain to the MSA except that at top right which is likely LSA. Scale in 10 mm intervals.



Figure 11: Artefacts relating to the background scatter at waypoint 657. All are in CCS. Scale in 10 mm intervals.

A large but very low density scatter of historical material was seen across a low hill in the north-eastern part of the study area (waypoints 655 and 655B). While some of the material may be from the late 19th century, there are some things that are very likely to be early 20th century in age (Figures

12 to 17). The latter would thus date the scatter to the early 20th century. Two early Ohlsson's Cape Brewery bottles were also present. Ohlsson's started in 1889 thus providing a maximum age for the bottles.



Figure 12: Ceramic fragments from waypoint 655.



Figure 13: Ceramic fragments from waypoint 655.



Figure 14: Glass fragments from waypoint 655.



Figure 15: A fragment of a wine bottle base from waypoint 655.



Figure 16: A fragment of an Ohlsson's Cape Brewery beer bottle from waypoint 655.



Figure 17: A fragment of an Ohlsson's Cape Breweries beer bottle from waypoint 655.

5.2. Historical aspects and the built environment

5.2.1. Desktop study

Van Schalkwyk (2011) reported an early 20th century farmstead constructed of stone and brick with corrugated iron roofs. It is unlikely that many earlier farmsteads would be present because this harsh landscape was only permanently settled in relatively recent times. This is borne out by the fact that the farm under study was only surveyed in 1899. Prior to this, Van Schalkwyk (2011) notes that Dutch-speaking trek boers would have used the area on a seasonal basis. It was only after the 1870s introduction of wind pumps that water was more readily available and the area became more amenable to farming (Webley & Halkett 2012).

Van Schalkwyk (2011) found an unusual house on the farm portion to the east of the study area that was built of clay and bricks and then cladded with corrugated iron sheeting. He thought it to date to approximately the 1920s. Another corrugated iron house nearby was visited by Orton (2013) who described a well-maintained stone livestock enclosure ('kraal'), a recent but traditionally-styled cooking shelter ('kookskerm') and another outbuilding. Van Schalkwyk (2011: fig. 8) also illustrates (but does not describe) another farmhouse from the region – it is far grander than that noted above and looks to be from the early to mid-20th century.

Loeriesfontein, the nearest town to the site, was first established in 1894 by Frederik Turner who built a shop, the first building in Loeriesfontein (Figure 18). Once the shop was established the town slowly grew around it.



Figure 18: *The first building in Loeriesfontein as photographed in 1895 (Source: Fred Turner Museum, Loeriesfontein).*

Van Schalkwyk (2011) and Orton (2013) both described a small graveyard with two graves near the 1920s house mentioned above; one was dated to 1913. Van Schalkwyk (2011) also illustrated (but did not describe) an isolated grave.

5.2.2. Site visit

No historical or built heritage resources were located in the study area.

5.3. Graves

No graves were seen in the study area and, due to the generally rocky substrate, the chance of finding graves is very limited.

5.4. Cultural landscape.

The site has a very weakly developed cultural landscape since the majority of anthropogenic interventions relate to farm tracks and fences. The landscape is largely a natural one (although it does still have cultural significance for its aesthetic value), but has now been compromised by two neighbouring wind farm developments, the Helios Substation and associated power lines which create a new 'cultural' layer on the landscape.

5.5. 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 most significant archaeological site is deemed to have low-medium cultural significance for its scientific value and is graded GPA. The remaining material is of low to very low significance and is graded GPB and GPC.

The cultural landscape has low cultural significance for its aesthetic and social value.

5.6. Summary of heritage indicators

The primary type of heritage resource of concern here is archaeology. Significant archaeological sites should not be disturbed without assessment and/or mitigation as required. While one archaeological site that would require mitigation work has been recorded, it has been avoided by the current layout (Figure 19). It is still possible that other similar sites might occur in areas not covered by the survey but, because the survey aimed to visit as many locations suited to finding archaeology as possible, the chances of significant impacts are fairly low.

The only other heritage resource is the broader cultural landscape, but this is of little concern as the landscape is largely natural with little cultural input. It has also been altered through the construction of two other wind energy facilities on neighbouring farms, the Khobab and Loeriesfontein WEFs. In general, a new development should not overly dominate the landscape. In this case the WEF would dominate but within the context of the existing electrical layer this is seen as acceptable.

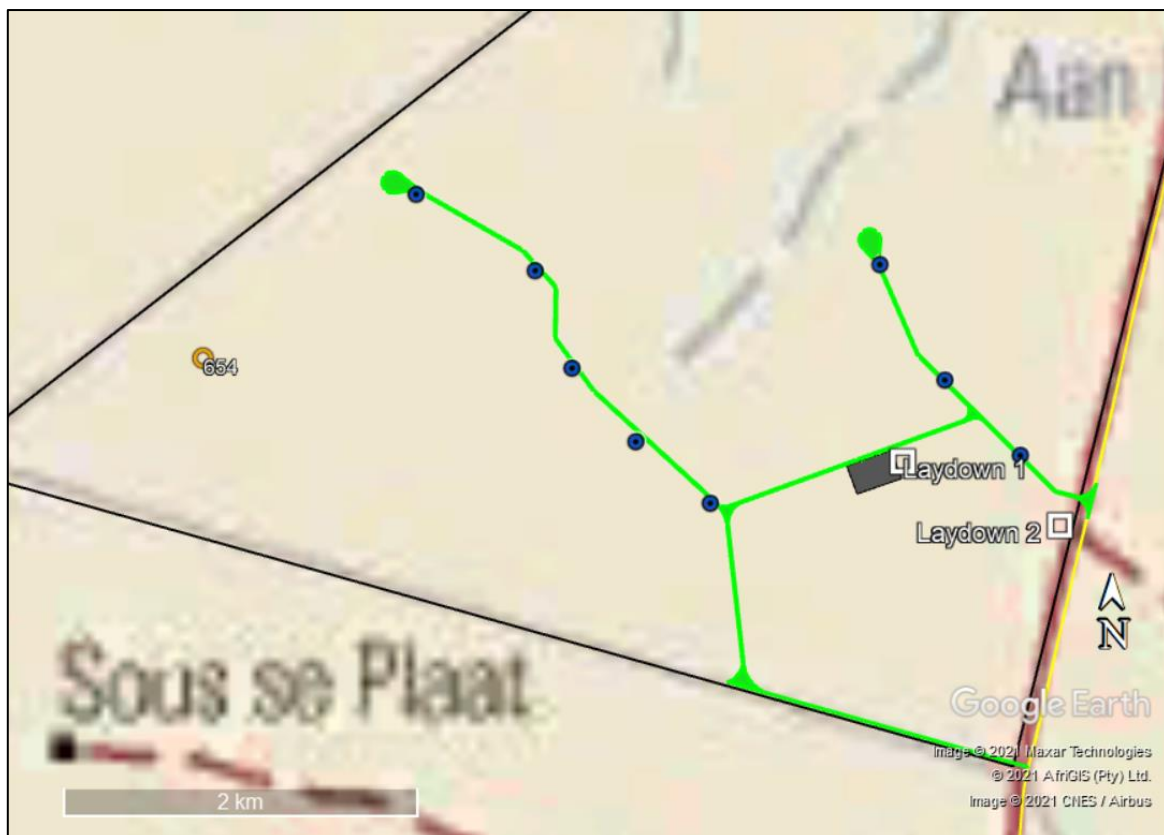


Figure 19: Aerial view of the study area showing the only significant site which is of low-medium cultural significance (and hence sensitivity) relative to the project layout.

6. ASSESSMENT OF IMPACTS

6.1. Impacts to archaeological resources

Impacts to archaeological resources would occur during the construction phase only, so long as all operation and decommissioning activities take place within the authorised footprint. They would be negative impacts because the sites may be damaged or destroyed and scientific data would be lost. Because the archaeological sites only have local cultural significance, the extent of the impacts would be local. The magnitude of impacts is likely to be low because the layout has avoided known culturally significant sites. Because damage to archaeological sites is completely irreversible, the impacts are considered to be long term impacts. It is probable that at least some impacts will occur, but these are likely to be to isolated artefacts attributable to the background scatter. The overall significance rating of these potential impacts calculates to low negative.

6.1.1. Management and mitigation requirements

A pre-construction survey of the layout is required to determine whether any further significant archaeological sites occur and that potentially require avoidance or mitigation. Any required mitigation would involve controlled excavation and collection of archaeological material. With mitigation the magnitude of the impact would reduce to very low and the overall significance to very low. There are no fatal flaws because all archaeological sites could be mitigated should the need arise and none of those currently known are important enough to require full *in situ* conservation.

Although graves have been listed in Section 5 above, they are not specifically assessed here because none are known and the chances of impacts to graves are exceedingly small. Their locations are also often very difficult to predict.

Although archaeological excavations are not currently required, a brief summary of the nature of such mitigation is provided here in case the need should arise at a later stage due to alterations to the layout and/or sites being found during the pre-construction survey. Mitigation of the artefact scatters would involve establishing a grid of metre squares and collecting all archaeological material in each square. Material would be scraped up from each square, sieved and sorted to extract the artefacts and other archaeological materials. These finds would be analysed and described in a report and the material would be stored in perpetuity in the provincial museum, in this instance the McGregor Museum, Kimberly. Because of the process that needs to be followed, it is recommended that mitigation, if needed, should be commissioned as far in advance of construction as possible (ideally, at least six months in advance of construction).

6.2. Impacts to the cultural landscape

Impacts to the cultural landscape would occur during all three phases and would relate to the presence of very tall industrial-type structures in a landscape that is otherwise gently undulating and distinctly rural and/or natural in character. They would be negative impacts because of the general incompatibility between wind turbines and the natural landscape. Because the cultural landscape is relatively weakly developed, it has been accorded low cultural significance and hence the extent of the impacts would be local. The magnitude of impacts is likely to be low because the area is so remote and there is an existing layer of electrical infrastructure and wind farms in the

surrounding landscape. Damage to the landscape is reversible with rehabilitation but the impacts are considered to be long term impacts because the facility is likely to operate for many years. If the facility is constructed, then the probability is definite because the existence of the turbines will be inescapable. The overall significance rating of these potential impacts calculates to low.

No mitigation is possible because of the sheer size of the turbines. They cannot be screened or placed in such a way as to be less visible from surrounding roads and structures. The ratings with mitigation thus do not change and the overall impact remains low.

6.3. The No-Go alternative

With implementation of the No-Go alternative the site would remain in its present state, No heritage resources would be directly impacted and natural degradation through erosion, weathering (rain and wind) and trampling (by animals and vehicles) would continue to occur. These negative impacts are extremely minor and would be of **very low** significance.

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 archaeological materials. Trampling from grazing animals and/or farm vehicles is minimal.

6.5. Cumulative impacts

Although some archaeological sites are likely to be (or have been) lost during the construction of other facilities (two wind energy facilities already occur, while other renewable energy facilities have been authorised nearby), cumulative impacts are deemed to be of low significance in this case because the broader landscape is extensive and is likely to hold many similar archaeological sites. Also, the individual significance of each site is such that it does not extend beyond the local area. The Kokerboom 3 wind farm layout avoids all known significant heritage sites and will thus make a negligible contribution to cumulative impacts.

Although the construction of other facilities will also affect the cultural landscape (two wind energy facilities already exist, and other renewable energy facilities have been authorised nearby), it is deemed preferable to cluster the renewable energy developments such that the impacts are kept to one area. Further away the cultural and natural landscape would no longer be affected. Cumulative impacts are deemed to be of low significance in this case because the landscape is not highly sensitive and is rather more natural than cultural.

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. However, in the context of an area with other WEFs present, this latter impact is not deemed a significant issue.

Table 2: Assessment of heritage impacts.

Impact			Without Mitigation								With Mitigation							
Category	Impact Title	Impact description	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance	Type	Extent	Magnitude	Duration	Probability	Confidence	Reversibility	Significance
Heritage	Impacts to archaeological resources	Damage to or destruction of archaeological sites and artefacts due to construction of turbines, access roads and related infrastructure	Negative	Local	Low	Long term	Probable	Sure	Irreversible	Low (-)	Negative	Site specific	Very low	Long term	Probable	Sure	Irreversible	Very low (-)
Heritage	Alteration of cultural landscape	Addition of industrial-type structures to a rural landscape with minimal development in the broader area but with two operational wind energy facilities on neighbouring properties	Negative	Local	Low	Long term	Definite	Certain	Reversible	Low (-)	Negative	Local	Low	Long term	Definite	Certain	Reversible	Low (-)

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Management Programme (EMPr) needs to make provision for a pre-construction archaeological survey of the entire layout well (preferably six months) before the start of construction. The ECO should regularly monitor all construction phase activities to ensure that they remain within the authorised footprint and that archaeological sites located outside of the footprint do not get inadvertently damaged or destroyed. Although any impacts would occur very quickly (just one vehicle driving in the wrong place can irreparably damage a sensitive archaeological site), it is obviously not feasible to be watching every aspect of construction throughout the construction period. Education of the staff is thus important to make sure that everyone knows the importance of remaining within the authorised footprints for all roads, turbine placements and other aspects of the development.

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. The development will provide electricity for use in South Africa. This is deemed an important function because of the historical problems associated with South Africa's electricity supply. The construction phase of the facility will also provide an increase in jobs for the local population. None of the heritage impacts (which are of low significance) is considered to be more important than these social and economic benefits.

9. CONCLUSIONS

This study has found just one significant heritage resource on the site (LSA artefact scatter at waypoint 654). Besides the landscape itself, which is of relatively low significance and has already been compromised by the other wind energy facilities, the only other heritage resource of concern is this archaeological site. Because it was identified early on in the project, it has been avoided by the layout developed for the final assessment. Although it is very likely that some isolated artefacts attributable to background scatter and other sites of low significance may be disturbed, the chances of highly significant sites falling within the footprint are considered to be very low. As such, no significant impacts to heritage resources are expected.

There are no specific areas within the current layout that require avoidance.

9.1. Reasoned opinion of the specialist

Given that known significant impacts have been avoided and the chances of highly significant impacts occurring are very low, it is the opinion of the present specialist that the proposed Kokerboom 4 WEF should be authorised in full.

10. RECOMMENDATIONS

Because the layout has been designed to avoid all known significant heritage resources on the site, it is proposed that the project be allowed to proceed. However, the following conditions should be included as part of the authorisation should one be issued:

- The final layout must be examined in the field by an archaeologist prior to construction with recommendations made for mitigation as required; and
- If any archaeological material or human burials are uncovered during the course of development then the find should be protected from further disturbance and work in the immediate area should be halted if necessary. 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.

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APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

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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 –

Memberships and affiliations:

South African Archaeological Society Council member	2004 –
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
ASAPA Cultural Resources Management Section member	2007 –
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 –

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)

- Accredited Professional Heritage Practitioner

Fieldwork and project experience:

Extensive fieldwork 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:

Phase 1 surveys and impact assessments:

- Project types
 - Notification of Intent to Develop applications (for Heritage Western Cape)
 - 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 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
- 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

APPENDIX 2 – Site Sensitivity Verification

A site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area. The details of the site sensitivity verification are noted below:

Date of Site Visit	20-21 February 2017 and 28 February 2020
Specialist Name	Dr Jayson Orton
Professional Registration Number	ASAPA: 233; APHP: 043
Specialist Affiliation / Company	ASHA Consulting (Pty) Ltd

- Provide a description on how the site sensitivity verification was undertaken using the following means:

- (a) desk top analysis, using satellite imagery;
- (b) preliminary on-site inspection; and
- (c) any other available and relevant information.

Initial work was carried out using satellite aerial photography in combination with the author's accumulated knowledge of the local landscape. This was used to determine any potentially sensitive areas so that they could be targeted during the site visits. Subsequent fieldwork served to ground truth the site, including areas identified as potentially sensitive. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Chapter 5).

- Provide a description of the outcome of the site sensitivity verification in order to:

- (a) confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.; and
- (b) include a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

The archaeology and cultural heritage map below (Figure A2.1) is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be medium to low. The mapping appears to be based on geology and gives no consideration to the margins of pans which are typically considered as highly sensitive for archaeology. The site visit showed that in fact the majority of the site is of low sensitivity but with one small pocket (where an archaeological site was found) considered to be of medium sensitivity. The eastern margin of a large pan falls into the northern part of the study area but it was not checked during the survey. Figure 19 (above) shows the area considered to be archaeologically sensitive. A photographic record and description of the relevant heritage resources is contained within the impact assessment report (Chapter 5).

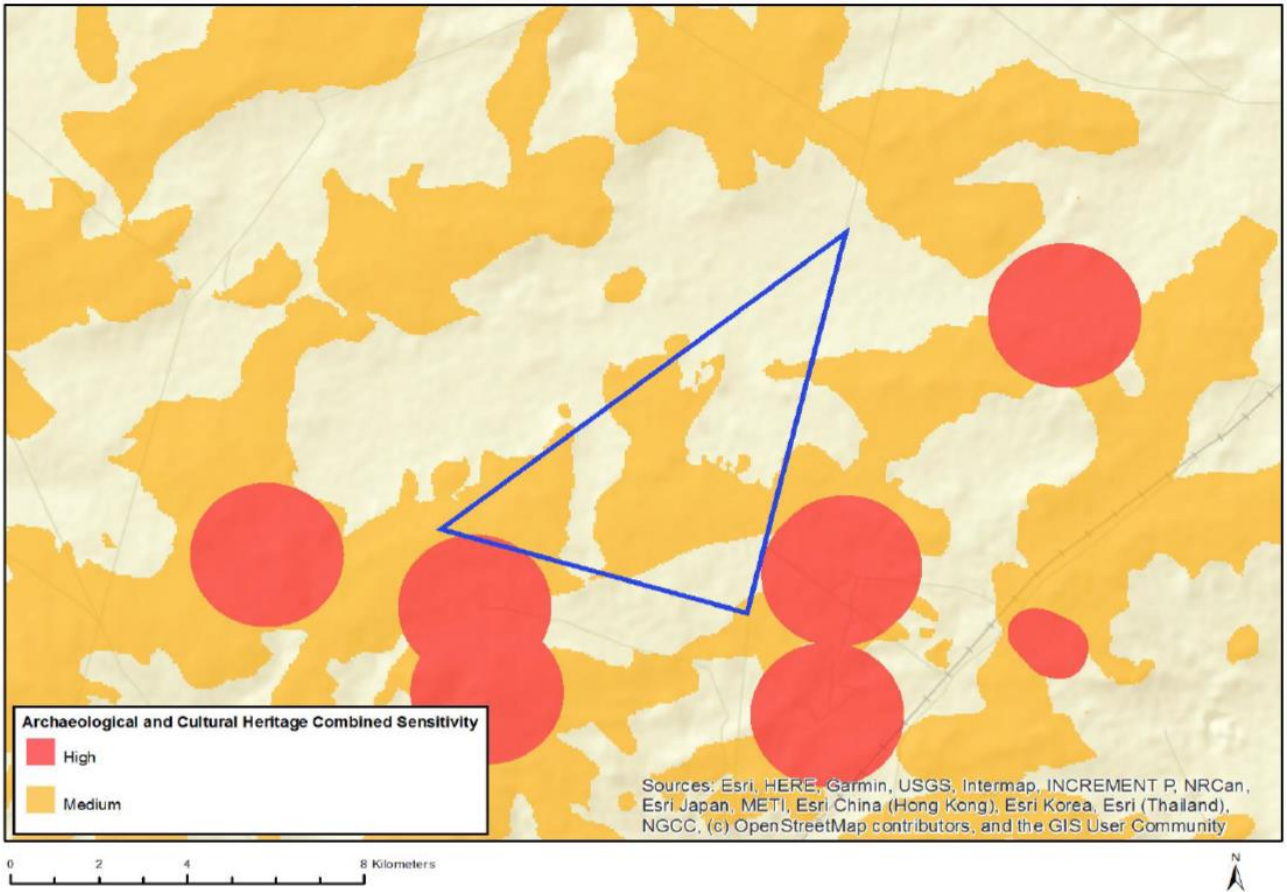


Figure A2.1: Screening tool map for the 'Archaeological and Cultural Heritage Theme'.