

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED KOKERBOOM 2 WIND ENERGY FACILITY ON FARM 215/REM AND FARM 1164/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.: 10339

Report for:

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On behalf of:

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1st draft: 16 December 2016
Final report: 31 January 2017

EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by 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 Springbok Tand 215 and the remainder of Springbokpan 1164 and is centred on S30° 23' 30" E19° 24' 30".

The project will entail the construction of up to 60 wind turbines with a hub height of up to 150 m and a rotor diameter of up to 150 m, as well as associated roads, power lines and support infrastructure. Two other wind energy facilities are already under construction to the northeast of the proposed site, namely Khobab and Loeriesfontein Wind Farms. Two other renewable energy projects have also been granted environmental authorisations in close proximity, namely: Orlight Solar PV Farm, and Dwarsrug Wind Farm.

The study area is comprised of gently undulating topography with low, scrubby vegetation. The ground is variably sandy or gravelly and a few seasonal streams cross the site. Standing rock outcrops are rare, although the ground is rocky in places.

Heritage resources were found to be scarce in the study area. Most common were archaeological sites with these being mostly on the summits of the low hills in the east and around low rock outcrops in the southwest. 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 in certain areas.

Because the layout has been designed to avoid all known heritage resources on the site, it is proposed that the project be allowed to proceed without the need for further heritage studies. However, the following condition should be included as part of the authorisation should one be issued:

- If there are any changes to the layout then these should be evaluated by an archaeologist. If any mitigation becomes necessary this should be commissioned and completed before the start of construction; 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

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.

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

CCS: Cryptocrystalline silica

CRM: Cultural Resources Management

DEA: National Department of Environmental Affairs

EIA: Environmental Impact Assessment

ESA: Early Stone Age

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Later 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

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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by 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 Springbok Tand 215 and the remainder of Springbokpan 1164 and is centred on S30° 23' 30" E19° 24' 30". Two wind farms, Kokerboom 1 and Kokerboom 2, are proposed adjacent to one another and will share some infrastructure. The present report concerns itself only with Kokerboom 2, while Kokerboom 1 is assessed in a separate report. The grid connection that will connect Kokerboom 1 and Kokerboom 2 to the national grid at the Eskom Helios substation will also be assessed in its own HIA.

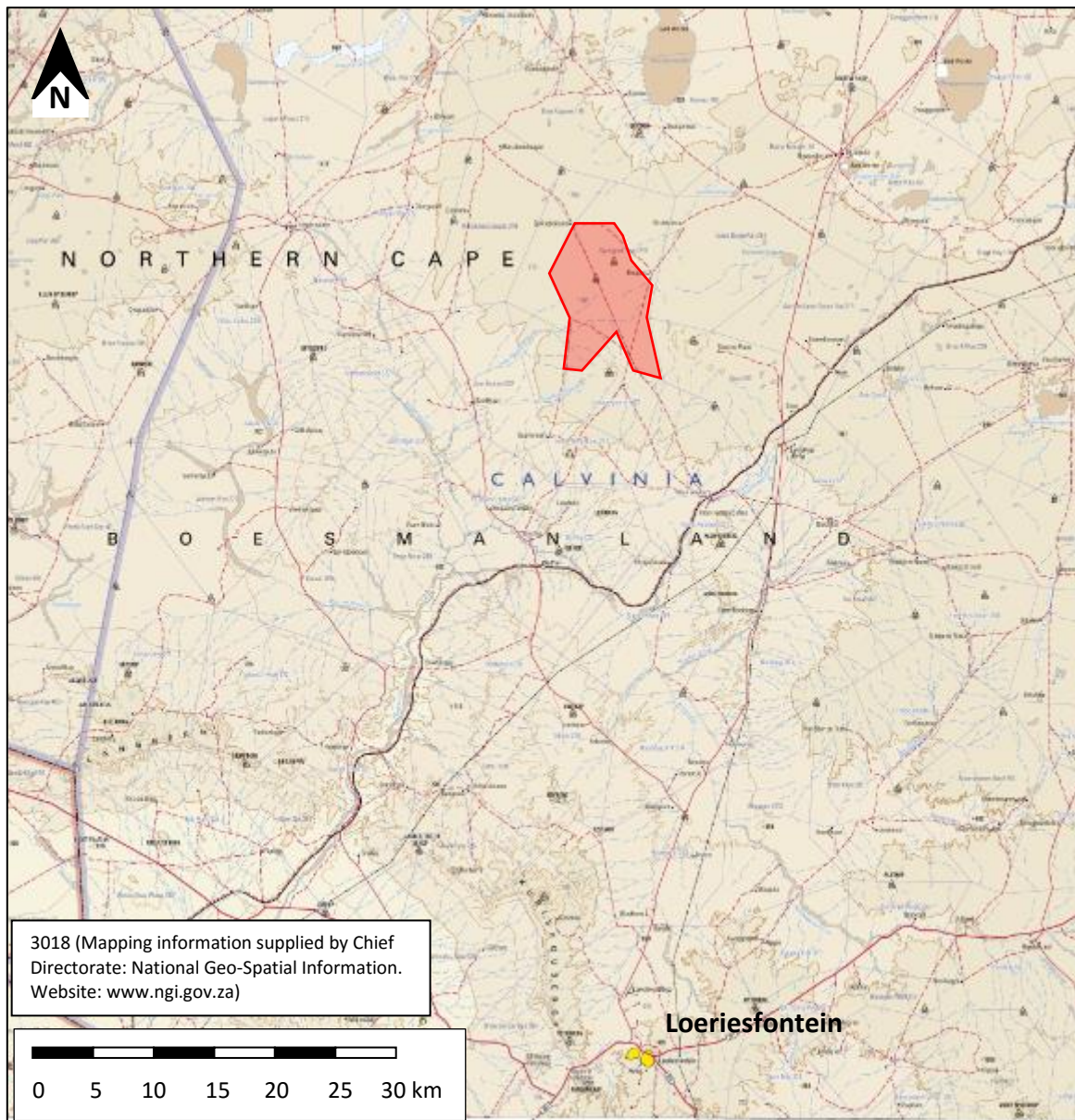


Figure 1: Map showing the location of the Kokerboom 2 site (red shaded polygon) relative to the town of Loeriesfontein in the south. The bold wavy line passing from southwest to northeast is the Sishen-Saldanha Railway.

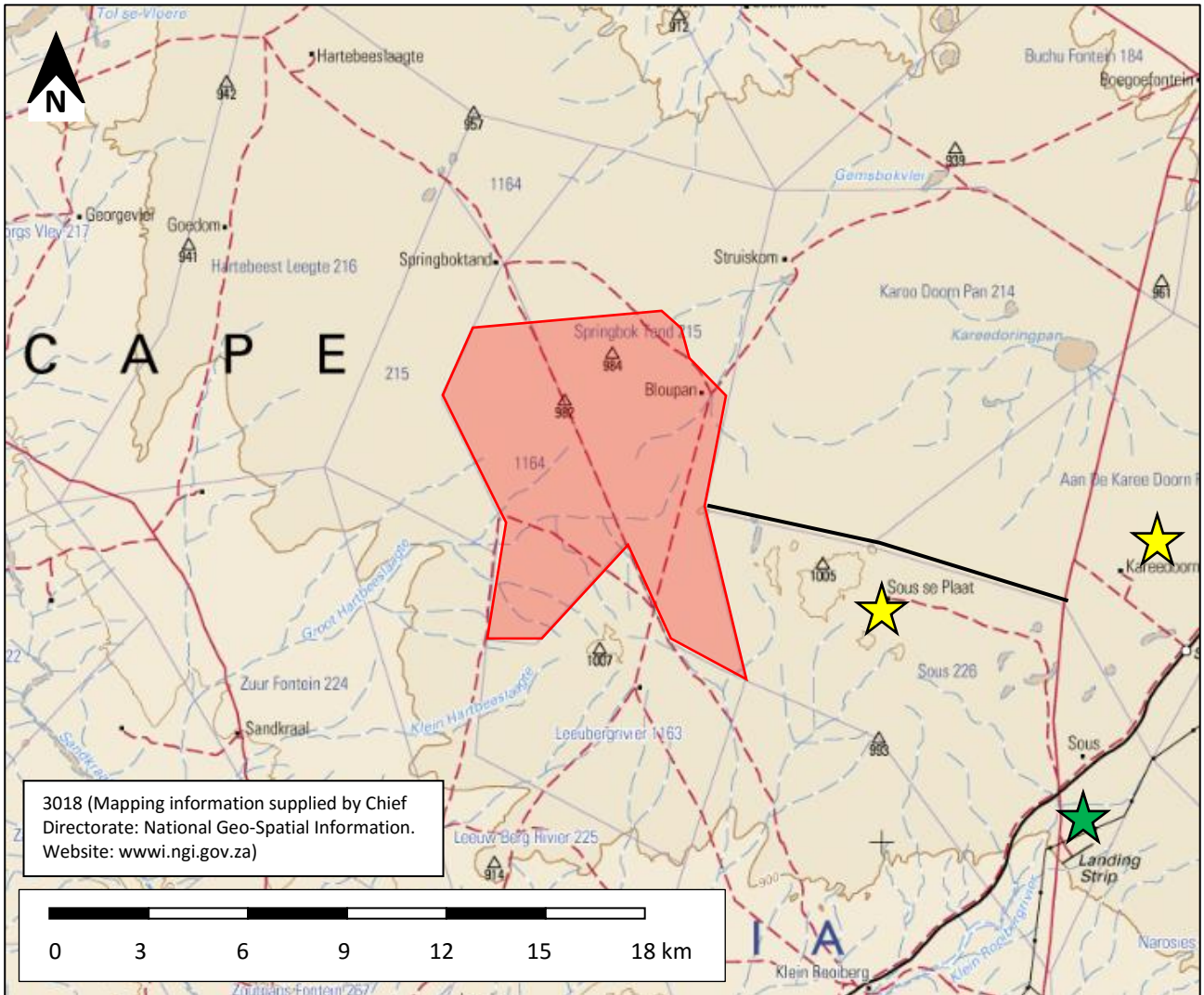


Figure 2: Map of the immediate vicinity of the study area (red shaded polygon = site, black line to the east = access road). Other wind farm developments already under construction in the vicinity are indicated by the yellow stars, while the green star denotes the position of the Eskom Helios Substation.

1.1. Project description

The proposed project would have a generating capacity of up to 240 MW and would comprise of the following components:

- Up to 60 wind turbines with a hub height of up to 150 m and a rotor diameter of up to 150 m;
- Hard standing surfaces of approximately 25 m x 50 m alongside each turbine;
- A substation approximately 120 m x 120 m;
- Internal access roads of between 6 and 10 m width (during construction these roads may need to be up to 20m wide (8m wide road and 12m buffer/ reserve));
- Workshop and administration buildings;
- Medium voltage overhead power lines crossing the site, linking certain turbine strings to the onsite substation;

- Medium voltage underground powerlines linking the turbines and following the roads; and
- Temporary laydown and site camp areas.

1.1.1. 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 Aurecon 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;
- Assess all proposed site alternatives associated with the Kokerboom 2 Wind Farm and associated infrastructure;
- Make use of the Aurecon Impact Assessment Methodology (further detailed in the Kokerboom 2 EIA) when assessing impacts for all alternatives proposed as part of the Kokerboom 2 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; and
- Comply with the content requirements for specialist reports listed in Appendix 6 of the 2014 EIA Regulations (GN R982 of 2014).

Furthermore, the Department of Environmental Affairs (DEA) has requested, in a letter dated 22 November 2016 (DEA Ref: 14/12/16/3/3/2/986) that the cumulative impact assessment must indicate the following:

- Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land.
- Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
- The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
- A cumulative impact environmental statement on whether the proposed development must proceed.

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 DEA 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 DEA.

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

This site and that for the second facility (Kokerboom 1) were surveyed together on 5 July and 15-17 October 2016. The surveys were during winter and spring, 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.

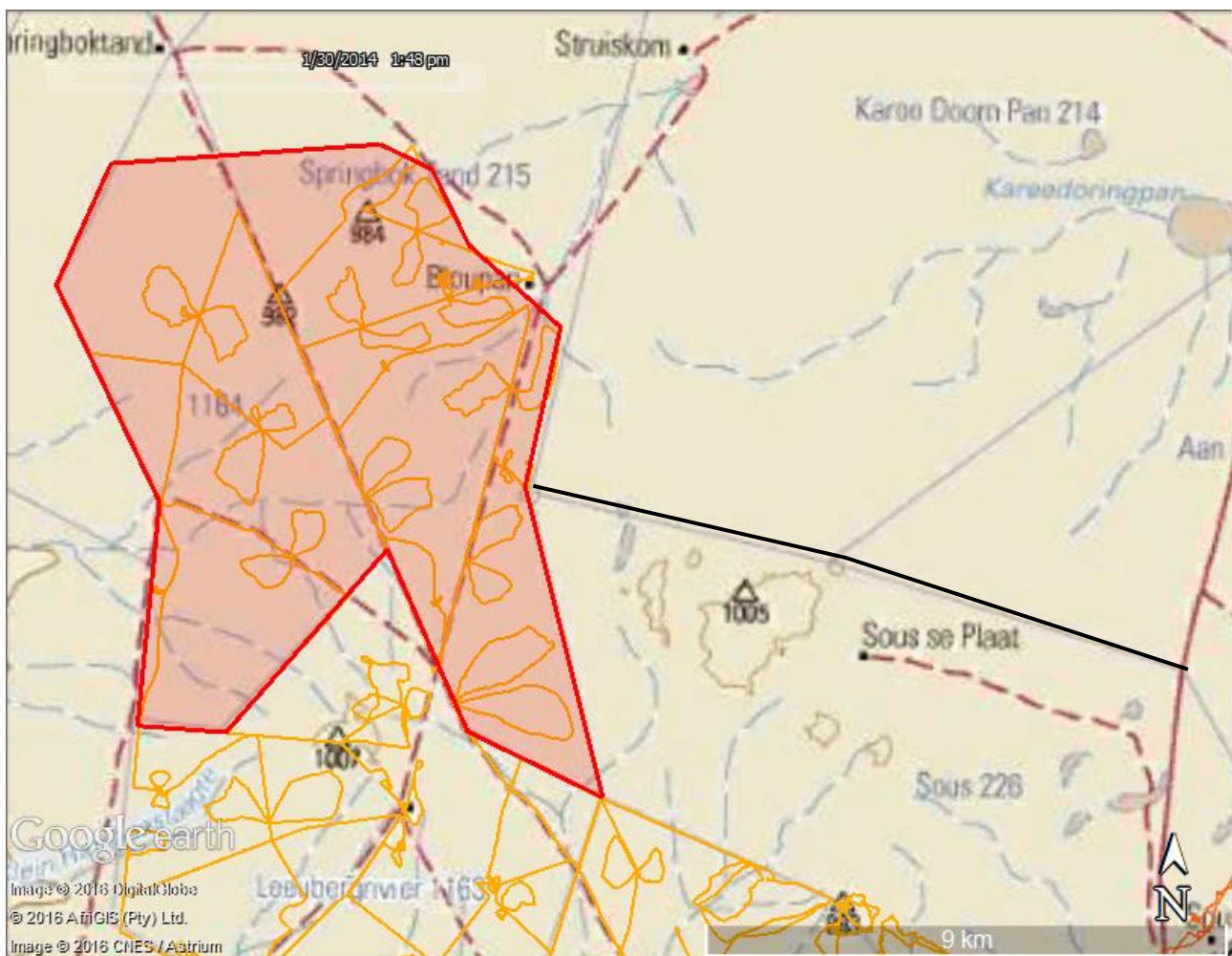


Figure 3: Map of the Kokerboom 2 study area (red shaded polygon = site, black line to the southeast = access road) showing the drive and walk paths created during the survey (orange lines).

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 separately.

3.4. Impact assessment

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

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. Because the survey was carried out during the scoping phase in order to identify areas to be avoided, the actual layout itself has not been surveyed. The road alignment was not available at the time of the survey and was not examined on the ground. However, these are not deemed to be 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 currently being erected to the east of the present study area (see Figure 2) and a further wind energy facility 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 lies 5 km east 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) with a high point occurring along the eastern boundary. A few very minor hills occur in places. A large drainage line runs towards the southwest and has a few tributaries that also cross the site. A number of ephemeral pans were evident in the north-eastern part of the study area (Figure 5). The flatter ground tends to be sandy and grassed, especially in the north, while on the low hills erosion has resulted in the surfaces being gravelled. Rock outcrops are rare, although the hills do often have exposed shale bedrock visible. Occasional small, low dolerite outcrops were present in places (Figure 6).



Figure 4: View across the northern part of the study area showing the endless grassy plain that forms about a quarter of the study area to the north of the large drainage line.



Figure 5: View towards the southwest across one of the ephemeral pans (arrowed) showing the slightly taller vegetation evident in such areas.



Figure 6: View towards the north across the south-western part of the study area showing a cluster of dolerite rock rocks marking a low outcropping.

5. HERITAGE CONTEXT

This section of the report contains the desktop study and establishes what is already known about heritage resources in the vicinity of the study area. What was found during the field survey may then be compared with what is already known in order to gain an improved understanding of the significance of the newly reported resources.

5.1. Archaeological aspects

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 Later (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. Orton (2013) found a few small LSA artefact scatters associated with both hill tops and the margins of streams. 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 just 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, immediately to the south of the Farm Sous 226 (see Figure 2). It consisted of ceramic, glass and metal fragments thought to date to the early 20th century (Webley & Halkett 2012).

5.2. Historical aspects and the built environment

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 farms under study were only surveyed in 1880 and 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 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 7). Once the shop was established the town slowly grew around it.



Figure 7: 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; one was dated to 1913. Van Schalkwyk (2011) also illustrated (but did not describe) an isolated grave.

6. 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 surveys for both wind energy facilities (Kokerboom 1 & Kokerboom 2) and the power line corridors. The project area(s) into which they fall are indicated in the initial column. Because all three reports are being submitted simultaneously, all finds have been described in Table 1 in order to provide further context for the heritage resources rather than describing them in the desktop study above. However, only those relevant to the Kokerboom 2 project are assessed in the present report. An indication of the heritage significance and the amount of time required on site for adequate mitigation is also provided. The locations of the finds in the Kokerboom 1 study area are mapped in Figures 8 and 9.

Table 1: List of heritage resources recorded during the survey. Under 'Project' KB1 and KB2 refer to the proposed Kokerboom 1 and 2 facilities, while PL refers to the power line corridors. When in parentheses, the site is just outside of the study area. Under 'Significance' an indication is given of the amount of time required on each site to carry out archaeological mitigation where appropriate¹. Field Ratings are in terms of General Protection (GP) grades described in Section 3.5.

Project	Waypoint	GPS	Description	Field rating	Significance [mitigation]
KB2	174	S30 24 04.8 E19 23 40.6	Area with background scatter MSA CCS and hornfels artefacts.	GP C	Very low
KB2	175	S30 22 09.5 E19 25 37.2	Small hill with several patches of LSA artefacts. Some fresh hornfels scatters, one white CCS core with two refitting flakes, some ostrich eggshell.	GP B	Medium [8 hours]
KB2	176	S30 22 09.4 E19 25 36.3			
KB2	177	S30 22 08.9 E19 25 35.5			
KB2	178	S30 22 08.7 E19 25 36.4			
(KB2)	179	S30 22 25.1 E19 26 33.6	Beacon built of stone slabs (just outside study area). Purpose unknown but seems recent.	GP C	Low
KB2	180	S30 22 55.4 E19 24 44.5	Pan area with lots of background scatter artefacts over wide area.	GP C	Very low
KB2	266	S30 22 56.6 E19 24 45.1			
KB2	181	S30 22 42.1 E19 24 23.7	Large and very dense area of background scatter MSA CCS and hornfels artefacts.	GP C	Low-Medium [8 hours]
KB2	382	S30 25 23.4 E19 22 31.0	Scatter of ostrich eggshell amongst an outcrop of dolerite rocks.	GP C	Very low
KB2	383	S30 25 22.8 E19 22 30.1	LSA Scatter of CCS and quartzite artefacts and plenty of ostrich eggshell in a clearing amongst an outcrop of dolerite rocks.	GP C	Low
KB1 PL	173	S30 26 06.9 E19 25 31.2	Small scatter of historical ceramic fragments.	GP C	Low
KB1	379	S30 28 55.5 E19 25 10.1	About twelve ostrich eggshell fragments. One had an impact fracture from the outer surface suggesting human intervention.	GP C	Very low

¹ 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.

Project	Waypoint	GPS	Description	Field rating	Significance [mitigation]
KB1	380	S30 29 00.8 E19 25 16.2	About twenty ostrich eggshell fragments.	GP C	Very low
KB1	381	S30 27 20.9 E19 25 12.6	Farm structure used as a wool sorting shed. Probably 1960s/1970s.	---	---
KB1	384	S30 28 50.4 E19 22 51.9	LSA Small scatter of CCS artefacts and one piece of ostrich eggshell close to a minor drainage line. There were a few bladelets and a bladelet core included.	GP C	Low
KB1	291	S30 29 02.9 E19 23 18.5	LSA scatter of CCS, quartzite and ostrich eggshell close to dolerite outcrop and near a river.	GP B	Medium [4 hours]
KB1	385	S30 29 03.0 E19 23 14.7	LSA Scatter of CCS, quartz and hornfels artefacts with many ostrich eggshell fragments alongside a dolerite outcrop and near a river.	GP B	Medium [4 hours]
KB1	386	S30 29 00.0 E19 23 20.0	Small LSA scatter of CCS artefacts with plenty of ostrich eggshell fragments alongside a dolerite outcrop and near a river.	GP C	Low
KB1	388	S30 28 02.6 E19 27 44.2	Small scatter of about 15 ostrich eggshell fragments, one of which was burnt, and one orange CCS flake.	GP C	Very low
KB1	389	S30 28 58.6 E19 29 51.7	Hill with a few patches of LSA artefacts on the edge of the hill facing south-eastwards.	GP B	Medium [4 hours]
KB1	390	S30 28 58.3 E19 29 51.9	Scatter of white CCS artefacts, one quartzite flake and much ostrich eggshell at 389. Scatter of white CCS and hornfels artefacts, and one historical bottle glass fragment at 390. Scatter of white CCS artefacts, one quartz flake and some ostrich eggshell at 391.		
KB1	391	S30 28 58.0 E19 29 52.0			
KB1	392	S30 28 57.7 E19 29 51.8	Small historical medicine bottle as well as the neck and several small fragments of a second one. The whole bottle was embossed with "EYNE & MATHEW LTD"	---	Very low
KB1 PL	393	S30 28 16.3 E19 29 56.3	Extensive scatter of white CCS and ostrich eggshell on top of a large hill with a trigonometric beacon on it. There was a small backed bladelet in CCS and one potsherd. It seems that there may be many more artefacts obscured by the gravel here.	GP A	Medium-High [8 hours]
KB1	398	S30 28 47.9 E19 30 21.2	Four fresh hornfels artefacts on top of a hill.	GP C	Very low
(PL)	394	S30 28 12.4 E19 30 08.3	A light scatter of white CCS and ostrich eggshell on a hill.	GP C	Low
(PL)	395	S30 28 13.5 E19 30 09.5	Scatter of white CCS artefacts and large amounts of ostrich eggshell on a hill.	GP B	Medium [4 hours]
PL	396	S30 28 16.5 E19 30 08.8	Small scatter with a handful of white CCS artefacts on a hill.	GP C	Low
PL	397	S30 29 39.0 E19 33 23.6	Small scatter of CCS artefacts immediately alongside existing construction camp.	GP C	Very low
PL	001	S30 30 09.0 E19 33 49.6	Four small stone, brick and cement structures no doubt related to the airstrip.	---	-
PL	002	S30 29 42.4 E19 33 51.8	LSA site on hilltop. Cryptocrystalline silica (CCS), quartz, hornfels, ostrich eggshell, cores, blades, 1 adze, 20 m diameter.	GP B	Medium [4 hours]

Project	Waypoint	GPS	Description	Field rating	Significance [mitigation]
PL	004	S30 29 45.2 E19 33 30.8	Ephemeral background scatter of heavily weathered stone artefacts, probably pertaining to the MSA.	GP C	Very low
PL	005	S30 27 10.1 E19 34 26.9	Windmill, sheep dip (005). Nearby, in the seasonal pan, was one hand-painted refined earthenware ceramic fragment and one ostrich eggshell fragment.	GP C	Low [Avoid]
PL	011	S30 27 00.2 E19 34 24.5	Ephemeral LSA scatter in CCS on edge of seasonal pan.	GP C	Low
PL	012	S30 27 10.1 E19 34 25.5	A stone cairn (012) made of round dolerite cobbles (there are no such cobbles naturally occurring in the immediate area). Location suggests it is unlikely to be a grave.	GP C	Low (possibly High)
PL	013	S30 28 25.4 E19 33 42.3	Small LSA scatter of CCS within an area of about 2 m ² and located on the crest of a hill.	GP B	Low-medium [2 hours]
PL	014	S30 28 30.0 E19 33 50.4	Dump with shale pieces, red frog bricks, glass, ceramics, metal, animal bones and ashy patches. Most material is 20 th century but a few items may date to the very late 19 th century. A small vernacular house in stone and mud but with a more recent addition in brick on southern end lies to the east along with a recent (but traditional style) kookskerm and outdoor bread oven. The house also has a corrugated iron addition. The roof, which may once have been a brakdak (see Fagan 2008), is now of corrugated iron.	GP A	Medium-high [Avoid]
PL	015	S30 28 57.6 E19 33 32.7	Isolated lower grindstone on bank of stream bed.	---	---
PL	016	S30 29 04.8 E19 33 31.7	Ephemeral LSA scatter of CCS artefacts 100 m from the dry stream bed.	GP C	Very low
PL	017	S30 29 05.6 E19 33 29.9	Ephemeral LSA scatter of CCS artefacts 65 m from the dry stream bed.	GP C	Very low
PL	018	S30 29 05.3 E19 33 28.8	Ephemeral LSA scatter of CCS artefacts 35 m from the dry stream bed.	GP C	Very low
PL	019	S30 29 02.5 E19 33 29.0	Ephemeral LSA scatter of CCS artefacts near dry stream bed but with some historical glass and ceramics also present.	GP C	Very low
PL	020	S30 29 07.3 E19 33 26.0	LSA scatter of CCS, ostrich eggshell, 1 tooth enamel fragment on bank of dry stream bed. Probably truncated by disturbance from the gravel road.	GP B	Low-medium [4 hours]
PL	021	S30 29 11.9 E19 33 27.4	Ephemeral scatter of historical ceramics with one bearing the text "...E IN BEL...", presumably "made in Belgium". Late 19 th /early 20 th century.	GP C	Very low
PL	022	S30 29 11.3 E19 33 28.5	Very large LSA scatter of CCS, ostrich eggshell on the side of a dolerite outcrop just downslope of disturbed area. Scatter is about 15 m by 20 m. Also a boulder with "AL" scratched on it but this is recent.	GP A	Medium-high [16 hours]

Project	Waypoint	GPS	Description	Field rating	Significance [mitigation]
PL	023	S30 29 09.7 E19 33 32.0	Smaller LSA scatter of CCS and ostrich eggshell further east on same hill. Also some historical ceramic fragments.	GP B	Low-medium [4 hours]

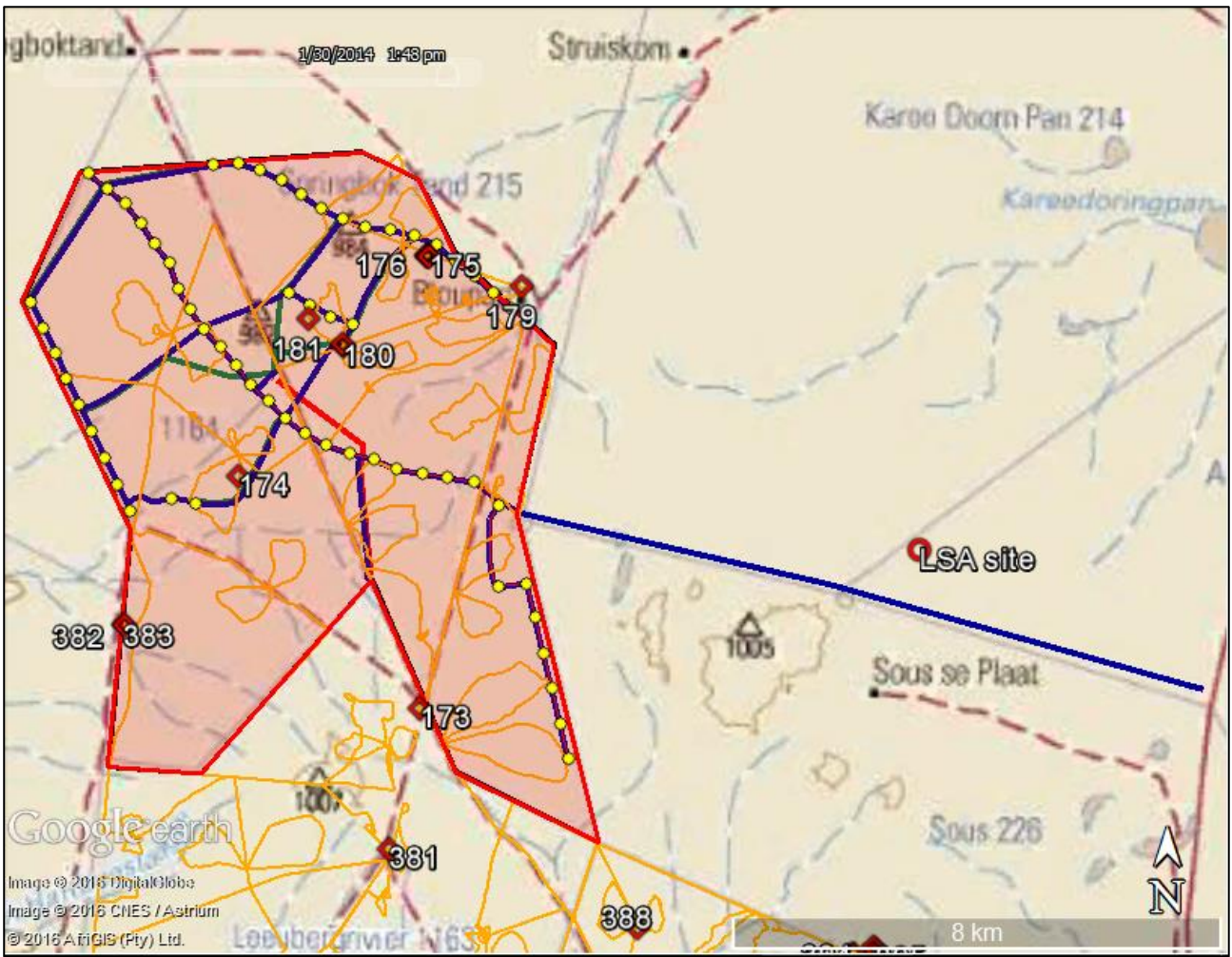


Figure 8: Map of the entire Kokerboom 2 study area showing the locations of the various finds. (red numbered symbols) relative to the proposed infrastructure (yellow dots = turbines, blue lines = roads, green and red lines = overhead power lines). The orange lines are the walk and drive paths from the survey. An area in the northeast is enlarged below.

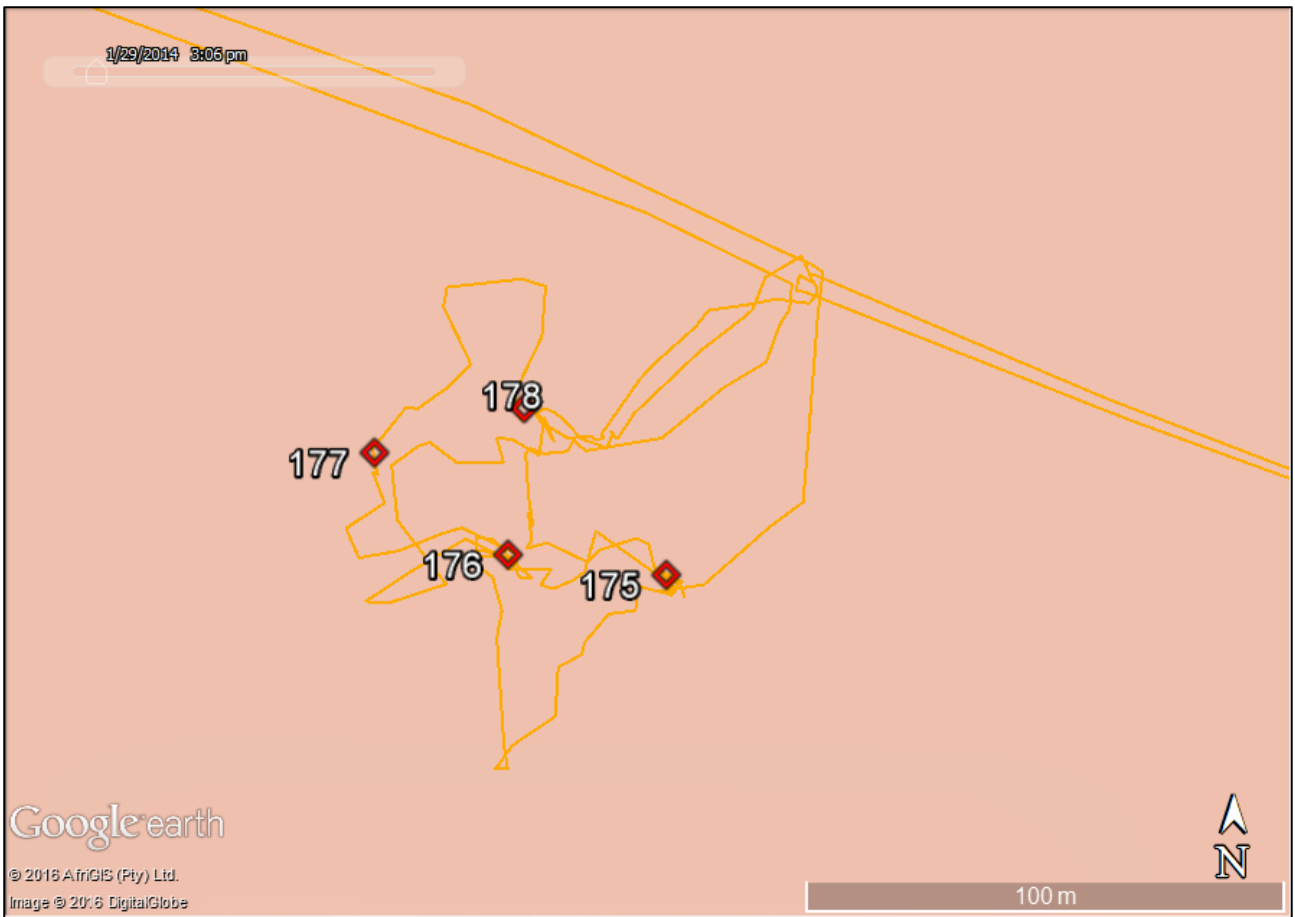


Figure 9: Map of a small part in the northeast of the Kokerboom 2 study area showing the locations of finds.

6.1. Archaeology

6.1.1. Stone Age archaeology

At a few places in the northern and central parts of the study area we located slightly denser than usual background scatters. Artefacts from two of these are illustrated in Figures 10 and 11. The scatters are fairly similar to one another but that at Waypoint 181 was far more extensive with some fairly dense patches. The artefacts are generally quite weathered indicating that they very likely originate from the MSA.



Figure 10: Stone artefacts found at waypoint 174. Scale in cm.



Figure 11: Stone artefacts found at waypoint 181. Scale in cm.

There was only one good LSA site located during the survey. This was on a small but quite prominent hill in the north-eastern part of the study area (Figure 12). On the hill were several scatters of very “fresh-looking” artefacts that must be quite recent (Figures 13 to 15). The artefacts are made largely from CCS and hornfels. While the CCS is brightly-coloured (Figure 14), the hornfels is distinctive because it is unweathered and is a black/dark grey colour (Figure 15).



Figure 11: View of the surface of the hill top at waypoints 175 to 178.



Figure 12: Stone artefacts (black/dark grey) on the surface of the hill at waypoints 175 to 178.



Figure 13: Stone artefacts found at waypoint 175. Scale in cm.



Figure 14: Stone artefacts found at waypoint 178. Scale in cm.



Figure 15: Stone artefacts and ostrich eggshell fragments found at waypoint 383. Scale in cm.

6.1.2. Historical archaeology

No historical material was seen in the study area. The study area is relatively far from the farmstead.

6.2. Built heritage

No built heritage was located in the study area with the only structure recorded being a stone beacon located just outside the eastern edge of the study area. Its function is unknown but it does not appear to have great antiquity.

6.3. Graves

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

6.4. 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, but has now been compromised by neighbouring wind farm developments, the Helios Substation and associated power lines which create a new 'cultural' layer on the landscape.

6.5. Statement of significance

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 archaeological resources on the whole are deemed to have medium cultural significance for their scientific value.

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

6.6. Summary of heritage indicators and provisional grading

The primary type of heritage resource of concern here is archaeology. Several artefact scatters have been located that, if they were to be impacted, would require mitigation work (according to the approximate excavation/sampling durations indicated in Table 1). They are LSA scatters and are allocated provisional grades of "Generally Protected B" and "Generally Protected C" (Table 1). 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 is also currently being altered through the construction of two other wind energy facilities on neighbouring farms. The SAHRA grading system was not designed for landscapes.

7. ASSESSMENT OF IMPACTS

7.1. 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, although there are several sites of medium cultural significance, the layout has avoided all identified 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.

With mitigation, which would involve controlled excavation and collection of archaeological material from any important sites that might be impacted, 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 them are important enough to require *in situ* conservation. Given the current wind farm layout, however, no mitigation is envisaged as all findings of significance have been suitably avoided.

Although some archaeological sites are likely to be lost during the construction of other facilities (two wind energy facilities are under construction, while a third wind farm and a solar energy facility have been authorised), 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 2 wind farm layout avoids all significant heritage sites and will thus make a negligible contribution to cumulative impacts.

Although graves have been listed in Section 6 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 very difficult to predict.

Although mitigation other than designing the facility to avoid known sites (as has been done) is not 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. 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 at least six months in advance of construction.

7.2. 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. 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.

Although the construction of other facilities will also affect the cultural landscape (two wind energy facilities are under construction, while a third wind farm and a solar energy facility 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.

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 another wind energy facility currently under construction on a neighbouring property	Negative	Local	Low	Long term	Definite	Certain	Reversible	Low (-)	Negative	Local	Low	Long term	Definite	Certain	Reversible	Low (-)

8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Aside from ensuring that any necessary archaeological mitigation is implemented², the only management measure that should be incorporated into the Environmental Management Programme is the need to ensure that activities remain inside 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.

9. 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 is considered to be more important than these social and economic benefits.

10. CONCLUSIONS

This study has found that there are very few significant heritage resources present on the site. Besides the landscape itself, which is of relatively low significance and has already been compromised by the other wind energy facilities presently under construction, the only other heritage resources of concern are a few archaeological sites, largely concentrated on low hills in the east and near rock outcrops in the southwest. Because these were identified at the scoping phase, they have been avoided by the proposed layout. Although it is likely that some isolated artefacts attributable to background scatter may be disturbed, no significant impacts to heritage resources are expected.

11. RECOMMENDATIONS

Because the layout has been designed to avoid all known heritage resources on the site, it is proposed that the project be allowed to proceed without the need for further heritage studies. However, the following condition should be included as part of the authorisation should one be issued:

² Although no mitigation is required on the basis of the present layout, the nature of wind energy facility development is such that layouts can change and mitigation may become necessary at a later stage.

- If there are any changes to the layout then these should be evaluated by an archaeologist. If any mitigation becomes necessary this should be commissioned and completed before the start of construction; 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

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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