

**HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED
KOKERBOOM 3 WIND ENERGY FACILITY ON FARMS 214/1
AND 214/2, 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:

ZUTARI (PTY) LTD
PO Box 494, Cape Town, 8000
Tel: 021 526 6025
Email: Corlie.Steyn@zutari.com

On behalf of:

BUSINESS VENTURE INVESTMENTS NO. 2105 (PTY) LTD



Dr Jayson Orton
ASHA Consulting (Pty) Ltd
40 Brassie Street, Lakeside, 7945
Tel: (021) 788 1025 | 083 272 3225
Email: jayson@asha-consulting.co.za

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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 65 km north of Loeriesfontein in Northern Cape. The study area is located on Portions 1 and 2 of Karee Doorn Pan No. 214. It is centred on S30° 22' 00" E19° 30' 00".

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 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 and some pans occur.

Heritage resources were found to be generally scarce in the study area but a few archaeological sites of up to medium cultural significance were located. The farm complex in the north-western part of the study area also contains heritage structures and ruins of up to medium significance. 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;
- The site at waypoint 722 must be examined and its extent physically marked on site during the pre-construction survey to enable proper cordoning off by the ECO. However, if it will not be possible to avoid direct disturbance to the site, as seems likely, then mitigation (in the form of sampling and collection) will be required prior to construction of turbine #25; 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

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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 65 km north of Loeriesfontein in Northern Cape (Figures 1 & 2). The study area is located on Portions 1 and 2 of Karree Doorn Pan 214. It is centred on S30° 22' 00" E19° 30' 00" and is to be known as the Kokerboom 3 wind energy facility (WEF).¹ The operational Khobab and Loeriesfontein WEFs occur on neighbouring farms to the south and east respectively.

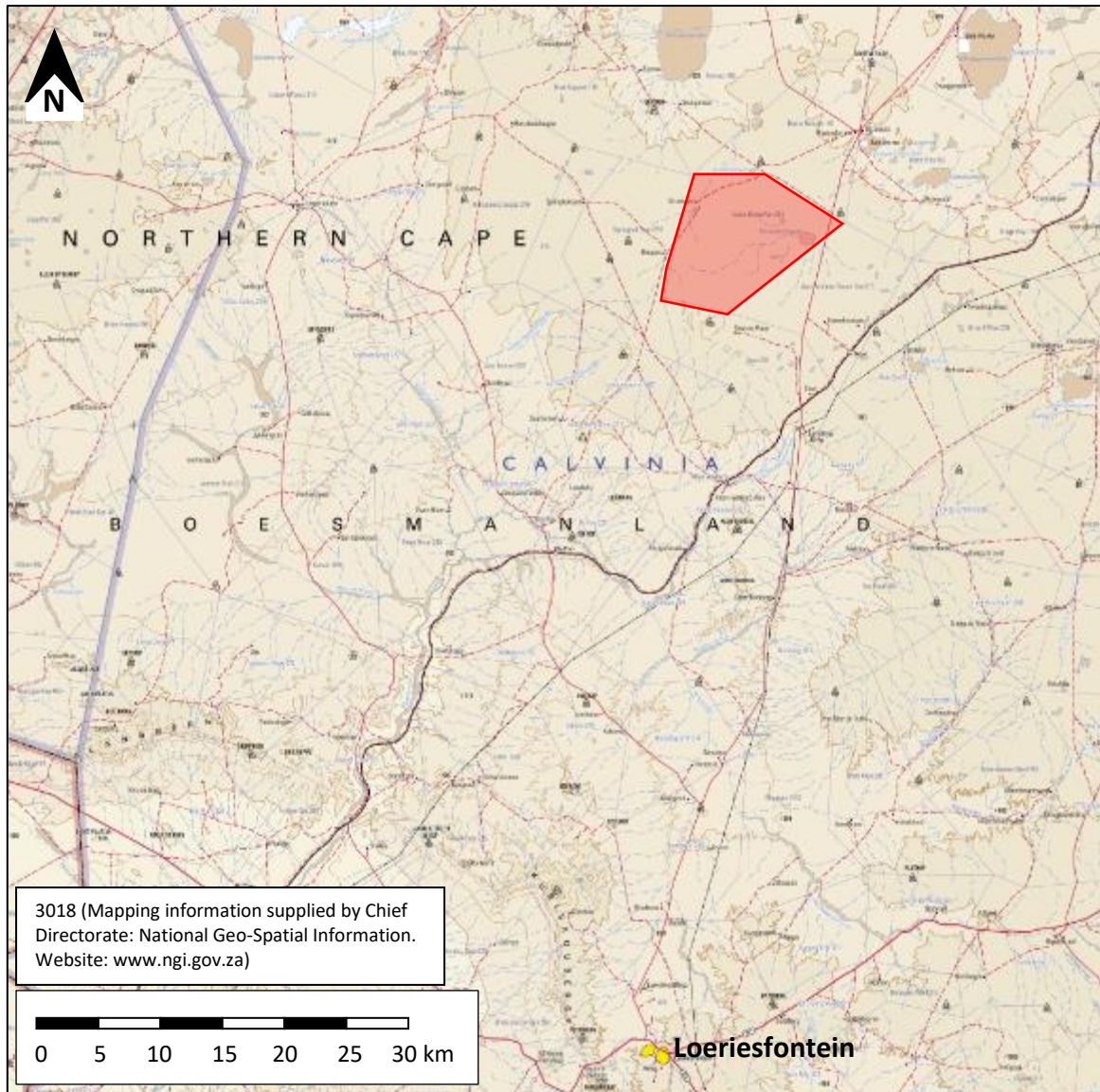


Figure 1: 1:250 000 topographic map showing the location of the Kokerboom 3 site (red shaded polygon) relative to the town of Loeriesfontein in the south. The bold wavy line passing from southwest to northeast is the Sishen-Saldanha Railway.

¹ Note that an earlier assessment considered the then proposed Kokerboom 3 WEF but the project description and layout have changed sufficiently to call for a new Scoping and Environmental Impact Assessment. The earlier heritage assessment can be found here: <https://sahris.sahra.org.za/cases/kokerboom-3-wef>.

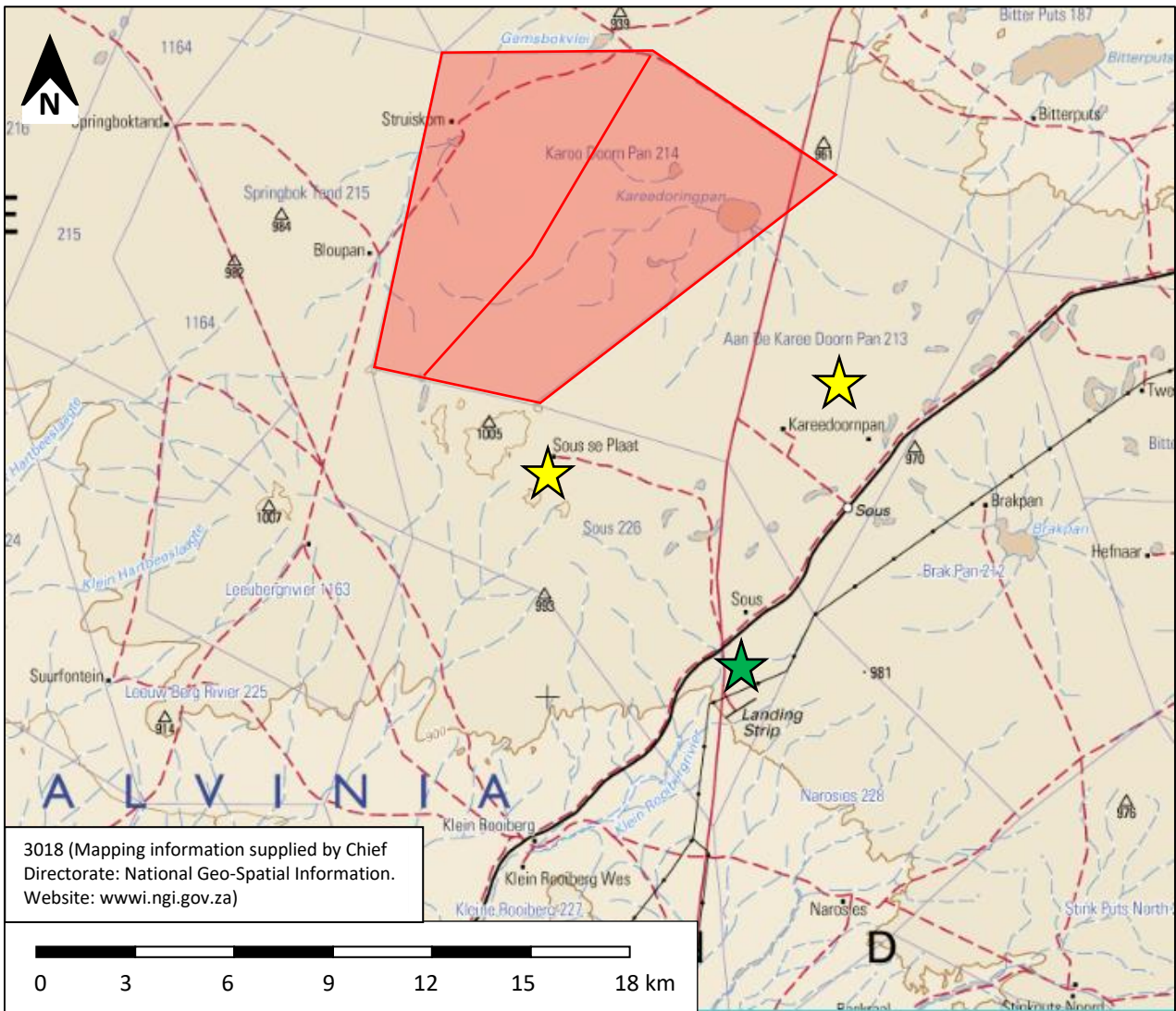


Figure 2: 1:250 000 topographic map of the immediate vicinity of the study area (red shaded polygons = site). Other wind farm developments already constructed in the vicinity are indicated by the yellow stars, while the green star denotes the position of the Eskom Helios Substation.

1.1. The proposed project

1.1.1. Project description

The proposed project would have a generating capacity of up to 300 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 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) (Note that three access points are under consideration, one of them linking through another proposed WEF, but these are irrelevant to the heritage assessment);

- 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 150 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, while the rest of the site was examined on 24, 25, 26 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.

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 separately².

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

² 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.

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).

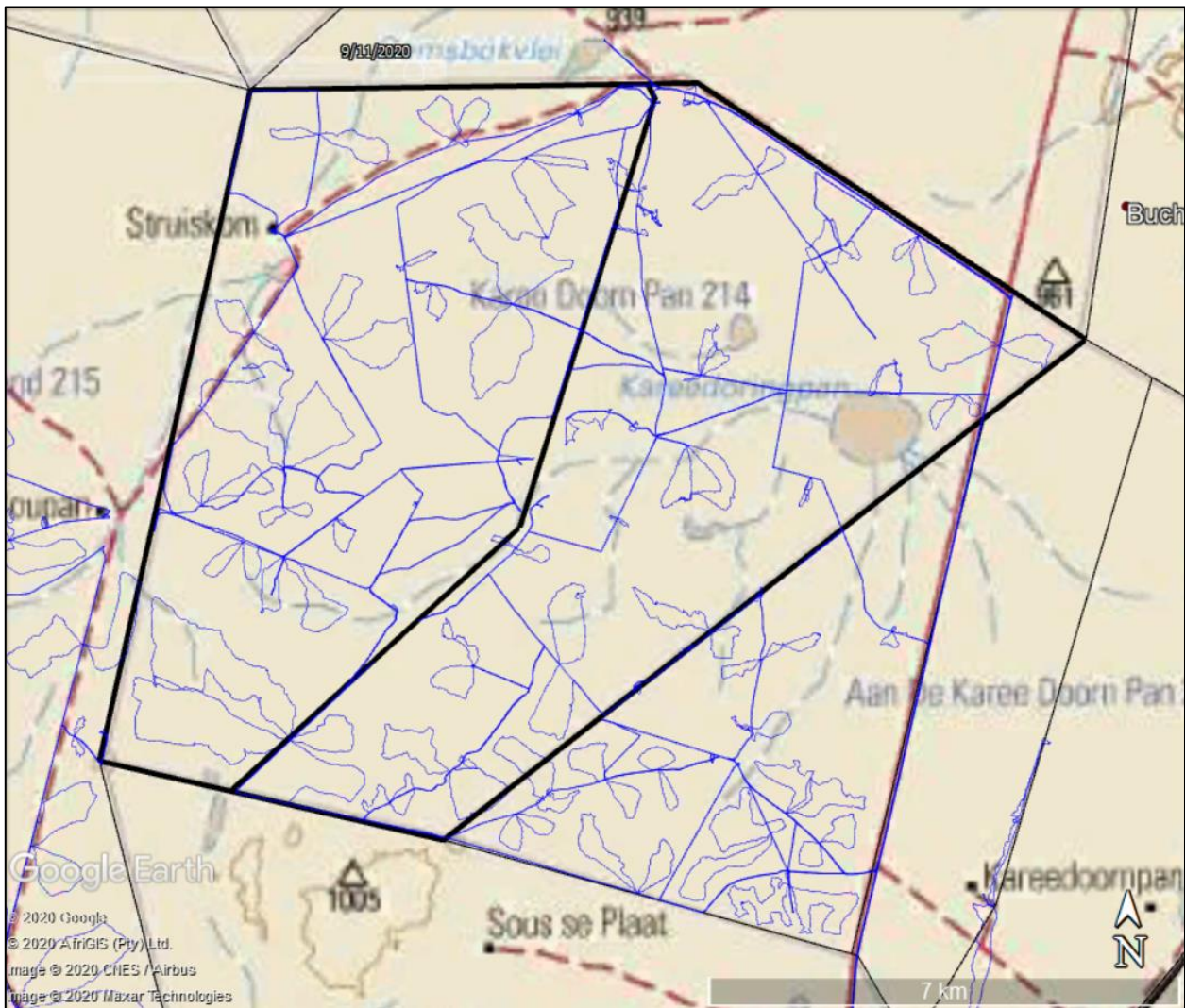


Figure 3: Map of the Kokerboom 3 study area (the two bold black polygons denote relevant farm portions) showing the drive and walk paths created during the survey (blue lines). Note that blue lines outside the study area relate to other surveys by the present author.

3.6. 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 turbine and road layout itself has not been surveyed. 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 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. A number of ephemeral pans were evident in the south-eastern part of the study area, generally associated with calcrete gravel (Figure 5). The flatter ground tends to be sandy and grassed, while on the higher ground erosion has resulted in the surfaces being gravelled (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 southeast showing dolerite outcrops overlooking a pan in the northern part of the study area.



Figure 5: View towards the southeast across one of the ephemeral pans (less vegetated area in mid-picture).

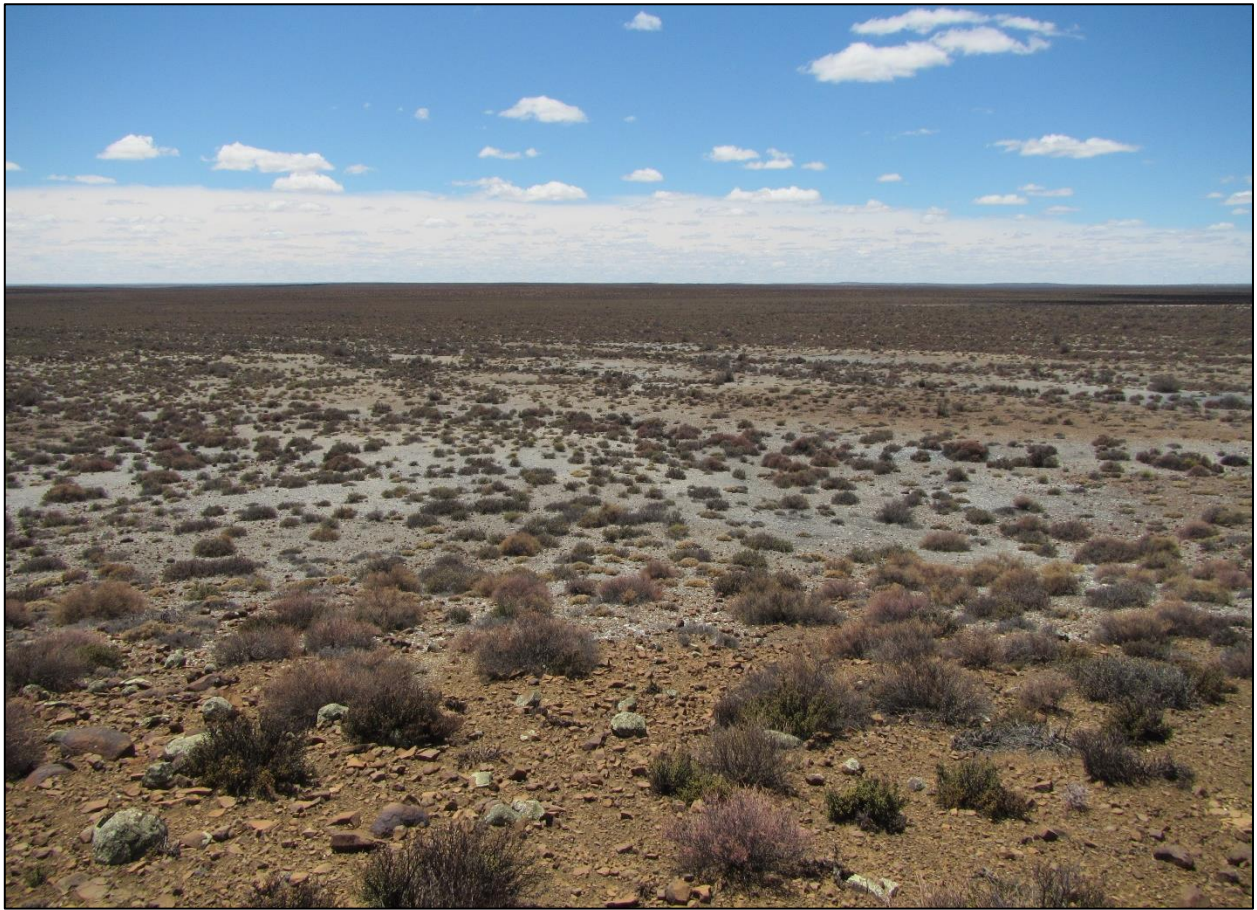


Figure 6: View towards the north in the central part of the study area showing the gravel surface on the high ground (foreground).

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 3 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 3 study area are mapped in Figures 7 to 9.

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 appropriate³. Field Ratings are in terms of the grades described in Section 3.5.

Waypoint	GPS	Description	Significance [mitigation]	Field rating
678	S30 21 30.9 E19 33 37.5	LSA stone artefact scatter on the northern edge of a pan. It has CCS artefacts and ostrich eggshell fragments.	Low	GPB
679	S30 21 30.0 E19 33 39.9	LSA stone artefact scatter on the northern edge of a pan. It has CCS artefacts and ostrich eggshell fragments.	Low-medium	GPA

³ 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.

Waypoint	GPS	Description	Significance [mitigation]	Field rating
		It was noted that there were many ostrich eggshell fragments and several historical glass and ceramic fragments along the edge of the pan in this area. These are not significant.		
680	S30 19 38.6 E19 31 14.9	A dolerite outcrop with many ostrich eggshell fragments and occasional CCS artefacts.	Very Low	GPC
681	S30 19 38.7 E19 31 13.0	A dolerite outcrop with a cluster of ostrich eggshell in between boulders on the outcrop.	Very Low	GPC
682	S30 19 39.2 E19 31 13.3	A single small bedrock grinding patch (very shallow) on a dolerite outcrop.	Very Low	GPC
683	S30 19 42.1 E19 31 12.5	A dolerite outcrop with many ostrich eggshell fragments and one CCS artefact.	Very Low	GPC
684	S30 19 51.4 E19 31 32.5	A scatter of ostrich eggshell fragments, including one burnt piece, on a dune to the south of a pan.	Very Low	GPC
685	S30 20 03.2 E19 31 36.8	A scatter of CCS artefacts and ostrich eggshell fragments in an open area alongside a streambed and to the north of some dolerite outcrops. There is also one quartz artefact.	Low-medium 2 hours	GPA
686	S30 20 11.0 E19 31 18.0	A scatter of ostrich eggshell fragments, including some burnt ones, and CCS artefacts between dolerite outcrops.	Low	GPB
687	S30 20 59.4 E19 32 12.8	An ephemeral artefact scatter on the edge of a pan. The material is unknown but might be hornfels. Although there are many ostrich eggshell fragments scattered along the pan margin here, there are none directly associated with these artefacts.	Very Low	GPC
688	S30 20 43.6 E19 29 32.8	A scatter of ostrich eggshell fragments, including one showing evidence of having been struck from the outer surface, located between boulders on a dolerite outcrop.	Very Low	GPC
689	S30 20 22.5 E19 29 36.4	A scatter of ostrich eggshell fragments and CCS artefacts as well as one burnt bone on a dolerite outcrop. They occur alongside and minimally inside a tiny enclosure built with dolerite blocks. The floor space is no more than 1m (W-E) by 2m (N-S) and the opening is towards the north.	Low-Medium 2 hours	GPA
690	S30 20 21.8 E19 29 34.3	A low density scatter of CCS artefacts.	Very Low	GPC
691	S30 19 58.0 E19 30 26.3	An ephemeral scatter of CCS artefacts.	Very Low	GPC
692	S30 20 14.8 E19 30 37.7	A dolerite outcrop with plenty of ostrich eggshell on and around it but no stone artefacts were seen.	Very Low	GPC
693	S30 20 14.9 E19 30 38.1	A dolerite outcrop with plenty of ostrich eggshell and some CCS artefacts on and around it.	Low	GPB
694	S30 19 57.7 E19 30 51.0	A scatter of ostrich eggshell fragments, including some burnt pieces, on a dolerite outcrop.	Very Low	GPC
695	S30 20 12.9 E19 28 07.0	The farmstead on Portion 2 of Farm 214. It has a modern house (maybe 1970s) as well as a shed that is likely to be early 20 th century and a mud brick house ruin that may be late 19 th century. The ruin has wooden door and window frames, some muurkaste, and bamboo ceiling which has collapsed. The roof poles seem to have been removed for reuse elsewhere. The house stands on a stone plinth. There is a very good chance that it was originally a brakdak house.	Medium	IIIB

Waypoint	GPS	Description	Significance [mitigation]	Field rating
696	S30 20 11.4 E19 28 04.0	This is the dump associated with the house ruin. It has a mixture of late 19 th /early 20 th century and later 20 th century materials. There is a fairly low density of cultural materials.	Medium-Low	GPA
697	S30 22 13.0 E19 28 05.0	An area with an elevated density of background scatter alongside a pan/watercourse. The artefacts are of orange-coloured chert.	Very Low	GPC
698	S30 22 45.2 E19 28 46.9	A small scatter of LSA white CCS artefacts on a hilltop and overlooking a pan/watercourse to the north. There are about 25 artefacts.	Low	GPB
699	S30 22 41.3 E19 27 49.7	An area with an elevated density of background scatter associated with red gravel. The artefacts are of orange-coloured chert.	Very Low	GPC
700	S30 22 53.1 E19 27 28.3	An area with an elevated density of background scatter associated with red gravel. The artefacts are of orange-coloured chert. The south-western part of the study area seems to have this gravel and these artefacts far more than anywhere else on site.	Very Low	GPC
701	S30 21 21.8 E19 28 01.7	A scatter of ostrich eggshell fragments as well as some bone and one CCS artefact on a dolerite outcrop.	Low	GPB
702	S30 21 17.9 E19 27 50.1	An ephemeral scatter of ostrich eggshell fragments and some CCS on a dolerite outcrop.	Very Low	GPC
703	S30 21 18.6 E19 28 13.5	A scatter of ostrich eggshell fragments on a large dolerite outcrop (c. 40x30m).	Medium-Low	GPA
704	S30 21 18.8 E19 28 14.1	A scatter of ostrich eggshell fragments and CCS artefacts on the same dolerite outcrop.		
705	S30 21 18.5 E19 28 14.6	Dense scatter of ostrich eggshell fragments with some stone artefacts in CCS, hornfels and quartzite located in a basin on the same dolerite outcrop.		
706	S30 21 19.3 E19 28 14.5	A large ostrich eggshell scatter (including some burnt pieces) and some stone artefacts in CCS, hornfels and 'other' on the southern slope of the dolerite outcrop.		
707	S30 21 18.8 E19 28 14.3	A scatter of ostrich eggshell fragments and artefacts of CCS and hornfels on the top of the dolerite outcrop.		
708	S30 21 18.8 E19 28 15.5	A large ostrich eggshell scatter and some stone artefacts in CCS, on the eastern slope of the dolerite outcrop.		
709	S30 22 26.2 E19 27 59.6	An area with an elevated density of background scatter associated with red gravel. The artefacts are of orange-coloured chert.	Very Low	GPC
710	S30 20 16.9 E19 29 55.3	A single grinding groove (very shallow groove) on a flat area of dolerite bedrock. There is also some ostrich eggshell around the outcrop.	Low	GPB
711	S30 20 15.5 E19 30 37.4	A widespread scatter of ostrich eggshell fragments on the southern side of a dolerite outcrop.	Very Low	GPC
712	S30 20 26.2 E19 30 52.1	A scatter of ostrich eggshell fragments and one tortoise bone alongside a small dolerite outcrop	Very Low	GPC
717	S30 23 10.9 E19 31 38.2	A large scatter of ostrich eggshell with CCS artefacts on a sandy dolerite hill. Includes a backed bladelet fragment.	Medium 16 hours	IIIB
718	S30 23 10.4 E19 31 38.8	A large and very dense scatter of ostrich eggshell with CCS and hornfels artefacts on a sandy dolerite hill.		
719	S30 23 09.9 E19 31 37.2	A large scatter of ostrich eggshell with CCS artefacts on a sandy dolerite hill.		
720	S30 23 03.1 E19 31 26.8	An ephemeral scatter of CCS artefacts on the summit of a shale hill.	Very Low	GPC

Waypoint	GPS	Description	Significance [mitigation]	Field rating
721	S30 23 09.7 E19 31 29.9	An area of slightly higher density background scatter.	Very Low	GPC
722	S30 23 06.5 E19 30 54.5	A huge scatter of ostrich eggshell fragments and some CCS and hornfels artefacts on the side of a dolerite soil hill. Also some burnt ostrich eggshell fragments.	Medium-Low 8 hours	GPA
723	S30 23 35.8 E19 29 54.5	Elevated density background scatter of red/orange CCS artefacts.	Very Low	GPC
724	S30 23 27.7 E19 29 46.3	An outcrop of milky-coloured CCS. Not obviously flaked but there are blocks of it around the area that are worked. Also some flakes.	Very Low	GPC
725	S30 23 26.3 E19 29 41.3	Elevated density of background scatter with CCS of varying colour but the milky rock is notable.	Low	GPB
726	S30 23 26.1 E19 29 40.0	Elevated density of background scatter with CCS of varying colour but the milky rock is notable.	Low	GPB
727	S30 23 24.9 E19 29 39.9	Elevated density of background scatter with CCS of varying colour but the milky rock is notable.	Low	GPB
728	S30 23 20.0 E19 29 41.9	An outcrop of milky-coloured CCS. Not obviously flaked but there are blocks of it around the area that are worked. Also a number of flakes.	Low	GPB
729	S30 22 20.7 E19 31 51.4	A scatter of white CCS artefacts on a hilltop. There are many artefacts, including a backed bladelet and a backed point. There are also ostrich eggshell fragments.	Medium-Low 4 hours	GPA
730	S30 22 20.4 E19 31 53.9	A scatter of green bottle glass, one pink glass fragment, one clear glass fragment, one metal item of unknown function (looks like silver or similar and is untarnished) and also a piece of a harmonica.	Very Low	GPC
731	S30 22 23.5 E19 32 58.3	An ephemeral scatter of CCS artefacts on a hilltop.	Very Low	GPC
080	S30 19 11.4 E19 31 56.1	A scatter of ostrich eggshell fragments and some CCS artefacts on the south side of a dolerite outcrop. Also an upper grindstone on a dolerite cobble.	Low	GPB
081	S30 20 01.8 E19 31 31.0	A scatter of ostrich eggshell fragments on a dolerite outcrop.	Very Low	GPC
082	S30 20 05.8 E19 31 38.0	A scatter of ostrich eggshell fragments on a dolerite outcrop. A CCS flake was seen at the base of the outcrop to the east.	Very Low	GPC
090	S30 21 08.9 E19 32 13.2	A scatter of ostrich eggshell fragments and some CCS artefacts on the south-western margin of a large pan.	Low	GPB
091	S30 20 40.2 E19 29 30.9	A scatter of ostrich eggshell fragments and some CCS artefacts alongside a dolerite outcrop.	Low	GPB
092	S30 20 41.5 E19 29 26.4	A scatter of ostrich eggshell fragments among the boulders on a dolerite outcrop.	Very Low	GPC
096	S30 20 29.0 E19 29 14.2	A scatter of ostrich eggshell fragments and some CCS artefacts on the south side of a dolerite outcrop.	Low	GPB
100	S30 20 29.7 E19 29 16.2	A scatter of ostrich eggshell fragments and a single CCS flake.	Low	GPB
101	S30 19 42.1 E19 31 00.5	A scatter of ostrich eggshell fragments and some CCS artefacts alongside a dolerite outcrop.	Low	GPB
103	S30 19 42.0 E19 31 00.9	A scatter of green bottle glass near a dolerite outcrop. Likely all from one bottle.	Very Low	GPC
104	S30 19 40.5 E19 31 00.5	A scatter of ostrich eggshell fragments on the southern side of a dolerite outcrop.	Very Low	GPC

Waypoint	GPS	Description	Significance [mitigation]	Field rating
115	S30 22 35.1 E19 28 50.5	An area with an elevated density of background scatter alongside a pan/watercourse. The artefacts are of orange-coloured chert.	Very Low	GPC
117	S30 22 21.8 E19 29 25.8	A scatter of ostrich eggshell fragments and urbs alongside a dolerite outcrop. Also some background scatter here.	Low	GPB
123	S30 23 48.6 E19 30 52.6	A light scatter of CCS artefacts.	Very Low	GPC
124	S30 23 52.8 E19 30 52.6	An area with an elevated density of background scatter.	Very Low	GPC
126	S30 23 42.2 E19 29 57.2	A light scatter of CCS artefacts.	Very Low	GPC

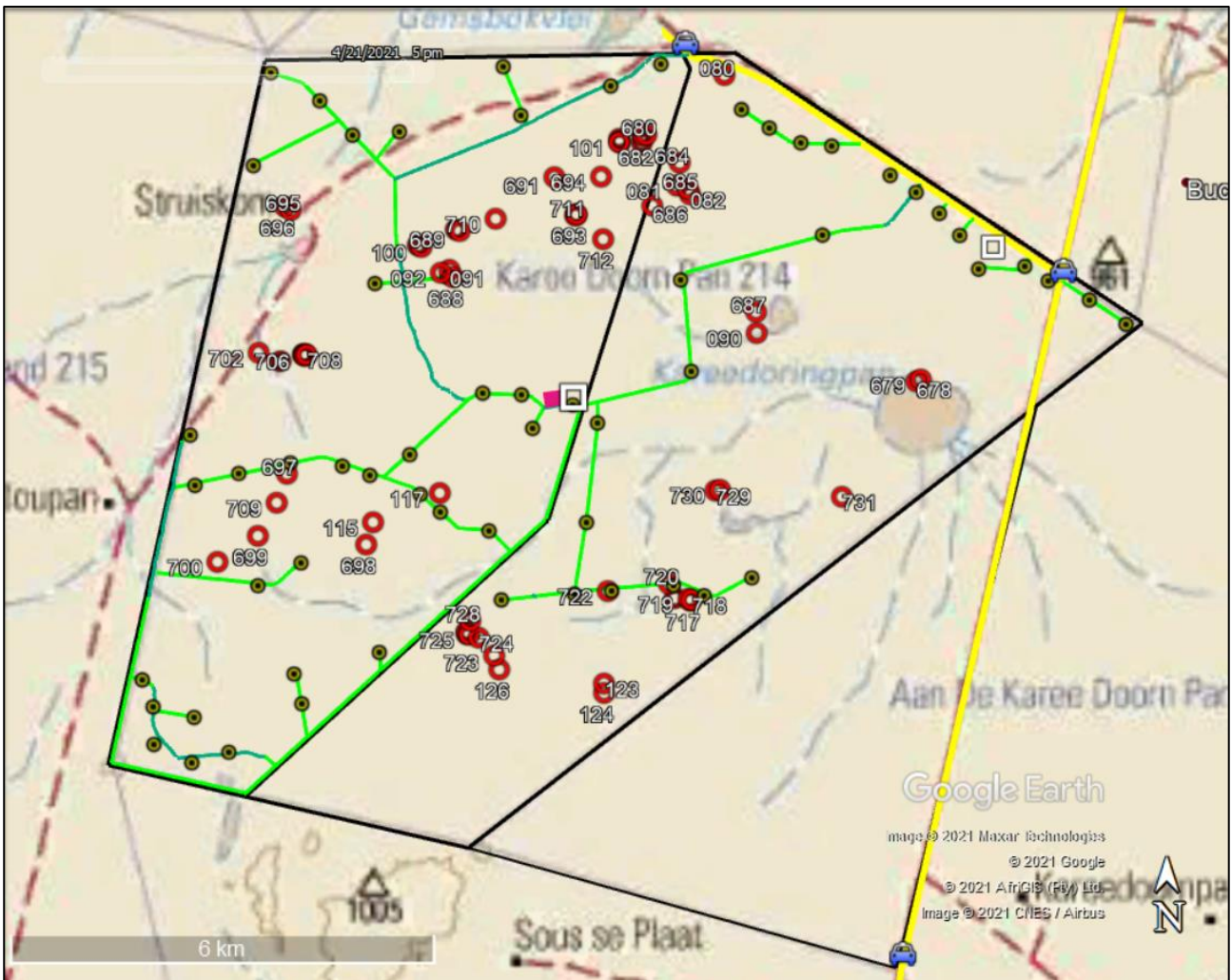


Figure 7: Map of the entire Kokerboom 3 study area showing the locations of all finds (red numbered symbols) relative to the proposed infrastructure (circles with central dots = turbines, dark and light green lines = existing and proposed roads respectively, yellow lines = public roads, small pink rectangle = substation and O&M building, white squares = laydown areas, not to scale, blue cars = potential access points). Areas in the north and centre are enlarged below.

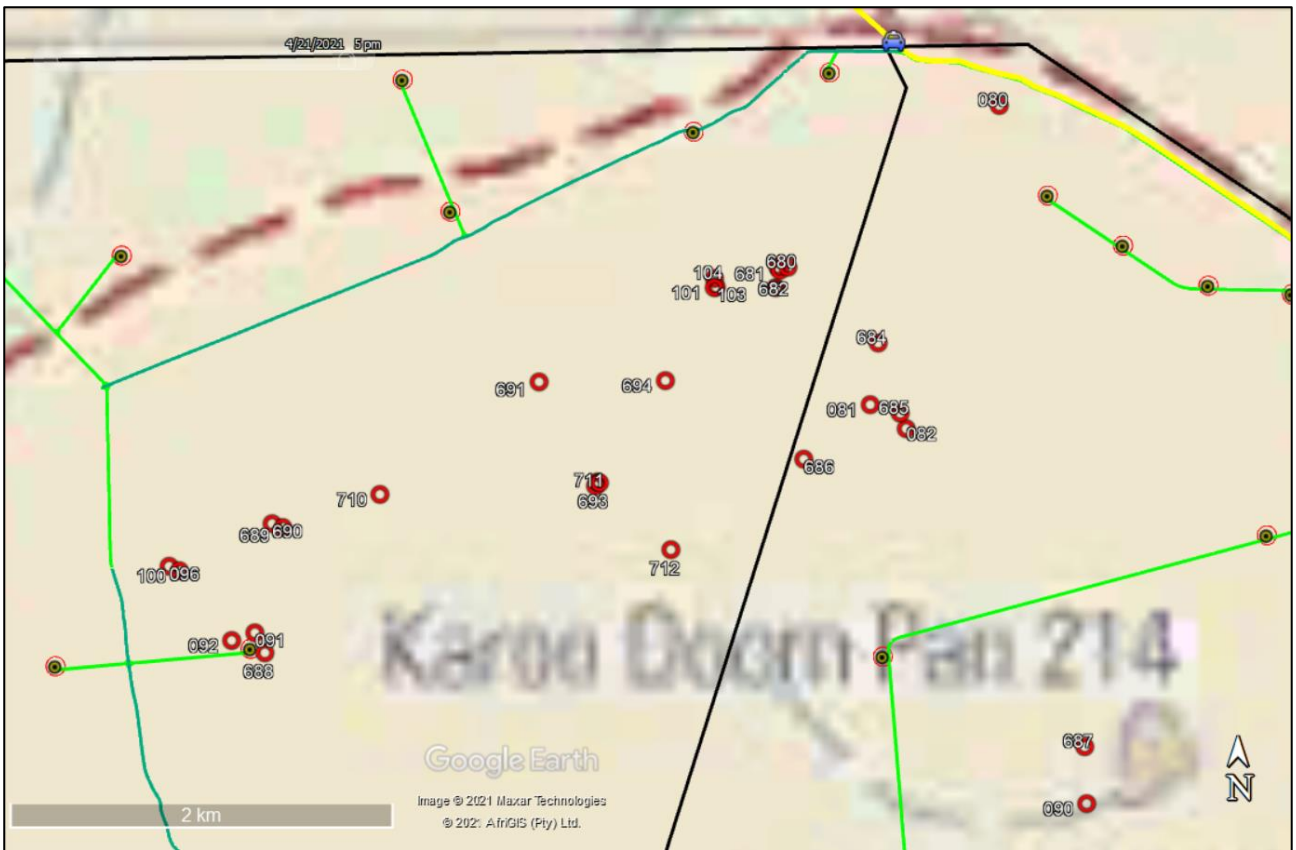


Figure 8: Map of the northern part of the Kokerboom 3 study area. Key as for Fig. 7.

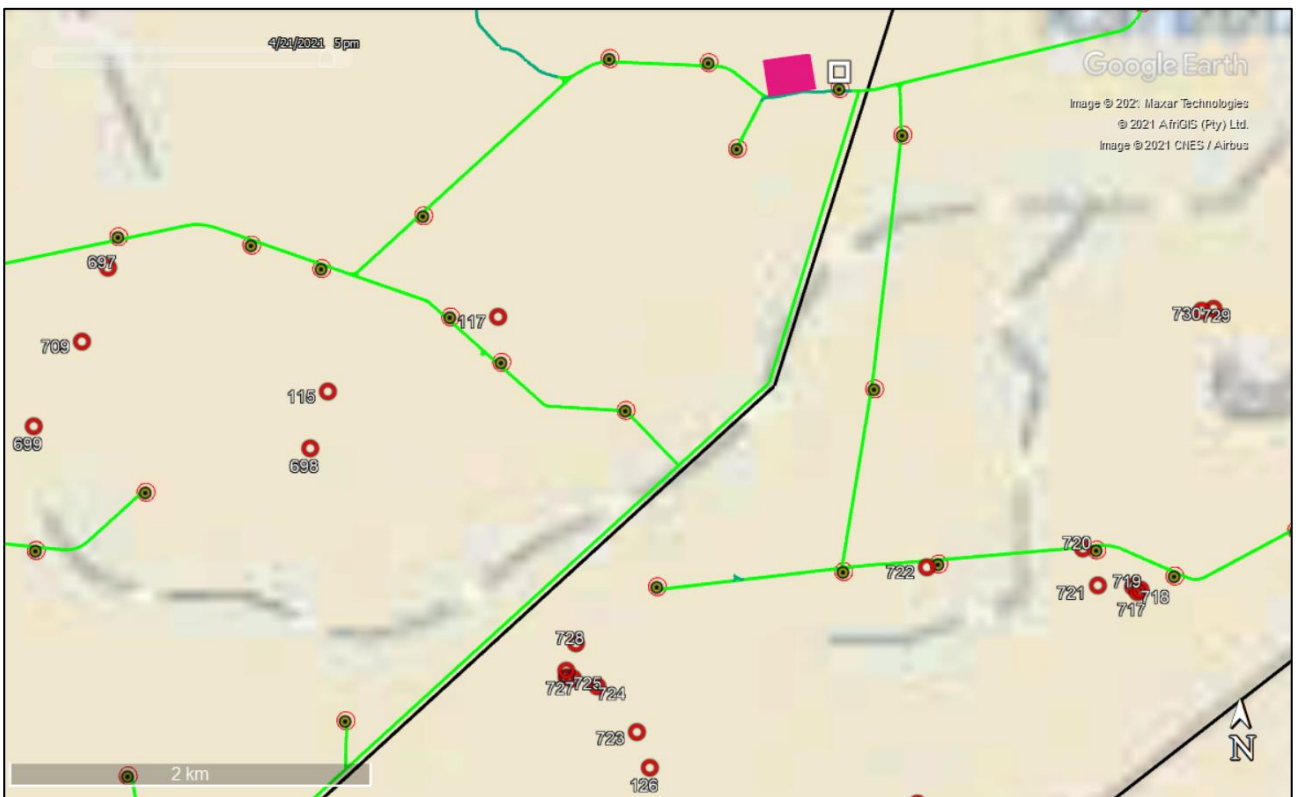


Figure 9: Map of the central part of the Kokerboom 3 study area. Key as for Fig. 7 but thin red circles = turbine foundations.

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

Archaeological resources were found to be widespread in the study area but with the southern part being surprisingly sparse (Figure 7). Many low density and/or small LSA occurrences were noted, often in association with dolerite outcrops. These generally had stone artefacts and ostrich eggshell fragments with the artefacts being of cryptocrystalline silica (CCS) and hornfels. Figure 10 shows an example of finds at one of the better LSA artefact scatters seen during the survey. Figure 11 shows an example of a dolerite outcrop that had a widespread scatter of LSA material over it. Ostrich eggshell fragments were abundant with only a few stone artefacts seen.



Figure 10: LSA artefacts and ostrich eggshell fragments from the northern margin of the large pan in the north-eastern part of the study area (waypoint 679). Scale in cm.



Figure 11: A dolerite outcrop at waypoint 693 with a probably natural sandy hollow in it. There was a widespread scatter of ostrich eggshell and CCS artefacts on the outcrop.

An unusual find was a single grinding groove on a dolerite outcrop alongside an ephemeral watercourse. Such finds are common around water sources in northern Bushmanland and also occur occasionally in the Kamiesberg. The last precolonial archaeological feature requiring discussion is the many background scatter artefacts that occur throughout the site. The density of such artefacts varies across the study area but is always far too low to merit any collection or further study. Figure 14 shows a number of these artefacts from an area close to a watercourse where they were denser than usual, while Figure 15 shows a range of BGS artefacts from across the study area. As is evident, they are well weathered indicating a relatively great age. They are almost certainly all from the MSA.



Figure 12: A dolerite outcrop at waypoint 710 with a single shallow grinding groove on it.



Figure 13: Close up of the grinding groove at waypoint 710. Scale in cm.



Figure 14: Background scatter artefacts at waypoint 115. Scale in cm.

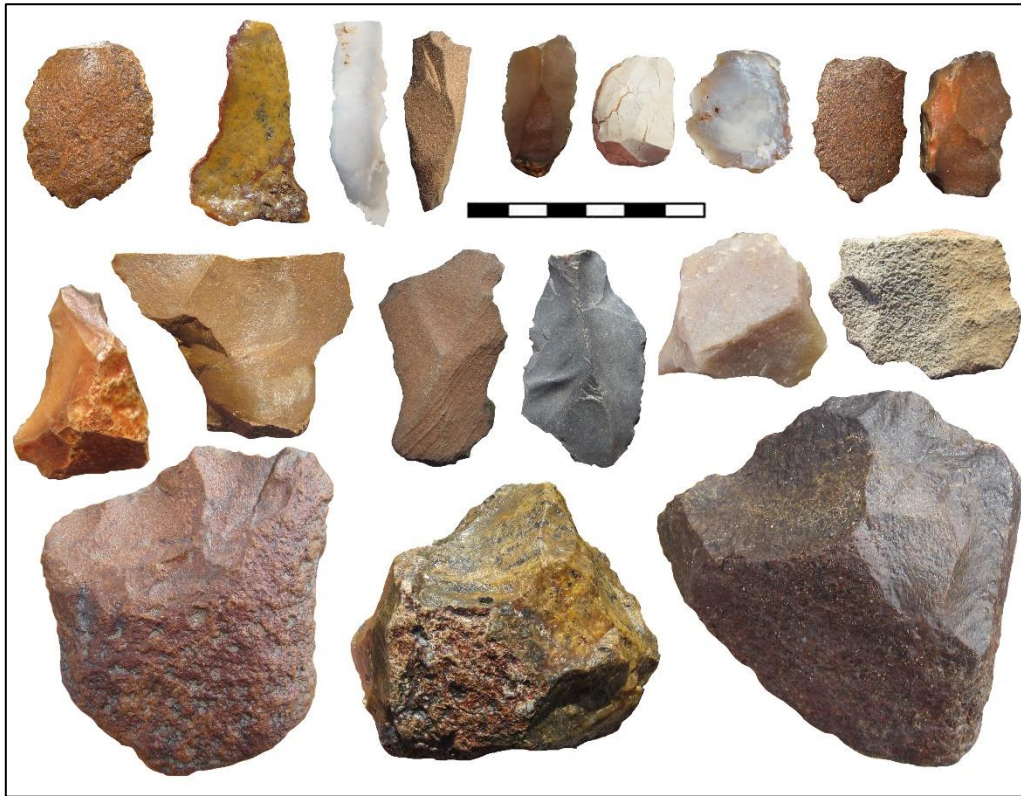


Figure 15: Selection of artefacts pertaining to the background scatter of the study area. Scale in cm.

5.1.3. Site visit: Historical archaeology

A light scattering of historical artefacts was noted along the northern margin of the large pan in the eastern part of the study area (Figure 16). They may well represent an area where camp was set up after heavy rains and before the first house was built on the farm.



Figure 16: Historical artefacts from the northern margin of the large pan in the eastern part of the study area (near waypoint 679). They are a transfer-printed refined white earthenware (left), a coarse porcelain fragment with the glaze being sun-damaged (top right) and a wine bottle base (bottom right).

At the farm complex, which was built overlooking a pan, there is a ruined house built from sun-dried mudbricks on a stone plinth (Figures 17 & 18). A *muurkas* is evident and some windows and doors preserve wooden frames. While the roof beams were likely removed for reuse elsewhere, the presence of bamboo, much mud in the interior of the ruin and a flat-topped central wall suggest that the structure was very likely a *brakdak*. Also at this complex was an ash and artefact dump located 60 m northwest of the ruined cottage. The artefacts include a wide variety of materials dating from the last decades of the 19th century as well as some 20th century materials (Figure 19). The former include transfer and hand-painted refined white earthenwares as well as glass from wine and possibly mineral water bottles and some iron fragments.



Figure 17: The front façade of the ruined farmhouse at waypoint 695 in the north-western part of the study area.



Figure 18: The interior of the ruined farmhouse at waypoint 695 in the north-western part of the study area.



Figure 19: Historical materials from the ash dump at the farm complex (waypoint 696) in the north-western part of the study area.

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 neighbouring farm to the southeast. It 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 20). Once the shop was established the town slowly grew around it.



Figure 20: 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 close to 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

A single built heritage structure was located in the study area (Figure 21). This was an outbuilding at the farm complex at waypoint 695. Although heavily plastered, the building appears to have been built from stone. A stone plinth is visible below the plaster. Also nearby a water reservoir and wind pump are very likely older than 60 years of age but the reservoir has been plastered internally with modern grey cement (Figure 22). An abandoned piece of farm equipment also stands in the werf and is very likely a heritage object (Figure 23).



Figure 21: The farm outbuilding at waypoint 695 in the north-western corner of the study area.



Figure 22: Reservoir and wind pump at the farm complex at waypoint 695 in the north-western part of the study area.



Figure 23: An old piece of farm equipment at the farm complex at waypoint 695 in the north-western part of 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 sites are deemed to have medium cultural significance and are graded IIIB. The precolonial one (waypoints 717-719) is significant for its scientific value, while the colonial period site (waypoint 695) has historical, architectural, technological and social value. Other precolonial archaeological sites are rated low-medium significance for their scientific value and graded GPA. The remaining material is of low to very low significance and is graded GPB and GPC.

The farmstead has both archaeological and built heritage elements with significance as described above.

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 several archaeological sites that would require mitigation work have been recorded, all have been avoided by the current layout (Figure 24). 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.

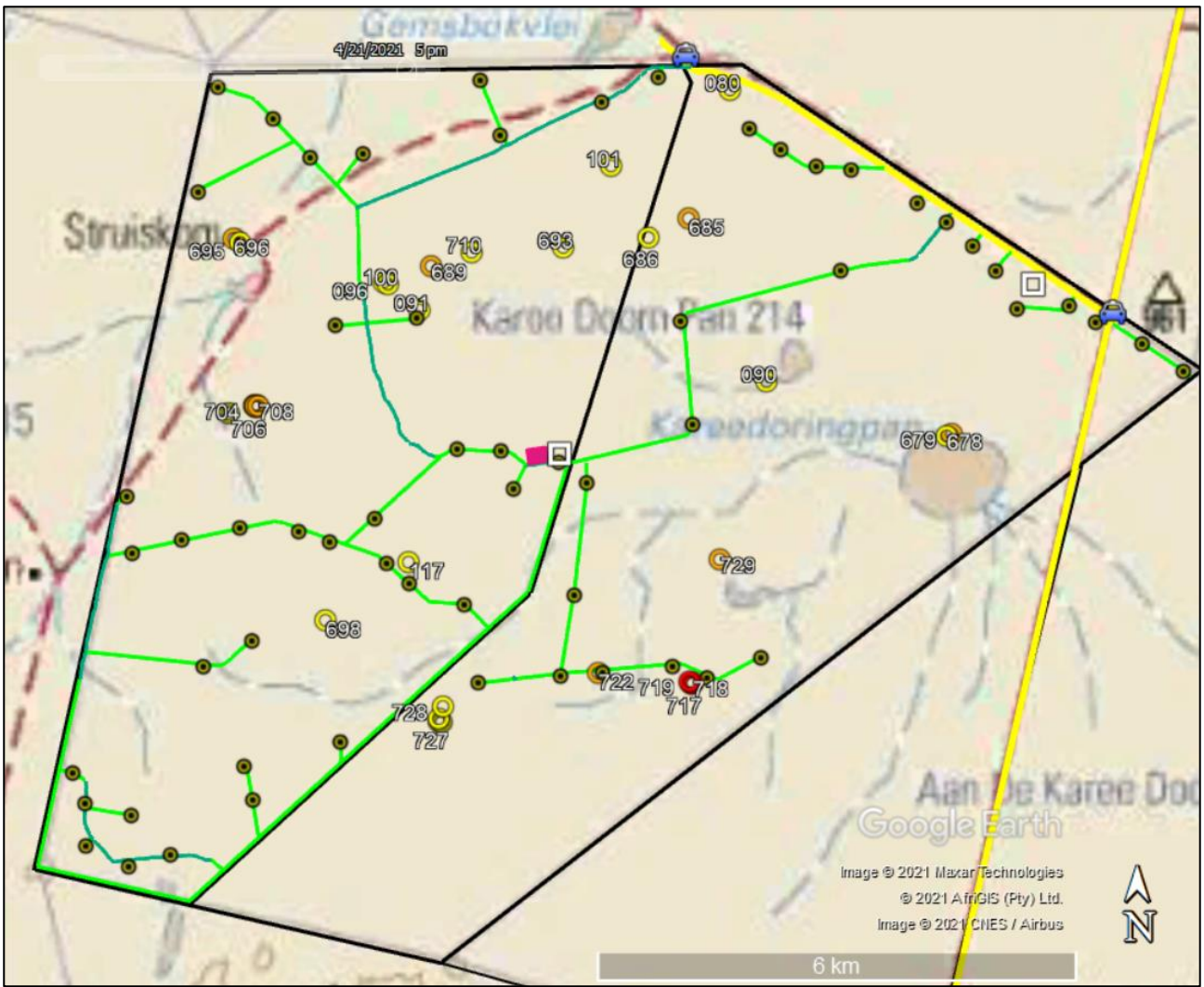


Figure 24: Aerial view of the study area showing sites of low (yellow), low-medium (orange) and medium (red) cultural significance (and hence sensitivity) relative to the project layout.

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. It should be noted, however, that one site graded GPA and requiring mitigation if it is to be disturbed, lies some 20 m from the edge of a turbine foundation (turbine #25). 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 without mitigation.

6.1.1. Management and mitigation requirements

A pre-construction walkdown of the final layout is required to determine whether any further significant archaeological sites occur that require avoidance or mitigation. The spatial extent of the site at waypoint 722 should also be physically mapped with markers placed on site to assist with its identification by the Environmental Control Officer (ECO). If it is deemed to be too close to safely protect then mitigation will be required. 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 (at least six months in advance of construction being ideal).

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 survey must also specifically examine the site at waypoint 722 and physically mark it on the ground to enable easy identification and monitoring by the ECO. Prior to construction the ECO should cordon off the site along the line established by the archaeologist. 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. Should the facility be decommissioned, then the waypoint 722 area should again be cordoned off and protected while construction vehicles are on site unless archaeological mitigation (excavation and sampling/collection) took place prior to construction or decommissioning.

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 that there are a number of 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, the only other heritage resources of concern are the archaeological sites. Because they were identified early on in the project, they have 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 low. As such, no significant impacts to heritage resources are expected.

There are no specific areas within the current layout that require avoidance but it will be important to ensure that the site at waypoint 722 is properly cordoned off and protected throughout the construction phase (unless it is subject to appropriate mitigation in the form of excavation and collection). The same will be required during decommissioning unless a decision was made to effect

archaeological mitigation prior to construction. Figures 25 to 27 map the spatial relationship between the layout and the three archaeological sites nearest to it.



Figure 25: A site graded GPA (waypoint 722) lies within 15 m of a turbine foundation (#25).

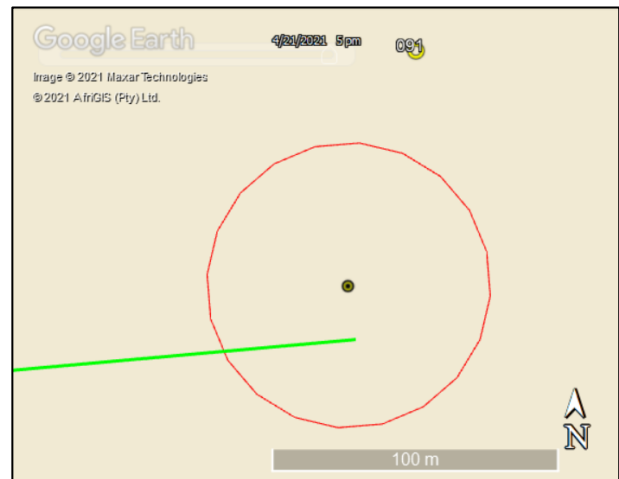


Figure 26: A site graded GPB (waypoint 091) lies 30 m from a turbine foundation (#35).



Figure 27: A site graded IIIB (waypoints 717-719) lies 140 m from the nearest turbine foundation (#27).

9.1. Reasoned opinion of the specialist

Given that known significant impacts have been avoided in the site layout and the chances of highly significant impacts occurring are very low, it is the opinion of the present specialist that the proposed Kokerboom 3 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;
- The site at waypoint 722 must be examined and its extent physically marked on site during the pre-construction survey to enable proper cordoning off by the ECO. However, if it will not be possible to avoid direct disturbance to the site, as seems likely, then mitigation (in the form of sampling and collection) will be required prior to construction of turbine #25; 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.

11. REFERENCES

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APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 6A Scarborough Road, Muizenberg, 7945
Telephone: (021) 788 8425
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

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

Education:

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

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

Employment History:

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

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 24-28 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 a number of small pockets (where archaeological and/or built heritage resources were found) considered to be of up to medium sensitivity. Some of these occurred around pans and there is no doubt that more sites would have been located close to pans if these areas had been searched more thoroughly. Figure 24 (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).

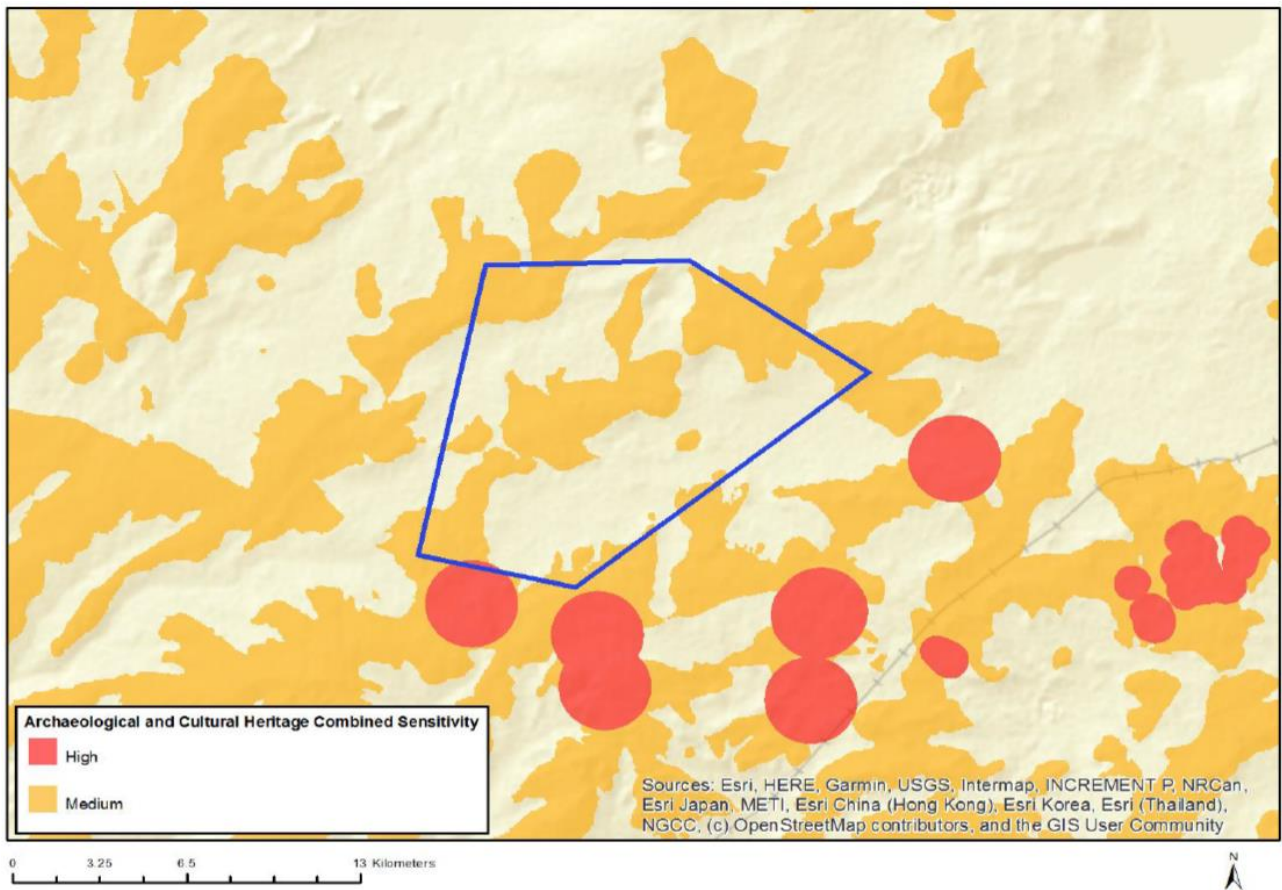


Figure A2.1: Screening tool map for the 'Archaeological and Cultural Heritage Theme'.