HERITAGE IMPACT ASSESSMENT

Environmental Impact Assessment for the Proposed Development of a 75 MW Solar Photovoltaic Facility (Boven Solar PV3) on Boven Rugzeer 169/remainder, northeast of Kenhardt, Northern Cape Province

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

Report for:

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On behalf of:

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EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction, operation and decommissioning of the 75 Megawatt (MW) Boven Solar PV3 solar energy facility on the remainder of farm Boven Rugzeer 169, near Kenhardt, Northern Cape. A 132 kV transmission line will link the facility with the Nieuwehoop Substation presently under construction on Gemsbok Bult 120/3.

A field survey of the preferred site, the alternative sites and the transmission corridors revealed archaeological material to be very thinly scattered throughout but several sites with low-medium heritage significance were located alongside a pan in the north-western part of the preferred development site and on a rocky koppie along the transmission corridor. These sites are mostly stone artefact scatters, although some had ostrich eggshell fragments associated with them and some (at the koppie) had low stone structures. One stone pile may have been a grave. The site in the PV area could potentially be destroyed through construction of the proposed facility, but those on the koppie are unlikely to be affected. The archaeological sites should be avoided with a buffer of at least 20 m, but, to protect some of the context of the sites, buffers of 75 m from the centre of the pan and 120 m from the summit of the koppie are preferred. Excavation, if required, would be by a professional archaeologist under a permit issued to the archaeologist by the South African Heritage Resources Agency. The possible grave is considered to be of high heritage significance. It should be avoided with a buffer of at least 5 m (or included within the koppie buffer) but if this is not possible then it should be tested under a permit issued to the archaeologist and, if human remains are found, it would require exhumation. If the site was found to not contain a burial then it would have no heritage significance.

There will also be impacts to the cultural landscape, but these would be of low significance. Mitigation would serve to slightly reduce the contrast of the built elements in the landscape.

There are no fatal flaws and overall the heritage impacts are considered to be of low significance for all phases. Mitigation would reduce the significance of impacts to archaeology and graves to very low, while impacts to the landscape will remain of low significance. Cumulative impacts to archaeology and graves are insignificant because no important heritage sites would be lost during implementation of the proposed development. The clustering of this development with the many others proposed in the area means that the cumulative impacts to the landscape are considered to be acceptable and of low significance.

The potential impacts are quite limited and fairly easily avoidable. Therefore it is recommended that the proposed Boven PV3 facility and its associated transmission lines be authorised subject to the following conditions:

- Should it not be possible to avoid the significant archaeological sites with a buffer of at least 20 m (or 75 m from the centre of the pan and 120 m from the summit of the rocky koppie), then they should be excavated;
- The possible grave should be avoided with a buffer of at least 5 m (or 120 m from the summit of the rocky koppie) or else tested and, if necessary, exhumed prior to construction;
- The construction team should be made aware of the potential to locate more graves and be instructed to report any suspicious stone features prior to disturbance;

- Where technically feasible, the built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and
- If any archaeological material or human burials are uncovered during the course of construction then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such a heritage resource 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.

Hand-axe: A bifacially flaked, pointed stone tool type typical of the Early Stone Age.

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

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.

Patinated: Chemically altered surface.

Pleistocene: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

Abbreviations

ASAPA: Association of Southern African Professional Archaeologists

CCS: Crypto-crystalline silica

CRM: Cultural Resources Management

CSIR: Council for Scientific and Industrial Research

EA: Environmental Authorisation

EIA: Environmental Impact Assessment

EMPr: Environmental Management Programme

ESA: Early Stone Age

GPS: global positioning system

HIA: Heritage Impact Assessment

In situ: In its original location or context.

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

NID: Notification of Intent to Develop

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R982	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.5 & Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.6 & Appendix 2
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.4
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 6.2
g) an identification of any areas to be avoided, including buffers;	Sections 7 & 11
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 11
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.5
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	Sections 7 & 8
k) any mitigation measures for inclusion in the EMPr;	Section 11
l) any conditions for inclusion in the environmental authorisation;	Sections 11 & 13
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 11
n) a reasoned opinion- i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Sections 12 & 13
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 6.1
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 6.1
q) any other information requested by the competent authority.	n/a

Contents

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction, operation and decommissioning of the 75 Megawatt (MW) Boven Solar PV3 solar energy facility on the remainder of farm Boven Rugzeer 169, near Kenhardt, Northern Cape. A 132 kV transmission line will link the facility with the Nieuwehoop Substation presently under construction on Portion 3 of Gemsbok Bult Farm 120.

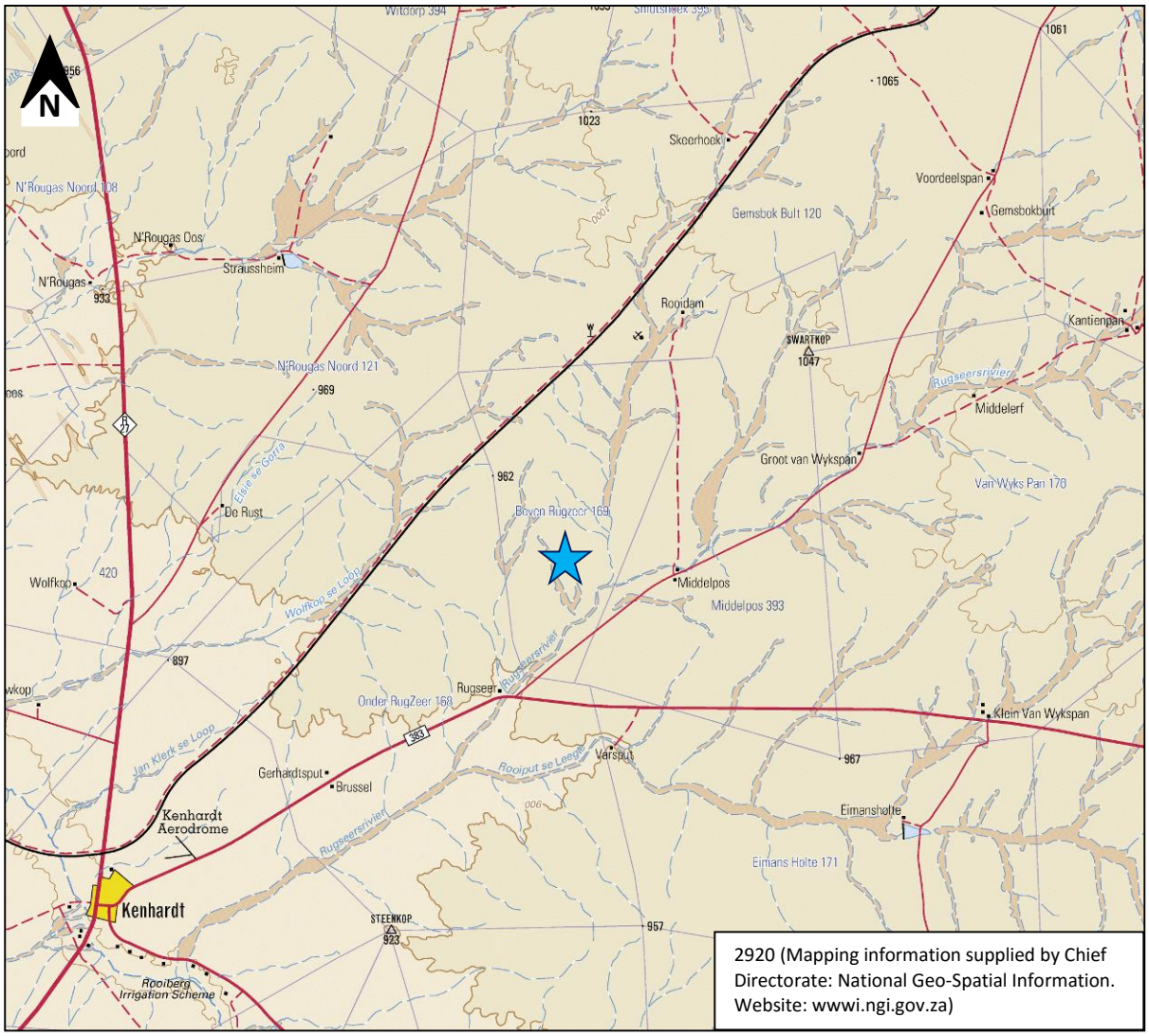

Figure 1: *Map showing the location of the Boven Solar PV3 site (blue star) to the south of the Sishen-Saldanha railway line.*

1.1. Project description

This project, referred to as Boven Solar PV3, is one of seven solar projects being proposed on three neighbouring land parcels (Figure 2). It will entail construction of the following components:

- Solar Arrays:
    - CPV or PV Modules;
    - Single Axis Tracking structures (aligned north-south) and Fixed Axis Mounting structures (aligned east-west);
    - Solar module mounting structures comprised of galvanised steel and aluminium;
    - Foundations which will likely be drilled and concreted into the ground; and
    - Solar measuring station.

- Building Infrastructure:
    - Offices;
    - Operational and maintenance control centre;
    - Warehouse/workshop;
    - Ablution facility;
    - Converter station;
    - On-site substation building;
    - On-site workers accommodation camp; and
    - Guard House.

- Associated Infrastructure
    - 132 kV overhead transmission line;
    - On-site substation;
    - Additional feeder bay and Busbar at the Eskom Nieuwehoop Substation or extensions of the existing infrastructure;
    - A new 400/132kV transformer bay at the Eskom Nieuwehoop Substation;
    - 400/132kV Transformer at the Eskom Nieuwehoop Substation;
    - Extension of the 400kV busbar;
    - Extension of the 132kV Busbar;
    - 22/33 kV internal transmission lines/underground cables;
    - Access road;
    - Internal gravel roads;
    - Fencing;
    - Panel maintenance and cleaning area;
    - Stormwater channels;
    - Water pipelines; and
    - Temporary work area during the construction phase (i.e. laydown area).

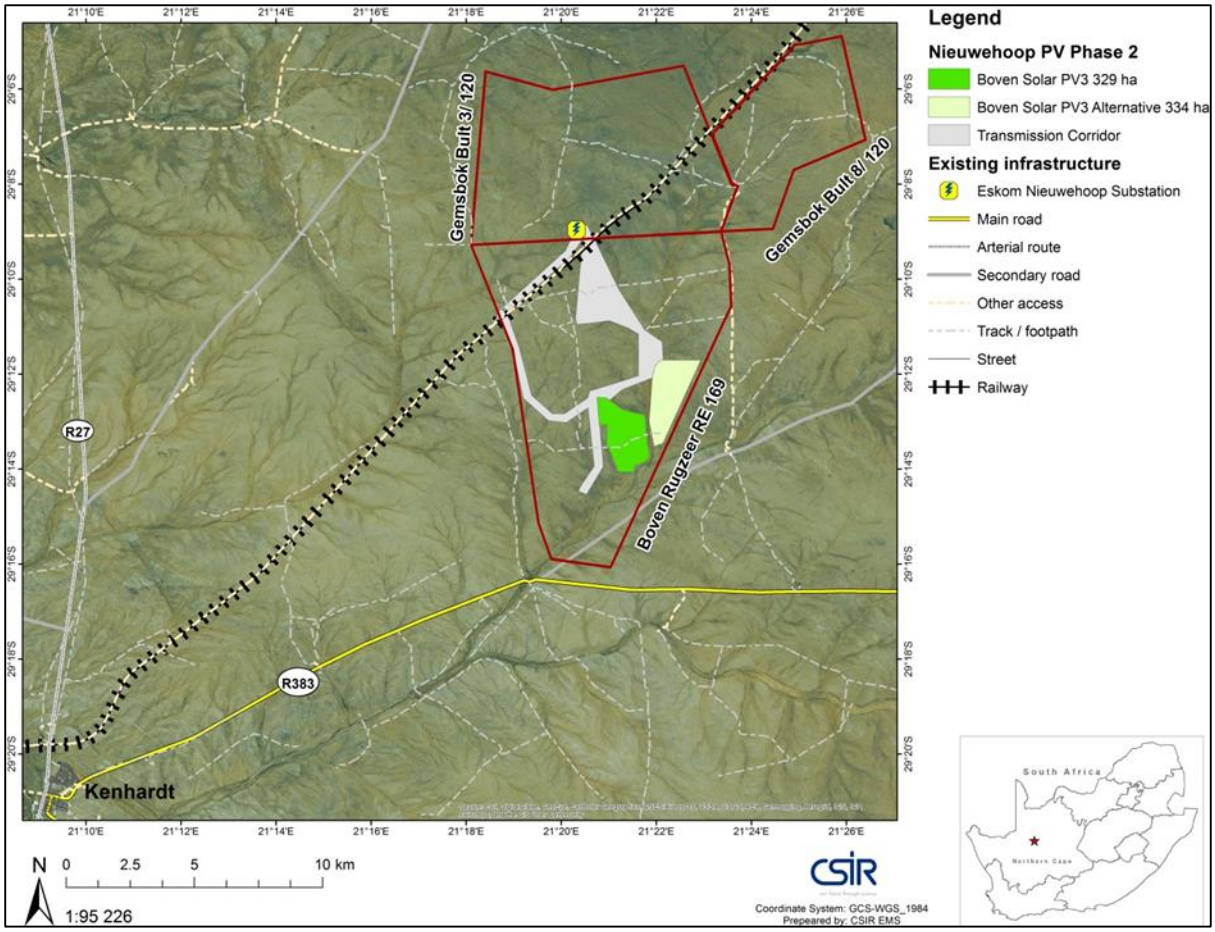

Figure 2: *Map showing the location of the proposed Boven Solar PV3 facility (bright green) with the alternative project sites (pale green) that were considered during the scoping phase.*

1.2. Project aspects relevant to heritage impacts

Any aspect of the development as proposed might have a negative impact on heritage resources and thus the entire project is relevant to the heritage assessment. Aspects that disturb the ground (e.g. foundations, roads, trenches) may affect archaeology, palaeontology and graves, while all superstructure (e.g. solar panels, buildings, fences) would introduce impacts to the cultural landscape.

1.3. Terms of reference

ASHA Consulting (Pty) Ltd was requested to conduct a field study and produce a heritage impact assessment (HIA) that would meet the requirements of the heritage authorities.

During the scoping phase the South African Heritage Resources Agency (SAHRA) was notified of the proposed development. They responded requesting an impact assessment that examined archaeology, palaeontology and other aspects of heritage as relevant.

The HIA was based on the following broad Terms of Reference:

- Prepare and undertake a desktop study on the fossil heritage, archaeology, and heritage sites within the proposed project area.
- Undertake a detailed field examination of the archaeological sites and heritage features within or in the region of the development area.
- Describe the type and location of known archaeological sites and in the study area, and characterize all heritage items that may be affected by the proposed project.
- Describe the baseline environment and determine the status quo in relation to the specialist study.
- Record sites of archaeological relevance (photos, maps, aerial or satellite images, GPS co-ordinates, and stratigraphic columns).
- Evaluate the potential for occurrence of archaeological features within the study area.
- Identify and rate potential direct, indirect and cumulative impacts of the proposed project on the archaeological heritage for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facility, together with the impact of other similar or related projects in the area (or being proposed);
- A Heritage Impact Assessment (HIA) report will be produced detailing the findings of the impact assessment. The report will cover all aspects of heritage (including archaeology, graves, built environment and the cultural landscape) as required by the NHRA; and
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr); and
- Provide input to the EMPr, including mitigation measures and monitoring requirements to ensure that the impacts on the archaeology are limited.

Note that fossil heritage (palaeontology) is excluded from the present report because it has been handled by a separate specialist.

1.4. Scope and objectives 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 for consideration by the National Department of Environmental Affairs (DEA) who will review the EIA and grant or refuse Environmental Authorisation (EA). The HIA report will outline any mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of EA should this be granted.

1.5. The author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting HIAs and archaeological specialist studies in the Western Cape and Northern Cape provinces of South Africa since 2004 (Please refer to the Curriculum Vitae included in 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 accredited with the Association of

Southern African Professional Archaeologists (ASAPA) Cultural Resources Management (CRM) section (Member #233) as follows:

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

1.6. 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. A full declaration is provided in Appendix 2.

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 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

The fieldwork for all seven proposed projects was undertaken simultaneously. The Boven PV3 study area and its alternative study area were examined in 2015 only, while parts of the transmission corridor overlap with areas already surveyed in 2014 for other earlier applications on the same farm. The areas of concern here were examined in the field on 09 and 10 June 2014, 29 October 2015 and 02 to 04 November 2015. These site visits took place in winter of 2014 and late spring of 2015 respectively, although in this dry area seasonality has no effect on the visibility of heritage resources – visibility was excellent. The surveys sought to conduct a landscape survey where certain landscape features known to be more sensitive were located and searched. Transects through all areas of the site were carried out to ensure that consistent results were being obtained and that the survey methodology was reliable. During the survey the positions of finds were recorded on a hand-held GPS receiver

set to the WGS84 datum. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

The 2014 survey was conducted by the author, while the 2015 survey saw the author working on site with Mr Matthew Shaw, an archaeology Masters student. Although both the preferred and alternative sites were surveyed, the present impact assessment report assesses only the preferred option.

3.3. Impact assessment

For consistency, the impact assessment was conducted through application of a scale supplied by the CSIR.

3.4. Grading

Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade 1 and 2 resources are intended to be managed by the national and provincial heritage resources authorities, while Grade 3 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 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. Heritage Western Cape (2012), however, uses a system in which resources of local significance are divided into Grade 3A, 3B and 3C. These approximately equate to high, medium and medium-low local significance, while sites of low or very low significance (and generally not requiring mitigation or other interventions) are referred to as ungradable. For convenience, the Heritage Western Cape system is employed here.

3.5. Assumptions and limitations

The study is carried out at the surface only and hence any completely buried archaeological sites will not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. Given the nature of the surface geology with bedrock frequently protruding through the gravel, neither of these limitations is likely to have affected the outcome of the report.

With regards to cumulative impacts, various other solar energy facilities and electrical transmission lines have been proposed in the immediate area. A new substation is presently under construction, while three solar energy facilities have received EA, although it is unknown when/if they will be built. The full list of developments considered in the cumulative impact assessment can be found in Table 6.1 of Chapter 6 of the EIA Report.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The preferred site is located in a remote area between 24 and 26 km northeast of Kenhardt. It is located some 5 km to the southeast of the Sishen-Saldanha Railway Line and its gravel service road. Although major power lines are not currently present in the area, a large substation is currently under construction just north of the site and the railway line – this is the Eskom Nieuwehoop Substation (Figure 3). Three other PV facilities have already been granted authorisation in close proximity to the substation setting a precedent for electrical development in the area. The land is otherwise generally undeveloped and used for small stock grazing. Farm tracks and fences criss-cross the general area and occasional wind pumps occur.

4.2. Site description

The broader study area is very flat with topography limited to a few low rises and several rocky outcrops, one along the western margin of the farm and the others to the east. Ephemeral stream beds are ubiquitous and are evident largely by the slightly denser vegetation occurring along their courses. Overall, the surface is flat, coated in sand and gravel and has very sparse vegetation (Figure 3). The Boven Solar PV3 area contains a small pan in its north-western part (Figure 4).

Figure 3: *View across the general study area showing the substrate and vegetation cover.*

Figure 4: *View of the small pan in the northwestern part of the Boven Solar PV3 study area.*

5. CULTURAL 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 is 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

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont 1995). Such material is referred to as 'background scatter' and is invariably of very limited significance. At times, however, the scatter can become very dense and mitigation work is occasionally called for. The artefacts located in these contexts are largely Early Stone Age (ESA) and Middle Stone Age (MSA) and are not associated with any other archaeological materials – these would have long since decomposed and disappeared. Previous experience immediately east of the present site suggests that such dense accumulations of artefacts are unlikely to occur in this area.

Of potentially more significance, however, are Later Stone Age (LSA) sites which are commonly located along the margins of water features in Bushmanland. These features include both pans and ephemeral drainage lines. Such sites were identified to the east of the present study area in association with pans but artefact scatters associated with drainage lines were rare (Orton 2014a, 2014b, 2014c). The drainage lines on the present site, however, are more prominent and perhaps more likely to reveal LSA camp sites. These sites would typically contain mostly stone artefacts, but fragments of ostrich eggshell (used as water containers and also as a food source) and pottery are also found at times, while bone is rare and likely confined to sites that are very recent. Similar LSA sites can also be found in association with rocky outcrops but none appear to occur within the present study area.

Because of their positions along water courses and adjacent to rocky areas, such sites are often avoided by development proposals because of the need to avoid the relevant natural features. Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the Hartebeest River close to Kenhardt, where he expected elevated frequencies of archaeological material, revealed virtually nothing.

Another kind of archaeological site fairly commonly encountered in Bushmanland is small rock outcrops that have been quarried as a source of stone material for making stone tools. Several such occurrences were noted to the east where quartz outcrops where frequently flaked (Orton 2014a, 2014b, 2014c).

Rock engravings are known from the broader area (Louw Roux Bushmanland 2013). From the limited information available, these appear to be naturalistic images produced by the Bushmen. Geometric images, produced by the Khoekhoen, are not well known from the area (Orton 2013), although David Morris (pers. comm. 2015) has seen examples in the region. Painted art is also very rare but again, examples are known, particularly on large granite boulders.

5.2. Historical aspects

The Anglo-Boer War was fought across the Northern Cape, but information on the role of Kenhardt appears difficult to locate. The town was occupied by the Boers in late February 1900 after they convinced the magistrate that they had a large gun and would fire on the town if it did not surrender. They later surrendered to the British who occupied the town on 31st March 1900. My mid-1900 there were perhaps 100 Cape Rebels detained in a camp outside of Kenhardt (Grobler 2004). The British raised a local force known as the Border Scouts in Upington in May 1900. Many were mixed-race individuals, some local farmers, others Kalahari hunters, but all disliked the Boers. The scouts were responsible for a large area of the north-western Cape Colony centred on Upington and Kenhardt. They eventually numbered 786 by January 1901 and were under the command of Major John Birbeck (AngloBoerWar.com 2015; Rodgers 2011). At the beginning of 1902 there were 150 Border Scouts stationed at Kenhardt. Two boers, H.L. Jacobs and A.C. Jooste, were accused of treason and executed in the town on 24 July 1901 (Grobler 2004). A memorial stands there to their honour (Green Kalahari n.d.).

No major action appears to have taken place around Kenhardt, although the Boers are known to have attacked a patrol on 17th May 1901, while the British attacked a Boer position on 25th June 1901 (AngloBoerWar.com 2015).

5.3. Built environment

The built environment is sparsely represented in Bushmanland because the farms tend to be so large. The vast majority of structures appear to be quite recent in age (20th century) and are of very limited heritage significance. In any case, the development will not affect any buildings. Graves are also very rare. Some older farms may have small graveyards located close to their farm buildings but, again, these are highly unlikely to be included within the areas proposed for development. Unmarked pre-colonial graves can, in theory, be located

anywhere, although they are generally more common in sandy areas where excavation of graves was easier and in more productive areas where population densities would have been higher. It is highly unlikely that pre-colonial graves would be encountered in the study area.

5.4. Other aspects

The cultural and natural landscape is also of concern. However, the cultural landscape is very poorly developed in this area with fences, water troughs and wind pumps being the primary features. The natural landscape lacks visually interesting and sensitive features. In addition, the proposed site is a long distance from any important roads (it is 11 km from the R27) and is highly unlikely to be visible to anyone other than local residents making use of the gravel road along the railway line. Solar PV facilities are not very tall and, if an earthy coloured paint is used for the buildings where technically feasible, they can be almost invisible from as little as 1 km away.

6. IDENTIFICATION OF KEY ISSUES

6.1. Key Issues Identified During the Scoping Phase

Only one potentially significant heritage issue was identified during the scoping phase of this EIA process. This was:

- The potential damage to or destruction of Stone Age archaeological sites occurring in proximity to water courses and pans.

No formal consultation was carried out specifically for the purposes of the heritage impact assessment because all studies were covered by the PPP. The CSIR conducted a joint PPP for all seven proposed PV developments. The only heritage-related comment received was the formal comment from SAHRA requesting that an HIA, including studies of archaeology and palaeontology and other relevant heritage, be conducted. The present report is in fulfilment of their request, although it should be noted that another specialist is assessing palaeontological impacts.

6.2. Sensitivity of the site in relation to proposed activity

The site is sensitive for the many archaeological artefacts and sites on its surface that would be damaged or destroyed through construction related activities. These include site preparation and all works related to installation of the project components.

6.3. Identification of Potential Impacts

The potential impacts identified during the EIA assessment are:

6.3.1. Construction Phase

- Damage to or destruction of archaeological resources

- Damage to or destruction of graves
- Impacts to the cultural and natural landscape

6.3.2. Operational Phase

- Impacts to the cultural and natural landscape

6.3.3. Decommissioning Phase

- Impacts to the cultural and natural landscape

6.3.4. Cumulative impacts

- Damage to or destruction of archaeological resources;
- Damage to or destruction of graves; and
- Impacts to the cultural and natural landscape.

7. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. All are archaeological in nature and comprise largely of Stone Age remains. Table 1 lists and describes the findings, while Figure 5 maps them. Further discussion of certain finds is presented below.

Table 1: *List of archaeological resources found during the surveys (2014 waypoint are indicated). Note that, even though the alternative site is not formally assessed here, the resources found are still listed for the record. Where the project number appears in brackets this indicates that the resource is close to but not actually within the footprint area. A number of hours under mitigation is the suggested time required to carry out mitigation excavations.*

Project	Waypoint	Co-ordinates	Description	Heritage significance	Suggested mitigation
Boven PV3	255	S29 12 56.3 E21 21 22.2	Flaked quartz outcrop with a few artefacts around it.	Low	-
Boven PV3	256	S29 12 55.8 E21 21 21.9	A cairn made of quartz blocks on top of a quartz outcrop. Assumed recent.	Low	-
Boven PV3	838	S29 12 32.4 E21 20 59.8	Low density, adiagnostic quartz scatter.	Low	-
Boven PV3 Tx	839	S29 12 15.6 E21 21 11.8	Small pear-shaped biface (hand-axe) 8cm wide and 10 cm long.	Low	-
Boven PV3	840	S29 12 56.7 E21 21 02.3	An area of very dense background scatter along the north-eastern edge of an intact pan.	Low-medium	Avoid with a buffer of at least 75 m from centre of pan or conduct archaeological excavations to rescue artefacts and data (2 hours).

Project	Waypoint	Co-ordinates	Description	Heritage significance	Suggested mitigation
Boven PV3	841	S29 12 57.8 E21 21 00.8	An ephemeral LSA scatter of quartz and ostrich eggshell at the south-western edge of an intact pan.	Low	-
(Boven PV3)	842	S29 14 17.4 E21 21 28.6	A light and very widespread scatter of quartz, quartzite and silcrete close to the Rugseer River.	Low	-
(Boven PV3)	843	S29 14 13.7 E21 21 22.5	Large LSA scatter of quartz and ostrich eggshell.	Low-medium	Avoid or conduct archaeological excavations to rescue artefacts and data (4 hours).
Boven PV3 Alt.	783	S29 11 47.8 E21 22 41.2	A dense LSA artefacts scatter with quartz, quartzite, CCS, banded iron formation, and possibly silcrete. One scraper noted. Site is between a large expanse of exposed granite which has shallow depressions on it that trap rain water and a small stream bed which flows past the side of the granite.	Low-medium	Avoid with a buffer of at least 20 m or conduct archaeological excavations to rescue artefacts and data (2 hours).
Boven PV3 Alt.	242	S29 12 43.1 E21 22 16.1	Possible grave. It appears as an area of similarly sized black rocks packed in a loose rectangular arrangement, slightly elongated from north to south. A few rocks have become dispersed with time. These rocks must have originated from about 20 m to the south where many more occur.	High	Avoid with a buffer of at least 5 m or test excavate to check for human remains then make decision to avoid or exhume with required process.
Boven PV3 Alt.	243	S29 13 05.2 E21 22 10.2	Light scatter of quartz and quartzite artefacts on a quartz outcrop. Also some glass, tins and bullet cases.	Low	-
Boven PV3 Alt.	244	S29 12 43.0 E21 21 59.8	Flaked quartz outcrop with a few artefacts around it.	Low	-
Boven PV3 Alt.	245	S29 12 36.7 E21 21 59.3	Flaked quartz outcrop with a few artefacts around it.	Low	-
Boven PV3 Tx	037 (2014)	S29 10 55.1 E21 21 36.7	Flaked quartz outcrop with artefact scatter surrounding it.	Low	-
Boven PV3 Tx	042/043 (2014)	S29 09 57.0 E21 20 59.4	*c.* 150 m long flaked quartz outcrop.	Low	-
Boven PV3 Tx	789	S29 11 26.7 E21 18 59.6	Scatter of LSA quartz artefacts on the side of a rocky hill.	Low	-
Boven PV3 Tx	790	S29 11 27.6 E21 18 58.9	Scatter of LSA quartz and ostrich eggshell on the side of the hill.	Low-medium	Avoid with a buffer of at least 20 m (120 m from the summit of the koppie is ideal) or conduct archaeological excavations to rescue

Project	Waypoint	Co-ordinates	Description	Heritage significance	Suggested mitigation
					artefacts and data (2 hours).
Boven PV3 Tx	791	S29 11 28.6 E21 18 59.4	Scatter of LSA quartz and ostrich eggshell in a small cleared area on the side of the hill.	Low-medium	Avoid with a buffer of at least 20 m (120 m from the summit of the koppie is ideal) or conduct archaeological excavations to rescue artefacts and data (2 hours).
Boven PV3 Tx	792	S29 11 29.4 E21 19 00.0	Small cairn of rocks built near the top of the hill. Also a recent engraving of a face.	Low	-
(Boven PV3 Tx)	793	S29 11 29.8 E21 18 59.2	Scatter of LSA quartz artefacts on the side of a rocky hill.	Low	-
(Boven PV3 Tx)	794	S29 11 29.3 E21 18 58.4	Scatter of LSA quartz artefacts on the side of a rocky hill.	Low	-
Boven PV3 Tx	795	S29 11 29.9 E21 19 01.5	Circular stone structure of about 2 m diameter built on the east side of the rocky hill. No obvious associated artefact scatter.	Low	-
Boven PV3 Tx	796	S29 11 30.1 E21 19 01.3	A large stone-packed mound just south of 795. It just does not look natural and may well be a grave.	High	Avoid with a buffer of at least 5 m (120 m from the summit of the koppie is ideal) or test excavate to check for human remains then make decision to avoid or exhume with required process.
Boven PV3 Tx	797	S29 11 31.0 E21 19 02.1	Circular stone enclosure of about 2 m diameter. There is some quartz, CCS, glass and metal scattered about. There is a lower grindstone in the wall of the enclosure.	Low-medium	Avoid with a buffer of at least 20 m (120 m from the summit of the koppie is ideal) or conduct archaeological excavations to rescue artefacts and data and map the site (2 hours).

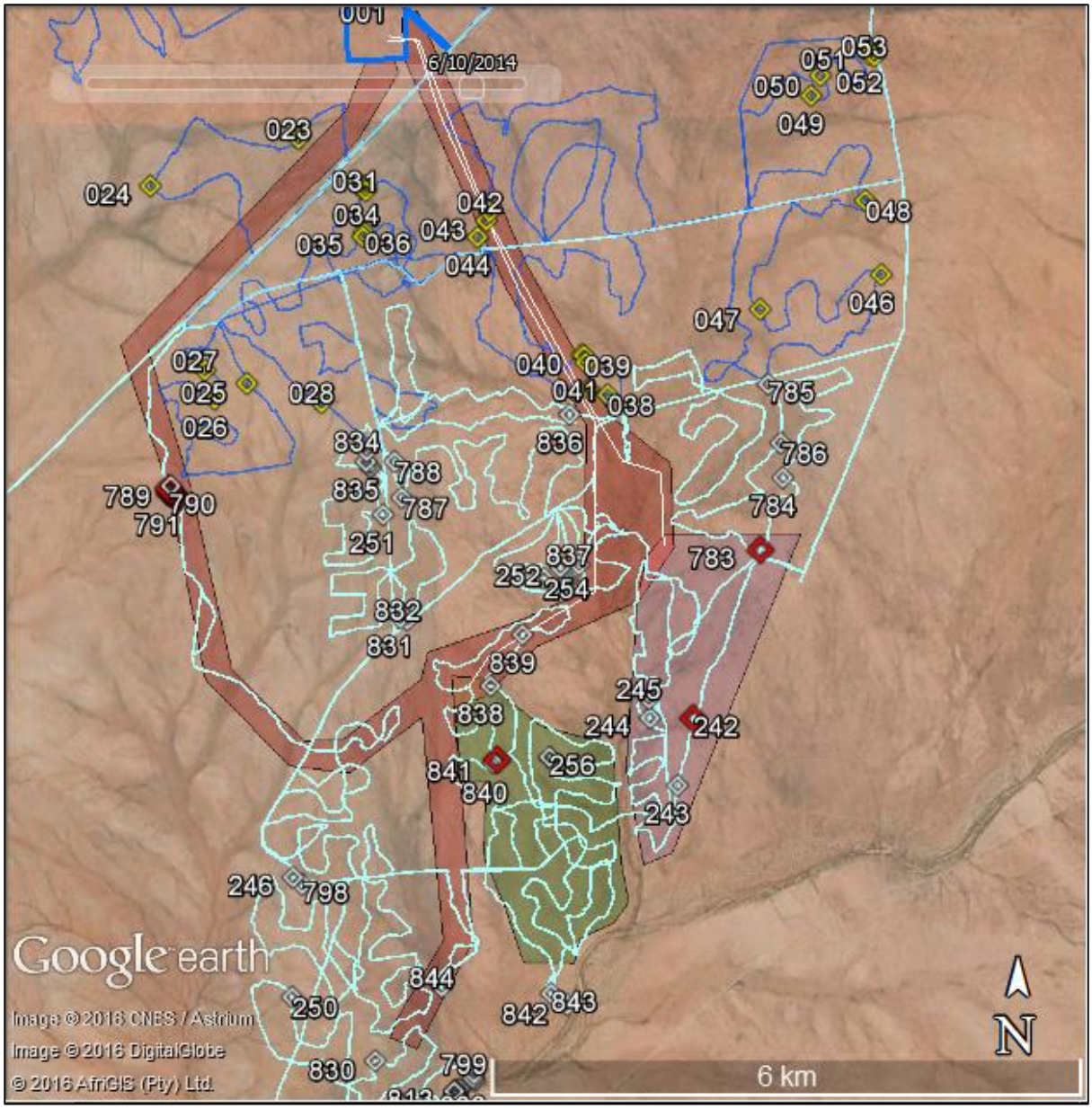

Figure 5: *Aerial view of the study area showing the preferred site (green), transmission corridors (red) and alternative site (purple) with all finds superimposed. The important heritage points are marked in red (Nos 783, 840, 242, 790, 791, 795 & 797). See also enlargement below. The Nieuwehoop Substation location is in blue in the far north. The survey tracks are the thin dark blue (2014) and turquoise (2015) lines.*

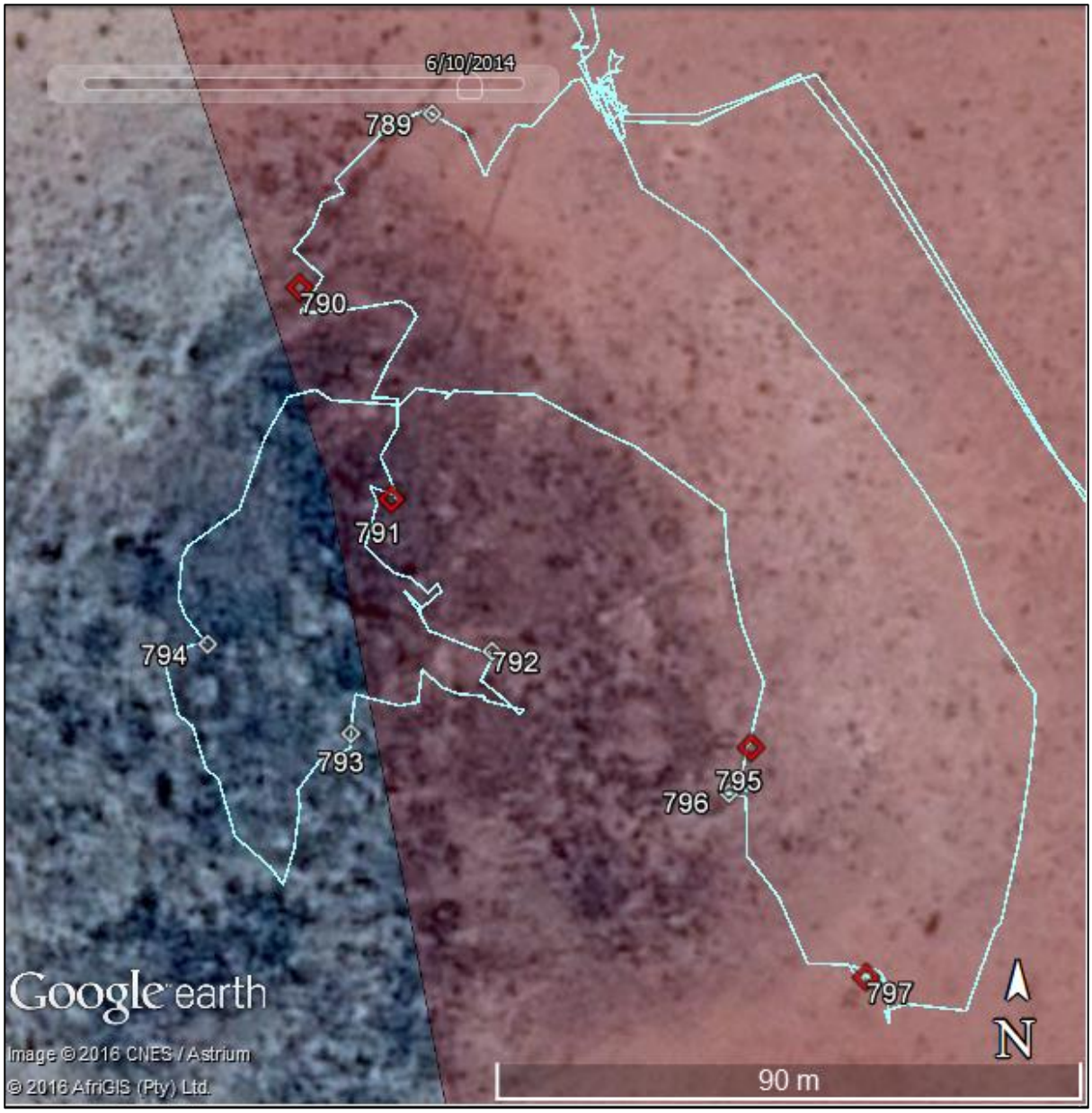

Figure 6: *Aerial view of part of the transmission corridor in the far west with finds superimposed. The important heritage points are marked in red (Nos 790, 791, 795 & 797). See also enlargement below. The Nieuwehoop Substation location is in blue in the far north. The survey tracks are the thin dark blue (2014) and turquoise (2015) lines.*

7.1. Archaeology

Archaeological material was found throughout the broader study area but in quite variable densities. The majority of the area contained only an extremely low density background scatter with occasional artefacts attributable to all three Stone Ages. A few hand-axes were noted and, unusually, a single cleaver. One significant artefact scatter was located around the north-eastern side of the pan in the north-western part of the study area (Figure 4). It was part of the background scatter but, because of its proximity to a water source, was far denser than usual. A well-patinated hornfels scraper, probably ascribable to the MSA, was found there (Figure 7). On the opposite side of this same pan was a very ephemeral LSA artefact and

ostrich eggshell scatter but it was too ephemeral to be worth further consideration. Only one other area of concern was located and this was at the small rocky koppie in the western part of the transmission corridor. A number of scatters of artefacts were noted on the koppie (Figure 6). The one at waypoint 791 was within a small cleared area which appears to have had rocks pushed to the sides to create low walls (Figure 8). Such sites were likely used to watch for prey in the landscape. Also at this koppie, but on the sandy plain below it, was a small stone circular structure (Figure 9). It had stone artefacts, ostrich eggshell, metal and glass associated with it. A lower grindstone made on a relatively square dolerite slab was incorporated into the wall of the structure. It is difficult to tell its age: it might have been Stone Age but then reused by historic herders, or it might have been built by Stone Age people working for colonial farmers (hence the access to glass and metal), or it might be historical with the Stone Age material pre-existing on the surface. The grindstone may have simply been seen as another rock and incorporated into the wall. Other finds on this koppie were a stone cairn near its summit, a mound of stones that seemed grave-like but was rather large, another circular stone enclosure with no associated artefacts and a peculiar engraving that, from its unpatinated nature, is no doubt recent.

Figure 7: *A well-patinated hornfels scraper from waypoint 840.*

Figure 8: *A small cleared circle at waypoint 791 with stone artefacts and ostrich eggshell in it.*

Figure 9: *A stone structure on the sand below the koppie at waypoint 797.*

7.2. Graves

The only possible grave affected by the preferred proposal lies within the electrical corridor (Figure 10). This is on the koppie as noted above at waypoint 796. Although larger than expected for a grave, the accumulation was certainly not natural.

Figure 10: *View of the grave-like mound of dolerite rocks towards the koppie to the north.*

7.3. Cultural landscape

The cultural landscape in the area is fairly weakly developed with relatively little anthropogenic modification of the landscape being evident. What there is – farm tracks, wind pumps, reservoirs, fences – relates to a landscape of small stock farming but this has been compromised in the study area by the railway line and the new substation.

7.4. 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 are deemed to have low-medium cultural significance for their scientific value, while the landscape has low significance for its aesthetic and social value.

Graves are deemed to have high cultural significance for their social value.

7.5. Summary of heritage indicators and provisional grading

The majority of archaeological resources identified are of low significance and merit no further consideration. However, the artefact scatter alongside the pan and the small sites on the rocky koppie offer limited research opportunities and would require basic mitigation if

they were to be impacted. They are of low-medium significance and can be provisionally graded 3C. The possible grave site is important because of the potential for human remains but its context suggests low-medium significance and a provisional grading of 3C to be appropriate for the site. The landscape is not considered gradable.

8. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

8.1. Damage to and Destruction of Archaeological Resources (Construction Phase)

It is anticipated that any archaeological sites located within the final development footprint of the PV facility would be physically damaged or, more likely, destroyed when the surface is levelled in preparation for construction. The chances of impacts through erection of the transmission lines are far smaller because of the very limited ground disturbance that would occur. All these impacts would be direct, negative impacts. The extent of the impacts would be site specific and their duration permanent. The consequence of the impacts is rated as moderate and the probability is very likely. The impacts are non-reversible and the resources cannot be replaced. Because the consequence of impacting the archaeological sites (alongside a pan at waypoint 840 and on the koppie at waypoints 790, 791, 795 & 797) found within the proposed development area is moderate, the significance of any potential impacts is likely to be low before mitigation. Mitigation would involve an archaeologist conducting excavations to rescue archaeological material from the relevant sites and, once this is complete, the significance of the potential impacts would be reduced to very low. Alternatively, the archaeological sites could be avoided with a minimum buffer of 20 m. If this option is chosen then it is suggested that a buffer of 75 m from the centre of the pan and 120 m from the summit of the rocky koppie be implemented in order to preserve some of the immediate context of the sites.

8.2. Damage to and Destruction of Graves (Construction Phase)

It is anticipated that any graves located within the final development footprint would be physically damaged or, more likely, destroyed when the surface is levelled in preparation for construction. These impacts would be direct, negative impacts. Only one possible grave site was located and this was within the transmission corridor. The extent of the impact would be site specific and its duration permanent. The consequence of the impact is rated as extreme and the probability is very unlikely because of the very limited surface impacts likely in the transmission corridor. The impacts are non-reversible and the resource cannot be replaced. The consequence and probability combine to give an impact significance rated as low before mitigation. In all likelihood the grave can be easily avoided. However, should this not be possible an archaeologist should conduct a test excavation to confirm whether the site contains human remains and, if it does, then exhumation would need to be conducted with the permission of SAHRA. The significance of the impact would be reduced to very low with mitigation.

8.3. Impacts to the Natural and Cultural Landscape (Construction, Operational and Decommissioning Phases)

The impact of the proposed project on the natural and cultural landscape is expected to occur during the construction, operational and decommissioning phases because of the presence of structures and equipment in the rural landscape. These impacts would be negative and direct, with a local spatial extent, and a long-term duration (for the lifetime of the facility). The consequence and probability of the impact are rated as moderate and very likely respectively and these combine to produce a potential impact of low significance. The reversibility of the impact and irreplaceability of the resource are rated as high and moderate respectively. Solar panels are not as visible from a distance as the built aspects of the proposed development would be, but with the use of earthy-coloured paint on the buildings (where technically feasible), the degree of visual intrusion would be slightly reduced but the impact significance is still rated as being low.

During the operational phase, the addition of solar panels to the landscape will result in a marked change in its character from a rural landscape to one characterized by electrical infrastructure. Given that the precedent has already been set for electrical development, the significance of these potential impacts is considered to be low. No mitigation measures are recommended for the operational and decommissioning phases.

8.4. Cumulative Impacts to Archaeological Resources

The development of multiple solar energy facilities will result in many archaeological artefacts and sites being disturbed and/or destroyed over a wide area. Few of the sites recorded in the region have high cultural significance and it is likely that the vast majority of those that do would be protected from harm because of their proximity to water courses and pans. Cumulative impacts would be negative and direct in nature. They would occur at the local level and would be permanent. Because no sites of high archaeological significance were found within the present study area, the cumulative impact consequence is rated as moderate with the probability of impacts being very likely. These combine to provide a significance rating of low for this project. The impacts are irreversible and the irreplaceability of archaeological resources is high. With mitigation the impact significance is reduced to very low.

8.5. Cumulative Impacts to Graves

The development of multiple solar energy facilities may result in a number of graves being disturbed and/or destroyed over a wide area. However, because graves can be very difficult to identify and many may well continue to exist beneath any developments, it is difficult to evaluate any cumulative impacts. The nature of graves as individual and generally isolated heritage resources is such that, although each is significant, the disturbance of multiple examples will not result in a significant cumulative impact. Cumulative impacts would be negative and direct and occur at the local level. They would be permanent in duration. The moderate consequence and likely probability combine to give an impact significance rating of low before mitigation. After mitigation it is expected to be very low. The mitigation measures include avoiding graves or testing via excavations to check for human remains. If any are

located then exhumation would need to occur with the approval of SAHRA. The post-mitigation impact significance would be very low.

8.6. Cumulative Impacts to the Natural and Cultural Landscape

The development of multiple solar energy facilities will result in significant visual degradation of the local environment. However, it is also worth noting that it is far better, from the cumulative impact point of view, to cluster the facilities rather than to have them spread out over the landscape. The present application is one of a number of applications for solar energy facilities in close proximity to the Nieuwehoop Substation and, because of this clustering, the cumulative impacts are more acceptable. The impacts would be direct and negative occurring at the local level and with long term duration. The consequence is rated as moderate and, although the impact is very likely to occur, the significance of the impact is low. Although mitigation is suggested (i.e. use earthy-coloured paint on built elements where technically feasible), this will not have much effect overall, therefore the post-mitigation significance is still rated as being low.

9. IMPACT ASSESSMENT SUMMARY

The assessment of potential impacts and recommendation of mitigation measures as discussed above are collated in Tables 2 to 5 below. Note that indirect impacts are not assessed because the nature of the identified heritage resources is such that significant indirect impacts are highly unlikely to occur.

Table 2: *Impact assessment summary table for the Construction Phase.*

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Clearing of site	Destruction of archaeological resources	Negative	Site	Permanent	Moderate	Very likely	Non-reversible	High	Archaeological excavation to be undertaken by a professional archaeologist or avoid sites with a buffer of 20 m; Ensure all works occur inside approved development footprint.	Low	Very low	5	High
Clearing of site	Destruction of graves	Negative	Site	Permanent	Extreme	Very unlikely	Non-reversible	High	Avoid grave with a buffer of at least 5 m or test and exhume as required	Low	Very low	5	Medium
Clearing of site and construction of the proposed facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	Use earthy-coloured paint on built elements where technically feasible	Low	Low	4	High

Table 3: *Impact assessment summary table for the Operational Phase.*

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
The presence of the proposed PV facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	None required	Low	Low	4	High

Table 4: *Impact assessment summary table for the Decommissioning Phase.*

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
The presence of construction vehicles	Impacts to the natural and cultural landscape	Negative	Local	Short term	Moderate	Very likely	High	Moderate	None required	Low	Low	4	High

Table 5: *Cumulative impact assessment summary table.*

Cumulative Impacts													
Aspect/ Impact Pathway	**Nature of Potential Impact/ Risk**	**Status**	**Spatial Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility of Impact**	**Irreplaceability**	**Potential Mitigation Measures**	**Significance of Impact and Risk**		**Ranking of Residual Impact/ Risk**	**Confidence Level**
										Without Mitigation/ Management	**With Mitigation/ Management (Residual Impact/ Risk)**		
Clearing of site	Destruction of archaeological resources	Negative	Local	Permanent	Moderate	Very likely	Non-reversible	High	Archaeological excavation to be undertaken by a professional archaeologist	Low	Very low	5	High
Clearing of site	Destruction of graves	Negative	Local	Permanent	Moderate	Likely	Non-reversible	High	Avoid grave with a buffer of at least 5 m or test and exhume as required	Low	Very low	5	Low
Clearing of site and construction of the proposed facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	Use earthy-coloured paint on built elements where technically feasible	Low	Low	4	High

10. PERMIT REQUIREMENTS

The NHRA does not require the developer to obtain permits prior to construction. However, any archaeological mitigation work (i.e. test excavations, sampling etc.) that may be required (in the event of archaeological resources or graves of significance being found within the development footprint during construction) would need to be conducted under a permit issued to, and in the name of, the appointed archaeologist. The permit application process allows the heritage authorities to ensure that a suitably qualified and experienced archaeologist undertakes the work and that the proposed excavation/sampling methodology is acceptable.

11. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

11.1. For inclusion in the EMPr

It should be noted that the monitoring that may be suggested in an HIA and requested by the heritage authorities is different to that commonly enforced in the EIA context:

- For heritage purposes monitoring would be to check for previously undiscovered (and generally buried) heritage resources in areas where the probability remains high despite nothing being found during assessment; while
- In the EIA context, monitoring serves to ensure that authorisation conditions have been met. These requirements have been included in the EMPr document.

For heritage purposes then, and based on present information, no monitoring is required.

- If the archaeological sites indicated in Figures 11 and 12 cannot be avoided (with a minimum buffer of 20 m but preferably 75 m from the centre of the pan and 120 m from the summit of the rocky koppie) then provision should be made well in advance of the start of construction (preferably at least 6 months) for archaeological mitigation to be carried out. This will allow the archaeologist time to obtain a permit, conduct the work, analyse the material and obtain a positive comment from SAHRA. If the sites can be avoided then the Environmental Control Officer (ECO) should ensure that they are cordoned off and protected from harm.
- The ECO should meet with workers on site at the start of the construction phase to explain the possibility that previously unidentified graves might be present. The possible grave recorded during the survey could be pointed out as an example. During clearing of the surface, all personnel should be vigilant for any unusual stone features and these should be reported to the ECO, who should then report the find to an archaeologist. The find should be cordoned off and protected *in situ* until it can be evaluated by an archaeologist. Such features may need to be tested by an archaeologist to confirm whether they are graves or not. If they are graves then exhumation would be required prior to further work in the area.
- It should be ensured that all construction and operation activities take place within the authorised construction footprint so as to minimise damage to heritage resources that have not been mitigated;

- Where technically feasible, earthy-coloured paint should be used on the built elements of the project so as to reduce the visual contrast in the landscape.

11.2. For inclusion in the Environmental Authorisation

- Should it not be possible to avoid the significant archaeological sites with a buffer of at least 20 m (or 75 m from the centre of the pan and 120 m from the summit of the rocky koppie), then they should be excavated;
- The possible grave should be avoided with a buffer of at least 5 m (or 120 m from the summit of the rocky koppie) or else tested and, if necessary, exhumed prior to construction;
- The construction team should be made aware of the potential to locate more graves and be instructed to report any suspicious stone features prior to disturbance;
- Where technically feasible, the built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and
- If any archaeological material or human burials are uncovered during the course of construction then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such a heritage resource is the property of the state and may require excavation and curation in an approved institution.

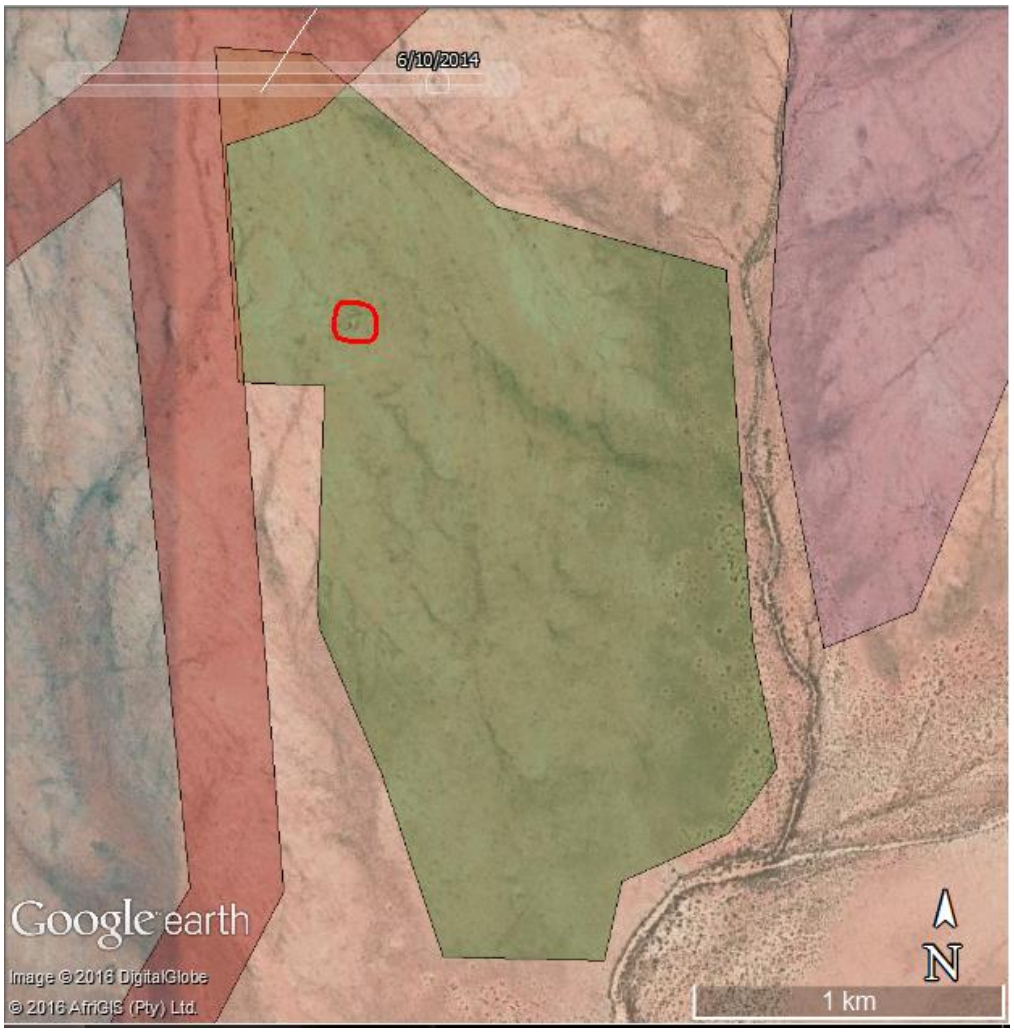

Figure 11: *Aerial view of the preferred development site showing the locations of the sensitive heritage site (red).*

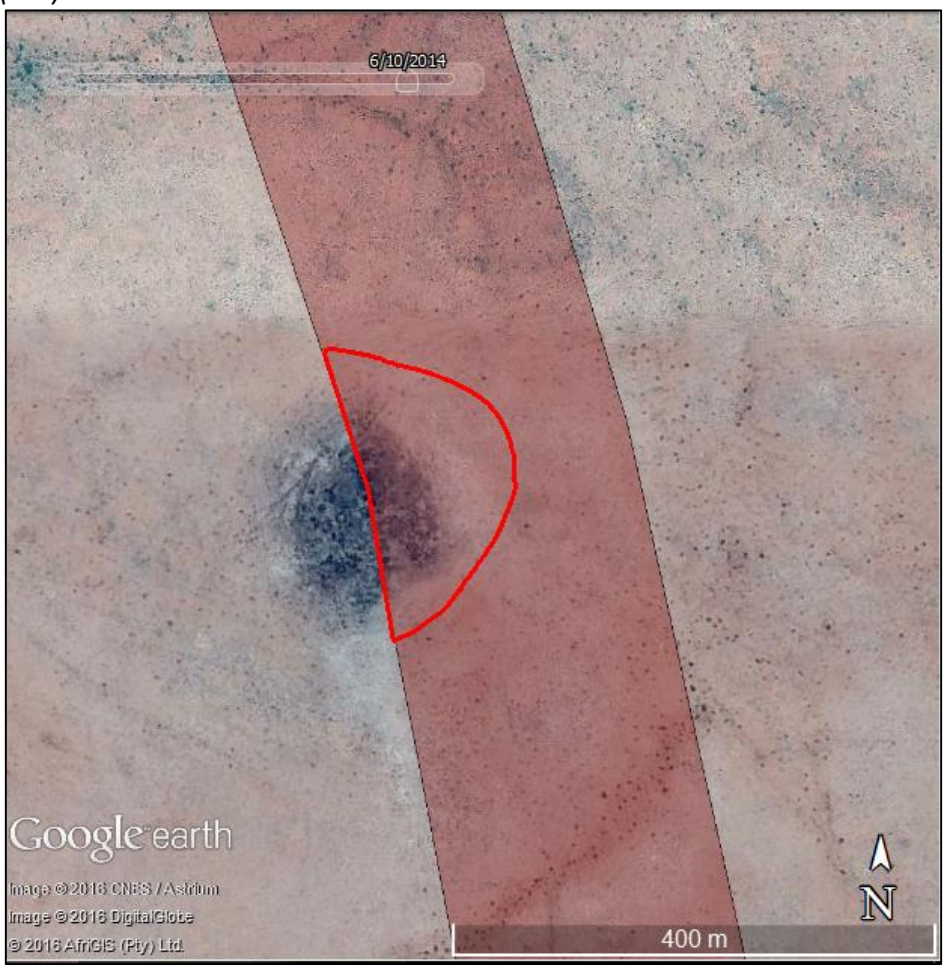

Figure 12: *Aerial view of part of the transmission corridor in the west showing the area enclosing the sensitive heritage sites (red).*

12. CONCLUSIONS

Several Stone Age archaeological sites and one possible grave site were found in the preferred development site and transmission corridor. One archaeological site occurs on the margins of a pan in the north-western part of the proposed development area (Figure 10), while the other sites and the possible grave are all associated with a rocky koppie along the transmission corridor. Although the pan will likely be avoided during development for ecological reasons, mitigation of the site alongside it would be very easy to effect if required. The koppie should be easy to avoid because of the long spans between power line pylons. This makes the project area fairly well-suited to development provided that the heritage sites are avoided and protected or appropriate mitigation measures are implemented. Overall, impacts to heritage resources are of low significance and will not influence the decision to proceed with the project. The development requires no heritage permits but if any archaeological mitigation is required then this would need to occur under a permit issued to the appointed archaeologist.

13. RECOMMENDATIONS

The potential impacts are quite limited and fairly easily avoidable. Therefore it is recommended that the proposed Boven PV3 facility and its associated transmission lines be authorised subject to the following conditions:

- Should it not be possible to avoid the significant archaeological sites with a buffer of at least 20 m (or 75 m from the centre of the pan and 120 m from the summit of the rocky koppie), then they should be excavated;
- The possible grave should be avoided with a buffer of at least 5 m (or 120 m from the summit of the rocky koppie) or else tested and, if necessary, exhumed prior to construction;
- The construction team should be made aware of the potential to locate more graves and be instructed to report any suspicious stone features prior to disturbance;
- Where technically feasible, the built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and
- If any archaeological material or human burials are uncovered during the course of construction then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such a heritage resource 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:

ASAPA membership number: 233, CRM Section member

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)

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)

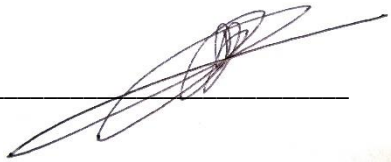
Phase 2 mitigation and research excavations:

- 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 - Specialist Declaration

I, Jayson Orton, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: 

Name of Specialist: JAYSON ORTON

Date: 01 FEBRUARY 2016