

**HERITAGE IMPACT ASSESSMENT:
PROPOSED 300 MW PHOTOVOLTAIC FACILITY AND
POWER LINE ON OLYVEN KOLK 187/3, 187/6 & 187/7,
KENHARDT MAGISTERIAL DISTRICT, NORTHERN CAPE**

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

SAHRA Case No.: 11247

Report for:

Agency for Cultural Resource Management

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On behalf of:

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EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by Agency for Cultural Resource Management to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction of a 300 MW photovoltaic (PV) solar energy facility and associated transmission line on Portions 3 and 6 of the farm Olyven Kolk 187, some 28 km southwest of Kenhardt, Northern Cape. While the PV facility would be constructed on Portion 6, the transmission line would run over Portions 3, 6 and 7. It should be noted that this assessment excludes palaeontology which has been assessed in a separate report.

The site was relatively flat with a generally hard substrate that varied between granitic sand with low rock outcrops and dense patches of gravel. Small water courses cross the study area and vegetation is sparse with the majority being along the water courses.

Aside from palaeontological resources which are considered in a separate report, the only significant heritage concern is archaeology. Although stone artefacts are widespread across the landscape, certain areas have been identified as being denser and of greater significance. These consist of occasional Later Stone Age sites along water courses and around a pan and large scatters of Early Stone Age artefacts that include many large cutting tools. MSA artefacts are widespread and generally of little concern. The landscape will also be impacted, but its cultural component is very limited. Furthermore, the presence of power lines, a substation a small solar energy facility and the Sishen-Saldanha Railway Line have already compromised the landscape. Although a historical structure of medium significance is present, it will not be impacted.

Impacts to archaeological resources, and in particular ESA material, are thus the primary concern for this project. The LSA sites will likely be protected due to their close proximity to water courses and a pan. The cultural landscape is weakly developed and has already been compromised by the presence of the Sishen-Saldanha Railway Line, a substation, a large power line and a small solar energy facility. The site is very remote and landscape impacts are of little concern. No other aspects of heritage were found to be relevant. There are no fatal flaws, although a follow-up survey and some mitigation work will very likely be required.

Given that the archaeological resources are only of medium cultural significance and can easily be mitigated, it is concluded from a heritage point of view that the project should be authorised, but subject to the following conditions which should be incorporated into the conditions of approval:

- An archaeological survey of any areas approved for development and not yet surveyed must take place at least six months prior to the start of construction;
- Any significant archaeological sites and dense clusters of ESA material within the final development footprint should be excavated, sampled and collected as appropriate; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Glossary

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

Cleaver: A bifacially flaked stone tool with a sharp flat edge opposing the butt and typical of the Early Stone Age Acheulean Industry.

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

Handaxe: A bifacially flaked, pointed stone tool type typical of the Early Stone Age Acheulean Industry.

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

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

Hominin: a smaller group consisting of modern humans, extinct species of humans and all their immediate ancestors.

Large Cutting Tool: A name for the group of ESA artefacts that includes handaxes, picks and cleavers.

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.

Pick: A bifacially flaked Early Stone Age stone tool with a broad, unworked butt opposing a pointed tip.

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

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

CRM: Cultural Resources Management

DEA: National Department of Environmental Affairs

ECO: Environmental Control Officer

EIA: Environmental Impact Assessment

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

LCT: Large Cutting Tool

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

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

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

PPP: Public Participation Process

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 Agency for Cultural Resource Management to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction of a 300 MW photovoltaic (PV) solar energy facility and associated transmission line on Portions 3 and 6 of the farm Olyven Kolk 187, some 28 km southwest of Kenhardt, Northern Cape (Figures 1 & 2). The centre of the PV study area is at approximately S29° 27' 35" E20° 52' 40". While the PV facility would be constructed on Portion 6, the transmission line would run over Portions 7, 6 and 3.

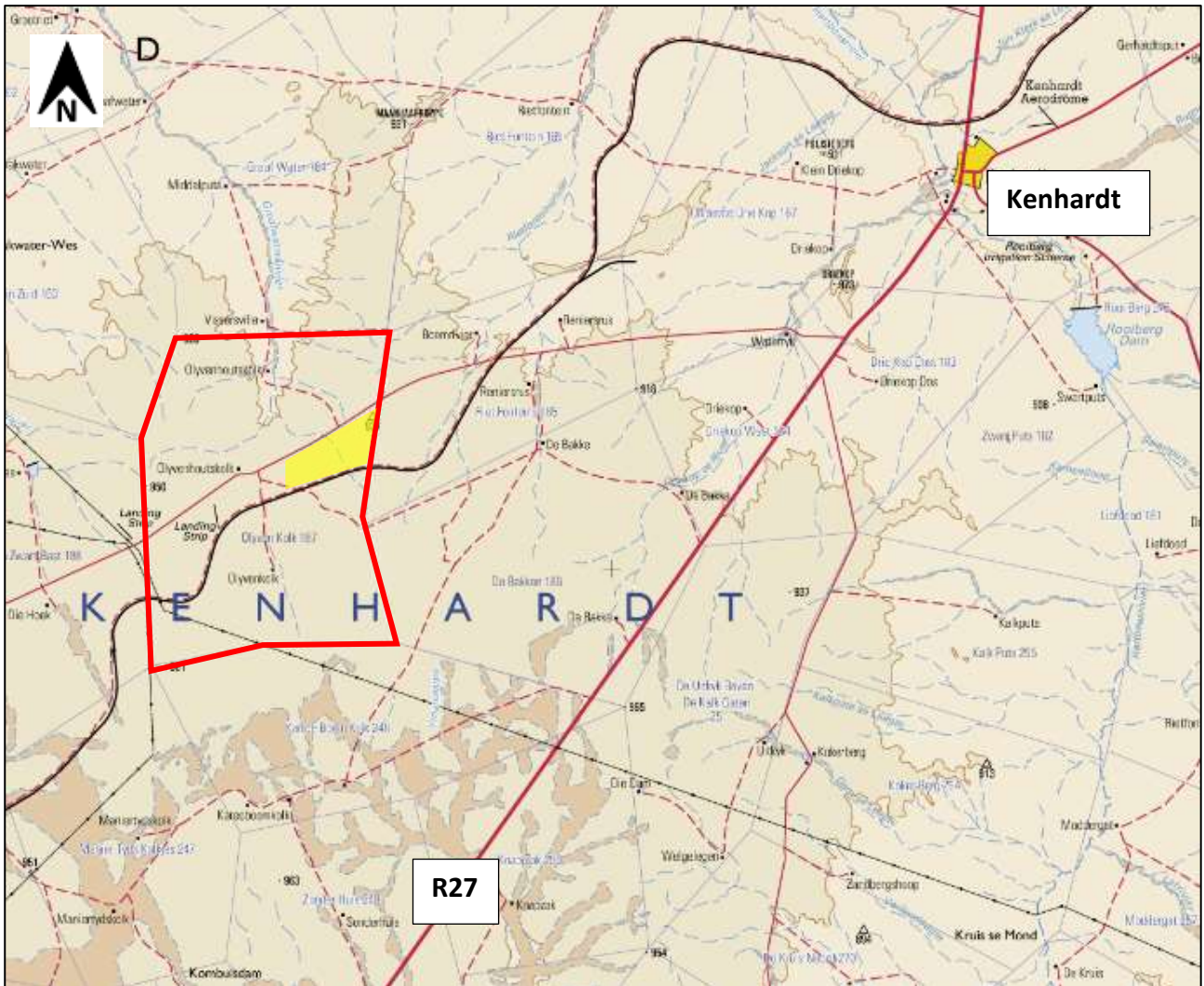


Figure 1: Extract from 1:250 000 topographic map 2920 showing the location of the site relative to Kenhardt and the R27 road. Olyven Kolk 187 is outlined in red, while the yellow polygon indicates Portion 6. The wavy black line is the Sishen-Saldanha Railway Line. Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

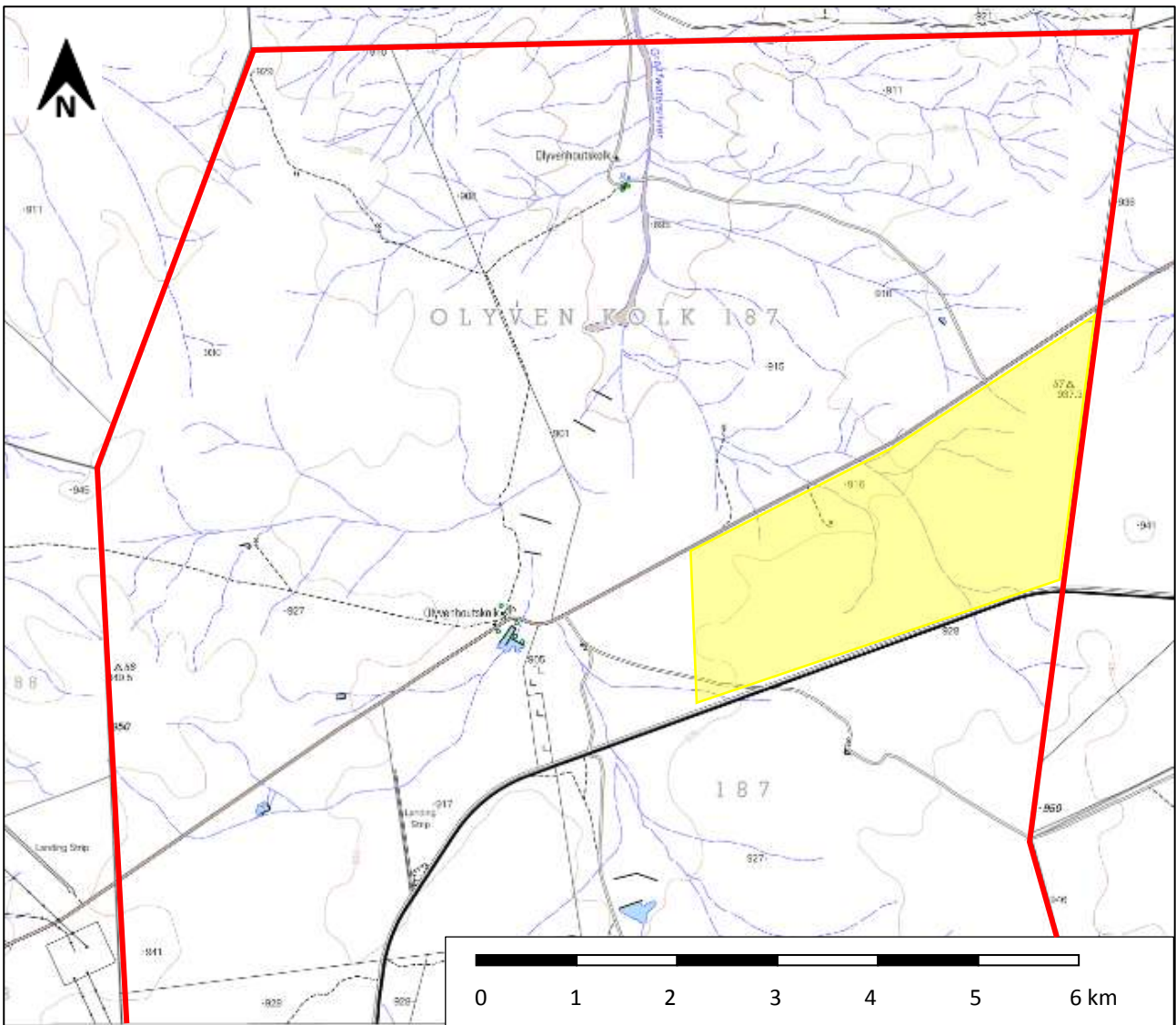


Figure 2: Extract from 1:50 000 topographic map 2920BD showing the location of the site. Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

1.1. Project description

The proposed project will a total have a total generating capacity of approximately 300 MW and a total footprint of approximately 600 ha. The project would entail the following components:

- Solar panels approximately 5m high arranged in units and mounted on the ground using a ground screw. Where this is not feasible, a concrete foot piece secured to a steel pen driven into the ground would be used. The solar panels may be equipped with sun-trackers;
- Electric cabling connecting the solar panels will be laid underground;
- Ancillary infrastructure such as inverters and transformers, a central busbar, isolators, switch gear, protection infrastructure, measurement devices;
- A maintenance facility and security and control room;
- A 132 kV power line (mono pole structures) of approximately 7 km over Portions 7, 6 and 3 of Farm 187 to feed the electricity generated into the existing Aries substation;

- Paved and/or gravel access roads of 6 m width;
- Gravel roads of 5 m width around each block of solar panels; and
- Expansion of the Aries substation to receive the generated electricity into the ESKOM grid.

1.1.1. Aspects of the project relevant to the heritage study

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

1.2. Terms of reference

ASHA was requested to compile a Heritage Impact Assessment (HIA) that would meet the requirements of SAHRA. The study was to be field-based but also have a desktop component. Target areas were provided for field assessment, although these were smaller than the total footprint that would be required for construction.

On notifying the South African Heritage Resources Authority (SAHRA) of the proposed development, they responded requesting that a Heritage Impact Assessment (HIA) be compiled. The assessment should include an archaeological study, a palaeontological desktop study and any other aspects relevant to the study area.

It should also be noted, however, that following S.38(3) of the National Heritage Resources Act (No. 25 of 1999), even though certain specialist studies may be specifically requested, all heritage resources should be identified and assessed.

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 Environmental Affairs (DEA) who will review the Environmental Impact Assessment (EIA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

1.4. The author

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

also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

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

1.5. Declaration of independence

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

2. 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 as well as military remains more than 75 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.”

Section 3(3) describes the reasons that a place or object might be considered part of the national estate. These are as follows:

- a) its importance in the community, or pattern of South Africa’s history;
- b) its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;
- c) its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;
- d) its importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects;
- e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i) sites of significance relating to the history of slavery in South Africa.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, 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(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the 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 and 1:50 000 maps were sourced from the Chief Directorate: National Geo-Spatial Information.

3.2. Field survey

The target areas were subjected to a detailed foot survey on 7th to 9th and 13th September 2018 (Figure 3). This was in Spring, but in this dry region seasonality – and hence vegetation cover – makes no difference to the outcome of an archaeological survey because ground visibility is always good. During the survey the positions of finds and survey tracks were recorded on a hand-held Global Positioning System (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.

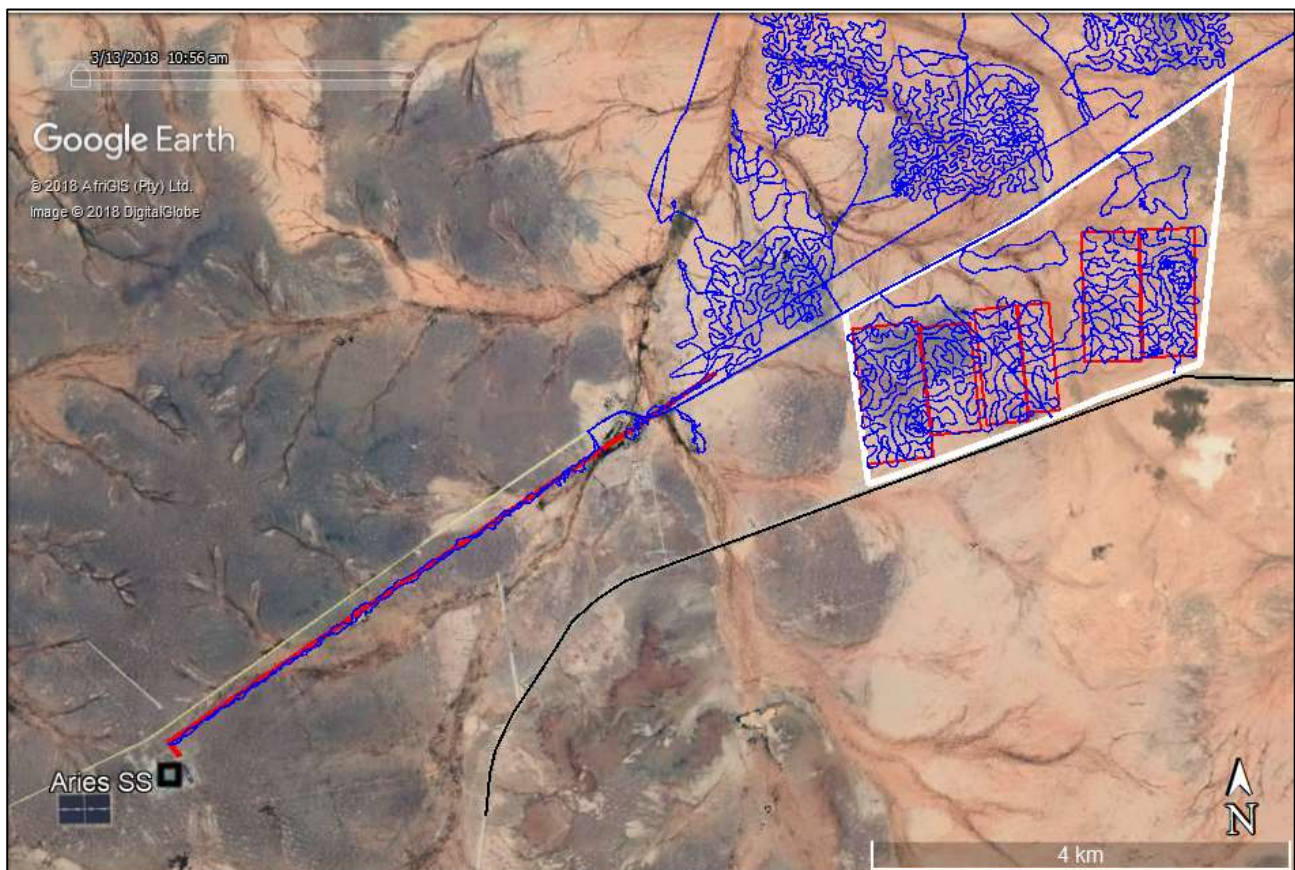


Figure 3: Aerial view of the study area showing Farm 187/6 (white polygon), the PV study area (red polygons), the Aries Substation (labelled) and the survey tracks (blue lines). The Sishen-Saldanha Railway (black line) and existing solar energy facility (in the south-western corner) are also visible.

3.3. Specialist studies

Dr John Almond has prepared a desktop palaeontological study which is submitted separately. As such, palaeontology is not considered in this HIA and the reader should consult Dr Almond's report in this regard.

3.4. 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 system¹ for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.5. 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.

3.6. 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. The very dense surface gravel sometimes made spotting artefacts difficult but it is felt that significant artefact scatters would not have been missed just because of their far greater density than the typical background scatter. A 150 m section of the power line route could not be surveyed as it was within a large watercourse and densely choked with thorn bushes.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The study area lies in a rural context characterised by small stock farming. A regional gravel road linking Kenhardt and Pofadder runs past the northern side of the PV study area while parts of the proposed power line lie on either side of the road. The Sishen-Saldanha Railway Line runs past the

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

southern edge of the PV study area. The Eskom Aries Substation lies some 7.5 km southwest of the western edge of the PV study area and, as a result of its presence, a number of existing powerlines cross the landscape and connect to the substation. A small solar energy facility lies immediately west of the Aries Substation.

4.2. Site description

The broader area around the site is quite flat with only very minor undulations, largely related to the many small ephemeral water courses that cross the region. These are easily visible in Figure 2. There are two predominant substrates in the study area. Sandy ground with light gravel cover dominates in the east, while very dense gravel occurs in the north-western part of the PV study area. This gravel is visible as a dark area on Figure 3 and is related to the underlying Dwyka Group glacial deposits. Figures 4 to 8 show a selection of views across the study area illustrating these substrates. A small pan lies in the south-western part of the PV study area at the edge of the dense gravel area. It has some patches of large gravel alongside it and the vegetation is taller and denser around the pan (Figure 9), as it is in the many ephemeral water courses. Many small quartzite bedrock outcrops occur throughout the PV study area, both in sandier substrates (Figure 4) and in areas coated in gravel (Figure 8).



Figure 4: View towards the south in the PV study area with a quartzite bedrock seam exposed on the surface.



Figure 5: View towards the west from the south-eastern corner of the PV study area. The Sishen-Saldanha Railway is faintly visible at far left (arrowed).



Figure 6: View towards the south across the eastern part of the PV study area showing bare sandy substrate with denser vegetation in the background along an ephemeral water course.



Figure 7: View towards the south in the south-western part of the PV study area showing a sandy plain with minimal vegetation.



Figure 8: View towards the south of the extensive gravel plain in the western part of the PV study area. A bedrock outcrop is visible at far right.



Figure 9: A small pan in the south-western part of the PV study area.

The power line route commences on sandy substrate in the east (Figure 10) and then crosses a wide water course which has many trees in it (Figure 11). It cross the farm dam and then proceeds over a gravel plain with occasional sandy areas (Figures 12 to 14).



Figure 10: View towards the west along the power line route with the farm house visible at far right. The Kenhardt-Pofadder Road lies to the left.



Figure 11: View towards the south of the area in the watercourse just east of the farm dam. Some LSA archaeology was found here.



Figure 12: View towards the east in the central part of the power line route showing dense gravel and the water course leading to the farm dam in the background.



Figure 13: View towards the west in the central part of the power line route. The Aries Substation is visible on the skyline.



Figure 14: View towards the west near the western end of the power line route showing dense gravel.

5. ARCHAEOLOGICAL AND HISTORICAL CONTEXT

This section of the report contains the desktop study and establishes what is already known about heritage resources in the vicinity of the study area. What was found during the field survey as presented below 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

Archaeological surveys in the Kenhardt area have focused on two areas to the northeast of the town near the Niewehoop Substation and to the southwest near the Aries Substation. The present project lies near the Aries Substation and that area will be the focus of this review.

Halkett and Orton (2011) surveyed a site to the south of the power line route and found the landscape to be coated in stone artefacts in varying density. They attributed the artefacts to the early (ESA), Middle (MSA) and Later (LSA) Stone Ages. The ESA and MSA material was widespread and not clustered into discrete scatters. The artefacts included 1 small hand axe and two possible but very weathered examples. Two scatters of LSA artefacts were found, however, and these included lower grindstones. The archaeology was deemed to be of low significance.

Pelser (2011) worked just west and southwest of the Aries Substation. He also noted ESA and MSA stone artefacts to be widespread throughout his study area and found LSA material in one place only. He considered the very high density of artefacts to be important and suggested medium to high significance for most of his finds.

Kaplan (2012a, 2012b) surveyed land to the north of the present study area and once again found stone artefacts to be common. He attributed most to the MSA with smaller numbers of ESA and LSA artefacts being present. Three significant sites were documented. One was an MSA site on a high point in the landscape. Large numbers of artefacts were present and outcrops of bedrock

were found to have been quarried. Another site was an LSA scatter alongside an ephemeral water course. The artefacts were mostly of quartz but included some hornfels. Ostrich eggshell fragments were also noted, along with a single weathered sherd of undecorated pottery (Kaplan 2012b). Another was a small scatter of MSA artefacts alongside a water course (Kaplan 2012a). ESA hand axes were also seen.

Kaplan (2011b, 2011c) looked at the area along and south of the presently proposed power line. This work also documented a widespread scatter of stone artefacts again largely from the MSA. Among the records made was a dense MSA scatter alongside a water course. Another survey near the north-eastern end of the proposed power line route produced similar material with no significant sites found (Kaplan 2011a).

In the broader area it is notable that rock engravings and paintings have been found near Kenhardt (personal observation 2016), while one painted site is known further to the northeast near the Nieuwehoop Substation (Orton 2016a). The painted sites are both geometric tradition sites, while the engravings are fine line images of animals.

5.2. Historical aspects and the built environment

The region is generally quite inhospitable and has been only very sparsely occupied during historical and modern times. This, and the dominant agricultural activity of sheep farming, has resulted in a very minimal historical footprint on the landscape. The main anthropogenic features are widely spaced farm complexes, fences, farm tracks and wind pumps. None of the reports cited above documented any historical remains, although Pelser (2011) did mention the possibility that a small informal stone structure might be historical in age.

Historical aerial photography is unfortunately not available prior to the 1970s, by which time the Sishen-Saldana Railway Line was already constructed.

6. FINDINGS OF THE HERITAGE STUDY

This section presents the fieldwork observations. Archaeological sites are listed in Appendix 2 and mapped in Appendix 3. They are described and illustrated here.

6.1. Archaeology

The entire study area was found to be coated in artefacts attributable to background scatter of varying age. The vast majority would appear to date to the MSA, although, aside from faceted platforms and some characteristic triangular flakes, diagnostic elements were rare or even absent. The LSA seems least well represented.

Figure 15 shows examples of flakes, blades and cores which are most likely attributable to the ESA. Large cutting tools (LCTs) are characteristic of the ESA. Handaxes are the most common LCTs and large numbers of them were found in the study area. The tips of handaxes frequently broke off, either during manufacture or during use. Figures 16 to 19 show four broken examples, while Figures 20 to 23 show four complete ones. Cleavers are a far rarer type of LCT and only two were found in the PV study area (Figures 24 and 25). Another rare LCT type is the pick. One was found in

the PV study area (Figure 26) and another along the power line route. The artefacts were all in quartzite of varying colours and textures. Note that all scales in Figures 16 to 26 have been made equal such that the artefact sizes can be seen in true proportion relative to each other.



Figure 15: Examples of artefacts likely attributable to the ESA. The small artefact between the two very large flakes is a scraper and above that are two cores. Scale = 10 cm.



Figure 16: Tip of a large handaxe from the PV study area. Scale in cm.



Figure 17: Small handaxe with the tip missing from the PV study area. Scale in cm.



Figure 18: Tip of a large handaxe from the power line study area. Scale in cm.



Figure 19: Small handaxe with the tip missing from the PV study area. Scale in cm.



Figure 20: Medium-sized weathered handaxe from the power line study area. Scale in cm.



Figure 21: Small handaxe from the PV study area. Scale in cm.



Figure 22: Large handaxe from the PV study area. Scale in cm.



Figure 23: Medium-sized handaxe from the PV study area. Scale in cm.



Figure 24: Cleaver from the PV study area. Scale in cm.



Figure 25: Cleaver from the PV study area. Scale in cm.



Figure 26: Pick from the PV study area. Scale in cm.

The distribution of LCTs seemed to be in areas where there was light gravel cover, although isolated examples were found more widely on both sandy areas and dense gravel areas. Although artefact size serves as a general indicator of age, individual artefacts cannot always reliably be ascribed to one or another period of the Stone Age. The distribution of LCTs was thus used as a proxy for the distribution of ESA archaeology across the landscape. One area was considered to be of medium significance due to the relatively large number of LCTs and also because there were many other large artefacts found in association which are most likely to be from the ESA. This area lies in the far eastern part of the PV study area (Figure A3.4). Although one dense cluster of LCTs was found along the power line route (Figure A3.6) this has not been delimited as sensitive areas due to the very limited impact that a power line would have on such a widespread resource.

Because individual ESA 'sites' cannot be identified, it is best to consider the ESA archaeology as a cultural landscape. It would fall into Orton's (2016b) Type 4 Precolonial Cultural Landscape.

As already intimated, the bulk of the background scatter seems to be comprised of MSA artefacts. Such artefacts were found to occur throughout the study area and are far more extensively distributed than those from the ESA. Due to their widespread occurrence and lack of focal points, these artefacts are generally not considered significant. However, two areas were identified as being denser than usual. One of these – located close to the Sishen-Saldanha Railway – was a scatter of artefacts almost all in the same pale-coloured quartzite at waypoint 058. It was quite extensive and clearly represents a short period of deposition. Figures 27 and 28 show this scatter. It occurred in an area of moderate density gravel.



Figure 27: Selection of artefacts from the MSA scatter at waypoint 058. Scale in cm.



Figure 28: View of the surface at waypoint 058 showing the many pale-coloured quartzite artefacts.

Another area of higher density scatter was identified alongside a granite bedrock outcrop in the south-western part of the PV study area (Figures 29 & 30). It is quite likely that this scatter is composed of a mixture of MSA and LSA artefacts and is thus less significant. The artefacts were all in quartzite of varying colours and textures.



Figure 29: Selection of artefacts from the MSA/LSA scatter at waypoint 048. Scale in cm.



Figure 30: View of the surface at waypoint 048 showing the exposed granite in the background.

At waypoint 050 alongside this artefact scatter was a small C-shaped stone ‘structure’ of unknown function (Figure 31). There were no artefacts obviously associated with it and it is not considered significant.



Figure 31: View towards the northwest of the small stone ‘structure’ at waypoint 050. The opening faces southeast.

LSA sites and artefacts seem to be generally quite rare in this landscape. The only ones found in the present study area were associated with water sources. Within the south-western part of the PV study area there is a small pan. Two small LSA sites were found around this pan, one to the north and the other to the south. The northern site, at waypoint 063, was comprised of stone artefacts and ostrich eggshell fragments. Although a few artefacts attributable to the background scatter are no doubt included, it is quite clear that the assemblage is different from the bulk of the archaeology seen in the area. The artefacts are small and largely of crypto-crystalline silica (CCS) with some quartz and hornfels (Figure 32). Also present was an anvil and a hammer stone. A single fragment of hand-painted refined white earthenware that likely dates to the late 19th century was also found but it cannot be known whether this is associated with the site or arrived there later. The second site, at waypoint 064, was located in a small ‘clearing’ between bushes (Figure 33). It

had relatively few stone artefacts – all in quartz and quartzite – but there was a fair number of ostrich eggshell fragments across the site. An anvil and hammer stone were also present.

Where the power line route crosses the large water course a number of LSA sites were found. Although one, at waypoint 073, was located on the eastern fork of the watercourse, the most interesting and significant were found on the western fork, just below the farm dam. Figure 10 shows this location. One of the scatters was small and insignificant and comprised only of a number of quartz flaked stone artefacts (waypoint 087). Four other locations were recorded in close proximity to one another and are here considered to be a single site since the edges of the scatters overlap to some degree. Ostrich eggshell was common on three of the four scatters (Figure 34). The artefacts were of quartz, quartzite, CCS and hornfels (Figure 35) with the proportional distribution of each material being variable from waypoint to waypoint. A lower grindstone was found at waypoint 083 and a hammer stone at 084.



Figure 32: Selection of stone artefacts, ostrich eggshell fragments (upper right) and the single European ceramic from waypoint 063.

Figure 33: The area in which the site at waypoint 064 was located. The pan lies to the right.



Figure 34: The ostrich eggshell scatter at waypoint 084.

Figure 35: A small selection of stone artefacts from the vicinity of waypoint 086 to show the various materials present. The large artefact on the right is an ESA handaxe fragment. Scale in cm.

Aside from the refined white earthenware fragment reported above and a few pieces of stoneware also found in the large water course, the only historical archaeology seen was an old farm complex. Although located well away from the power line route, it was briefly recorded in case of any later changes to the project description. It was comprised of two stone livestock enclosures (one in ruin; Figure 36), a 20th century ruined house (Figure 37), the ruins of a small stone-built cottage (Figure 38) and a few other stone features (Figure 39). There was also an ash and rubbish midden (Figure 40). It contained late 19th and early 20th century materials.



Figure 36: The large ruined stone livestock enclosure at waypoint 076. It appears as though stones have been stolen for reuse elsewhere.



Figure 37: The 20th century ruin at waypoint 079. It is part sundried brick and part cement blocks.



Figure 38: The stone-built small cottage ruin at waypoint 078 with hearth in the foreground.



Figure 39: A small stone foundation at waypoint 080.



Figure 40: The ash and rubbish midden at waypoint 077.

6.2. Graves

No graves were seen during the survey. The study area was virtually entirely over hard substrate and unmarked graves are not expected.

6.3. Built environment

A modern cement block shed is the only structure occurring within the PV study area. The modern farm complex (which lies 300 m north of, and on the opposite side of the road from, the proposed power line route) was not specifically visited but all structures currently in use appeared to be modern, or had at least been substantially modernised. There is one structure isolated in the far western part of the farm complex that was older and relatively unmodified (Figure 41). It is a small Karoostyle cottage with a larger-than-normal *stoepkamer*-type addition. Because they are not in ruin, other elements of built heritage would include the intact livestock enclosure at waypoint 081 and the low stone walls at waypoints 082 and 088.



Figure 41: The small Karoostyle cottage within the fenced farm complex on Olyven Kolk.

6.4. Cultural landscape

There are two aspects to the cultural landscape. The first is the archaeological landscape of ESA and MSA artefacts that occur so widely as to not be separable into sites. The Stone Age 'footprint' on the landscape was very light, consisting only of leaving a widespread scatter of modified stones on the ground. This aspect is dealt with under archaeology above and is not considered further here.

The second aspect of cultural landscape is the historical one. This aspect relates to the more recent land uses of small stock farming, minimal agriculture when more water was available and, in very recent times, electrical development. The agricultural activities have resulted in fences, farm tracks, occasional buildings, dams (some of which may be excavated out pans, although this could not be confirmed) and the remnants of low 'dam walls' built across the watercourses, likely to enable agriculture.

6.5. Summary of heritage indicators

Aside from palaeontological resources which are considered in a separate report, the only significant heritage concern is archaeology. Although stone artefacts are widespread across the landscape, certain areas have been identified as being denser and of greater significance. The landscape will also be impacted but its cultural component is very limited. Furthermore, the presence of power lines, a substation, a small solar energy facility and the Sishen-Saldanha Railway Line have already compromised the landscape.

6.6. 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 heritage resource may be seen as significant are outlined in Section 2 above.

The archaeological resources are deemed to have medium cultural significance for their scientific value and are accorded a provisional field grading of GP A.

The cultural landscape is deemed to have low cultural significance for its aesthetic and historical value while the single historical structure has medium significance for its architectural value.

7. ASSESSMENT OF IMPACTS

Impacts to archaeology and the cultural landscape are the only heritage impacts of concern and are assessed in this section. The single built heritage resource will not be impacted and no other type of heritage resource were identified as requiring further assessment.

7.1. Impacts to archaeological resources

Impacts to archaeological resources would only occur during the construction phase of the project (Table 1). They would be direct impacts in which archaeological sites and/or artefacts would be damaged and/or destroyed. The significance and grading of the material suggests that this impact would be of medium intensity and felt locally. Despite being permanent, the significance of the impact is likely to be **medium**. With mitigation this would be reduced to **low**. There are no fatal flaws in terms of impacts to archaeology. The amount of development in the area is minimal and, even with the construction of other large solar energy facilities, the nature and likely extent of similar archaeological resources means that the cumulative impacts can be expected to be of low significance.

Table 1: Assessment of archaeological impacts.

Potential impacts on cultural-historical aspects: ARCHAEOLOGY	
Nature of impact:	Direct destruction and/or damage to archaeological sites and artefacts.
Extent of impact:	Local
Duration of impact:	Permanent
Intensity:	Medium
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low
Degree to which the impact may cause irreplaceable loss of resources:	High
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium
Degree to which the impact can be mitigated:	High
Proposed mitigation:	<ul style="list-style-type: none"> • Survey final layout footprint; • Excavation/sampling of significant sites; and • Collection of ESA artefacts and diagnostic elements from dense artefact clusters
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low

7.1.1. Mitigation

Because the survey was largely limited to specified target areas, there will need to be a follow up survey of any areas within the final development footprint that have not yet been covered. It is important that LCTs are individually plotted in order to provide an accurate indication of where the densest ESA scatters lie. The results of this survey along with those reported here will be used to determine which areas should be subjected to archaeological mitigation.

For archaeological sites the mitigation would entail excavation and sampling of the sites to recover archaeological materials. Radiocarbon dating might be required if suitable organic materials are present. For the ESA scatters a thorough examination of the relevant areas with collection of all LCTs and other diagnostic elements (e.g. cores, large blades) should be carried out. Artefact locations can be recorded by GPS. All materials would require analysis and reporting and the work would need to be carried out under a permit issued by SAHRA.

7.1.2. Management

Management measures would be limited to ensuring that construction, maintenance and decommissioning activities all remain within the authorised footprints. This monitoring would be carried out by the Environmental Control Officer (ECO).

7.2. Impacts to the cultural landscape

Impacts to the cultural landscape would occur equally during all phases of the project (Table 2). They would be direct impacts related to the presence of large construction and maintenance machinery, power lines, solar panels and related infrastructure in the landscape which otherwise has a generally rural/natural character. The nature and significance of the cultural landscape suggests that this impact would be of low intensity and felt locally. Despite being of long term duration, the significance of the impact is likely to be **low**. Mitigation would still result in a significance of **low**. There are no fatal flaws in terms of impacts to the cultural landscape. The amount of development in the area is minimal and, even with the construction of other large solar energy facilities, the expected clustering of renewable energy developments around the substation allows for other areas to remain undeveloped. Cumulative impacts can thus be expected to be of low significance.

Table 2: Assessment of cultural landscape impacts.

Potential impacts on cultural-historical aspects: CULTURAL LANDSCAPE	
Nature of impact:	Direct intrusion of large machinery and electrical infrastructure in the landscape.
Extent of impact:	Local
Duration of impact:	Long term
Intensity:	Low
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be mitigated:	Low
Proposed mitigation:	<ul style="list-style-type: none"> • Ensure effective rehabilitation of any disturbed areas not required during operation • Ensure effective rehabilitation after

	decommissioning if this occurs
Cumulative impact post mitigation:	Low
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low

7.2.1. Mitigation

It is not feasible to screen such large developments and no practical mitigation measures can be suggested to deal with the main impact (i.e. the presence of the facility in the landscape). However, minor measures such as rehabilitation of disturbed areas at the end of construction will slightly reduce the overall impact. If decommissioning occurs then effective rehabilitation of the entire site would ensure that the impacts are almost entirely eliminated. Other best practice measures to reduce visual impacts should also be applied as appropriate.

7.2.2. Management

The ECO should ensure that areas not falling within the authorised footprint are not unnecessarily disturbed.

7.3. Existing impacts to heritage resources

There are currently no obvious threats to archaeological heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials, especially the ruined historical farm complex (which lies well away from the area proposed for development). The cultural landscape is slightly affected by the presence of the Sishen-Saldanha Railway Line, an existing power line, the Aries Substation and a small solar energy facility located just west of the substation.

7.4. 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.

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 provision of electricity to support South Africa's economic development is deemed to be more important than the impacts to heritage resources that are expected from the proposed development.

9. CONCLUSIONS

Impacts to archaeological resources, and in particular ESA material, are the primary concern for this project. Although LSA sites also occur, they tend to be along water courses and will likely be protected. MSA artefacts are widespread and generally of little concern. The cultural landscape is weakly developed and has already been compromised by the presence of the Sishen-Saldanha Railway Line, a substation, a large power line and a small solar energy facility. The site is very remote and landscape impacts are of little concern. No other aspects of heritage were found to be relevant. There are no fatal flaws, although a follow-up survey and some mitigation work will very likely be required.

Given that the archaeological resources are only of medium cultural significance and can easily be mitigated, it is concluded from a heritage point of view that the project should be authorised.

10. RECOMMENDATIONS

It is recommended that the project be allowed to proceed but subject to the following conditions which should be incorporated into the conditions of approval:

- An archaeological survey of any areas approved for development and not yet surveyed must take place at least six months prior to the start of construction;
- Any significant archaeological sites and dense clusters of ESA material within the final development footprint should be excavated, sampled and collected as appropriate; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

11. REFERENCES

Halkett, D. & Orton, J. 2011. Heritage Impact Assessment (archaeology and palaeontology): proposed Olyven Kolk Solar Power Plant, Northern Cape Province. Unpublished report prepared for Environmental Resources Management Southern Africa (Pty) Ltd. St James: ACO Associates cc.

Kaplan, J. 2011a. Archaeological Impact Assessment the proposed Solar Cape 10 MW photovoltaic energy generation facility near Kenhardt, Northern Cape Province. Unpublished report prepared for Cape Lowlands Environmental Services. Riebeek West: Agency for Cultural Resource Management.

Kaplan, J. 2011b. Archaeological Impact Assessment the proposed Solar Cape 100MW photovoltaic energy generation facility near Kenhardt Northern Cape Province. Unpublished report prepared for Cape Lowlands Environmental Services. Riebeek West: Agency for Cultural Resource Management.

- Kaplan, J. 2011c. Addendum to report. Archaeological Impact Assessment the proposed Solar Cape 100 MW photovoltaic energy generation facility near Kenhardt Northern Cape Province. Unpublished report prepared for Cape Lowlands Environmental Services. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2012a. Archaeological Impact Assessment the proposed Green Continent Partners 75 MW Photovoltaic Electricity Generation Facility on Portion 8 of Farm Olyvenkolk 187, Kenhardt District, Northern Cape Province. Unpublished report prepared for Eco Impact Legal Consulting. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2012b. Archaeological Impact Assessment the proposed Wine Estate Capital Management 75 MW Photovoltaic Electricity Generation Facility on Portion 12 of the farm Olyvenkolk NO. 187 Kenhardt District Northern Cape Province. Unpublished report prepared for Eco Impact Legal Consulting (Pty) Ltd. Riebeek West: Agency for Cultural Resource Management.
- Orton, J. 2016a. Heritage Impact Assessment Environmental Impact Assessment for the Proposed Development of a 75 MW Solar Photovoltaic Facility (Gemsbok Solar PV5) on Gemsbok Bult 120/8, northeast of Kenhardt, Northern Cape Province. Unpublished report prepared for CSIR. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2016b. Prehistoric cultural landscapes in South Africa: a typology and discussion. *South African Archaeological Bulletin* 71: 119-129.
- Pelser, A. 2011. A report on an archaeological impact assessment (AIA) for the proposed solar energy plant on Klein Zwart Bast 188, Kenhardt District, Northern Cape. Unpublished report AE1104 prepared for Robert De Jong & Associates. Archaetnos.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 40 Brassie Street, Lakeside, 7945
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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 –

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233

CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

Memberships and affiliations:

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

Fieldwork and project experience:

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

Feasibility studies:

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

Phase 1 surveys and impact assessments:

- Project types
 - Notification of Intent to Develop applications (for Heritage Western Cape)
 - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)

- Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
- Archaeological specialist studies
- Phase 1 archaeological test excavations in historical and prehistoric sites
- Archaeological research projects
- Development types
 - Mining and borrow pits
 - Roads (new and upgrades)
 - Residential, commercial and industrial development
 - Dams and pipe lines
 - Power lines and substations
 - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

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

Awards:

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

APPENDIX 2 – List of finds

Finds in the PV areas

Waypoint	Location	Description	Significance
048	S29 27 33.5 E20 53 28.3	Moderate density scatter of small to medium-sized quartzite artefacts associated with an area of granite bedrock.	Low
049	S29 27 33.0 E20 53 29.3	Moderate density scatter of small to medium-sized quartzite artefacts associated with an area of granite bedrock.	Low
050	S29 27 33.3 E20 53 29.3	A small stone C-shaped 'structure' with its opening pointing towards the southeast. No directly associated artefacts but general area has many artefacts from waypoints 048 and 049. The age and function of this feature are unknown and likely indeterminable.	Low
051	S29 27 32.5 E20 53 28.4	Moderate density scatter of small to medium-sized quartzite artefacts associated with an area of granite bedrock.	Low
052	S29 27 29.5 E20 53 39.2	Relatively dense background scatter. Includes ESA and MSA and possibly even some LSA. Vast majority of artefacts are in quartzite of various colours and textures, but rare quartz flakes also occur.	Low
053	S29 27 11.4 E20 53 34.5	Scatter of ostrich eggshell in an ephemeral water course. No evidence for human modification could be found.	Very low
ESA1	S29 27 10.2 E20 53 36.9	Extensive area with dense background scatter and including many LCTs.	Medium Mitigate
055	S29 27 06.4 E20 53 35.5	Scatter of ostrich eggshell. No evidence for human modification could be found.	Very low

Waypoint	Location	Description	Significance
056	S29 27 03.7 E20 53 06.2	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it. No obvious quarried outcrop was seen.	Low
057	S29 27 50.5 E20 52 40.2	Long line of gravel that has been cleared to the edge of presumably an old track. The track is no longer visible but the line of gravel can be traced on aerial photography for c. 500 m. It commences at the existing farm road and runs towards the southwest where it fades before reaching the railway line.	Very low
058	S29 27 51.6 E20 52 42.8	Area of dense gravel with many background scatter artefacts in it. The vast majority of artefacts are of a pale quartzite and clearly originate from the same source.	Low-medium Mitigate
059	S29 27 51.4 E20 52 44.4	Within the same area of gravel as 058, this site is a quarried quartzite outcrop.	Low
060	S29 27 15.9 E20 53 06.5	Area in an ephemeral watercourse with many pale quartzite flakes that must have all come from the same source. There was nothing diagnostic but based on the size of the artefacts the scatter must date to the MSA.	Low
061	S29 27 54.7 E20 52 06.3	Area with dense background scatter close to a pan.	Low-medium
062	S29 27 50.8 E20 52 04.2	Area with dense background scatter close to a pan.	Low-medium
063	S29 27 53.7 E20 52 04.3	LSA scatter with quartz, quartzite (incl. a hammer stone/core), CCS, hornfels and ostrich eggshell. The scatter is in an open area between bushes to the north of the pan.	Low-medium
064	S29 27 56.2 E20 52 04.4	LSA scatter with quartz, quartzite (incl. an anvil and a hammer stone) and ostrich eggshell. The scatter	Low-medium

Waypoint	Location	Description	Significance
		is in an 'alcove' between bushes to the south of the pan. More ostrich eggshell than stone artefacts.	
065	S29 27 54.9 E20 52 05.8	Area with dense background scatter close to a pan.	Low-medium
066	S29 27 51.7 E20 52 07.7	Area with dense background scatter close to a pan.	Low-medium
067	S29 27 47.2 E20 52 00.9	Area of gravel with many pale quartzite flakes that must have all come from the same source. There was nothing diagnostic but based on the size of the artefacts the scatter must date to the MSA.	Low
068	S29 27 47.1 E20 52 21.5	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
069	S29 27 31.6 E20 52 21.4	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
070	S29 27 27.3 E20 52 13.2	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
071	S29 27 26.5 E20 51 57.9	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
072	S29 27 29.0 E20 52 03.7	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
073	S29 27 30.2 E20 51 52.2	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
074	S29 27 37.2 E20 52 00.0	A small quartzite outcrop with evidence of having been quarried to remove flakes.	Low
ESA2	S29 26 47.2 E20 53 25.1	ESA artefact scatter with many LCTs. Only identified quickly by the presence of handaxes.	Medium Mitigate

Finds along the power line route

Waypoint	Location	Description	Significance
075	S29 27 46.6	LSA scatter of quartz and quartzite artefacts in a	Low

Waypoint	Location	Description	Significance
	E20 50 33.8	large watercourse.	
076	S29 27 51.6 E20 50 45.2	Stone-packed kraal. It appears as though people have been removing stone for reuse elsewhere as the small rubble fill stones are present alongside the broken sections, but not the larger rocks. (It lies well south of the power line route.)	Low-Medium
077	S29 27 52.5 E20 50 44.0	Historical rubbish midden with glass of various colours and ceramics. Does not seem much older than perhaps the turn of the 20 th century. (It lies well south of the power line route.)	Low-Medium
078	S29 27 53.1 E20 50 43.9	The remains of a small stone cottage with hearth. An adjoining area has a cement floor with stone surrounding it. (It lies well south of the power line route.)	Low-Medium
079	S29 27 56.7 E20 50 44.6	Historical cottage built in phases. Oldest phase (eastern corner) has sundried bricks, but the rest is of home-made cement blocks. (It lies well south of the power line route.)	Low
080	S29 27 57.8 E20 50 43.7	Small, square stone foundation of unknown function. There are a few home-made bricks lying around suggesting a brick structure above. (It lies well south of the power line route.)	Low
080a	S29 27 58.4 E20 50 45.3	Cement floor. 20 th century. (It lies well south of the power line route.)	Very low
081	S29 28 00.6 E20 50 45.8	Stone reservoir and kraal as well as wind pump on stone plinth. (It lies well south of the power line route.)	Low-medium
082	S29 27 53.3 E20 50 20.5	Low stone walling at stock pens. The walls are at the base of the wire fences. Other end of 088.	Low
083	S29 27 54.6 E20 50 25.1	Small LSA artefact scatter with a lower grindstone and flaked artefacts in quartz and quartzite.	Low-Medium

Waypoint	Location	Description	Significance
		Located alongside the large water course.	
084	S29 27 53.8 E20 50 24.8	LSA artefact scatter with quartz and quartzite flaked artefacts and some ostrich eggshell. Includes a quartzite hammer stone. Located alongside the large water course.	Low-Medium
085	S29 27 53.4 E20 50 24.3	LSA artefact scatter with quartz and quartzite flaked artefacts some and ostrich eggshell. Located alongside the large water course.	Low-Medium
086	S29 27 53.3 E20 50 25.4	LSA artefact scatter with quartz, quartzite, hornfels and crypto-crystalline silica flaked artefacts and some ostrich eggshell. Located alongside the large water course.	Low-Medium
087	S29 27 50.9 E20 50 24.4	LSA artefact scatter with quartz flaked artefacts. Located alongside the large water course.	Low
088	S29 27 49.3 E20 50 20.9	Low stone walling at stock pens. The walls are at the base of the wire fences. Other end of 082.	Low
089	S29 27 50.8 E20 50 12.3	Small vernacular historical cottage with external hearth and chimney stack alongside the main gravel road to the north of the power line route. Probably dates to the early 20 th century.	Medium-High
090	S29 29 20.3 E20 47 49.7	Small quarried quartzite outcrop.	Very low

APPENDIX 3 – Mapping

Note that all maps include data from another project to the north whose survey was conducted concurrently with the present one.

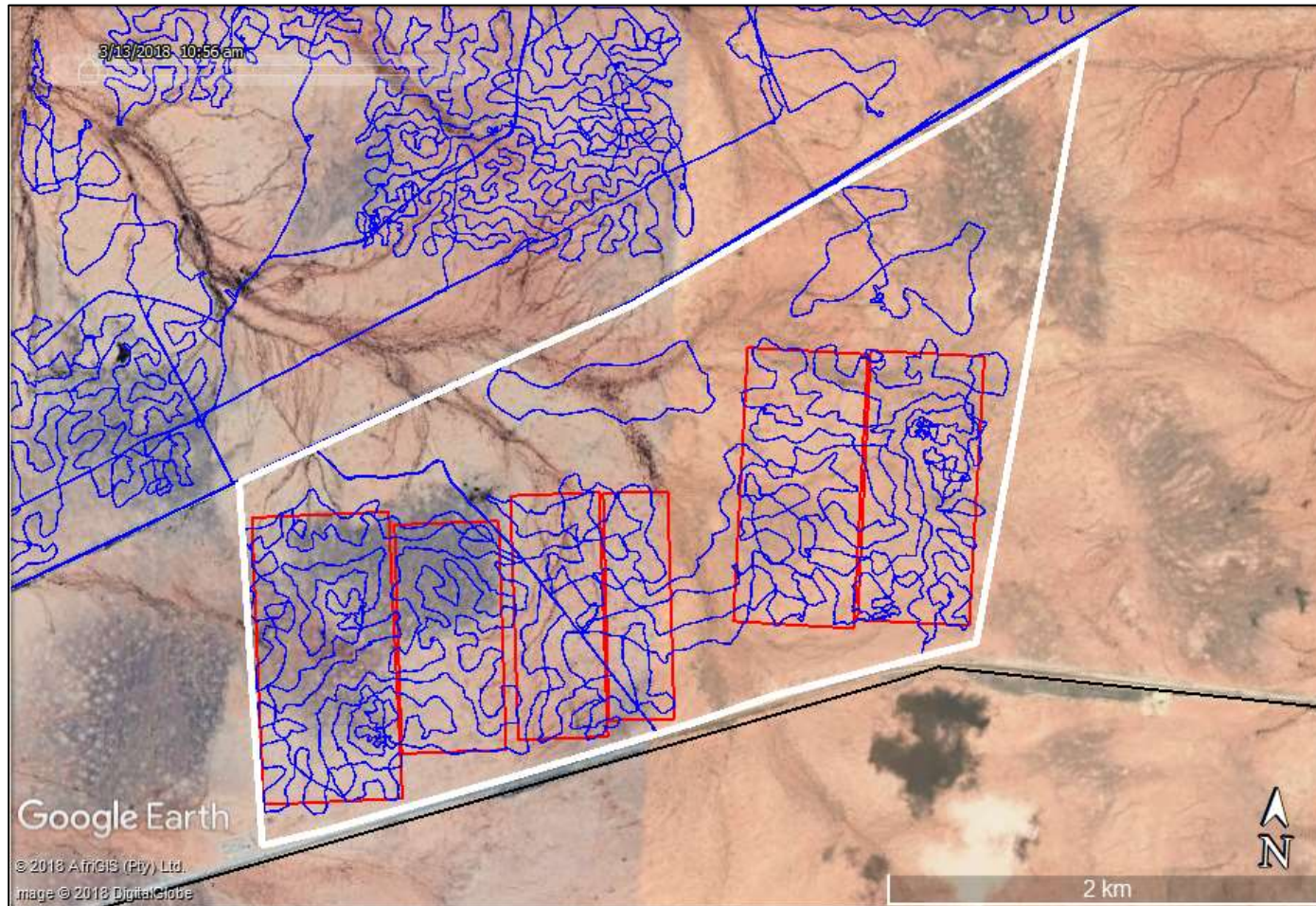


Figure A3.1: Aerial view of the PV study area, Portion 6 (white polygon), showing the target areas for survey (red polygons) and the survey tracks (blue lines). The black line is the Sishen-Saldanha Railway Line.

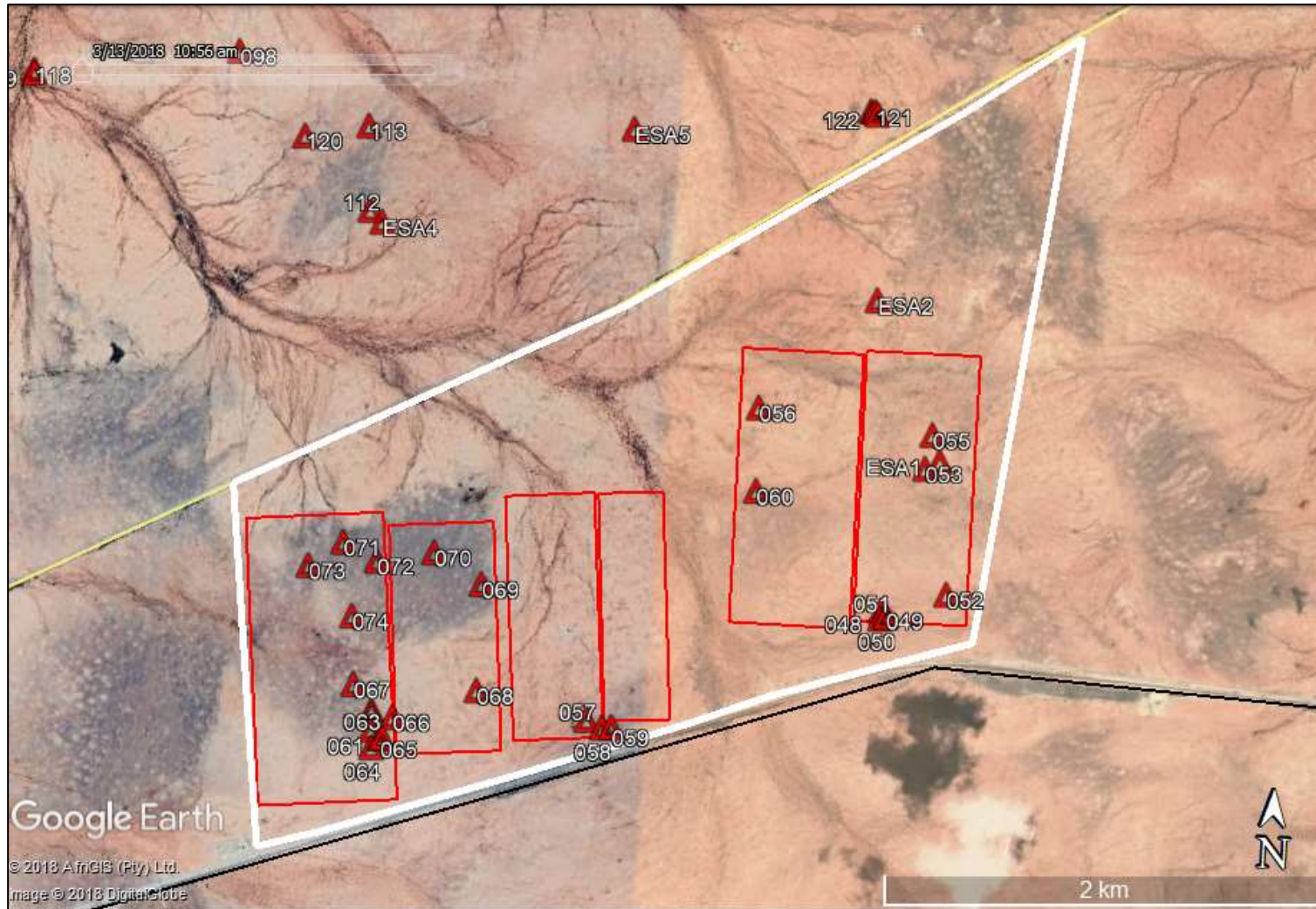


Figure A3.2: Aerial view of the PV study area, Portion 6 (white polygon), showing the target areas for survey (red polygons) and the archaeological finds (numbered red triangles). The black line is the Sishen-Saldanha Railway Line.

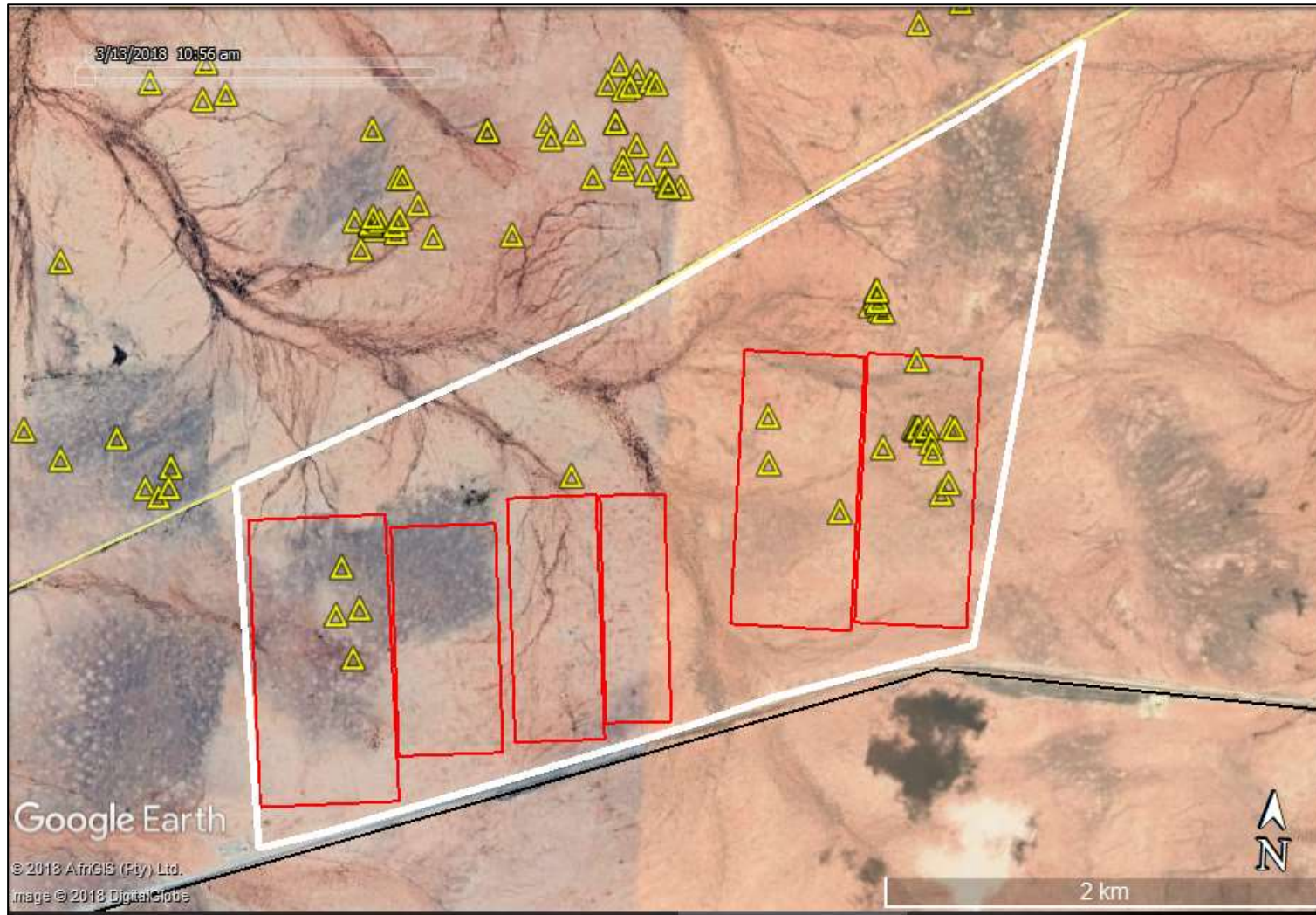


Figure A3.3: Aerial view of the PV study area, Portion 6 (white polygon), showing the target areas for survey (red polygons) and the ESA LCTs seen during the survey (yellow triangles). The black line is the Sishen-Saldanha Railway Line.

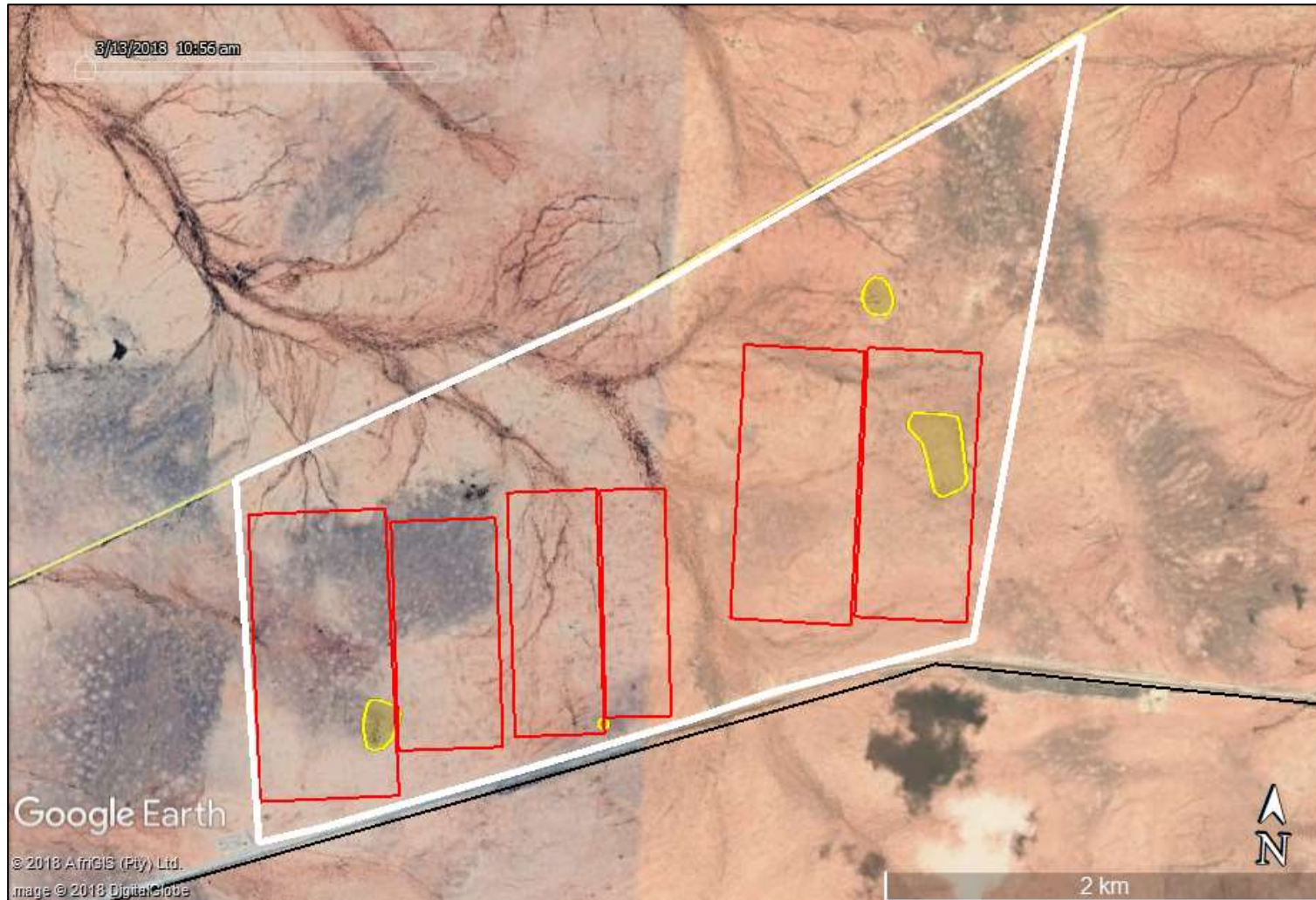


Figure A3.4: Aerial view of the PV study area, Portion 6 (white polygon), showing the target areas for survey (red polygons) and the areas considered sensitive from an archaeological point of view (yellow shaded areas). The black line is the Sishen-Saldanha Railway Line.

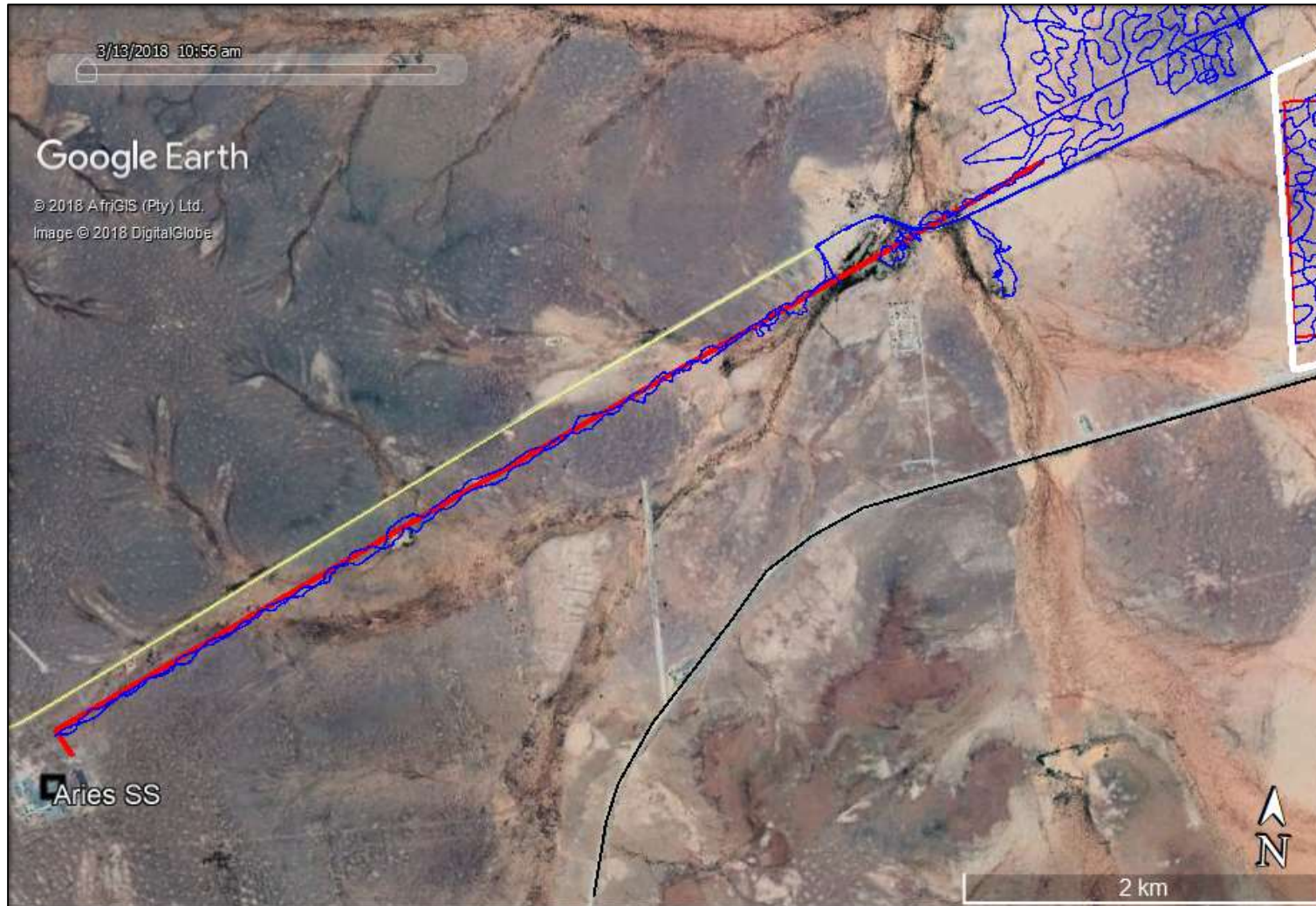


Figure A3.5: Aerial view of the power line study area (red line) showing the survey tracks (blue lines). The black line is the Sishen-Saldanha Railway Line.



Figure A3.6: Aerial view of the power line study area (red line) showing the archaeological finds (numbered red triangles). The black line is the Sishen-Saldanha Railway Line.

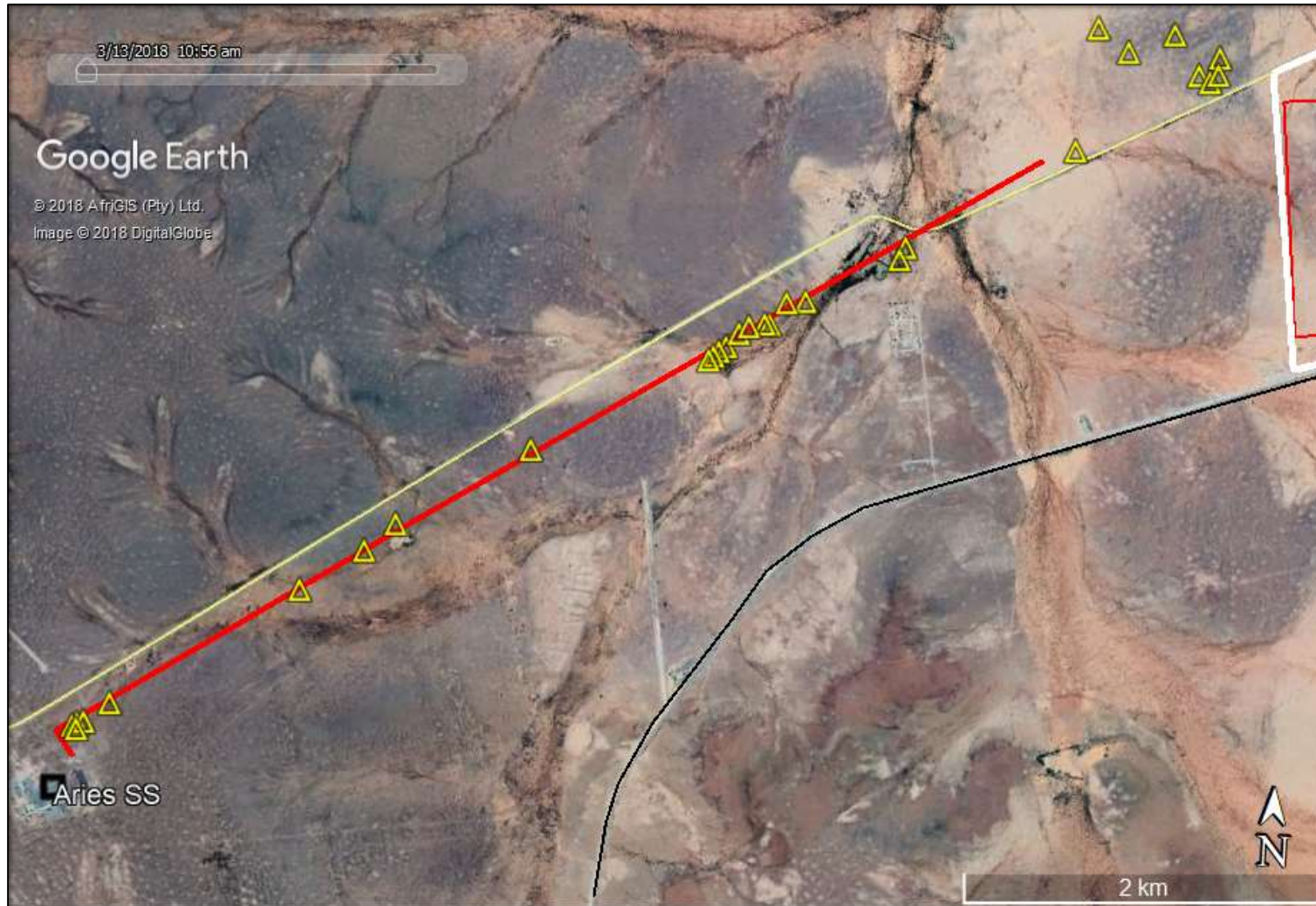


Figure A3.7: Aerial view of the power line study area (red line) showing the ESA LCTs seen during the survey (yellow triangles). The black line is the Sishen-Saldanha Railway Line.



Figure A3.8: Aerial view of the power line study area (red line), showing the area considered sensitive from an archaeological point of view (yellow shaded area).