Phase 1a Archaeological Impact Assessment

Environmental Impact Assessment

Proposed Mogara Solar and Grid Connection on Portions 1 and 2 of the Farm Legoko No 460 and Sekgame 461, District of Kuruman Rd, Gamagara Local Municipality, Northern Cape Province

Conducted in terms of Section 38(8) of the National Heritage Resource Act (No. 25 of 1999)

prepared for

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1. Executive Summary

This report provides archaeological input for the integrated Heritage Impact Assessment that forms part of the Environmental Impact Assessment process for the proposed development of the Mogara Solar facility to be situated about 8 to 10 km south east of Kathu in the Northern Cape. The study reported here covers the proposed alternative development footprints, the proposed overhead power line routes, and access roads.

Previous archaeological studies in the area showed that the surroundings of Kathu are rich in archaeological resources, particularly those of the Stone Age period. It was surprising, therefore, that no significant archaeological sites were identified during this investigation. Although several Later Stone Age stone artefacts were identified, they occur in the main as isolated finds or in very low density scatters that are in unstratified contexts and that lack organic remains and other cultural materials. No other tangible heritage resources of value were identified. Consequently, the archaeological record in the studied areas is considered to be of low significance, and therefore, it is recommended that no further archaeological studies are required prior to the development.

From an archaeological perspective there are no fatal flaws, and therefore, no objections to the authorisation of the proposed development of either of the alternative layouts for the Mogara Solar facility, associated grid connection routes and access road.

Recommendations to be included in the EMPr:

- Archaeological resources identified during this study do not require further recording/studies, and because they are considered to be of low heritage value and have been adequately recorded through this assessment, it is suggested that they can be disturbed or damaged without a permit from SAHRA.
- In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately.
- If exposed during development, archaeological resources must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
- In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.

2. Name, Expertise and Declaration

I, Peter Nilssen (PhD in archaeology, University of Cape Town 2000), herewith confirm that I am a Professional member - in good standing - of the Association of South African Professional Archaeologists (ASAPA), including the Cultural Resource Management section of the same association since 1989 (ASAPA professional member # 097). I am an accredited Principal Investigator for archaeozoology (specialist analysis), coastal, shell midden and Stone Age archaeology; Field Director for Colonial Period archaeology; and Field Supervisor for Iron Age archaeology and Rock Art. I have worked as a professional archaeologist in Cultural Resource Management since 1989 and have completed more than 200 heritage-related impact assessments and mitigation projects as Principal Investigator. All submitted works were approved by provincial and national heritage authorities.

As the appointed independent specialist (archaeologist) for this project hereby declare that I:

- act as an independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- 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;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 982) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- am aware that a false declaration is an offence in terms of regulation 48 of GN No. R. 982.

Signature of the specialist:

Name of company: Dr Peter Nilssen

Professional Archaeologist and Specialist Heritage Practitioner

Date: **27 July 2018**

3. NEMA Requirements for Specialist Reports

NEMA requirements for Specialist Reports		
Appendix 6	**Specialist Report content as required by the NEMA 2014 EIA Regulations, as amended**	**Section**
1 (1)(a)	(i) the specialist who prepared the report; and	Title page & Section 2; as well as the accompanying CV
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 2
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 5.3
(cA)	an indication of the quality and age of the base data used for the specialist report;	desktop study up to 2018; see Section 5.6 and section 6
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5.4 & Section 7
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5.6 and Section 6.4
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process, inclusive of equipment and modelling used;	Section 5.6
(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 5.6 and Section 6.4
(g)	an identification of any areas to be avoided, including buffers;	Section 6.4
(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 6.4 and associated Figures and Plates
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.7
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Section 6
(k)	any mitigation measures for inclusion in the EMPr;	Section 6.4
(l)	any conditions for inclusion in the environmental authorisation;	Section 8
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8
(n)	a reasoned opinion-	Section 8
	(i) whether the proposed activity or portions thereof should be authorised; and	
	(iA) regarding the acceptability of the proposed activity or activities; 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;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Part of the EIA process and integrated HIA
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See integrated HIA
(q)	any other information requested by the competent authority.	Not at this time
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

4. NHRA Requirements for Heritage Reports

NHRA requirements for Heritage Reports -National Heritage Resources Act (No 25 of 1999)		
Section 38(3)	**The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:**	**Section**
38 (3)(a)	The identification and mapping of all heritage resources in the area affected;	Section 6.3
(b)	an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;	Section 6.3
(c)	an assessment of the impact of the development on such heritage resources;	Section 7
(d)	an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;	See integrated HIA
(e)	the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;	See integrated HIA
(f)	if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and	Yes, but see Sections 7 & 8
(g)	plans for mitigation of any adverse effects during and after the completion of the proposed development.	None, but see Sections 7 & 8

5. Introduction

5.1. Background to Development Proposal

The proposed development details provided below for the solar facility and grid connection are taken, mostly verbatim, from in-house reports prepared by Atlantic Renewable Energy Partners (Pty) Ltd (Miszczak 2018a and 2018b).

K2018091776 (SOUTH AFRICA) (Pty) Ltd is proposing the establishment of a commercial photovoltaic (PV) solar energy facility (SEF), called Mogara Solar, on Portion 1 and Portion 2 of Legoko Farm No 460, situated in the District of Kuruman Rd, Northern Cape Province, within the jurisdiction area of the Gamagara Local Municipality (Figures 1 through 5).

The proposed development activities trigger the National Heritage Resources Act (Act 25 of 1999), and therefore, this author was appointed to provide archaeological input to the broader integrated Heritage Impact Assessment that is being undertaken by Perception Planning in terms of Section 38(8) of the National Heritage Resources Act. Mr Dale Holder of Cape Environmental Assessment Practitioners (Cape EAPrac) is facilitating the EIA process.

5.2. Proposed Development Infrastructure

Solar Facility:

The technology under consideration is PV modules mounted on either fixed-tilt or tracking structures. Other infrastructure includes inverter stations, internal electrical reticulation, internal roads, an on-site switching station / substation, a 132 kV overhead transmission line (OHL), auxiliary buildings, construction lay-down areas and perimeter fencing and security infrastructure. The on-site switching station / substation will locate the main power transformer/s that will step up the generated electricity to a suitable voltage level for transmission into the national electricity grid, via the OHL. Auxiliary buildings include, inter alia, a control building, offices, warehouses, a canteen and visitors centre, staff lockers and ablution facilities and gate house and security offices. Mogara Solar will have a net generating capacity of 75 MW_{AC} with an estimated maximum footprint of ± 225 ha.

It is customary to develop the final / detailed construction layout of the SEF only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), after which major contracts are negotiated and final equipment suppliers identified. However, for the purpose of the Draft Scoping Report (DSR) in accordance with the minimum requirements prescribed by the Department of Environmental Affairs (DEA), two alternative layouts were identified. The following section elaborates on the layout options for the Mogara Solar facility.

An initial / conceptual area of ± 225 ha was identified during the initiation phase of the EIA (Scoping) for Mogara Solar. The area is located in the south western corner of Portion 2 of the Farm 460 Legoko (outlined in white in Figure 2).

This initial/ conceptual area only considered the already authorised solar facilities on the properties, namely AEP Legoko Solar (DEA 14/12/16/3/3/2/819) and AEP Mogobe Solar (DEA 14/12/16/3/3/2/820), the existing Eskom 275kV line that runs through both properties,

and the area under assessment as part of another EIA application (shown in light purple in Figure 2).

The initial/ conceptual area did not consider any environmental sensitive areas (to be identified by the various specialist studies). This initial / conceptual area was driven primarily by its proximity to the N14 access road as well as reduced OHL distance to connect into the planned Sekgame Switching Station, located ± 1,5 km to the west of the site.

Following the identification of the initial/ conceptual area, an ecological expert, Mr Simon Todd, was appointed to develop a vegetation and sensitivity rating for the properties. This sensitivity plan was then used to determine the location of the preferred layout alternative, identified therefore in such a manner as to avoid all areas with a medium – high, high and very high sensitivity. This also ensured that potential impact on the protected Acacia erioloba was minimised. Figure 3 below shows the ecological sensitivity for portions 1 and 2 of Legoko 460.

The preferred layout alternative considered during the draft scoping phase of the EIA is depicted in Figure 3 below. Layout Alternative 1 (Preferred) constitutes a preliminary layout area mostly within the initial/ conceptual area, however, due to the high sensitivity erioloba density in the south west corner of the initial/ conceptual area, Layout Alternative 1 has avoided this and has instead extended into Portion 1 of Legoko 460 so that the solar facility footprint occupies only Medium and Medium-High sensitivity area.

In accordance with the minimum requirements prescribed by the DEA, a second layout option was identified. Layout Alternative 2 is shown in Figure 4 below. Layout Alternative 2 is not preferred because it's solely occupying Medium-High sensitivity, and Layout Alternative 1 only has 19 ha over Medium-High sensitivity.

An overview of the main components of the SEF layout is as follows: 1) Solar PV modules connected in series to form a string. A number of strings are then wired in parallel to form an array of modules. PV modules are mounted on structures that are either fixed, north-facing at a defined angle, or mounted to a single or double axis tracker to optimise electricity yield; and 2) There are various options for mounting structure foundations, which include cast / pre-cast concrete, driven / rammed piles, or ground / earth screws mounting systems.

The impact on agricultural resources and production of these mounting structure options are the same. Concrete, however, is least preferred due to the effort required to remove the concrete from the soil in the decommissioning phase and the resulting impact on the environment. The Mogara Solar facility will therefore aim to mostly use either driven / rammed piles, or ground / earth screws for mounting systems, and only resort to concrete foundations should geotechnical studies necessitate this.

The auxiliary buildings will comprise the following as a minimum:

- Control Building / Centre (± 31m x 8m);
- Office (± 22m x 11m);
- 2 x Warehouses (each ± 50m x 20m);
- Canteen & Visitors Centre (± 30m x 10m);
- Staff Lockers & Ablution (± 22m x 11m); and
- Gate house / security offices (± 6m x 6m).

The total area occupied is approximately 0.31 ha, excluding the facility substation.

Grid Connection & Cabling:

It is proposed to connect the SEF directly to the planned Sekgame Switching Station located ± 5km to the south of the existing Ferrum MTS (Figure 5). The SEF substation will be approximately 100m x 100m in size and feature a step-up transformer/s to transmit electricity via a 132 kV OHL directly to the Sekgame Switching Station. The OHL is envisaged to be ±4km in length, a maximum height of 24m and occupy a servitude width of 31m – 51m.

A 75 MW_{AC} installation will require specific electrical components to meet the national grid code requirements in order to generate and supply electricity into the national grid.

The conversion from DC (modules) to AC is achieved by means of inverter stations. A single inverter station is connected to a number of solar arrays, and are placed along the internal service roads for ease of access. A number of inverter stations will be installed for the SEF, each of which is connected to the on-site / facility substation.

Final placement of the inverter stations and on-site / facility substation will need to take ground conditions into consideration. Interconnecting electrical cabling will be trenched where practical and follow internal access roads to the greatest extent. Sensitive areas will consequently be avoided as far as possible, or alternatively, cables will be fastened above-ground to the mounting structures so as to avoid excessive excavation works and clearing of vegetation.

Roads:

Two main access roads are being considered off the N14 to the proposed Mogara Solar facility, as depicted in Figure 6 below (the orange and brown lines).

- Preferred Site Access (brown): follows an existing gravel access road to the site, and then an existing internal farm access road over Portion 2 of the Farm 460 Legoko. This option is in closer proximity to the farm homestead than the alternative, however it is shorter (±2.9km) than the alternative.
- Alternative Site Access (orange) follows an existing farm access road to Portion 2 of the Farm 460 Legoko. This option is located further from the farm homestead however it is longer (±4.7km) than the preferred access route.

The internal road network of the SEF will be gravelled roads, 4 – 5m in width, around the solar array periphery. Roads located in-between the solar modules will be un-surfaced tracks to be used for maintenance and cleaning of solar PV panels.

A detailed transport and traffic plan will be undertaken during the EIA phase of the project. Precautionary measures will be taken to mitigate the risk of ground disturbances where access roads will be constructed. Special attention will be given to drainage, water flow and erosion by applying appropriate building methods.

Layout:

Layout Alternative 1 (Preferred) has been developed based on key criteria identified above, including inter alia, already authorised solar footprints, accessibility, assessment of alternatives, proximity to the planned Sekgame Switching Station, as well as consideration of sensitive areas to minimise ecological and other impacts.

5.3. Purpose and Scope of the Study

The overall purpose of a Phase 1a Archaeological Impact Assessment (AIA) is to assess the sensitivity of archaeological resources in the affected area, to determine the potential impacts on such resources, and to avoid and/or minimize such impacts by means of management and/or mitigation measures. Note that the AIA presented here considers archaeological materials of prehistoric and historic origin, as well as the cultural landscape. The study presented here provides input to the broader integrated Heritage Impact Assessment being undertaken by Perception Planning. This AIA was undertaken according to best practice principles and meets standards required by the heritage authorities in terms of the National Heritage Resources Act, No. 25 of 1999 (also see table in Section 4).

The objectives of the Phase 1a Archaeological Impact Assessment are:

- To assess the nature and sensitivity of archaeological resources in the affected parts of the receiving environment;
- To identify the impact of the proposed development on such resources, as well as options for mitigation and/or management in order to minimize potential negative impacts and to make recommendations for mitigation / management where necessary; and
- To identify archaeological resources and issues that may require further investigation.

This archaeological study also provides input for community consultation in terms of Section 38 (3) (e) of the NHRA. This report will be made available to all Interested and Affected Parties (I&APs) as part of the Public Participation Process being undertaken for the EIA process. In addition, heritage interest groups may then provide feedback as part of the official community consultation to fulfil NHRA requirements. Such feedback may result in further consultation in terms of Section 38 (3) (e) of the NHRA.

This assessment is based on the latest available information as presented in sections 5.1 and 5.2 above and in the alternative development layouts shown in Figures 3 through 6 and will be amended during the EIA phase should new information be made available.

The archaeological field investigations undertaken for the AEP Legoko and AEP Mogobe Solar projects are used here as these earlier studies covered the affected areas for the proposed Mogara Solar facility (Nilssen 2015a and 2015b). The scope of the archaeological impact assessment focuses on the preferred and alternative layouts for Mogara Solar, the grid connection route, as well as access roads detailed in section 5.2 above (Figures 3 through 6).

Since archaeological resources occur on ground surfaces or in sub-surface sediments, only those aspects of the proposed development that will impact on surface or sub-surface sediments are considered relevant.

Standard Terms of Reference (ToR) for a Phase 1a Archaeological Impact Assessment:

a) Locate development impact areas including turbine and sub-station sites, turbine hard stands, routes of roads and cables, upgrades and changes to existing district and minor roads, specifically at intersections and at crossings of drainage lines.

b) Conduct a detailed foot survey of the development impact areas to identify and record all archaeological resources.

c) Assess the predicted impacts of the proposed development activities, as well as the No-Go option on such resources according to the Cape EAPrac Impact Assessment Methodology.

d) Recommend management and mitigation measures to reduce negative impacts and enhance positive impacts.

e) Indicate if additional studies/ fieldwork are necessary.

f) Prepare and submit a report that meets standards required by Heritage Authorities in terms of Section 38(3) of the National Heritage Resources Act, No. 25 of 1999 as well as NEMA.

Because the proposed development activities - construction and installation - may have a permanent negative impact on archaeological resources in the development area, this report provides a summary of the findings made during comprehensive archaeological foot surveys of the affected properties (Nilssen 2015a and 2015b).

5.4. Study Area

The proposed and preferred Alternative 1 location for the Mogara Solar facility is on Portions 1 and 2 of the Farm 460 Legoko, which is approximately 8km SE of Kathu in the Northern Cape Province (Figures 1). The proposed Alternative 2 location for the Mogara Solar facility is on Portion 1 of the Farm 460 Legoko, some 10 km SE of Kathu (Figure 1). For both alternatives, the 225 ha footprint of the development is a portion of the larger properties with a total extent of about 1917 ha. The site is easily accessible by vehicle from the N14 via two gravel roads that enter the property at its southern and northern extents (see red arrows in Figure 1). The grid connection options and access roads will be on Sekgame 461, Kathu (Figure 1).

The terrain is essentially flat with very minor undulation in places. A few small, shallow pans or depressions were noted, however, and these are likely to collect rain water and may have been attractive to game animals and hunters in the past. Surface sediments consist mostly of orange-red Hutton Sands (Kalahari sands) that overlie a very flat plane of calcrete that is of Tertiary age (Beaumont 2008a). The latter is intermittently exposed at the surface and is variably solid and nodular. More surface calcrete was observed on Portion 2 relative to that on Portion 1 of Farm 460 Legoko (Nilssen 2015b).

Vegetation is generally open, but not sparse, and consists of grasses, bush and some thorny shrubs, as well as a variety of thorny Acacia trees. There are notably fewer Acacia trees on Portion 2 in comparison with Portion 1 of Farm 460 Legoko. The vegetation regime has been described as "Thorn Veld, which consists mainly of Swarthaak (*Acacia mellifera*) and Driedoring (*Rhigozum trichotomum*), with a scatter of Kameeldoring trees (*Acacia erioloba*) and Vaalbos (*Tachonanthus camphorathus*)" (Dreyer 2008). From a botanical perspective, the preferred alternative on Portion 2 is less sensitive than the proposed site for alternative 2 on Portion 1 of Farm 460 Legoko, which is situated immediately to the south (Nilssen 2015b). The environmental setting (terrain, topography, geological sediments and vegetation) of both the proposed PV area, access road, and the grid connection route are very similar.

Archaeological visibility is excellent across the vast bulk of the studied area. The surrounding land use is agricultural and undeveloped and is mainly used for the grazing of domestic stock (cattle, sheep and goats). Recent human related disturbances to the environment include a road (N14), vehicle tracks, fencing, farmsteads and associated

structures and infrastructure, minor earthmoving activities and overhead power line. Natural disturbances include burrowing by large and small animals. A few examples of the immediate surroundings and environment (topography, vegetation cover, disturbances and exposed surfaces) of the proposed PV areas, grid connection route and access road are shown in Plates 1 and 2.

5.5. Legal Requirements

The following legal requirements - relevant to heritage - apply to the proposed Hotazel Solar and grid connection development:

- The National Environmental Management Act, No. 107 of 1998 (NEMA as amended): An Environmental Authorisation is required for Listed Activities in Regulations pursuant to NEMA, and specialist assessments are required to inform the Scoping and EIA phases associated with the Application for Environmental Authorisation for the project;
- The National Heritage Resources Act, No. 25 of 1999 (NHRA): A full Heritage Impact Assessment is being undertaken for the South African Heritage Resources Agency (SAHRA) and Northern Caper Provincial Heritage Resources Authority.

The archaeological component of the EIA process is being undertaken to comply with the following clauses of Section 38(1) of the NHRA which trigger the requirement for a heritage impact assessment: (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (c) any development or other activity which will change the character of a site; and (i) exceeding 5 000 m^2 in extent. See further details required for the heritage study in terms of the NHRA No 25 of 1999 in Section 38(3) in Appendix A (also see table in Section 4).

5.6. Approach to the Study - Methodology

This assessment was conducted according to best practice principles and in accordance with guidelines and minimum standards required by heritage authorities in respect of the NHRA (HWC 2007, 2016a, 2016b, SAHRA 2017, SAHRA APM 2007, 2012 & 2018), and as set out in Section 13, GN.R982 of NEMA (General requirements for EAPs and Specialists).

5.6.1. Desktop & Literature Review

The purpose of a desktop study and literature review is to gain an understanding of the archaeological and heritage background of the immediate surroundings and to establish the nature and type of archaeological remains that occur in the affected area, as well as the type of limitations and constraints encountered by specialists working in the area.

This author has work experience on the affected properties, the immediate surroundings and broader Northern Cape region, and is familiar with the main types of heritage resources and issues (e.g., Nilssen 2015a, 2015b, 2015c, 2016a, 2016b and 2016c). A desktop study and literature review was undertaken for the 2015 and 2016 studies and refreshed again in July 2018 for the immediate surroundings (Nilssen 2015a and 2015b). This relied in part on this author's experience in the area and also focused on the SAHRIS database up to July 2018, which is by no means exhaustive. Previous heritage and

archaeological studies in the region have already provided detailed descriptions of the history, heritage and archaeological record of the area (see for example and references in Beaumont & Morris 1990, De Jong & Van Schalkwyk 2010, Fourie 2015a, Fourie & van der Walt 2007a, Humphreys & Thackeray 1983, Hutten & Hutten 2013, Kruger 2015, 2016a, Küsel, U. *et al* 2009 and Webley & Halkett 2008). While giving a broad overview of the archaeological record presented in the above-named reports as well as those listed in the reference section below, the focus is on presenting key heritage concerns already identified in earlier studies and how they relate to the assessment being conducted here.

The desktop study also involved a detailed inspection of aerial imagery available through Google Earth. The main aim of examining aerial imagery was to determine which development activities encroached upon previously undisturbed and hence potentially sensitive areas, and to locate man-made structures or ruins for potential future investigation in the event that they were threatened by proposed development activities. Existing disturbances and developments were also located via aerial imagery and were inspected on foot where necessary.

5.6.2. Consultation

The Public Participation Process will be run as part of the EIA process, and where deemed necessary, community consultation will be conducted in terms of section 38(3)(e) of the NHRA. These processes will be undertaken as part of the integrated Heritage Impact Assessment process that is being compiled by Perception Planning.

5.6.3. Archaeological Foot Survey

The purpose of an AIA is to conduct a survey of the affected areas in order to identify, record and rate the significance of archaeological resources, to assess the impact of the proposed area and linear developments on such resources and to recommend mitigation and management measures where necessary.

To assess the nature and significance of the archaeological record in the affected area, it was necessary to conduct a comprehensive foot survey. The latter focused on the entire extents of Portions 1 and 2 of Farm 460 Legoko (Nilssen 2015a & 2015b). The potential for different landforms, sediments or landscape features to contain archaeological traces was assessed according to type, such as rocky surfaces, sandy surfaces, cultivated areas, previously developed or disturbed areas, rock shelters, and so on. Overall, the significance of archaeological occurrences or sites was assessed against results of previous archaeological studies in the region as well as their content and context. Attributes that were considered in determining significance include artefact and/or ecofact types, rarity of finds, exceptional items, organic preservation, aesthetic appeal, potential for future research, density of finds and the context in which archaeological traces occur.

On behalf of the applicant, Mr Dale Holder of Cape EAPrac provided background information, terms of reference, locality maps and alternative development layout plans for the proposed activity. The land owners, Mr Carel Reitz and Mr Frans Briedenhann, were contacted for permission to access the study areas, and thereafter, the entire archaeological survey was conducted independently and on foot.

The comprehensive archaeological foot survey that was initially conducted on Portion 1 of the Farm 460 Legoko provided a good introduction to the nature and significance of the archaeological record of the affected surroundings (Nilssen 2015b). The findings of the latter study were used as a guide to the approach used for the foot survey in studying Portion 2 of the Farm 460 Legoko.

Open vegetation and large expanses of exposed ground surfaces provided excellent archaeological visibility and allowed for a good understanding of the archaeological record in the area. Due to good archaeological visibility, and based on the very sparse and low significance of archaeological occurrences identified during the comprehensive foot survey on Portion 1 of Farm 460 Legoko, survey walk tracks were spaced between about 100 and 200m apart. The relatively large spaces between the latter survey tracks is justified by this author's familiarisation with the study area and its contents over several days, as well as the low density and overall uniformity of the archaeological record (Nilssen 2015a & 2015b).

Survey tracks were fixed with a hand held Garmin Camo GPS to record the search area (Figure 7, gpx tracking file is available from author). The position of identified archaeological occurrences, observations and photo localities were fixed by GPS and such data are available from the author on request. Due to the large number of isolated and very low density occurrences of Stone Age materials identified during the 2015 studies, all these are not indicated individually in Figure 7 and a table with coordinate data is not provided. Plates 3 and 4 show examples of archaeological occurrences identified in the newly proposed development alternatives on Portions 1 and 2 of the Farm 460 Legoko. Data for all finds and observations are available from this author on request. Digital audio notes and a comprehensive, high quality digital photographic record were also made.

Once archaeological traces were identified, recorded and assessed in terms of their significance, the aim of the AIA is to assess the potential negative impacts of development on such resources and to make recommendations in mitigation. Below is the grading system and recommended mitigation provided by SAHRA (2007). Note that heritage practitioners provide field ratings while the heritage authorities are responsible for grading heritage resources.

Site Significance	**Field Rating**	**Grade**	**Recommended Mitigation**
High Significance	National Significance	Grade I	Site conservation / site development
High Significance	Provincial Significance	Grade II	Site conservation / site development
High Significance	Local Significance	Grade III	Site conservation or extensive mitigation prior to development / destruction
High / Medium Significance	Generally Protected A	Grade IV-A	Site conservation or mitigation prior to development or destruction
Medium Significance	Generally Protected B	Grade IV-B	Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C	Grade IV-C	On-site sampling, monitoring or no archaeological mitigation required prior to or during development / destruction

5.7. Assumptions, Limitations and Gaps in Knowledge

This assessment assumes that the proposed Mogara Solar facility will be contained within either of the two 225ha alternative development sites, and that the proposed overhead power line and access road alignments as indicated in Figures 5 and 6 will not be rerouted. In the event that the impact areas are changed, then a further archaeological investigation may be required. It is also assumed that all background information and layout plans provided by Cape EAPrac are correct and current. Once all participating specialists' input are considered and incorporated into the final development layout plan, Cape EAPrac will circulate the final layout plan to participating specialists for their consideration and approval.

This assessment is specifically for the two alternative footprints proposed for the Mogara Solar facility and corridors of the proposed power line and access road routes, and does not apply to, and may not be used for, any other future developments on the remainder of the affected properties.

There were no further limitations to the study since all relevant portions of the affected areas were accessible on foot and archaeological visibility is excellent, and therefore, it is considered that sufficient observations were made for the purpose of this assessment. Due to the fact that parts of the archaeological record may be covered by surface sediments, this study is limited to such resources exposed on the surface and in disturbed contexts. Consequently, it cannot be ruled out entirely that additional archaeological resources may be exposed during the construction phase of the development.

At present there are no gaps in knowledge regarding the proposed development.

6. Results

6.1. Desktop & Literature Review

A literature review of previous archaeological and heritage-related work in the surrounding area was conducted in part by using information from the Report Mapping Project of the SAHRA-APM Unit as well as SAHRIS. Most of the reports cited here were downloaded from the SAHRA web site (http://www.sahra.org.za/sahris/map/reports). Numerous heritage-related studies were undertaken for a variety of environmental applications including mining of mainly manganese, transport infrastructure, borrow pits, solar energy facilities, electrical infrastructure, and so on. In addition to these are research papers and publications, as well as impact assessments consulted during this author's work in this part of the Northern Cape and North West Province. Cited and consulted literature is listed in the references section below.

Previous heritage and archaeological research as well as impact assessments in the broader region have already provided detailed accounts of the history, heritage and archaeological riches of this part of the Northern Cape (see for example and references in Beaumont & Morris 1990, De Jong & Van Schalkwyk 2010, Fourie 2015a, Fourie & van der Walt 2007a, Humphreys & Thackeray 1983, Hutten & Hutten 2013, Kruger 2015, 2016a, Küsel, U. *et al* 2009, Morris 2008a, Morris & Beaumont 2004, and Webley & Halkett 2008).

The most important archaeological sites in the region include, but are not limited to Kathu Pan, Bestwood and Kathu Townlands (Stone Age & Pastoralist), Wonderwerk Cave (Stone Age & Pastoralist) and Blinkklipkop (prehistoric mining of specularite).

The site of Kathu Pan includes a cluster of important Stone Age sites and is situated on a tributary of the Kuruman River about 5km NW of the town of Kathu (Beaumont & Morris 1990, Morris 2008a, Morris & Beaumont 2004, Webley & Halkett 2008). Early Stone Age tools and the remains of now extinct animals were observed in the exposed profiles of a sink hole at Kathu Pan 1 in 1974 (Beaumont 1990, Webley & Halkett 2008). Beaumont excavated numerous sites in the Kathu Pan that contain a very long sequence of Stone Age occupation of the Northern Cape from Early through Middle to Later Stone Age times (Beaumont 1990). More recent research on Stone Age implements from Kathu Pan dated to about 500 000 years ago, suggests that archaic humans (probably *Homo heidelbergensis*) were hafting stone implements some 200 000 years earlier than previously thought (Wilkins *et al.* 2012). The recent publication of evidence for the use of ochre / haematite / pigment in the Kathu area between 300 000 and 500 000 years ago has dramatically changed the way we view the origins of modern humans and modern human behaviour (Watts *et al*. 2016).

In addition to Kathu Pan, other less known, but significant archaeological sites in the area include the Kathu Reserve and Kathu Townlands sites, as well as the Uitkoms sites with Stone Age elements including Howiesons Poort, "Late Pietersburg", Wilton, Oakhurst, Fauresmith, Ceramic LSA, Iron Age ceramic scatters and Acheulean materials (Beaumont 2006a, 2006b, 2007a and Dreyer 2007).

Wonderwerk Cave, situated in the Kuruman Hills some 40 to 50km SE of the present study area, is probably the best known and most significant archaeological site in the Northern Cape (Beaumont & Vogel 2006; Chazan *et al*. 2008, Humphreys & Thackeray 1983). Excavations in this cave have revealed Early Stone Age (ESA; in excess of 780 000 years old), Fauresmith (270 000 to 500 000 years ago), Middle Stone Age (MSA; 70 000 to 220 000 years ago) and Later Stone Age (LSA; from about 1000 to 12 500 years ago) materials and it is thought that the ESA sediments may date back as far as 2 million years ago (Beaumont & Vogel 2006). Since 2004 an interdisciplinary team is re-dating the sequence and investigating the stone artefacts, faunal and botanical remains in the ESA sediments (Chazan *et al.* 2008). A more recent publication argues that early hominins were making and controlling fire as early as one million years ago, and currently this is the earliest evidence for the controlled use of fire by human ancestors worldwide (Berna *et al.* 2012). Conditions in Wonderwerk Cave have ensured excellent preservation of organic remains. The cave contains a 10 000 year long Later Stone Age sequence including; the Kuruman Industry (between 10 000 BP [Before Present] and 8 500 BP) that is dominated by large scarpers in dolomite and banded ironstone, and the Wilton Complex (starting around 8 500 BP) that includes a greater variety of formal tools made from chert, chalcedony and jasper (Webley & Halkett 2008). The walls of Wonderwerk Cave are adorned with paintings and rock engravings dating back to more than 10 000 years ago, which were discovered during excavations in the Later Stone Age horizons (Lewis-Williams & Dowson 1989).

Combining the evidence and chronometrically dated sequences from Wonderwerk Cave and the archaeological sites surrounding Kathu, it has been possible to reconstruct a technological and industrial sequence spanning nearly the entire span of hominin and human development in this part of Africa (Beaumont 2013).

Tsantsabane, better known as Blinkklipkop, is an ancient specularite mine approximately 5km NE of Postmasberg (Beaumont 1973, Thackeray *et al*. 1983). Specularite was mined from this site by indigenous peoples before colonial times, and the site was visited by many European travellers in the 19th century. The oldest archaeological sediments include the remains of sheep and/or goat, indicating that pastoralists were present in the Kuruman Hills by 1200 BP (Webley & Halkett 2008). Additional pre-historic specularite

mines occur at Doornfontein north of Beeshoek and those at Lylyfeld, Demaneng, Mashwening, King, Rust en Vrede, Paling, Gloucester and Mount Huxley also contain Pottery LSA material as well as Fauresmith age stone implements (Beaumont & Boshier 1974, Beaumont 1973, Morris 2008a, McGregor Museum records, Thackeray *et al*. 1983).

Sites with rock engravings have been recorded at Beeshoek - about 10km NW of Postmasberg - and Bruce, and according to Morris, these sites were salvaged between the 1970s and 1990s as they were threatened by development and mining activities (Fock & Fock 1984, Morris 1992, Morris 2008a, Beaumont 1998). In addition to the rock art in Wonderwerk Cave, rock paintings occur in caves and rock shelters in the Kuruman Hills and the Ghaap Escarpment (Morris 1988). Rock engravings have also been recorded north of the town of Kuruman and are present in the larger landscape where suitable rocky outcrops occur (Kruger 2015a). Pecked engravings are more common north of the Orange River while scratched engravings are dominant to the south and in the Karoo (Morris 1988).

Iron Age farmers are known to have arrived in the Northern Cape after the 1600s with stone walling to the NE of Kuruman being the only archaeological evidence for their presence and settlement in the region (Humphreys & Thackeray 1983, Webley & Halkett 2008). Only Tswana speaking - Iron Age - people were occupying the area when the first colonists arrived and the primary Tswana settlement of Dithakong was situated NE of Kuruman, an area rich in fresh water springs (Webley & Halkett 2008).

The first colonists to arrive in this part of South Africa were missionaries, explorers, hunters and traders – including the better known names of Moffat, Burchell, Smith and Lichtenstein - who travelled through the area en route to Kuruman along what became known as the “missionary road”. As mentioned above, the only people present in the area at the arrival of colonists were the Tswana speakers. Kuruman has witnessed a 200 year long period of African-colonial interaction since the establishment of the Kuruman Mission by the London Missionary Society (LMS) in 1816. Robert Moffat (1795-1887) arranged with Chief Mothibi to relocate the Mission to the present position at Seodin in the valley of the Kuruman River, and it is now known as the Moffat Mission.

The Tswana areas were annexed by the British in 1885 and the Tswana were forced to live on reserves. The Tswana revolted against the British in 1895, but were quickly overthrown and their land taken by the British who then divided the land and granted it to colonist farmers (Snyman 1986 in van Schalkwyk 2016a, Fourie & van der Walt 2007b). The history of interaction – as in most parts of the colonised world – is one of conflict over land and territories. Much of the remainder of the history and human occupation of the area involves live stock farming and the mining of iron ore and manganese.

Apart from the above-mentioned archaeological remains that are of medium to high significance, other remnants of past human activity that have been documented in the immediate surroundings of the present study area include low density scatters or isolated occurrences of Stone Age tools representing the whole spectrum of pre-historic occupation, higher density scatters of LSA materials on edges of certain depressions or pans, a few rock shelters with LSA remains, Iron Age ceramic scatters, conflict sites, historic cemeteries and graves, traditional settlements, as well as 20th century farmsteads and associated infrastructure and outbuildings (e.g., Angel 2016, Beaumont 2000, 2005b, 2006a, 2006b, 2006c, 2007a, 2007b, 2007c, 2007d, 2008a, 2008b, 2008c, Dreyer 2007, 2008, Kruger 2014b, Kaplan 2008, Morris 2001, 2005a, 2005b, 2008a, 2008b, Nilssen 2015a, 2015b, 2016a, Van Ryneveld 2005, van Vollenhoven 2017, Webley & Halkett 2008).

Since the bulk of the archaeological record in the immediate surroundings is that of the Stone Age period, a brief overview of the technology associated with the development of archaic and modern humans during this era is given below.

Early Stone Age (ESA) materials including Acheulean hand axes, cleavers and chopping tools that may date from as early as 2.7 million years ago and come to end about 300 000 years ago is the earliest evidence for the tool-making human ancestors occupying this area. Such artefacts are usually found among alluvial gravels. While present, ESA artefacts are fairly rare and are usually found in disturbed or derived contexts where they are mixed with artefacts of more recent Stone Age times. No definitively ESA materials were identified in the present study area.

The Middle Stone Age (MSA) starts about 300 000 years ago and the interface between the ESA and MSA is sometimes marked by a stone tool industry known as the Fauresmith, where small hand axes appear to indicate the transition from archaic humans to *Homo sapiens*. In the main, however, MSA stone artefacts are characterised by flake and blade industries where evidence for core preparation - also known as the Levallois technique - is seen on prepared or faceted platforms of flakes and blades. Convergent flakes or points are also one of the markers of the MSA period. Like the ESA specimens, though more numerous, stone artefacts of MSA origin also occur among alluvial gravels and are commonly mixed with artefacts of Later Stone Age origin. Unfortunately, no other cultural materials or faunal remains are associated with these artefacts when found in exposed contexts.

The Later Stone Age (LSA) starts about 40 000 years ago and is characterised by substantial technological improvements over the MSA industries. Advancements on previous technologies and new technologies as well as cultural developments include the widespread occurrence of rock art (cave paintings and rock engravings), decorative objects (ostrich egg shell beads, marine shell pendants and beads, ochre), human burials with grave goods including painted stones, an expanded stone tool kit, microlithic stone tool industries (often associated with composite tools such as bow and arrow hunting), bone tools, tortoise carapace bowls, ostrich egg shell containers, fire making sticks and so on. Due to the non-preservation of organic remains in exposed contexts such as the affected environment, the archaeological traces of the LSA occupants is limited to stone artefacts. While LSA stone artefacts are present in the landscape, they occur in low densities - often in isolation, are sometimes mixed with MSA specimens and lack organic and cultural remains. As a result, these materials are generally of low scientific value.

The bulk of archaic human (ESA) and human (MSA to recent) occupation of this area involves the Stone Age era, and therefore, the most significant cultural layer in this area involves the pre-colonial cultural landscape and its sense of place (see UNESCO 2008 for definitions, significance and preservation of cultural landscapes). Overlying the Stone Age cultural layer is the Iron Age and KhoeKhoe layer which accounts for the earliest farmers in the Northern Cape. The most recent cultural layer in the landscape is that of colonists who initially occupied the land as live stock farmers, but their most recent use of the land is for the mining of manganese and for the farming of solar energy.

6.2. Consultation

The Public Participation Process will be undertaken as part of the EIA process, and will form part of the integrated Heritage Impact Assessment that is being conducted by Perception Planning.

6.3. Archaeological Foot Survey

Detailed archaeological foot surveys of Portions 1 and 2 of the Farm 460 Legoko were performed in 2015 (Nilssen 2015a and 2015b). Results of those studies are used for the present assessment of the proposed alternatives for the Mogara Solar facility.

The only portion of the survey conducted by vehicle was the access road entering the study area from the North-West. This approach was adopted because most of the area for the access road is already disturbed by an existing tar road, and the narrow strip closer to the study area could be adequately inspected by travelling at around 6km per hour in both directions. The stretch for the proposed access road accounted for about 5.7km of the total distance that was surveyed. For the remaining areas, the archaeological survey was conducted on foot over a 12 day period from 4 to 15 May 2015. A total distance of around 210km was walked, covering an area of approximately 300ha in extent (Figure 7). Archaeological visibility was excellent with open vegetation providing between 60 and 80% of exposed ground surfaces that were open for archaeological inspection.

The archaeological record on both Portions of Farm 460 Legoko is the same. While several archaeological occurrences were identified and recorded, these are few and far between and occur as isolated stone artefacts or very low density stone artefact scatters. The vast bulk of the finds are of Later Stone Age origin with only a few specimens being of potential Middle Stone Age origin or adiagnostic with respect to their relative age. The most common formal tools are a variety of scrapers and second most common are notched pieces and adzes (Plates 3 & 4). Banded ironstone is the most common raw material and few pieces were made in chalcedony or chert. The absence of Early Stone Age material was surprising given their abundance in the immediate surroundings of Kathu. No other tangible heritage resources were identified and built structures on the property are all modern and of no heritage value.

One of the very low density scatters occurs on the edge of a shallow pan or depression at waypoint 23 (see Figure 7 and Plates 3 & 4 in Nilssen 2018) and is similar to those described by Beaumont and Morris (Beaumont 2000, Morris 2005a). This suggests that early hunters may have waited for game at these naturally occurring water sources. The stone artefact scatter is considered to be too ephemeral to warrant sampling or collection. No other cultural or faunal remains are associated with the stone artefacts.

Significance and Recommendation

Stone Age materials identified in the study area occur as isolated finds or in very low density stone artefact scatters, and are not associated with any organic or other cultural remains. As a result, these heritage resources are considered to be of low archaeological significance and are designated a field rating of Generally Protected C. Because they were adequately documented during this study, it is suggested that no further investigation or recording is needed before development commences. It is also recommended that, due to

their low significance, a permit for their disturbance or destruction is not required from the heritage authorities.

Because no significant archaeological resources were identified during the survey, the proposed development layouts and linear developments do not need to be altered. It is suggested that the documentation of the archaeological record in the affected areas made during the current study is sufficient and that no further investigation is needed. It is further noted that there are no fatal flaws or constraints from an archaeological perspective, and that there are no objections to the proposed linear and area developments associated with the Mogara Solar facility. On archaeological grounds, there is no preference for either of the proposed development alternatives, although the applicant's preferred alternative (Alternative 1) is in an ecologically less sensitive area when compared with Alternative 2.

7. Sources of Risk, Impact Identification and Assessment

Because archaeological resources are non-renewable and each archaeological occurrence is unique, it is important that areas affected by development are assessed for the presence and sensitivity of such resources prior to development. The Mogara Solar facility and associated power line and access road will involve area and linear developments respectively and these could have a permanent negative impact on archaeological resources. This study has shown that archaeological resources do occur in the affected environment, but that they are of low significance. The purpose of this AIA is to assess the sensitivity of archaeological resources in the affected areas, to determine the potential impacts on such resources, and to avoid and/or minimise such impacts on sensitive resources through management and/or mitigation measures.

Direct negative impacts on archaeological resources will occur during the construction and installation phase of the proposed development. Indirect and cumulative impacts will occur during the operational phase of the development. It is noted that, as part of the cumulative impacts on the archaeological record, Eskom is proposing to construct and upgrade their existing 66kV network to a 132kV network between Hotazel, Kuruman and Kathu (see Figure 8). It appears that a portion of this upgrade will affect the area studied during this archaeological investigation. It is concluded, however, that the cumulative impact of the proposed Eskom upgrade will be negligible in the current study area.

While artefacts of mainly Later Stone Age origin were identified in the study areas, no significant archaeological sites were recorded and based on the surface finds, it is highly improbable that significant archaeological sites are currently buried beneath surface sediments.

The below criteria for assessment are drawn from the EIA Regulations that were published in April 1998 by the South African Department of Environmental Affairs and Tourism. The format of impact tables presented below was provided by Cape EAPrac.

The below focuses on the **impact of both development alternatives** (the preferred Alternative 1 and Alternative 2 as shown in Figures 3 & 4) for the Mogara Solar facility as well as the overhead power line routes and access road on identified archaeological resources (see Table 1 below).

Nature of Impact

The construction and installation phase of the development, as outlined in Section 5.1 and 5.2 above, will involve considerable disturbance to surface and sub-surface sediments. Such activities will have a significant and permanent negative impact on archaeological resources identified in the study area. However, the archaeological record in the study area is considered to be of low significance. The operational phase, long term and cumulative impacts including the proposed Eskom upgrade described above, will have a negligible impact on archaeological resources.

Extent of Impact

The impact will be local, confined to the 225 ha footprint area, power line routes and access road. Because the archaeological record is considered to be of low significance and because it has been adequately documented during this study, the impact will not change the heritage value of the immediate and surrounding environment (local, provincial or national).

Duration of Impact

Long term to permanent.

Intensity

High.

Probability of Occurrence

Definite

Legal Requirements

While archaeological resources identified during this assessment are protected by Section 35(4)(a) of the National Heritage Resources Act (Act 25 of 1999), which states that "No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite", it is suggested that, due to their low significance and having been adequately recorded during this study, a permit for their disturbance or destruction is not required from the heritage authorities.

Status of the Impact

Negative for archaeological resources, but positive for the development.

Accumulative Impact

Because the archaeological record in the study area is considered to be of low significance and because it has been adequately recorded during this investigation, it is considered that the cumulative impact of the proposed development, as well as that of the proposed Eskom upgrade referred to above, will be negligible. This negative impact is graded as low.

Degree of Confidence in Prediction

High

In the event of the **No-Go Option:**

Nature of Impact

In the absence of development, the continued farming activities (cattle, sheep, goat and game grazing) and natural erosion and disturbance by burrowing animals will have a slow negative impact on the archaeological record.

Extent of Impact
Local, existing and continued.

Duration of Impact
Continual.

Intensity
Low.

Probability of Occurrence
Low.

Legal Requirements
None.

Status of the Impact
Neutral.

Accumulative Impact
Low, existing and continual.

Degree of Confidence in Prediction
Medium.

As outlined in section 5.1 and 5.2 above, the proposed development will involve construction and installation activities that will have a permanent negative impact on archaeological resources identified in this study. However, the archaeological resources are considered to be of low significance and their destruction will not have a negative impact on the heritage value of the area.

Table 1. Summary of impacts on archaeological resources associated with both alternatives of the Mogara Solar facility (Mogara Alt 1 & 2), 132kV overhead power line route (power line), access road and the No-Go option (NO-GO).

Alternative	Nature of impact	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Status of the impact	Accumulative impact	Degree of confidence	Level of significance	Significance after mitigation
Mogara Alt 1 & 2	Construction & Installation	Local	Long term to permanent	High	Definite	Negative for archaeological resources; positive for development	Low	High	Low	Low
Mogara Alt 1 & 2	Operational	Local	Long term to permanent	Low	Low	Neutral	Low	High	Low	Low
Power line	Construction & Installation	Local	Long term to permanent	Low	Low to medium	Negligibly negative	Low	High	Low	Low
Power line	Operational	Local	Long term to permanent	Low	Low	Neutral	Low	High	Low	Low
Access road	Construction	Local	Long term to permanent	Low	Low to medium	Negligibly negative	Low	High	Low	Low
Access road	Operational	Local	Long term to permanent	Low	Low	Neutral	Low	High	Low	Low
NO-GO	Farming activities	Local	Long term to permanent	Low	Low to medium	Neutral	Low	Medium	Low	Low

8. Conclusions and Recommendations

From an archaeological perspective there are no fatal flaws, and therefore, no objections to the authorisation of the proposed development of either of the alternative layouts for the Mogara Solar facility, associated grid connection route and access road.

Recommendations to be included in the EMPr:

- Archaeological resources identified during this study do not require further recording/studies, and because they are considered to be of low heritage value and have been adequately recorded through this assessment, it is suggested that they can be disturbed or damaged without a permit from SAHRA.
- In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately.
- If exposed during development, archaeological resources must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
- In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.

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9. Figures and Plates (on following pages)

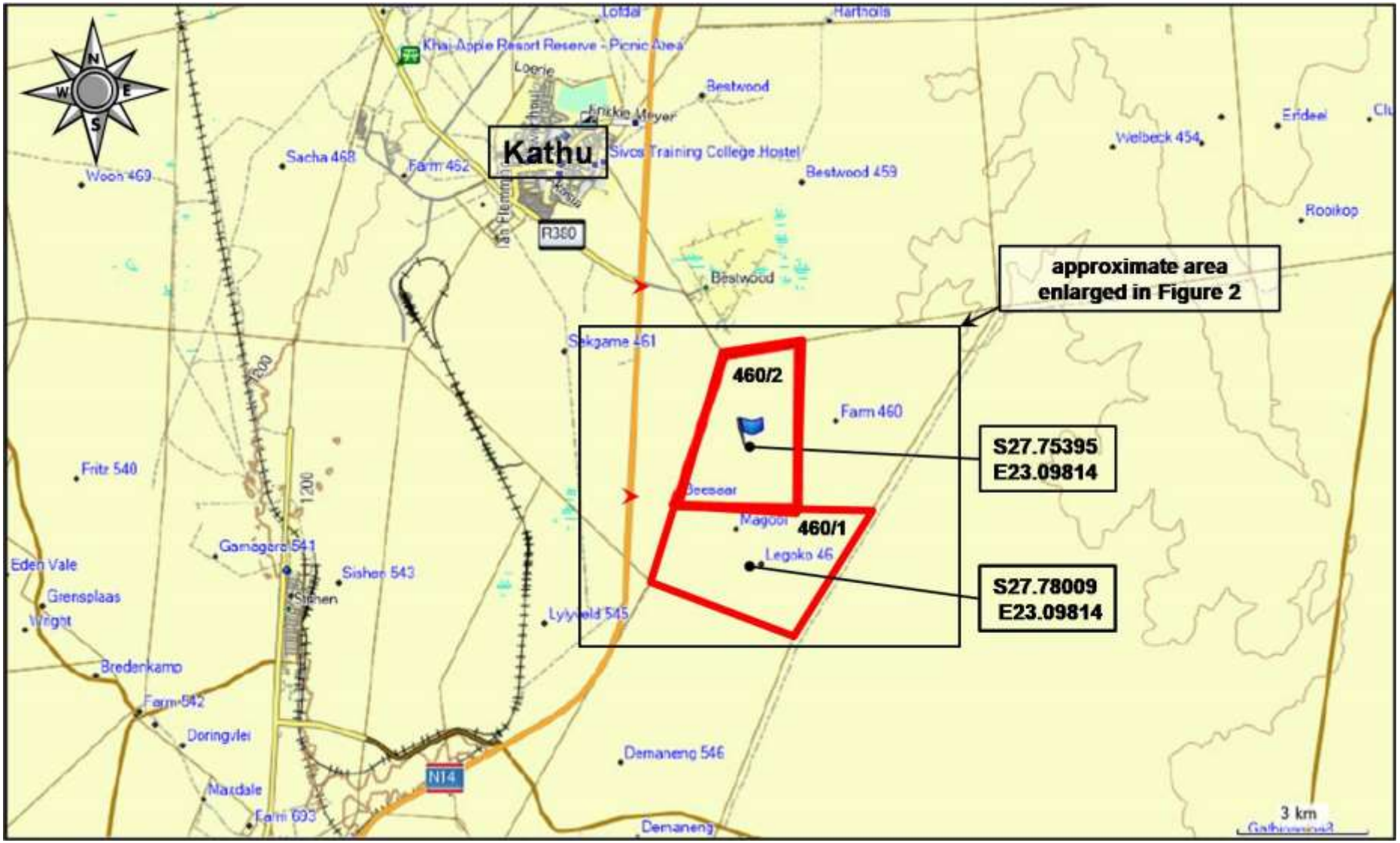

Figure 1. Location of study area (red polygons) relative to Kathu, Northern Cape Province. Relevant 1:50 000 maps are 2723CA & 2723CC (courtesy of Garmin MapSource & Basecamp). Red arrows indicate access points to study area via existing gravel roads.

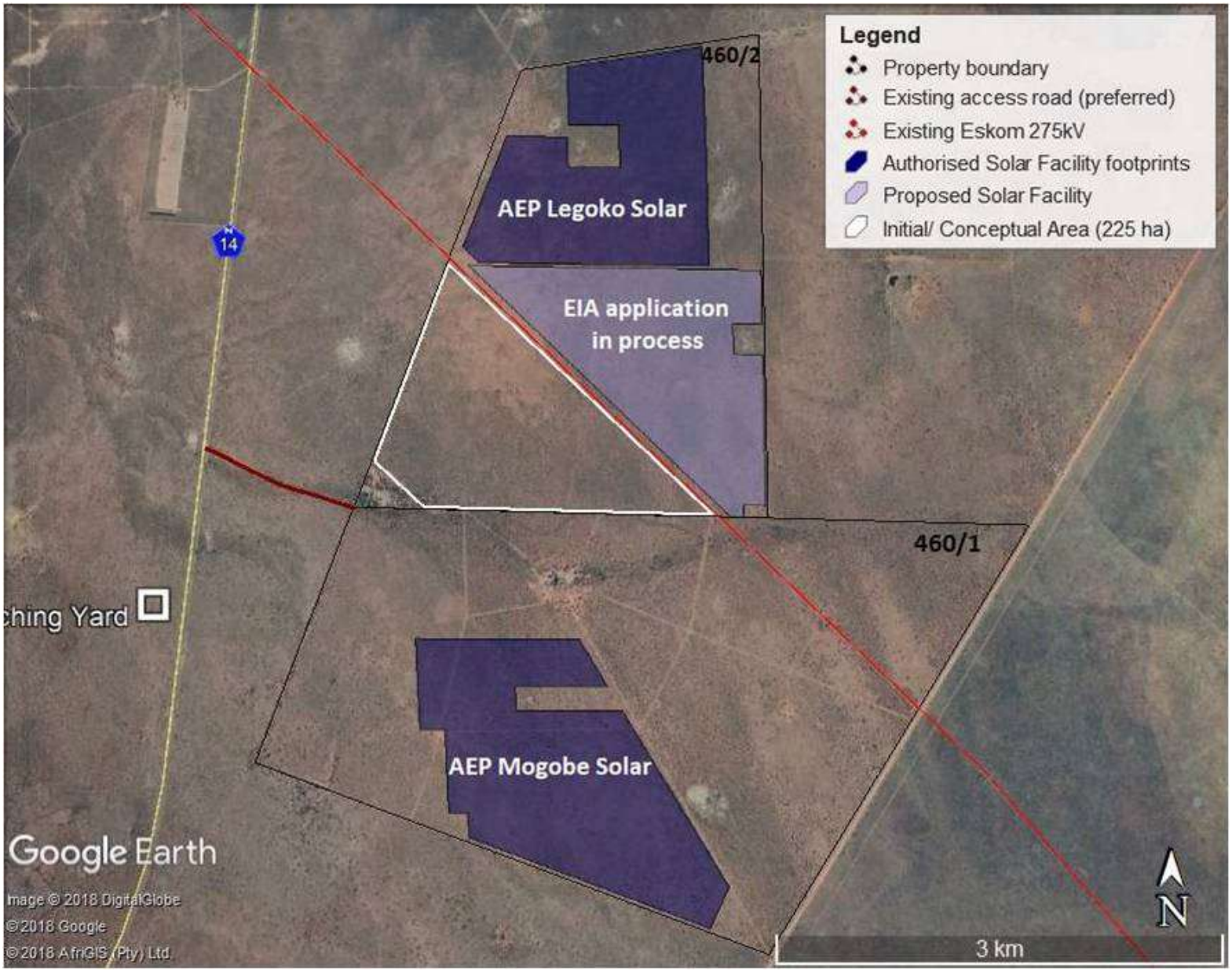

Figure 2. Google Earth image of the initial conceptual area enlarged from Figure 1. Courtesy of the client, Cape EAPrac and Google Earth 2018.

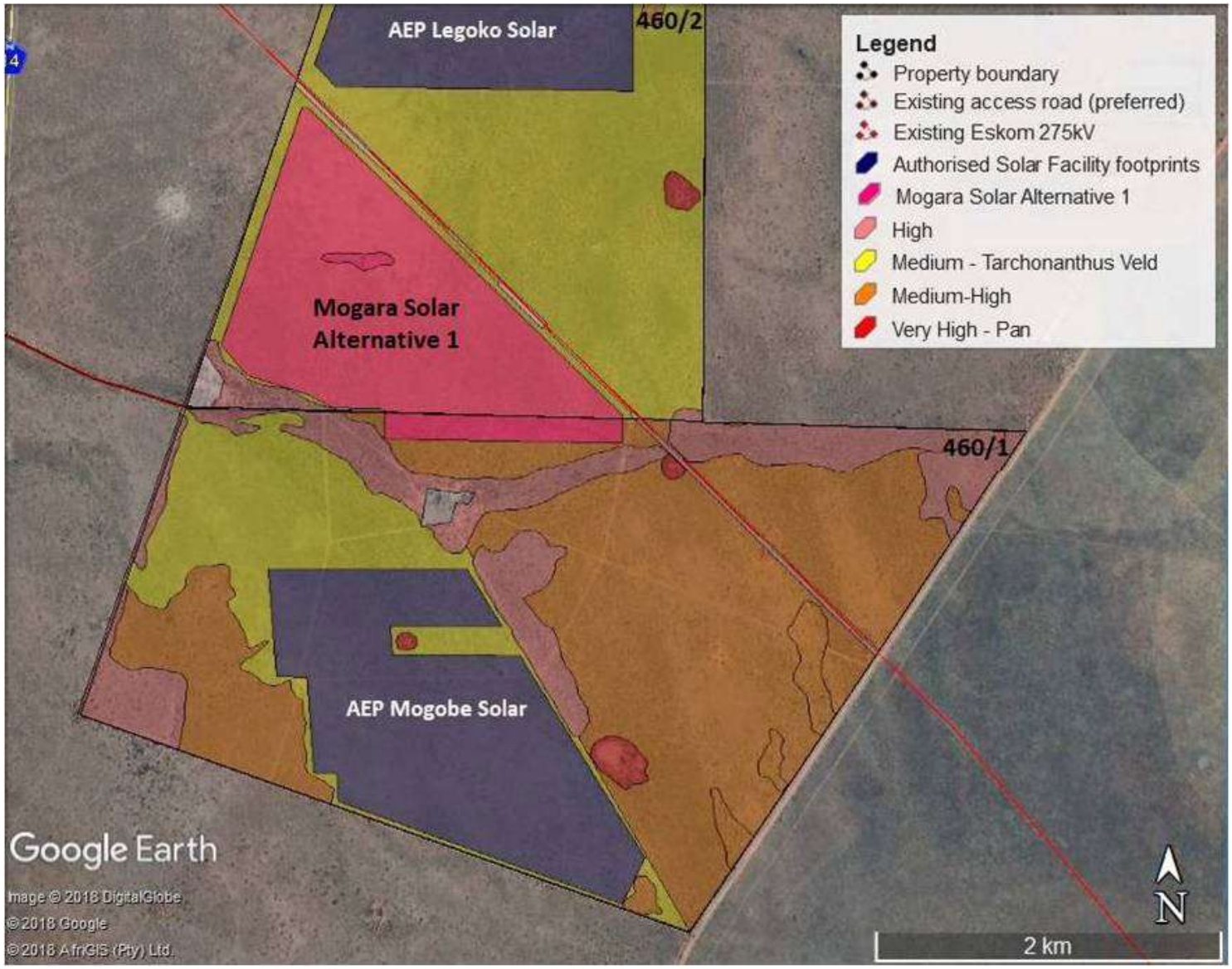

Figure 3. Google Earth image of the study area showing the Alternative 1 layout (preferred) and ecological sensitivity for Portions 1 & 2 of Legoko 460. Courtesy of the client, Cape EAPrac and Google Earth 2018.

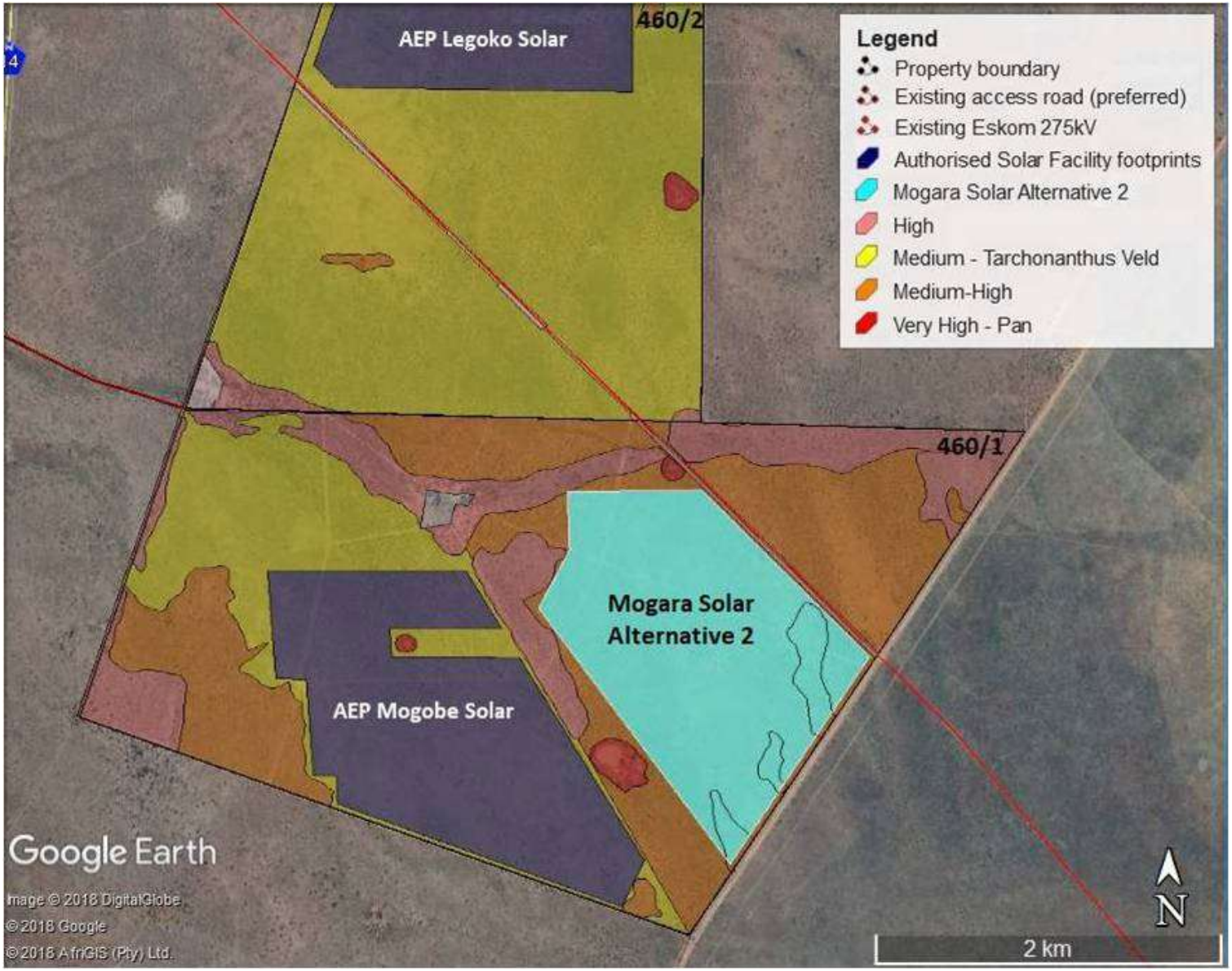

Figure 4. Google Earth image of the study area showing the Alternative 2 layout and ecological sensitivity for Portions 1 & 2 of Legoko 460. Courtesy of the client, Cape EAPrac and Google Earth 2018.

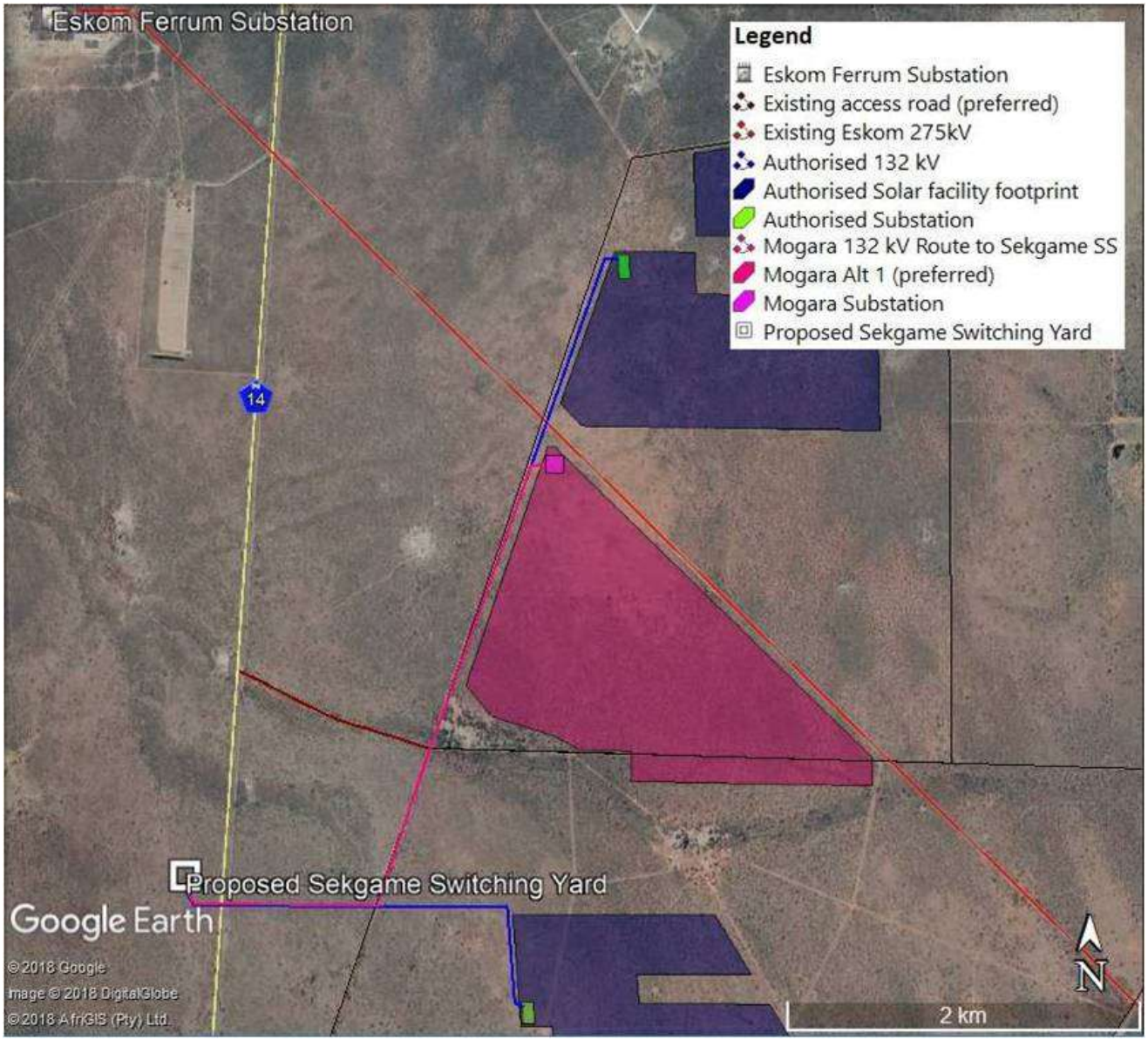

Figure 5. Google Earth image showing the proposed grid connection from Alternative 1 (preferred) to the proposed Sekgame Switching Yard. Courtesy of the client, Cape EAPrac and Google Earth 2018.

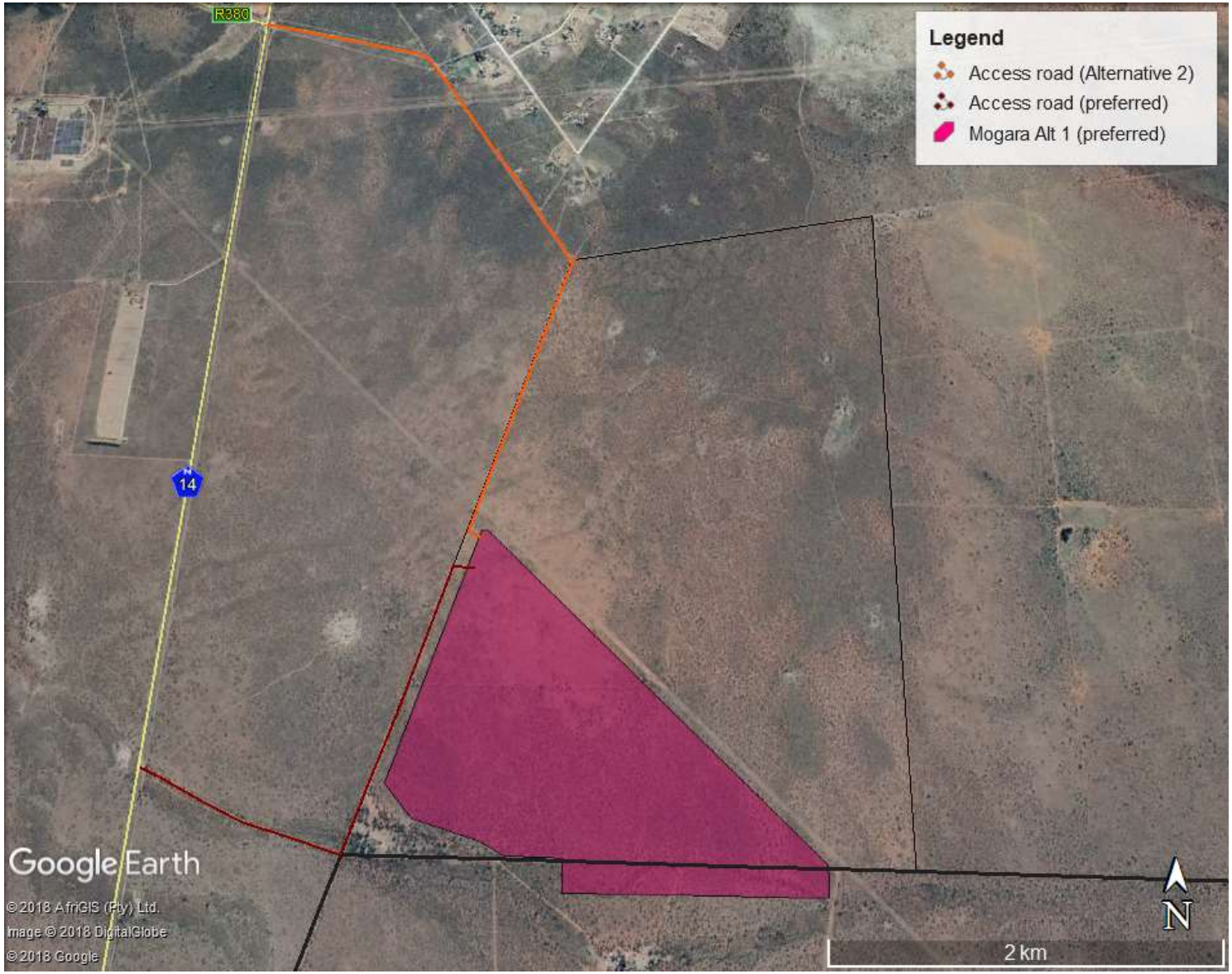

Figure 6. Google Earth image showing the two alternative access roads to Mogara Solar. Courtesy of the client, Cape EAPrac and Google Earth 2018.

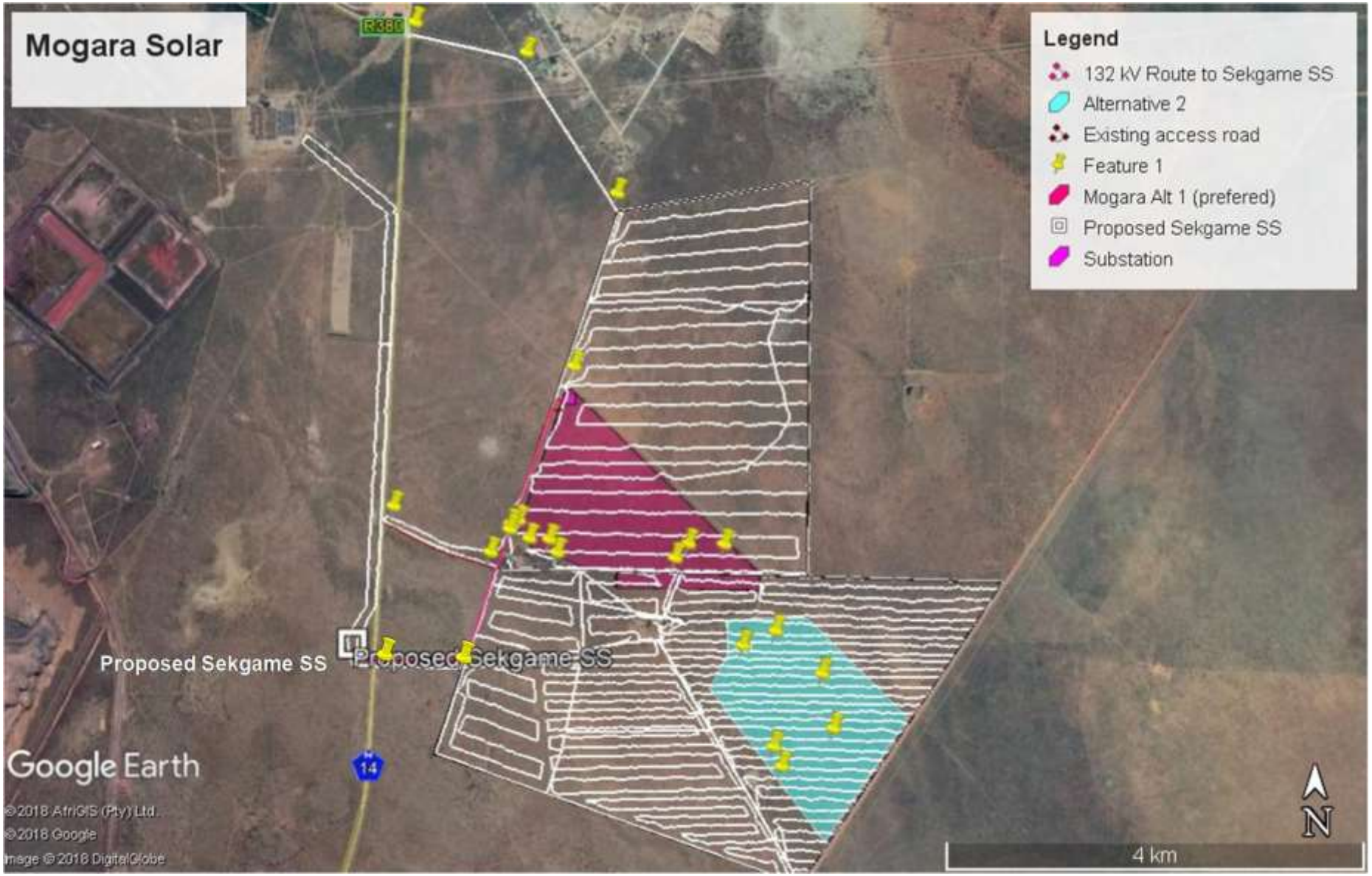

Figure 7. Studied areas indicated with white lines that represent archaeological survey tracks as fixed by a hand held GPS.

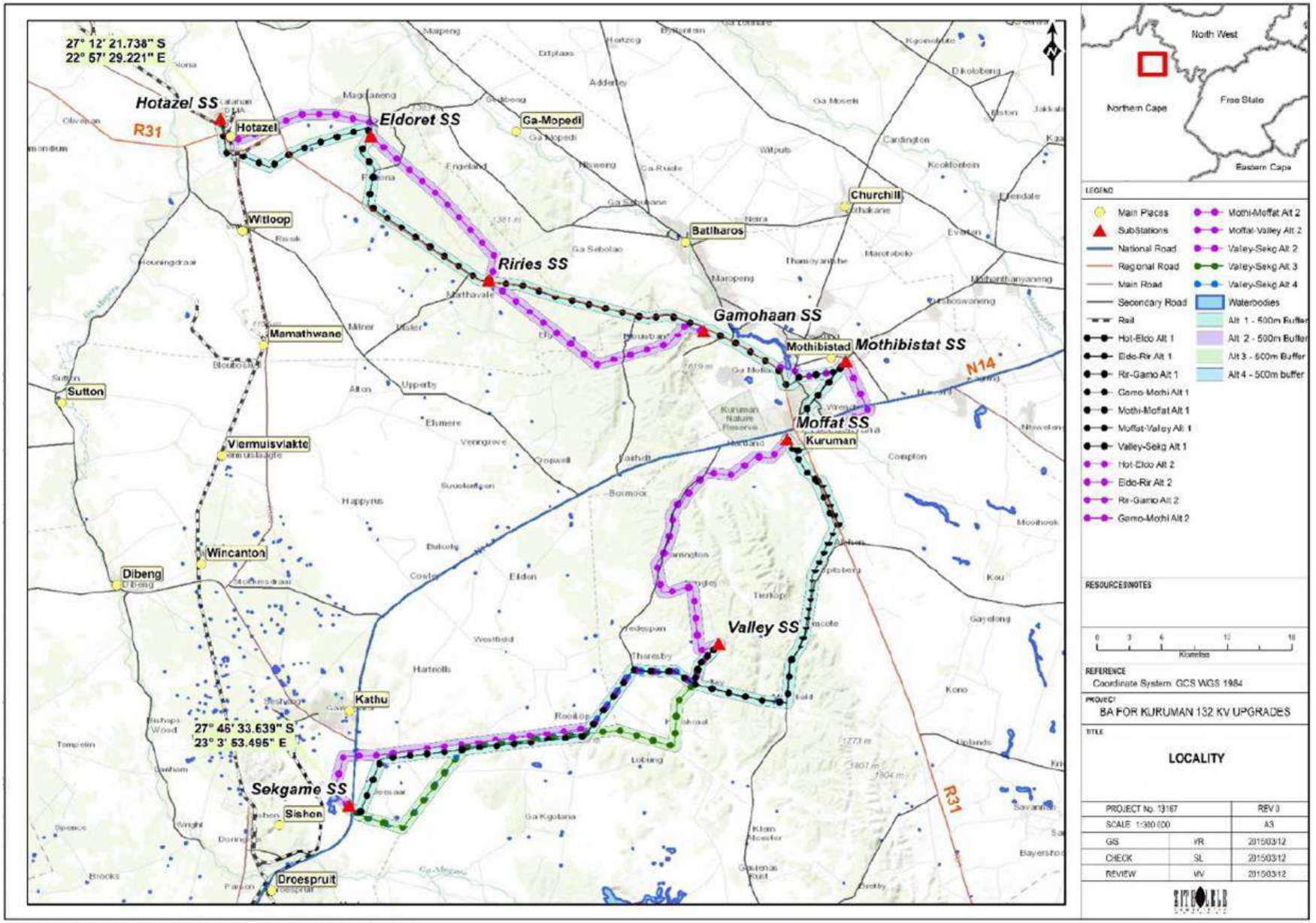

Figure 8. Proposed Eskom upgrade of 66kV to 132kV power line in Hotazel, Kuruman and Kathu. Courtesy of Cape-EAprac.

Plate 1. Examples of the affected environment in the proposed alternative development areas. Note flat terrain, open vegetation, recent disturbances and exposed surfaces of both orange-red Hutton Sands and calcrete.

Plate 2. Examples of the affected environment in alternative 1 (top left) and along the proposed grid connection alignment and access roads. Note flat terrain, open vegetation, recent disturbances and exposed ground surfaces.

Plate 3. Example of context and Later Stone Age stone artefact found in association with exposed calcrete. This specimen is in chert and displays fine retouch into a combination scraper and adze.

Plate 4. Example of context and Stone Age stone artefacts in banded ironstone, including a finely retouched flake (scraper / adze) and a heavily pecked and damaged hammer stone (bottom right).

Appendix A

Legislation regarding the general protection of heritage resources taken from the National Heritage Resources Act (Act 25 of 1999)

Provisional protection

29. (1) SAHRA, or a provincial heritage resources authority, may, subject to subsection (4), by notice in the Gazette or the Provincial Gazette, as the case may be—

(a) provisionally protect for a maximum period of two years any—

(i) protected area;

(ii) heritage resource, the conservation of which it considers to be threatened and which threat it believes can be alleviated by negotiation and consultation; or

(iii) heritage resource, the protection of which SAHRA or the provincial heritage resources authority wishes to investigate in terms of this Act; and

(b) withdraw any notice published under paragraph (a).

(2) A local authority may, subject to subsection (4), by notice in the Provincial Gazette—

(a) provisionally protect for a maximum period of three months any place which it considers to be conservation-worthy, the conservation of which the local authority considers to be threatened and which threat it believes can be alleviated by negotiation and consultation; and

(b) withdraw any notice published under paragraph (a): Provided that it notifies the provincial heritage resources authority within seven days of such provisional protection.

(3) A provincial heritage resources authority may, by notice in the Provincial Gazette, revoke a provisional protection by a local authority under subsection (2) or provisionally protect a place concerned in accordance with subsection (1).

(4) A heritage resources authority or a local authority may not provisionally protect any heritage resource unless it has notified the owner of the resource in writing of the proposed provisional protection.

(5) A heritage resource shall be deemed to be provisionally protected for 30 days from the date of service of a notice under subsection (4) or until the notice is withdrawn or the resource is provisionally protected by notice in the Gazette or the Provincial Gazette, whichever is the shorter period.

(6) A heritage authority or a local authority may at any time withdraw a notice which it has issued under subsection (4).

(7) SAHRA shall inform the relevant provincial heritage authority and local authority within 30 days of the publication or withdrawal of a notice under subsection (1).

(8) A provincial heritage resources authority shall inform the relevant local authority within 30 days of the publication or withdrawal of a notice under subsection (1).

(9) A local authority shall inform the provincial heritage authority of the withdrawal of a notice under subsection (2)(b).

(10) No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provisionally protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provisional protection.

Legislation relevant to Heritage Areas taken from the National Heritage Resources Act (Act 25 of 1999)

Heritage areas

31. (1) A planning authority must at the time of revision of a town or regional planning scheme, or the compilation or revision of a spatial plan, or at the initiative of the provincial heritage resources authority where in the opinion of the provincial heritage resources authority the need exists, investigate the need for the designation of heritage areas to protect any place of environmental or cultural interest.

(2) Where the provincial heritage resources authority is of the opinion that the need exists to protect a place of environmental or cultural interest as a heritage area, it may request a planning authority to investigate its designation in accordance with proposals submitted by the provincial heritage resources authority with its request. The planning authority must inform the provincial heritage resources authority within 60 days of receipt of such a request whether it is willing or able to comply with the request.

(3) Where the planning authority informs the provincial heritage resources authority that it is willing and able, the provincial heritage resources authority must assist the planning authority to investigate the designation of the place as a heritage area.

(4) Where the planning authority does not so inform the provincial heritage resources authority, or informs the provincial heritage resources authority that it is not so willing and able, the provincial heritage resources authority may investigate the designation of the place as a heritage area and, with the approval of the MEC, designate such place to be a heritage area by notice in the Provincial Gazette.

(5) A local authority may, by notice in the Provincial Gazette, designate any area or land to be a heritage area on the grounds of its environmental or cultural interest or the presence of heritage resources, provided that prior to such designation it shall consult—

(a) the provincial heritage resources authority; and

(b) owners of property in the area and any affected community, regarding inter alia the provisions to be established under subsection (7) for the protection of the area.

(6) The MEC may, after consultation with the MEC responsible for local government, publish regulations setting out the process of consultation referred to in subsection (5).

(7) A local authority must provide for the protection of a heritage area through the provisions of its planning scheme or by-laws under this Act, provided that any such protective provisions shall be jointly approved by the provincial heritage resources authority, the provincial planning authority and the local authority, and provided further that—

(a) the special consent of the local authority shall be required for any alteration or development affecting a heritage area;

(b) in assessing an application under paragraph (a) the local authority must consider the significance of the area and how this could be affected by the proposed alteration or development; and

(c) in the event of any alteration or development being undertaken in a heritage area without the consent of the local authority, it shall have the power to require the owner to stop such work instantly and restore the site to its previous condition within a specified period. If the owner fails to comply with the requirements of the local authority, the local authority shall have the right to carry out such restoration work itself and recover the cost thereof from the owner.

(8) A local authority may erect signage indicating its status at or near a heritage area.

(9) Particular places within a heritage area may, in addition to the general provisions governing the area, be afforded further protection in terms of this Act or other heritage legislation.

Legislation relevant to archaeology and palaeontology taken from the National Heritage Resources Act (Act 25 of 1999)

Archaeology, palaeontology and meteorites

35. (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

(6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

(7) (a) Within a period of two years from the commencement of this Act, any person in possession of any archaeological or palaeontological material or object or any meteorite which was acquired other than in terms of a permit issued in terms of this Act, equivalent provincial legislation or the National Monuments Act, 1969 (Act No. 28 of 1969), must lodge with the responsible heritage resources authority lists of such objects and other information prescribed by that authority. Any such object which is not listed within the prescribed period shall be deemed to have been recovered after the date on which this Act came into effect.

(b) Paragraph (a) does not apply to any public museum or university.

(c) The responsible authority may at its discretion, by notice in the Gazette or the Provincial Gazette, as the case may be, exempt any institution from the requirements of paragraph (a) subject to such conditions as may be specified in the notice, and may by similar notice withdraw or amend such exemption.

(8) An object or collection listed under subsection (7)—

(a) remains in the ownership of the possessor for the duration of his or her lifetime, and SAHRA must be notified who the successor is; and

(b) must be regularly monitored in accordance with regulations by the responsible heritage authority.

Legislation relevant to burial grounds and graves taken from the National Heritage Resources Act (Act 25 of 1999)

Burial grounds and graves

36. (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

(7) (a) SAHRA must, over a period of five years from the commencement of this Act, submit to the Minister for his or her approval lists of graves and burial grounds of persons connected with the liberation struggle and who died in exile or as a result of the action of State security forces or agents provocateur and which, after a process of public consultation, it believes should be included among those protected under this section.

(b) The Minister must publish such lists as he or she approves in the Gazette.

(8) Subject to section 56(2), SAHRA has the power, with respect to the graves of victims of conflict outside the Republic, to perform any function of a provincial heritage resources authority in terms of this section.

(9) SAHRA must assist other State Departments in identifying graves in a foreign country of victims of conflict connected with the liberation struggle and, following negotiations with the next of kin, or relevant authorities, it may re-inter the remains of that person in a prominent place in the capital of the Republic.

Legislation relevant to the proposed activity under consideration taken from the National Heritage Resources Act (Act 25 of 1999)

Heritage resources management

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50 m in length;

(c) any development or other activity which will change the character of a site—

(i) exceeding 5 000 m2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

(2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection (1)—

(a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or

(b) notify the person concerned that this section does not apply.

(3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

(a) The identification and mapping of all heritage resources in the area affected;

(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;

(c) an assessment of the impact of the development on such heritage resources;

(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(g) plans for mitigation of any adverse effects during and after the completion of the proposed development.

(4) The report must be considered timeously by the responsible heritage resources authority which must, after consultation with the person proposing the development, decide—

(a) whether or not the development may proceed;

(b) any limitations or conditions to be applied to the development;

(c) what general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;

(d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and

(e) whether the appointment of specialists is required as a condition of approval of the proposal.