CHAPTER II:

Heritage Impact Assessment (Archaeology and Cultural Heritage)

CSIR
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HERITAGE SPECIALIST STUDY:

Scoping and Environmental Impact Assessment (EIA) Processes for the Proposed Development of a Solar Photovoltaic Facility (Kudu Solar Facility 5) and associated infrastructure, near De Aar, Northern Cape Province

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

SAHRA Case ID: 20340

Report for:

CSIR – Environmental Management Services
P.O. Box 320, Stellenbosch, 7599
Email: RAbed@csir.co.za

On behalf of:

Kudu Solar Facility 5 (Pty) Ltd

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

1st draft: 23 March 2023
Final report: 23 May 2023

Specialist declaration

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Scoping and Environmental Impact Assessment (EIA) Processes for the Proposed Development of 12 Solar Photovoltaic Facilities (Kudu Solar Facilities 1 to 12) and associated infrastructure, near De Aar, Northern Cape Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

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1. SPECIALIST INFORMATION

Specialist Company Name:	ASHA Consulting (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	0
Specialist name:	Dr Jayson Orton			
Specialist Qualifications:	D.Phil (Archaeology, Oxford, UK) MA (Archaeology, UCT)			
Professional affiliation/registration:	ASAPA CRM member No. 233 APHP member No. 043			
Physical address:	40 Brassie Street, Lakeside, 7945			
Postal address:	40 Brassie Street, Lakeside			
Postal code:	7945	Cell:	083 272 3225	
Telephone:	021 788 1025	Fax:	n/a	
E-mail:	jayson@asha-consulting.co.za			

2. DECLARATION BY THE SPECIALIST

I, JAYSON ORTON, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

ASHA CONSULTING (PTY) LTD

Name of Company:

19 OF-2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

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3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, JAYSON ORTON, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

ASHA CONSULTING (PTY) LTD

Name of Company

19-05-2023

Date

SGT

Signature of the Commissioner of Oaths

2023-05-19

Date

SOUTH AFRICAN POLICE SERVICE
KIRSTENHOF SAPS
19 MAY 2023
CSC
SUID-AFRIKAANSE POLISIEDIENS

Details of Specialist, Declaration and Undertaking Under Oath

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EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to assess the potential impacts to heritage resources that might occur through the proposed development of a suite of twelve photovoltaic (PV) solar energy facilities (SEFs) to be located between 50 km and 66 km northeast of De Aar, Northern Cape. They will be named Kudu PV1 SEF, Kudu PV2 SEF, etc. The present report pertains to the Kudu PV5 SEF which has a centre point at S30° 15’ 32.7” E24° 19’ 25.0”.

The wider site was assessed in the field over 4 days and found to be covered in very dense grass which made visibility extremely poor. However, several dolerite hills and outcrops were encountered and visibility was better on those. Fieldwork was thus focused on the visible dolerite with the open grasslands receiving very little attention. Desktop work and previous experience suggested that significant heritage resources were likely to be very rare in the open grasslands with most heritage focused on the rocky areas. Ephemeral scatters of Pleistocene-aged MSA artefacts were seen in the grasslands in a few denuded areas and the Basberg farm graveyard and some animal watering points of varying age were also located in the grassland. All other resources were associated with rocky outcrops and included LSA engravings, a rock gong, historical engravings, historical stone walling (related to agricultural uses and also to the Anglo-Boer War) and farmsteads. The farmsteads were not on the outcrops but close to them.

No heritage resources with more than low cultural significance were found within the Kudu PV5 site but the site does form part of the wider cultural landscape which would be altered if the facility was constructed.

All impacts were found to be of low to very low significance after mitigation and no fatal flaws were found. Given the lack of significant heritage on the PV5 site, it is the opinion of the heritage specialist that the proposed project should be authorised in full.

It is recommended that the proposed Kudu PV5 SEF be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- Visually permeable fences, preferably in a dark colour, should be used;
- Buildings to be painted in earthy colours to reduce contrast;
- Night-time light spillage should be minimised, possibly through the use of motion detectors so that the area can stay dark until light is needed; 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: Artefacts whose spatial position is conditioned more by natural forces than by human agency

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

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.

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.

Patina: The weathered surface of an artefact which has changed colour and/or texture (patinated, patination).

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

BA: Basic Assessment

CSIR: Council for Scientific and Industrial Research

CRM: Cultural Resources Management

DFFE: Department of Forestry, Fisheries and the Environment

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GPS: global positioning system

GP: General Protection

HIA: Heritage Impact Assessment

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

REDZ: Renewable Energy Development Zone

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Compliance with Appendix 6 of the 2014 EIA Regulations

Requirements of Appendix 6 – GN R326 (7 April 2017)	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.4 Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii (Preliminary Section of this report)
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 7.6, 7.4 & 7.8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3
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 alternatives;	Sections 1.1.3 & 5 Appendix 3
g) an identification of any areas to be avoided, including buffers;	Section 11
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Appendix 3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.6
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 5 Section 11
k) any mitigation measures for inclusion in the EMPr;	Section 10
l) any conditions for inclusion in the environmental authorisation;	Section 12
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity and activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Sections 11.1 & 12
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 3.7
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 6.1
q) any other information requested by the competent authority.	Not Applicable
2. Where a government notice gazetted by the Minister provides for any protocol of minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply	Part A of the Assessment Protocols published in Government Notice No. 320 on 20 March 2020 is applicable (i.e. Site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed). See Appendix 3.

Contents

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a suite of twelve photovoltaic (PV) solar energy facilities (SEFs) to be located between 50 km and 66 km northeast of De Aar, Northern Cape (Figure 1). They will be named Kudu PV1 SEF, Kudu PV2 SEF, etc. The present report pertains to the Kudu PV5 SEF which has a centre point at S30° 15' 32.7" E24° 19' 25.0" (Figure 2). The properties affected are shown in Table 1.

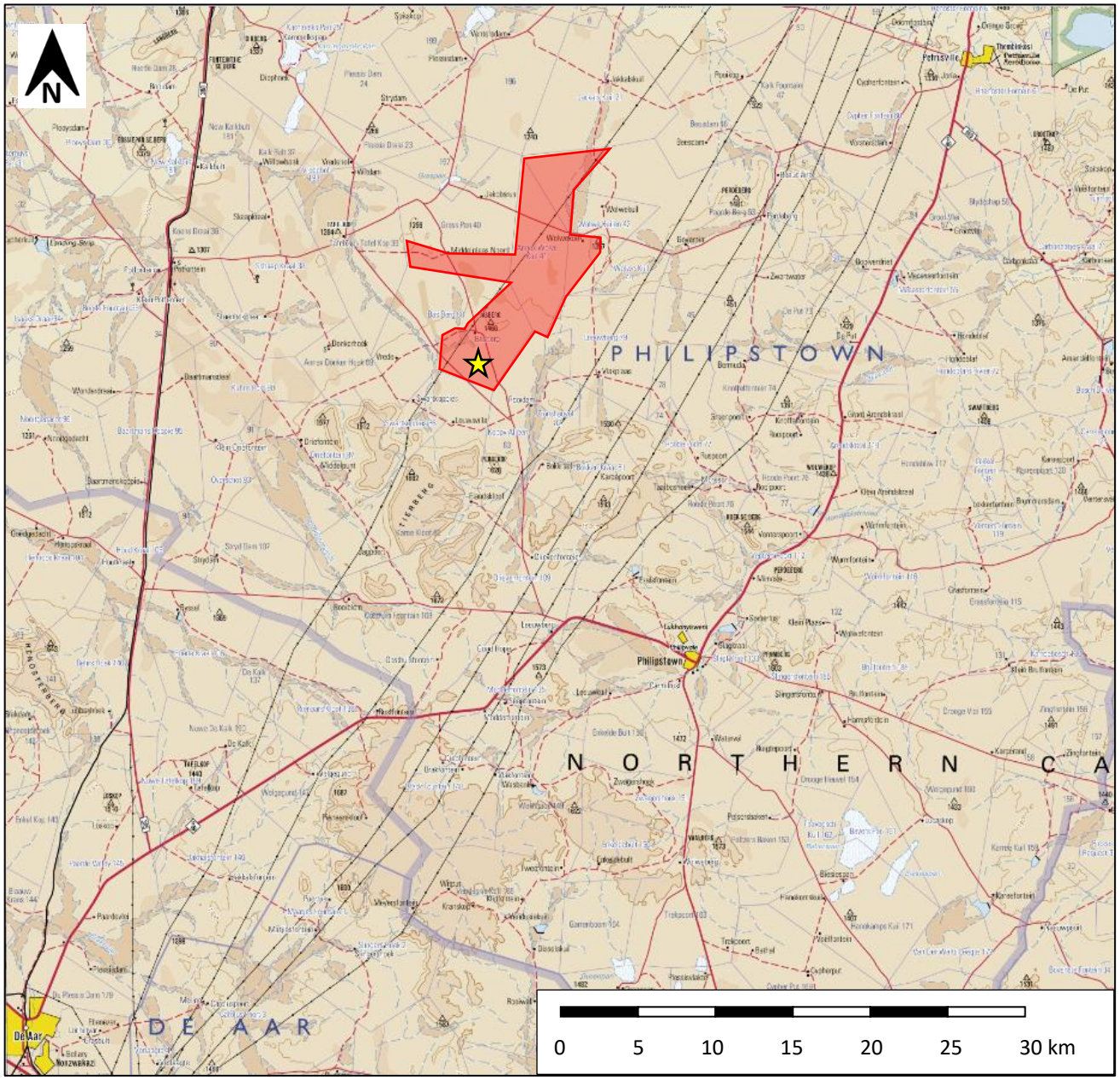


Figure 1: *Extract from 1:250 000 topographic map 3024 showing the location of the broader study area (red shaded polygon) in relation to De Aar and Philipstown. The approximate location of PV5 is starred. Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

Table 1: *List of farm portions included in the overall study area with an indication of which farm portions are affected by each proposed Kudu PV project.*

Farm Portions Affected	**Kudu PV facility**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Remaining Extent of the Farm Bas Berg No. 88	X	X										
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	X	X	X	X	X							
Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88												
Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grass Pan No. 40[1]						X	X					
Remaining Extent of the Farm Annex Wolve Kuil No. 41								X				
Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41								X	X	X	X	
Remaining Extent of the Farm Wolve Kuilen No. 42												
Portion 2 of the Farm Wolve Kuil No. 43												X

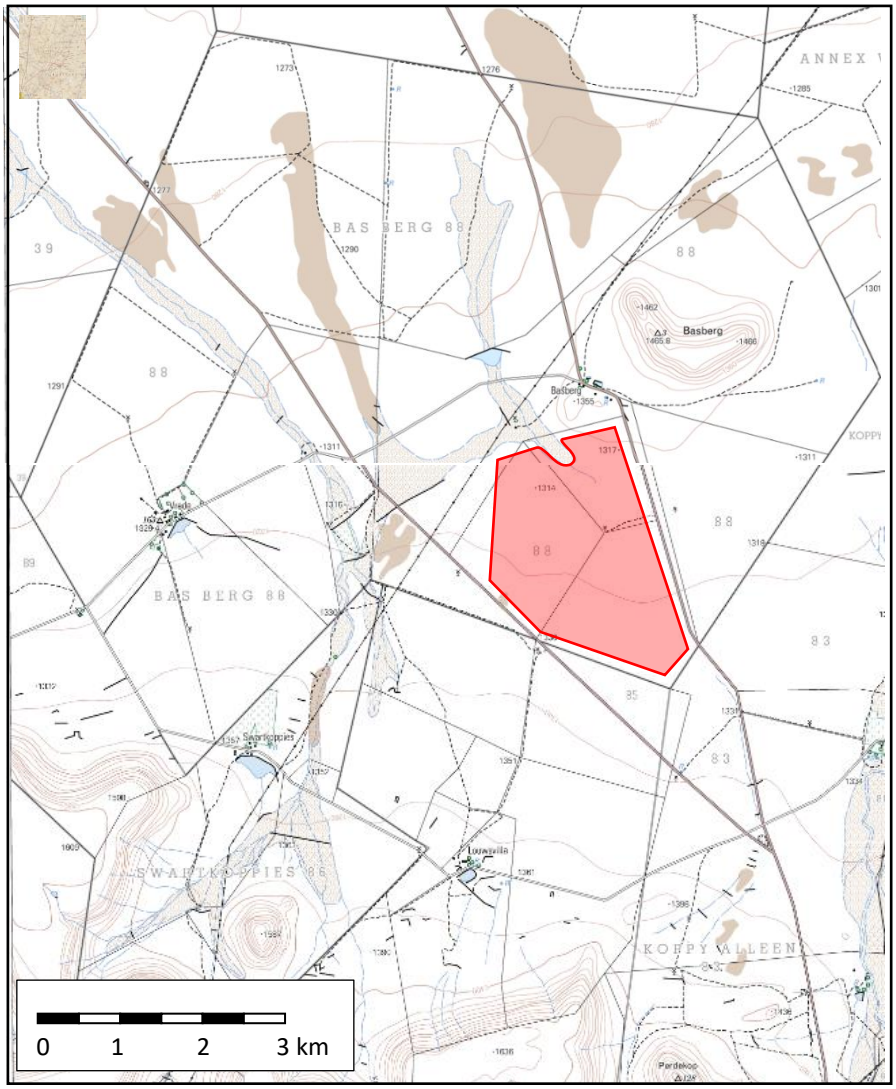


Figure 2: *Extract from 1:50 000 topographic map 3024AB & AD showing the location of the PV5 site (red polygon). Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

[1] Note that although the topographic map and SG Diagram uses the spelling "Grass Pan, the current Title Deed shows the property name as "Grasspan".

1.1. The proposed project

1.1.1. Project description

ABO Wind is proposing to develop twelve PV SEFs and associated Electrical Grid Infrastructure (EGI), north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province. The Kudu PV5 SEF will consist of the infrastructure described in Table 2 with the layout being as shown in Figure 3. Note that the Kudu EGI projects, Projects 13 to 26 are the subject of separate assessments that will be carried out at a later stage.

Table 2: *Details of the proposed Kudu PV5 SEF.*

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	▪ 350 MWac
Total developable area that includes all associated infrastructure within the fenced off area of the PV facility	**Revised Scoping Buildable Areas:** ▪ 537 ha
PV Panel Structure (with the following possible tracking and mounting systems): ▪ Single Axis Tracking structures (aligned north-south); ▪ Dual Axis Tracking (aligned east-west and north-south); ▪ Fixed Tilt Mounting Structure; ▪ Mono-facial Solar Modules; or ▪ Bifacial Solar Modules.	▪ Height: Approximately 3.5 m (maximum)
Building Infrastructure	
Auxiliary Buildings	▪ Type: These include, but are not limited to, Operation and Maintenance (O&M) building / centre, site office, workshop, staff lockers, bathrooms/ablutions, warehouses, guard houses, etc. ▪ Cumulative Footprint: Approximately up to 5000 m^2 ▪ Height: Up to 10 m
Inverter/Transformer Stations	▪ Preliminary average number of stations: 27 ▪ Height: Approximately 3 m ▪ Footprint: Approximately 220 m^2 each
On-site Substation Complex	▪ Components of the on-site substation complex: ○ On-site Independent Power Producer (IPP) or Facility Substation (~1 ha). ○ Lithium Ion or Redox Flow Battery Energy Storage System. Refer to the details below. ○ Switching Station and Collector Station (~2 ha). This forms part of Projects 13 – 24 and will be assessed as part of separate processes. ▪ Footprint of the on-site substation complex: Up to approximately 8 ha

	▪ Height of the on-site substation complex: Up to 10 m ▪ Capacity of the on-site substation complex: This varies according to the detailed design and requirements from potential clients, however a capacity stepping up from 22 kV or 33 kV to 132 kV is estimated.
Associated Infrastructure	
Battery Energy Storage System (BESS)	▪ Technology: Lithium-Ion BESS or Redox Flow BESS (both options considered in the Scoping and EIA Process) ▪ Footprint: Approximately 1 ha ▪ Height: Up to 10 m ▪ Capacity: Up to 500 MW / 500 MWh
On-site medium voltage internal cables	▪ Placement: Underground or above ground in certain sections ▪ Capacity: 22 or 33 kV ▪ Depth: Maximum depth of 1.5 m
Underground low voltage cables or cable trays	▪ Depth: Maximum depth of 1.5 m
Access roads (including upgrading and widening of existing roads, where relevant)	▪ Details: Existing roads will be used as far as practically achievable, with some intersections potentially needing widening and some roads potentially needing upgrading.
Internal roads	▪ Details: New internal service roads will need to be established. These would either comprise farm roads (compacted dirt/gravel) or paved roads. ▪ Width: Approximately 4 – 5 m
Fencing around the PV Facility Perimeter	▪ Type: Could be palisade or mesh or fully electrified ▪ Height: Up to 3 m
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Panel cleaning and maintenance area	▪ Refer to the EIA Report for information.
Work area during the construction phase (i.e. laydown area)	▪ Temporary Laydown: Up to 7 ha.
Water Requirements	▪ Approximately 18 000 m^3 of water is estimated to be required per year for the construction phase. ▪ Approximately 2 000 m^3 of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are unknown at this stage. ▪ Potential sources: Local municipality, third-party water supplier, existing boreholes or drilled boreholes on site.
Construction Period	▪ 12 – 18 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years.

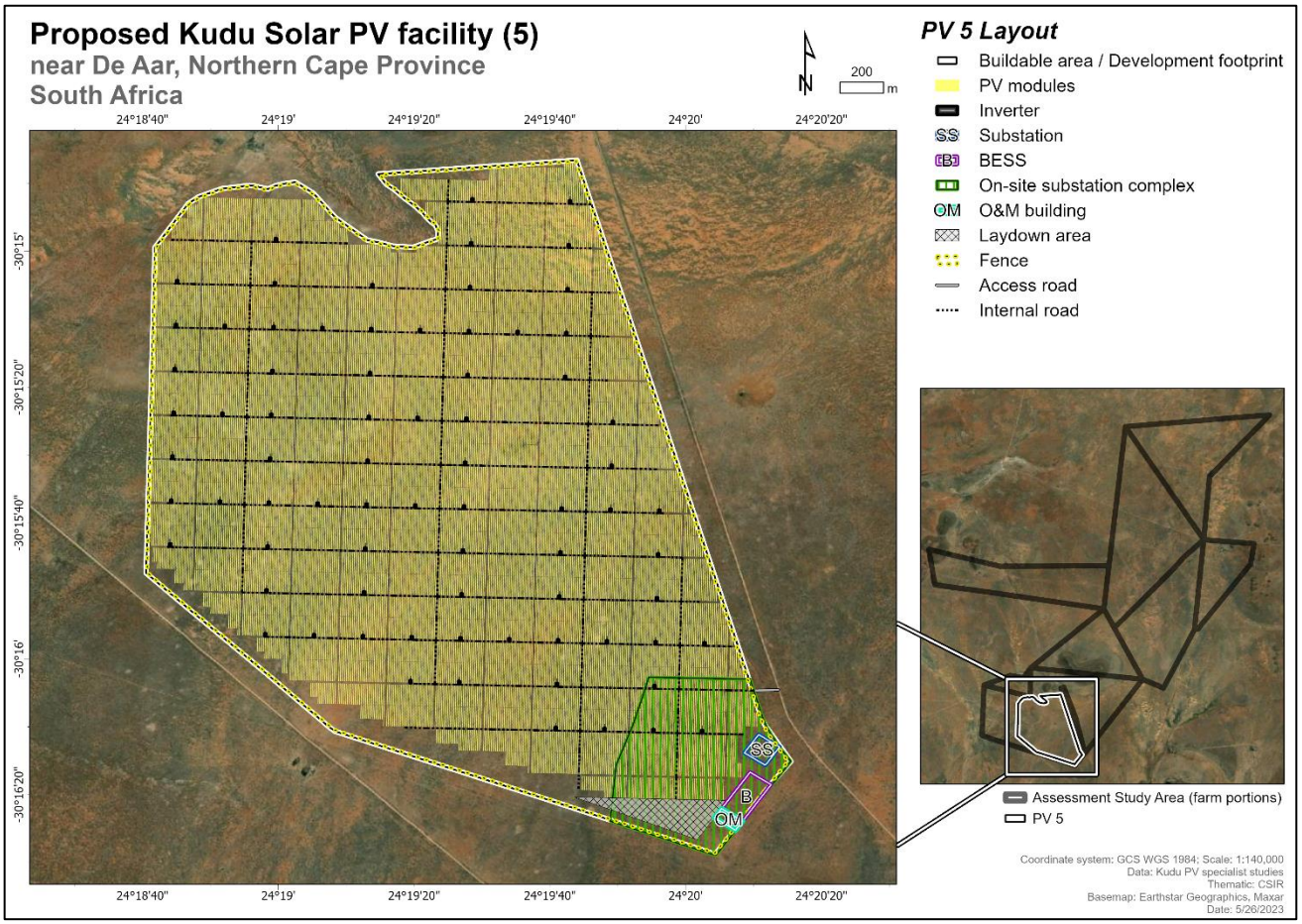


Figure 3: *Map showing the layout of the proposed project.*

1.1.2. Identification of alternatives

No alternative sites have been examined because the assessment process started with a larger site (i.e. study area consisting of eight farm portions totalling 8 150 ha) and the final footprint has been selected based on the lack of sensitive environmental features. Two different battery technologies are being considered, but this makes no difference to the heritage assessment and, being equally acceptable, they are not assessed separately in this report.

1.1.3. Description of project aspects relevant to the heritage study

All aspects of the proposed development are relevant, since excavations for foundations may impact on archaeological and/or palaeontological remains, while the 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 Consulting was asked to:

- Conduct a field survey to search for sensitive areas and sites of heritage significance;

- Provide mapping data indicating where sensitive features lay;
- Compile separate impact assessment reports per project including the following:
    - Describe regional and local features of the receiving environment;
    - Map sensitive features;
    - Assess (identify and rate) the potential impacts on the environment;
    - Identify relevant legislation and legal requirements; and
    - Provide recommendations on possible mitigation measures, rehabilitation procedures, and management guidelines.

1.3. Scope, purpose and objectives of the report

A heritage impact assessment (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 Forestry and Fisheries and Environment (DFFE) 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. Details of specialist

This specialist assessment has been undertaken by Dr Jayson Orton of ASHA Consulting (Pty) Ltd. He 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.

A signed specialist statement of independence is included at the front of this specialist assessment.

2. LEGISLATIVE CONTEXT

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

The NHRA 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 types of cultural significance that a place or object might have in order to 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.

2.2. Approvals and permits

2.2.1. Assessment Phase

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 DFFE.

2.2.2. Construction Phase

If archaeological or palaeontological mitigation is required prior to construction, then the appointed archaeologist or palaeontologist would need to obtain a permit from SAHRA. This would be issued in their name. This is so that the heritage authority can ensure that the appointed practitioner has proposed an appropriate methodology that will result in the mitigation being done properly. A built environment permit, if required, would need to be obtained from the Provincial Heritage Resources Authority (PHRA).

2.3. Guidelines

SAHRA have issued minimum standards documents for archaeological and palaeontological specialist studies. There is also a Western Cape Provincial guideline for heritage specialists working in an EIA context and which is generally useful. The reporting has been prepared in accordance with these guidelines. The relevant documents are as follows:

- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

3. APPROACH AND METHODOLOGY

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. The information sources used in this report are presented in Table 3 with relevant dates of each source referenced in the text as needed. Data were also collected via a field survey. The data quality is suitable for the purpose of informing this report.

Table 3: *Information sources used in this assessment.*

Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

3.2. Field survey

The site was subjected to a foot survey on 21, 22, 24 and 25 April 2022. This was during autumn and after good summer rains the grass was quite dense which meant that visibility of the ground and archaeological resources was very poor. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 4). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

ASHA was requested to consider the entirety of the eight properties identified for the Kudu solar projects with a view to informing the final layouts. As such, the survey ranged widely across the study area but, due to an extremely low incidence of finds in the open grasslands, these areas were covered only very sparsely. More emphasis was placed on parts of the study area most likely to be sensitive (e.g. hills, rocky outcrops and areas close to farmsteads).

It should be noted that the amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report.

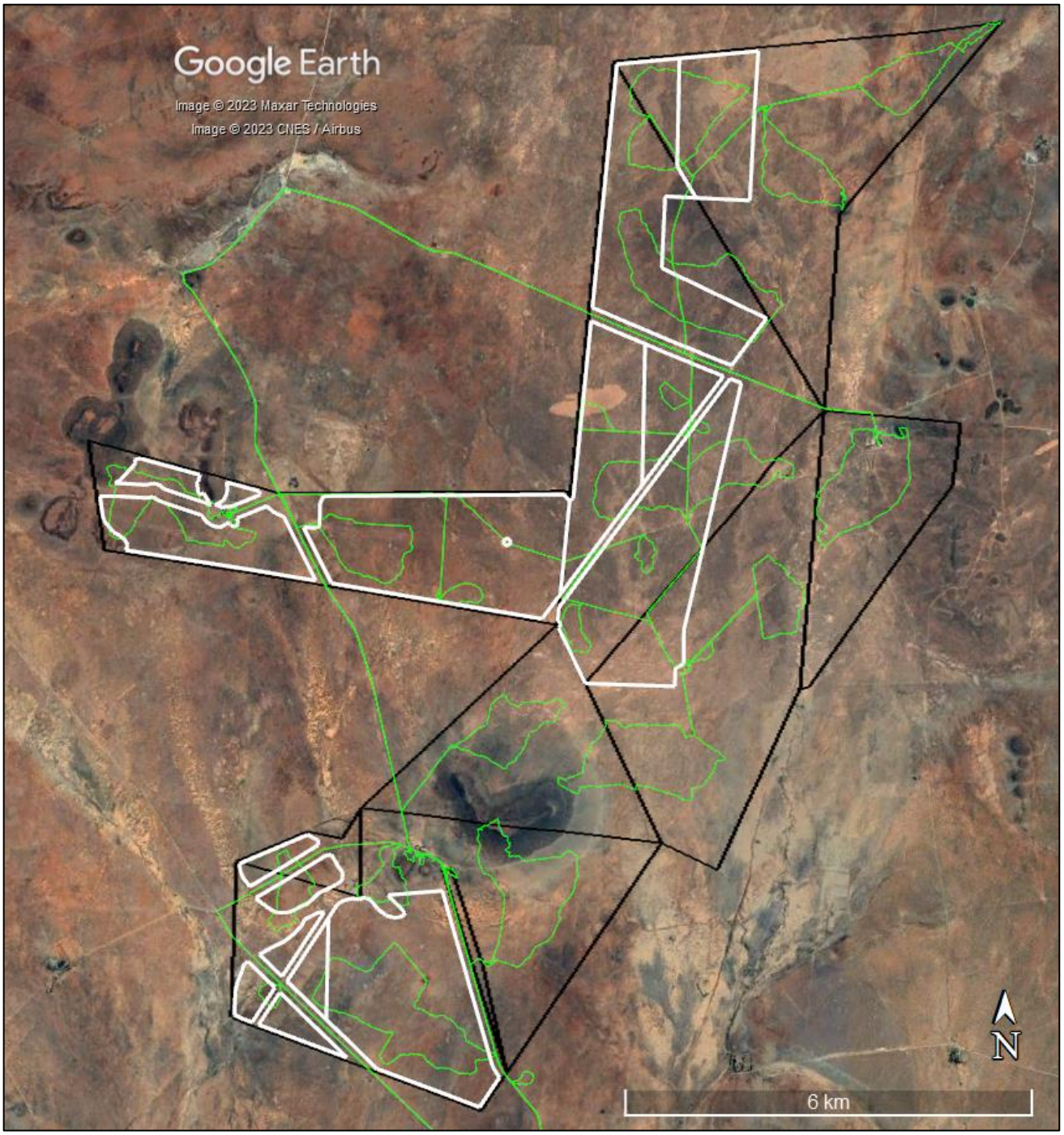


Figure 4: *Map showing the survey tracks (green lines) across the wider study area. The farm portions are in black and the PV footprints are in white.*

3.3. Specialist studies

A separate palaeontological specialist study was compiled.

3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a scale supplied by the CSIR. Please see the EIA report for details.

3.5. Grading

Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade 1 and 2 resources are intended to be managed by the national and provincial heritage resources authorities, while Grade 3 resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system[2] 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).

3.6. Assumptions, knowledge gaps and limitations

The study is carried out at the surface only and hence any completely buried archaeological sites will not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. On site the grass was dense which meant that ground visibility was very limited. From experience, significant resources in this type of environment tend to be spatially related to dolerite outcrops and these were generally easily located and surveyed. Surveys of the grasslands were very minimal because of both the very low visibility and the expected very low likelihood of finding significant heritage resources there. Nonetheless, transects were walked through these grassy areas to confirm the expectations. Despite the relatively low survey coverage, the expected distribution patterns are assumed to hold true.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area. It is also notable that most of the projects shown in the cumulative impacts map (see Section 7.4) do not appear on the South African Heritage Resources Information System (SAHRIS).

[2] The system is intended for use on archaeological and palaeontological sites only.

3.7. Consultation processes undertaken

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.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The broader Kudu study area is very remote and lies far from any towns. Philipstown is the nearest and lies some 27 km to the southeast. Petrusville is some 33 km east-northeast and De Aar is 57 km to the southwest. The area is used for livestock grazing. Access is all on gravel roads and the only other infrastructure present aside from farming-related features are several high voltage (HV) powerlines. One of these passes through the middle of the Kudu study area (Figure 5). The study area does not fall within a Renewable Energy Development Zone (REDZ; the nearest is Kimberley REDZ 130 km to the northeast) but is entirely contained within the Central Electricity Grid infrastructure (EGI) Corridor.

Figure 5: *Map showing the project location in relation to existing HV powerlines (green lines).*

4.2. Site description

The wider study area is a flat grassy plain with a number of dolerite hills protruding from it. The PV facilities are proposed on the flat grassland areas. The largest hill is Basberg which lies in the southern part of the study area and affords excellent views over the grasslands to the north and south (Figures 6 and 7). Another prominent but very much smaller hill, *Kaaimanskop*, lies in the north and offers views over that part of the study area (Figure 8).

Figure 6: *Panoramic view towards the south from the summit of Basberg showing the general character of the landscape.*

Figure 7: *Panoramic view towards the north from the summit of Basberg showing the general character of the landscape.*

Figure 8: *View towards the southwest from the summit of Kaaimanskop showing the character of the flat grasslands in the wider study area.*

The Kudu PV5 facility study area is flat, open grassland and lacks any features. The nearest dolerite hill is just over 200 m to the north and 300 m to the southeast. Figures 9 to 11 show views of this area.

Figure 9: *View towards the north from near the southern edge of the PV5 footprint towards Basberg on the right hand skyline.*

Figure 10: *View towards the southwest through the centre of the PV5 footprint.*

Figure 11: *View towards the east through the centre of the PV5 footprint.*

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project.

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of largely high palaeontological sensitivity but with small areas of moderate and zero sensitivity (Figure 12). The latter are the dolerite outcrops. Because of this high sensitivity, a palaeontological survey was carried out. The survey found that in fact the areas marked high sensitivity on the SAHRIS map are better considered low sensitivity in practice. Further details are contained in the relevant specialist report.

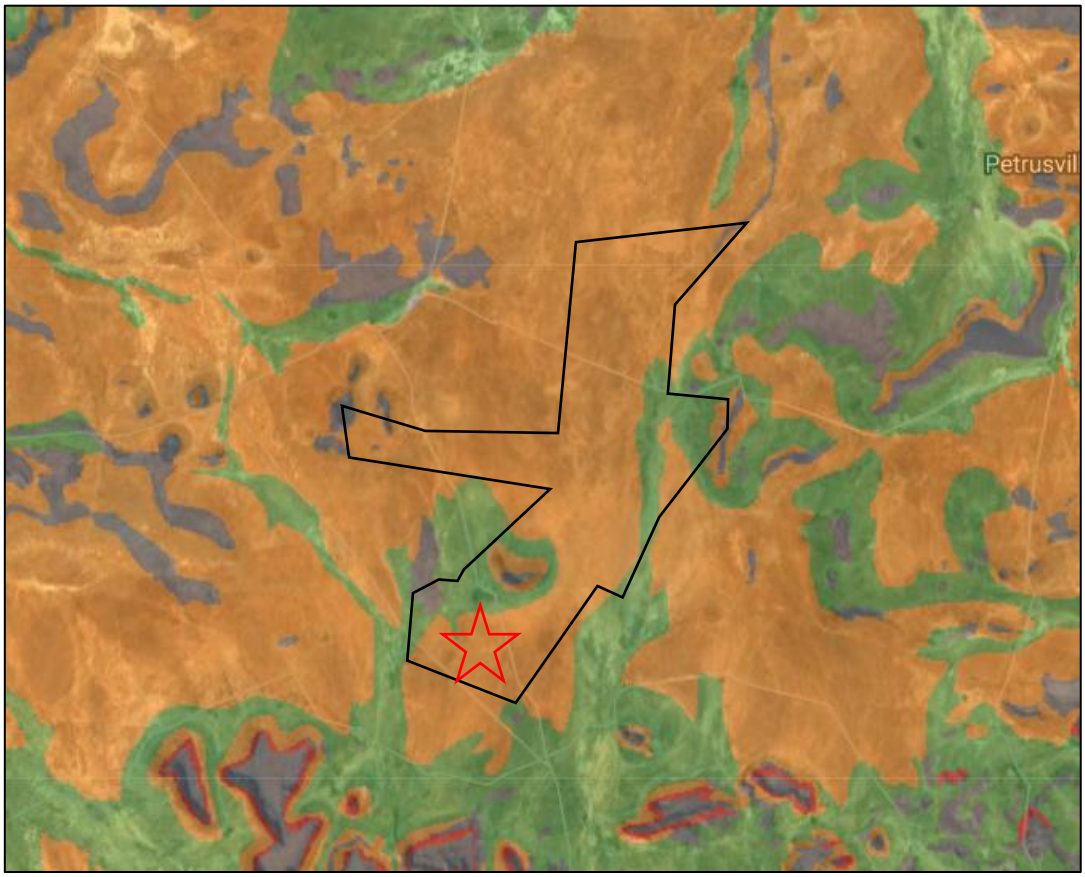


Figure 12: *Extract from the SAHRIS Palaeosensitivity Map showing the wider study area to be of largely high sensitivity (orange shading). PV5 is underlain almost exclusively by sediments of high sensitivity but a small area of moderate lies in the northwest (red star).*

5.2. Archaeology

5.2.1. Desktop study

The Karoo has a long pre-colonial history as testified by the many thousands of stone artefacts that can be found among surface gravels in many areas. These date to the Early (ESA), Middle (MSA) and Late Stone Ages (LSA) but the former tend to be the least common and do not appear to be on record in the relatively well-studied De Aar area. Pleistocene-aged MSA artefacts occur quite widely and are usually exposed in areas where there is erosion or deflation of the surface. These artefacts are identifiable as MSA by the fact that they are weathered and heavily patinated from very long term exposure and appear orange in colour with their edges rounded off. Much less patinated artefacts are younger with the least patinated or often entirely unpatinated ones being from the Holocene LSA. Heavily patinated artefacts were reported by Van Vollenhoven (2013) to the east of the study area, although he considered them to be from the LSA.

Most other work in the wider area has been close to De Aar and has revealed a variety of Stone Age materials. Because they are generally far better preserved, LSA sites are usually the most significant. Most impressive was a very dense LSA site on a low hill just to the northeast of the town (Orton 2022a). This site had many thousands of stone artefacts as well as pottery and contact period metal items. Other LSA sites in the area tend mostly to be focused on the dolerite outcrops and include

ephemeral stone-walled features (Orton 2012; Orton & Webley 2013a, 2013b). However, LSA materials have also been recorded along the Brak River (Orton 2022b). MSA artefacts as noted above have also been widely documented around De Aar (Morris 2011; Kruger 2012; Orton 2012).

One of the most significant aspects of Karoo archaeology is the presence of many prehistoric stone kraals. Most notably, the Seacow River valley to the south of the present study area has revealed many such kraals (Sampson 1984, 1985, 1986, 2010) and enabled a kraal typology to be constructed (Hart 1989). The kraals are typically constructed on sloping ground against dolerite ridges and overlooking water sources. Domestic debris and stone artefacts are seldom associated with them, but when they are, they are taken to represent either the pastoralists camping alongside their kraals or else later re-occupation of the kraals by hunter-gatherer people (Sampson 1985). Although pottery is often taken to signify pastoralist occupation, Sampson (2010) and others (Bollong *et al.* 1993, 1997; Rudner 1979) have shown that in the interior some pottery is tempered with fibre and was made by Bushmen hunter-gatherers rather than Khoekhoe pastoralists.

Rock engravings occur widely, but in highly variable density, on the dolerite outcrops of the Karoo. Rock paintings are also said to be known from the area (De Aar, n.d.) but further details are unknown. Orton & Webley (2013a) found a rock gong that also had a faint fine-line animal engraving on it, while some 40 km south of the Kudu study area Webley and Orton (2011) reported some rock engravings. Some historical engravings (names, initials and dates) are also sometimes found engraved on the rocks (Orton 2012; Webley & Orton 2011). Parkington *et al.* (2008) show an early 20th century map of engravings known at that time (Figure 13). While they do not provide a modern equivalent, this map does give an indication that the main distribution of engravings is to the north of the present study area in the eastern part of Northern Cape and western part of Free State.

Historical archaeological materials in the Karoo are most often associated with farmsteads, either standing, ruined or demolished (e.g. Orton 2012). These materials are often collected in a domestic dump and include items such as glass, ceramics, bones, ash and rubble. Ruined farm buildings include houses, kraals and various outbuildings. Isolated artefacts or small clusters – such as where a bottle was dropped and broke – are also regularly found in isolation but are not significant.

The Anglo-Boer War was a significant event in Karoo history and will be discussed below. However, it is noted here that artefacts and ruined/disused structures related to the war are also frequently found. Alongside the Brak River at De Aar, for example, was an extensive, but low-density scatter of historical materials that may well represent an Anglo-Boer War camp. Another ephemeral scatter of such material was found by Orton (2021) on a very low hill to the north of and overlooking De Aar. On excavation, this site turned out to have almost all glass and metal artefacts and was very likely a small lookout post (Orton 2022). Small stone-walled features and sometimes larger forts related to the war can also be found but none are known from the area by the present author. No major Anglo-Boer War battles occurred within 70 km of the Kudu study area.

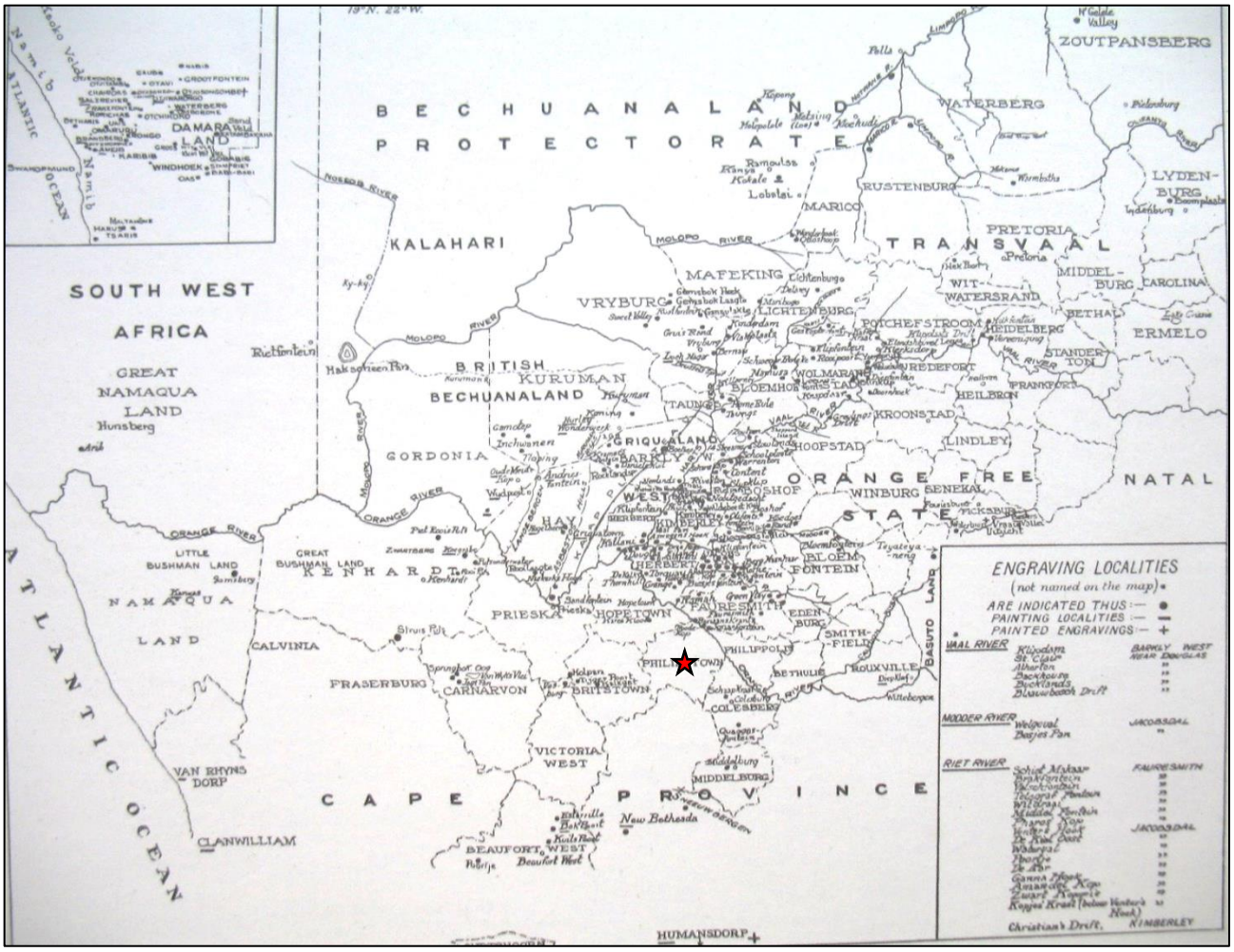


Figure 13: *Map compile by Maria Wilman in the early 20th century showing the locations of known rock engravings. Source: Parkington* et al. *(2008: 33).*

5.2.2. Site visit

Table 4 provides a full list of heritage resources recorded across the wider Kudu study area during the survey. They are mapped in Appendix 3. The full list is useful because of the extreme paucity of significant heritage in the PV5 footprint. Reporting only materials from that PV site would suggest there to be very little heritage present on the landscape. However, it was evident that significant heritage resources were associated with nearby dolerite hills and outcrops. These include historical materials related to farming and the Anglo-Boer War as well as both Stone Age and historical engravings. One site had Stone Age engravings on a rock gong. Because the facility layout was designed to avoid sensitive features (and all rocky outcrops), none occur within or close to the proposed footprint and impacts to them are not expected.

It is clear from the observations of weathered and patinated artefacts in areas where the soil is exposed that such finds will be present as background scatter artefacts throughout the study area but likely in variable densities. This includes within the PV5 site. These artefacts relate to many millennia of occupation of the landscape through the MSA and LSA and, because their distribution is conditioned more by natural factors such as erosion, these artefacts are not connected with specific, spatially definable occupation sites. All other traces of occupation have long since disappeared and these artefacts have very low cultural significance. They are therefore of no further concern.

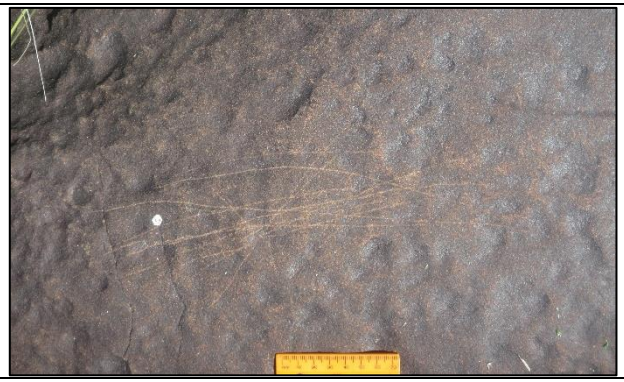
Table 4: *List of finds made during the survey. Note that all finds from the wider study area are provided for context but those relevant to the PV5 project have their waypoint numbers highlighted in green (waypoints 1010, 1011 & 1013).*

Waypoint	Location	Description		Significance Grade
947	S30 11 13.0 E24 23 45.3	Farm complex on Wolwe Kuilen 42/rem. The house is early 20th century and it is in good condition (including inside). There are various outbuildings. The main house is surrounded by trees.	 	High
948	S30 09 40.1 E24 21 50.3	Gum trees, wind pump and reservoir – part of the cultural landscape		Low

949	S30 08 21.5 E24 22 20.5	Light scatter of well-patinated hornfels MSA flakes and blades and also one less patinated core located in an eroded area. 		Very low GPC
950	S30 09 01.2 E24 21 30.2	Light scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC

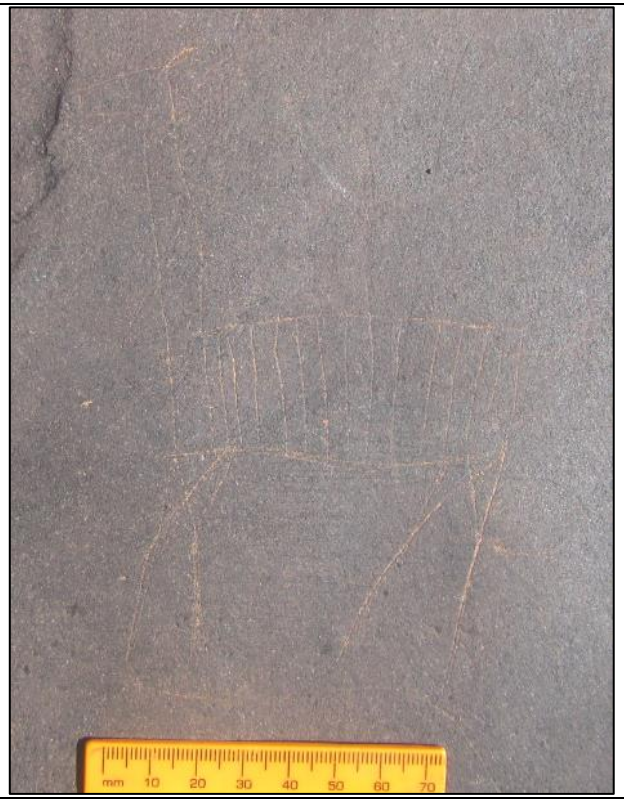
951	S30 08 34.6 E24 22 39.0	Line of gum trees, a wind pump, an old stone-lined low reservoir (derelict), a square plastered and white-washed reservoir and a newer corrugated iron and cement reservoir – heritage resources forming part of the cultural landscape. 	 	Low
952	S30 08 22.9 E24 23 33.5	A cluster of gum trees with a corrugated iron reservoir under them – part of the cultural landscape.		Low

953	S30 08 03.5 E24 24 26.0	A small circular feature made of dolerite rocks and about 1.5 m in diameter. Very close by is a small cairn of dolerite rocks. Both are very overgrown with grass. Also seen here were a few fragments of dark bottle glass, the neck of a small cobalt blue bottle, two fragments of red-painted refined white earthenware and some wire. The site is presumably related to farming activity. 	  	Medium GPA
954	S30 08 06.6 E24 24 32.1	A circular stone-walled feature of dolerite rocks and located on a low dolerite hill. The feature is about 2 m in diameter. It lies very close to the kraal at waypoint 955 (visible in the background).		Medium GPA

955	S30 08 07.1 E24 24 31.9	A rectangular stone-walled measuring about 9 m by 20 m. It is heavily overgrown with grass. It is very close to the circular feature at waypoint 954. 		Medium GPA
956	S30 08 07.3 E24 24 31.7	A dolerite rock with a scratched motif on it.		Low GPB
957	S30 07 54.5 E24 24 50.2			High

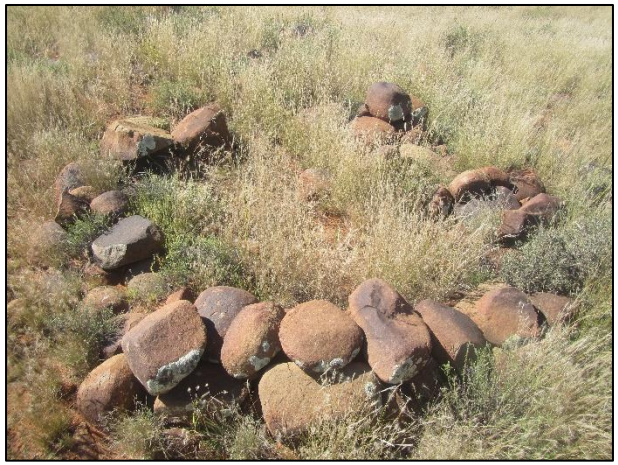
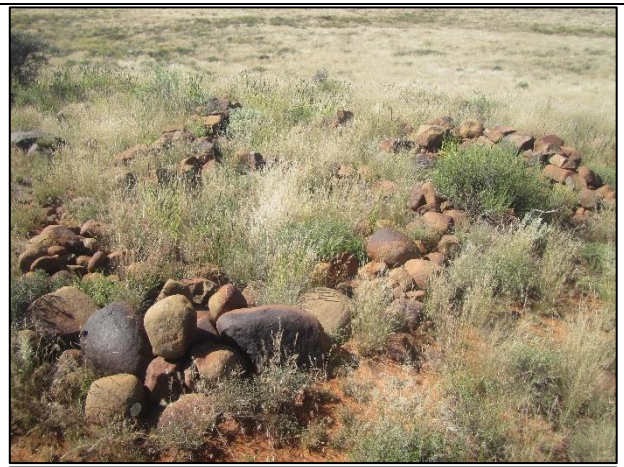
957B	S30 07 53.8 E24 24 46.2	These two points lie along the southern end of an approximately 5 km long dolerite stone wall that extends northwards along a dolerite dyke on Farm 209 ending at waypoint 959 on the farm to the north (outside the study area). The wall has been broken down to erect the current farm fence.	 	IIIB
958	S30 07 53.8 E24 24 51.8	A lightly scraped geometric engraving. It is almost certainly not part of the geometric tradition rock art but looks quite recent.		Medium GPA

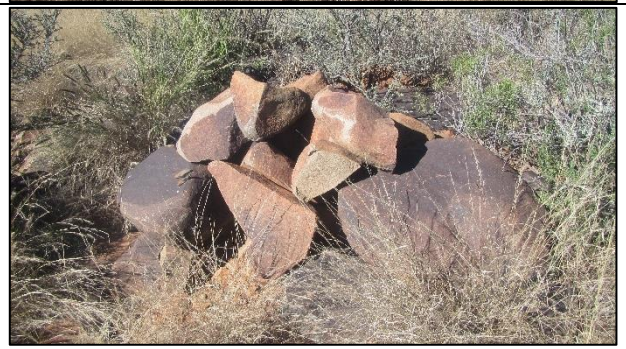
959	S30 07 53.1 E24 24 52.6	This point is at the northern end of the wall recorded under waypoint 957.		High IIIB
960	S30 07 53.3 E24 24 52.0	A dolerite rock with some scratches on it.		Very low GPC

961	S30 07 53.4 E24 24 51.9	Two historical scratched horse engravings and a few other images. The horses are identical in design, but the one is far smaller (and clearer) than the other. The large one is above the scale in the photograph below, while the smaller is indicated by the yellow arrowed. There is also a patch of multiple parallel lines that is very well patinated and must be far older (red arrow). 		Medium IIIB

				
962	S30 08 23.9 E24 24 12.8	An isolated dolerite rock that looks like it has been used as a lower grindstone. The surface is lightly concave which presumably invited this use.		Very low GPC
963	S30 09 03.6 E24 23 16.6	Light scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
964A	S30 09 14.1 E24 23 25.6			Medium

964B	S30 09 14.9 E24 23 25.6	These waypoints are the four corners of a U-shaped kraal located on the northern foot of a prominent hill. The open side of the kraal faces downhill and the entire structure is 33 m by 33 m. It is heavily overgrown with grass.		GPA
964C	S30 09 15.2 E24 23 24.5			
964D	S30 09 14.2 E24 23 24.4			
965	S30 09 16.3 E24 23 25.8	These waypoints represent the corners of two adjoining rectangular stone-walled kraals. The whole feature has ends of about 21 m (north) and 26 m (south), while its sides measure 50 m (west)and 44 m (east). The shared wall in the middle is 26 m long.		Medium GPA
965B	S30 09 16.1 E24 23 26.5			
965C	S30 09 16.8 E24 23 26.9			
965D	S30 09 17.1 E24 23 26.0			
965E	S30 09 17.8 E24 23 26.4			
965F	S30 09 17.4 E24 23 27.2			

966	S30 09 15.5 E24 23 25.8	There are two stone-walled features here. One is a small, circular feature less than 2 m across (photograph below), while the other has two enclosures with the whole feature being about 5 m across (photographs at right). They are assumed to relate to farming activities and are located just north of the kraal at waypoint 965. 	 	Medium GPA

967	S30 09 17.5 E24 23 25.4	Two stone-walled enclosures of about 2 m diameter each.		Medium GPA
968	S30 09 18.2 E24 23 25.0	A small stone cairn with two fragments of dark bottle glass alongside it.		Medium GPA
969	S30 09 18.9 E24 23 25.0	A small stone cairn. Feature apparently related to the ABW.		Medium GPA

970	S30 09 19.6 E24 23 25.1	A small stone cairn. Feature apparently related to the ABW.		Medium GPA
971	S30 09 19.7 E24 23 25.1	An elongated pile of stones. Feature apparently related to the ABW.		Medium GPA
972	S30 09 20.1 E24 23 25.4	A small stone cairn on a flat dolerite outcrop. Feature apparently related to the ABW.		Medium GPA

973	S30 09 20.6 E24 23 25.2	An elongated pile of stones. Feature apparently related to the ABW.		Medium GPA
974	S30 09 21.0 E24 23 25.2	An elongated pile of stones. Feature apparently related to the ABW.		Medium GPA

975	S30 09 21.2 E24 23 25.5	A small stone cairn. Feature apparently related to the ABW.		Medium GPA
976	S30 09 21.2 E24 23 25.1	A small stone cairn. Feature apparently related to the ABW.		Medium GPA

977	S30 09 21.7 E24 23 25.1	A small stone cairn. Feature apparently related to the ABW.		Medium GPA
978	S30 09 19.1 E24 23 15.0	The overgrown and much degraded remains of an earthen walled dam with a few stones present on the ground at 978 and a slight earth mound present at 978B and 978C. The earth mound has no doubt eroded flat.		Very low GPC
978B	S30 09 18.5 E24 23 14.2			
978C	S30 09 19.7 E24 23 13.3			
979	S30 09 18.9 E24 23 15.0	Light scatter of moderately well-patinated MSA hornfels flaked stone artefacts.		Very low GPC

980	S30 09 48.7 E24 22 15.6	A row of gum trees with other older trees and a corrugated iron reservoir nearby. Part of the cultural landscape.		Low
981	S30 09 45.7 E24 22 17.3	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
982	S30 11 08.7 E24 21 35.8	Some trees and a reservoir. Part of the cultural landscape.		Low
983	S30 11 22.8 E24 18 16.7	A large farm outbuilding and two ruined labourers' cottages that are likely more than 60 years old. They are on Portion 5 of Grass Pan 40, outside the study area. There is also one more recent cottage. These are on a neighbouring farm and were not visited.		Medium

984	S30 11 09.9 E24 23 47.8	Light scatter of well-patinated hornfels MSA flakes as well as a few less patinated ones and some quite fresh ones. The latter are LSA. The artefacts are located in an eroded area with plenty of hornfels gravel at the foot of a dolerite hill.		Very low GPC
985	S30 11 10.5 E24 23 53.6	The poorly preserved remains of a stone-walled kraal measuring about 18 m by 37 m and located on the foot of a dolerite hill. Although the site was not examined in detail, some glass, ceramics and metal fragments were seen.		Low GPB

986	S30 11 11.3 E24 23 55.5	This is the foundation of a small (presumably) house made of dolerite rocks but with a brick and cement portion built on to the southern side. It is located very closer to the kraal at waypoint 985. Although the site was not examined in detail, some glass, ceramics and metal fragments were seen.		Medium GPA
987	S30 11 08.2 E24 23 56.3	A scraped engraving on top of a dolerite hill. It looks quite recent and relatively casually done. It might be lettering but it is not possible to be sure of this.		Very low GPC

988	S30 11 07.5 E24 23 55.9	A circular enclosure of about 3.5 m by 2.5 m located on the summit of a dolerite hill. It is just a low wall of informally piled stones. No associated artefacts seen so cannot tell if this is historical or precolonial.		Low GPB
989	S30 11 07.2 E24 23 55.8	A circular enclosure of about 1 m diameter located on the summit of a dolerite hill. It looks like informally piled stones but could also be badly tumbled. The walling is far more substantial than that at waypoint 988 No associated artefacts seen so cannot tell if this is historical or precolonial.		Low GPB
990	S30 11 10.1 E24 24 00.2	Ephemeral scatter of well-patinated hornfels MSA flakes as well as some quite fresh ones. The latter are LSA. The artefacts are located in an eroded area with plenty of hornfels gravel at the foot of a dolerite hill.		Very low GPC
991	S30 12 03.3 E24 23 13.1	Some gum trees and a reservoir. Part of the cultural landscape.		Low

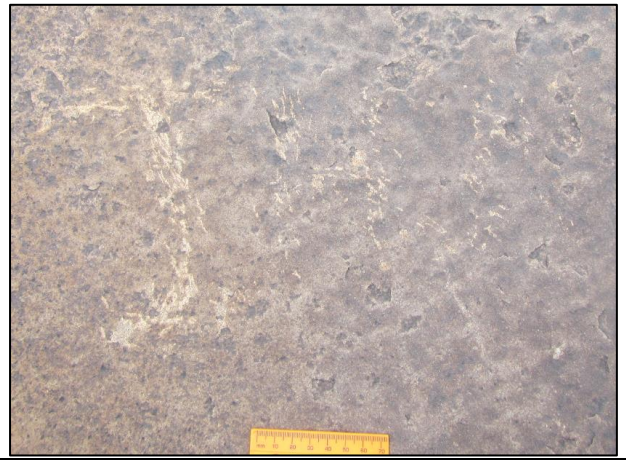
992	S30 11 15.1 E24 23 30.6	A rectangular earthen feature measuring 18 m by 24 m. It is barely visible on the ground but is clear on aerial photography. It may have been a low dam but there are no stones on the walls and no wind pump nearby.		Very low GPC
993	S30 11 10.7 E24 23 30.0	This is a scatter of patinated MSA hornfels artefacts in a disturbed area. There are heavily patinated and somewhat less patinated artefacts indicating hat not all come from the same time.		Very low GPC
994	S30 11 20.6 E24 21 49.2	An ephemeral scatter of well-patinated MSA hornfels artefacts located in the jeep track below powerlines.		Very low GPC
995	S30 11 48.6 E24 21 23.7	An ephemeral scatter of well-patinated MSA hornfels artefacts located in the jeep track below powerlines.		Very low GPC

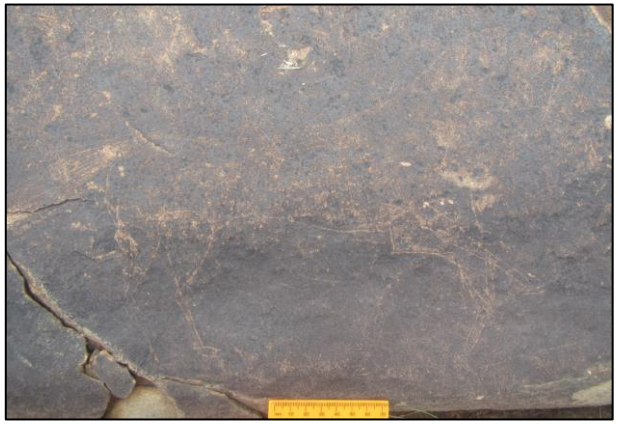
996	S30 11 49.9 E24 21 59.1	Some gum and Karee trees and a reservoir. Part of the cultural landscape.		Low
997	S30 11 47.4 E24 22 01.2	An ephemeral scatter of well-patinated MSA hornfels artefacts located in a denuded area.		Very low GPC
998	S30 11 29.7 E24 22 52.1	This is an area with windrows as well as a fruit orchard (quince, prickly pear and probably peach trees) as well as a grove of Soutbos. There is a stone-lined dam (marked as waypoint 999) and some wind pumps and a corrugated iron reservoir. Part of the cultural landscape.		Low
999	S30 11 28.2 E24 22 50.6	This is the stone-lined dam noted under waypoint 998.		
1000	S30 11 18.4 E24 22 07.5	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1001	S30 13 01.1 E24 21 55.9	Some trees, a corrugated iron reservoir and a wind pump. Part of the cultural landscape.		Low
1002	S30 13 32.8 E24 22 02.6	Some trees and a reservoir. Part of the cultural landscape.		Low

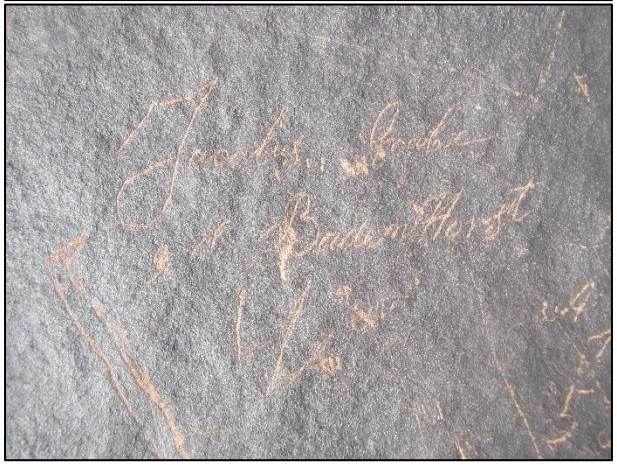
1003	S30 13 55.1 E24 21 30.5	An old prickly pear orchard located very far from any farm buildings. Part of the cultural landscape.		Low
1004	S30 13 52.7 E24 20 48.4	A light scatter of fresh hornfels flaked stone artefacts and some ostrich eggshell fragments at the northern foot of a dolerite hill (Basberg). It cannot be determined how extensive the scatter is due to the dense grass but it might stretch much further than was evident. These finds were in a pathway.		Low GPB
1005	S30 12 01.4 E24 20 19.0	Some trees, a corrugated iron reservoir and a wind pump. Part of the cultural landscape.		Low
1006	S30 11 53.4 E24 19 44.3	A cluster of gum trees. Part of the cultural landscape.		Low
1007	S30 11 33.2 E24 18 22.3	A farmstead on Portion 5 of Grass Pan 40, outside the study area. It was not visited. The house looks to be early 20th century.		High

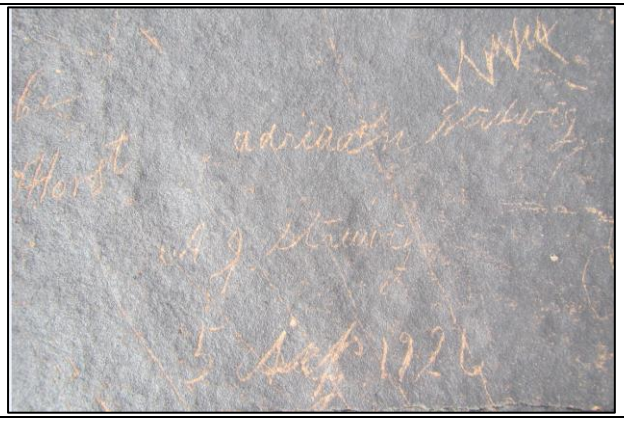
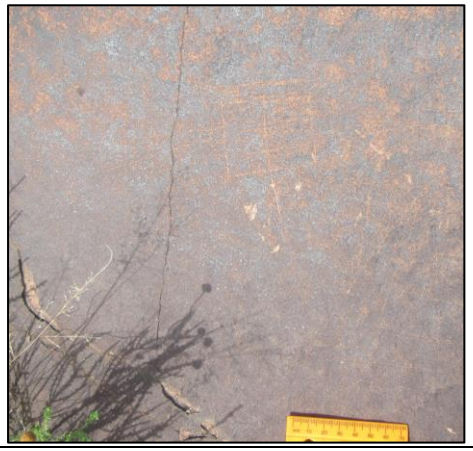
1008	S30 14 30.9 E24 19 35.9	The oldest-looking of a set of three different labourers' cottages. It is in poor condition and is probably early-mid-20th century.		Low
1009	S30 17 32.6 E24 20 50.6	Mixed age hornfels artefacts exposed along the edge of a borrow it. Some artefacts were seen to have some calcrete adhering and the patination varied from well-patinated red to only lightly patinated grey.		Very low GPC
1010	S30 16 13.1 E24 19 54.9	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1011	S30 16 10.6 E24 19 41.7	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1012	S30 16 15.8 E24 19 04.5	Some gum trees, a corrugated iron reservoir and a wind pump. Part of the cultural landscape.		Low

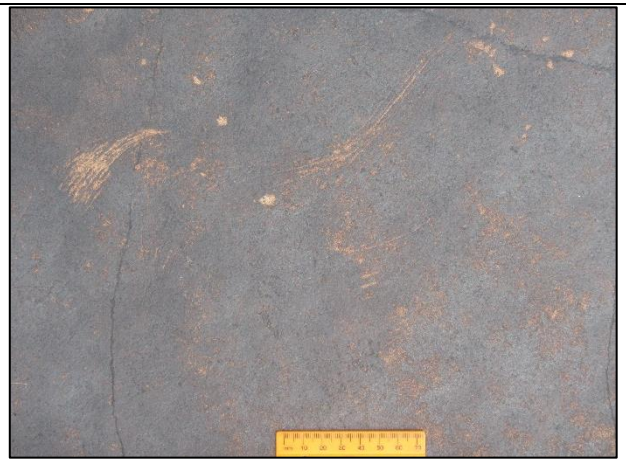
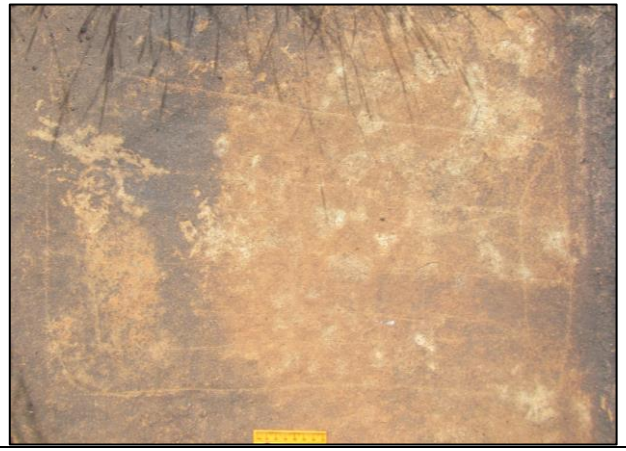
1013	S30 15 28.9 E24 19 35.7	Some trees, a corrugated iron reservoir and a wind pump. Part of the cultural landscape.		Low
1014	S30 15 21.0 E24 20 07.6	A large willow tree, a corrugated iron reservoir and a wind pump. Part of the cultural landscape.		Low
1015	S30 14 35.8 E24 19 46.5	An earthen-walled dam with a few stones along its crest at one point.		Very low

1016	S30 14 36.0 E24 19 49.5	An area of 25 m diameter on a low dolerite hill with many historical/recent engravings. They include indistinguishable scratches and motifs, horses, ostriches and writing. One rock has the date “5 Sep 1926” and the name “Jacobus Grabe (likely) Badenhorst” in cursive writing. It also has “E. ROBINSON” and a large stylised ostrich scratched on it. Another rock has two ostriches, one with a shaded body, while two others have stylised horses scratched on them. The site has been allocated a grade despite the date of 1926, since it is easily possible that the engravings were made over a long period of time and some may be older than 100 years. Either way, the site demonstrates a connection with intangible heritage through its continuation of the engraving tradition. The same applies to all the rock engravings recorded below. 	 	Medium-High IIIB

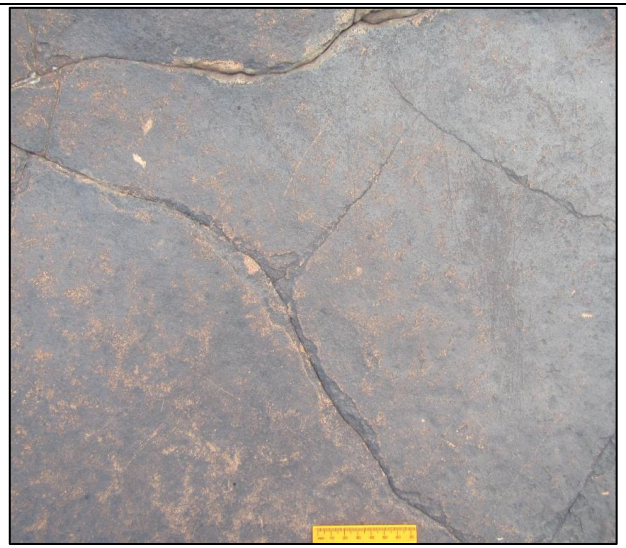
		 	 	

				
1017	S30 14 37.1 E24 19 50.9	This is another area on the same low hill as waypoint 1016 but it is about 10 m in diameter. It includes a checkered motif made in a cross shape with some squares having an X in them, along with several other geometric and indeterminate scratched motifs. 		Medium GPA

1018	S30 14 38.1 E24 19 51.3	This is another area on the same low hill as waypoint 1016 but it is about 5 m in diameter. The engravings here include a stylised horse which is somewhat patinated and could be older than the rest, a geometric motif similar to a Nine Men's Morris board, a set of three columns of 8, 9 and 10 short lines respectively, and some indeterminate scratches/motifs. 	 	Medium-High IIIB

1019	S30 14 38.8 E24 19 51.5	Further along the same hill as waypoint 1016, a very lightly scratched stylised horse with several other indeterminate very light scratches over and around it.		Medium GPA
1020	S30 14 39.8 E24 19 52.7	Further along the same hill as waypoint 1016, an indeterminate scratched geometric motif.		Low GPB

1021	S30 14 40.3 E24 19 52.7	Further along the same hill as waypoint 1016, an indeterminate scratched motif.		Low GPB
1022	S30 14 38.7 E24 19 48.9	Various scratched rocks with one image being an animal with the top of its body drawn far higher than it should be. 		Low GPB

1023	S30 14 27.5 E24 19 26.2	The Basberg farm complex has an assortment of structures of varying age. The main house is in very good condition and looks to be early-mid-20th century. A large barn made from clay bricks is probably a little older, as is a very small structure with two doors and an internal hearth. Right outside it is a pole with several hooks on it (possibly for hanging hunted animals). A werf wall of dolerite cobbles runs round the back of the main house.	 	Medium-High

		 		
1024	S30 14 27.7 E24 19 24.4			

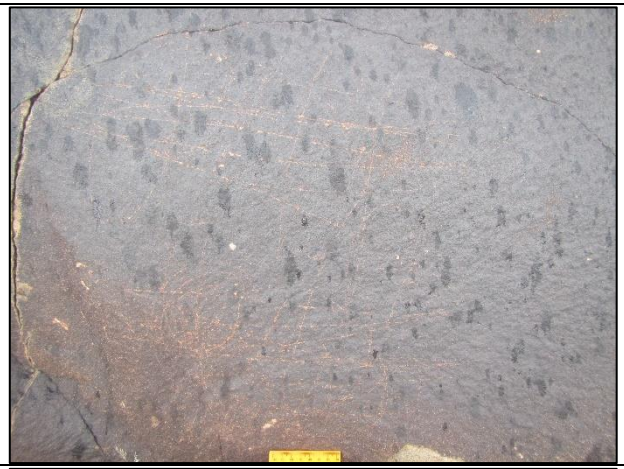
1024B	S30 14 28.1 E24 19 23.5	A large ash and rubbish midden measuring about 35 m long and about 10-20 m wide. It is on sloping ground. The waypoints are near each end. There is plenty of glass and ceramics as well as various types of metal (iron, copper and a grey metal, possibly pewter) and much bone. There are also rock and brick fragments present. Among the ceramics there is some stoneware but the vast majority of pieces are refined white earthenware including hand-painted, sponge-printed, transfer printed in various colours, lined industrial). The glass includes various colours (pink, clear, dark green, brown, black) and various forms (wine, medicine). The material probably does not go back beyond the late 19th century. A large scraper on a dolerite flake was also noted. 	   	Medium-High IIIB

			 	
Waypoints 1025-1033 are all on the hill immediately behind (south of) the Basberg farm house.				
1025	S30 14 28.2 E24 19 23.3	A poorly preserved and possibly unfinished engraving that looks like a horse. Only the top of the head, neck back and tail and back legs are present.		Medium GPA

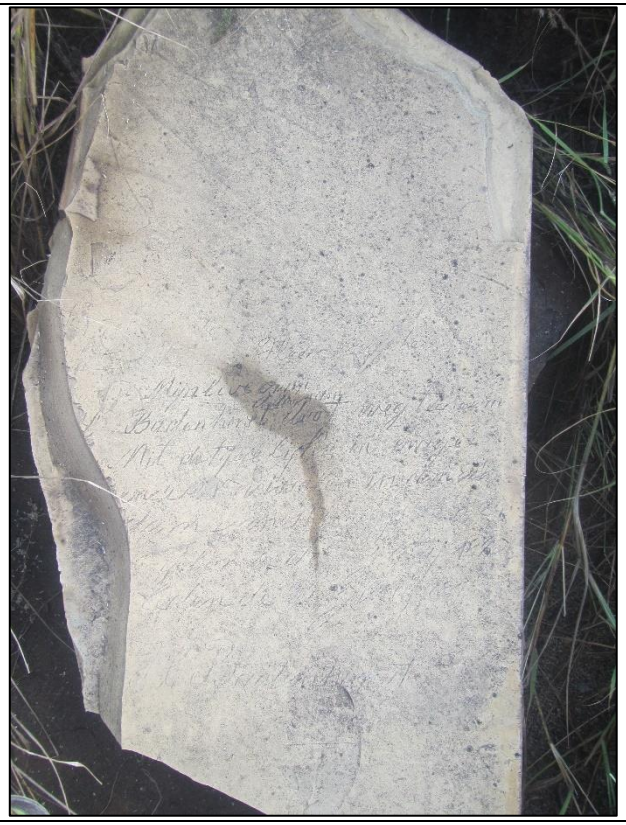
1026	S30 14 29.6 E24 19 24.2	Some historical scratched engravings on the side of the hill. One rock has a geometric form similar to the one at waypoint 1018 (Nine Men's Morris-like) with "AS 1948" or "1968" scratched over it. A second rock has what looks like a Nine Men's Morris board with another geometric scratched over it. A third rock includes a probable horse (its head is unclear) with some geometric marks over it.	 	Medium GPA

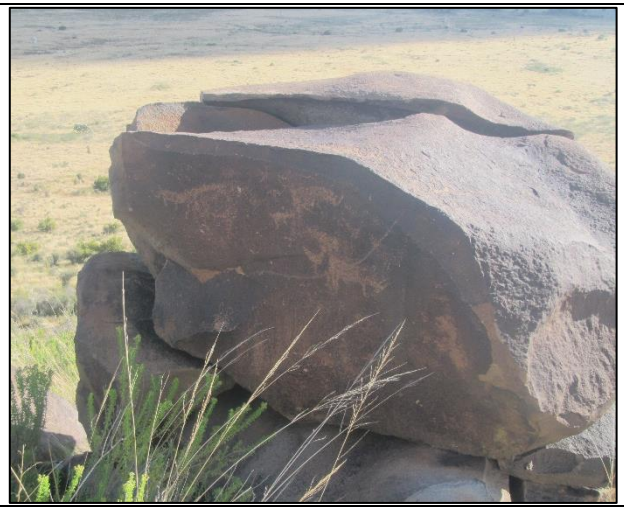
				
1027	S30 14 31.5 E24 19 25.3	A rock at the top of the hill with some indeterminate historical scratches on it.		Very low GPC
1028	S30 14 31.5 E24 19 26.4	A rock with various indeterminate motifs as well as a fair bit of writing. Among the writing can be seen a date of “25 MAY ‘30” and another with “5 1940” written below the word/name “BABS”.		Medium GPA

1029	S30 14 31.1 E24 19 26.5	This is a set of rocks at the top of the hill with various mostly scraped initials on various horizontal and vertical faces and also a scraped cross with a backdrop of vertical scratched lines. 		Medium GPA
1030	S30 14 31.6 E24 19 27.1	Another set of rocks at the top of the hill with various historical and (probably mostly) quite recent scratched names and motifs. Included are the names “ANDRE” and “IAN” as well as “A+D” and a heart.		Medium GPA
1031	S30 14 32.6 E24 19 28.2	A rock at the top of the hill with some indeterminate historical scratches on it.		Very low GPC
1032	S30 14 32.1 E24 19 28.5	A rock at the top of the hill with some indeterminate historical scratches on it.		Very low GPC

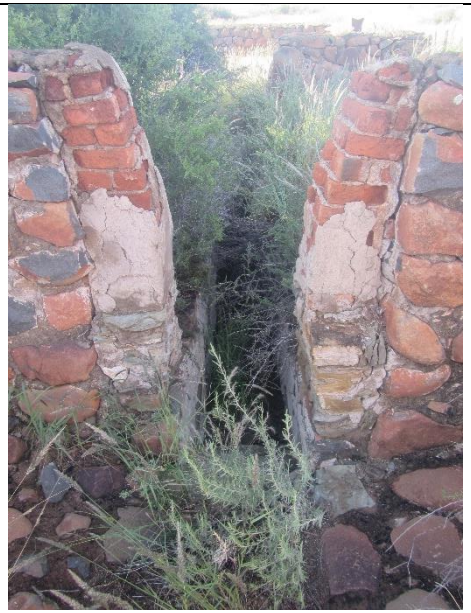
1033	S30 14 31.7 E24 19 28.5	A rock on the side of the hill with an indeterminate geometric historical motif on it.		Very low GPC
1034	S30 14 30.6 E24 19 32.3	A dolerite cobble and cement kraal with an adjoining shed. The cement is fairly modern so likely early-mid-20th century.		Medium
1035	S30 15 01.9 E24 18 22.9	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1036	S30 15 05.6 E24 18 14.1	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC

1037	S30 14 25.7 E24 19 20.0	A dolerite rock away from the foot of the hill with some historical scratches on it. There is also a small amount of building rubble in the grass here but no evidence of any foundation or walling.		Very low GPC
1038	S30 14 26.7 E24 19 17.1	A heavily overgrown (with grass) but fenced (with a now derelict wire fence) graveyard to the west of the Basberg fam complex. It is impossible to count the graves. There is one double grave for “HENDRIK JOHANNES CHRISTIAN HANEKOM” who lived from 1833 to 1907 and his wife “HENDRINA JOHANNA” who died in 1901 (birth date illegible) and whose maiden name was Badenhorst. These may be the parents of the Badenhorst who left his name at waypoint 1016. Another grave has a stone lying loose on top of it with much cursive writing on it. It is very difficult to read but bears dates that look like 1826 and 1891 near the base. The name “Badenhorst” also appears near the top and at the very base of the stone. There are several graves that only have dolerite cobbles packed over them.		High IIIA

				
1039	S30 14 28.5 E24 19 17.7	Occasional fresh hornfels LSA artefacts can be seen in the grass here but it is impossible to determine how extensive or dense the scatter might be.		Low GPB
1040	S30 14 32.1 E24 19 17.0	An area at the foot of the hill had many large dolerite flakes of the sort that would be expected from stone dressing. Along this area it is apparent that stones have been moved to the side to create a roadway		Very low GPC

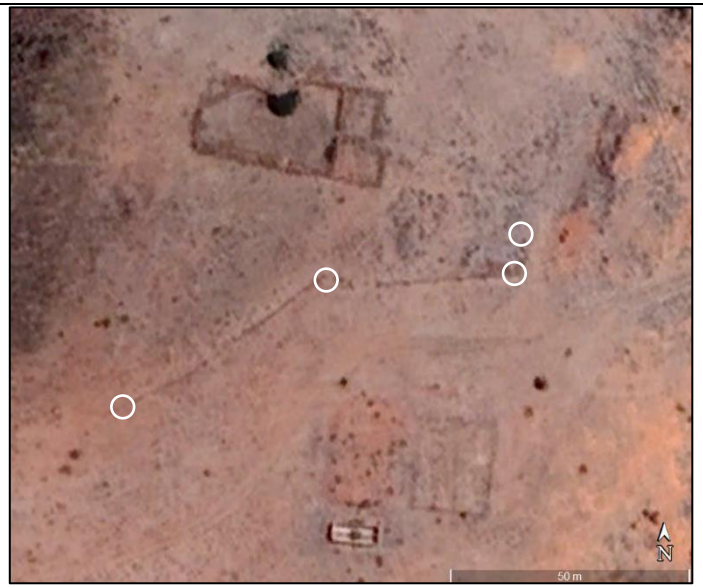
1041	S30 14 35.0 E24 19 18.5	This is an engraving of a single animal, likely an eland. It is somewhat stylised with a very small hump and a nose that ends in a point. The rump is also pointing upwards rather than being square. It is somewhat patinated and poorly preserved and lies halfway up the hill.		Medium-High IIIB
1042	S30 14 35.5 E24 19 20.2	A rock at the top of the hill with a ground patch and some scratches on it.		Very low GPC
1043	S30 14 36.2 E24 19 20.8	A rock at the top of the hill with a ground patch on it.		Very low GPC
1044	S30 14 37.8 E24 19 20.7	A boulder right on the edge of the hilltop has a number of scraped engravings on its vertical face that faces onto the hill. The engravings look quite fresh but yet are poorly preserved. There seem to be two ostriches towards the right, but the rest are difficult to tell the species of. A large flake of dolerite on top of the boulder has been used as a rock gong and makes a fairly high-pitched sound.		High IIIA

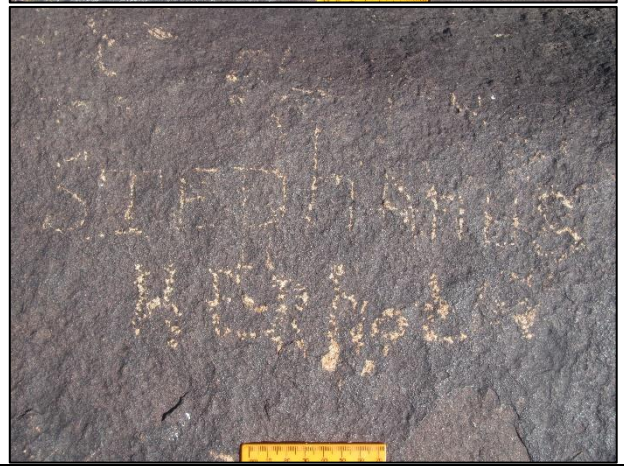
		 		
1045	S30 14 38.5 E24 19 21.9	A rock at the top of the hill with a ground patch on it.		Very low GPC
1046	S30 14 40.2 E24 19 22.1	A rock at the top of the hill with a ground patch and two pecked areas on it.		Very low GPC

1047	S30 14 42.2 E24 19 24.2	A rock at the base of the hill with a ground patch on it.		Very low GPC
1048	S30 14 49.2 E24 18 57.8	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1049	S30 14 44.6 E24 18 57.6	A sheep dip made with dolerite and grey cement and likely to date to the early-mid-20th century. There are two square enclosures with the dip in between. The enclosure from which the sheep enter the dip has a stone and cement floor, while the other enclosure has an earth floor. 		Low

1050	S30 14 26.2 E24 19 26.1	This is a pair of historical gate posts at the Basberg farm complex and which stand on either side of a public road.		Medium
Waypoints 1051 to 1056 are an historical farm complex. The grass in this area was very dense and it is likely that other features may have been missed. Notably, no graves were found and it seems likely that some must be present.				
1051	S30 11 49.0 E24 17 46.9	An early-mid-20th century ruined building with dressed stone halfway up the walls and red clay bricks above. Grey cement has been used throughout. The brick section was plastered but much of the plaster has peeled off. The joinery is metal, including the door which has fallen off. The roof is missing.		Low GPB

1052	S30 11 48.4 E24 17 47.3	Two parallel and conjoined rectangular enclosures. One measures about 8 m by 18 m and is only one stone high. The second one to the east is about 6 m by 18 m. On site only the larger enclosure was seen, such was the density of the grass, with the second identified only from aerial photography. The walls are made from stones (two skins and rubble fill). Due to the grass it was impossible to photograph the whole feature, but a detail is provided with the grass removed.		Medium GPA
1053	S30 11 48.4 E24 17 46.8	This is the remains of a house of about 11 m by 20 m. A dressed stone plinth is present, and a semi-circular cement step has been built onto the eastern side. There are many broken red frog bricks and it is evident that both grey cement and mud mortar were used in the construction. The cement may have been added at a later date.		Medium GPA
1054	S30 11 47.1 E24 17 46.8	This is a stone wall of about 100 m length running parallel to the road through the farm complex. The wall is a row of single boulders		Medium GPA
1054B	S30 11 47.1 E24 17 48.2			

1054C	S30 11 46.8 E24 17 48.1	usually in the order of 0.3 to 0.5 m in diameter. The rocks are too big to be the base of an old fence line and the shape of the entire feature (shown by white circles at right) suggests another indeterminate function. 		
1054D	S30 11 48.0 E24 17 44.9			
1055	S30 11 46.7 E24 17 48.6	A long feature of about 22 m with the southern part being about 3 m wide and made of bricks (though no in situ bricks could be seen) and the northern part being 5 m wide and of stone.		Medium GPA

1056	S30 11 46.2 E24 17 46.6	A stone kraal complex with maximum length of about 39 m by 19 m. There are three enclosures with two smaller ones to the east and one larger one to the west.		Medium GPA
1057	S30 11 46.4 E24 17 44.3	Four boulders on a dolerite hill with various inscriptions as follows: “STEPHANUS”, “CNEL”, “J.C.L. v. Vuure...” (middle initial uncertain and right hand end of rock broken) with “1898” below it and another name on a broken rock that includes “VAN VUU…”. Some other graffiti is unclear. 	 	Medium- High IIIB

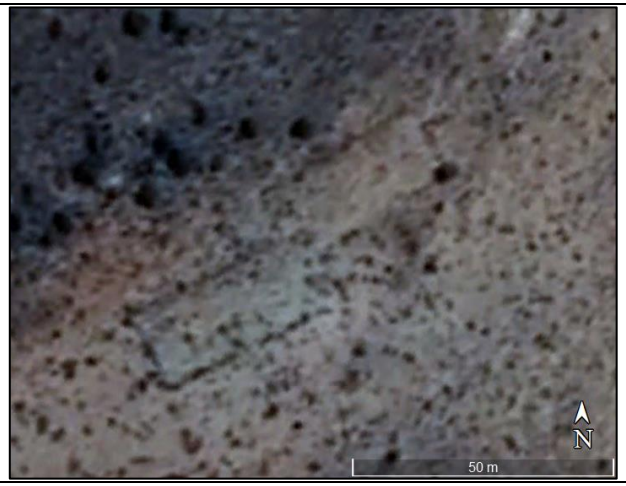
				
1058	S30 11 49.6 E24 17 40.0	A cluster of trees, a corrugated iron reservoir, a wind pump and some wire enclosures. Part of the cultural landscape, but directly associated with the historical farm complex.		Medium
1059	S30 11 41.7 E24 17 38.2	A rock with scratched writing on it. Among other things, it includes “JLVV” and “4de oet 07”. The date could be a corruption of August in French, or else could really be “oct”. Neither seem satisfactory explanations, since French is unlikely to have been spoken here and *Oktober* is spelled with a “k” in both Dutch and Afrikaans.		Medium-High IIIB

1060	S30 11 31.2 E24 17 16.8	Ephemeral scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC
1061	S30 11 42.8 E24 17 03.1	Three ground rocks on a dolerite outcrop.		Very low GPC
1062	S30 11 42.0 E24 17 03.3	A Nine Men's Morris board has been lightly scratched onto a rock and there is a ground rock here too.		Very low GPC
1063	S30 11 41.4 E24 17 03.7	Two ground rocks and a set of five parallel scratched lines that are between 35 and 45 mm long and a few mm apart from each other. The scratches are likely more recent, possibly less than 100 years old.		Low GPB
1064	S30 11 40.8 E24 17 04.1	There are several ground rocks on a dolerite outcrop here.		Very low GPC
1065	S30 11 40.1 E24 17 04.5	One ground rock on a dolerite outcrop.		Very low GPC

1066	S30 11 56.8 E24 17 22.8	A small beacon of dolerite rocks on a small dolerite outcrop.		Very low GPC
1067	S30 11 54.0 E24 17 36.5	A 400 m long berm runs from northwest to southeast. Its function could not be ascertained.		Very low GPC
1067B	S30 12 02.0 E24 17 48.1			
1068	S30 11 51.8 E24 17 50.1	There are two stone-lined dams here that are built end to end and share a short side. They seem well-preserved but are very overgrown and impossible to photograph. They are directly related to the adjacent historical farmstead.		Low GPB
1069	S30 11 51.2 E24 17 47.2	This is a concrete plinth that seems like the foundation for a pump. It is likely mid-20th century in age.		Very low GPC
1070	S30 11 51.5 E24 18 35.8	A cluster of gum trees and a corrugated iron reservoir. Part of the cultural landscape.		Low
1071	S30 12 09.4 E24 19 22.5	An ephemeral scatter of hornfels stone artefacts with variable patina were found in a denuded area with exposed calcrete. Included is a large, circular scraper.		Very low GPC

				
1072	S30 14 18.1 E24 19 24.2	Several large pepper trees occur alongside the road just north of the Basberg farm complex. These are part of the cultural landscape.		Medium

1073	S30 14 33.1 E24 19 34.0	Two boulders with pecked and scraped engravings of animals. They look historical/recent. 		Low GPB
1074	S30 14 33.4 E24 19 33.8	Some stone walling running along just below the summit of a dolerite hill. Its function is indeterminate. There is also a boulder with “AS” scratched onto it as well as what looks like an incomplete Nine Men’s Morris board. 		Low GPB

1075	S30 18 07.5 E24 21 27.3	These three points are at the ends of three walls that divide two U-shaped kraal enclosures on the side of a dolerite hill. The total kraal measures about 50 m by 76 m. The lowest sides (towards the northeast) have no walls present. A few hornfels flakes (probably LSA), some glass and some transfer-printed ceramics were also seen here. 		Medium GPA
1075B	S30 18 08.0 E24 21 28.4			
1076	S30 18 08.6 E24 21 29.8			
1077	S30 18 14.2 E24 21 29.7	These six points outline a kraal with three enclosures and which was very poorly visible in the long grass. The one is about 36 m by 16 m, while the other two are each about 26 m by 14 m. The latter two share a long side, while the first one shares one of its short sides with the other two.		Medium GPA
1077B	S30 18 14.6 E24 21 28.9			
1077C	S30 18 15.4 E24 21 29.3			
1077D	S30 18 15.0 E24 21 30.2			
1077E	S30 18 15.8 E24 21 28.0			
1077F	S30 18 15.4 E24 21 27.8			

1078	S30 18 25.1 E24 21 30.0	This is a small brick cottage that lies outside the study area and was not visited. It looks from a distance to be in ruin.		Medium GPA
1079	S30 18 17.8 E24 21 22.3	This is an old road alignment that has a telephone wire strung alongside it. The road is only represented by a slight indentation in the ground.		Very low GPC
1080	S30 19 14.9 E24 21 34.6	This is an earthen-walled reservoir and wind pump just outside the study area.		Low

5.3. Graves

Graves are often present close to farm complexes, especially those that are far from towns and municipal graveyards. For this reason, it was unusual to see just one graveyard in the wider study area. This was at the Basberg farmstead and was located a short distance to the west of the complex, far from any potential impacts.

Other graves might still occur in the area, including possibly within the PV5 footprint, but these are most likely to be unmarked graves whose locations cannot be determined or predicted. The chances of such graves being present, however, are very low.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

Although the study area is remote from towns, it is worth briefly mentioning the nearest ones. Philipstown was founded in 1863 on the farm Rietfontein and contains a number of Provincial Heritage Sites (Schoeman 2008). Petrusville is slightly younger, having been founded in 1877, although the owner of the farm Rhenosterfontein had already donated a part of his farm to the Dutch Reformed Church in 1822 (Frandsen 2019). De Aar was founded as an important railway junction linking lines from all over southern Africa. Although the site for the junction was chosen in 1881, the town itself was only formally declared just after the end of the Anglo-Boer War (Schoeman 2008). The War was an important period on the region's history resulting in the creation of many heritage resources ranging from battlefields, to forts and blockhouses and many smaller stone-walled features. As already noted, battlefields are absent from the vicinity and Green (2022) does not list any blockhouses from the area.

Moving into the immediate study area, a review of historical aerial photography shows that all three currently extant farm complexes in or very close to the study area were present at least 50 years ago and in much the same state as they are now. A barn has had additions at Wolwekuil (on Remainder of Wolwe Kuilen 42) since 1968 (Figure 14), a labourer's cottage was added at Middelplaas Noord (Portion 5 of Grass Pan 40) since 1968 (Figure 15), but Basberg (on Portion 3 of Basberg 88) is no different now than it was in 1974 (Figure 14). Notable at Wolwekuil (on Remainder of Wolwe Kuilen 42) are the two enclosures made from *Agave americana* plants (Figure 14). These spiky plants were used in the past to create enclosures for livestock or vegetables (Baloyi & Klopper 2017). It is evident that small-scale agriculture was undertaken at the first two farms in 1968 but in both cases this land use has long since been discontinued. At Basberg, too, there was small scale agriculture some distance to the southwest of the farmstead but it had already been discontinued by 1974 (not illustrated). Figure 17 shows that in the far south of Annex Wolwe Kuilen 41/rem a prickly pear orchard was planted after 1968. It is in poor condition today, having clearly been abandoned for many years. It is noted that this orchard was planted very far from a homestead, but its location is in a drainage line which must have facilitated it getting enough water.

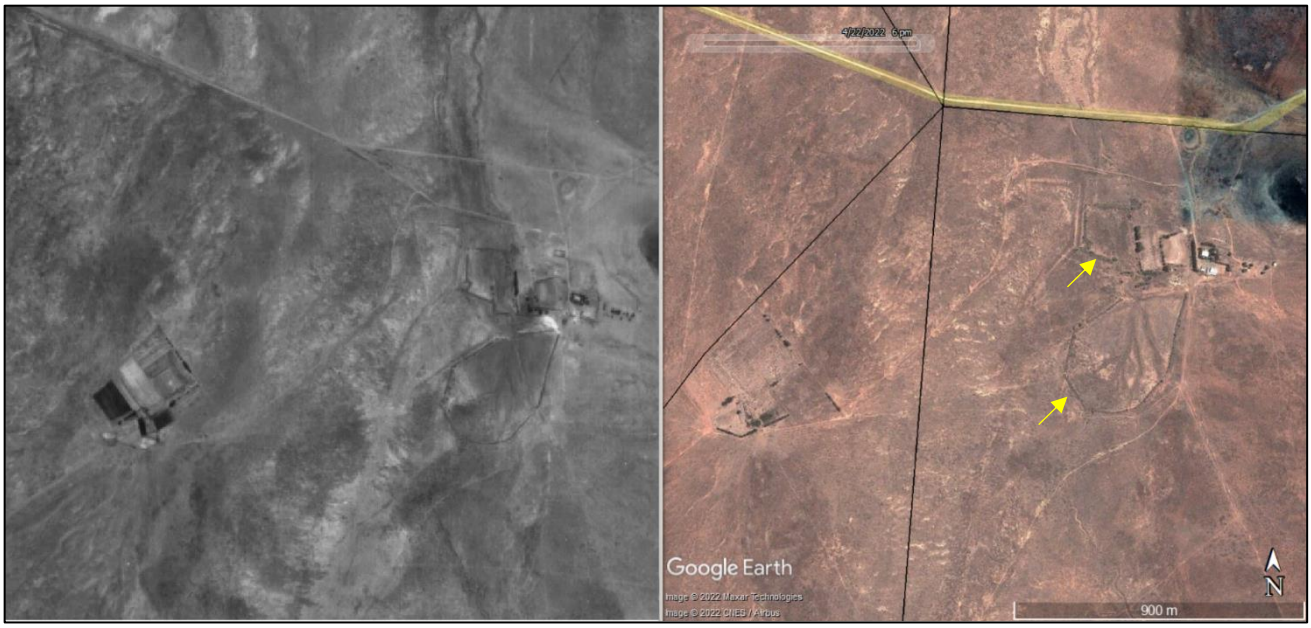


Figure 14: *1968 (611_012_00356) and modern (Google Earth) views of the Wolwekuil farm complex (on Remainder of Wolwe Kuilen 42). Three structures are visible in the main complex (waypoint 947) and the orchard and fields to the southwest (on Remainder of Annex Wolwe Kuilen 41) were in use (waypoints 998 & 999). At the farmstead there are two enclosures of Agave plants that predate 1968 (yellow arrows).*

Figure 15: *1968 (611_012_00354) and modern (Google Earth) views of the Middelplaas Noord farm complex (on Portion 5 of Grass Pan 40). Two structures are visible in the main complex (waypoint 1007) and the larger structure is visible to the north (waypoint 983).*

Figure 16: *1974 (738_025_12970) and modern (Google Earth) views of the Basberg farm complex (on Portion 3 of Basberg 88). All structures present today were present in 1974 as well (waypoint 1008).*

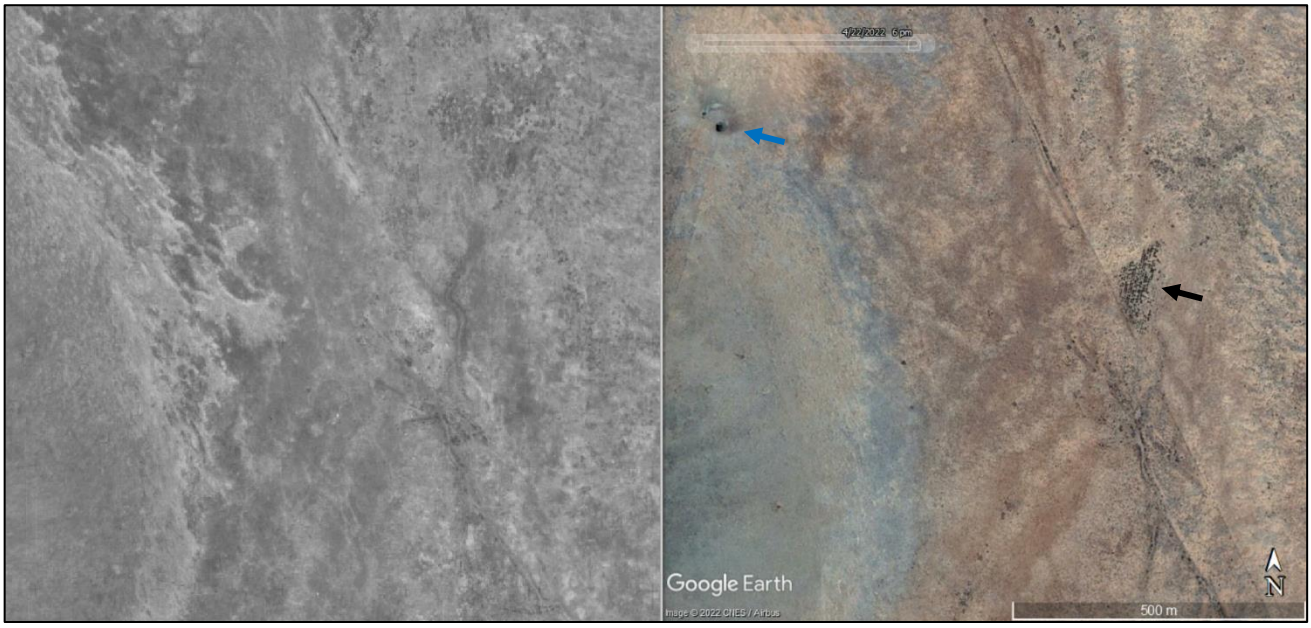


Figure 17: *1974 (738_025_12972) and modern (Google Earth) views showing the location of a prickly pear orchard (black arrow) planted since 1974 on the remainder of Annex Wolwe Kuilen 41. The water point (blue arrow) on Basberg 88/rem also post-dates 1974.*

5.4.2. Site visit

Most significant historical resources that were not archaeological were at the farmsteads and comprised of houses, outbuildings and related features as noted in the desktop study above. No buildings occur within 400 m of the PV facilities. The only other historical features were some of the livestock watering points that have reservoirs older than 60 years but none of these are considered

significant heritage resources. One such reservoir occurs within the PV5 study area (waypoint 1013) and will be removed.

5.5. Cultural landscapes and scenic routes

Cultural landscapes are the product of the interactions between humans and nature in a particular area. Sauer (1925) defined them thus: "The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result".

Many water points were present on the landscape as noted above. Some have large karee trees associated with them and others large gum trees. Their ages are variable but it is evident that many new rows of gum trees have been planted at some of these water points in recent decades. They are variable in age with some clearly being modern additions to the landscape (e.g. Figure 18 and 19). Nonetheless, all contribute to the rural character and sense of place of the wider study area. There is one of these water points (with a reservoir) within the PV5 footprint. Its age is unknown but it does predate 1974 (Figure 19) so is a well-established feature of the cultural landscape.

Figure 18: *1968 (611_012_00356) and modern (Google Earth) views of two watering points on Portion 1 of Annex Wolwe Kuilen 41. It is evident that there was more activity at the western one in 1968, while the eastern one was not yet present at that time. These are close to PV11 and are illustrated here as an example.*

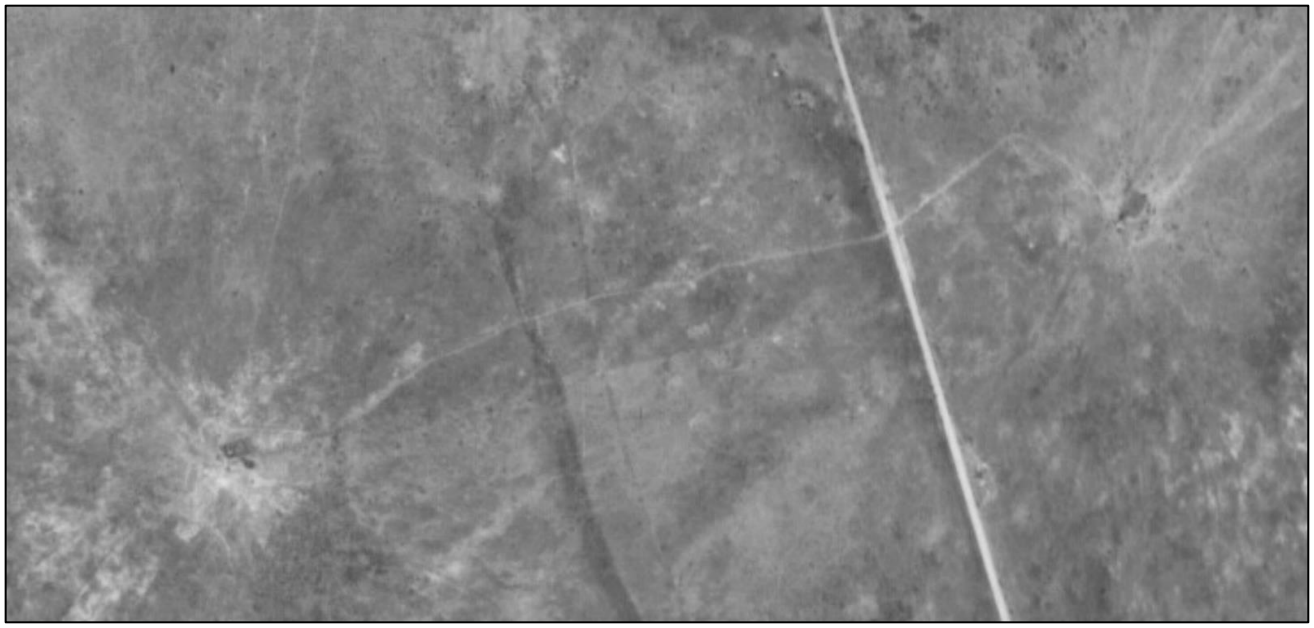


Figure 19: *1974 (738_026_13055) view of two watering points on Portion 3 of Basberg 88. The western one is within PV5.*

A key feature of the cultural landscape is the quietness of the Karoo and the darkness at night. While there would be some noise during construction, the operation of the facility is quiet and this is not an issue. However, security lighting can alter the night-time qualities of a place and the large, dark star-lit sky is an important aspect of the local landscape.

The study area is well away from any major roads and there are thus no scenic route concerns.

5.6. 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 place may have cultural significance are outlined in Section 3(3) of the NHRA (see Section 2 above).

The archaeological resources within the PV footprint are deemed to have very low cultural significance at the local level for their scientific value and can be graded GPC. Higher significance finds do occur in the wider study area with finds up to grade IIIA having been recorded.

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA.

The built environment heritage resources of the area are up to medium significance for their architectural, historical and social values.

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having medium cultural significance at the local level.

Heritage features are mapped in Figure 20 in relation to the proposed Kudu PV5 footprint.

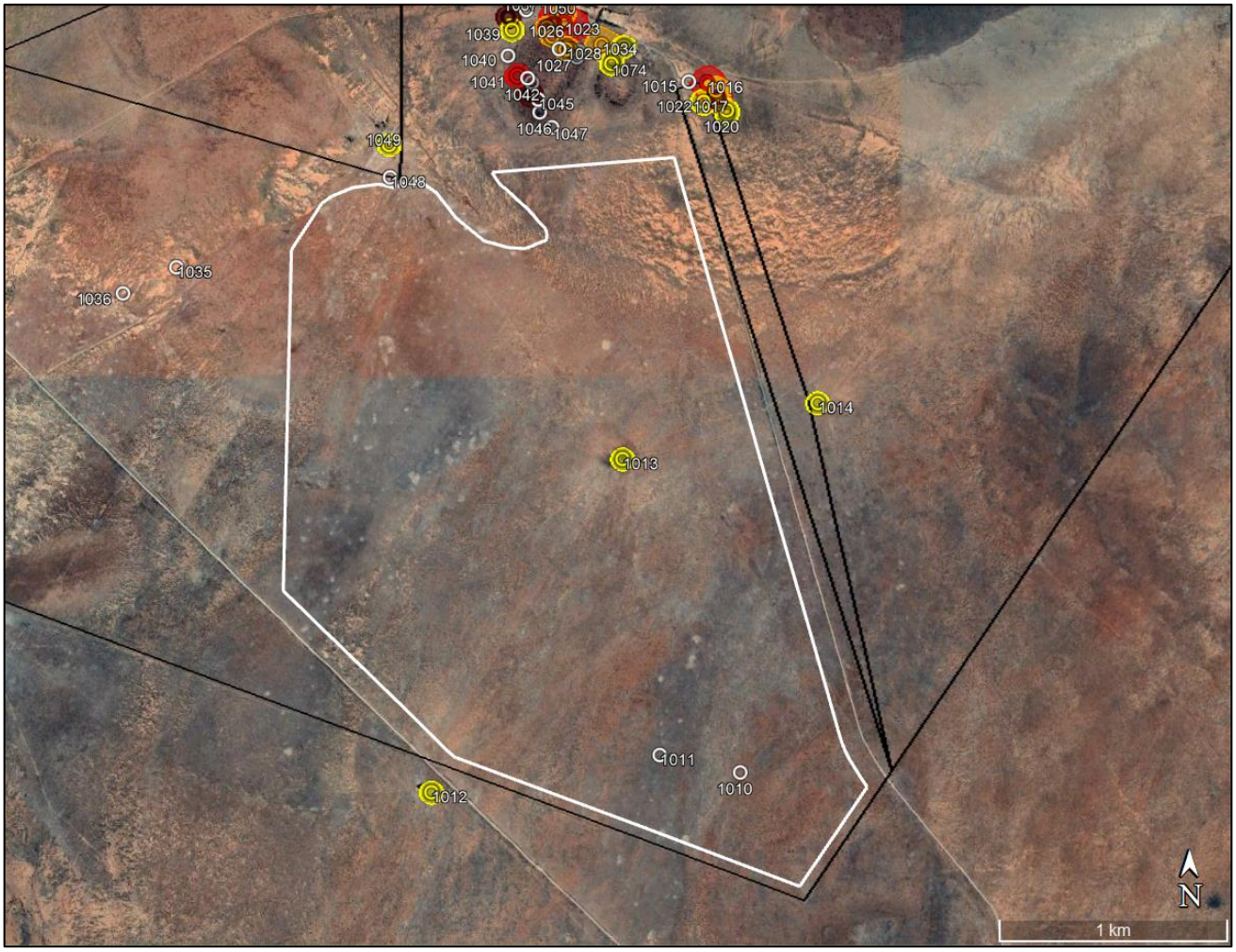


Figure 20: *Map of heritage resources occurring in and around the PV5 study area. They are mapped with 50 m buffers (dark red symbols = IIIA, red = IIIB, orange = GPS, yellow = GPB), but GPC resources are not buffered (white symbols).*

5.7. Summary of heritage indicators

- Significant fossils should not be damaged or destroyed by the proposed project.
- Significant archaeological sites should not be damaged or destroyed by the proposed project.
- Graves should not be damaged or destroyed by the proposed project.
- The cultural landscape should not be dominated by the proposed project.

6. ISSUES, RISKS AND IMPACTS

6.1. Summary of issues identified during the Scoping Phase

The potential heritage issues identified during the scoping phase of this EIA process include:

- Potential impacts to archaeological resources;
- Potential impacts to graves; and
- Potential impacts to the cultural landscape.

Palaeontological impacts were also considered but it was found after a field assessment that no significant impacts would occur and this aspect was not studied further in the EIA Phase.

Consultation was carried out during the Scoping Phase but no heritage issues were raised. A comment was received from SAHRA as follows:

> The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit requests that the HIA must be revised to include a map of the track logs and must be revised to show all project components such as the access roads etc. The table of identified heritage resources i.e. Table 2, must be revised to indicate in which Kudu project each heritage resources is located within and any specific mitigation and/or management measures required.

Their comment has been taken into account in the HIA.

6.2. Identification of potential impacts/risks

Based on the fieldwork, impacts to fossils were not considered to be a significant issue and were not studied further in the EIA Phase.

The potential impacts identified during the EIA assessment are:

Construction Phase

- Potential impacts to archaeology
- Potential impacts to graves; and
- Potential impacts to the cultural landscape.

Operational Phase

- Potential impacts to the cultural landscape.

Decommissioning Phase

- Potential impacts to the cultural landscape.

Cumulative impacts

- Potential impacts to archaeology
- Potential impacts to graves; and
- Potential impacts to the cultural landscape.

7. IMPACT ASSESSMENT

7.1. Construction Phase

7.1.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when equipment is brought to site and grubbing begins. However, because the archaeological materials expected to occur on the grassy plains are of such low cultural significance and likely to be very low density, the impact consequence is deemed to be slight and the probability unlikely leading to an impact significance of **very low negative** (Table 4). The only mitigation measures suggested are to report any chance finds of dense artefact clusters and contract an archaeologist to conduct any sampling that may be required. The chances of such finds being made are extremely small. After mitigation the significance is still **very low negative**.

There are no fatal flaws in terms of construction phase impacts to archaeology.

7.1.2. Impacts to graves

Direct impacts to graves would occur during the construction phase when equipment is brought to site and grubbing begins. However, because graves are extremely unlikely to be present in the PV footprint, the impact probability is deemed to be extremely unlikely. Despite the extreme consequence (because of the high cultural significance of graves), the impact significance is **very low negative** (Table 4). Mitigation measures entail reporting and protecting chance finds until they can be professionally dealt with. After mitigation the significance is still **very low negative**.

There are no fatal flaws in terms of construction phase impacts to graves.

7.1.3. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase when equipment is brought into the area and construction work begins. The activity associated with construction will disrupt the quiet, rural character of the area. Although the impact would be short term, its consequence is considered substantial and it would definitely occur if construction happens. The significance would be **moderate negative** (Table 4). The only mitigation measures suggested are minimising the duration of the construction period and ensuring that any areas not needed during operation are rehabilitated at the end of the construction period. With mitigation, the significance drops to **low negative**.

There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

7.2. Operation Phase

7.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase as a result of the presence of the PV facility in the rural landscape. Although the activity will have abated, the duration of impact will be long and the consequence is considered substantial. If the facility is built the impact would definitely occur and the significance would be **moderate negative** (Table 4). Mitigation measures include ensuring that operation activities remain in designated areas, that buildings are painted in earthy colours and that night-time light pollution is minimised. With mitigation, the significance drops to **low negative**.

There are no fatal flaws in terms of operation phase impacts to the cultural landscape.

7.3. Decommissioning Phase

7.3.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the decommissioning phase when equipment is brought into the area and decommissioning of the facility begins. The activity associated with decommissioning will disrupt the quiet, rural character of the area. Although the impact would be short term, its consequence is considered substantial and it would definitely occur if the facility is built and requires decommissioning. The significance would be **moderate negative** (Table 4). The only mitigation measures suggested are minimising the duration of the decommissioning period and ensuring that the site is adequately rehabilitated. With mitigation, the significance drops to **low negative**.

There are no fatal flaws in terms of decommissioning phase impacts to the cultural landscape.

Table 4: *Assessment of impacts.*

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
Construction Phase						
Damage or destruction of archaeological materials	Status	Negative	Very low (5)	- Report any chance finds of dense clusters of artefacts to SAHRA and/or an archaeologist - Protect in situ and appoint archaeologist to sample as needed	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Damage or destruction of graves	Status	Negative	Very low (5)	- Report any chance finds to SAHRA and/or an archaeologist - Protect in situ and appoint archaeologist to exhume	Very low (5)	High
	Spatial extent	Site specific				
	Duration	Permanent				
	Consequence	Extreme				
	Probability	Extremely unlikely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of SEF and equipment into the landscape	Status	Negative	Moderate (3)	- Minimise duration of construction period - Ensure effective rehabilitation, at the end of the construction period, of areas not needed during operation	Low (4)	High
	Spatial extent	Local				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Operational Phase						
Intrusion of SEF into the landscape	Status	Negative	Moderate (3)	- Ensure that all maintenance vehicles and operational activities stay within designated areas - Paint buildings in earthy colours to reduce contrast - Make use of motion detectors and downlighting to reduce night-time light pollution	Low (4)	High
	Spatial extent	Regional				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Decommissioning Phase						
Intrusion of SEF and equipment into the landscape	Status	Negative	Moderate (3)	- Minimise duration of decommissioning period - Ensure effective rehabilitation of the entire site once the infrastructure has been removed	Low (4)	High
	Spatial extent	Local				
	Duration	Short term				

	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Cumulative impacts – Construction phase						
Impacts to archaeology, graves	Status	Negative	Low (4)	- Follow stipulated mitigation measures as required per project (none required for this project) - Conduct mitigation if needed per project (none required for this project)	Very Low (5)	High
	Spatial extent	Regional				
	Duration	Permanent				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of SEF and equipment into the landscape	Status	Negative	Moderate (3)	- Minimise duration of construction period - Minimise cut-and-fill and landscape scarring in general - Avoid construction on slopes and high ground - Ensure effective rehabilitation, at the end of the construction period, of areas not needed during operation	Low (4)	High
	Spatial extent	Regional				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Cumulative impacts – Operational Phase						
Intrusion of SEF into the landscape	Status	Negative	Moderate (3)	- Make use of motion detectors and downlighting to reduce night time light pollution - Place ancillary infrastructure in less prominent areas	Low (4)	High
	Spatial extent	Regional				
	Duration	Long term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Cumulative impacts – Decommissioning Phase						
Intrusion of SEF into the landscape	Status	Negative	Moderate (3)	- Make use of motion detectors and downlighting to reduce night time light pollution - Place ancillary infrastructure in less prominent areas - Ensure rehabilitation after decommissioning	Low (4)	High
	Spatial extent	Regional				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				

7.4. Cumulative Impacts

Table 5 and Figure 21 show the other projects considered for cumulative impacts, although it must be noted that other types of development (e.g. roads, agriculture) can also result in impacts to heritage resources. These impacts are difficult to quantify because of the variable survey conditions that are likely to have pertained during the assessments of the various projects. Nonetheless, it is noted that archaeological finds in the areas typically considered for development in the grasslands tend to be minimal, while finds on hills tend to be avoided in the construction of wind energy facilities (WEFs). It is still possible that some archaeological sites and/or graves might have been overlooked during the various surveys and the potential cumulative impacts for the construction phase are thus rated **low negative** (Table 4). Incorporating the various mitigation measures that are suggested for each project (which might include pre-construction surveys or archaeological mitigation) would reduce the impact significance to **very low negative**.

Impacts to the cultural landscape relate mainly to the amount of change that one could see/experience from one place, including the night-time lighting of the facilities. It is essentially impossible that one could see all the facilities listed in Table 5 from one area due to the various dolerite hills in the landscape. As a result, the consequence is only rated as substantial and the significance as **moderate negative** for all phases (Table 4). Employing the listed mitigation measures in each phase would reduce the impacts after mitigation to **low negative**.

There are no fatal flaws in terms of cumulative impacts.

Table 5: *Proposed renewable energy projects, located within 30 km of the proposed Kudu Solar Facilities, that will be considered in the Cumulative Impact Assessment (in addition to the Kudu Solar Facilities and EGI Projects) (Source: DFFE REEA, Quarter 4, 2022; and SAHRIS).*

DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE
12/12/20/2258 12/12/20/2258/1	Solar PV	75	Approved and Preferred Bidder (Operational)	The Proposed Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape Province – Kalkbult
12/12/20/2463/1 12/12/20/2463/1/2 12/12/20/2463/1/A2 12/12/20/2463/1/AM3 12/12/20/2463/1/AM4 12/12/20/2463/1/AM5	Onshore Wind	140	Approved and Preferred Bidder (Operational)	Longyuan Mulilo De Aar 2 North Wind Energy Facility Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility The Wind Energy Facility (North and South) situated on the Plateau Near De Aar, Northern Cape Province
12/12/20/2463/2 12/12/20/2463/2/AM2	Onshore Wind	100	Approved and Preferred Bidder (Operational)	Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility The Wind Energy Facility (North and South) Situated On The Plateau Near De Aar, Northern Cape Province
14/12/16/3/3/1/1166 14/12/16/3/3/1/1166/AM3 14/12/16/3/3/1/1166/AM4	Transmission line	132	Approved	Basic Assessment for the proposed construction of a 132 kV transmission line corridor adjacent to the existing Eskom transmission line from Longyuan Mulilo De

DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE
				Aar 2 North Wind Energy Facility (WEF) to the Hydra Substation in De Aar, Northern Cape
14/12/16/3/3/1/785	Transmission line	132	Approved	Proposed construction of two 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape.
14/12/16/3/3/2/278 14/12/16/3/3/2/278/1 14/12/16/3/3/2/278/2	Onshore Wind	118	Approved	Proposed Castle Wind Energy Facility Project, located near De Aar, Northern Cape
14/12/16/3/3/2/564 14/12/16/3/3/2/564/AM1 14/12/16/3/3/2/564/AM2	Solar PV	75	To be confirmed	Proposed Swartwater 75MW solar PV power facility in Petrusville within Renosterburg Local Municipality, Northern Cape
14/12/16/3/3/2/740	Solar PV	300	Approved	Proposed 300MW Solar Power Plant in Phillipstown area in Renosterberg Local Municipality
14/12/16/3/3/2/744	Solar PV	unknown	Approved	Proposed PV facility on farm Jakhalsfontein near De Aar
14/12/16/3/3/2/739	Solar PV	70 – 100	To be confirmed	Proposed 70 – 100 MW Solar Power Plant in Petrusville
Not issued yet (it is understood that the project is still within the pre-application stage)	Solar PV	800 (Maximum)	Pre-Application	The Proposed Keren Energy Odyssey Solar PV Facilities (Odyssey Solar 1, Odyssey Solar 2, Odyssey Solar 3, Odyssey Solar 4, Odyssey Solar 5, Odyssey Solar 6, Odyssey Solar 7 And Odyssey Solar 8)
To be confirmed	Solar PV	3050	Scoping	The Proposed Development of the Crossroads (formally referred to as the Hydra B) Green Energy Cluster of Renewable Energy Facilities and Grid Connection Infrastructure, Pixley Ka Seme District Municipality, Northern Cape Province. The Cluster entails the development of up to 21 solar energy facilities, with the Scoping and EIA Processes consisting of three phases. Phases 1, 2 and 3 consist of 9, 6 and 6 solar facilities, respectively. The Phase 1 Scoping and EIA Processes were launched in January 2023.
14/12/16/3/3/2/2244 14/12/16/3/3/2/2245 14/12/16/3/3/2/2246 14/12/16/3/3/2/2247 14/12/16/3/3/2/2248 14/12/16/3/3/2/2249 14/12/16/3/3/2/2250 14/12/16/3/3/2/2251 14/12/16/3/3/2/2252 14/12/16/3/3/2/2253 14/12/16/3/3/2/2254 14/12/16/3/3/2/2255	Solar PV	2180	Scoping and EIA Process underway	Proposed Development of 12 Solar Photovoltaic (PV) Facilities (Kudu Solar Facility 1 to 12) and associated infrastructure, near De Aar, Northern Cape Province

DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE
N/A	Transmission Line	220	Existing Power Line	HYDRA ROODEKUIL 2
N/A	Transmission Line	132	Existing Power Line	HYDRA ROODEKUIL 1
N/A	Transmission Line	765	Existing Power Line	BETA HYDRA 2
N/A	Transmission Line	400	Existing Power Line	HYDRA PERSEUS 3
N/A	Transmission Line	220	Existing Power Line	VAN DER KLOOF ROODEKUIL 2
N/A	Transmission Line	220	Existing Power Line	VAN DER KLOOF ROODEKUIL 1
N/A	Transmission Line	400	Existing Power Line	BETA HYDRA 1
N/A	Transmission Line	400	Existing Power Line	HYDRA PERSEUS 2
N/A	Transmission Line	132	Existing Power Line	KALKBULT/KAREEBOSCHPAN 1
N/A	Transmission Line	132	Existing Power Line	ROODEKUIL/ORANIA 1
N/A	Transmission Line	765	Planned Power Line	Perseus to Gamma 2nd 765 kV line Cape Corridor Phase 4: 2nd Zeus-Per-Gam-Ome 765kV Line
N/A	Transmission Line	765	Planned Power Line	Relocate Beta-Hydra 765kV line to form Perseus-Hydra 1st 765kV line Cape Corridor Phase 2: Zeus – Hydra 765kV Integration
N/A	Transmission Line	765	Planned Power Line	Perseus to Gamma 2nd 765 kV line Cape Corridor Phase 4: 2nd Zeus-Per-Gam-Ome 765kV Line

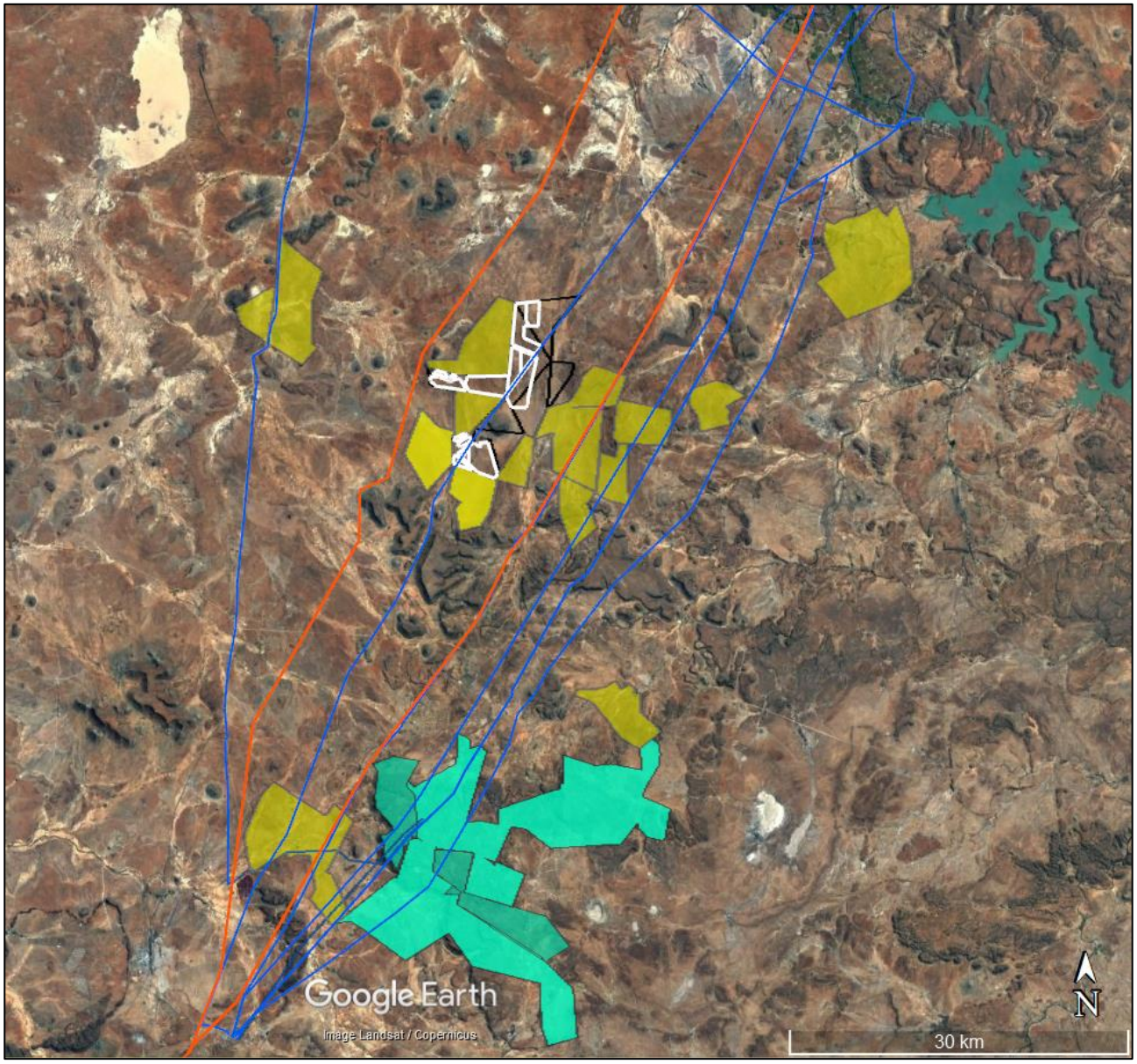


Figure 21: *Map showing renewable energy facilities (operational and proposed) in the vicinity of the Kudu study area. Kudu land parcels shown in white.*

7.5. 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 project will provide construction phase jobs but more importantly it will help alleviate the ongoing electricity supply problems which are hampering economic growth in South Africa. Stabilising the electricity supply will thus have significant socio-economic benefits as a growing economy means more jobs and better income all round. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual heritage impacts.

7.6. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that might affect archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of **negligible negative** significance. The only existing impact to the rural cultural landscape relates to the presence of several HV powerlines running though the area. Their impact on the landscape is quite small and the existing impact is thus rates as **very low negative**.

7.7. The No-Go alternative

If the project were not implemented then the site would stay as it currently is (impact significance of **negligible** for archaeology and graves and **very low negative** for the landscape). Although the heritage impacts with implementation would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.

7.8. 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 publicly accessible vantage points is undesirable. Because of the height of the majority of the proposed development and its very remote location, such an impact to the landscape is not envisaged.

8. IMPACT ASSESSMENT SUMMARY

The overall impact significance essentially follows the most significant impact in each phase following the implementation of the proposed mitigation measures. These are shown in Table 6.

Table 6: *Overall Impact Significance (Post Mitigation)*

Phase	**Overall Impact Significance**
Construction	Low negative
Operational	Low negative
Decommissioning	Low negative
Nature of Impact	**Overall Impact Significance**
Cumulative – Construction	Low negative
Cumulative – Operational	Low negative
Cumulative – Decommissioning	Low negative

9. LEGISLATIVE AND PERMIT REQUIREMENTS

This report and the proposed recommendations will need to be approved by SAHRA. There are no further legislative requirements for the approval process under the NHRA but if archaeological mitigation is needed then the appointed archaeologist will need to apply for and be granted a permit from SAHRA to do the work. This must be carried out well in advance of construction to ensure that there is enough time for SAHRA to approve the mitigation work before construction commences.

10. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The actions recorded in Table 7 should be included in the environmental management program (EMPr) for the project.

Table 7: *Heritage considerations for inclusion in the EMPr.*

Impact	**Mitigation / management objectives & outcomes**	**Mitigation / management actions**	**Monitoring**		
			Methodology	**Frequency**	**Responsibility**
Impacts to archaeology and graves					
Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Construction, Operation and Decommissioning Phases: Reporting chance finds of graves and dense clusters of artefacts as early as possible to an archaeologist and/or SAHRA (https://www.sahra.org.za/contact/), protect in situ and stop work in immediate area and appoint archaeologist to exhume or sample as needed (where relevant)	Inform staff to be vigilant and carry out inspections of all new excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to the cultural landscape					
Visible landscape scarring	Minimise landscape scarring	Construction Phase: Ensure disturbance is kept to a minimum and does not exceed project requirements. Minimise the duration of the activities. At the end of the construction period, rehabilitate areas, not needed during operation.	Monitoring of surface clearance relative to approved layout	Ongoing basis	Construction Manager or Contractor
				As required	ECO
Intrusion into cultural landscape	Minimise construction duration	Operational Phase: Ensure that all maintenance vehicles and operational activities stay within designated areas.	Undertake visual inspections and report non-compliance	As required	Environmental Manager
Intrusion into cultural landscape	Minimise contrast and light pollution	Operational Phase: Paint buildings in earthy colours to reduce contrast. Make use of motion detectors and	Monitor that this has been considered in the design	Once off	Project Developer

		downlighting to reduce night-time light pollution.	and operation of the facility		
Visible landscape scarring	Minimise landscape scarring	Decommissioning Phase: Ensure disturbance is kept to a minimum and does not exceed project requirements. Minimise the duration of the activities. Rehabilitate the entire site once the infrastructure has been removed.	Monitoring of surface clearance relative to approved layout	Ongoing basis	Construction Manager or Contractor
			Undertake visual inspections and report non-compliance	As required	Environmental Manager

11. CONCLUSIONS

There are no significant concerns for the proposed Kudu PV5 project. The heritage indicators and project responses are shown in Table 8. The facility layout has been designed to avoid all known heritage resources with the exception of the cultural landscape which will not be significantly impacted. The loss of the water point (waypoint 1013) does not change the overall landscape character. There are no areas requiring avoidance and no protective buffers are needed. The development footprint and detailed layout (Figure 3) are considered suitable from a heritage perspective. Any further changes to the detailed layouts as might become necessary are deemed acceptable if the changes remain within the overall development footprint area assessed during the Scoping and EIA Process.

Table 8: *Heritage indicators and project responses.*

Indicator	**Project Response**
Significant fossils should not be damaged or destroyed by the proposed project.	No significant fossils expected, chance finds procedure to be implemented following guidelines in palaeontological study.
Significant archaeological sites should not be damaged or destroyed by the proposed project.	The project has been designed to avoid all significant sites. None fall within the footprint and none are close enough to be at risk of incidental damage.
Graves should not be damaged or destroyed by the proposed project.	No known graves fall within the footprint and none are close enough to be at risk of incidental damage.
The cultural landscape should not be dominated by the proposed project.	The landscape is characterised by hills in a flat landscape and because the development will be fairly low, it will not overly dominate the landscape.

11.1. Statement and reasoned opinion of the specialist

Given the lack of significant heritage resources in the proposed Kudu PV5 footprint and generally limited impacts to the cultural landscape, it is the opinion of the heritage consultant that the project may be authorised in full using either battery technology.

12. RECOMMENDATIONS

It is recommended that the proposed Kudu PV5 SEF be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- Visually permeable fences, preferably in a dark colour, should be used;
- Buildings to be painted in earthy colours to reduce contrast;
- Night-time light spillage should be minimised, possibly through the use of motion detectors so that the area can stay dark until light is needed; 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.

13. REFERENCES

Baloyi, C.M. & Klopper, R.R. 2017. Agave americana L. Accessed online at: https://pza.sanbi.org/agave-americana on 20th March 2023.

Bollong, C.A., Sampson, C.G. & Smith, A.B. 1997. Khoikhoi and bushman pottery in the Cape Colony: ethnohistory and Later Stone Age ceramics of the South African interior. Journal of Anthropological Archaeology 16: 269-299.

Bollong, C.A., Vogel, J.C., Jacobson, L., Van der Westhuizen, W. & Sampson, C.G. 1993. Direct dating and identity of fibre temper in pre-Contact Bushman (Basarwa) pottery. Journal of Archaeological Science 19: 41–55.

Frandsen, D. 2019. *History of Petrusville. Accessed online at: https://www.karoo-southafrica.com/eastern-upper-karoo/petrusville/history-of-petrusville/#:~:text=Petrusville%20has%20its%20origins%20on,to%20the%20Dutch%20Reformed%20Church. On 20th March 2023.*

Green, A.C. 2022. Blockhouses: a field guide. Johannesburg: Porcupine Press.

Hart, T.J.G. 1989. Haaskraal and Volstruisfontein: Later Stone Age events at two rockshelters in the Zeekoe Valley, Great Karoo, South Africa. Unpublished M.A. dissertation, University of Cape Town.

Orton, J. 2012. Heritage Impact Assessment for three Solar Energy Facilities at De Aar, Western Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. St James: ACO Associates cc.

Orton, J. 2022. Archaeological Mitigation Final Report: Du Plessis Dam PV1 at De Aar, De Aar Magisterial District, Northern Cape. Report prepared for Landscape Dynamics Environmental Consultants (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.

Orton, J. & Webley, L. 2013a. Heritage Impact Assessment for multiple proposed Solar Energy Facilities on De Aar 180/1 (Badenhorst Dam Farm), De Aar, Northern Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. Diep River: ACO Associates cc.

Orton, J. & Webley, L. 2013b. Heritage Impact Assessment for multiple proposed solar energy facilities on Du Plessis Dam 179, De Aar, Northern Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. Diep River: ACO Associates cc.

Parkington, J., Morris, D. & Rusch, N. 2008. Karoo Rock Engravings. Cape Town: Creda Communications.

Rudner, J. 1979. The use of stone atefacts and pottery among the Khoisan peoples in historic and proto-historic times. South African Archaeological Bulletin 34: 3-17.

SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

Sampson, C.G. 1984. A prehistoric pastoralist frontier in the Upper Zeekoe Valley, South Africa. In: Hall, M., Avery, G., Avery, D.M., Wilson, M.L. & Humphreys, A.J.B (eds) Frontiers: southern African archaeology today: 96 – 110. Oxford: British Archaeological Reports International series 207.

Sampson, C.G. 1985. Atlas of Stone Age settlement in the central and upper Seacow Valley. Memoirs of the National Museum (Bloemfontein) 20: 1-116.

Sampson, C.G. 1986. Model of a prehistoric herder-hunter contact zone: a first approximation. South African Archaeological Society Goodwin Series 5: 50-56.

Sampson, C.G. 2010. Chronology and dynamics of Later Stone Age herders in the Seacow River valley, South Africa. Journal of Arid Environments 74:848-848.

Sauer, C.O. 1925. The Morphology of Landscape. University of California Publications on Geography 2(2): 19-54.

Van Vollenhoven, A. 2013. A report on a cultural heritage impact assessment for the proposed Swartwater Solar PV Power Facility, close to Petrusville, Northern Cape Province. Report prepared for USK Consulting. Grienkloof: Archaetnos.

Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Winter, S. & Oberholzer, B. 2013. Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. Report prepared for the Provincial Government of the Western Cape Department of Environmental Affairs and Development Planning. Sarah Winter Heritage Planner, and Bernard Oberholzer Landscape Architect / Environmental Planner, in association with Setplan.

APPENDIX 1 – Curriculum Vitae

Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 23 Dover Road, Muizenberg, 7945
Telephone: (021) 788 1025
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

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

Education:

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

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

Employment History:

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

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 - Site Sensitivity Verification

As required in Part A of the Government Gazette 43110, GN 320, a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool. The details of the site sensitivity verification are noted below:

Date of Site Visit	21, 22, 24 and 25 April 2022
Specialist Name	Dr Jayson Orton
Professional Registration Number	Association of Southern African Professional Archaeologists (ASAPA): 233 Association of Professional Heritage Practitioners (APHP): 043
Specialist Affiliation / Company	ASHA Consulting (Pty) Ltd

Method of the Site Sensitivity Verification

Initial work was carried out using satellite aerial photography in combination with the author's accumulated knowledge of the local landscape. This was used to provide sensitivity data. Subsequent fieldwork served to ground truth the site, including areas identified as potentially sensitive. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Sections 5.2.1 and 5.4.1).

Outcome

The first map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low throughout the wider Kudu study area. The site visit showed that in fact the majority of the site is of low sensitivity but with several pockets of higher sensitivity being present (where archaeological and other heritage resources were found). The heritage specialist thus disputes the screening tool report sensitivity mapping. The other three maps below show the areas considered to be archaeologically sensitive. Most are sites considered to be of high sensitivity, but those sites marked as low cultural significance can be seen as medium sensitivity. The remaining land in between is of low sensitivity. A photographic record and description of the relevant heritage resources are contained within the impact assessment report.

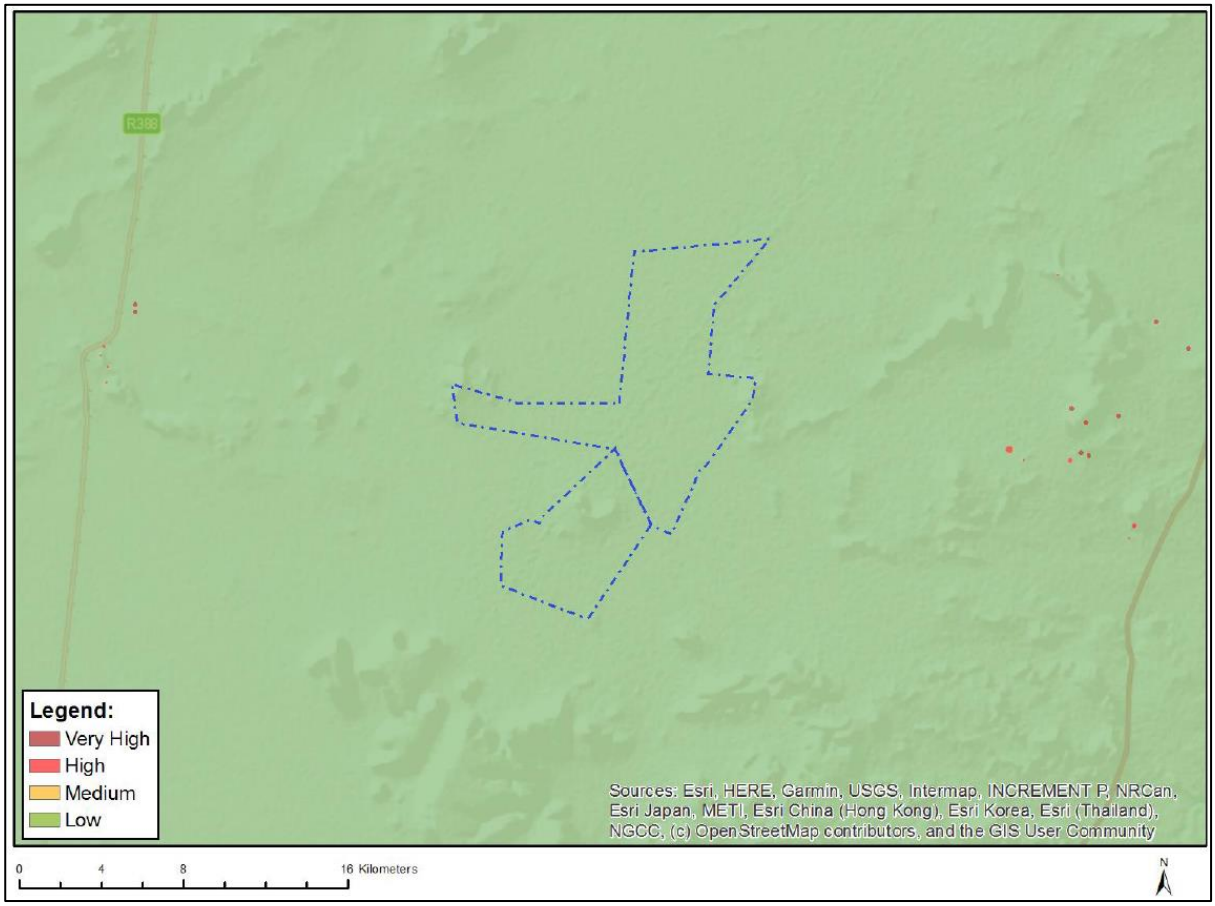
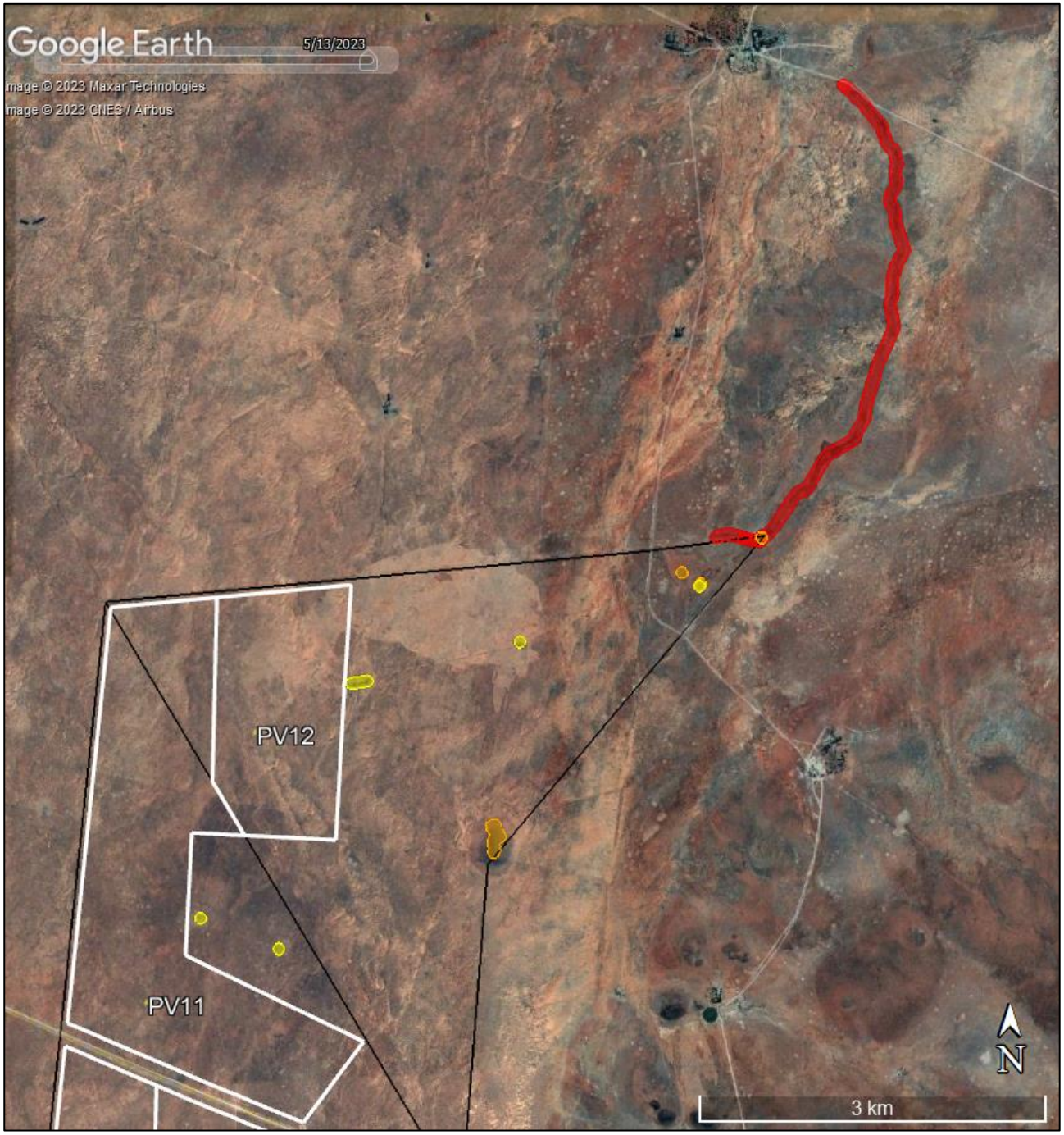


Figure A2.1: *Screening tool map of archaeological and heritage sensitivity.*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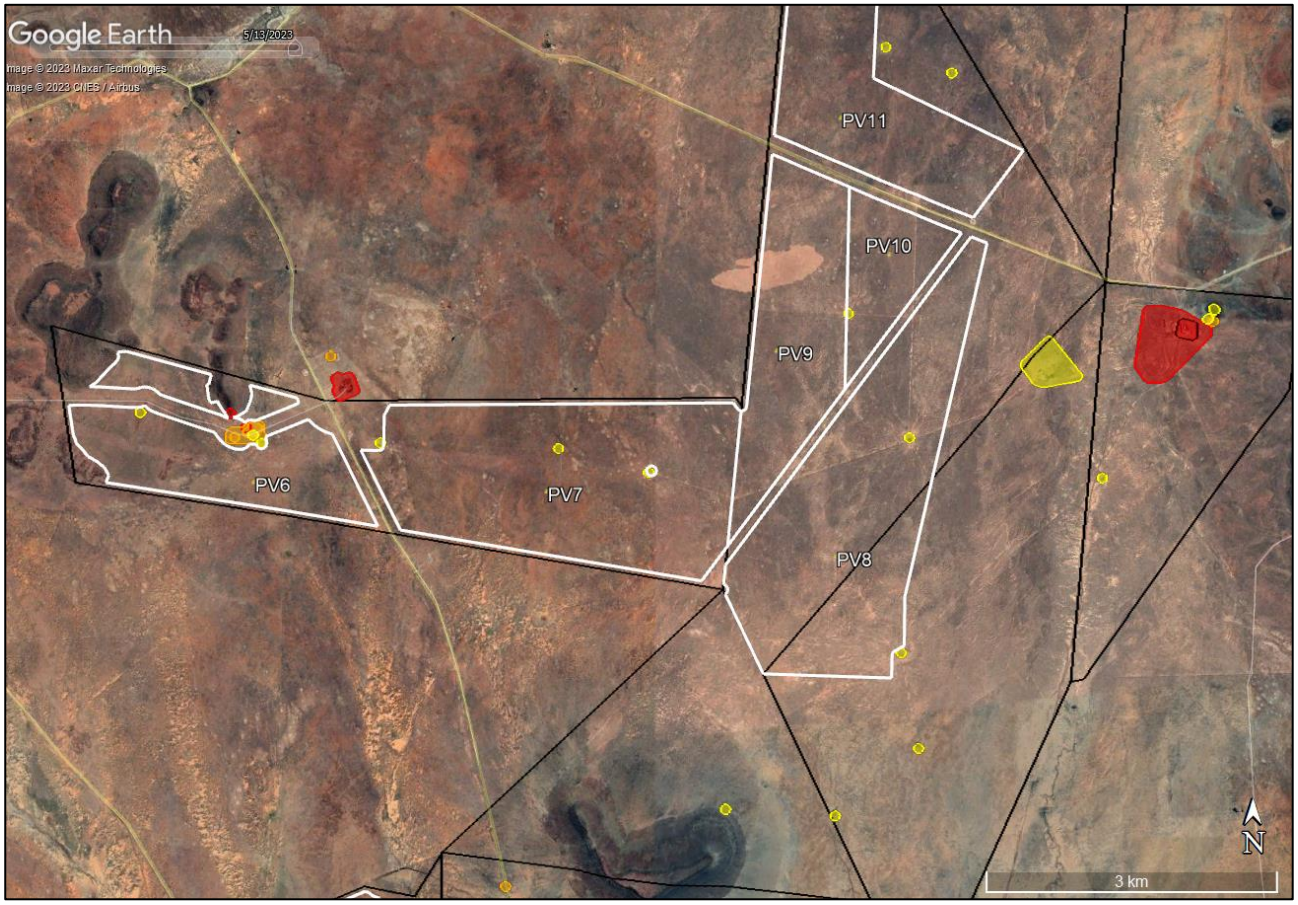
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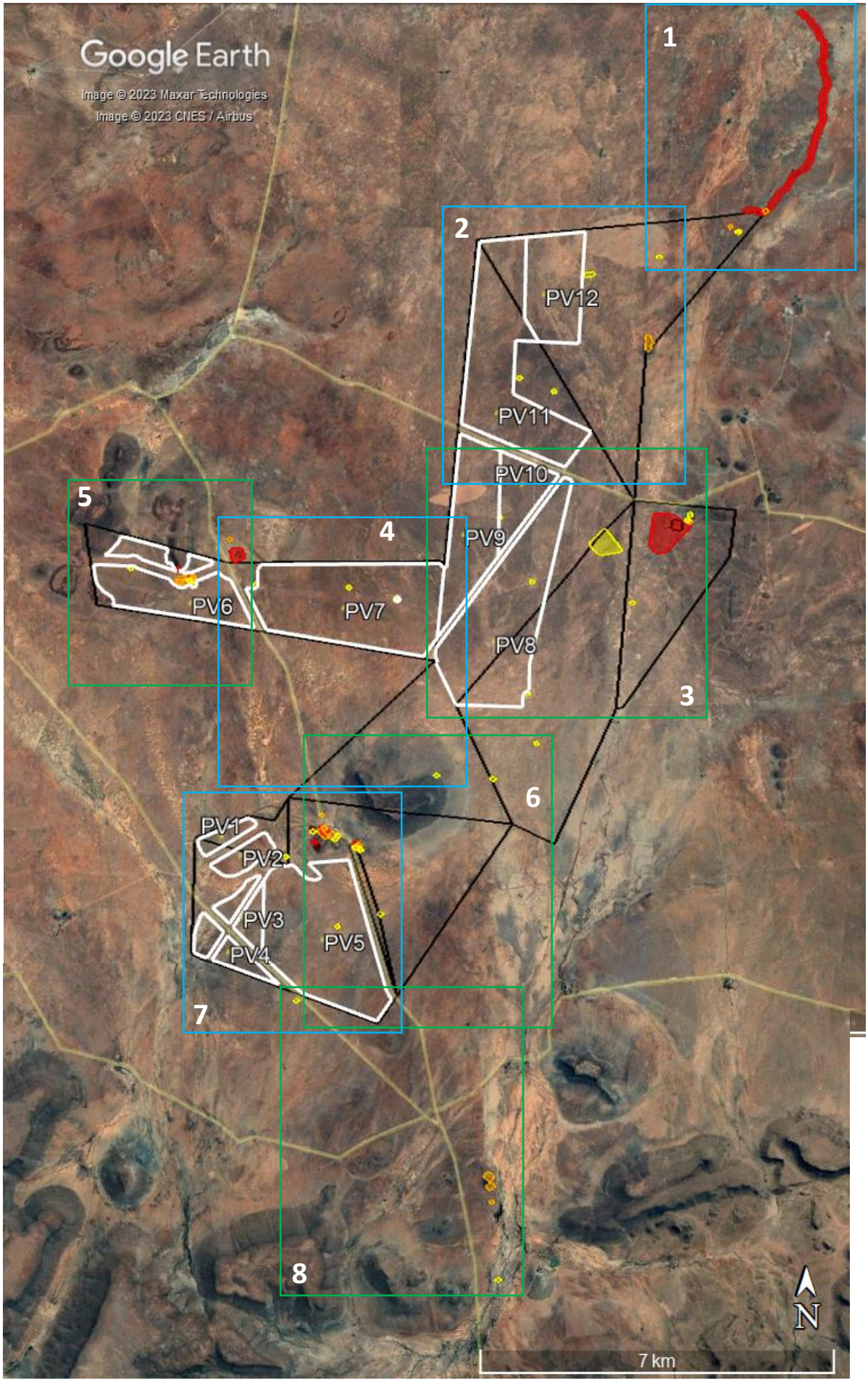
APPENDIX 3 – Mapping

Key to mapping: Black polygons: farm boundaries
White polygons: project footprints (i.e. fence lines; labelled by yellow pins)
Dark Red: Grade IIIA
Red: Grade IIIB
Orange: Grade GPA
Yellow: Grade GPB
White: Grade GPC

Maps shown with facility fence line only for the sake of mapping clarity. The fence line will contain all the proposed infrastructure as shown in the detailed layout in Figure 3 of the HIA report.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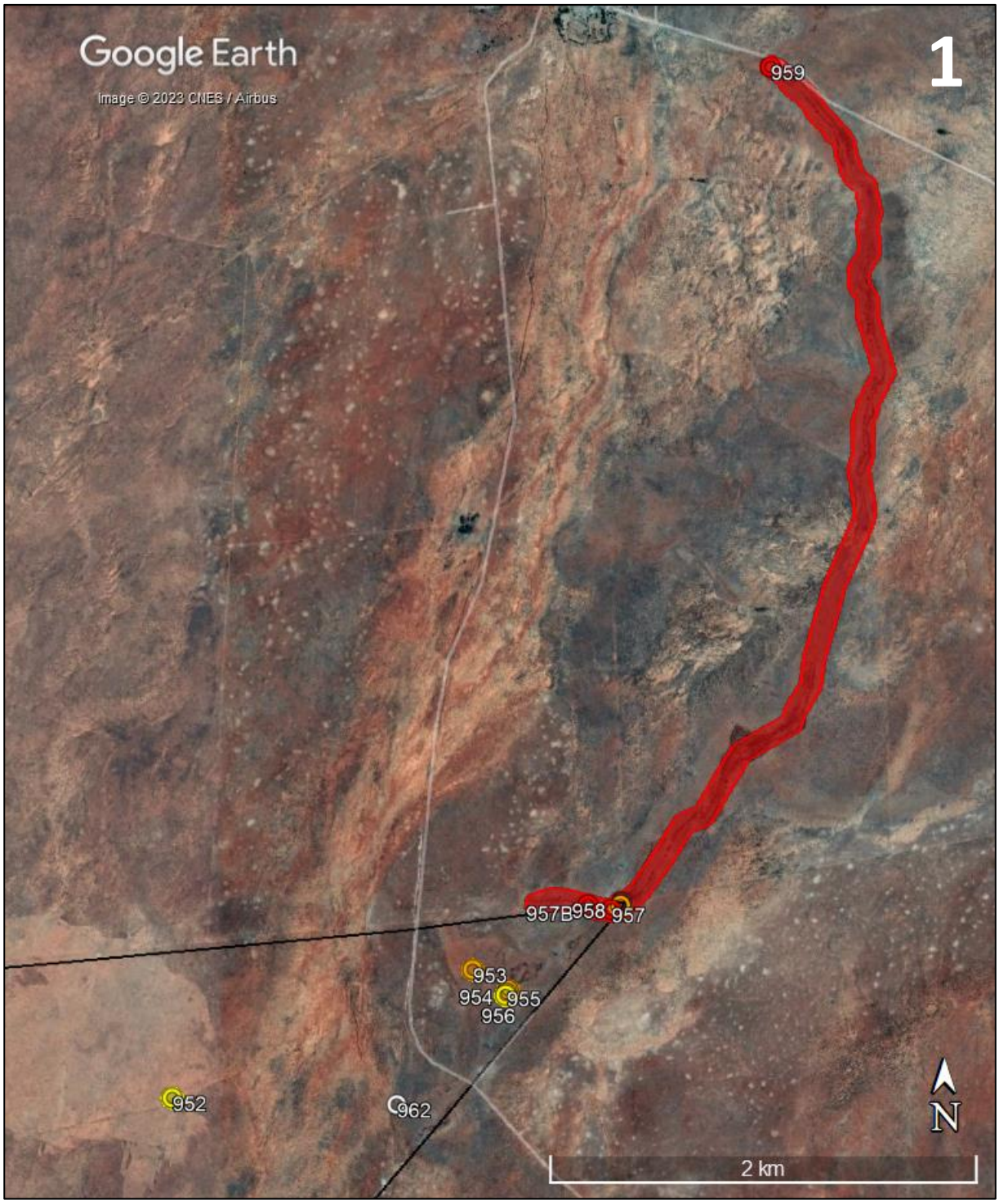
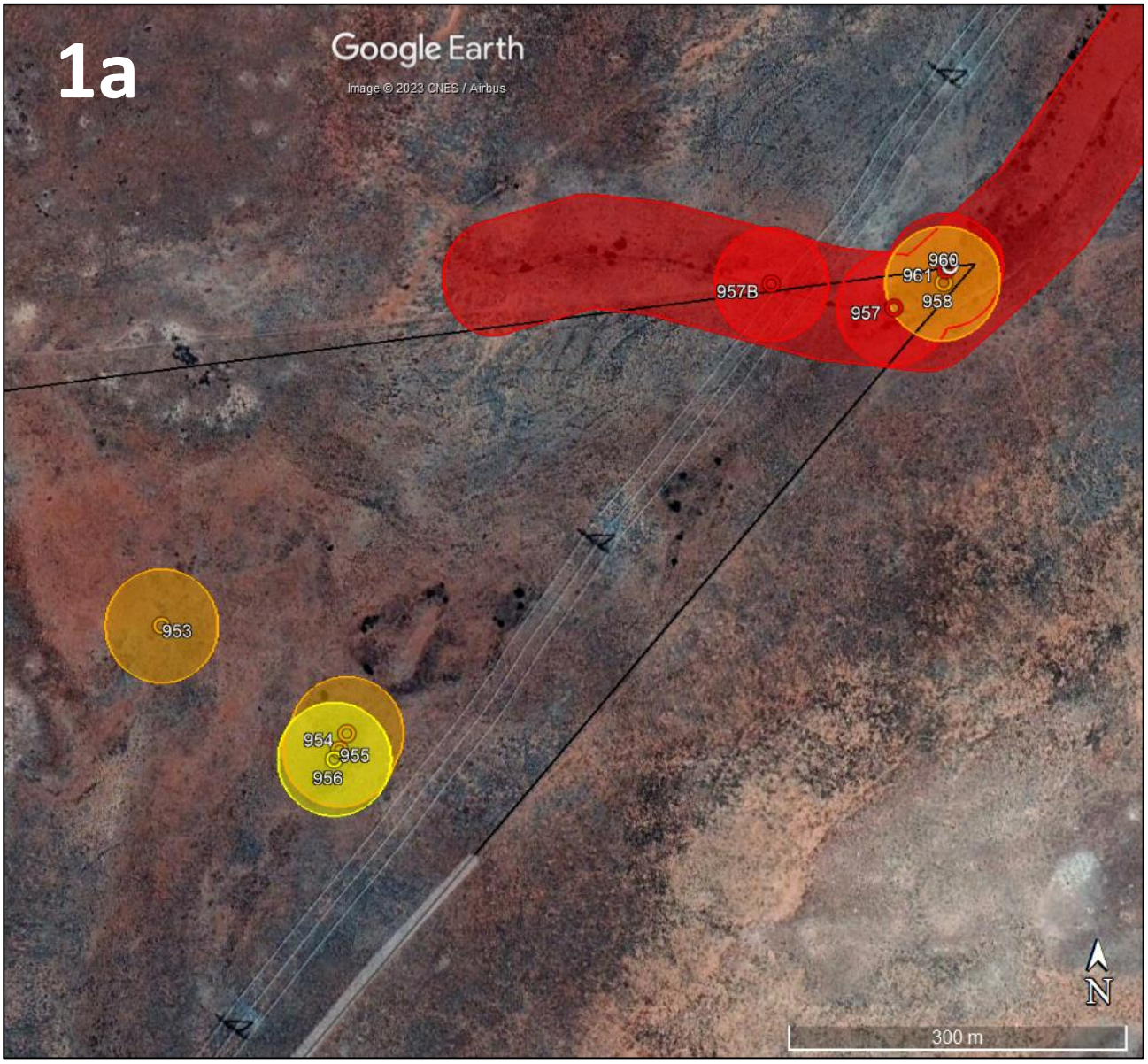
Numbered boxes indicate main enlargements below.

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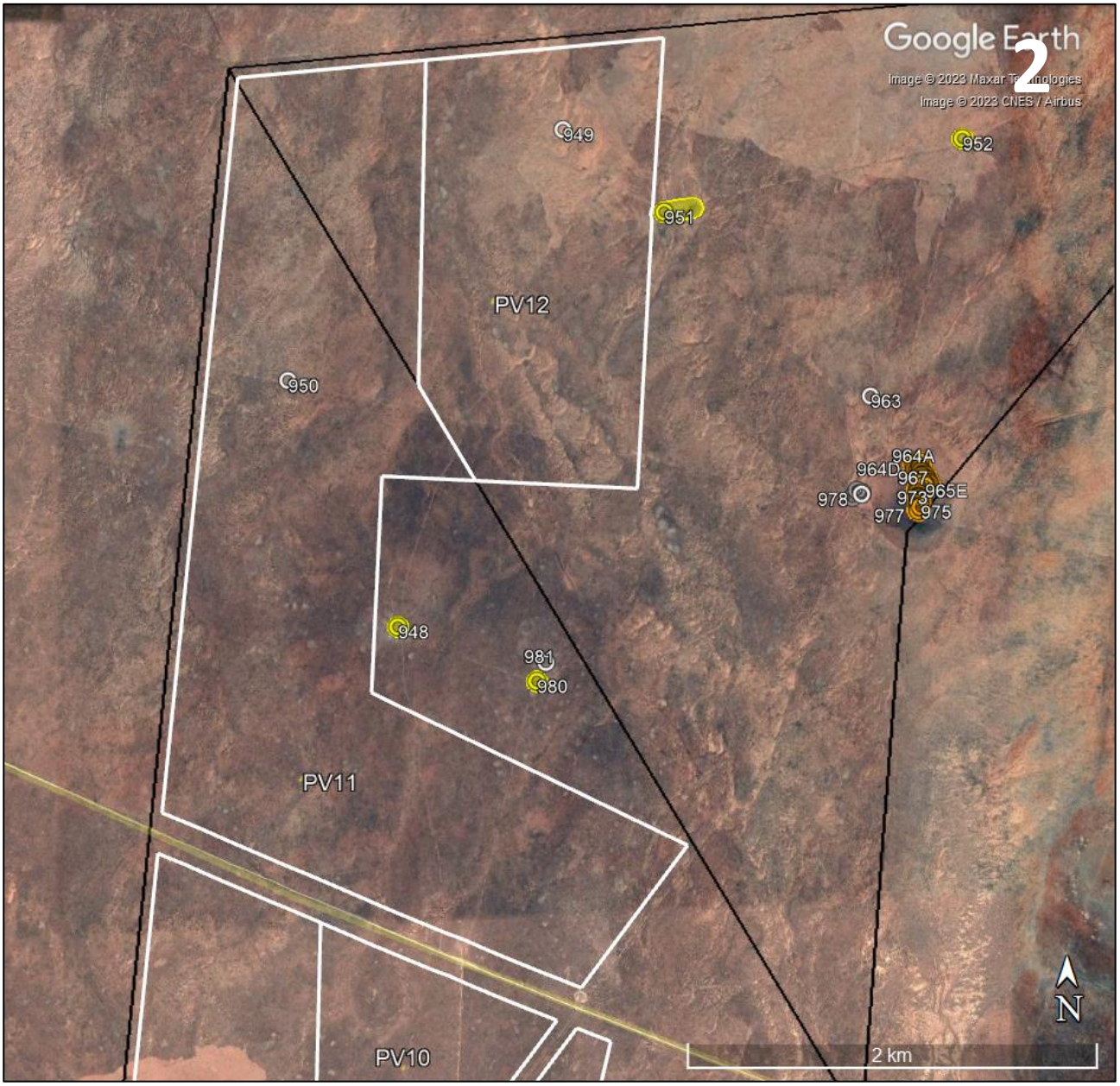
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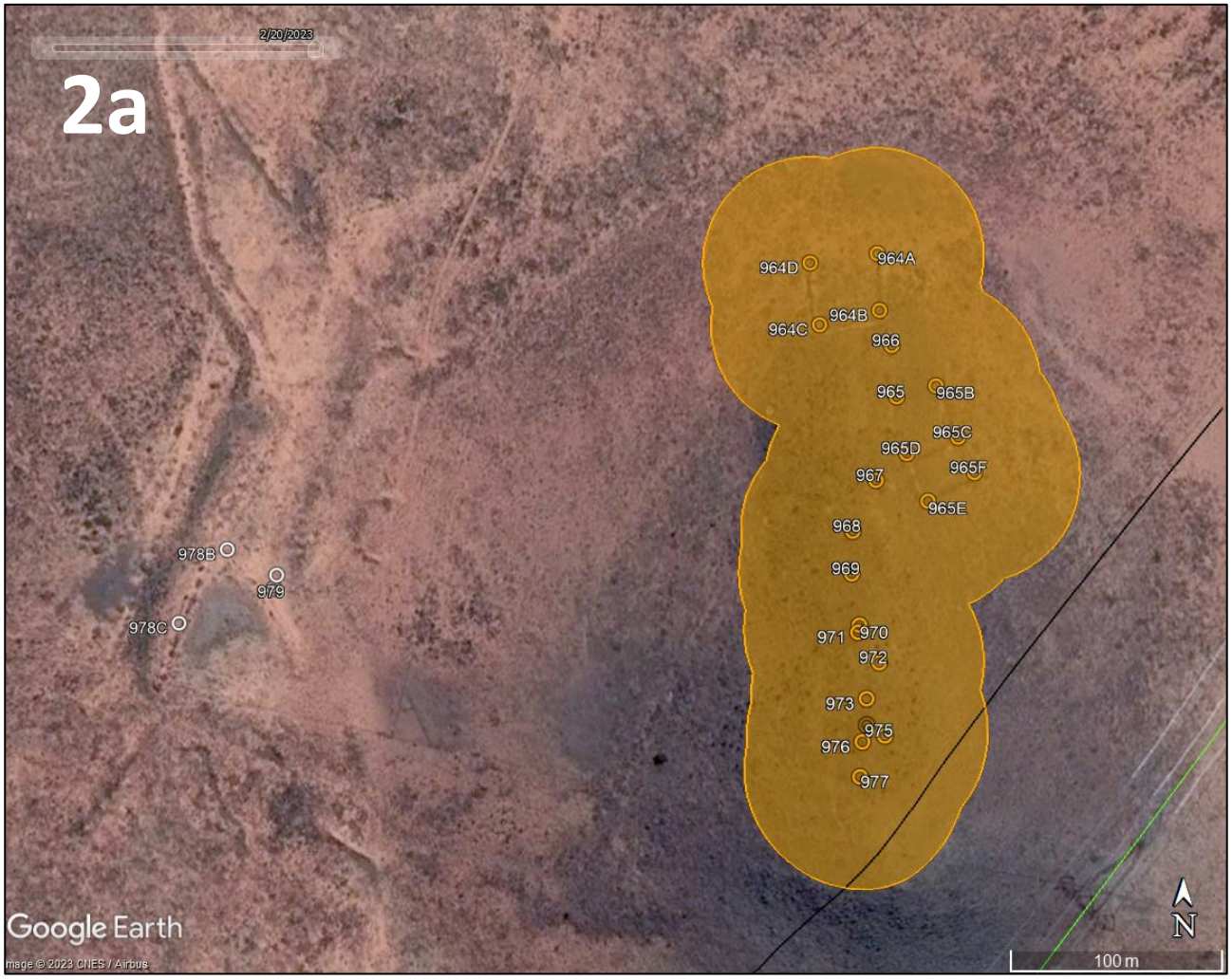
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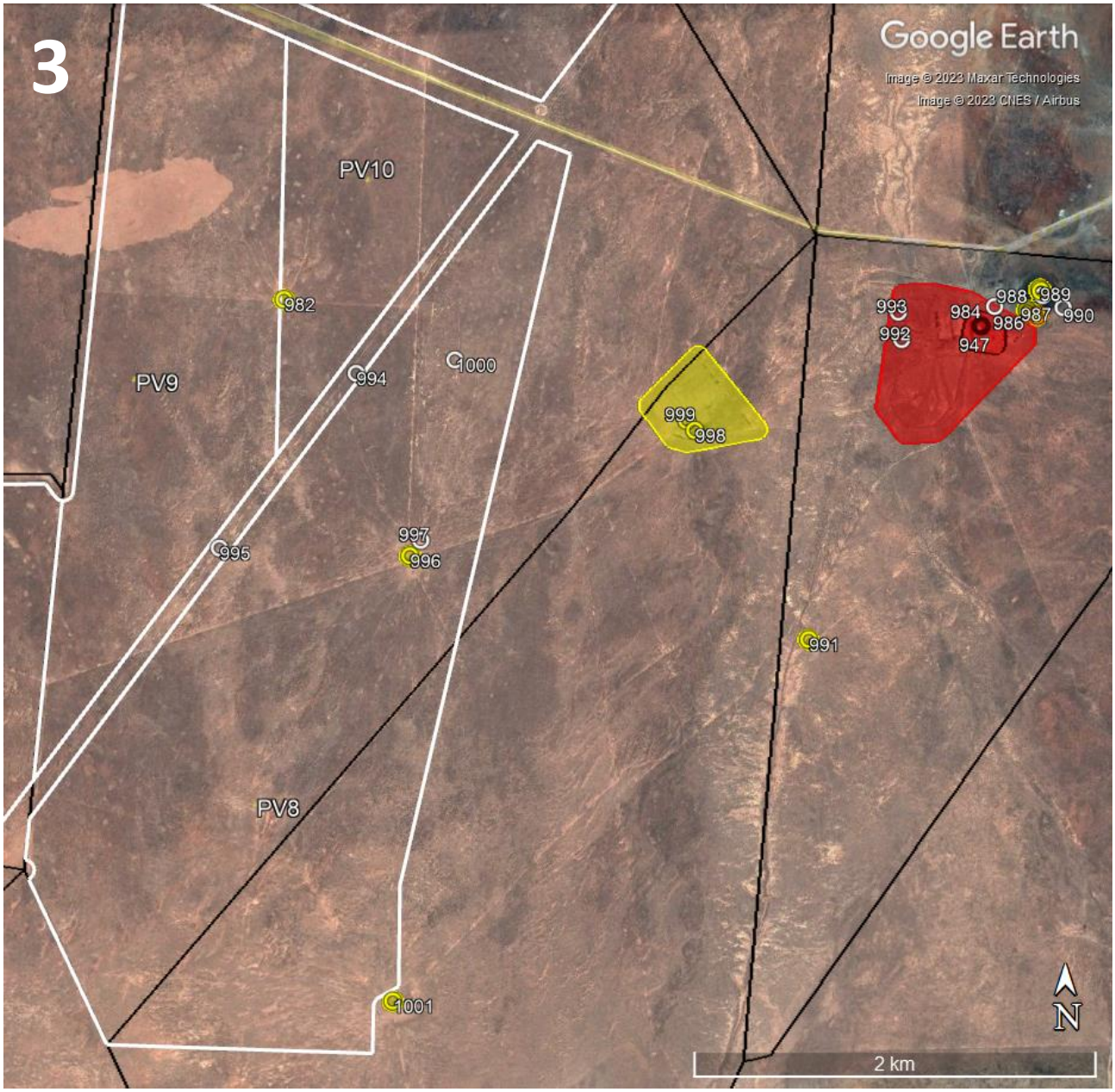
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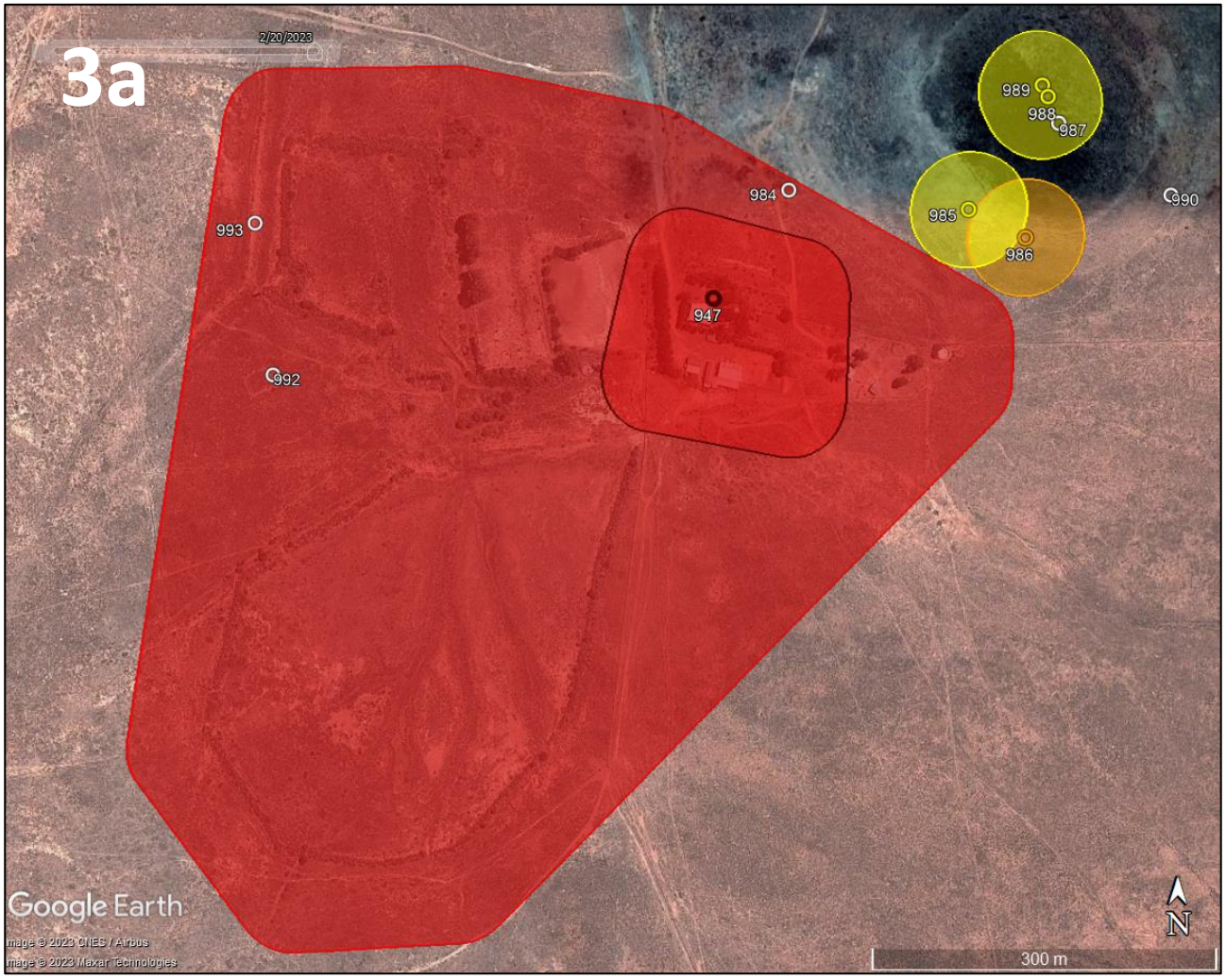
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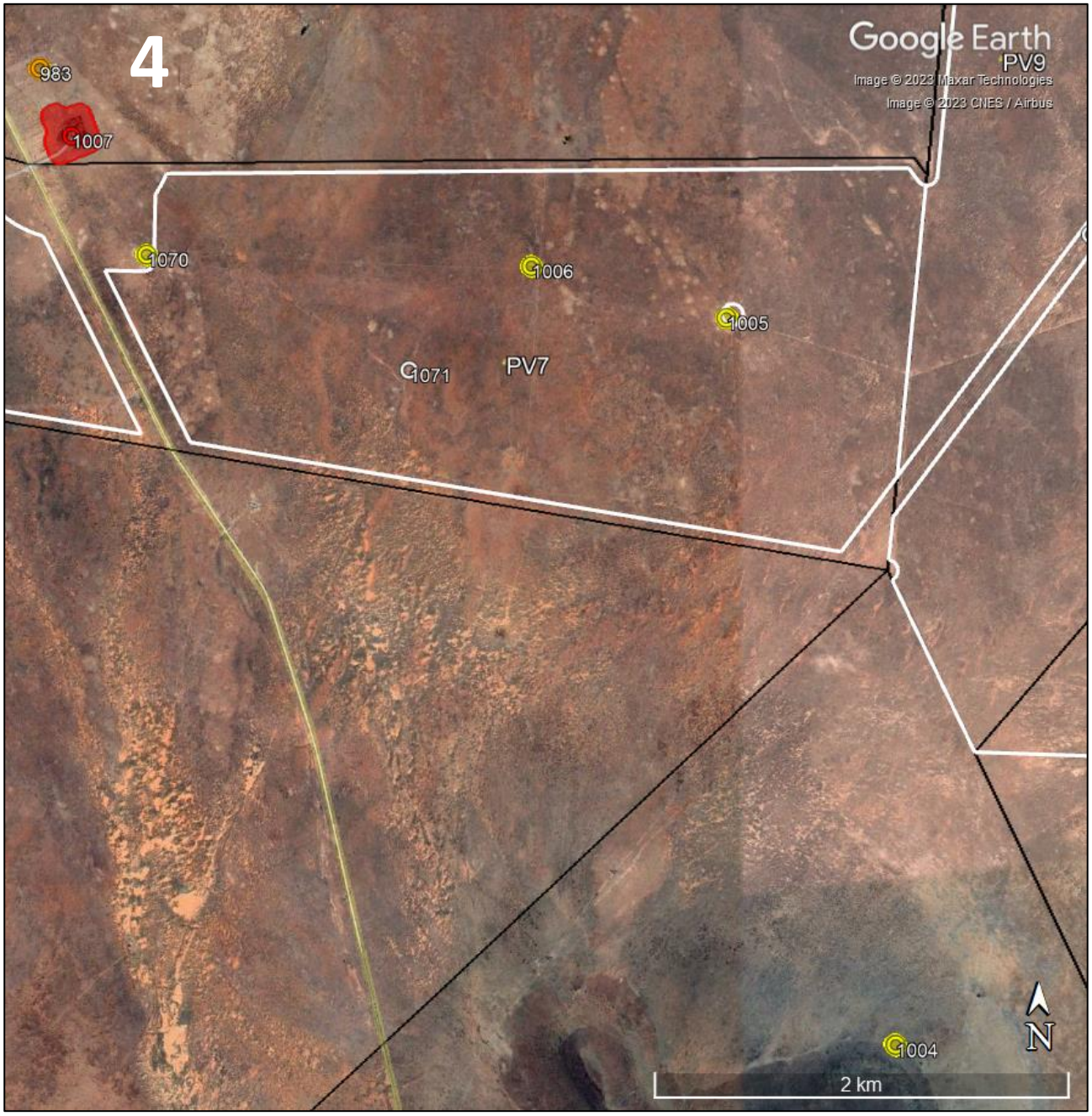
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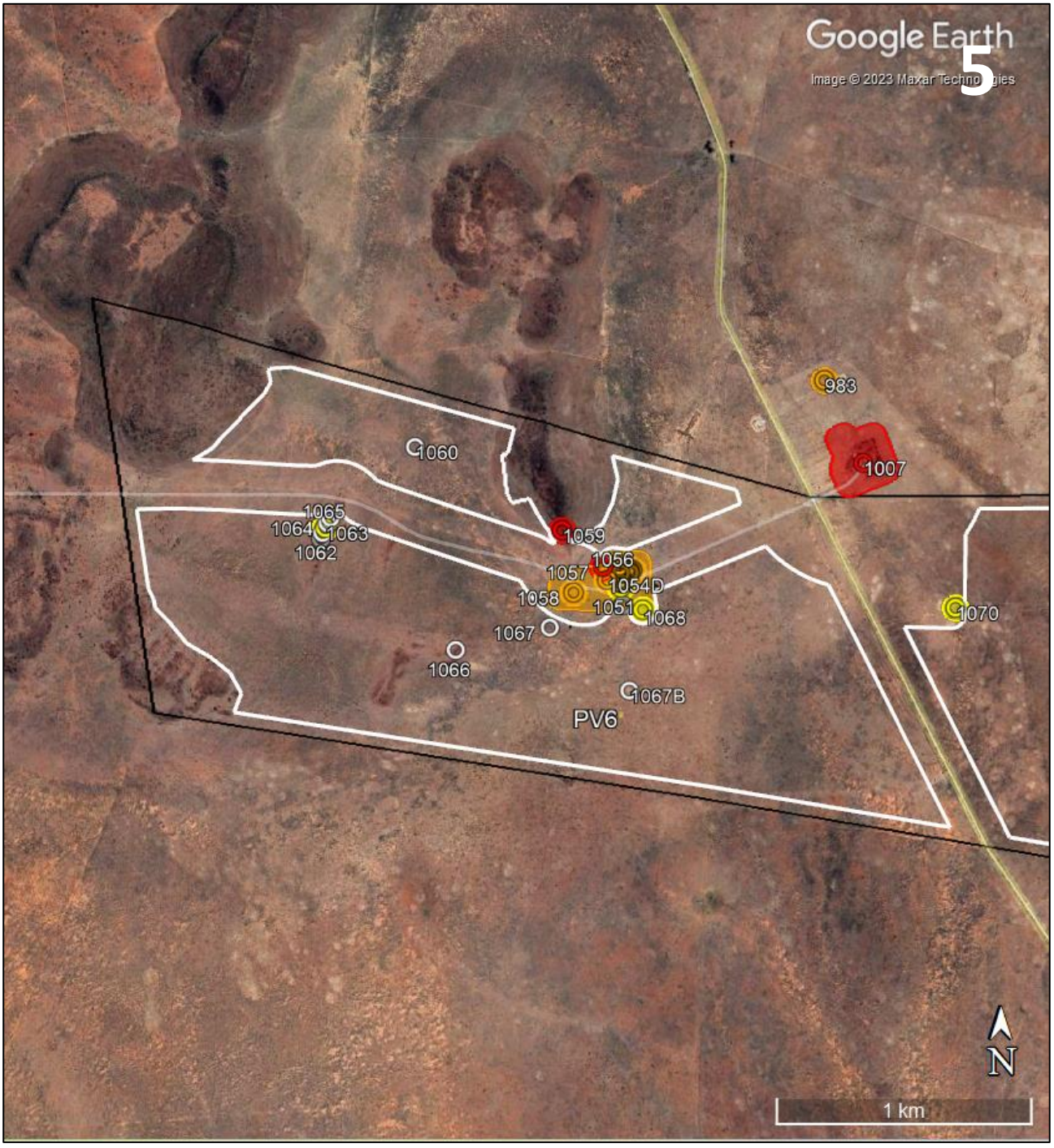
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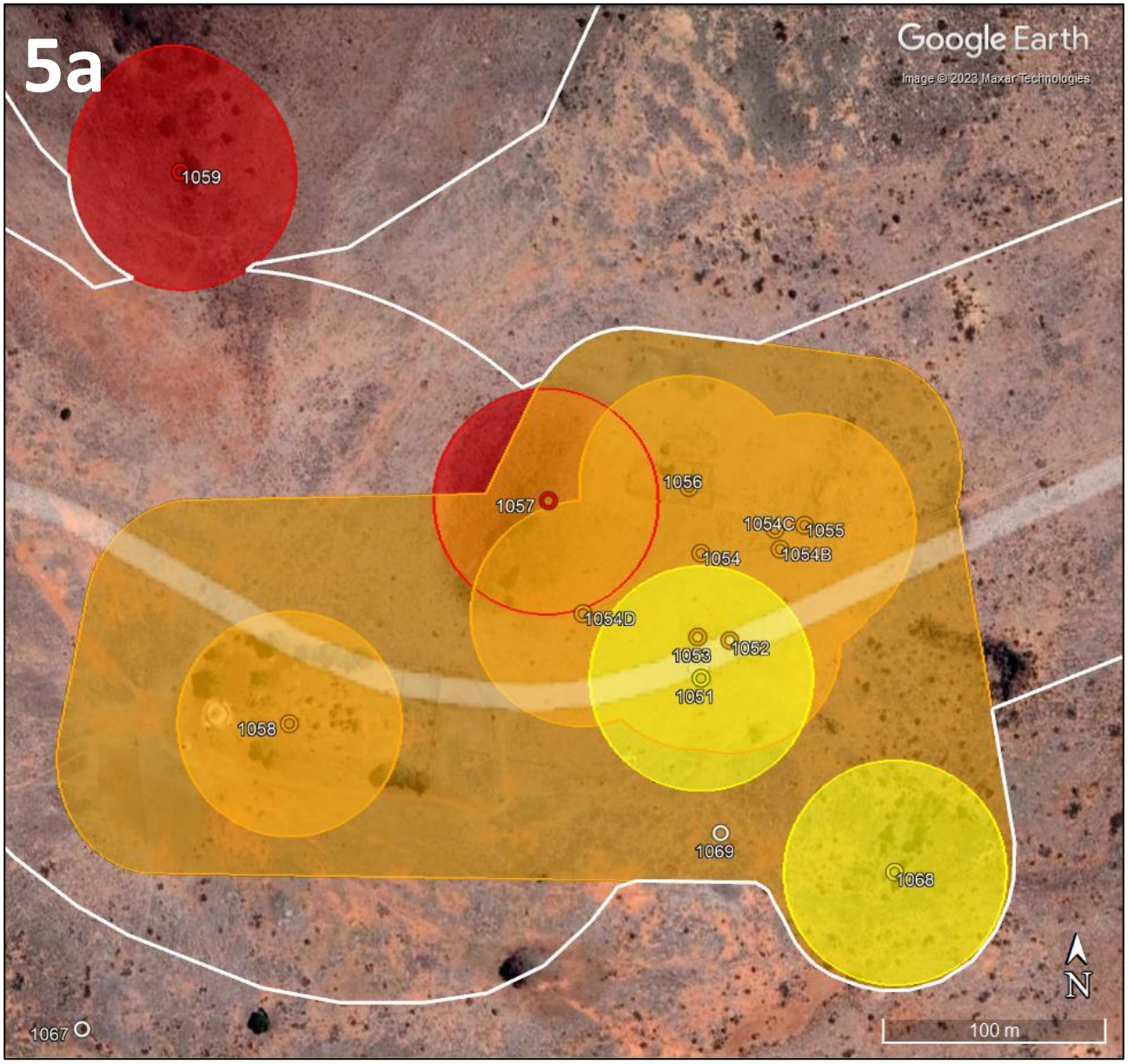
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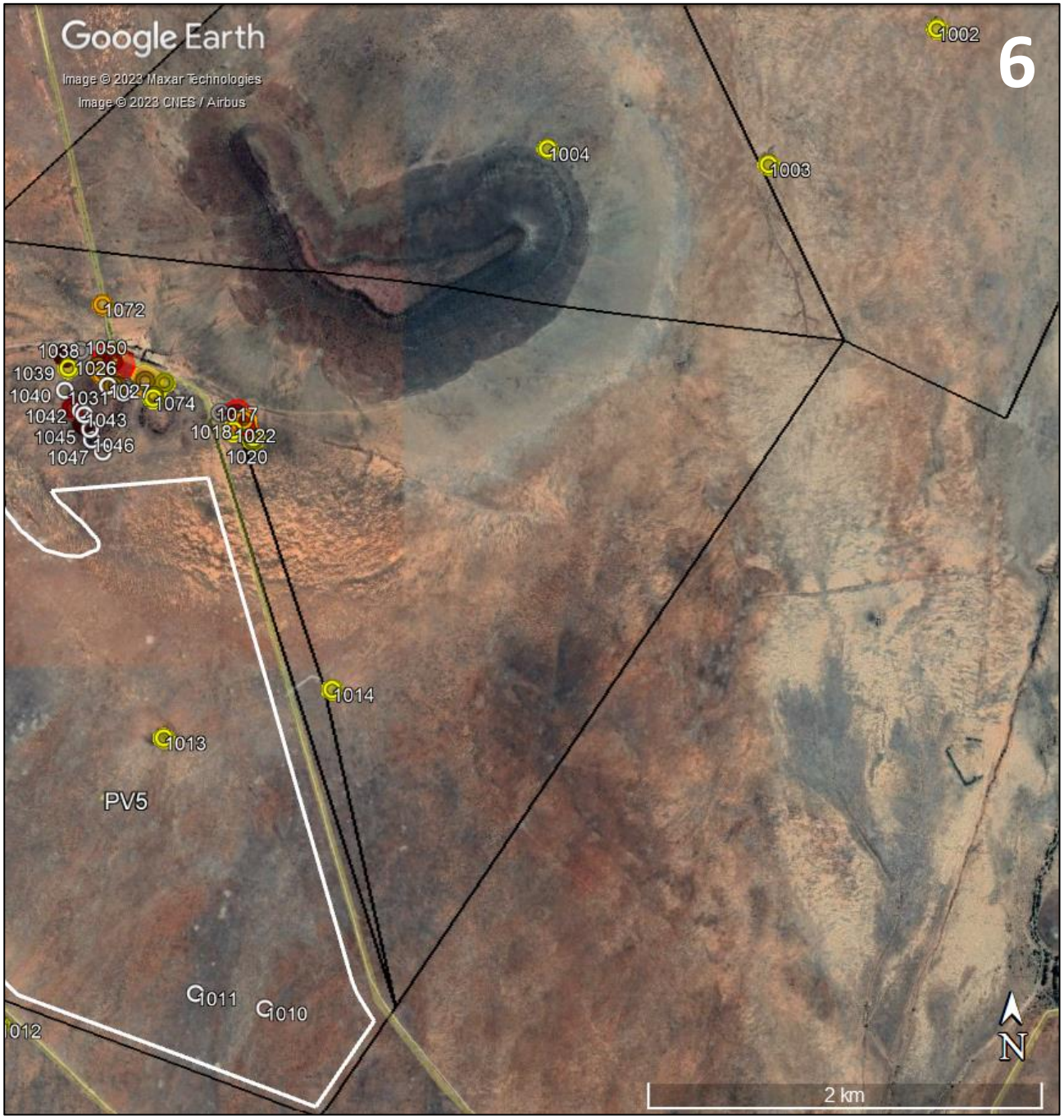
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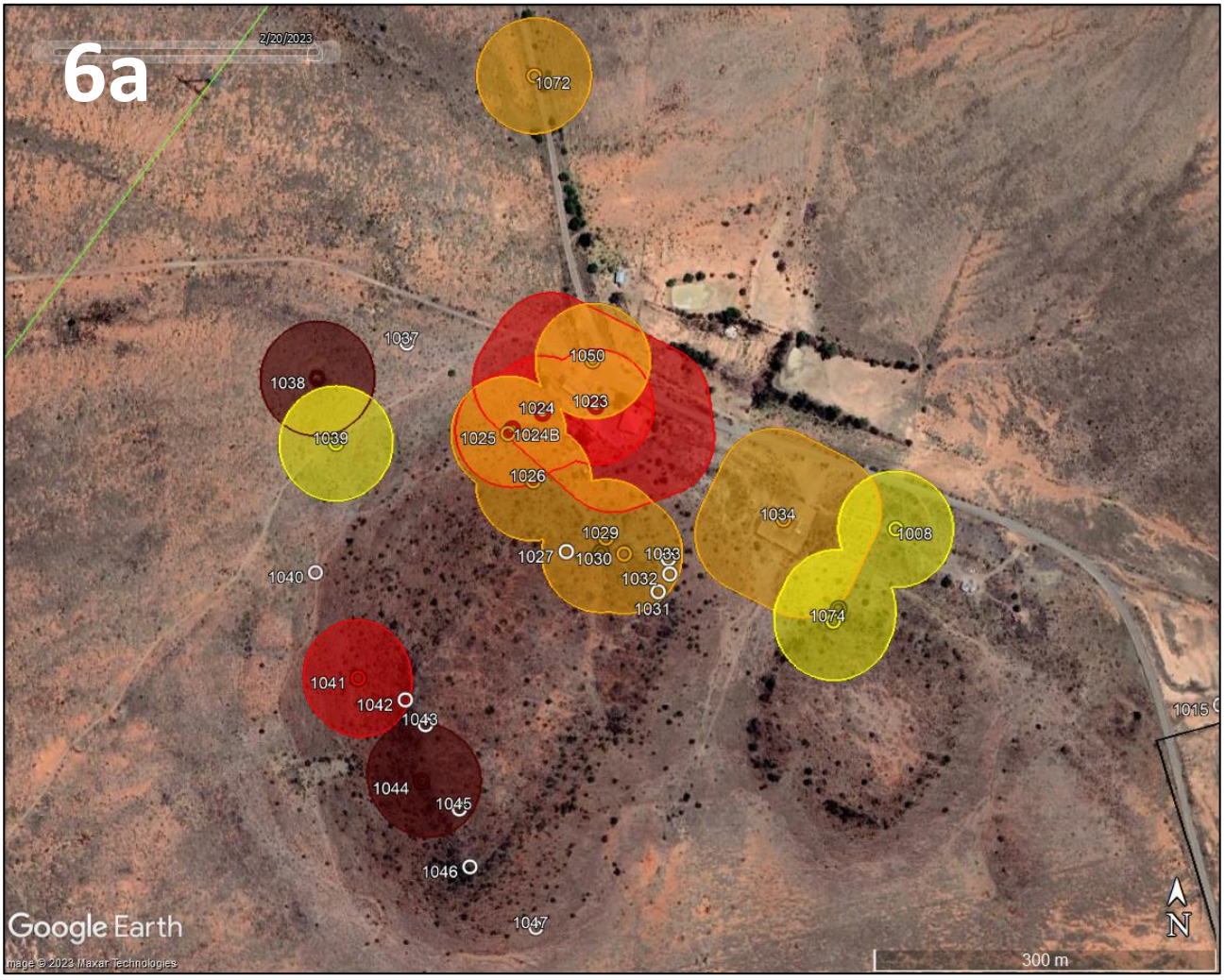
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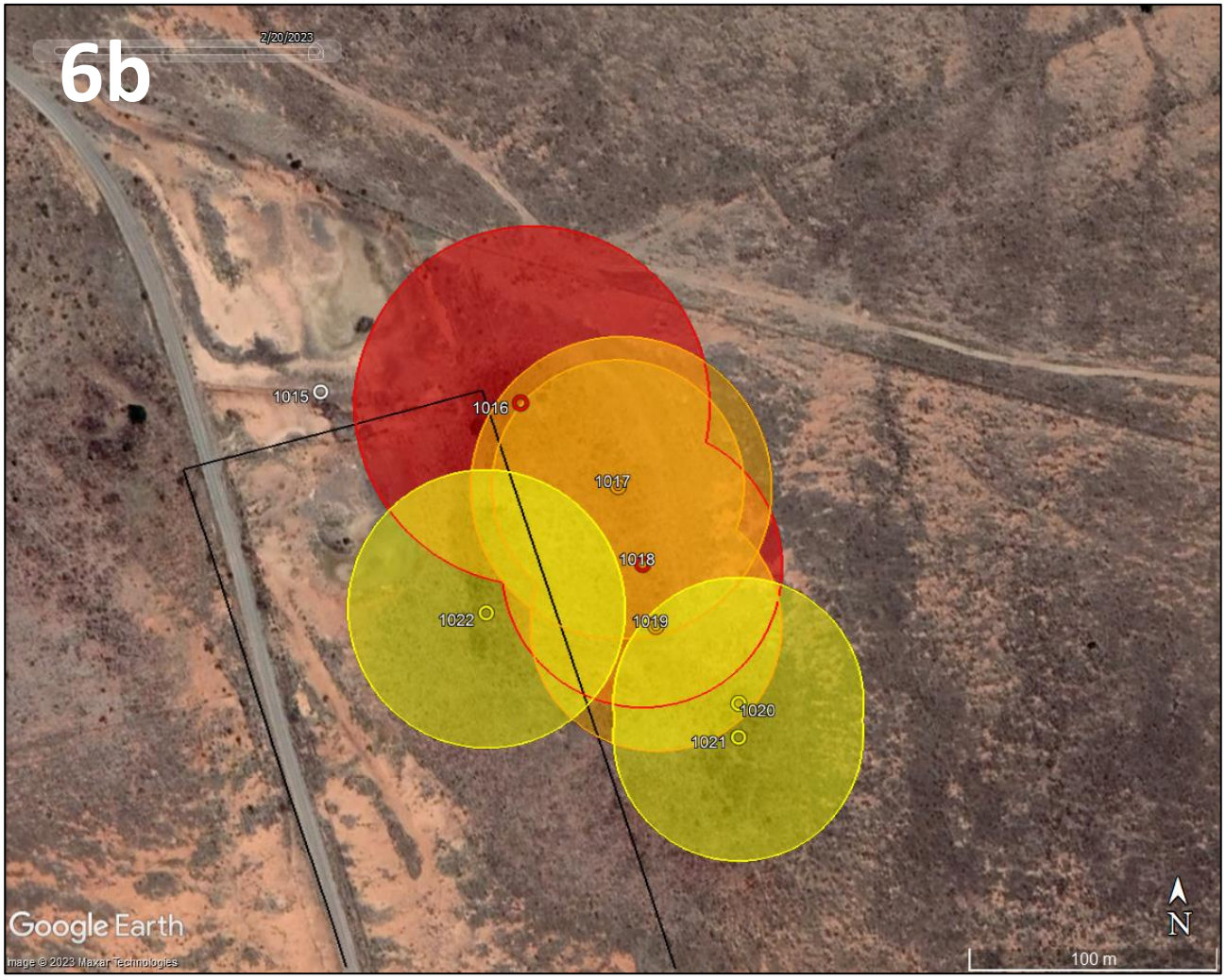
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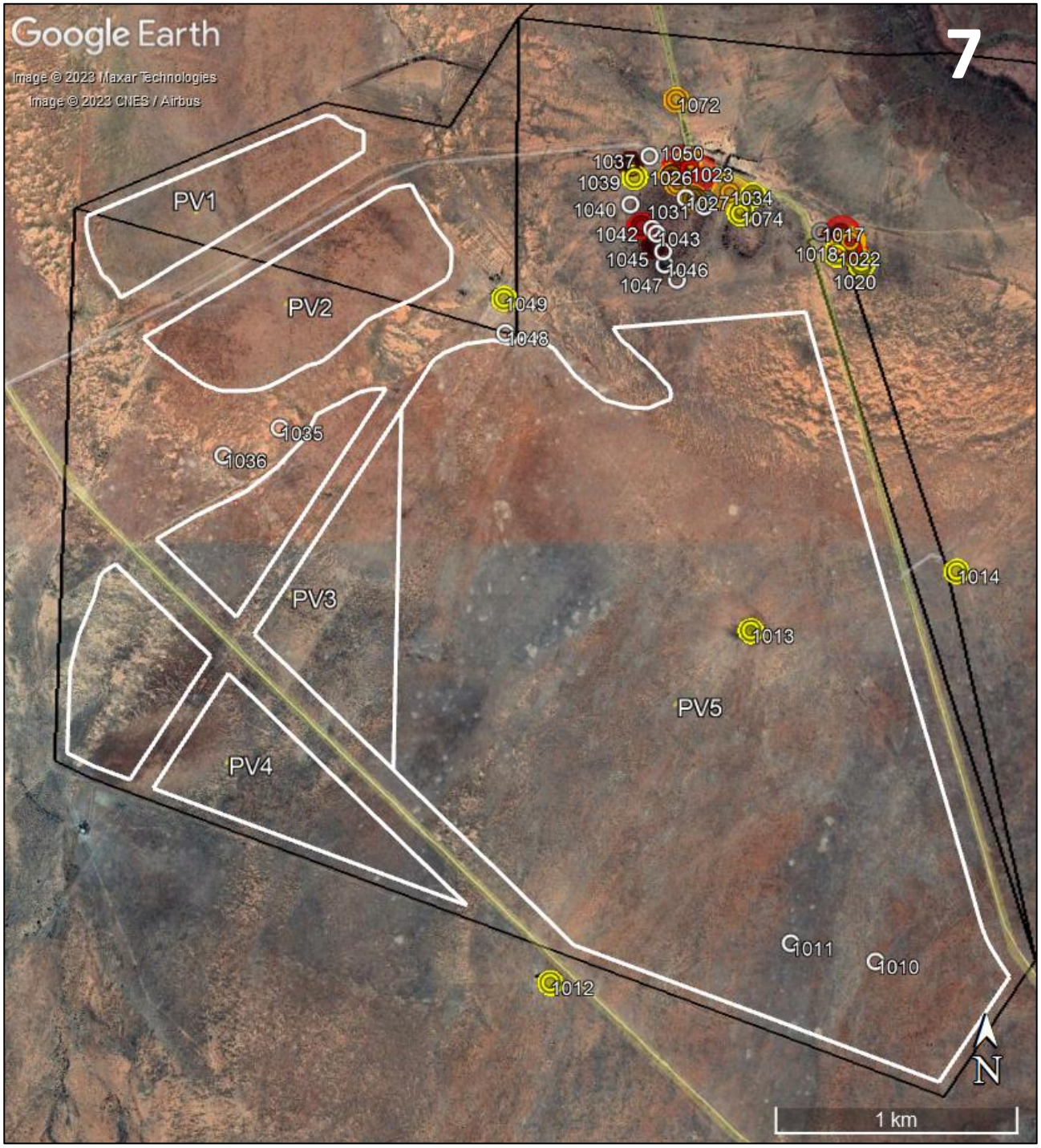
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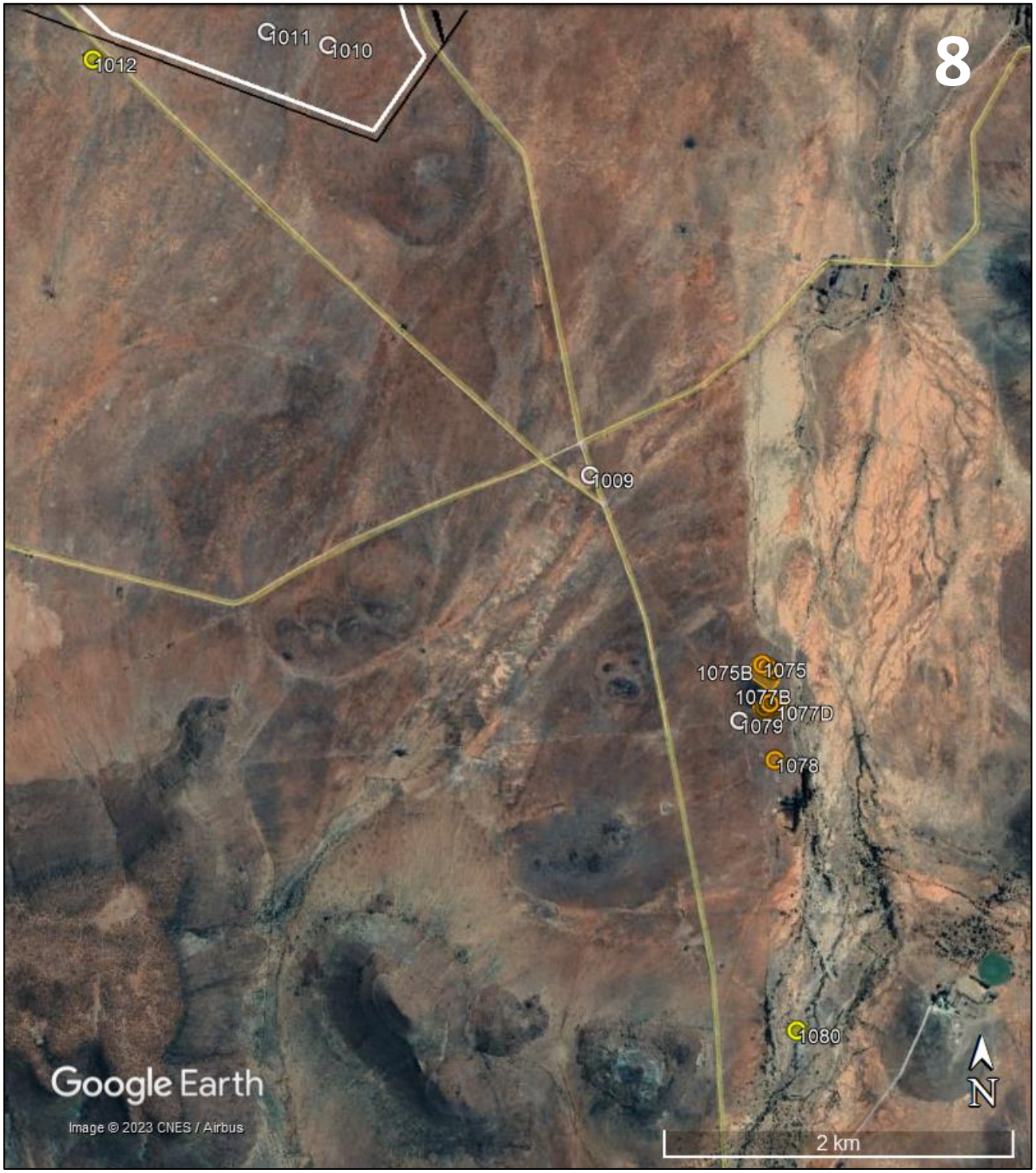
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