

DRAFT BASIC ASSESSMENT REPORT

Basic Assessment for the proposed development of the Padloper Solar PV Facility 1 (i.e., Padloper PV 1), the proposed development of a 132 kV Overhead Power Line between the Padloper PV 1 and the proposed authorised Ishwati Emoyeni Collector Substation (i.e., Padloper EGI 1), and their associated infrastructure, near Murraysburg in the Northern Cape and Western Cape Provinces



APPENDIX D.3: Archaeology, Palaeontology and Cultural Heritage - Padloper PV 1-4

**HERITAGE IMPACT ASSESSMENT:
BASIC ASSESSMENT FOR THE PROPOSED
PADLOPER PHOTOVOLTAIC FACILITY 1 NEAR
MURRAYSBURG, RICHMOND MAGISTERIAL DISTRICT,
NORTHERN CAPE**

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

SAHRA Case ID: 22167/38.8

Report for:

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EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by the African Clean Energy Developments (Pty) Ltd to assess the potential impacts to heritage resources that might occur through the proposed development of a photo-voltaic (PV) solar energy facility to be located on Portion 7 of Farm Klipplaat No. 109, Northern Cape. The site is located some 23 km north-northeast of Murraysburg with a mid-point at approximately S31° 45' 10" E23° 50' 57". It will have an access road that crosses the farm Rood Zandheuwel 102.

Among other things, the project will include solar panels, a substation, electrical cabling, access roads, offices and a temporary laydown area.

The Padloper Solar Facility 1 site was found to be flat and virtually devoid of archaeological materials. No significant archaeological remains were located there. The access road passes some historical sites, including the farmstead whose earlier house has been insensitively converted into a barn. A number of heritage structures occur there but none will be impacted. A stone-walled kraal at waypoint 208 lies along the access road but is sufficiently far enough away (14 m) as to be easily protected. Likewise, a stone house ruin lies close to the access road (28 m away) but will also be easily protected. A small stone retaining wall at waypoint 213 may be impacted by road building but this is not culturally significant and is of no further concern.

All impacts are predicted to be of Low significance after mitigation and there are no further concerns for the project.

It is recommended that the proposed Padloper Solar Facility 1 be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- The stone-walled kraal at waypoint 208 must be flagged as a no-go area and any road widening that occurs must not impact on the walling (enough space must be allowed for large loads to easily pass by without hitting the wall with approximately 5 m of clear space between the loads and the wall);
- No stones may be removed from any archaeological sites (with the exception of waypoint 213 if it cannot be preserved); and
- Lighting mitigation must be employed to ensure that light is directed only to where it is needed and, preferably, that it only switches on when needed;
- Buildings to be painted in earthy tones where technically feasible;
- Signage demarcating the entrance of the facility must be modest in nature and should not exceed the height of regular street signage;
- 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.

Core: a stone from which other pieces (flakes and blades) have been intentionally removed.

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

Flake: a piece of stone intentionally removed from a core. Flakes are identifiable by certain features related to the point at which the core was struck.

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.

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

EMPr: Environmental Management Program

ESA: Early Stone Age

GPS: global positioning system

GP: General Protection

HIA: Heritage Impact Assessment

HWC: Heritage Western Cape

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-	Section 1.4 Appendix 1
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;	
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 8.6, 8.4 & 8.8
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, 6
g) an identification of any areas to be avoided, including buffers;	Section 13
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;	Sections 5.6 & 13
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 13
k) any mitigation measures for inclusion in the EMPr;	Sections 8 & 11
l) any conditions for inclusion in the environmental authorisation;	Section 14
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 11
n) a reasoned opinion-	Sections 13.1 & 14
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;	
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 12
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not Applicable
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.

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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the African Clean Energy Developments (Pty) Ltd (ACED)) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a photovoltaic (PV) solar energy facility to be located on Portion 7 of Farm Klipplaat No. 109, Northern Cape. The site is located some 23 km north-northeast of Murraysburg with a mid-point at approximately S31° 45' 10" E23° 50' 57". It will have an access road that crosses the farm Road Zandheuwel 102. The project is part of a cluster of seven such facilities with the other six located in Western Cape (Figures 1 & 2).

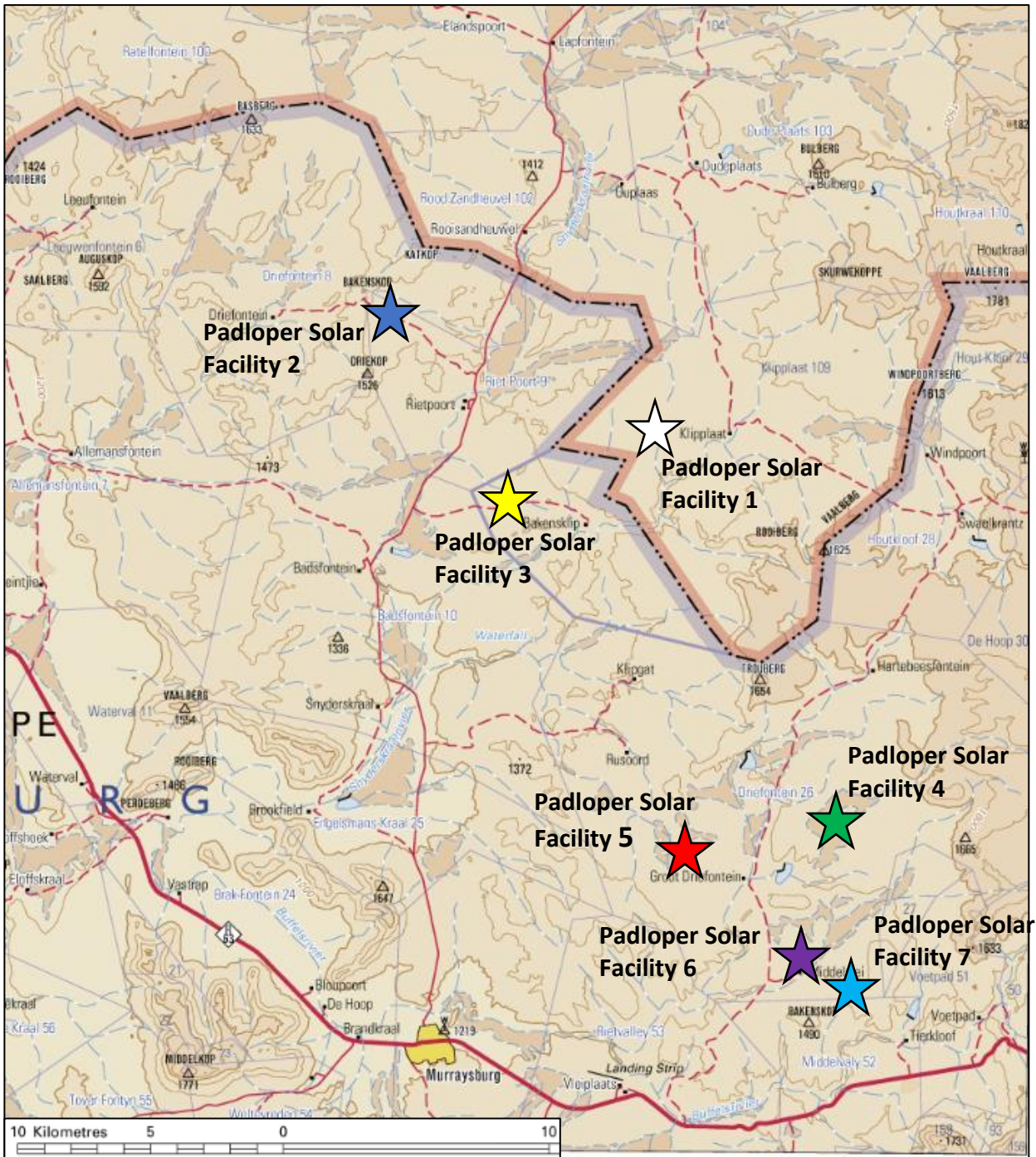


Figure 1: Extract from 1:250 000 mapsheet 3122 showing the location of the site (white star). The locations of the other six facilities (all in Western Cape) are shown for context.

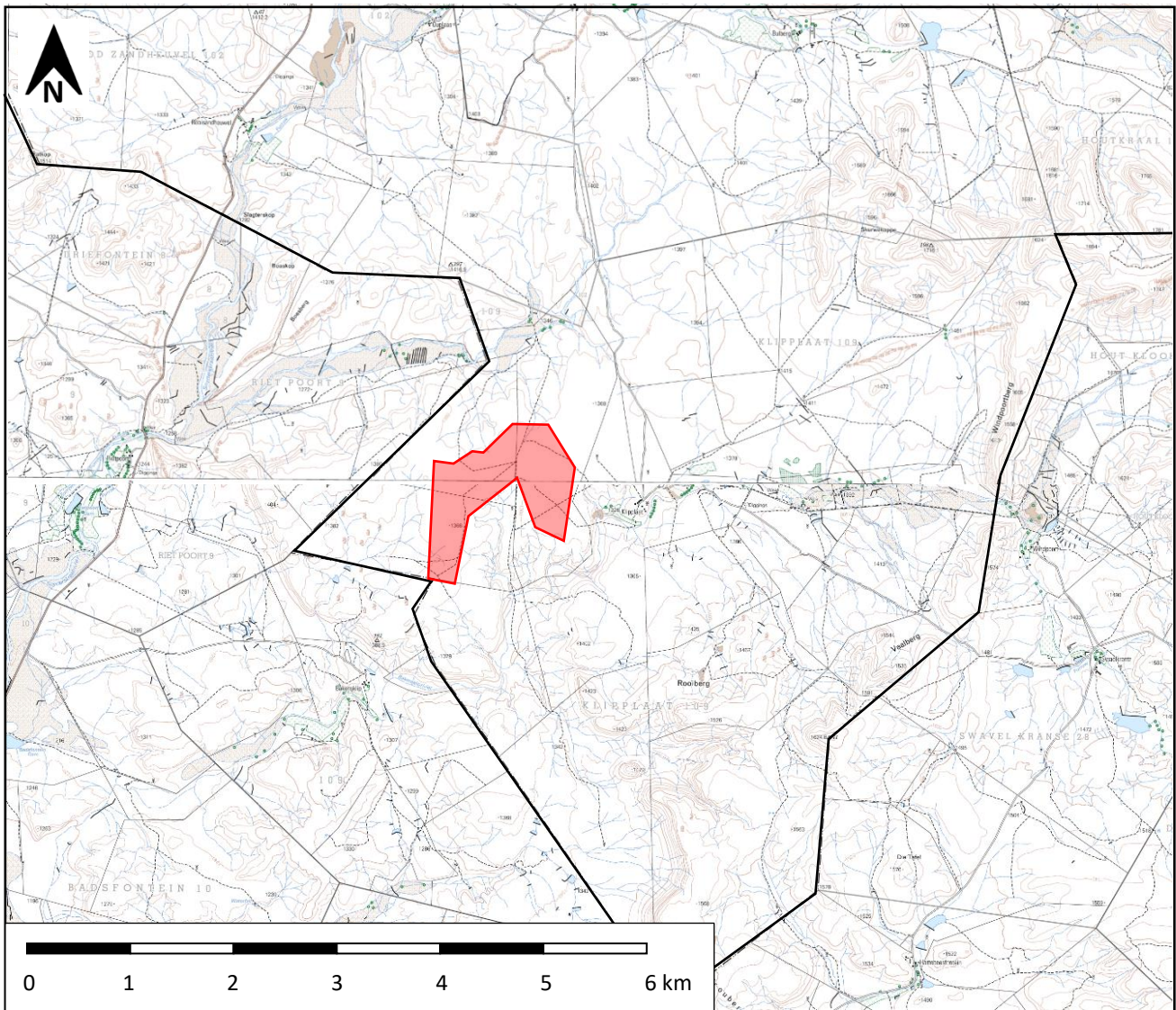


Figure 2: Extract from 1:50 000 topographic map 3123DB & DD showing the location of the site. Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

1.1. The proposed project

1.1.1. Project description

The proposed solar Padloper Solar Facility 1 project will consist of the following components:

Infrastructure	Component	Dimensions / Specifications
Solar PV	Type of Technology	Solar Photovoltaic (PV) Technology
	Height of PV panels	Maximum of ± 4.5 m
	Capacity of the PV Facility	Up to 250 MW
	Area of PV Array (i.e., proposed area occupied by PV Modules)	420 ha

Infrastructure	Component	Dimensions / Specifications
		Note: The permanent fence line will run as close as possible to the solar array demarcation and substation area. Therefore, the PV array area and the total fenced area (i.e., the area that includes all associated infrastructure within the fenced off area of the PV facility) is anticipated to be similar.
	Technology mounting structure	The following technologies are being considered: <ul style="list-style-type: none"> • 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.
	Inverter-transformer stations	3.5 MW inverters will be located across the proposed project. The exact number of inverters are still to be confirmed however all inverter-transformers will be within the PV array.
	Area occupied by inverter-transformer stations and height	Inverter-Transformer stations: 0.022 ha each The inverter stations will have a height of ± 3 m each (excluding lightning rods). The lightning rods are expected to extend 10 m high. Each inverter station will have 1 – 2 lightning rods).
Associated infrastructure		
On-site substation	A 132 kV facility substation complex will be located within the site and will have a height of up to 18 m. The area of the substation is as follows: 1.55 ha	
Temporary Construction and Laydown area	Construction camp area (ha)	1 - 4 ha Note: These areas will be rehabilitated after construction and will not be retained for the operational phase.
Main access roads Please note: The existing road network will be used as far as practically possible and upgraded as needed.	Current width of access roads (m)	5 m
	Length of access roads (km)	Approximately 10.2 km
Internal roads Please note: The existing road network will be used as far as practically possible and upgraded as needed.	Width of access roads (m)	5 m
	Length of roads (km)	Approximately 13 km The internal road network will be used to conduct security patrols and to access all the equipment (module cleaning and equipment maintenance).
Upgrading of existing access road/s Please note: Where required for turning circle/bypass areas, however, access or internal roads may be up to 10 m to allow for larger component transport.	Yes / No	Yes. Existing roads will be used as far as practically achievable.
	Current width (m)	± 5 m
	Upgraded width (m)	± 8 m (6 m wide road surface with 1 m drain either side)
Internal transmission and/or distribution lines	All on-site medium voltage cabling (22 or 33 kV) will be buried to a maximum depth of 1.5 m.	
Site offices including a warehouse/workshop and an	Number of buildings	Site offices and O&M control centre will be located in one building. The workshop and storage area

Infrastructure	Component	Dimensions / Specifications
operational and maintenance (O&M) control centre. The details provided in this section is for one site office.		may be attached to the O&M control centre. All buildings will be located within the O&M complex/footprint.
	Maximum height (m)	Up to 10 m
	Footprint (m ²)	300 m ²
Guard houses Note: There will be 2 guardhouses at the proposed project site. The details provided in this section is for one guard house.	Maximum height (m)	Up to 3 m
	Footprint (m ²)	± 6 m x 6 m ± 36 m ²
Ablution facilities Note: There will be 2 ablution facilities proposed project site, included in site offices and guardhouse footprints. The details provided in this section is for one ablution facility.	Maximum height (m)	Up to 10 m
	Footprint (m ²)	Staff lockers: ± 22 m x 11 m ± 242 m ²
Battery energy storage system (BESS)	Battery technology type	Lithium-Ion, Sodium-Ion, Solid State and Redox Flow technology types are being considered
	Approx. footprint (ha)	± 5 ha
	Maximum height (m)	Up to 10 m
	Capacity	1 500 MWh
On site medium voltage cables or cable trays	Maximum depth (m)	Up to 1.5 m
	Capacity	22 or 33 kV
Water use requirements	Estimated quantity of water (litres) required for the construction phase	50 000 m ³ per annum
	Estimated quantity of water (litres) required for the operational phase	12 000 m ³ per annum
	Estimated quantity of water (litres) required for the decommissioning phase:	The exact amount of water required during this phase is unknown at this stage but expected to be similar to or less than that of the construction phase.
Construction period		Approximately 18 – 24 months

It is important to note that the exact specifications of the proposed project components will only be determined during the detailed engineering phase prior to construction (subsequent to the issuing of an Environmental Authorisation (EA)), should such an authorisation be granted for the proposed project, but that the information provided above is seen as the worst-case scenario. Figure 3 shows the project proposal as assessed in this report.

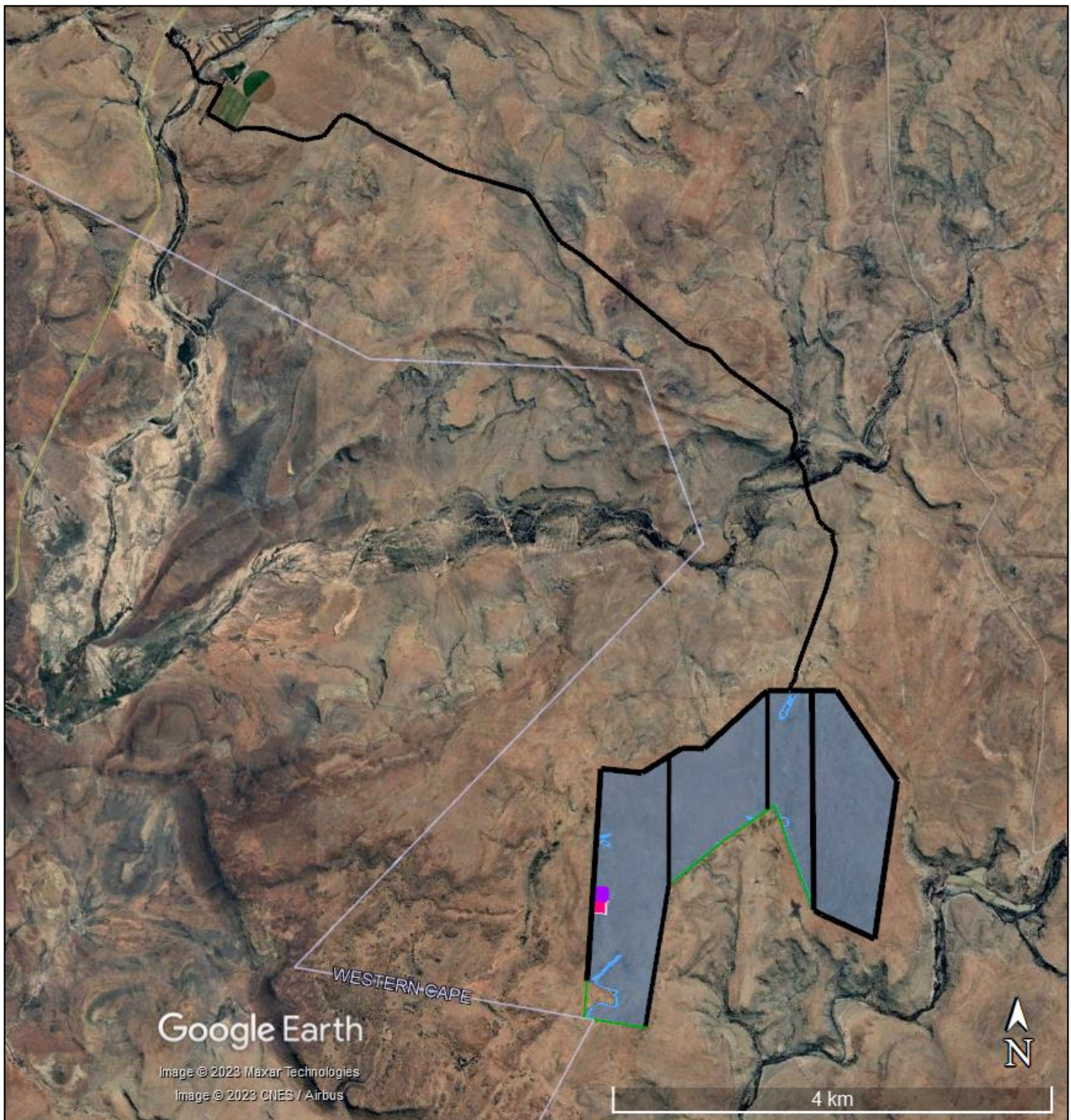


Figure 3: Aerial view of the study area showing the project layout. Black lines are access and internal roads, blue area is solar panels, purple block is the temporary laydown area, pink block is the facility substation complex, green polygon is the study area.

1.1.2. Identification of alternatives

No alternative sites were considered. However, a preferred development area was provided for assessment with the final footprint within that area chosen based on sensitivities identified by the specialists. The final footprint was also designed following specialist inputs to reduce impacts.

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 do the following:

- Describe regional and local features of the receiving environment;
- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Map sensitive features;
- Assess (identify and rate) the potential impacts on the environment within a Heritage Impact Assessment (HIA) report;
- 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

An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the National Department of Forestry and Fisheries and Environment (DFFE) who will review the Basic Assessment (BA) 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 a BA. 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 National Department of Forestry, Fisheries and the Environment (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 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:

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

2.4. Application timeline

The application to DFFE under NEMA is currently in the pre-application phase with submission of the final Basic Assessment Report estimated to be in November 2023.

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 1 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 1: 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	Current	Spatial	Map showing palaeontological sensitivity

	Information System (SAHRIS)			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
Screening Tool maps	DFFE	Current	Spatial	Potential sensitivity of the study area

3.2. Field survey

The site was subjected to a detailed foot survey on 21 September 2022 by three archaeologists (Dr Jayson Orton, Steve van den Heever and Joseph Matembo). This was during spring but, in this dry area, the season makes no meaningful difference to vegetation covering and hence the ground visibility for the archaeological survey. 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.

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.

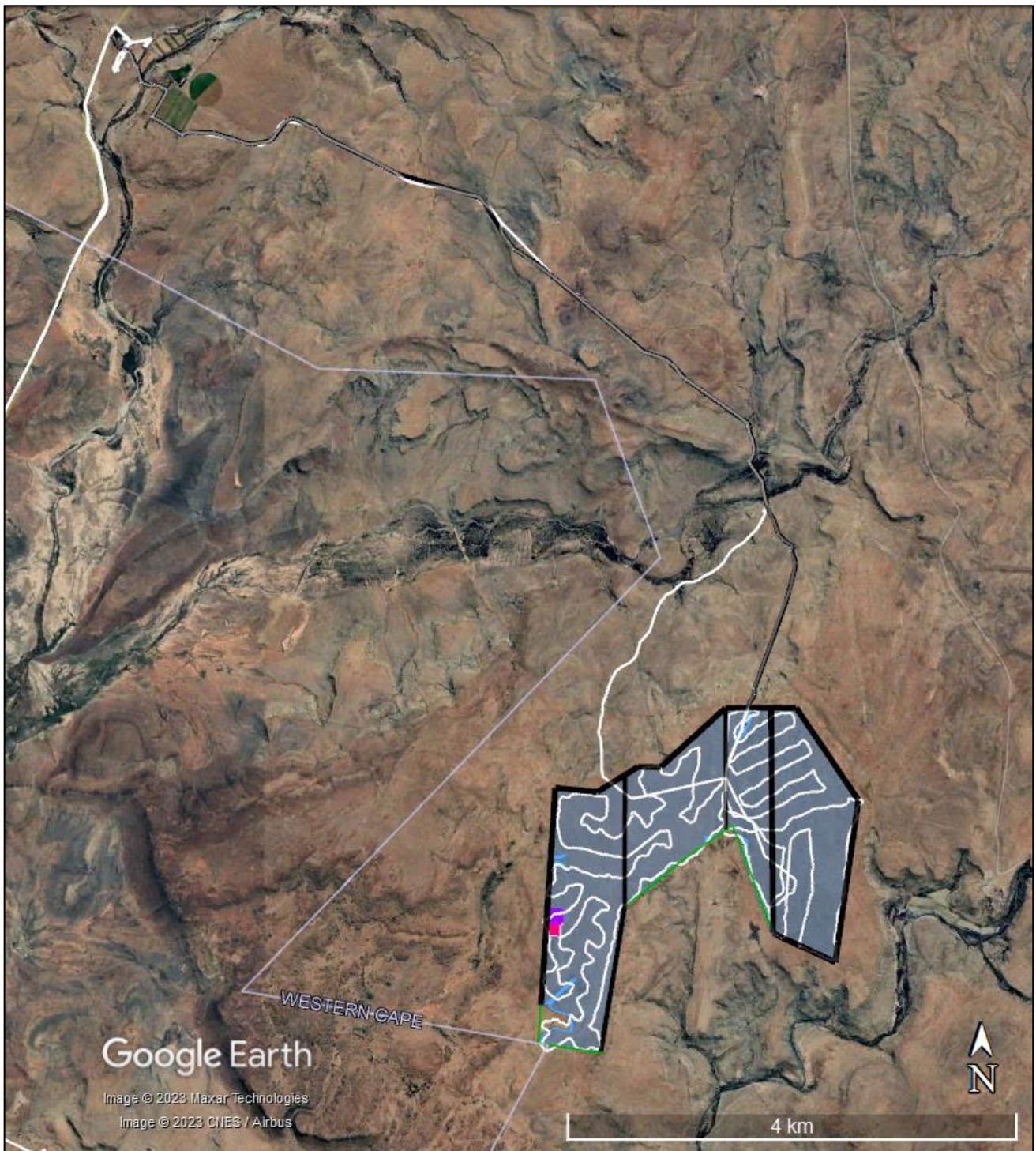


Figure 4: Aerial view of the study area (key as per Figure 3) showing the survey tracks (white lines).

3.3. Specialist studies

The archaeological specialist study is included within the HIA but a separate specialist assessment of potential palaeontological impacts was carried out by Elize Butler. The latter report is submitted separately along with this HIA.

3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a methodology supplied by the CSIR.

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

3.6. Assumptions, knowledge gaps and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The survey aimed to identify all obvious heritage resources and achieve a reasonably dense survey coverage. It is assumed that the findings would be indicative of the overall pattern on the landscape.

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.

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.

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

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The site is in a very remote, rural area 25 km from Murraysburg and 38 km from Richmond. It is accessed only by local gravel roads. The Padloper Solar Facility 1 site itself is a largely natural landscape with only occasional signs of livestock farming evident (fences, water tanks, tracks). The site falls entirely within the Beaufort West Renewable Energy Development Zone (REDZ) and the Central Electricity Grid Infrastructure (EGI) Corridor (Figure 5).

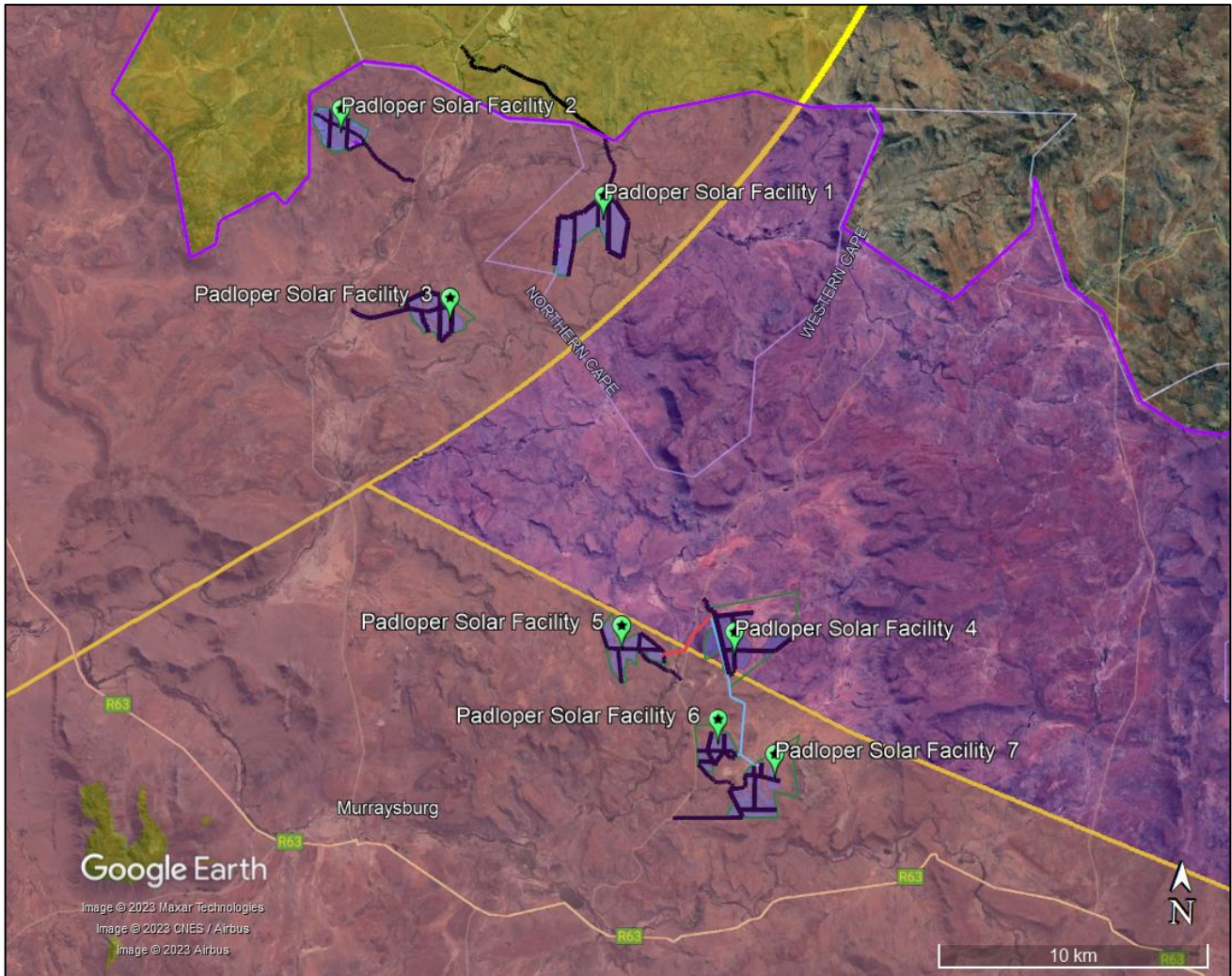


Figure 5: Map showing the suite of seven Padloper solar projects to be within the Beaufort West REDZ (purple) and the Central and Eastern EGI Corridors (yellow). Note, however, that Padloper Solar Facility 4 only has a small section within the Eastern EGI Corridor.

4.2. Site description

The access road to the Padloper Solar Facility 1 site follows an existing farm track and runs across relatively flat terrain but crosses some low ridges in places (Figures 6 to 8). The Padloper Solar Facility 1 site itself lies on a very flat plateau. There are few rock outcrops, and the substrate is a

mixture of sand and gravel, with low vegetation. Figures 9 to 12 show the nature of the Padloper Solar Facility 1 study area, emphasising the generally very flat terrain.



Figure 6: View towards the southeast in the northern third of the access road.



Figure 7: View towards the southeast in the central third of the access road.



Figure 8: View towards the south in the southern third of the access road. The proposed Padloper Solar Facility 1 facility location is on the skyline plateau.



Figure 9: View towards the southeast across the eastern part of the Padloper Solar Facility 1 study area.



Figure 10: View towards the northwest through the northern part of the Padloper Solar Facility 1 study area.



Figure 11: View towards the north in the south-western part of the Padloper Solar Facility 1 study area.



Figure 12: View towards the south in the south-western part of the Padloper Solar Facility 1 study area and showing a rare rocky outcrop.

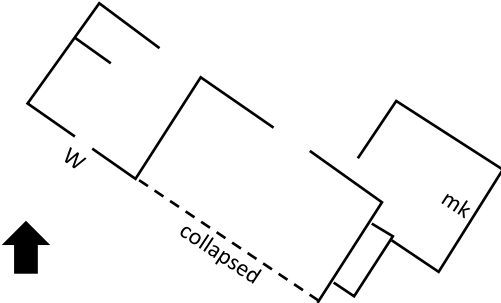
5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Finds from the survey are listed in Table 2 with their locations mapped in Figures 13 and 14.

Table 2: List of finds from the heritage survey.

Waypoint	Location	Description	Significance Grade
204	S31 41 17.9 E23 47 58.5	Currently a farm shed, this structure would once have been the main farmhouse. It was likely a long, gabled structure with a lean-to on the back (northwest side). It probably looked much like the barn at waypoint 207. It has a Victorian stoep along the entire front (southeast side) with end walls containing diamond windows. A stoepkamer has been bult into the southern end. The front door has been removed to leave a wider opening with no door. Sash windows still sit in the front wall but the other windows have been replaced with large steel windows (probably mid-20 th century). The internal walls have been demolished and all ceilings removed. If it was gabled, the gables were removed and a new	Low

Waypoint	Location	Description	Significance Grade
		metal roof spanning the entire structure was added. It seems likely these changes were made during the mid-20 th century after the current farmhouse – which looks like 1950s (and which predates 1959) – was built.	
205	S31 41 18.4 E23 47 58.1	A small gabled building immediately to the southwest of 204 but with its axis at 90 degrees to 204. It has wooden joinery (doors all around) and a metal roof. The lower part of the walls (as exposed in a doorway) is stone and mud mortar with the rest of brick. The outside is plastered but there are many small cracks in the plaster. Internal walls divide the structure into our small rooms now used for storage.	Medium
206	S31 41 15.3 E23 47 59.0	A barn-type structure that had a curved roof which has been removed. The walls seem to be of brick and mud mortar. It has wooden doors and metal windows. It was not examined in detail but is quite clearly now a ruin. Stone-walled kraal was seen on aerial photography a short distance to the east of this ruin.	Low GPB
207	S31 41 17.1 E23 47 59.3	This is a long barn built on the same axis as the house at waypoint 204 and located to its northeast. It has gables and a lean-to on the west. An earlier vehicle entrance in the southern end gable has been closed up, but the one in the southern end of the southeast-facing wall does not look new. Two wooden pedestrian doors also appear in the east wall. The structure has a beautiful wooden ceiling. The rest of the barn was not examined in detail.	Medium
208	S31 41 16.9 E23 47 47.7	A stone-walled kraal that has been built around the base of a dolerite koppie. It has upright slabs at the entrance and corners.	Medium- Low GPA
209	S31 41 21.2 E23 47 50.5	The ruin of a stone-walled building that has here doors in the front wall facing towards the northeast. With three doors it was probably something like a stable building. Not examined in detail.	Medium- Low GPA
210	S31 41 21.9 E23 47 50.9	Another stone-walled outbuilding located just to the southeast of that at waypoint 209. Its walls look like they were never more than half height.	Medium- Low GPA
211	S31 41 24.0 E23 47 53.0	This is the labourers' village. The cottages seem to be 20 th century. Two flat-roofed houses are likely older than the other three. They were not examined in detail.	Low
213	S31 42 14.8 E23 50 00.5	A small section of stone retaining wall along the farm road. Its age is unknown but it is roughly packed suggesting a more recent age. The farm road is present on a 1959 aerial photograph making the walling likely to be older than 60 years.	Very Low GPC

Waypoint	Location	Description	Significance Grade
214	S31 43 31.6 E23 51 26.4	<p>A small two-roomed, gabled, stone-walled cottage ruin facing to the northeast. The north-western room was added to the other room and has a window in its south-western wall. The earlier room contains a huge hearth that fills much of the south-eastern gable and the south-western wall of this room has almost entirely collapsed. An outside room has also been built onto the eastern corner of the structure and it has a muurkas in its south-eastern wall. There is no roof present, but a beam and a piece of corrugated iron lie in the outside room. The rubbish around the site seems to be modern and no ash dump was seen.</p> 	Medium-Low GPA
215	S31 43 32.5 E23 51 27.4	The ephemeral remains of a stone-walled kraal built up against a scarp.	Very Low GPC
216	S31 43 55.4 E23 50 53.8	There are many old stone fence posts in this general area running in different directions. The waypoint and buffer are a representative location for the wider cluster.	Low GPB
217	S31 45 27.3 E23 50 37.4	An ephemeral scatter of LSA hornfels artefacts with one core and several flakes.	Very Low GPC
218	S31 45 15.6 E23 50 33.7	A mid-20 th century brick and cement reservoir and two associated watering troughs. The troughs are partly demolished.	Very Low GPC
219	S31 41 25.4 E23 47 49.1	A set of nine graves said by the farmer to have been victims of the Spanish flu and who were building a dam on the neighbouring farm. Three have headstones indicating dates of death as 24 th June 1917 (van der Westhuizen), 28 th October 1918 (Crail) and 29 th October 1918 (Crail). The latter two were a son and mother. There are four packed dolerite mounds, four graves with only head and foot stones (one of which has the 29 th October 1918 date of death) and one more formal grave (with the 24 th June 1917 date of death). The other headstone is lying loose on the ground.	High IIIA

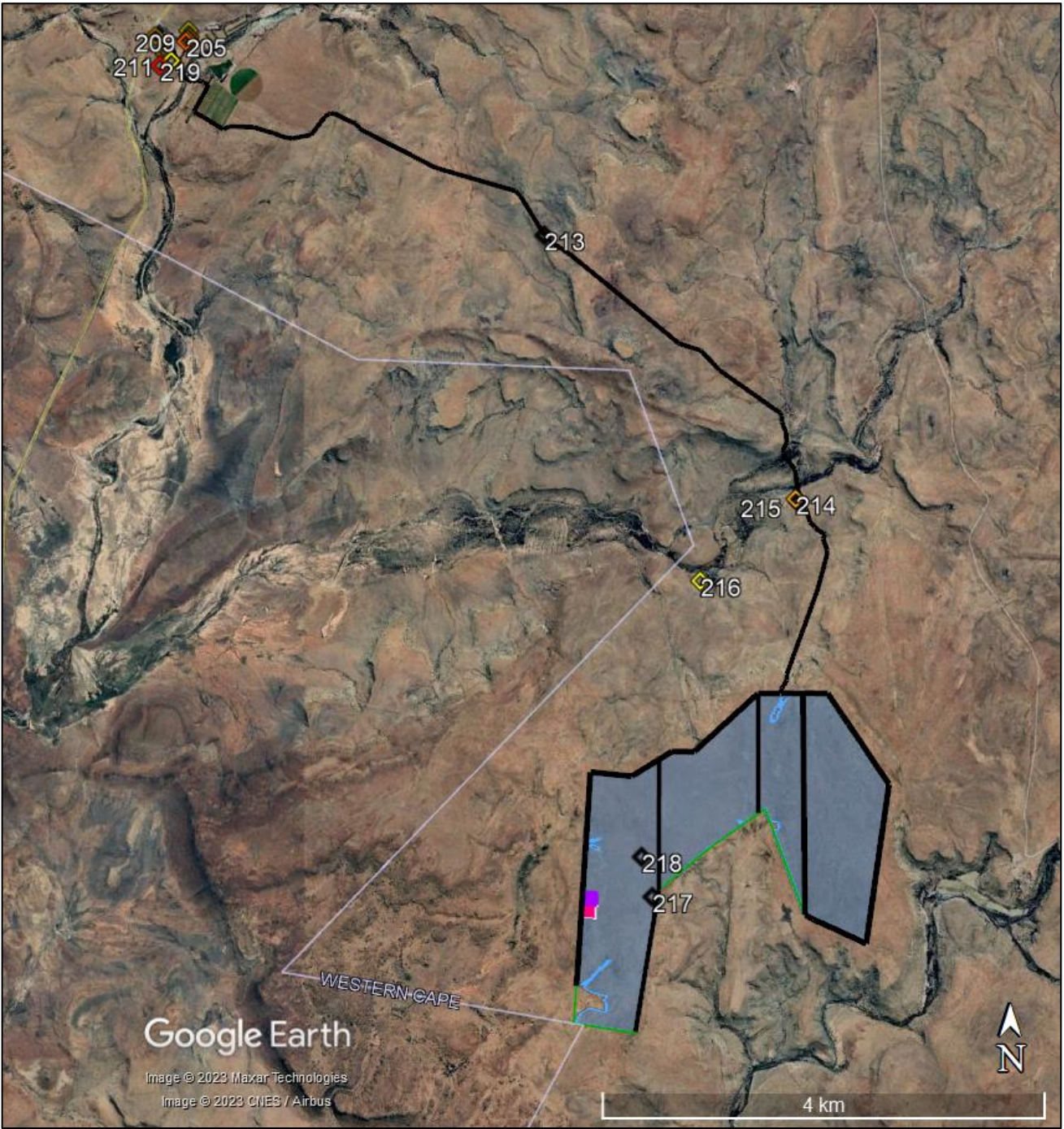


Figure 13: Map showing the distribution of finds from the survey.



Figure 14: Map showing the location of finds at the Rooisandheuwel farmstead.

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of very high palaeontological sensitivity (red shading; Figure 15), although the access road crosses areas of zero sensitivity (grey shading). For this reason, a specialist study was commissioned and is submitted along with the present report.

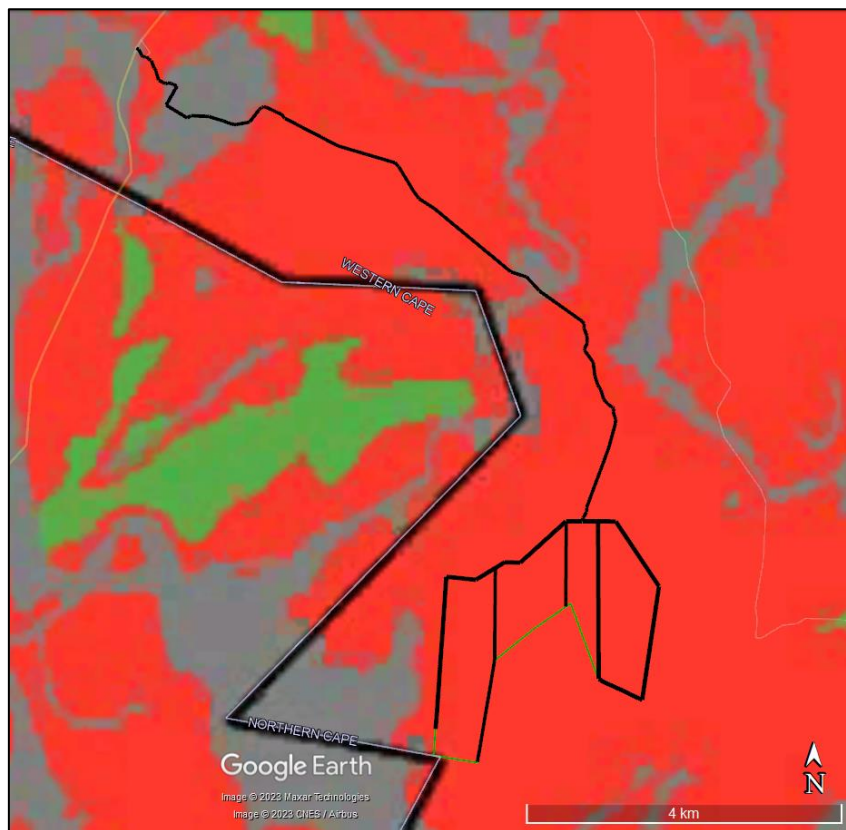


Figure 15: Extract from the SAHRIS Palaeosensitivity Map showing the Padloper Solar Facility 1 site (green = project study area, black = project roads).

5.2. Archaeology

5.2.1. Desktop study

The Karoo region has a long history going back to the Early Stone Age (ESA) as testified to by occasional diagnostic artefacts from this period (generally handaxes). Middle Stone Age (MSA) artefacts are generally the most commonly encountered stone age materials in the Karoo and are generally well patinated, indicating their great age. Later Stone Age (LSA) finds are less common but generally of higher significance because of their better contexts (Orton *et al.* 2016). The vast majority of material tends to be what is referred to as background scatter. This can be defined as “widespread isolated artefacts whose distribution results from either primary or secondary causes” (Orton 2016:121). In this dry landscape, LSA archaeological sites are well-known to be focused most strongly on water sources, but dolerite and other rock outcrops, which offer opportunities for shelter and a vantage point to watch for potential prey, are also commonly occupied landscape features. The dolerite also offered surfaces on which to do rock engravings, while small sandstone shelters were sometimes painted. This pattern is well demonstrated by surveys in the wider area (Binneman *et al.* 2011; Halkett 2014; Hart 2016; Orton 2012, 2021a, 2021b, 2021c, 2021d, 2022a, 2022b). Most sites are scatters of stone artefacts, often accompanied by ostrich eggshell fragments and sometimes pottery, but some include fragments of bone and, rarely, archaeological deposits. The latter would normally be found in rock shelters but, due to the nature of the local geology, overhangs are rare. Rock shelters form in sandstone bands, but the rock outcrops in the vicinity of the present study area are mostly of dolerite.

Some distance to the southwest, near Three Sisters, Binneman *et al.* (2011) found MSA and LSA artefacts in various places. Pottery was seen at one LSA site, but ostrich eggshell fragments were more commonly associated with these sites, including some painted rock shelters. The Seacow River Valley, lying some 40 to 140 km east and northeast of the current study area, is one of the best studied parts of South Africa. There, Sampson (1984, 2010; Sampson *et al.* 2015) recorded vast numbers of Stone Age sites with many of them being Khoekhoe sites, including kraals. ESA and MSA sites were also found to occur. Hart's (2016) study immediately southeast of the present study area located many LSA sites but found ESA and MSA occurrences to be very rare. The LSA sites were mostly stone artefact scatters but some included pottery. A few circular stone-walled features were also recorded. Working in the present study area, Halkett (2014) also documented a number of LSA sites, many containing retouched tools and some with pottery. Near Murraysburg, Tusenius (2012) found background scatters of LSA materials in one area and a background scatter of mixed age materials including an ESA handaxe in another (Tusenius 2015). Nearby, Kaplan (2007) found a scatter of LSA artefacts with occasional MSA artefacts in between. Deacon (2007) worked along the N1 to the west and found background scatter artefacts pertaining to the MSA and LSA and also scratched engravings that he supposed to be from the 20th century. They included a horse and rider and an ostrich. Such engravings are relatively common in the central Karoo having been recorded between Three Sisters and Beaufort West (Orton 2010) and also – in very large numbers – some 140 km west of the study area (Orton 2022b). Morris (1988) has reviewed these recent engravings and notes that they have been attributed by Battiss (1948) to Europeans and Griquas and by Fock (1979) to 'Hottentots'. Morris (1988) suggests that some were almost certainly made by early Baster and Trekboer immigrants and that the tradition continued into the 20th century. He also notes the inclusion of wagons and human figures in western clothing.

LSA rock art sites occur in low density through the wider area, and include painted and engraved 'geometric tradition' sites as well as painted and engraved 'fine line' tradition sites (Binneman *et al.* 2011; Halkett 2014; Hart 2016; Orton 2021a, 2021b, 2021c, 2021d, 2022a, 2022b, in prep.). One of Hart's (2016) sites was considered as being of provincial significance due to the layering of painted imagery on the shelter wall and the very unusual inclusion of engravings on the same surface. Hart (2016) considered it likely that hundreds, if not thousands, of rock art sites occurred in his large study area. Most of those he recorded were engravings on dolerite outcrops with many of them being heavily patinated. However, younger images extending into the recent historical past were also documented. A similar pattern was found to pertain in the present study area by Halkett (2014), but he only found one rock painting which was a small shelter with red finger smears on its back wall. He notes that engravings were commonly found on suitable dolerite surfaces with most being scratched designs. Morris (2006) notes the existence of another rock painting site nearby as do Malherbe *et al.* (2011). Parkington *et al.* (2008) have documented many engravings in the Karoo region. They do not map their work but do provide a historical map of engraving distribution which shows the densest concentration being well to the north around the Kimberley region.

An interesting aspect of Karoo archaeology is rock gongs. These are (usually) dolerite rocks that are naturally perched in such a way that when struck they release a ringing musical note. The gongs are identified by heavily worn patches where they have been repeatedly struck. Parkington *et al.* (2008) have studied a number of gongs from Nelspoort and Vosburg, 70 km to the southwest and 140 km northwest of the present study area respectively, while Orton (2021b) recorded two further examples in the Nuweveld about 120 km to the west of Murraysburg. Both of the latter were surrounded by extensive stone artefact scatters indicating occupation of the area.

Historical stone-walled kraals and features are known to occur in the general area (Binneman *et al.* 2011; Gribble 2020; Halkett 2014; Hart 2016; Orton 2021a, 2021b, 2021c, 2021d, 2022a, 2022b; Tusenius 2012). These are likely mostly from the 19th century and represent the material remains of the early European farmers in the area. Such features are usually associated with variable density scatters of historical materials such as glass, ceramics and metal items. A large concentration of such material was recorded in the middle of the present study area at the old farmstead of Driefontein.

5.2.2. Site visit

The site visit showed archaeological materials to be extremely rare in the proposed Padloper Solar Facility 1 footprint area. Just two sites were recorded there, one a very ephemeral scatter of LSA stone artefacts in hornfels, and the other a brick and cement reservoir and two watering troughs that are likely mid-20th century in age and thus not archaeological.

However, a number of historical archaeological sites were seen alongside the proposed access road. These are all stone-walled sites related to the historical use of the landscape for farming purposes. One site is a stone-walled kraal built around a rocky outcrop (Figure 16). This is an unusual design but it is common to build kraals on a slope to facilitate drainage. To the south, some historical ruins were seen. One of these looks as though it may have been a stable building (Figure 17) and the other a house (Figure 18). While the kraal is at least 10 m from the existing road, the other two ruined structures are approximately 40 m away from it. Another house ruin was found midway along the access road (Figures 19 to 21). It relates to a small outpost with just the one building in evidence but with a number of other agricultural features visible on aerial photography, including dams and fields. The last feature of note was seen well away from the study area and access road and consists of a line of historical fence posts made from stone (Figure 22). Given the rocks packed around the bases of the uprights, it is perhaps unlikely that they were ever strung with wire but rather served only as a line of beacons indicating a historic boundary line.



Figure 16: Stone walling built around a rocky hill to create a kraal.



Figure 17: Ruined stone structure at waypoint 210.



Figure 18: Ruined stone cottage at waypoint 209.



Figure 19: Stone-walled cottage ruin at waypnt 214.



Figure 20: Internal hearth at waypnt 214.



Figure 21: Window at waypnt 214.



Figure 22: Historic fence line at waypoint 216 with stone fence posts/beacons that is no longer in use.

5.3. Graves

No graves were seen in the Padloper Solar Facility 1 study area or alongside the proposed access road. However, the landowner pointed out a set of nine graves located some 150 m from the access road, to the southwest of the farmstead at waypoint 219 (Figure 23). They are of varying styles and three headstones were present. The dates of death are 24 April 1917, 28 October 1918 and 29 October 1918. The chances of unmarked graves being present within the proposed footprint is extremely low.



Figure 23: The graves at waypoint 219. One with only head- and footstones is arrowed, while a second grave has a large stone mound (immediately behind the first in this view). The third at right is fenced.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

During the mid-18th century the first trekboers from the Cape made their way to the vicinity of the Sneeuberg and found the grazing to be excellent. They were granted loan farms there and very soon came into conflict with the Bushmen who were living in the area. The Bushmen started killing shepherds in the veld, attacking farms and stealing livestock. Malherbe *et al.* (2011) note that in the two and a half years from July 1786 to December 1788 the Bushmen killed 107 shepherds and stole 17 970 small stock and 6299 large stock. In addition, 99 horses were stolen or killed. The solution arrived at by the Dutch East India Company was to eliminate the Bushmen and between 1786 and 1795 at least 2500 were killed and another 600 captured.

Livestock farming drove the local economy with wool becoming a major product in the early 1800s.

The parish of Richmond was formed in 1843 with Graaff Reinett the next closest. To reduce travel distances, a new town was needed in between and Murraysburg was founded in 1855 on the farm Eenzaamheid. The name Murraysburg derives from Reverend Andrew Murray of Graaff-Reinet and Barend Burger. The proceeds of the plots sold in 1855 were used to build a church and parsonage. An unusual requirement in the sale of the plots was that the new owners were required to plant quince hedges around their boundaries (Fransen 2004). Schoeman (2013) notes that after the Dutch Reformed Church bought Eenzaamheid in 1855 the town remained church property until 1949 when it was bought by the divisional council which had already been established by 1895. Fransen (2004) lists several significant structures in the town, but only two in the surrounding areas – these are to the east and southeast of the Padloper study area, away from the project location.

During the Anglo-Boer War Murraysburg was the only town in the Cape Colony that had too few men to form a town guard. As a result Boer Commandos roamed the area freely and burned down several buildings in July 1901 (Schoeman 2013). There does not appear to have been any significant war action in the vicinity of Murraysburg.

Historical aerial photography shows the Rooisandheuwel farmstead on Farm 102 to have been much the same today as it was in 1959 but a few key differences are noted in the captions to Figures 24 and 25. Figure 26 shows historical and modern views of a small farm building/outpost on Farm 109.



Figure 24: Historical aerial photograph from 1959 (Job 434, strip 013, photograph 06071) showing the Rooisandheuwel farmstead with most structures already present. The main differences are (1) the farm workers' accommodation has been expanded with only two cottages having been present in 1959 (red arrow), (2) two further historical structures to their northwest still had roofs (yellow arrow), (3) The stone kraal in the northeast was roofed in 1959 (green arrow), and (4) a structure alongside the field in the east has now been removed (blue arrow).



Figure 25: Equivalent modern view to the one shown in Figure 24 above. Key as per Figure 24.

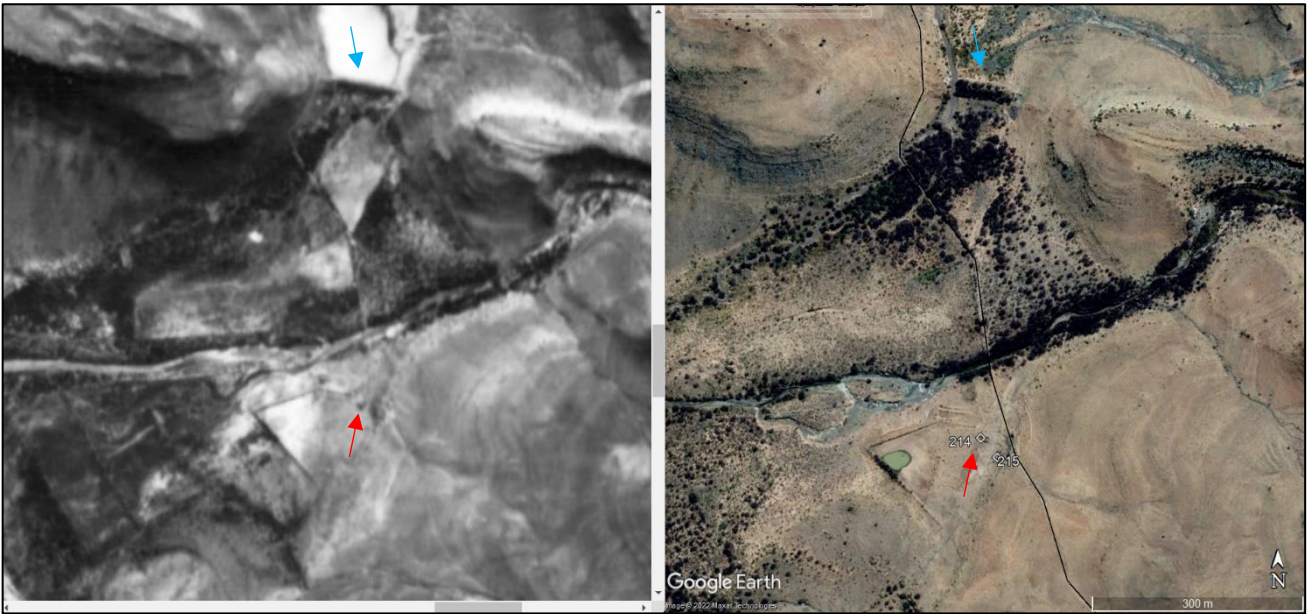


Figure 26: Historical aerial photograph from 1959 (Job 434, strip 013, photograph 06071) and a modern equivalent (Google Earth) showing, among other things, an unnamed farm outpost on Farm 109 with a large dam in the north (now breached; blue arrow), agricultural lands in the southwest and a stone cottage ruin (the latter confirmed by the fieldwork; red arrow).

5.4.2. Site visit

Almost all the historical and built environment features were located in the vicinity of the Rooisandheuwel farmstead. Some of these features are adjacent to the farm road proposed for use as the facility access road. It appears as though the previous farmstead was from the late 19th century, since the structure assumed to have been the main house has some Victorian features (Figure 27). It has been badly damaged in order to convert it to a barn – all internal walls have been removed, if it had gables then these have been removed and ad hoc entrances have been made (Figure 28). A small gabled structure sits just to the southwest of this building. It is in far better condition (Figure 29) and shows thick lower parts of its walls (Figure 30).



Figure 27: The southeast-facing front of the old farmhouse at waypoint 204. The north-eastern wall has had a large sliding door inserted. The gable in the background is a separate structure.



Figure 28: The south-western side of the old farmhouse at waypoint 204. A section of wall has been removed to facilitate large vehicle access.



Figure 29: The small historical structure at waypoint 205.



Figure 30: Thick stone and mud mortar wall inside the structure at waypoint 205.

Just northeast of the waypoint 204 house is another structure that seems like it was always a farm outbuilding (Figures 31 & 32). It was built on the same axis as the house and has not been much altered. Another building in the complex appears to have lost its roof relatively recently and is not effectively in run and perhaps better regarded as an archaeological site (Figure 33).



Figure 31: Historical barn at waypoint 207.

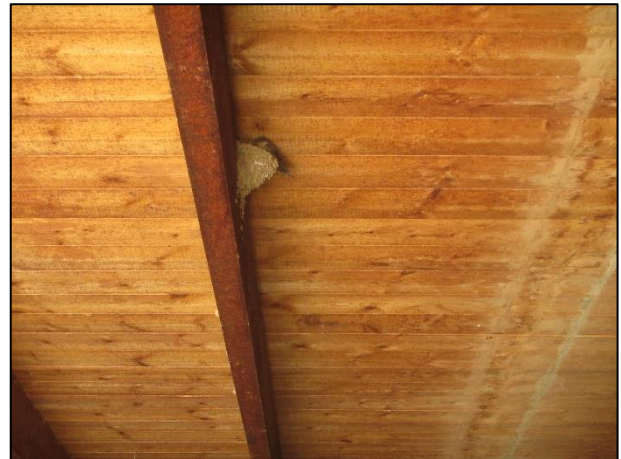


Figure 32: Well-preserved ceiling in the barn at waypoint 207.



Figure 33: Ruined historical structure at waypoint 206.

The farm labourers' village lies adjacent to the access road but the nearest structure is more than 20 m from the road (Figure 34). The buildings do not look old, but the historical aerial photograph in the desktop study confirms that two cottages were already built by 1959 and are thus heritage.



Figure 34: View of the farm workers' village at waypoint 211. The two structures that pre-date 1959 are arrowed.

Halfway along the proposed access road, at waypoint 213, there is a short section of track that climbs a hill. A length of drystone retaining wall has been built along the edge of the road (Figure 35). There is no obvious sign of its age, but the desktop study shows that the track has been there for more than 60 years which suggests this wall to also be older than 60 years.

The current farmhouse was not visited or photographed (it was surrounded by trees) but the desktop study shows it to be older than 60 years and, from the little that was visible, it is assumed to be mid-20th century in age.



Figure 35: View of the stone retaining wall holding up the farm track at waypoint 213.

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”. The broader landscape is largely natural but with pockets of rural/agricultural character at all the farmsteads. The proposed Padloper Solar Facility 1 site lies far from any farmsteads and the only anthropogenic traces it bears are tracks, fences and the watering point at waypoint 218. The landscape is generally quite scenic, but not overly distinctive in that these dolerite hills that form the escarpment and its foothills occur in an extensive swathe across the wider area.

The R63 that runs 23 km to the south of the study area can be regarded as a scenic route, but it will not be affected at all. The local gravel roads are not well enough travelled to be accorded the same status. In any case, the site is located 5.7 km away from the nearest public road which is the one linking Murraysburg and Richmond. Owing to topography, the solar panels will not be visible from this road or from the sensitive farmstead at the start of the project access road (Figure 36; note that the farmstead lies outside the viewshed area and is not marked on the map). In general, the facility will mainly be visible from high-lying land in the hills to the east of the site. It is concluded that, owing to its remote location far from roads and farmsteads, and despite the fact that the proposed project would alter the sense of place on site, the overall impact to the cultural landscape will be small.

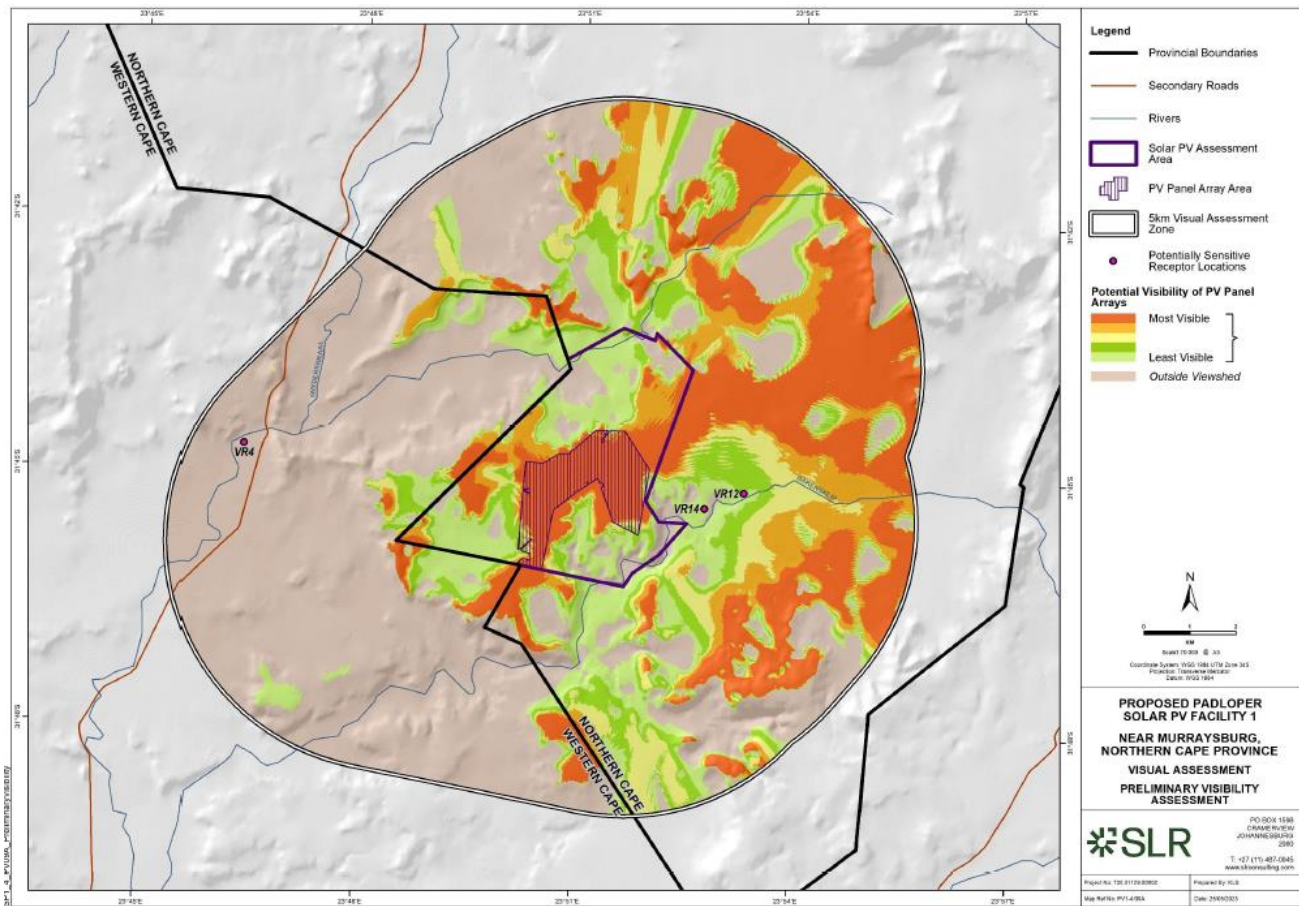


Figure 36: Viewshed showing the visibility of the Padloper Solar Facility 1 panels. The facility will not be visible from the Murraysburg-Richmond public road.

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 are deemed to have low-medium cultural significance at the local level for their scientific and historical values and can be graded up to GPA.

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

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having edium cultural significance at the local level. However, the farmstead and its immediate surroundings are considered as IIIA resources.

Figures 37 and 38 provide grade maps of the study area. Sites graded GPC are omitted from the maps for the sake of clarity.

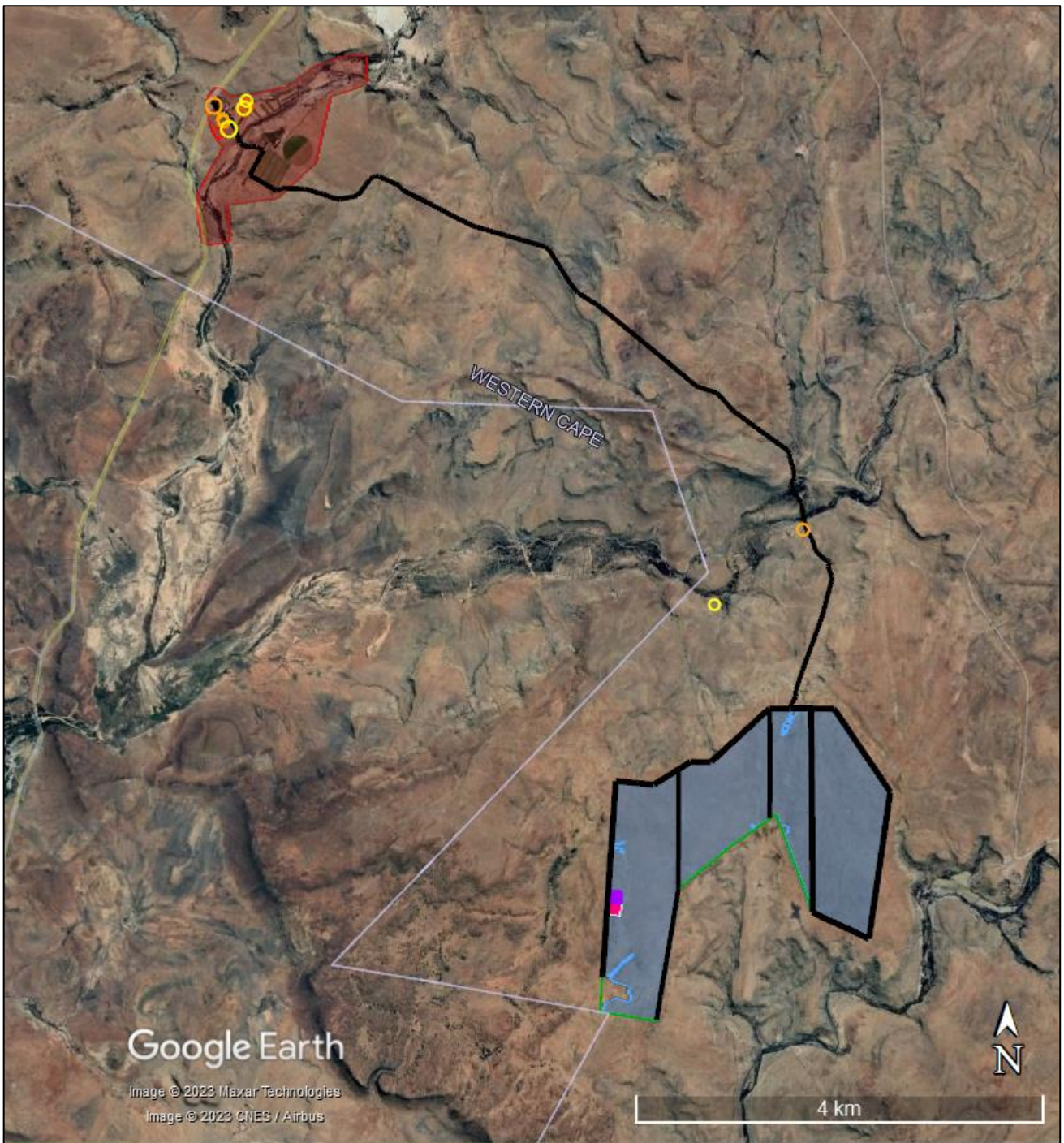


Figure 37: Grade map of the study area. Red = IIIA and IIIB, orange = GPA, yellow = GPB. Circles represent buffers and the polygon around the farmstead is a minimum of 50 m from all identifiable related features.

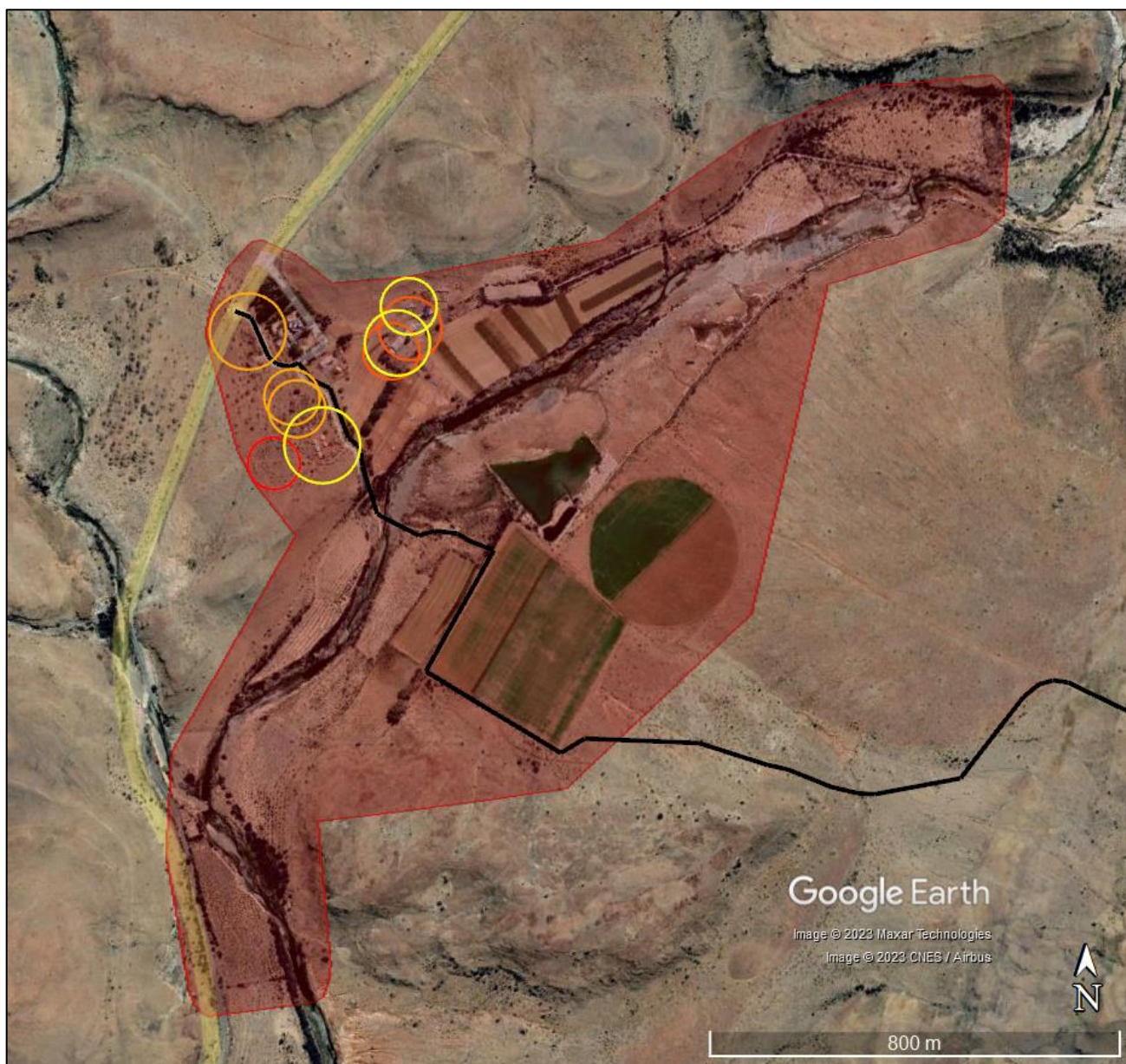


Figure 38: Close up of the north-western part of Figure 37.

5.7. Summary of heritage indicators

The following indicators are provided, but they exclude palaeontology which is assessed separately:

- Archaeological sites should be protected with a buffer of at least 30 m if possible. Reusing of existing roads through the buffers is allowed but any widening must take place away from the site.
- Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.
- The facility should not dominate views from multiple publicly accessible locations.

6. IDENTIFICATION OF ENVIRONMENTAL SENSITIVITIES

6.1. Sensitivities identified by the National Web-Based Environmental Screening Tool

Figure 39 shows the screening tool map for archaeology and cultural heritage. The entire site is indicated as being of low sensitivity.

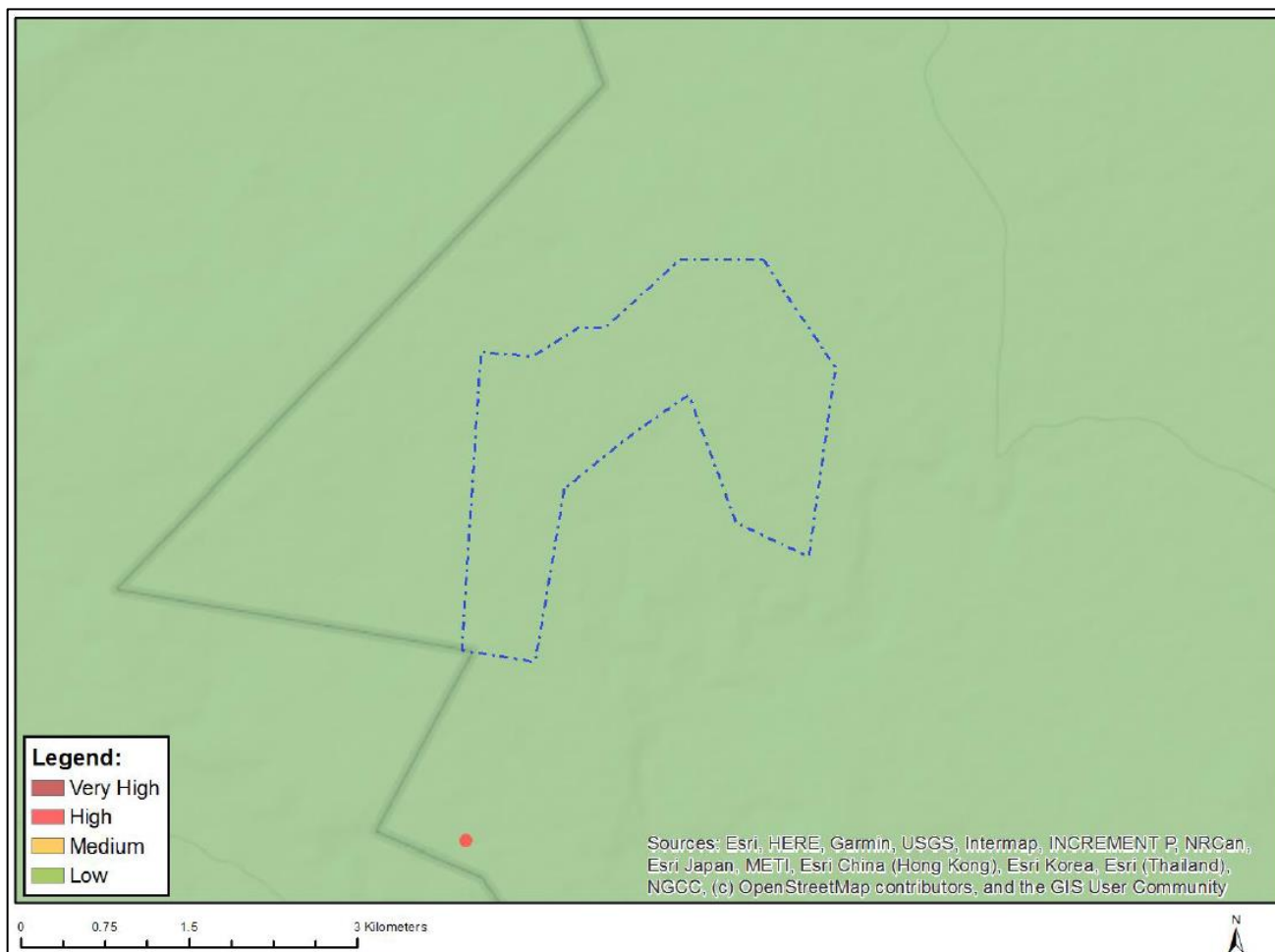


Figure 39: Screening tool map of the study area.

6.2. Specialist Sensitivity Analysis and Verification

The field survey has revealed that the Padloper Solar Facility 1 site is indeed of low sensitivity, although heritage sites with medium and high sensitivity have been recorded close to the access road. This mapping of sensitivity is shown in Figures 37 and 38 where Grade GPB sites can be considered as of medium sensitivity and GPA and above can be seen as high sensitivity.

6.3. Sensitivity Analysis Summary Statement

The fieldwork showed that the entire Padloper Solar Facility 1 site is of low sensitivity. This does not mean that no heritage resources will be present in these areas but the probability of resources of high cultural significance being found there is considered to be very low. Some heritage resources of up to low-medium cultural significance were found along the access road but only one resource of very low cultural significance – and hence low sensitivity – may be impacted. **The heritage specialist thus confirms the Screening Tool sensitivity for the Padloper Solar Facility 1 site and that low**

sensitivity also applies along most of the length of the access road. The exceptions are the farmstead area in the northwest and the small farm outpost which are both of high sensitivity.

7. ISSUES, RISKS AND IMPACTS

The potential impacts identified during the assessment are as follows:

Construction Phase

- Direct impacts to palaeontological resources
- Direct impacts to archaeological resources
- Direct impacts to the cultural landscape.

Operational Phase

- Direct impacts to the cultural landscape.

Decommissioning Phase

- Direct impacts to the cultural landscape.

Cumulative impacts

- Cumulative impacts to palaeontological resources
- Cumulative impacts to archaeological resources
- Cumulative impacts to the cultural landscape.

Impacts to graves were also considered, but were ruled out based on the rocky nature of the substrate throughout the study area and lack of known graves or graveyards close to the project area and access road. The rocky substrate means that Stone Age people would likely have buried their dead in river floodplains where excavatable sediments occur. No such environments will be impacted by the proposed project.

8. IMPACT ASSESSMENT

It should be noted that impacts to palaeontology are addressed in the separate palaeontological specialist study which is appended to this report and are thus not repeated here. Visual impacts are also assessed separately but the conclusions of the visual study are used here to inform the assessment of impacts to the cultural landscape. Each potential impact is discussed below and they are all summarised in Table 3.

8.1. Construction Phase

8.1.1. Impacts to archaeological resources

Direct impacts to archaeology would occur during the construction phase when the surface is cleared in preparation for construction of roads, solar panels and other infrastructure. Culturally significant sites are not expected to occur within the Padloper Solar Facility 1 area, but there is a small chance of impacting the stone-walled kraal at waypoint 208 during road construction. As such, the consequence is substantial and the potential impact significance is rated as **Boderate negative**. If the

developer ensures that the kraal at waypoint 208 is avoided and that chance finds get reported then the post-mitigation impact will be **Bery low negative**.

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

8.1.2. Impacts to the cultural landscape

Direct cultural landscape impacts arise when inappropriate or incompatible structures and equipment are introduced into the rural/natural landscape during the construction phase. The impacts are deemed to be local because the project will not be very tall (with the exception of the substation at 18 m high) and there are many hills in the area to limit visibility in the landscape. Impacts would be short term, however, because the construction phase is unlikely to exceed one year. Although the landscape is of medium cultural significance and impacts would definitely occur, the consequence is rated as substantial because of the limited visibility of the project in the landscape and general lack of cultural landscape elements in the Padloper Solar Facility 1 study area. The significance before mitigation is **Moderate negative**. Mitigation will entail minimising the construction duration, minimising all disturbance and scarring of the landscape and ensuring effective rehabilitation of any areas that will not be required during operation of the facility. All signage should be modest in size and similar in height to regular street signage. The impact significance after mitigation will be **Low negative**. There are no fatal flaws in terms of cultural landscapes.

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

8.2. Operation Phase

8.2.1. Potential Impacts to the cultural landscape

Direct cultural landscape impacts are a result of inappropriate or incompatible structures and equipment occurring in the rural/natural landscape during the operation phase. The impacts are again deemed to be local. The operation phase would be long term. The consequence is rated as substantial with the impact significance being **Moderate negative**. The most important mitigation relates to reducing light pollution at night since that has the potential to increase the visibility of the facility. It is preferable that the facility is entirely dark at night with motion-detectors placed to switch on lights only when needed. Also, buildings should be painted in earthy colours where possible to reduce contrast and all maintenance vehicles should stay within demarcated areas to avoid impacting undeveloped land. Signage should be modest in size, similar in height to regular road signs. With mitigation the significance will be **Low negative**.

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

8.3. Decommissioning Phase

Direct impacts during the decommissioning phase would be identical in nature to those from the construction phase except that the equipment on site would be uninstalling and removing the facility from the site. All ratings are the same. Mitigation in this case entails keeping the decommissioning duration as short as possible and ensuring full rehabilitation of the project site following the advice of the relevant specialist.

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

8.4. Cumulative Impacts

Note that cumulative impacts to palaeontology are considered by the relevant specialist study.

It is impossible to quantify the impacts to heritage resources because comprehensive surveys, especially for wind energy facilities, are impossible and, for various reasons, the reliability of the reported surveys is likely to be variable. Furthermore, cultural significance assessment is variable between practitioners. Although some archaeological sites are likely to be lost during the future construction of other facilities, it is clear that culturally significant heritage resources are rare on the local landscape and focused on farm complexes. Also, the individual significance of each site is such that it does not extend beyond the local area. The Padloper Padloper Solar Facility 1 layout avoids all known significant archaeological sites and will thus make a negligible contribution to cumulative impacts. The cumulative impacts are deemed to be of no more than **Low negative** significance in this case but with project specific mitigation as listed in Table 4 this would drop to **Very low negative** after mitigation.

Impacts to buildings and graves would be extremely rare and make no contribution to the assessment of cumulative impacts.

The construction of other facilities will also affect the cultural landscape. It is deemed preferable to cluster renewable energy developments such that the impacts are kept to one area. In the present instance this has been done as is evident from the map in Figure 40. Importantly, it is noted that all of the Padloper Padloper Solar Facility 1 projects lie within the approved sites for wind energy facilities. Because of the spread out nature of the various projects, the cumulative impacts would be regional in extent and the consequence is rated as being moderate. The impacts are very likely to occur if the projects are constructed. However, because the wind energy facilities will be vastly more prominent in the landscape than the solar facilities, the cumulative impact contribution of the Padloper Solar Facility 1 facility will be minimal. The cumulative impacts are deemed to be of **Low negative** significance in this case regardless of project-specific mitigation measures. Extra renewable energy facilities would also result in extra powerlines running through the landscape to facilitate the various grid connections.

Proposed Padloper Solar Photovoltaic (PV) and Electricity Grid Infrastructure (EGI) cluster near Murraysburg, in the Western Cape and Northern Cape, South Africa

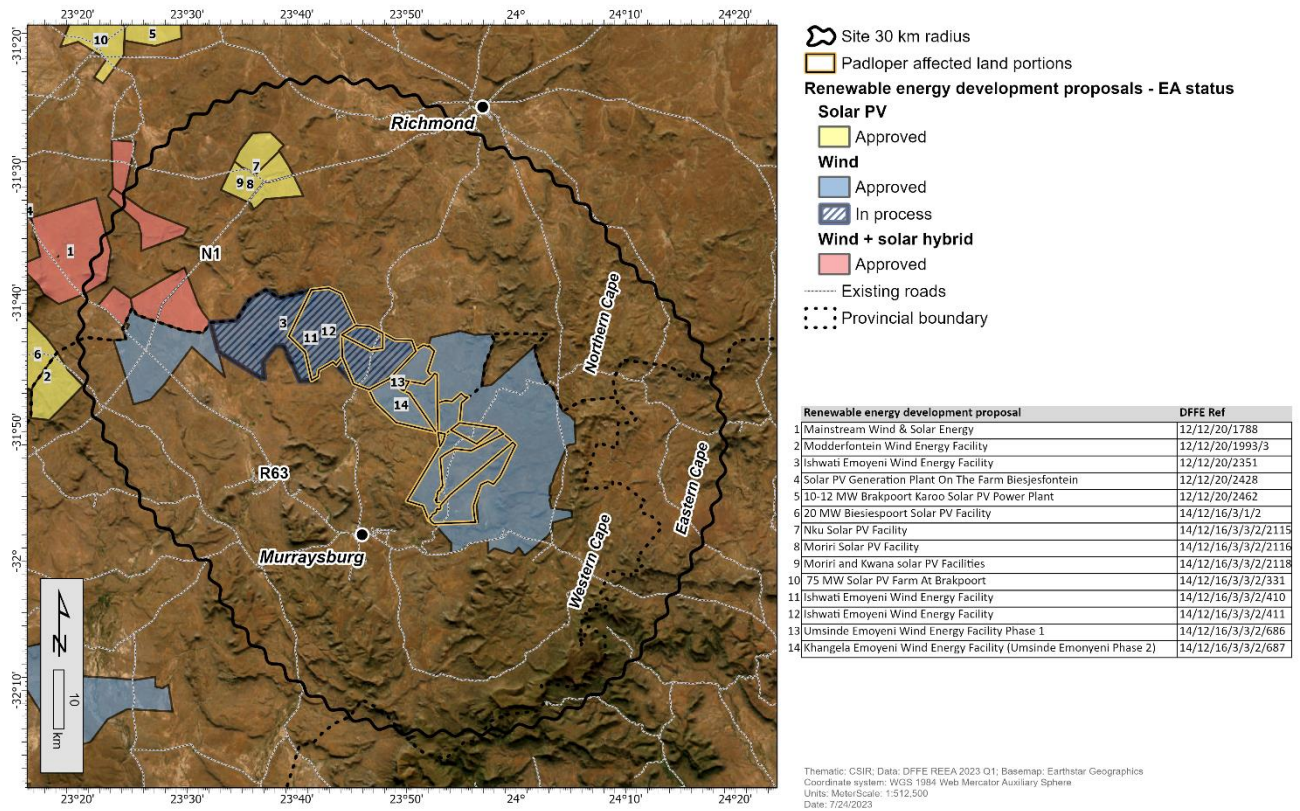


Figure 40: Map showing other projects considered in the assessment of cumulative impacts.

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	Moderate (3)	<ul style="list-style-type: none"> - Ensure avoidance of the stone kraal at waypoint 208 - Report any chance finds 	Very low (5)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Unlikely				
	Irreplaceability	High				
Intrusion of PV and equipment into the landscape	Status	Negative	Moderate (3)	<ul style="list-style-type: none"> - Minimise duration of construction period - Minimise cut-and-fill and landscape scarring in general - Ensure effective rehabilitation of areas not needed during operation 	Low (4)	High
	Spatial extent	Local				
	Duration	Short term				
	Consequence	Substantial				
	Probability	Very likely				
	Irreplaceability	Moderate				
Operational Phase						
Intrusion of PV into the landscape	Status	Negative	Moderate (3)	<ul style="list-style-type: none"> - Employ lighting mitigation that minimises light spillage - Paint buildings in earthy colours where possible - Ensure that all maintenance vehicles stay within designated areas - Signage to be of modest size 	Low (4)	High
	Spatial extent	Local				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Irreplaceability	Moderate				
Decommissioning Phase						
Intrusion of PV and equipment into the landscape	Status	Negative	Moderate (3)	<ul style="list-style-type: none"> - Minimise duration of decommissioning period - Ensure effective rehabilitation of all areas following advice of the relevant specialist 	Low (4)	High
	Spatial extent	Local				
	Duration	Permanent				
	Consequence	Substantial				
	Probability	Unlikely				
	Irreplaceability	High				
Cumulative impacts						
	Status	Negative	Low (4)	- As above	Very low (5)	High

Impacts to archaeology	Spatial extent	Regional				
	Duration	Permanent				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Non-reversible				
	Irreplaceability	High				
Intrusion of PV and equipment into the landscape	Status	Negative	Low (4)	- As above	Low (4)	High
	Spatial extent	Regional				
	Duration	Long term				
	Consequence	Moderate				
	Probability	Very likely				
	Reversibility	Moderate				
	Irreplaceability	Moderate				

8.5. 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 proposed Padloper Solar Facility 1 project would generate and feed electricity into the national grid. This is something very much needed for economic development in South Africa due to the historical and ongoing problems associated with electricity supply. Economic development has knock-on effects throughout society, but it is also noted that construction and operation phase jobs would also be created. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts.

8.6. 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 will affect fossils, archaeological materials and buildings. Trampling from grazing animals and/or farm/other vehicles could also occur. Impacts to archaeological sites are of no concern and would be of **negligible negative** significance. Buildings are generally not being impacted but the cultural significance of one has been severely compromised by inappropriate reuse. This is at least a **moderate negative** impact. There are no existing impacts to the rural landscape and this aspect is thus **neutral**.

8.7. The No-Go alternative

Not constructing the facility will mean that the study area stays undeveloped and the status quo is retained. The impacts that occur will be as per the existing impacts described above. Importantly, electricity generation would not take place which means that this benefit would be lost to society. This suggests that the No-Go option is less desirable in heritage terms.

8.8. 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 remote location, such an impact to the landscape is not envisaged.

9. 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 5.

Table 5: Overall Impact Significance (Post Mitigation)

Phase	Overall Impact Significance
Construction	Low
Operational	Low
Decommissioning	Low
Nature of Impact	Overall Impact Significance
Cumulative - Construction	Low
Cumulative - Operational	Low
Cumulative - Decommissioning	Low

10. LEGISLATIVE AND PERMIT REQUIREMENTS

This report and the proposed recommendations will need to be approved by SAHRA's DAU. There are no further legislative requirements for the approval process under the NHRA but if archaeological or palaeontological mitigation is needed then the appointed archaeologist or palaeontologist will need to submit a permit application to SAHRA to do the work. This work 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.

11. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The actions recorded in Table 6 should be included in the environmental management program (EMPr) for the project.

Table 6: 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	Avoid impacts to kraal at waypoint 208	<u>Planning & Construction Phase</u> : Plan access road to avoid kraal at waypoint 208 and widen as little as possible. Retain fence to southwest of road if possible.	Monitoring of No-Go areas (construction period only)	Once-off	Project developer
Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	<u>Construction Phase</u> : Reporting chance finds as early as possible to SAHRA (https://www.sahra.org.za/contact/), protect in situ and stop work in immediate area.	Inform staff to be vigilant and carry out inspections of new excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly during construction period only)	ECO
Damage or destruction of any known sites	Avoid impacts	<u>Construction Phase</u> : Place No-Go signage at identified sensitive locations (waypoints 208 and 214).	Monitoring of No-Go areas (construction period only)	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to the cultural landscape					
Visible landscape scarring	Minimise landscape scarring	<u>Construction Phase</u> : Ensure disturbance is kept to a minimum and does not exceed project requirements. 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 visual intrusion	<u>Operation Phase</u> : 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	<u>Operation Phase</u> : Paint buildings in earthy colours to reduce contrast. Make use of motion detectors and downlighting to reduce night-time light pollution.	Monitor that this has been considered in the design and operation of the facility	Once off	Project Developer
Intrusion into cultural landscape	Minimise signage	<u>All phases</u> : Signage to be modest and no higher than normal road signage.	Monitor that this has been considered in the	Once off	Project Developer

			design and operation of the facility		
Visible landscape scarring	Minimise landscape scarring	<u>Decommissioning Phase</u> : Ensure all areas are rehabilitated following specialist rehabilitation plan.	Monitor compliance and success of rehabilitation	As required	ECO

12. CONSULTATION

Consultation was carried out through the main public participation process (PPP).

13. CONCLUSIONS

There are no significant concerns for this project since no archaeological sites are under threat and no other heritage resources will be significantly impacted. Just two archaeological sites lie close to the access road but should be easily avoided and protected (Figures 41 & 42). The only other site that may be affected is the stone walling along the edge of the access road at waypoint 213. If it can be protected with widening happening away from the walling then that would be preferred, but, due to its very low cultural significance, this is not a requirement. Table 7 lists the heritage indicators and the project responses.



Figure 41: Aerial view of the stone-walled kraal at waypoint 208 (with 50 m buffer) with the farm road to be reused lying to its northeast. The distance between the road and the wall is approximately 14 m.



Figure 42: Aerial view of the stone ruin at waypoint 214 (with 50 m buffer) with the proposed project road lying to its east. The distance between the road and the ruin is approximately 28 m.

Table 7: Heritage indicators and project responses.

Indicator	Project Response
Archaeological sites should be protected with a buffer of at least 30 m if possible. Reusing of existing roads through the buffers is allowed but any widening must take place away from the site.	Only two sites (at waypoints 208 & 214) lie within 30 m of the development and are along the project access road. This is acceptable in both instances since the sites should be easily protected via no-go signage.
Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.	This has been done. No archaeological mitigation is required.
The facility should not dominate views from multiple publicly accessible locations.	The site is very remote and the facility will not be visible from public roads.

13.1. Statement and reasoned opinion of the specialist

Given the very low sensitivity of the study area and the lack of impacts to heritage resources, the heritage specialist is of the opinion that the proposed Padloper Solar Facility 1 may be authorised in full.

14. RECOMMENDATIONS

It is recommended that the proposed Padloper Solar Facility 1 be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- The stone-walled kraal at waypoint 208 must be flagged as a no-go area and any road widening that occurs must not impact on the walling (enough space must be allowed for large loads to easily pass by without hitting the wall);
- No stones may be removed from any archaeological sites (with the exception of waypoint 213 if it cannot be preserved; and
- Lighting mitigation must be employed to ensure that light is directed only to where it is needed and, preferably, that it only switches on when needed;
- Buildings to be painted in earthy tones where technically feasible;
- Signage demarcating the entrance of the facility must be modest in nature and should not exceed the height of regular street signage;
- 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.

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APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

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

Education:

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

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

Employment History:

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

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

➤ **Memberships and affiliations:**

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 – 2017
Heritage Western Cape APM Committee member	2013 – 2023
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, Franschoek, Namaqualand, Bushmanland
- LSA coastal shell middens
 - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
 - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
 - Franschoek (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:

<i>Date of Site Visit</i>	21 September 2022
<i>Specialist Name</i>	Dr Jayson Orton
<i>Professional Registration Number</i>	Association of Southern African Professional Archaeologists (ASAPA): 233 Association of Professional Heritage Practitioners (APHP): 043
<i>Specialist Affiliation / Company</i>	ASHA Consulting (Pty) Ltd

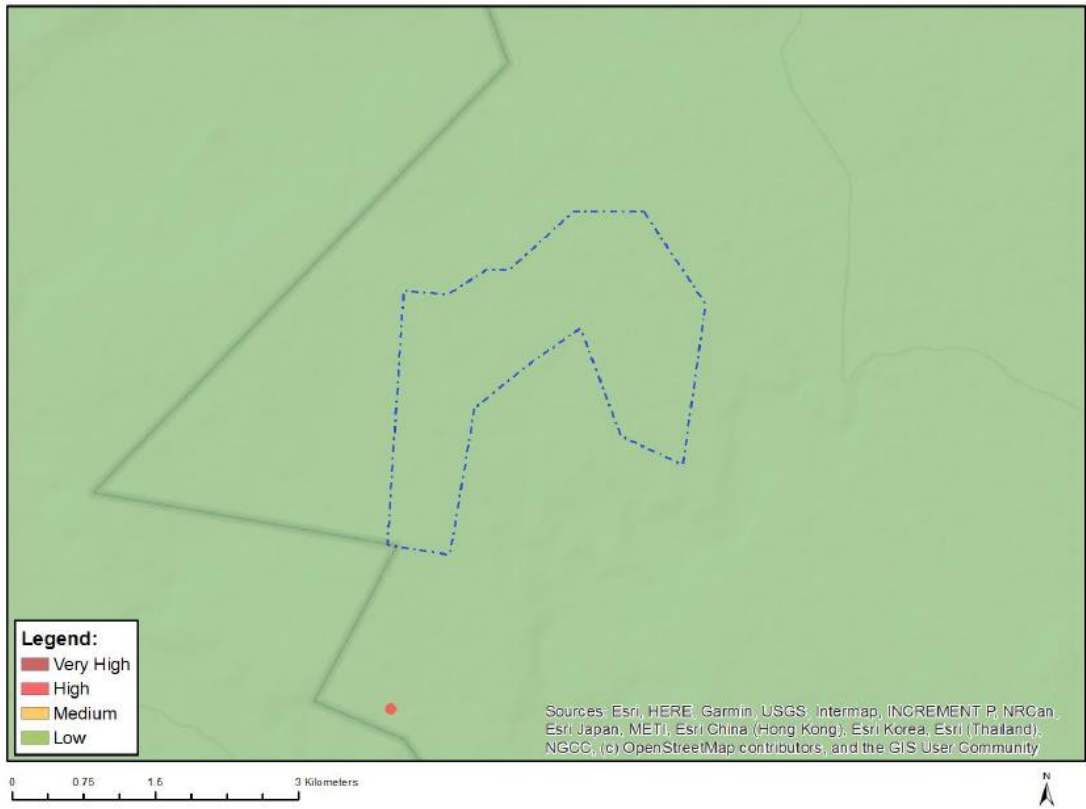
Method of the Site Sensitivity Verification

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 determine sensitive areas. 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).

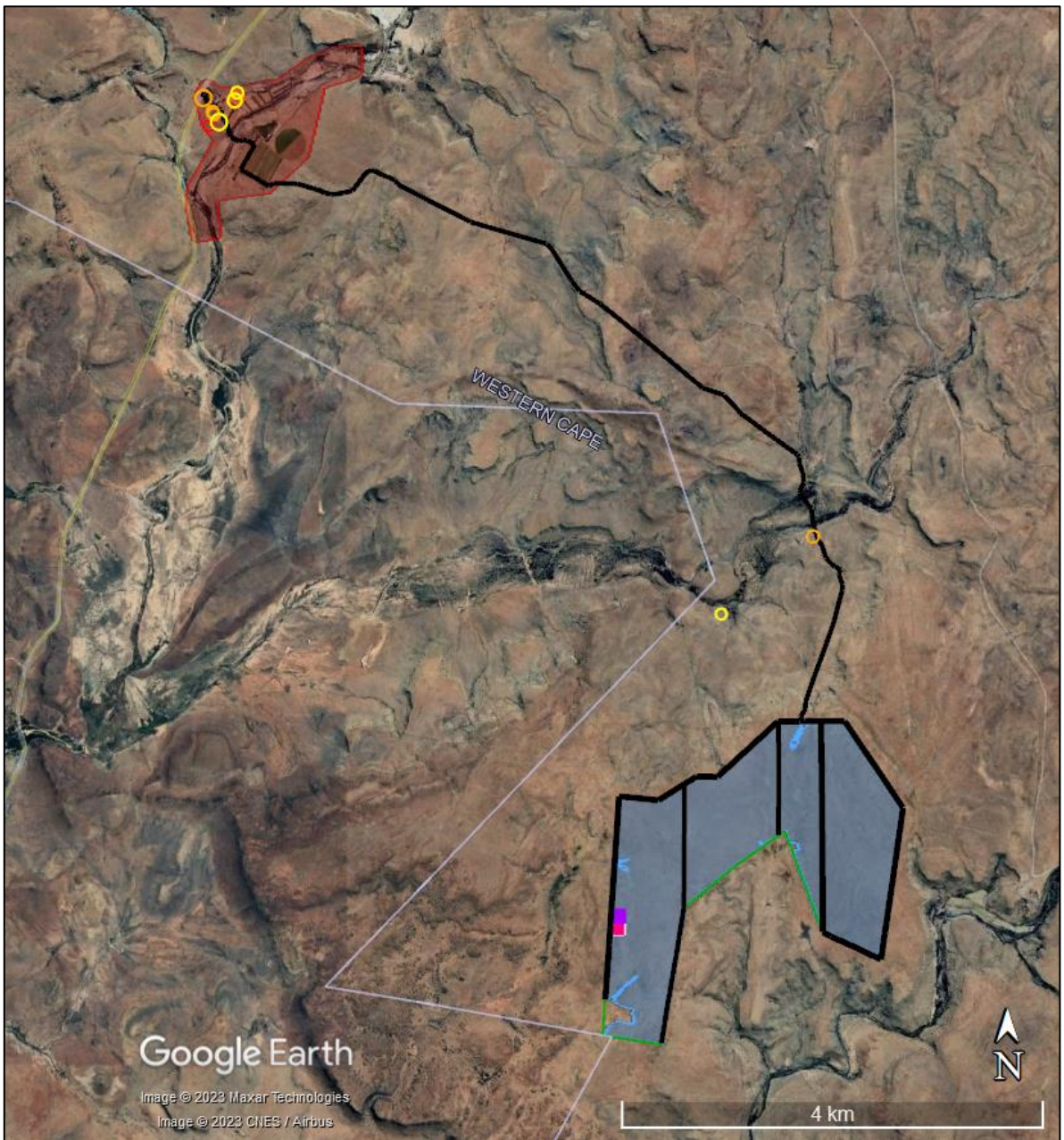
Outcome

The first map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low throughout the study area. The site visit confirmed that the entire Padloper Solar Facility 1 area is of low sensitivity but that areas of higher sensitivity occur along the proposed project access road. These include the farmstead in the northwest through which the road would pass. The second map below shows the areas considered to be sensitive from a heritage point of view. Photographs and descriptions of all these features are included in the specialist report. The heritage specialist thus disputes the Screening Tool report.

Sites of Grade IIIA (high cultural significance), IIIB (high cultural significance) and GPA (medium cultural significance) should be regarded as of high sensitivity. GPB sites (low cultural significance) can be seen as medium, while GPC (very low significance) are low sensitivity.



Screening tool map for the Archaeology and Cultural Heritage Theme.



Heritage sensitivity map. Red and orange areas can be regarded as high sensitivity, yellow areas are medium. The entire Padloper Solar Facility 1 area is of low sensitivity.

