

Appendix H.8

HERITAGE ASSESSMENT



**HERITAGE IMPACT ASSESSMENT:
PROPOSED MURA 1-4 PV FACILITIES, BEAUFORT WEST
MAGISTERIAL DISTRICT, WESTERN CAPE AND VICTORIA
WEST MAGISTERIAL DISTRICT, NORTHERN CAPE**

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

HWC Case No.: 22101902AM1019E

Report for:

Mura 1 (Pty) Ltd

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1st draft: 09 December 2022

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SUMMARY

1. Site Names

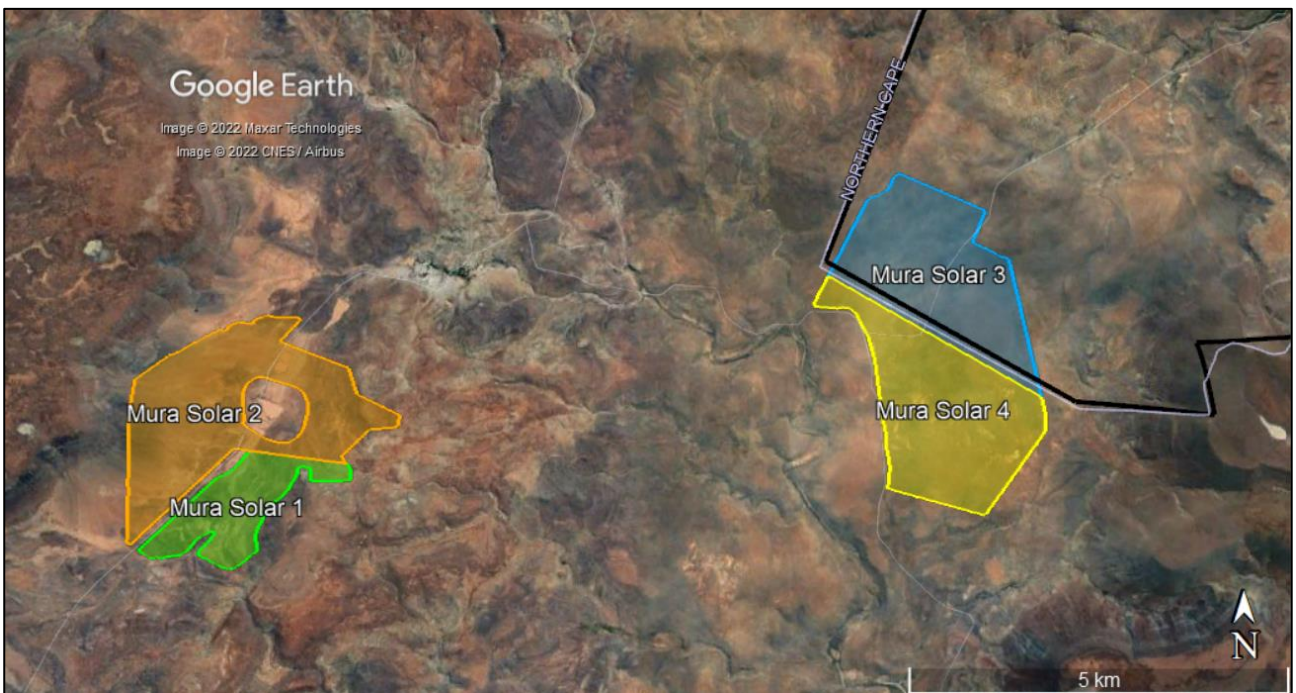
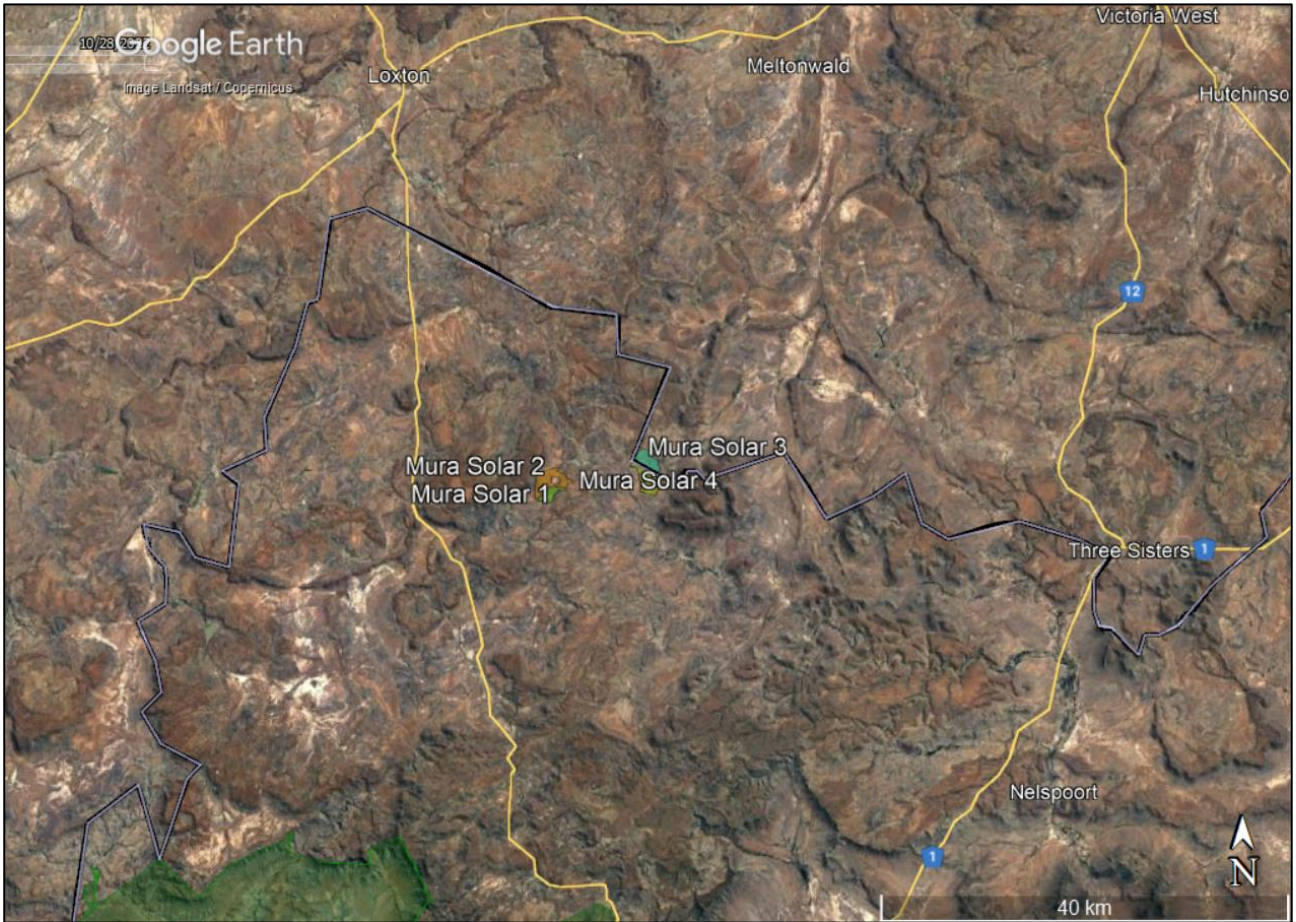
Mura 1 PV facility
 Mura 2 PV Facility
 Mura 3 PV Facility
 Mura 4 PV Facility

2. Location

Off R381, DR02317 and local gravel farm roads

Project	Province	Approximate centre point	Affected Farms
Mura 1	Western Cape	S31° 49' 56.7" E22 49' 46.5"	Leeuw Kloof 43 Portion 4 of Duiker Kranse 45
Mura 2	Western Cape	S31° 49' 17.6" E22 49' 33.0"	Bultfontein 13 Leeuw Kloof 43 Portion 4 of Duiker Kranse 45
Mura 3	Northern Cape	S31° 48' 19.0" E22 35' 36.8"	Leeuwkloof 43 RE of Abrams Kraal 206 Portion 4 of Duiker Kranse 45 RE of Portion 3 of Duiker Kranse 45 RE of Duiker Kranse 45 Sneeuwkraal 46 Aangrensend Abramskraal 11
Mura 4	Western Cape	S31° 49' 24.8" E22 35' 41.9"	Leeuwkloof 43 Aangrensend Abramskraal 11 Portion 4 of Duiker Kranse 45 RE of Portion 3 of Duiker Kranse 45 RE of Duiker Kranse 45 Sneeuwkraal 46

3. Locality Plan



4. Description of Proposed Development

Each of the four solar energy facilities will include, among other things, the following infrastructure:

- Solar panels;

- Substations;
- Operation and maintenance building;
- Battery Energy Storage System;
- Electrical cabling;
- Fencing;
- Construction camp / laydown area; and
- Access roads.

The four projects will have different extents as follows (including access roads and site camps):

- Mura 1: 198 ha
- Mura 2: 506 ha
- Mura 3: 436 ha
- Mura 4: 466 ha

5. Heritage Resources Identified

The palaeontological study found that fossils were very limited in the area and that the corridor should be considered as of low palaeontological sensitivity. A number of archaeological sites were found in and around the footprint areas. Because the footprints were designed to avoid as many environmental sensitivities as possible there are very few significant heritage resources in the footprints. The sites include ephemeral scatters of Stone Age artefacts and several historical stone-walled ruins and features. Historical artefacts were rare or absent from all but one of the ruins which had a light scatter of glass, ceramic and metal items but another ruin was only recorded from a distance. The landscape is also a heritage resource, but the site is in a very remote area with no public access and views are relatively short due to the very flat terrain surrounded by hills.

The access road to Mura 1 and 2 has very few heritage resources along it and none close to the existing road. However, the Mura 3 and 4 access road passes through a highly significant historical farm complex and associated features in the vicinity of waypoint 2000.

6. Anticipated Impacts on Heritage Resources

Mura 1 (Western Cape): No archaeological materials will be impacted.

Mura 2 (Western Cape): No archaeological materials will be impacted.

Mura 3 (Northern Cape): One potentially significant archaeological resource at waypoint 1402 could be impacted, although it lies within a small valley on the site making it likely that it will be avoided.

Mura 4 (Western Cape): One archaeological resource of low significance will be impacted at waypoint 1399.

Any alteration in the layout of the Mura 3 and 4 access road within 400 m of waypoint 2000 has the potential to result in damage to one or more elements of the farm complex.

7. Recommendations

Mura 1 (Western Cape): It is recommended that the proposed Mura 1 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- No stones may be removed from any archaeological site;
- The road construction camp location must be approved by an archaeologist and subjected to a site inspection if deemed necessary; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 2 (Western Cape): It is recommended that the proposed Mura 2 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- No stones may be removed from any archaeological site;
- The road construction camp location must be approved by an archaeologist and subjected to a site inspection if deemed necessary; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 3 (Northern Cape): It is recommended that the proposed Mura 3 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- The site at waypoint 1402 should be avoided if possible with a 50 m buffer or else revisited to record it in detail as well as determining whether any sampling would be required;
- Any realignment of the DR02317 within 400 m of waypoint 2000 must be checked in the field and approved by an archaeologist;
- No stones may be removed from any archaeological site;
- The road construction camp location must be approved by an archaeologist and subjected to a site inspection if deemed necessary; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 4 (Western Cape): It is recommended that the proposed Mura 4 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- The site at waypoint 1399 should be avoided if possible but this is not required (if avoided and protected then the buffer can be reduced to 25 m);
- Any realignment of the DR02317 within 400 m of waypoint 2000 must be checked in the field and approved by an archaeologist;
- No stones may be removed from any archaeological site;
- The road construction camp location must be approved by an archaeologist and subjected to a site inspection if deemed necessary; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

8. Author/s and Date

Heritage Impact Assessment: Jayson Orton, ASHA Consulting (Pty) Ltd, 09 December 2022

Archaeological specialist study: Jayson Orton, ASHA Consulting (Pty) Ltd, 09 December 2022

Palaeontological specialist study: John Almond, Natura Viva cc, November 2022

Visual Assessment: Quinton Lawson and Bernard Oberholzer, 5 December 2022

Glossary

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

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

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.

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

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

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BA: Basic Assessment

CRM: Cultural Resources Management

DFFE: Department of Forestry, Fisheries and the Environment

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

HWC: Heritage Western Cape

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

NCW: Not Conservation Worthy

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

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

NID: Notification of Intent to Develop

PPP: Public Participation Process

PV: Photovoltaic

REDZ: Renewable Energy Development Zone

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Mura 1 (Pty) Ltd to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of four photo-voltaic (PV) solar energy facilities in an area between Beaufort West and Loxton, in the Western and Northern Cape Provinces (Figures 1 & 2). The projects are to be known as Mura 1, Mura 2, Mura 3 and Mura 4 and their capacities, co-ordinate locations and property details are as shown in Table 1.

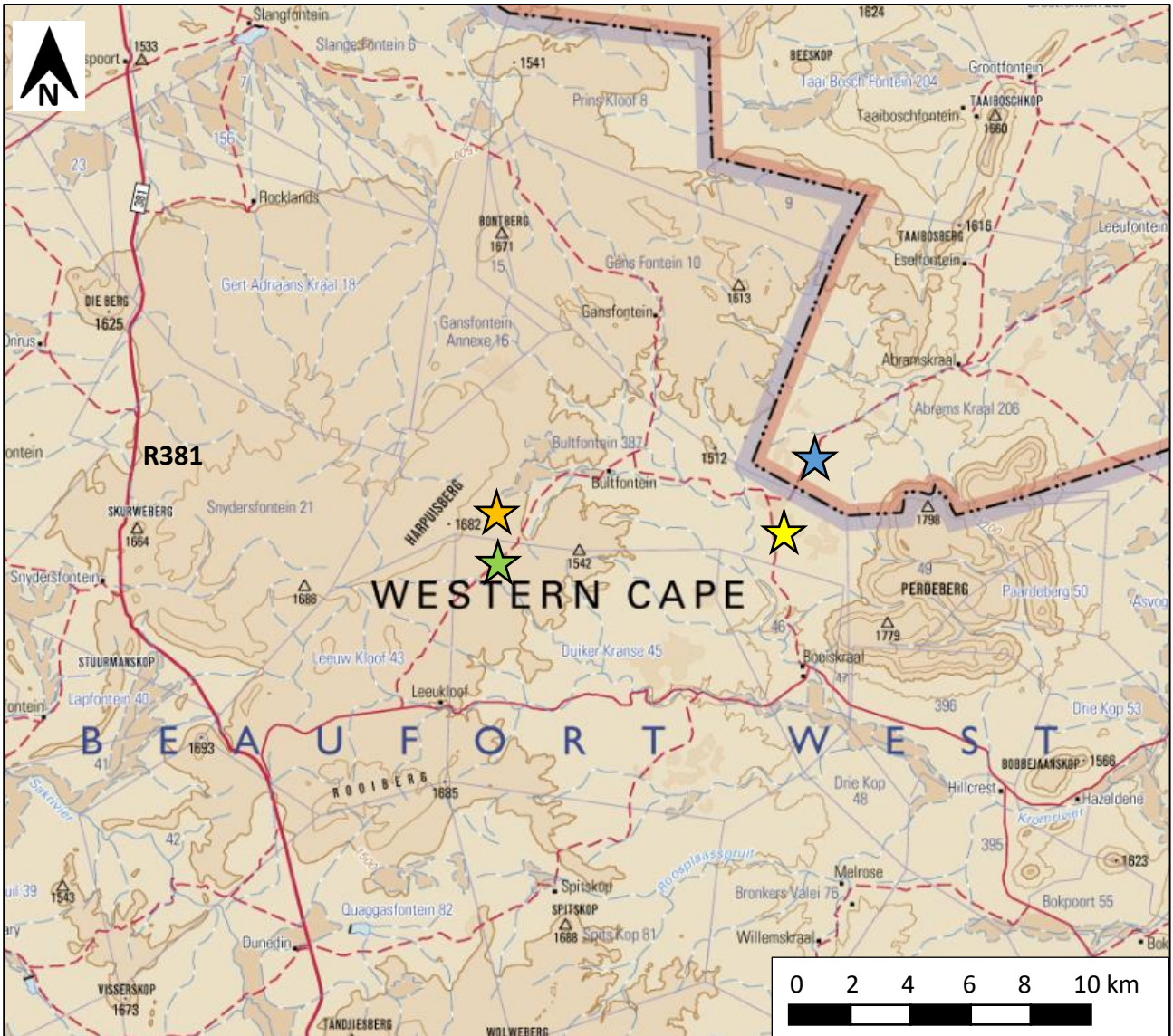


Figure 1: Extract from 1:250 000 mapsheet 3122 showing the location of the sites (green star = Mura 1; orange star = Mura 2, blue star = Mura 3, yellow star = Mura 4) relative to the R381 and the provincial boundary. The R381 at left runs north to Loxton and south to Beaufort West. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

It must be noted that the four facilities are the subject of four separate applications for Environmental Authorisation (EA) with Mura 1 being a Basic Assessment (BA) and Mura 2-4 each

being Scoping and Environmental Impact Assessments (EIA). However, permission has been granted for all four to be assessed in combined specialist reports.

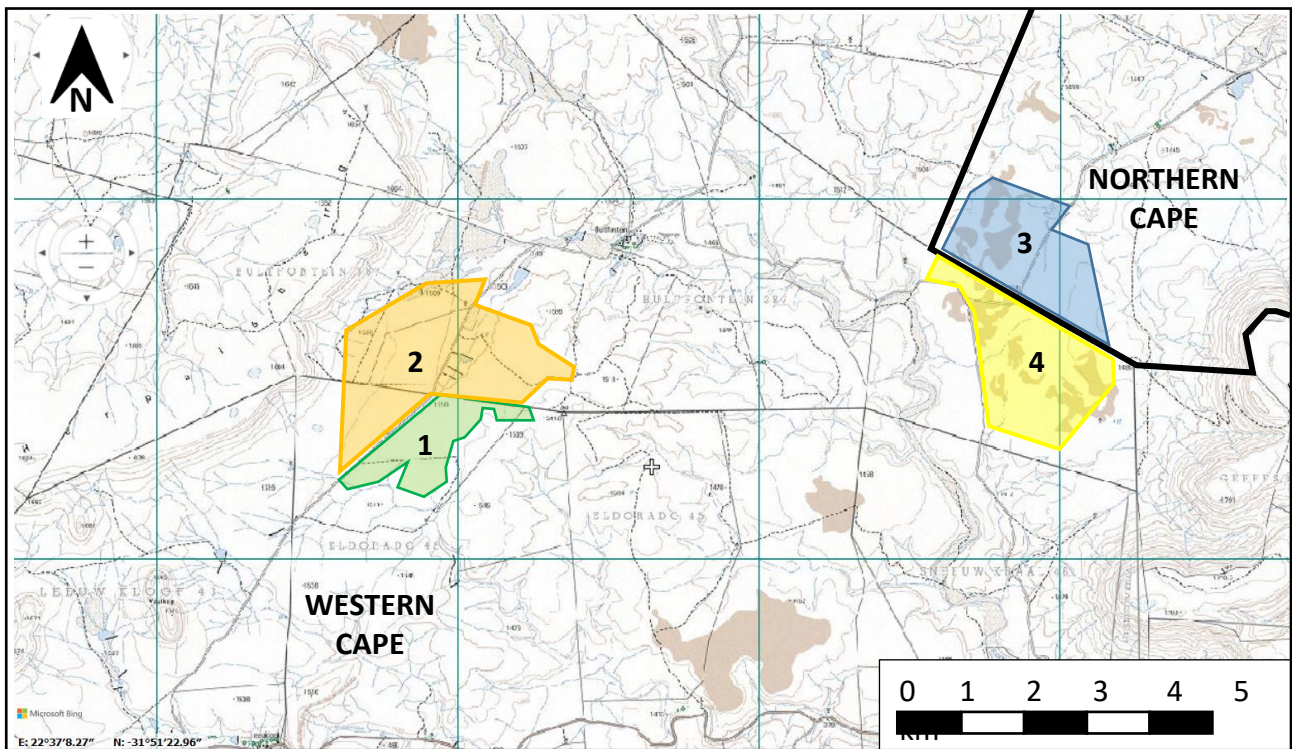


Figure 2: Extract from 1:50 000 mapsheet 3122CD showing the location of the Mura 1, Mura 2, Mura 3 and Mura 4 sites (numbered shaded polygons). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

1.1. The proposed project

1.1.1. Project description

Red Cap Energy (Pty) Ltd is proposing to develop four solar facilities and associated grid connections, on behalf of four separate Project Applicants, collectively known as the Mura PV projects between Loxton and Beaufort West in the Beaufort West Local Municipality and Ubuntu Local Municipality and the Central Karoo District Municipality and Pixley ka Sema District Municipality. The proposed Mura PV projects are located in close proximity to the approved Nuweveld Wind Farm Development. The four solar facilities will be assessed within a combined specialist report.

The sites will be accessed via the R381, DR02317 and existing access roads. Each solar facility will connect to the Eskom grid via new 132 kV overhead lines (assessed in separate processes to the PV facilities) connecting the two on-site solar substations via adjacent Eskom switching stations to the approved Nuweveld Collector substation.

Table 1: Location details of the four proposed PV facilities. The arm portions include those crossed by the access roads.

Project	Capacity	Footprint area (incl. Access roads and site camps)	Province	Approximate centre point	Affected Farms
PV1	150 MW	198 ha	Western Cape	S31° 49' 56.7" E22 49' 46.5"	Leeuw Kloof 43 Portion 4 of Duiker Kranse 45
PV2	400 MW	506 ha	Western Cape	S31° 49' 17.6" E22 49' 33.0"	Bultfontein 13 Leeuw Kloof 43 Portion 4 of Duiker Kranse 45
PV3	320 MW	436 ha	Northern Cape	S31° 48' 19.0" E22 35' 36.8"	Leeuwkloof 43 RE of Abrams Kraal 206 Portion 4 of Duiker Kranse 45 RE of Portion 3 of Duiker Kranse 45 RE of Duiker Kranse 45 Sneeuwkraal 46 Aangrensend Abramskraal 11
PV4	360 MW	466 ha	Western Cape	S31° 49' 24.8" E22 35' 41.9"	Leeuwkloof 43 Aangrensend Abramskraal 11 Portion 4 of Duiker Kranse 45 RE of Portion 3 of Duiker Kranse 45 RE of Duiker Kranse 45 Sneeuwkraal 46

Project components and specifications

The following are proposed as part of each project. It should be noted that no layouts have been provided for assessment by specialists¹ and that the areas under consideration for each solar project site should be assumed to be wholly transformed and will contain the following (see Section 3 below for project specific information):

A. Solar Field, comprising Solar Arrays:

- Maximum height of 6 m;
- PV Modules that are located on either single axis tracking structures or fixed tilt mounting structures or similar

B. Solar Farm Substation:

- Maximum height of 12m;
- Two up to 150 m x 75 m substation yards that will include:
 - Substation building; and
 - High voltage gantry.

¹ The proponent will generate layouts after completion of all specialist studies to be included in the draft assessment reports produced by the Environmental Assessment Practitioner (EAP).

C. Building Infrastructure:

- Maximum height of 8m;
- Offices;
- Operational and maintenance (O&M)/ control centre;
- Warehouse/workshop;
- Ablution facilities; and
- Converter/inverter stations.

D. Li-ion or similar solid state Battery Energy Storage System (BESS):

- Each solar farm will have up to a 4 ha area for a 240 MWac BESS;
- BESS substation (same specifications as the solar farm substations)
- Connected to the solar farm sub/switching stations via an underground high voltage cable.

E. Other Infrastructure located within the solar area footprint:

- Internal underground cables of up to 132 kV;
- Internal gravel roads;
- Fencing (between 2 – 3 m high) around the PV Facility;
- Panel maintenance and cleaning area;
- Storm water management system; and
- Site camps.

F. Associated Infrastructure (outside the solar area footprint but part of each solar project's application):

- Internal access gravel roads will have a 2-4 m wide driving surface and may require side drains on one or both sides. During construction the roads may be up to 12m wide, but this will be a temporary impact and rehabilitated following the construction phase; and
- Up to two 2.2 ha site camps within the access road corridor.

Figure 3 shows the study areas in their landscape context and also shows the roads that will be upgraded where necessary for access purposes.

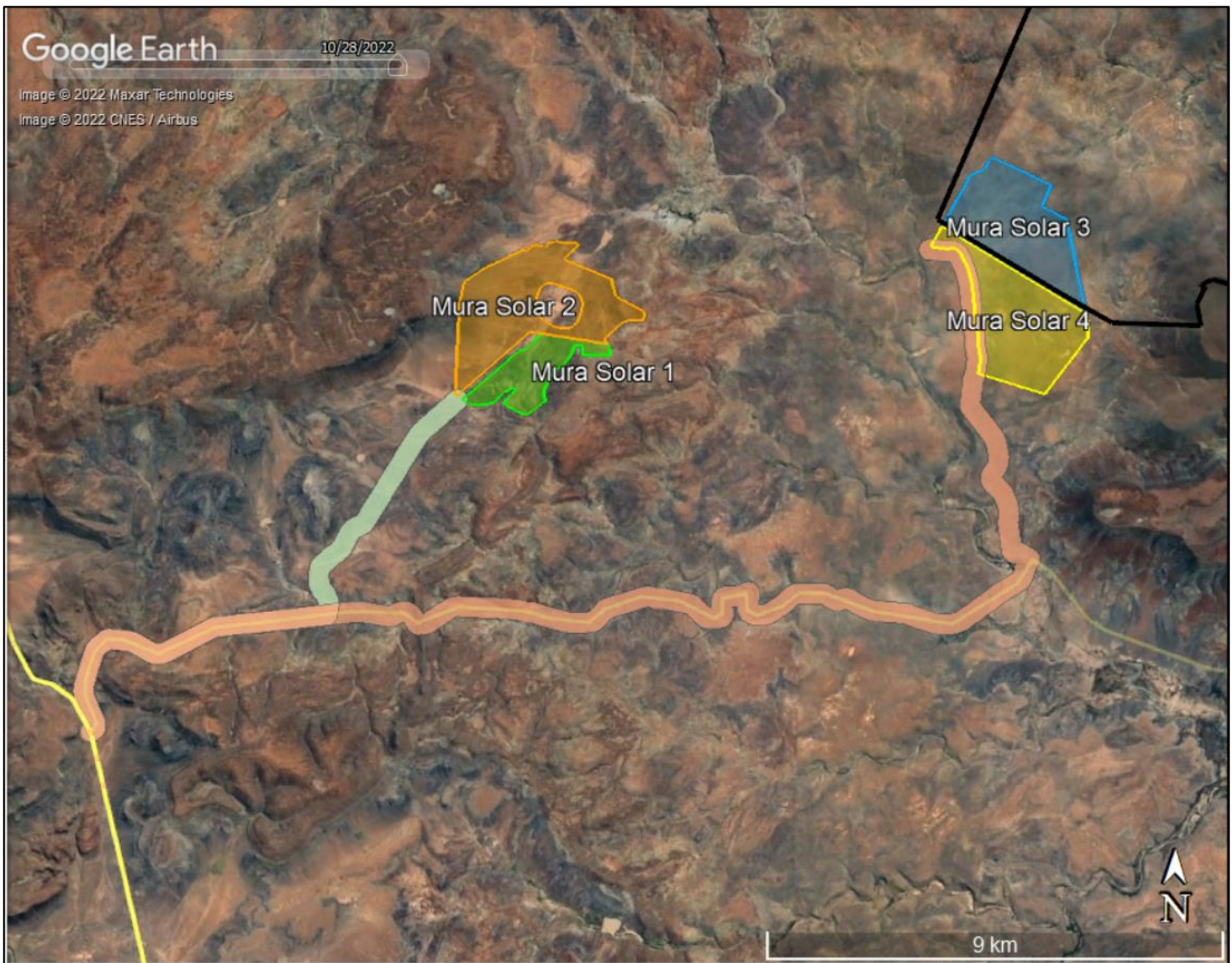


Figure 3: Aerial view showing the four study areas and their proposed access roads relative to the R381 (yellow line at left). The orange road corridor is the DR02317, while the green corridor is an unnamed smaller farm access road².

1.1.2. Identification of alternatives

Five initial areas were selected to be screened from an environmental and technical perspective. Three areas were then selected for field study, after which one more area was dropped because of environmental constraints which rendered development unfeasible. Most of Areas 2 and 5 was deemed suitable for development from both a technical and environmental point of view and four project sites were identified within them. These are the sites presented in this report. Because of this iterative process, no alternative locations are being assessed as these sites have already been determined to be low sensitivity.

1.1.3. Aspects of the project relevant to the heritage study

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

² Referred to as “Road A” in the Traffic Impact Assessment.

1.2. Terms of reference

ASHA Consulting was asked to:

- Provide a desktop-based screening assessment;
- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Describe regional and local heritage features of the receiving environment;
- Map sensitive features and provide spatial data to inform the final project layout;
- Assess the potential impacts on identified heritage resources;
- Identify relevant legislation and legal requirements; and
- Provide recommendations on possible mitigation measures and management guidelines.
- Findings and recommendations for each project were to be clearly separated in the report.

A Notification of Intent to Develop (NID) was submitted to Heritage western cape (HWC) for that portion of the project that fell within Western Cape. HWC responded with the following:

RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: HIA REQUIRED
In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape
Provincial Gazette 6061, Notice 298 of 2003

NOTIFICATION OF INTENT TO DEVELOP: PROPOSED DEVELOPMENT OF FOUR SOLAR FACILITIES AND ASSOCIATED GRID CONNECTIONS (PVs) ON VARIOUS FARMS, BEAUFORT WEST, SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

CASE NUMBER: 22101902AM1019E

The matter above has reference.

Heritage Western Cape is in receipt of your application for the above matter received. This matter was discussed at the Heritage Officers' Meeting held on 31 October 2022.

You are hereby notified that, since there is reason to believe that the proposed development of four solar facilities and associated grid connections, in particular PVs, on various farms, Beaufort West will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of Section 38(3) of the NHRA be submitted. Section 38(3) of the NHRA provides

- (3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): **Provided that the following must be included:***
- (a) *The identification and mapping of all heritage resources in the area affected;*
 - (b) *an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
 - (c) *an assessment of the impact of the development on such heritage resources;*
 - (d) *an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
 - (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
 - (f) *if heritage resources will be adversely affected by the proposed development, The consideration of alternatives; and*
 - (g) *plans for mitigation of any adverse effects during and after the completion of the proposed development.*

This HIA must in addition have specific reference to the following:

- Archaeological impact assessment &
- Palaeontological assessment.

The HIA must have an overall assessment of the impacts to heritage resources which are not limited to the specific studies referenced above.

The required HIA must have an integrated set of recommendations.


The comments of relevant registered conservation bodies; all Interested and Affected parties; and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

Please note, should you require the HIA to be submitted as a Phased HIA, a written request must be submitted to HWC prior to submission. HWC reserves the right to determine whether a phased HIA is acceptable on a case-by-case basis.

If applicable, applicants are strongly advised to review and adhere to the time limits contained the Standard Operational Procedure (SOP) between DEADP and HWC. The SOP can be found using the following link <http://www.hwc.org.za/node/293>

Kindly take note of the HWC meeting dates and associated agenda closure date in order to ensure that comments are provided within as Reasonable time and that these times are factored into the project timeframes.

HWC reserves the right to request additional information as required.
Should you have any further queries, please contact the official above and quote the case number.


.....
Colette Scheermeyer
Deputy Director



1.3. Scope and purpose of the report

A heritage impact assessment (HIA) is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the National Department of Forestry, Fisheries and Environment (DFFE) who will review the Basic Assessment (BA; in the case of Mura 1) and Scoping and Environmental Impact Assessments (S&EIA; in the case of Mura 2-4) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements per project that will need to be complied with from a heritage point of view and that should be included in the respective conditions of authorisation should these be granted.

1.4. The author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

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

1.5. Declaration of independence

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

2. 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: prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old, palaeontological material and meteorites;
- 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, some of the points in Section 3(3) 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 projects are subject to a BA (Mura 1) and three EIAs (Mura 2-4). The present report provides the heritage component for all four

assessments. HWC and Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the DFFE.

2.2.2. Construction Phase

If archaeological or palaeontological mitigation is required prior to construction, then the appointed archaeologist or palaeontologist would need to obtain a permit from SAHRA for work in Northern Cape or a workplan approval from HWC for work in Western Cape. 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. In the case of Northern Cape, a built environment permit, if required, would need to be obtained from Ngwao-Boswa Ya Kapa Bokoni.

2.3. Guidelines

SAHRA have issued minimum standards documents for archaeological and palaeontological specialist studies and HWC have done the same for HIAs and 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:

- Heritage Western Cape. 2016. Grading: purpose and management implications.
- Heritage Western Cape. 2019. Public consultation guidelines.
- Heritage Western Cape. 2021. Guide for Minimum Standards for Archaeology and Palaeontology reports submitted to Heritage Western Cape.
- Heritage Western Cape. 2021. Notification of Intent to Develop, Heritage Impact Assessment, (Pre-Application) Basic Assessment Reports, Scoping Reports and Environmental Impact Assessments, Guidelines for submission to Heritage Western Cape.
- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

2.4. Application timeline

The applications to DFFE under NEMA are currently in the pre-application phase with submission of the final Mura 1 BA and Mura 2-4 EIAs estimated to be in mid-2023.

3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. 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	CapeFarmMapper (http://gis.elsenburg.com/apps/cfm/#)	Current	Spatial	Cadastral boundaries, extents, and aerial photography (Western Cape only)
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.
Screening Tool maps	DFFE	Current	Spatial	Potential sensitivity of the study area

3.2. Field survey

The study areas were subjected to foot surveys on 4th and 14th July 2022, with the third and now omitted site surveyed on the 13th July 2022. A small section of Mura 2 was also covered on 18th March 2019 for another project (Orton 2021b). The July survey was during winter but, in this very 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 3). 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.

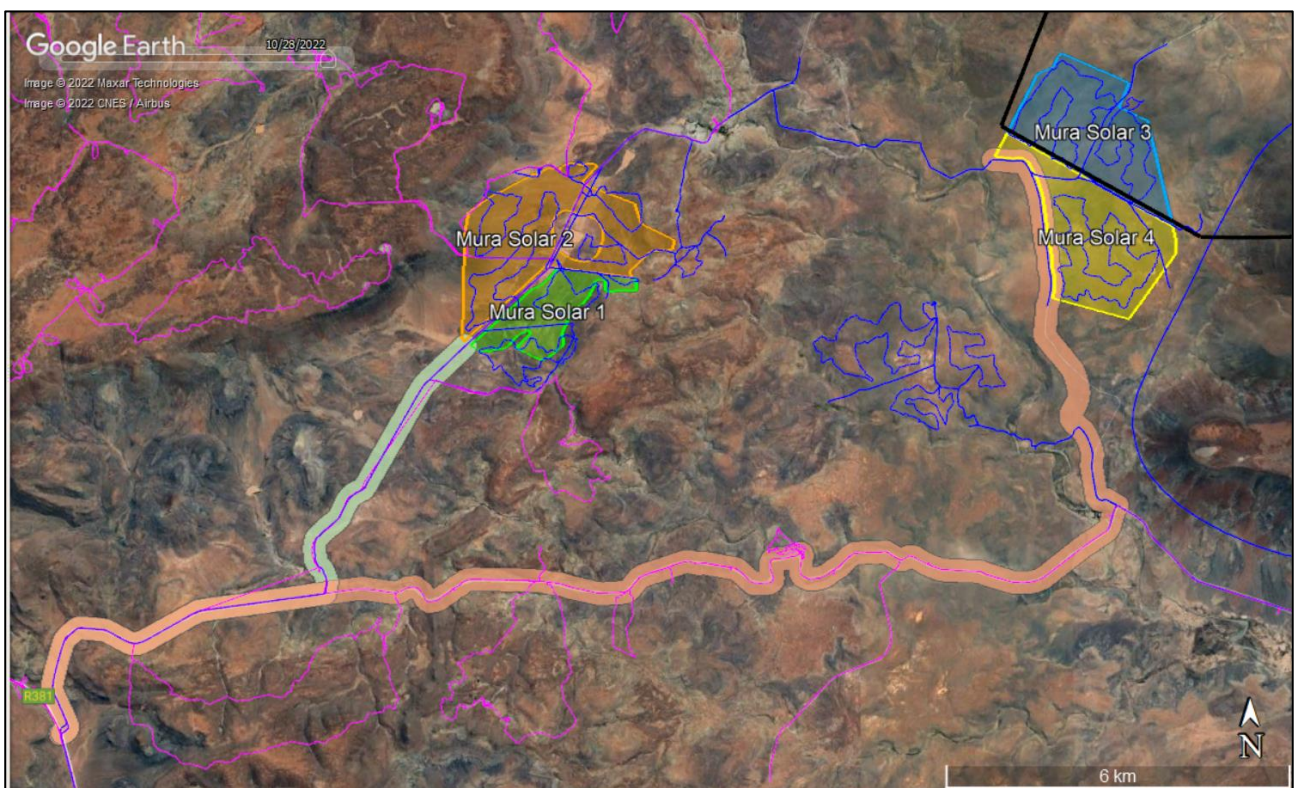


Figure 4: Aerial view of the study area (labelled coloured polygon) showing the survey tracks from 2019 (Nuweveld wind farm surveys, pink lines) and 2022 (current project surveys; blue lines).

3.3. Specialist studies

Specialist studies of archaeology and palaeontology were carried out. While the former is included within the HIA, the latter was undertaken by Dr John Almond of Natura Viva cc. It is summarised in the HIA and included in full as Appendix 3.

3.4. Impact assessment

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

3.5. Grading

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

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance, but this is generally yet to happen. Heritage Western Cape (2016), however, uses a system in which resources of local significance are divided into Grade IIIA, IIIB and IIIC. These approximately equate to high, medium and low local significance, while sites of very low or no significance (and generally not requiring mitigation or other interventions) are referred to as Not Conservation Worthy (NCW).

SAHRA (2007) has formulated its own system³ for use in provinces where it has commenting authority, including Northern Cape. 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. Consultation

The NHRA requires consultation as part of an HIA. Since the present study falls within the context of a BA and/or EIA which includes a public participation process (PPP), no full 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. In the case of Western Cape, however, it is required by HWC (see NID response) that heritage conservation bodies listed on their database as well as the local municipalities be approached directly with a request to comment on HIAs. The draft HIA was thus submitted to the relevant parties.

3.7. Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface.

³ The system is intended for use on archaeological and palaeontological sites only.

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.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The sites lie within a predominantly natural landscape with minimal infrastructure. The land is used for small stock and game rearing and the main signs of these activities are farm fences and jeep tracks. Some farm dams occur in the Mura 2 study area but the largest one has been excluded from the development footprint. The Mura 1 site and part of the Mura 2 site lie within the Beaufort West Renewable Energy Development Zone (REDZ; DEFF 2021), but the remaining study areas are just outside the boundary. All four sites are wholly within the Central Electricity Grid Infrastructure (EGI; DEA 2016) Corridor (Figure 5). Several wind energy facilities have been proposed and approved in the surrounding area, but none have yet been constructed.

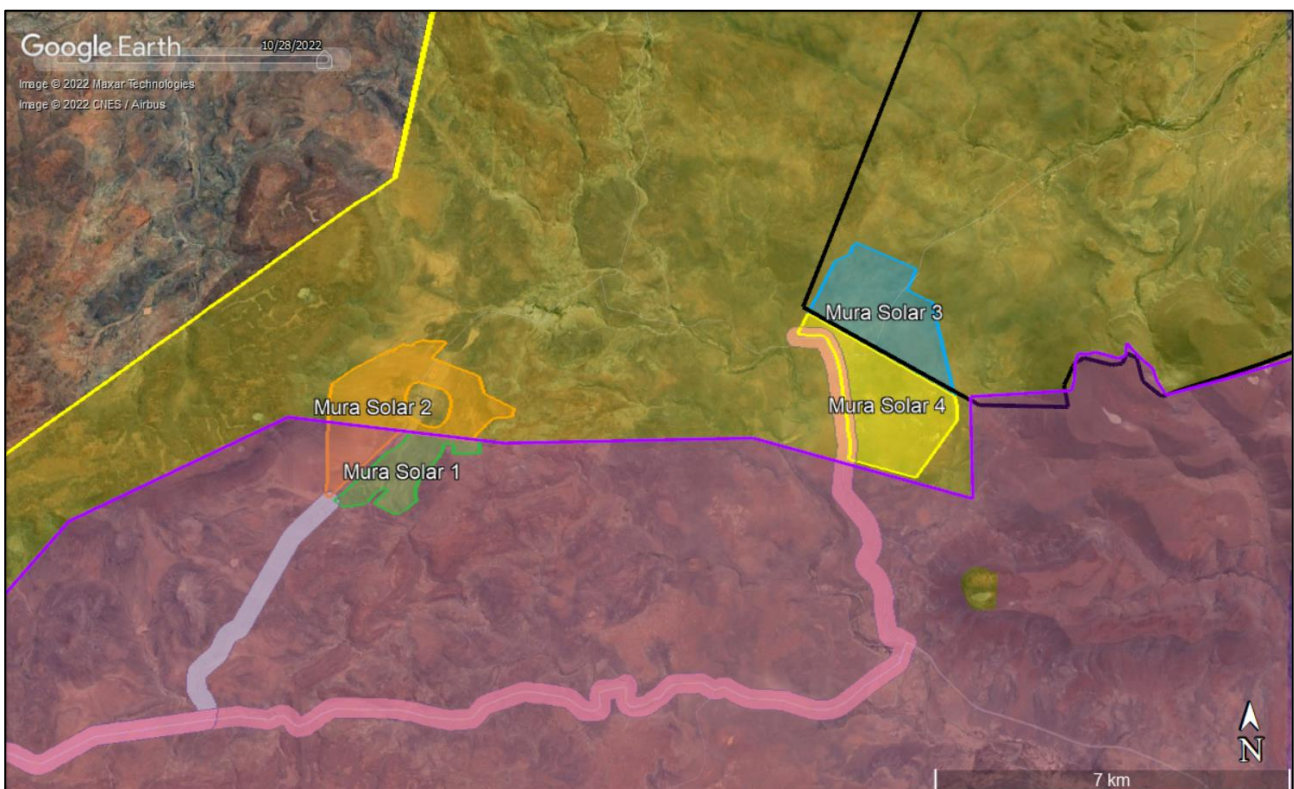


Figure 5: Aerial view of the four study areas showing the extent of the Beaufort West REDZ (purple shading) and the Central EGI Corridor (yellow shading).

4.2. Site description

The study areas are all very flat plains within a wide valley. While the surrounding mountains and hills are of dolerite, the plains are a mixture of hard rock geology capped with much sand and gravel. Vegetation is sparse but present almost everywhere. The exceptions are some ephemeral pans

located in the Mura 4 area. While there are a number of river valleys cutting the wider plain, these have been avoided by the development footprints and only small, ephemeral streams occur in places. Figures 6 to 18 show the characteristics of the various study areas.



Figure 6: Looking north across a stream bed at the southern edge of Mura 1. The Mura 1 and Mura 2 facilities would be on the very flat terrain in the background.



Figure 7: Looking west across the southern part of Mura 1 from immediately outside its eastern boundary showing the flat terrain chosen for development.



Figure 8: Looking north through the north-eastern part of Mura 1 showing the flat terrain chosen for development.



Figure 9: View towards the east from the western edge of Mura 2 showing the very flat plain chosen for development.

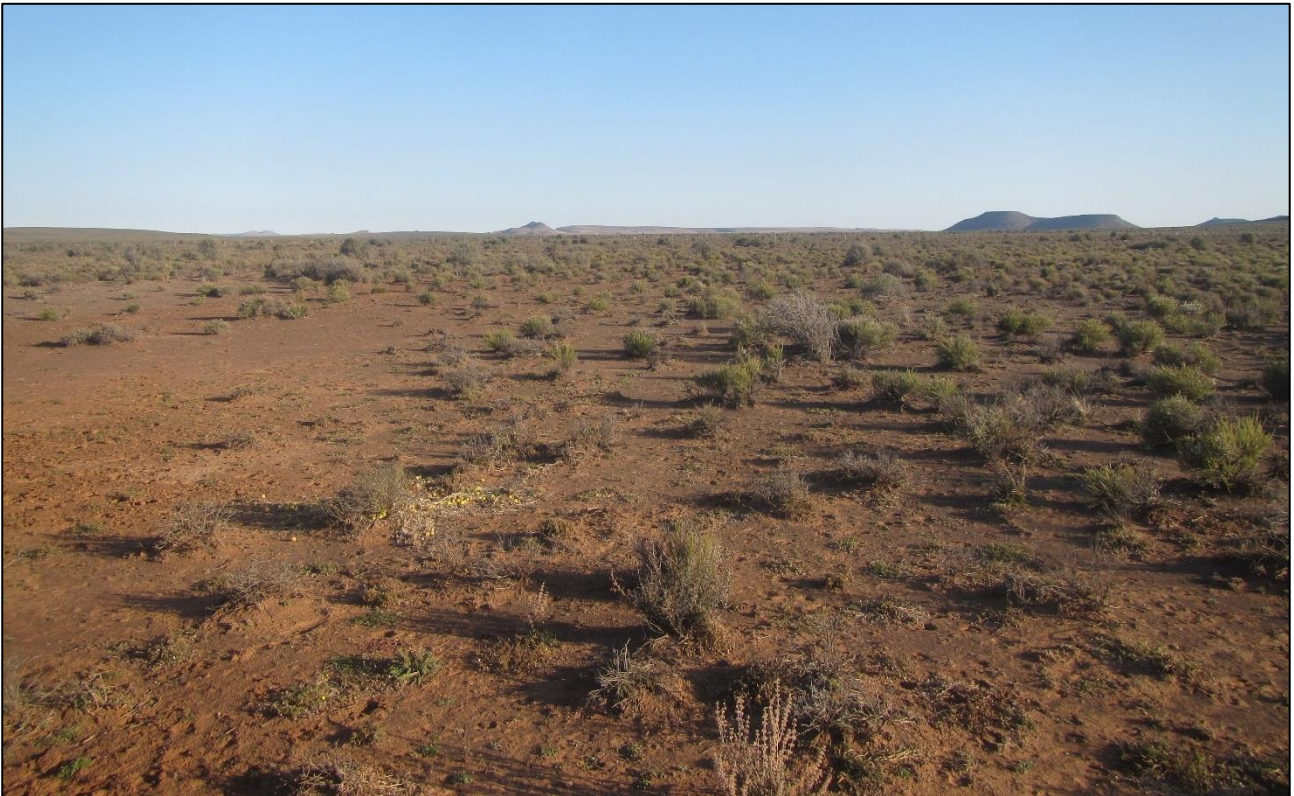


Figure 10: View towards the southwest from the northern edge of Mura 2 showing the flat landscape and sandy substrate.



Figure 11: View towards the south from the north-eastern edge of Mura 3 showing a rocky substrate in this area.



Figure 12: View towards the south from the western edge of Mura 3 showing a rocky substrate in this area.



Figure 13: Looking east through the southern part of Mura 3 with the Perdeberg massif in the background.



Figure 14: Looking south through the centre of Mura 4.



Figure 15: View towards the north from the south-eastern part of Mura 4 showing the flat terrain and sandy substrate with scattered gravel clasts.

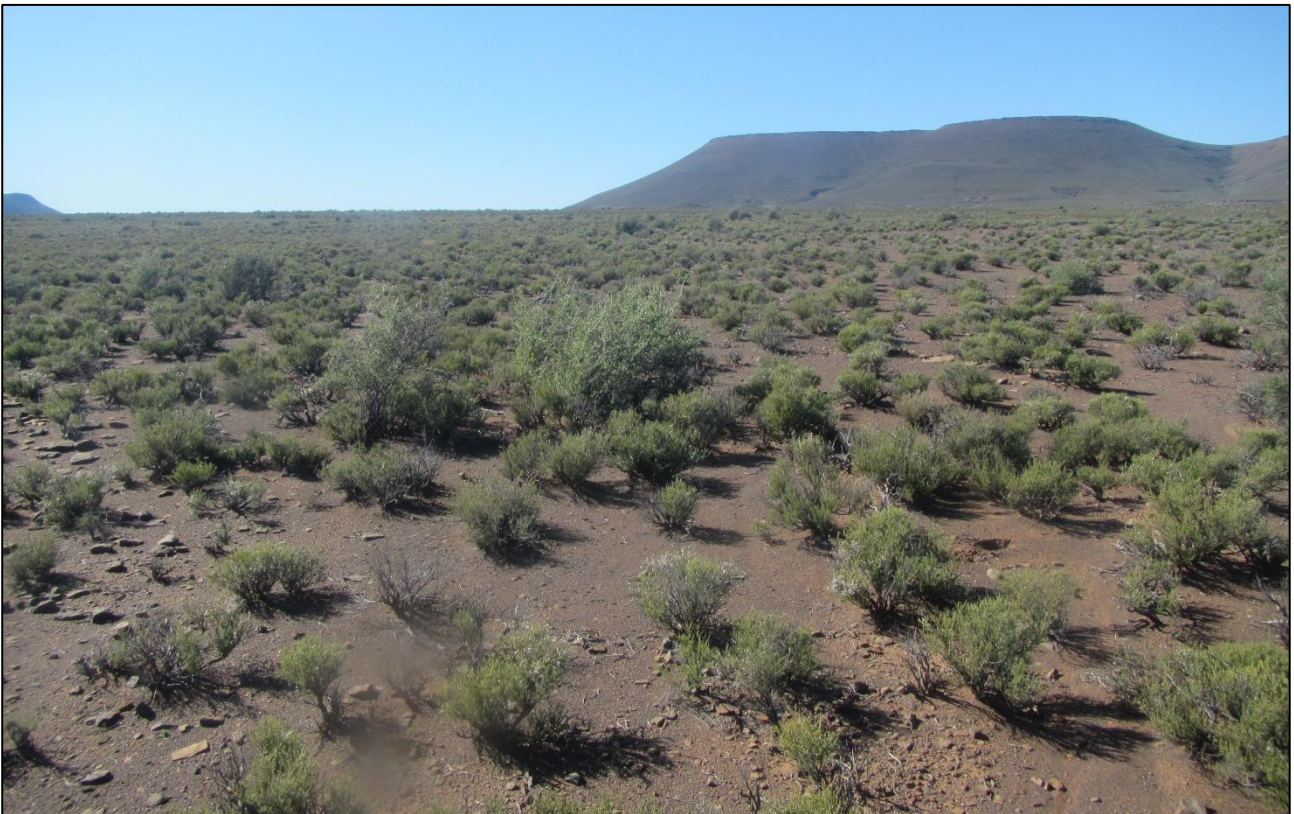


Figure 16: Looking towards the northeast from the south-western corner of Mura 4 showing the flat development site. The Perdeberg massif lies in the background.

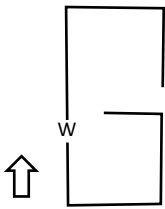


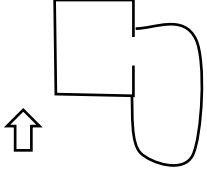
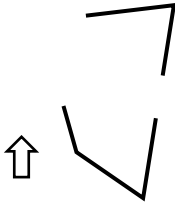
Figure 17: Looking east from near the western edge of Mura 4 showing ephemeral pans and with Perdeberg in the background.

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Table 2 lists the heritage resources recorded in the area during the survey for this project. Because the PV facilities footprint areas have been reduced in size after the surveys so as to avoid sensitive areas, many sites fall outside of the PV footprints. Nonetheless, all sites from the survey are listed for the record. Table 2 identifies which are affected by the various proposed PV facilities. Table 3 lists those sites recorded during the various surveys for the Nuweveld projects and that lie along the road corridors (Orton 2021a, 2021b, 2021c, 2021d). Note that many lie outside of the corridors and are not listed here but are included in the mapping (Appendix 2). The Table 3 sites are not discussed in detail here but a brief discussion of them is included in this section. They are highly unlikely to be affected by any road upgrades.

Table 2: List of finds from the heritage survey. Those sites falling within the various PV footprints are labelled with the Mura number and are colour coded (RC = road corridor). All other sites are more than 110 m from the project boundaries. Note that 1401 to 1403 fall into Northern Cape (grey shaded waypoint number).

Waypoint	Mura	Location	Description	Significance Grade
1320		S31 50 16.5 E22 30 02.5	<p>A two-room stone ruin built with slabs and no mortar. The ruin is about 2 m wide and 3.5 m long. The door faces east and a window faces west. There is an ephemeral scatter of historical material around the ruin but no dump. There was aqua and clear glass and a few fragments of refined white earthenware, one of which was lined industrial ware.</p> 	Medium IIIB
1321		S31 50 37.0 E22 29 28.3	A very ephemeral artefact scatter in an area that has minimal gravel. They are on local sandstone-type rocks, some of which is likely tuff. There are no diagnostic pieces but the freshness of the artefacts suggests that they relate to the LSA.	Very low NCW
1322		S31 50 34.6 E22 29 15.5	A very ephemeral artefact scatter in an area that has minimal gravel. They are on local sandstone-type rocks, some of which is likely tuff. There are no diagnostic pieces but the freshness of the artefacts suggests that they relate to the LSA.	Very low NCW
1323		S31 49 08.0 E22 30 02.1	A brick ruin which has been partially demolished and had most joinery removed. It is mid-20 th century at most and thus not heritage.	---
1324		S31 49 18.3 E22 30 09.1	This is the south-eastern end of a large earthen-walled dam. A drystone wall forms part of the spillway at this point. The dam is still functional. It lies across a floodplain that has a few berms across it and has been used for agriculture in the past.	Low IIIC
1325		S31 49 33.4 E22 31 10.2	This is a point on a small dolerite dyke where rocks have been cleared to the side to make way for a track/road. The road is no longer visible.	Very low NCW
1326		S31 49 28.4 E22 31 15.6	An ephemeral scatter of glass with two vessels represented. There is a piece of aqua bottle neck and the top part of a stopper. Also present were several fragments of slightly thinner clear glass.	Very low NCW
1327	2	S31 48 54.4 E22 30 06.3	This is the south-eastern end of one of two lines of rock slabs that have been placed at an angle in the ground. They no doubt relate to earlier farming activities in the area.	Very low NCW
1328		S31 48 54.3 E22 29 03.0	A stone-walled feature measuring about 5 m by 5 m and built against a low east-facing scarp. The feature is probably a small kraal. The walls are just made of piled rocks with no mortar. Previously recorded by Orton (2021).	Low IIIC
1329		S31 48 52.9 E22 29 03.1	A small square ruin of 2 m by 2 m with a door facing east and with a 1.5 m by 3 m vestibule in front of it. And which is offset towards the south. It is not apparent where the entrance to the vestibule was. The base of the walls seems to have been made with slabs on edge for the faces with the gap filled with smaller stones. Other stones were piled on top. There has been much tumbling and the feature is poorly preserved. Previously recorded by Orton (2021) who also noted the presence of a single piece of glass.	Low IIIC

Waypoint	Mura	Location	Description	Significance Grade
				
1349	3/4 RC	S31 52 01.5 E22 35 53.7	Farmstead with dam and fields (cultural landscape). Also recorded in Orton (2021a) as waypoint 1794 with the many stone walls at the farmstead being noted.	High IIIA
1389	3/4 RC	S31 51 50.9 E22 35 48.4	A small brick house that is in a state of disuse. It has a corrugated iron roof and window openings have been bricked up. Part of farmstead previously recorded as waypoint 1794.	Low IIIA
1390		S31 51 18.6 E22 35 03.9	An old agricultural implement of some sort. It would be considered a heritage object.	Medium IIIB
1391		S31 51 10.7 E22 34 43.9	A small square stone-walled ruin of about 2 m by 2 m and with its door opening towards the east. It is right adjacent to the road and one corner has been damaged or possibly deliberately removed to make way for the road.	Very Low IIIC
1392		S31 49 58.1 E22 33 56.0	A scatter of ostrich eggshell fragments with two stone flakes (in a dark grey rock) and one small piece of pink glass. The scatter is close to a river.	Very Low NCW
1393		S31 50 06.1 E22 33 07.5	A scatter of seven flakes. There may be more but this was all that was visible from a short search. The scatter lies close to a small stream bed.	Very Low NCW
1394		S31 50 18.4 E22 32 46.6	A scatter of ostrich eggshell fragments and a single stone flake in a clear area between some taller bushes.	Very Low NCW
1395		S31 50 48.4 E22 33 55.4	A stone beacon that lies very close to the intersection of three farm portions.	Medium IIIB
1396		S31 50 08.1 E22 28 57.2	A small accumulation of bedrock slabs that may have been arranged in position. The base of a black glass wine bottle was seen nearby.	Very Low NCW
1397		S31 48 14.7 E22 31 34.3	Farmstead with many stone-walled features including a large kraal at this waypoint. The farmstead is far from the PV study areas. Features in farmstead previously recorded as waypoints 1454 to 1456.	High IIIA
1398	4	S31 49 36.9 E22 36 23.9	A scatter of just nine large stone artefacts on a well-cemented sandstone. These may be from the ESA but do not appear to be very weathered.	Very Low NCW
1399	4	S31 49 54.4 E22 35 36.3	An unusually-shaped stone-walled enclosure with a small opening towards the east and a large one towards the west. The walling is only about 0.3 m high and the feature measured some 2 m by 4 m. There were no associated artefacts present. 	Low IIIC
1400	4	S31 49 16.2 E22 36 03.3	A small accumulation of rocks that is clearly anthropogenic but has no obvious function.	Very Low NCW
1401		S31 47 33.5 E22 36 32.8	A stone-walled ruin, probably a house but not visited (seen and recorded from the road and is far from the study area). It lies close to a river which has a dam in it.	Medium GPA

Waypoint	Mura	Location	Description	Significance Grade
1402	3	S31 47 59.4 E22 36 04.4	A stone-walled house ruin that was not visited as it lay deep in a small valley.	Medium GPA
1403	3	S31 47 46.8 E22 35 19.9	A mound of rocks about 1 m in diameter and 0.5 m high. It is in a generally rocky area and is a loosely packed pile so is definitely not a grave.	Very Low GPC
1404		S31 50 03.4 E22 33 58.6	Two small stone-walled ruins. One is at the waypoint and the other a short distance to the northwest. Both of them have two rooms. No artefacts were seen associated.	Medium IIIC
1406		S31 50 55.4 E22 36 02.5	Dolerite boulder with some scruffy engravings on it. Found and recorded by Madelon Tusenius during the palaeontological fieldwork. There are other boulders along the base of Perdeberg that might also be engraved.	Medium IIIC

Table 3: List of finds from the Nuweveld heritage surveys that fall within the 400 m wide road corridor. There are many other sites falling outside this corridor that are included in the mapping but are not listed here.

Waypoint	Mura	Location	Description	Significance Grade
1457	1/2 RC	S31 52 23.4 E22 27 11.2	A small west-facing rock shelter on the side of a prominent sandstone outcrop with an extensive ostrich eggshell scatter and some hornfels artefacts. There are also hornfels artefacts and potsherds on top of the hill but most have been collected up into one location for showing visitors.	IIIB
1458	1/2 RC	S31 52 24.5 E22 27 12.3	A small south-facing rock shelter on the side of a prominent sandstone outcrop with an ostrich eggshell scatter and some hornfels artefacts.	IIIB
1850	3/4 RC	S31 52 36.6 E22 28 01.1	The Leeuwkloof farm complex with various buildings and stone walls.	IIIA
1755	3/4 RC	S31 52 49.9 E22 27 51.4	A historical stone and cement dam that is no doubt part of the Leeuwkloof farm complex but has been recorded separately due its distance (c. 500 m) from the rest of the complex). Probably mid-20 th century in age.	IIIC
1848	3/4 RC	S31 52 35.5 E22 28 39.8	Collapsed walling along the river to the south and also along the north side of the road. Road may have been built through an enclosure.	NCW
1849	3/4 RC	S31 52 36.3 E22 28 36.4	A partial enclosure of large blocks built against a low scarp.	NCW
1806	3/4 RC	S31 52 32.7 E22 29 40.4	Two small stone ruins. One is circular and the other is oval with an entrance facing towards the east.	IIIC
1807	3/4 RC	S31 52 32.7 E22 29 42.6	Stone barn ruin and a few other associated features of varying age.	
1808	3/4 RC	S31 52 33.9 E22 29 43.8	A small two-roomed stone ruin with glass, ceramics and metal alongside it. A smaller stone feature and a small stone quarry occur just to the south.	
1974	3/4 RC	S31 52 16.0 E22 32 07.6	An isolated lower grindstone found upside down on a river terrace above a water hole.	NCW
1972	3/4 RC	S31 52 15.0 E22 32 12.1	A set of 8 east-facing graves lying side by side immediately above a river.	High IIIA
1973	3/4 RC	S31 52 14.6 E22 32 12.6	The remains of a stone feature of indeterminate function.	
1976	3/4 RC	S31 52 11.7 E22 32 23.9	A large, well-preserved kraal located up against a cliff.	

Waypoint	Mura	Location	Description	Significance Grade
1977	3/4 RC	S31 52 11.6 E22 32 26.1	A stone wall protruding from the cliff line and also a low terrace lying between this wall and the kraal (waypoint 1977).	
1978	3/4 RC	S31 52 12.8 E22 32 26.1	A house ruin which has largely collapsed. There are both 19 th and 20 th century glass and ceramic fragments scattered about.	
1979	3/4 RC	S31 52 13.7 E22 32 28.0	Western and southern corners of a large, asymmetrical kraal built up against the cliff line.	
1980	3/4 RC	S31 52 14.6 E22 32 29.3		
1981	3/4 RC	S31 52 14.9 E22 32 30.2	A buried stone that could represent a grave (seems unlikely though).	
1983	3/4 RC	S31 52 13.0 E22 32 21.6	A large stone-walled kraal on the edge of the river terrace. Part of it has collapsed into the river due to bank erosion. There is more low walling on the north-east side of this kraal.	
1984	3/4 RC	S31 52 13.8 E22 32 20.1	A small rock shelter with some black markings reminiscent of those at Kangnas (Orton 2013). They are made with a thick, black paint/substance and are variably preserved. There is also what looks like a single red finger-painted line. There is low stone walling in the shelter.	
1985	3/4 RC	S31 52 15.6 E22 32 23.0	A large square stone-walled kraal up against a cliff. Part is well-preserved while part is badly collapsed. An earlier opening at the northeast corner has been closed up with stone walling, while the main opening is now to the west. There is a second badly collapsed enclosure to the east of the main one. There is also some walling on the cliff to the southeast which forms part of a wide 'berm' of walling, rocks and sediment.	
1986	3/4 RC	S31 52 14.8 E22 32 22.3	A stone-built sheep dip and associated enclosures. There is a small, round packed stone feature to the west. The smaller enclosure of the main feature is paved, while there is some paving and a standing rock slab within the larger one.	
1987	3/4 RC	S31 52 15.0 E22 32 19.1	A stone-walled graveyard with an east-facing entrance in the northeast corner. The south-western corner of the wall has collapsed. There are eight east-facing graves in the west side of the graveyard and one west-facing grave just inside the entrance. One of the former looks like a double grave. There are only headstones and stone-packed mounds with no formal grave markings. A millstone fragment was lying in the southern part of the graveyard. Outside the western side of the graveyard are a further 12 graves. One has neither a head- nor a footstone, two have headstones only and face east, while the remaining nine all have head- and footstones.	
1988	3/4 RC	S31 52 15.7 E22 32 14.9	A stone and cement dam in the river with willow trees growing around it.	
1990	3/4 RC	S31 52 17.2 E22 32 19.8	A set of three stone-walled structures built against a cliff line. Two are semi-circular, while the third is rectangular.	
1991	3/4 RC	S31 52 16.9 E22 32 20.9	Another small rectangular stone feature located further along the cliff face from waypoint 1990 but away from it.	
1992	3/4 RC	S31 52 16.0 E22 32 26.4	A 19 th century dump with much bone and some glass, ceramics and metal.	
1993	3/4 RC	S31 52 16.1 E22 32 26.9	A house ruin built of mixed materials including stone, sun-dried mud bricks and fired clay bricks. It has had alterations over time. There is a widespread scatter of glass and ceramics all around this ruin.	

Waypoint	Mura	Location	Description	Significance Grade
1994	3/4 RC	S31 52 16.1 E22 32 29.0	A long, low terrace wall runs along the river with another one further up the slope from the river. At this point a wall links them and from this wall running towards the southeast is a double line of stones likely representing a water furrow. There are cavities (like muurkaste) in the west-facing side of the cross wall.	
1995	3/4 RC	S31 52 15.6 E22 32 28.9	An ash dump with lots of glass and ceramics.	
1996	3/4 RC	S31 52 16.3 E22 32 29.6	A point further along the parallel stones (possible water furrow) noted in waypoint 1994.	
1997	3/4 RC	S31 52 17.2 E22 32 30.1	A corner point on the larger, upper terrace wall.	
1998	3/4 RC	S31 52 18.6 E22 32 30.0	A T-junction on the larger, upper terrace wall.	
1999	3/4 RC	S31 52 19.2 E22 32 29.9	Various low stone features scattered in the bushes here. There is also a widespread but very low density ceramic scatter over this area of the river terrace.	
2000	3/4 RC	S31 52 17.3 E22 32 29.0	A house ruin built with mixed materials including stone, sun-dried mud bricks and fired clay bricks. Entrances in the northern and southern ends were built larger than a normal door (perhaps a barn) but that in the south end was later reduced to the width of a normal door. Some collapsed stone walling to the southeast made another enclosure while a crude wall of piled clay bricks surrounds part of this feature.	
1001	3/4 RC	S31 52 14.8 E22 32 25.0	The western end of the higher (upslope) terrace wall mentioned in waypoint 1994. It turns towards the river here but ends after about 10 m.	
1002	3/4 RC	S31 52 18.7 E22 32 25.2	There are various stone-walled features to the south of the road (not visited).	
1799	3/4 RC	S31 52 28.7 E22 32 27.8	Stone walling along the southwest side of the road.	
1800	3/4 RC	S31 52 25.8 E22 32 26.1	Long stone wall running along further upslope from 1799	
1801	3/4 RC	S31 52 21.3 E22 32 27.0	Point at which the long wall meets what looks to be a kraal. Not visited.	
1802	3/4 RC	S31 52 21.2 E22 32 28.2	Stone walling running along the edge of the road, part of a feature lying below the road.	
1796	3/4 RC	S31 52 21.2 E22 32 59.5	A stone dam built alongside a river.	IIC
1797	3/4 RC	S31 52 26.4 E22 32 50.1	Small square stone ruin.	NCW
1798	3/4 RC	S31 52 28.1 E22 32 49.7	Long stone wall parallel to the river. One end turns towards the river. May have enclosed a vegetable garden. Rare glass, ceramics and metal items. Also a kraal 200 m to the southeast and a ruin between there and the road (these two not visited).	NCW
1795	3/4 RC	S31 52 23.6 E22 33 52.2	Long, low rock shelter with ostrich eggshell fragments, bones, hornfels artefacts and a hammerstone.	IIC

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of largely very high sensitivity, although a large portion of the Mura 2 footprint is shown as of moderate sensitivity (Figure 18). It must be noted that these ratings are theoretical and based on the known potential of the rock types in the

wider region. Almond (2022:1) has found that the study area “is underlain by continental sediments of the Teekloof Formation (Poortjie and Hoedemaker Members) within the Lower Beaufort Group, Karoo Supergroup). Fossil assemblages of the *Endothiodon* Assemblage Zone of latest Middle to earliest Late Permian age are associated with the Lower Beaufort Group beds mapped within most or all of the combined project area; however, representatives of the older *Tapinocephalus* Assemblage Zone might also be present within the lower parts of the Poortjie Member (unconfirmed). These fossils record the recovery phase on land from the end-Middle Permian Mass Extinction Event of c. 260 million years ago.”

Almond’s (2022) site visit showed that exposures of suitable sedimentary rocks on the very flat sites were very rare and that covering sediments (which contained no fossils) and alteration of the bedrock by dolerite intrusions meant that significant fossils are unlikely to be present. He rates the entire study area as of low palaeontological sensitivity.

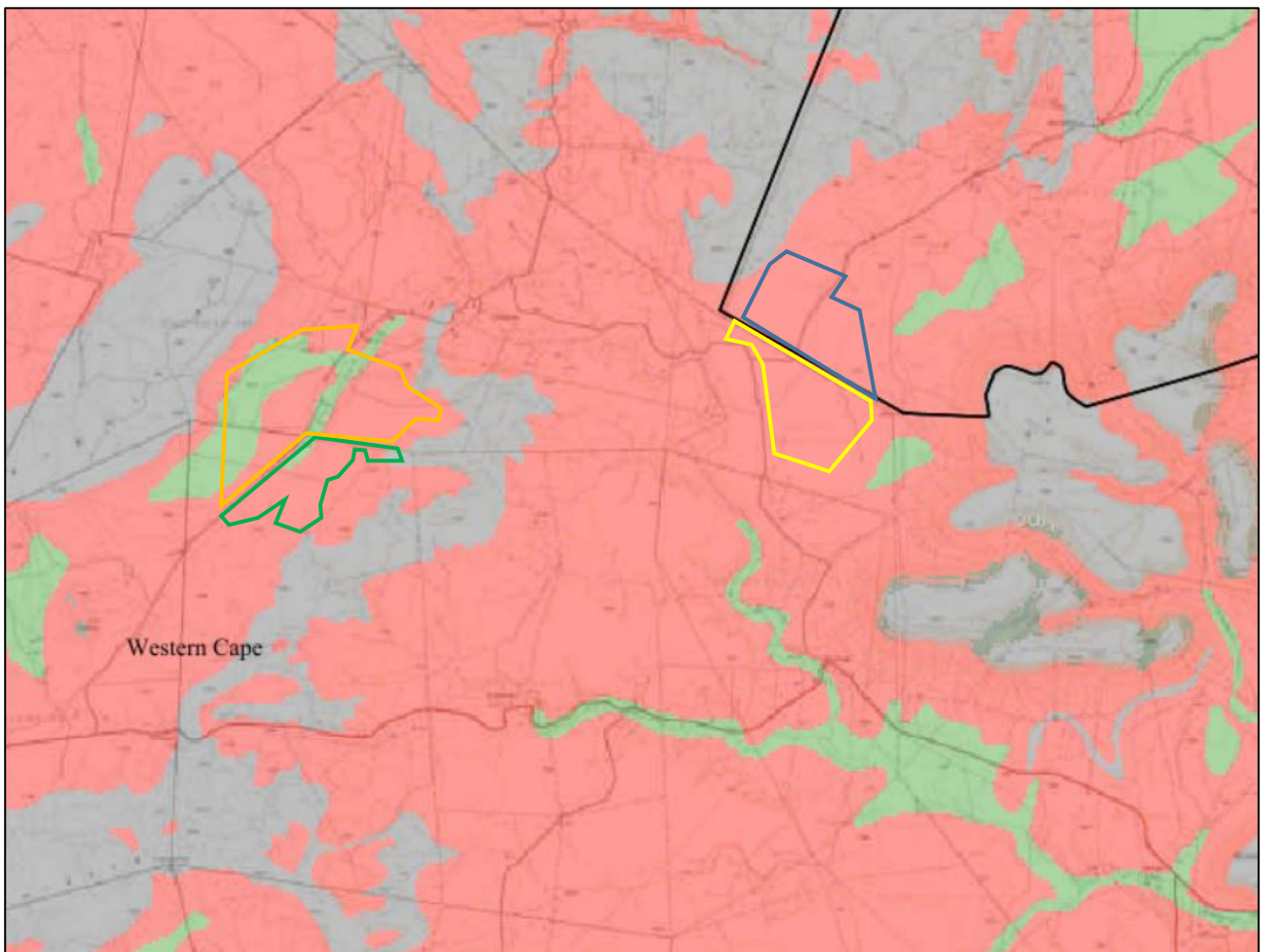


Figure 18: Extract from the SAHRIS Palaeosensitivity Map showing the site to be of largely very high sensitivity (red shading) but with a large part of Mura 2 being of moderate sensitivity.

5.2. Archaeology

5.2.1. Desktop study

The broader Karoo region generally contains sparse archaeological traces from the Early (ESA), Middle (MSA) and Later Stone Ages (LSA). 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).

ESA and MSA materials were found to be very rare in this mountain environment, but not absent (Orton 2022a). In this dry landscape, LSA archaeological sites are well-known to be focused most strongly on water sources. Where dolerite outcrops are close to water sources then these are strongly favoured for occupation. This pattern was well demonstrated locally by Orton (2021a, 2021b, 2021c, 2021d, 2022a, 2022b), but the density of sites found was quite low. These sites are usually scatters of stone artefacts (strongly dominated by hornfels with other materials being rare), often accompanied by ostrich eggshell fragments and sometimes pottery, but may also include fragments of bone and even archaeological deposits (the latter are unknown from the Nuweveld area though). Ostrich eggshell beads and lower grindstone are also rarely seen. Occasionally, the scatters were very dense and those sites must have either been occupied for a long period of time, or on many occasions. The flat plains that lack landscape features tend to also lack significant archaeological heritage resources. Webley and Hart (2010) examined a site to the east of Loxton and located just two flakes that they considered to be of MSA origin. Two WEF projects have been assessed to the north and northeast of the Mura study areas, but these projects do not appear on SAHRIS and their reports could thus not be consulted.

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, some 55 km to the southeast and 140 km to the north-northeast of the present study area respectively, but Orton (2021b) recorded two further examples in the Nuweveld within about 15 km to the west of the Mura study area, both of which were surrounded by extensive stone artefact scatters indicating occupation of the area.

Rock art sites occur in low density through the wider area, with three painted ‘geometric tradition’ sites and several engraved ‘fine line’ tradition sites on record from the Nuweveld (Orton 2021a, 2021b, 2021c, 2021d, 2022a, 2022b). Geometric tradition art is thought to have been produced by the Khoekhoen and the new records expand the known distribution of this tradition in the area (**Figure 19** 19). 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 to the northeast around the Kimberley region.

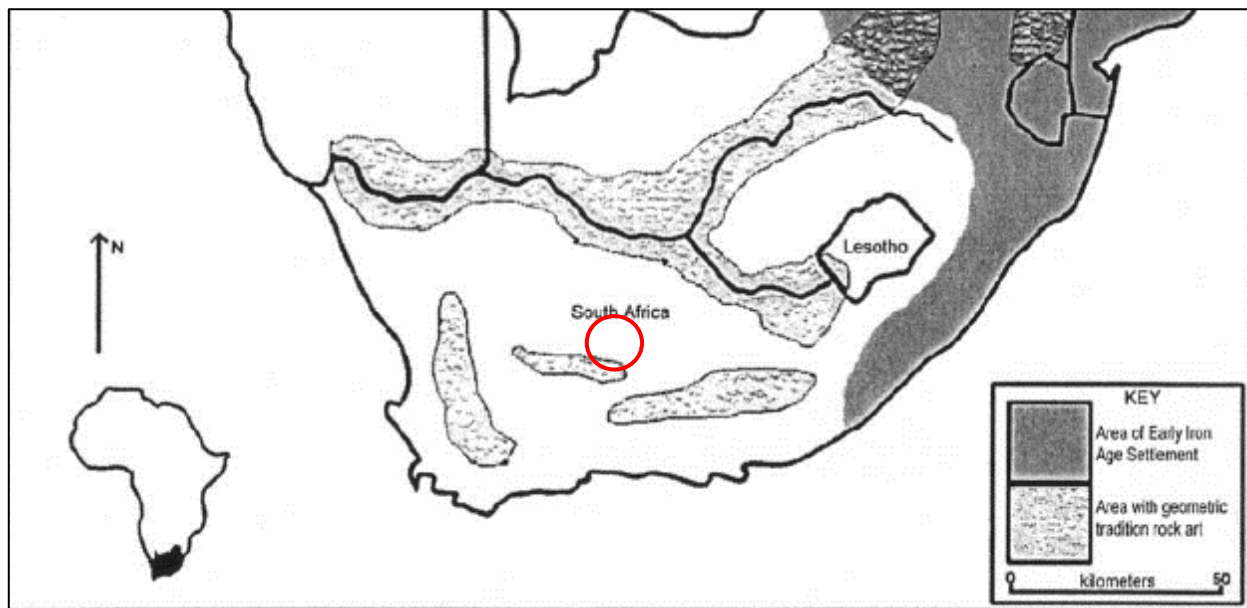


Figure 19: Extract from a map showing the distribution of geometric tradition rock art. Source: Smith & Ouzman (2004: fig. 9). The present study area is approximately within the red circle.

Until Orton's (2021a, 2021b, 2021c, 2021d) recent surveys in the area, historical archaeological resources, too, were little known from the Nuweveld area. These surveys showed that 19th century occupation of the area was widespread with many small abandoned and ruined stone-walled farmsteads scattered along the water courses of the area. The structures included houses (both formal rectangular flat roofed houses and lobed dwellings that might have had temporary roofs), kraals, and various small outbuildings of unknown function but likely including storage spaces and chicken coops. At the southern end of the Nuweveld Mountains, in the Karoo National Park (KNP), Kaplan (2005, 2006) recorded several small, ruined stone structures which were said to be kraals, a homestead and shepherd's huts. One of them had a small scatter of late 19th to early 20th century historical artefacts associated with it. A stone-built lime kiln and some animal traps are also on record there (SANParks 2017). Other stone walled ruins are known from the KNP and, according to Anonymous (2016) some were demolished in order to reuse the stone to build the Klipspringer Pass. This pass was built from 1986 to 1992 (Goetze 1993).

These early packed stone structures are invariably collapsed reducing them to archaeological sites in terms of the NHRA definitions. While some with taller walls may have had a formal or informal and/or temporary roof over them, others may have been hartebeeshuise with A-frame-type roofs made of branches and reeds placed above low stone or mud walls. Governor van Plettenberg, during his travels east to inspect the Colony, noted near the Sneeuwberg Mountains that the houses of the colonists consisted only of one room structures with low walls and straw roofs (Theal 1896-1911 cited in Böeseken 1975). In 1811 William Burchell illustrated a trekboer farmhouse (Van Zyl 1975), while Schoeman (2013) shows an image of such a historical stone dwelling still in use in the early 20th century (Figure).

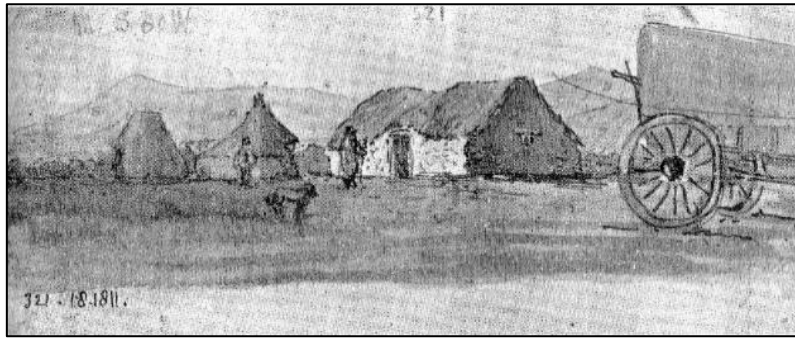


Figure 20: Drawing of an early 19th century trekboer farmhouse by William Burchell. Source: Van Zyl (1975:103).



Figure 21: A shepherd's hut photographed near Beaufort West in the early 20th century. Note the low, narrow doorway and informal roof structure. Source: Schoeman (2013:48).

The engraving tradition in the Karoo continued beyond the Stone Age as testified to by the many recent 'scratched' engravings that are known to occur. Horses are an extremely common subject in these recent engravings. Morris (1988) has reviewed the engravings of the Karoo 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. Recent work in the Nuweveld has revealed a scattering of such images but with a very dense concentration located 43 km west-southwest of the Mura study area (Orton 2022a, 2022b). Notably, subject matter in the latter area included many Nine Men's Morris boards, a Morris Minor car and dates of 1924 and 1934 (the latter written as 30.7.34 but assumed to be 20th century). While some of these engravings are clearly less than 100 years old and not legally archaeological, they demonstrate a continuity of the engraving tradition, and the sites can thus be considered as places associated with living heritage.

The Karoo has been a highly contested landscape at various times in the past. The Khoekhoen first migrated into South Africa about 2000 years ago. That they lived in the Karoo in precolonial times is testified to by the presence of geometric tradition rock art and precolonial kraals, while many historical records of their presence also exist. The only study to attempt to date the Khoekhoe

occupation was by Sampson (2010) in an area about 160 km northeast of the Mura study area. Through dating potsherds associated with kraals he determined that the kraals – and by implication herding – dated to between about AD 1000 and AD 1750, shortly before the arrival of the Trekboers. Sampson (2010:847) suggests that there would have been tension between the indigenous San and the incoming Khoekhoen but considers that their interactions resulted in “a millennium of (probably uneasy) space-sharing with the locals.”

5.2.2. Site visit

Stone Age materials were generally found to be rare. The only finds made were ephemeral scatters of artefacts. The most interesting was a scatter of nine large artefacts made in what is probably wacke. The artefacts are patinated brown and seem likely, based on their size, to relate to the ESA (Figure 22). They were in an area with several ephemeral pans.



Figure 22: A scatter of ESA flakes from waypoint 1398 within the eastern edge of Mura 4. Scale = 25 cm.

In one area to the south of the Mura 1 footprint there was a very light scattering of artefacts that were only lightly patinated and may be from the LSA (Figures 23 & 24). There was nothing else associated with them. Elsewhere, Stone Age finds were limited to a few isolated background scatter artefacts of Pleistocene and/or Holocene age.



Figure 23: Stone artefacts from waypoint 1321. Scale = 20 cm.



Figure 24: Stone artefacts from waypoint 1322. Scale = 20 cm.

Historical archaeological sites were somewhat more common than Stone Age sites. The smallest sites were small clusters of rocks. These may have been cairns but otherwise their functions could not be determined. None seemed like graves and one of them had a wine bottle base located alongside it (Figures 25 to 28).



Figure 25: *Small stone cairn/feature at waypoint 1396. This is just within the Mura 2 study area.*



Figure 26: *The base of a black glass wine bottle from waypoint 1396.*



Figure 27: *Small cluster of stones at waypoint 1400 and located within the Mura 4 study area.*



Figure 28: *Loosely packed pile of stones in a rock area at waypoint 1403 and located just inside the north-western corner of Mura 3.*

A number of stone-walled sites were found. These included a small livestock enclosure (Figure 29) and some small house ruins (Figures 30 to 32). These sites relate early European occupation of the area. Very few artefacts were found with them. Only one of the houses had a light scatter of glass, ceramics and metal associated with it (Figures 33 & 34).



Figure 29: Stone-walled ruin at waypoint 1328. It is likely a livestock enclosure. This site is 120 m outside the Mura 2 study area and located very close to waypoint 1329 (see Figure 30).



Figure 30: Stone-walled ruin at waypoint 1329. This site is 150 m outside the Mura 2 study area and located very close to waypoint 1328 (see Figure 29).



Figure 31: Stone-walled house ruin at waypoint 1401 and located 1 km northeast of the Mura 3 study area.



Figure 32: Stone house ruin at waypoint 1320. This site is 230 m outside Mura 1.



Figure 33: Artefacts from waypoint 1320. They include refined white earthenware, glass and a fragment of iron potjie. Scale = 20 cm.



Figure 34: Lined industrial ware and other refined white earthenware from waypoint 1320. Scale = 10 cm.

Another small stone-walled site was rather enigmatic due to its unusual shape (Figure 35). It had no associated artefacts and measured about 2 m by 4 m. Its function is unknown but the walls seem far too low to have served a residential function. The last historical site may not actually be archaeological in terms of its age. It comprises of a long line of slabs half buried in the ground and presumably had some sort of agricultural function (Figure 36).



Figure 35: Small stone-walled feature at waypoint 1399 within the southern part of Mura 4. The inset shows a plan view orientated the same way as the photograph with arrow indicating north.



Figure 36: Line of planted stones at waypoint 1327 within the Mura 2 study area.

The Nuweveld surveys revealed a number of archaeological sites along the access roads. These were mostly historical ruins and associated features. The majority are unlikely to be affected by any upgrades of the road since the road is generally already wide enough to accommodate the required vehicles. The most significant concern is a large, ruined farm complex located midway along the Mura 3 and Mura 4 access road at a point where there is a fairly sharp bend in the road. The most important features are all on the outside of the bend, however, and will thus not be affected if the bend needs to be changed. This farm complex has been extensively discussed in Orton (2021a:23). The majority of the complex lies to the north of the road, between the road and a river. A few buildings are present including one every unusual one which is shown in Figures 37 to 39. The complex also includes stone-walled livestock enclosures, a stone-built dip, other stone walling

(retaining walls, terraces, etc) and a graveyard, although the latter lies across the river, far from the access road.



Figure 37: A structure built of stone, sun-dried mud bricks and fired clay bricks at Waypoint 1993. Source: Orton (2021a: fig. 30).



Figure 38: Interior of the front wall of the house at Waypoint 1993. The front door is at the left edge of this photograph. Source: Orton (2021a: fig. 31).



Figure 39: Interior of the front wall of the house at Waypoint 1993. The front door is at the right edge of this photograph. Source: Orton (2021a: fig. 302).

5.3. Graves

No graves were seen in any of the study areas and, given the often hard substrate and general lack of occupation debris, none are expected to occur.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

For various reasons including changes to the structure of the Cape Colony, and the desire to seek new grazing and independence from Dutch East India Company (VoC) rule, farmers started to leave the Cape Colony during the 18th century. This process ultimately had its beginnings with the creation of a class of farmers referred to as free burghers who moved into the region surrounding Cape Town (e.g. Wellington, Paarl, Stellenbosch and Franschhoek). Willem Adriaan van der Stel, governor of the Colony from 1699 to 1707, abused his power as governor by favouring his own farming activities when supplying ships with food, thereby making the free burgher farmers unhappy. The Colonists were also initially not allowed to trade with the Khoekhoen but this rule was changed in February 1700. Around this time Van der Stel gave grazing licences further from the Colony in order to increase pastoral production (Penn 2005). These factors were the ultimate start of Colonial expansion after the Colony had remained confined to the Cape Town area for the first several decades and in fact perpetuated it during the following decades.

The colonists soon realised that the best way to survive in the relatively arid interior was to be as close to the year-round rainfall zone as possible. This allowed for seasonal movement into the summer rainfall region to the northeast or the winter rainfall region to the southwest. In this way they could maximise the availability of water and grazing for their livestock. The mountains lying within this zone – essentially the escarpment edge – were also better watered due to their elevated rainfall and more frequent permanent springs. Between about 1740 and 1770 there was a rapid expansion into this zone which extended from the Kamiesberg of Namaqualand, through the Onder Bokkeveld and the Hantam, to the Roggeveld Mountains, but possibly not yet as far northeast as the northern Nuweveld where the Mura study area is situated (Figure). This, then, along with the Nuweveld Mountains just east of the Roggeveld constituted the mid-18th century northern frontier zone. The Nuweveld saw 75 farms being granted in this 30 year period (Penn 2005). According to Botha (1926), the Nuweveld was so named because it was a new area to be colonised. Note also that the limits of the area under discussion are unknown. It seems likely, though, that it did not extend very much beyond (north of) the crest of the escarpment. Walker (1928) maps the 1798 colonial boundary as being just north of the crest of the escarpment (Figure).

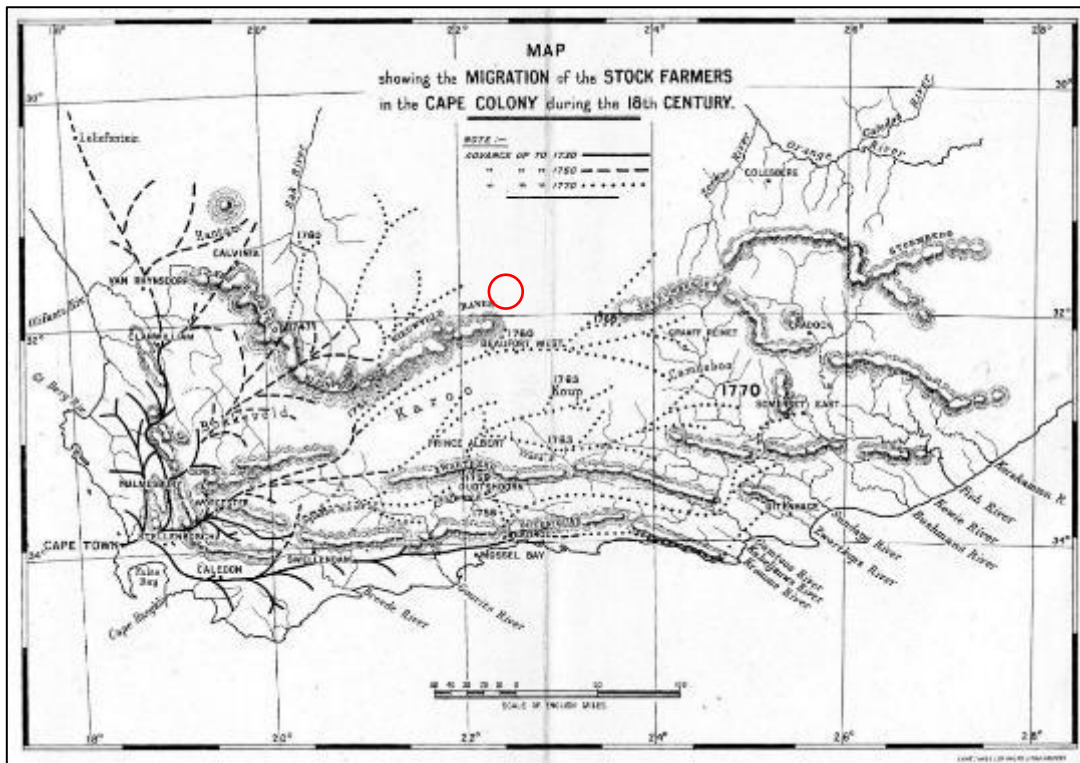


Figure 40: Map showing the mid-18th century trekboer expansion in the Karoo. Source: Botha (1926: opposite preface). The solar development study area is indicated by the red circle.



Figure 41: Map showing the extent of the Cape Colony by 1798. Source: Walker (1928:201). The solar development study area is indicated by the red circle.

The Nuweveld Mountains were actually within the summer rainfall area which made occupation slightly more tenuous because trekking west into the winter rainfall Roggeveld Mountains meant moving into areas already occupied by other trekboers. The Nuweveld area was thus never properly occupied by colonists during the 18th century with the local San and Khoekhoen frequently stealing livestock from the colonists. A series of robberies in December 1775 and January 1776 in the

Camdeboo and Swartruggens areas (some 200 km southeast of the present study area) resulted in a vicious commando being led against the San and Khoekhoen. Forty-five people were killed and thirty-six prisoners taken by the commando. This attack resulted in the passing of a resolution by the landdrost that no further commandos be undertaken without his express permission. Soon afterwards, many hostile San and Khoekhoen began assembling in the Koup, Sak River and Nuweveld areas, protecting themselves in fortified rock shelters. Although a request was made to mount a commando, the Nuweveld farmers could not await the outcome but found their small commando to be too weak to make any impact. A commando from the Sneeuwberg came to their assistance and the two together killed 111 San and Khoekhoen. Despite this success, many farmers vacated the Nuweveld area (Penn 2005).

In July of 1779 a group of twelve farmers decided to risk moving back into the Nuweveld area. The result was an increased intensity of San raids and commando activity that resulted in many deaths. This fighting continued and by September 1781 the farmers had too few cattle left to be able to sell to the VoC butchers. Commando activity also ceased because of a shortage of ammunition. By 1786 drought and San resistance resulted in the colonists once again vacating the Nuweveld and leaving it almost completely free of trekboers until 1793 (Penn 2005).

In June 1792 a large group of about 300 people – described as San by the colonists – attacked the Van Reenen brothers (who had the contract to deliver livestock to Cape Town) and stole about 600 sheep and 253 cattle. This act finally prompted the Government to take more serious action and two very well organised commandos were raised under the direction of two proven local leaders (N. Smit & J. van der Walt) and sent to the Nuweveld region where they killed more than 500 San. Owing to the lack of surface water, the area was still seen as marginal and could not support sufficient farmers to withstand or expel the San and/or Khoekhoen. In 1793 Van der Walt was permitted to move into the Nuweveld and was given two farms rent-free and the power to send out commandos as he saw fit (Penn 2005).

By the time the British took control of the Cape, the trekboers “had already acquired the characteristics of an embryo nation” (Van Zyl 1975:125). This was because the VoC had largely left them to look after themselves which resulted in them becoming quite independent of the Company and its rather weak rule. Due to various changes implemented under British rule, a growing unease developed amongst the colonists and this eventually led to a large-scale migration of farmers further north and east, beyond the borders of the Colony; this was the so-called ‘Great Trek’ of 1834 to 1854 (Muller 1975). Walker (1928), however, comments that this event could actually be seen merely as an acceleration of a process that had long been underway. The Cape Colony meanwhile expanded as shown in Figure 42 with the study area fully incorporated by 1825.

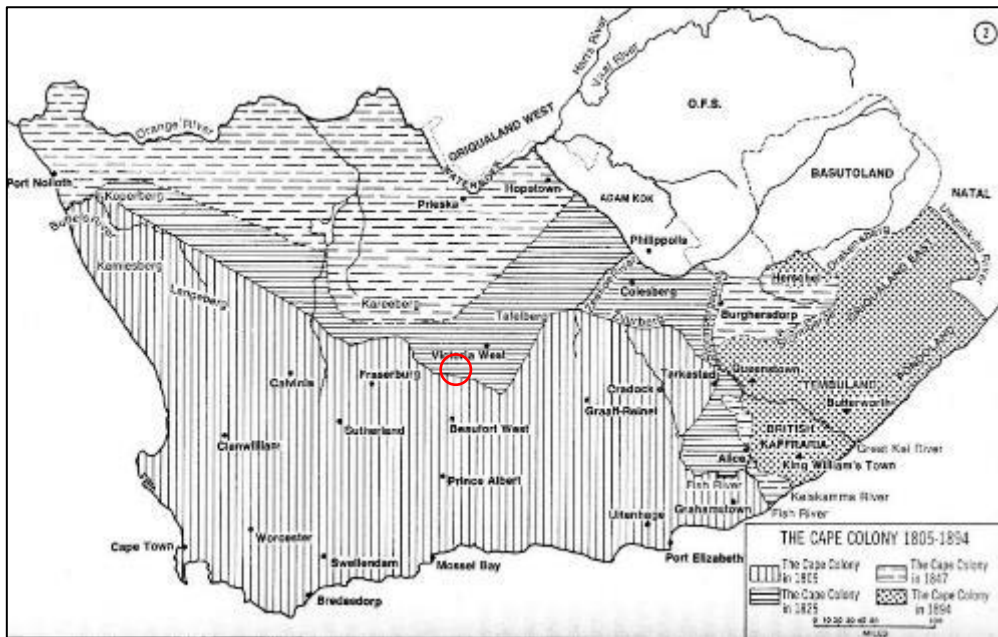


Figure 42: Map showing the expanding boundaries of the Cape Colony under British Rule. Source: Van Zyl (1975:102). The solar development study area is indicated by the red circle.

There appears to have been limited action in the Nuweveld area during the Second South African War (Anglo-Boer War). Lieutenant-Colonel EMS Crabbe made use of a farm called Waterval along the R381 and just north of the crest of the escarpment. On 5th February 1902 he moved west to join Major H.W.G. Crofton at Uitspanning but found that Crofton had been killed by the Boers and his force captured (Watt 2013). This action occurred some 20 km southwest of the study area. A skirmish is known to have occurred near the farm Oorlogsfontein (some 30 km east of the study area) on 17 February 1902. This resulted in the wounding of the distinguished 25 year old Commandant Henry Hugo who was then captured and died the next day (Willis 2021). No other information about this event could be found. The nearest Anglo-Boer War fort lies 7 km south of the corridor edge, to the southwest of Three Sisters (Green 2022).

Historical buildings occur widely across the Karoo with most dating to the 19th century. Orton *et al.* (2016:15-8) noted the following:

“In the harsh, resource-scarce Karoo environment with its restricted range of materials, necessity often was the mother of invention when it came to constructing shelter, resulting in a unique regional vernacular building tradition that displays the creative and technical achievement required to fashion an existence there. This relied on both traditional and conventional artisanal skills since buildings were hand-crafted from sun-baked bricks, locally occurring timber and quarried or collected stone. The result was a variety of local styles that we refer to collectively as Karoo vernacular.”

This varied architecture is evident not only in the towns but also in remote areas. Two building traditions are unique to the Karoo. Corbelled buildings, which mainly occur to the north and west of the present study area and date between about 1813 and 1870, evolved from the need to build roofs without wooden beams (Kramer 2012). Isolated examples are mapped to the west and southwest of the present study area. The second tradition is known as Karoostyle and has been described by Marincowitz (2006). These buildings are typically simple rectangular structures with flat roofs and parapets. Flat roofs were often of the type referred to as ‘brakdak’ which consists of

beams overlaid by sticks, reeds and then mud mixed with other materials such as manure or vegetation (Fagan 2008).

In rural areas buildings tend to be clustered into farm complexes with relatively few isolated structures. The complexes can include a variety of styles, while isolated structures are often small Karoostyle labourer's cottages. Due to the consolidation of farms into larger holdings in order to increase commercial viability, there are far fewer occupied farmsteads today than would have been the case in the past. Archaeological farm complexes generally outnumber historical ones showing that further back in time there were many more farming units.

The Molteno Pass, which lies along the R381 between Beaufort West and Loxton, serves as the primary access to the area above the escarpment. It was built by Thomas Bain from 1875 to 1880. Another section through a steep valley – also built by Bain – is referred to as the Roseberg Pass. These passes lie well south of the Mura study area. The route is known to have been in use since 1830 when it was just a path. In 1837 local farmers improved the route to allow for the passage of wagons (Willis 1994 cited in Ross 2013). Storrar (1984) suggests that the entire route was originally called Rose's Berg Pass. The R381 has had a number of sections realigned during modern upgrades but the steepest section through the Molteno Pass is almost unchanged – just one obvious short realignment is evident. De Jager's Pass lies along the DR2311 further to the east. It too was built by Thomas Bain with completion in 1880 and was known as Wagenaar's Kloof until 1899 when it was reconstructed and renamed. It had its origins in an early wagon track, also dating back to about 1830 (Ross 2013). The track ran past Wagenaarskraal and onwards into the interior (Schoeman 2013).

5.4.2. Site visit

Some farmsteads occur in the area but all are more than 1.5 km the Mura PV footprints. None were studied in detail as they will not be affected but it is noted that they include various historical structures, kraals, arable lands and clusters or lines of trees. Two farmsteads lie along the access roads and should be mentioned, although, again, impacts should not occur. These are the Leeukloof farmstead in the south and Booiskraal in the southeast. Figure 43 to 45 show examples of some of the structures at these complexes.



Figure 43: Structure in the Leeukloof Farm complex at Waypoint 1850. Source: Orton (2021a: fig. 49).



Figure 44: Structure in the Leeukloof Farm complex at Waypoint 1850. Source: Orton (2021a: fig. 50).



Figure 45: An unusual double story structure in the Boiskraal Farm complex at Waypoint 1794. Source: Orton (2021a: fig. 51).

The only historical feature close to the PV footprints is the large dam in the centre of – but excluded from – the Mura 2 area. It is an earthen-walled dam but stones have been packed around the ends of the walls to prevent erosion when the dam overflows (Figure 46).



Figure 46: One end of the large earthen dam with stone-packed ends at waypoint 1324. This site is enclosed by, but excluded from, the development area.

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 present PV study area is a largely natural landscape with minimal anthropogenic input. It is very remote and isolated with access only by the landowners. The earliest layers to the cultural

landscape are the archaeological traces of pre-colonial occupation and early farming, but these are very light. Modern farming has only resulted in the addition of some jeep tracks and fences to the PV study area but these are not noticeable from a distance. Farm complexes are widely spaced with none located closer than 1.5 km from the PV footprints. The string of earthen dams in the Mura 1 and Mura 2 area are older than 60 years and also a part of the cultural landscape. With the exception of the dams, the landscape in the vicinity of the PV facilities is currently a largely natural one with its cultural significance being due to its scenic qualities. There are no public roads anywhere close to the PV study area and the footprints will not be visible from any public roads. The same applies to the proposed access roads, except that the roads pass through two farm complexes as noted above. This not an issue for this project because there will be no lasting changes to the landscape around these complexes.

Although a visual impact assessment was not required by HWC for these PV projects because of their very remote location, it is notable that the viewshed mapping shows that visibility of the proposed developments is largely restricted to within about 3 km with only small areas having low to moderate visibility beyond this distance (Lawson & Oberholzer 2022: map 5).

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).

Although archaeological resources of up to grade IIIA occur close to the access road corridors, none are close enough to be of further concern. Within the PV footprint there are sites of up to grade IIIC, but sites graded up to IIIB occur nearby in areas excluded from development. These resources have variable cultural significance at the local level for their historical, social and scientific values.

Graves are deemed to have high cultural significance at the local level for their social value but are unlikely to occur. If found, they would be allocated a grade of IIIA.

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

Known heritage resources are mapped with 50 m buffers in Figures 47 to 49.

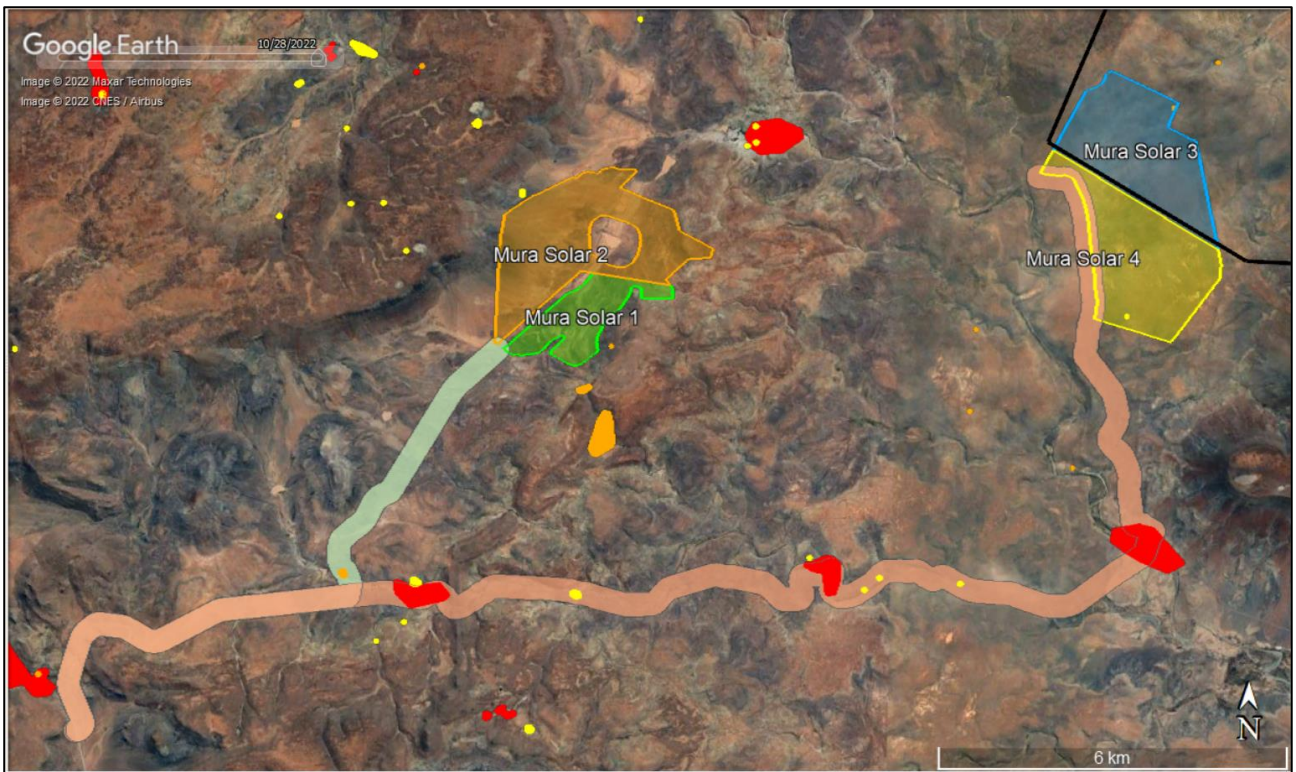


Figure 47: Grade map of the study area. Note that it is constructed using data from several projects but that only those sites directly relevant to this project appear in this report. Red = IIIA, orange = IIIB, yellow = IIIC.

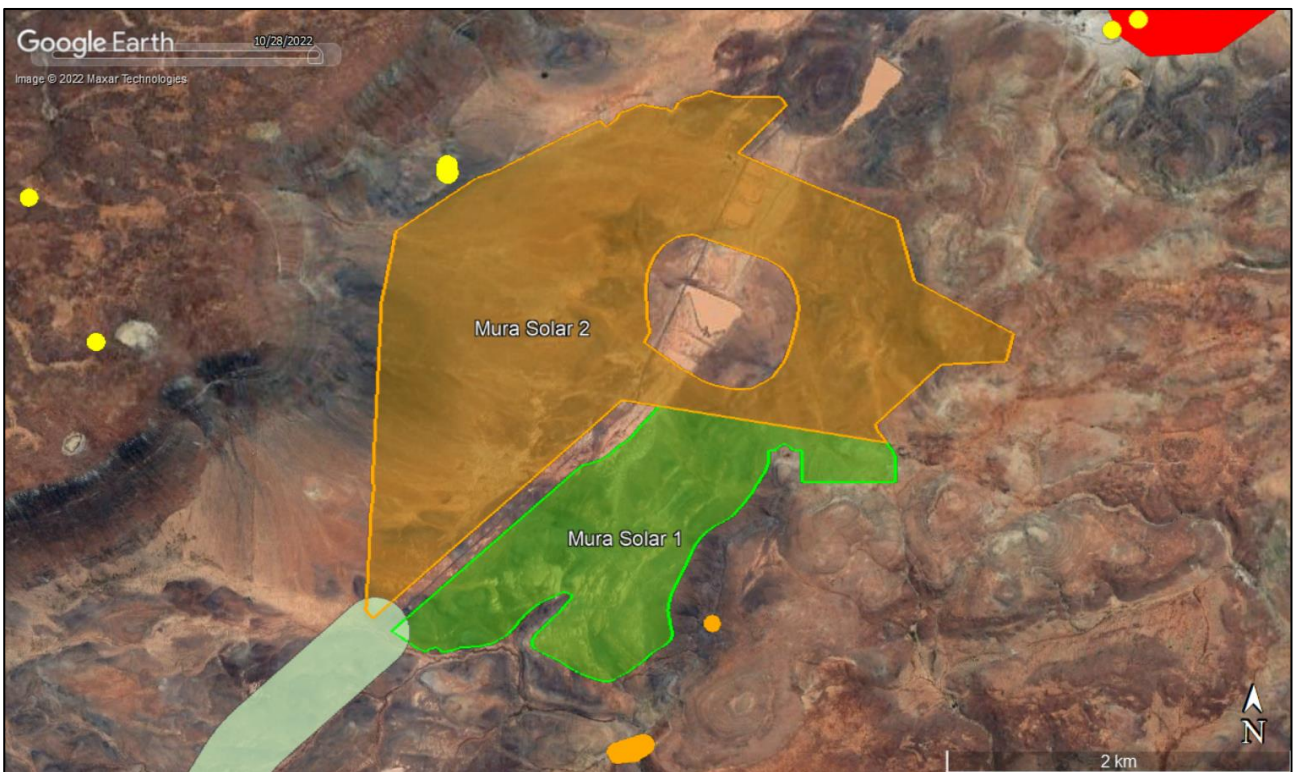


Figure 48: Smaller scale map showing heritage resource grading in the vicinity of the Mura 1 and Mura 2 footprints. Red = IIIA, orange = IIIB, yellow = IIIC.

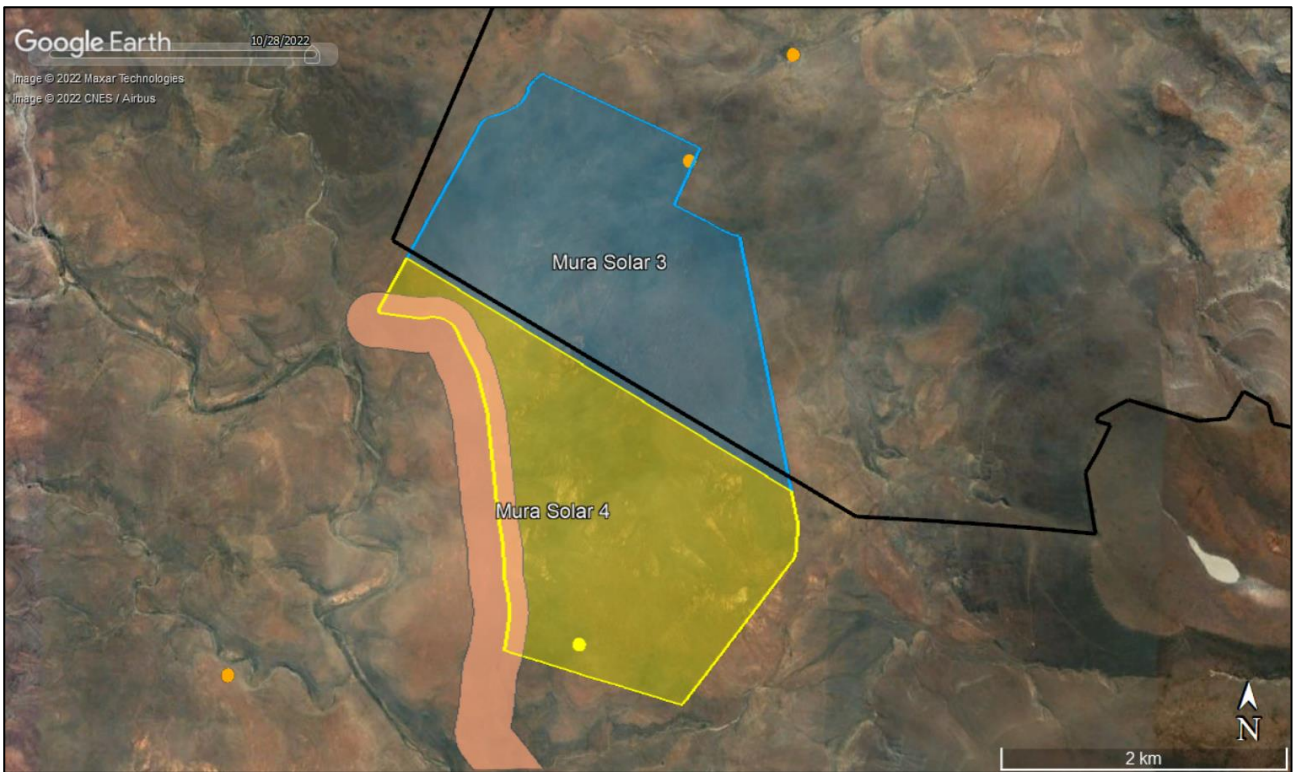


Figure 49: Smaller scale map showing heritage resource grading in the vicinity of the Mura 3 and Mura 4 footprints. Red = IIIA, orange = IIIB, yellow = IIIC.

5.7. Summary of heritage indicators

Due to the very isolated location of the study area, the heritage indicators relate only to archaeological and palaeontological impacts. The landscape on site is very flat and guidelines for the placement of infrastructure within the footprint areas are not deemed necessary.

- **Indicator:** Uncontrolled damage to fossils should be minimised as far as possible.
- **Indicator:** 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.
- **Indicator:** Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.

6. SITE SENSITIVITY VERIFICATION

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

Date of Site Visit	18 March 2019 and 4, 13 and 14 July 2022
Specialist Name	Dr Jayson Orton
Professional Registration Number	ASAPA: 233; APHP: 043
Specialist Affiliation / Company	ASHA Consulting (Pty) Ltd

Method of the Site Sensitivity Verification

Initial work was carried out using satellite aerial photography in combination with the author's accumulated knowledge of the local landscape. This was used to provide sensitivity data for screening phase. Subsequent fieldwork served to ground truth the site, including areas identified as potentially sensitive and further sensitivity data was provided to the developer to guide the development of project footprints. 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).

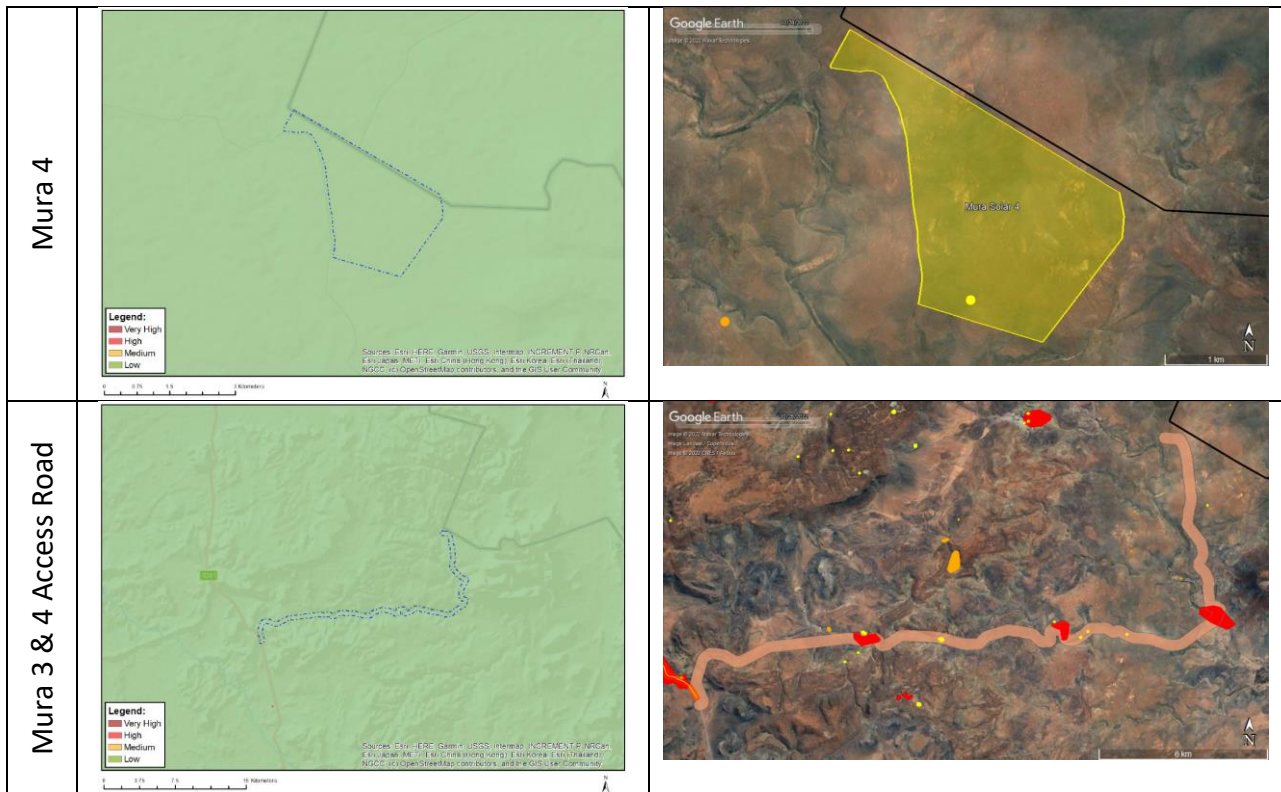
Outcome

The DFFE screening tool maps for the four project areas and two access roads (see table below) show the archaeological and heritage sensitivity to be low throughout. The site visit showed that while the majority of the land is in fact of low sensitivity, there are several areas considered to be of medium to high sensitivity. Most notable are the various farmsteads in the area and the large, ruined farm complex along the DR02317. There are also several other small areas of medium sensitivity. The table below includes comparable sensitivity maps for each of the screening tool maps. A photographic record and description of the relevant heritage resource is contained within Section 5 of the impact assessment report.

The heritage specialist thus disputes the uniform low sensitivity of the broader study area noting that several areas of medium to high sensitivity are present. Also, the wider landscape can be considered as at least medium sensitivity. **In sum, the overall sensitivity is best considered to be medium.** Note that the maps following the heritage grading requirements. Grade IIIA (red) is regarded as No-Go, grade IIIB (orange) is high sensitivity, grade IIIC/GPA/GPB (yellow) are medium, NCW/GPC (not mapped) are low.

Table 4: Comparative site sensitivity for the various projects.

Mura 1		
Mura 2		
Mura 1 & 2 Access Road		
Mura 3		



7. ASSESSMENT OF IMPACTS

The impacts identified for all four Mura projects are:

- *Construction phase:*
 - Impacts to palaeontology
 - Impacts to archaeology
 - Impacts to graves
 - Impacts to the cultural landscape
- *Operation phase:*
 - Impacts to the cultural landscape
- *Decommissioning phase:*
 - Impacts to the cultural landscape

While palaeontological heritage is assessed in the separate specialist study (Appendix 3), all the other impacts are considered here. Note that the assessment and ratings are identical for Mura 1 and Mura 2.

7.1. Construction Phase – Mura 1 & 2

7.1.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because significant archaeology is lacking from the PV areas and margins of the access road, the impact magnitude is very low. There is still a small chance that archaeological materials

may be present though and the significance calculates to **low negative** (Table 5). The only mitigation requirement is to ensure that any chance finds are reported. This will slightly reduce the probability of impacts and the resultant significance post-mitigation is **very low negative**.

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

7.1.2. Impacts to graves

Direct impacts to graves would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because graves are not known from the PV areas and margins of the access road, the impact magnitude is very low. The chances of graves being present and impacted are very low and the significance calculates to **very low negative** (Table 5). The only mitigation requirement is to ensure that any chance finds are reported. This would slightly reduce the probability of impacts, although this cannot be reflected in the ratings. The significance post-mitigation is still **very low negative**.

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

7.1.3. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase when construction equipment is brought onto the site and construction activity commences. The very remote location means that the magnitude is low but because impacts would definitely occur if the project goes ahead the significance calculates to **moderate negative** (Table 5). Mitigation would entail (1) keeping the construction duration as short as possible, (2) ensuring that the smallest area possible is cleared for construction and (3) ensuring that any areas not required during operation are rehabilitated. This would not affect the ratings, however, and the significance remains **moderate negative** after mitigation.

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

7.2. Operation Phase – Mura 1 & 2

7.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase due to the presence of the facility in the landscape. The magnitude is again low because of the remoteness of the site, and despite the long duration of impact (for the lifetime of the project), the significance calculates to **moderate negative** (Table 5). Mitigation would entail (1) ensuring that all maintenance activities remain within the approved footprint and (2) ensuring that night time light pollution is minimised. This would not alter the significance rating which remains at the **moderate negative** level.

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

7.3. Decommissioning Phase – Mura 1 & 2

7.3.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the decommissioning phase when construction equipment is brought onto the site and decommissioning activities commence. The very remote location means that the magnitude is low but because impacts would definitely occur if the project were decommissioned the significance calculates to **moderate negative** (Table 5). Mitigation would entail (1) keeping the decommissioning duration as short as possible, and (2) ensuring that the site is fully rehabilitated after the facility has been removed. This would reduce the magnitude rating, but the significance remains **moderate negative** after mitigation.

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

7.4. Construction Phase – Mura 3

7.4.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because a significant site is present within the Mura 3 footprint and some occur within the access road corridor, the impact magnitude is high. Because impacts would definitely occur if the project goes ahead, the significance calculates to **high negative** (Table 6). Mitigation requirements are to (1) avoid the sensitive area (strongly recommended) or create a detailed record of the site including any archaeological sampling that may be required and (2) to ensure that any chance finds are reported. This will reduce the magnitude and probability of impacts and the resultant significance post-mitigation is **very low negative**.

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

7.4.2. Impacts to graves

Direct impacts to graves resources would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because graves are not known from the PV areas and margins of the access road, the impact magnitude is very low. The chances of graves being present and impacted are very low and the significance calculates to **very low negative** (Table 6). The only mitigation requirement is to ensure that any chance finds are reported. This would slightly reduce the probability of impacts, although this cannot be reflected in the ratings. The significance post-mitigation is still **very low negative**.

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

7.4.3. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase when construction equipment is brought onto the site and construction activity commences. The very remote location means that the magnitude is low but because impacts would definitely occur if the project goes ahead the significance calculates to **moderate negative** (Table 6). Mitigation would

entail (1) keeping the construction duration as short as possible, (2) ensuring that the smallest area possible is cleared for construction and (3) ensuring that any areas not required during operation are rehabilitated. This would not affect the ratings, however, and the significance remains **moderate negative** after mitigation.

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

7.5. Operation Phase – Mura 3

7.5.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase due to the presence of the facility in the landscape. The magnitude is again low because of the remoteness of the site and, despite the long duration of impact (for the lifetime of the project), the significance calculates to **moderate negative** (Table 6). Mitigation would entail (1) ensuring that all maintenance activities remain within the approved footprint and (2) ensuring that night time light pollution is minimised. This would not alter the significance rating which remains at the **moderate negative** level.

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

7.6. Decommissioning Phase – Mura 3

7.6.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the decommissioning phase when construction equipment is brought onto the site and decommissioning activities commence. The very remote location means that the magnitude is low but because impacts would definitely occur if the project were decommissioned the significance calculates to **moderate negative** (Table 6). Mitigation would entail (1) keeping the decommissioning duration as short as possible, and (2) ensuring that the site is fully rehabilitated after the facility has been removed. This would reduce the magnitude rating, but the significance remains **moderate negative** after mitigation.

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

7.7. Construction Phase – Mura 4

7.7.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because one site is known, but with low cultural significance, and significant sites in the road corridor are not expected to be impacted, the impact magnitude is very low. Because an impact would definitely occur the significance calculates to **moderate negative** (Table 7). Mitigation would entail avoiding the archaeological site if possible and (2) ensuring that any chance finds are reported. This will reduce the probability of impacts and the resultant significance post-mitigation is **very low negative**.

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

7.7.2. Impacts to graves

Direct impacts to graves resources would occur during the construction phase when equipment is brought onto site and excavations for foundations, services and roadworks commence. Because graves are not known from the PV areas and margins of the access road, the impact magnitude is very low. The chances of graves being present and impacted are very low and the significance calculates to **very low negative** (Table 7). The only mitigation requirement is to ensure that any chance finds are reported. This would slightly reduce the probability of impacts, although this cannot be reflected in the ratings. The significance post-mitigation is still **very low negative**.

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

7.7.3. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase when construction equipment is brought onto the site and construction activity commences. The very remote location means that the magnitude is low but because impacts would definitely occur if the project goes ahead the significance calculates to **moderate negative** (Table 7). Mitigation would entail (1) keeping the construction duration as short as possible, (2) ensuring that the smallest area possible is cleared for construction and (3) ensuring that any areas not required during operation are rehabilitated. This would not affect the ratings, however, and the significance remains **moderate negative** after mitigation.

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

7.8. Operation Phase – Mura 4

7.8.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase due to the presence of the facility in the landscape. The magnitude is again low because of the remoteness of the site, and despite the long duration of impact (for the lifetime of the project), the significance calculates to **moderate negative** (Table 7). Mitigation would entail (1) ensuring that all maintenance activities remain within the approved footprint and (2) ensuring that night time light pollution is minimised. This would not alter the significance rating which remains at the **moderate negative** level.

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

7.9. Decommissioning Phase – Mura 4

7.9.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the decommissioning phase when construction equipment is brought onto the site and decommissioning activities commence. The very remote location means that the magnitude is low but because impacts would definitely occur

if the project is decommissioned the significance calculates to **moderate negative** (Table 7). Mitigation would entail (1) keeping the decommissioning duration as short as possible, and (2) ensuring that the site is fully rehabilitated after the facility has been removed. This would reduce the magnitude rating, but the significance remains **moderate negative** after mitigation.

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

7.10. Cumulative impacts

Cumulative impacts would occur through the construction, operation and decommissioning of many projects in the same area. Figure 50 shows the projects considered in the assessment of cumulative impacts and the assessment is provided in Table 8. In terms of archaeology, the magnitude and probability would increase but mitigation would still bring the significance down from **moderate negative** to **very low negative**. Graves are unlikely to be impacted and mitigation would reduce the impact significance from **low negative** to **very low negative**. Cumulative impacts to the landscape are likely to be **moderate negative** both before and after mitigation for both the construction and decommissioning phases. The operation phase impact significance could potentially be high negative before mitigation but with a slight reduction in intensity after mitigation this drops to **moderate negative**.

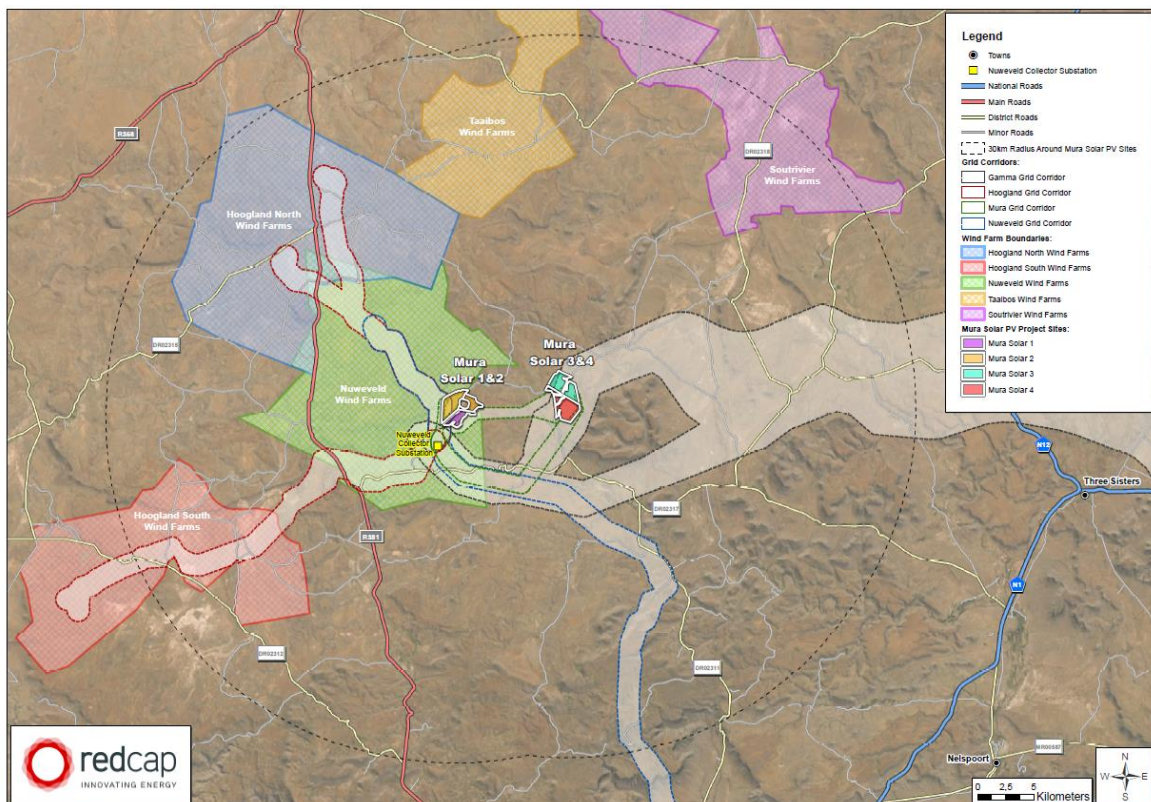


Figure 50: Map showing other projects within 30km of the Mura Solar PV Development considered during the assessment of potential cumulative impacts.

Table 5: Mura 1 and Mura 2 Impact Assessment.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Archaeology	Damage to or destruction of sites	Construction	Negative	High	1	1	5	5	2	24	N2	1	1	5	5	1	12	N1
Significance						N2 - Low							N1 - Very Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	1	1	5	5	1	12	N1	1	1	5	5	1	12	N1
Significance						N1 - Very Low							N1 - Very Low						
Impact 3:	Cultural landscape	Alteration of landscape character	Construction	Negative	Low	2	2	3	2	5	45	N3	2	2	3	2	5	45	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 4:	Cultural landscape	Alteration of landscape character	Operation	Negative	Low	2	2	3	4	5	55	N3	2	2	3	4	5	55	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 5:	Cultural landscape	Alteration of landscape character	Decommissioning	Negative	Low	2	2	3	2	5	45	N3	1	2	3	2	5	40	N3
Significance						N3 - Moderate							N3 - Moderate						

Table 6: Mura 3 Impact Assessment.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Archaeology	Damage to or destruction of sites	Construction	Negative	High	4	1	5	5	5	75	N4	1	1	5	5	1	12	N1
Significance						N4 - High							N1 - Very Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	1	1	5	5	1	12	N1	1	1	5	5	1	12	N1
Significance						N1 - Very Low							N1 - Very Low						

Impact 3:	Cultural landscape	Alteration of landscape character	Construction	Negative	Low	2	2	3	2	5	45	N3	2	2	3	2	5	45	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 4:	Cultural landscape	Alteration of landscape character	Operation	Negative	Low	2	2	3	4	5	55	N3	2	2	3	4	5	55	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 5:	Cultural landscape	Alteration of landscape character	Decommissioning	Negative	Low	2	2	3	2	5	45	N3	1	2	3	2	5	40	N3
Significance						N3 - Moderate							N3 - Moderate						

Table 7: Mura 4 Impact Assessment.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+)	E+	R+	D)x	P=	S	Rating	(M+)	E+	R+	D)x	P=	S	Rating
Impact 1:	Archaeology	Damage to or destruction of sites	Construction	Negative	High	1	1	5	5	5	60	N3	1	1	5	5	1	12	N1
Significance						N3 - Moderate							N1 - Very Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	1	1	5	5	1	12	N1	1	1	5	5	1	12	N1
Significance						N1 - Very Low							N1 - Very Low						
Impact 3:	Cultural landscape	Alteration of landscape character	Construction	Negative	Low	2	2	3	2	5	45	N3	2	2	3	2	5	45	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 4:	Cultural landscape	Alteration of landscape character	Operation	Negative	Low	2	2	3	4	5	55	N3	2	2	3	4	5	55	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 5:	Cultural landscape	Alteration of landscape character	Decommissioning	Negative	Low	2	2	3	2	5	45	N3	1	2	3	2	5	40	N3
Significance						N3 - Moderate							N3 - Moderate						

Table 8: Cumulative Impact Assessment.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
Impact 1:	Archaeology	Damage to or destruction of sites	Construction	Negative	High	2	1	5	5	3	39	N3	1	1	5	5	1	12	N1
Significance						N3 - Moderate							N1 - Very Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	1	1	5	5	2	24	N2	1	1	5	5	1	12	N1
Significance						N2 - Low							N1 - Very Low						
Impact 3:	Cultural landscape	Alteration of landscape character	Construction	Negative	Low	3	3	3	2	5	55	N3	2	2	3	2	5	45	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 4:	Cultural landscape	Alteration of landscape character	Operation	Negative	Low	3	3	3	4	5	65	N4	2	2	3	4	5	55	N3
Significance						N4 - High							N3 - Moderate						
Impact 5:	Cultural landscape	Alteration of landscape character	Decommissioning	Negative	Low	3	3	3	2	5	55	N3	1	2	3	2	5	40	N3
Significance						N3 - Moderate							N3 - Moderate						

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

7.12. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the four sites aside from the natural degradation, weathering and erosion that will affect archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of **negligible negative** significance. The cultural landscape is unspoilt and existing landscape impacts are rated as **neutral**.

7.13. The No-Go alternative

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

7.14. 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 remoteness of the areas proposed for development such an impact to the landscape is not envisaged.

8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The actions recorded in Table 9 should be included in the environmental management programme (EMPr) for the project.

Table 9: Heritage considerations for inclusion in the EMPr for each of the four Mura projects.

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Impacts to archaeology and graves					

Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Reporting chance finds as early as possible, 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)	ECO
Impacts to the cultural landscape					
Visible landscape scarring	Minimise landscape scarring	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

9. CONSULTATION WITH HERITAGE CONSERVATION BODIES

As required by HWC in their response to the NID, this report is submitted to the local municipality for heritage comment. There are no registered conservation bodies with an interest in this area.

10. CONCLUSIONS

There are no highly significant concerns for any of the four Mura PV projects. One site in Mura 3 is best avoided and likely will be given its location in a small river valley right at the edge of the proposed footprint area. Even if not avoided, mitigation could be carried out by way of recording the site and sampling any dense artefact scatter that might be present. One stone-walled site in Mura 4 is of low significance and does not require any further recording or mitigation. Ideally it should be avoided, but this is certainly not compulsory given its low significance.

A ruined farm complex along the Mura 3 and Mura 4 access road is a potential concern since the road makes a tight turn within the area of the complex (Figure 51). Although all significant features (building ruins, kraals, graves) are located outside of the turn, there is some stone walling inside it (agricultural terracing, etc). Should road realignment be required in this area then some stone walling (likely all of low cultural significance) may well be affected. This will need to be determined once the detailed design is done.



Figure 51: Aerial view of the farm complex at waypoint 2000 showing its relationship to the DR02317 road.

Table 10 lists the heritage indicators and the project responses.

Table 10: Heritage indicators and project responses.

Indicator	Project Response
Uncontrolled damage to fossils should be minimised as far as possible	<p>Mura 1: Significant fossils are not expected in the study area but a Chance Finds Protocol has been supplied for inclusion in the EMPr.</p> <p>Mura 2: Significant fossils are not expected in the study area but a Chance Finds Protocol has been supplied for inclusion in the EMPr.</p> <p>Mura 3: Significant fossils are not expected in the study area but a Chance Finds Protocol has been supplied for inclusion in the EMPr.</p> <p>Mura 4: Significant fossils are not expected in the study area but a Chance Finds Protocol has been supplied for inclusion in the EMPr.</p>
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.	<p>Mura 1: This has been done.</p> <p>Mura 2: This has been done.</p> <p>Mura 3: One GPA site (waypoint 1402) lies within the PV footprint and will require either avoidance or mitigation.</p> <p>Mura 4: One IIIC site (waypoint 1399) lies within the PV footprint. Neither avoidance nor mitigation are required, but avoidance would be ideal.</p>

<p>Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.</p>	<p>Mura 1: This has been done. Mura 2: This has been done. Mura 3: This has been done in the PV footprint for all except one site as noted above. The access road has some sites within 30 m of its edge but impacts are highly unlikely. Mura 4: This has been done in the PV footprint for all except one site as noted above. The access road has some sites within 30 m of its edge but impacts are highly unlikely.</p>
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10.1. Reasoned opinion of the specialist

Mura 1: Given that there are no significant concerns for this project, it is the opinion of the heritage specialist that the project should be authorised in full.

Mura 2: Given that there are no significant concerns for this project, it is the opinion of the heritage specialist that the project should be authorised in full.

Mura 3: Given that the one significant site within the footprint should be easily avoided or the impact can be mitigated and that significant sites along the access roads should be safe from harm, it is the opinion of the heritage specialist that the project should be authorised in full.

Mura 4: Given that the one site within the footprint is of low significance and does not require further work and that significant sites along the access roads should be safe from harm, it is the opinion of the heritage specialist that the project should be authorised in full.

11. RECOMMENDATIONS

Mura 1 (Western Cape): It is recommended that the proposed Mura 1 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- No stones may be removed from any archaeological site; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 2 (Western Cape): It is recommended that the proposed Mura 2 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- No stones may be removed from any archaeological site; and

- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 3 (Northern Cape): It is recommended that the proposed Mura 3 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- The site at waypoint 1402 should be avoided if possible with a 50 m buffer or else revisited to record it in detail as well as determining whether any sampling would be required;
- Any realignment of the DR02317 within 400 m of waypoint 2000 must be checked in the field and approved by an archaeologist;
- No stones may be removed from any archaeological site; and
- If any archaeological material or human burials are uncovered during the course of development, 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.

Mura 4 (Western Cape): It is recommended that the proposed Mura 4 PV facility should be authorised but subject to the following recommendations which should be included as conditions of authorisation:

- A Fossil Chance Finds Procedure (as supplied in the palaeontological specialist study) must be included in the project EMPr;
- The site at waypoint 1399 should be avoided if possible but this is not required (if avoided and protected then the buffer can be reduced to 25 m); and
- Any realignment of the DR02317 within 400 m of waypoint 2000 must be checked in the field and approved by an archaeologist;
- No stones may be removed from any archaeological site; and
- If any archaeological material or human burials are uncovered during the course of development, 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:

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

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

Education:

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

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

Employment History:

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

Professional Accreditation:

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

CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

➤ **Memberships and affiliations:**

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 – 2017
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –
Kalk Bay Historical Association	2016 –
Association of Professional Heritage Practitioners member	2016 –

Fieldwork and project experience:

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

Feasibility studies:

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

Phase 1 surveys and impact assessments:

- Project types
 - Notification of Intent to Develop applications (for Heritage Western Cape)
 - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
 - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
 - Archaeological specialist studies
 - Phase 1 archaeological test excavations in historical and prehistoric sites
 - Archaeological research projects
- Development types
 - Mining and borrow pits
 - Roads (new and upgrades)
 - Residential, commercial and industrial development
 - Dams and pipe lines
 - Power lines and substations
 - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

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

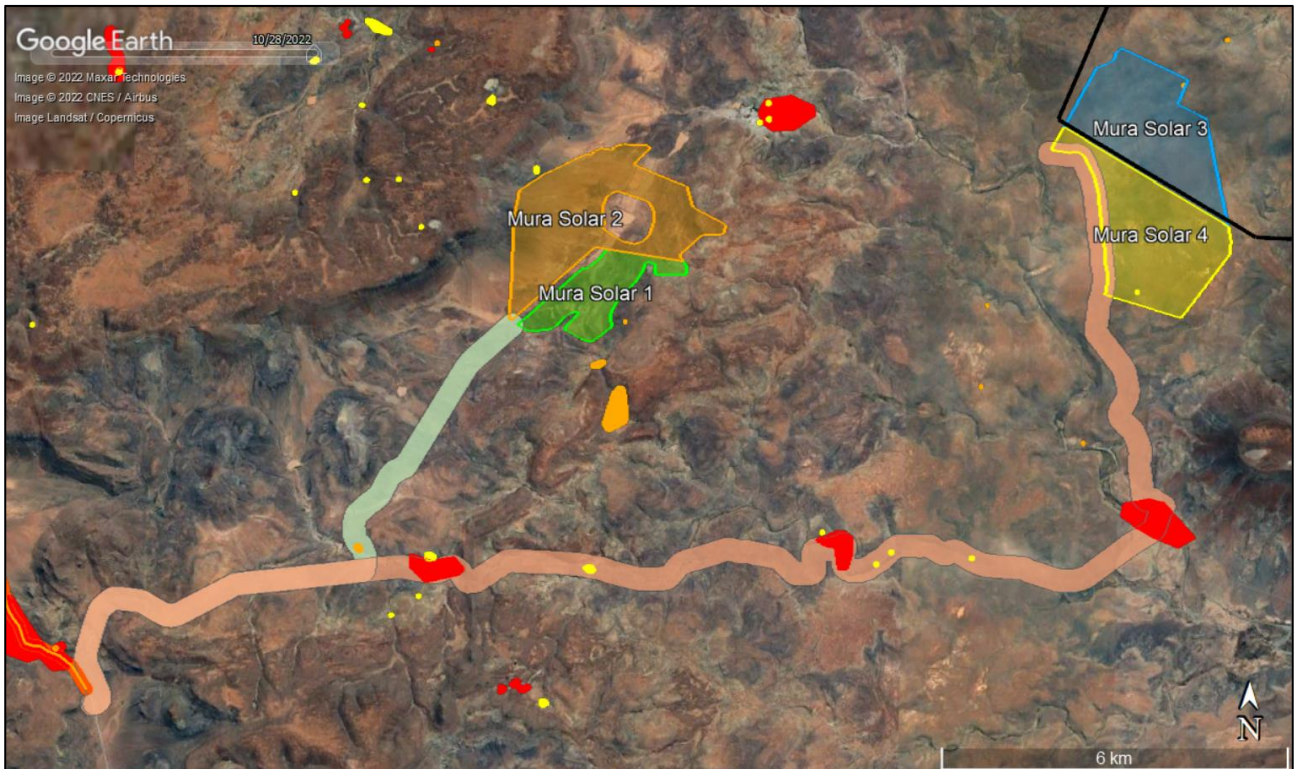
Awards:

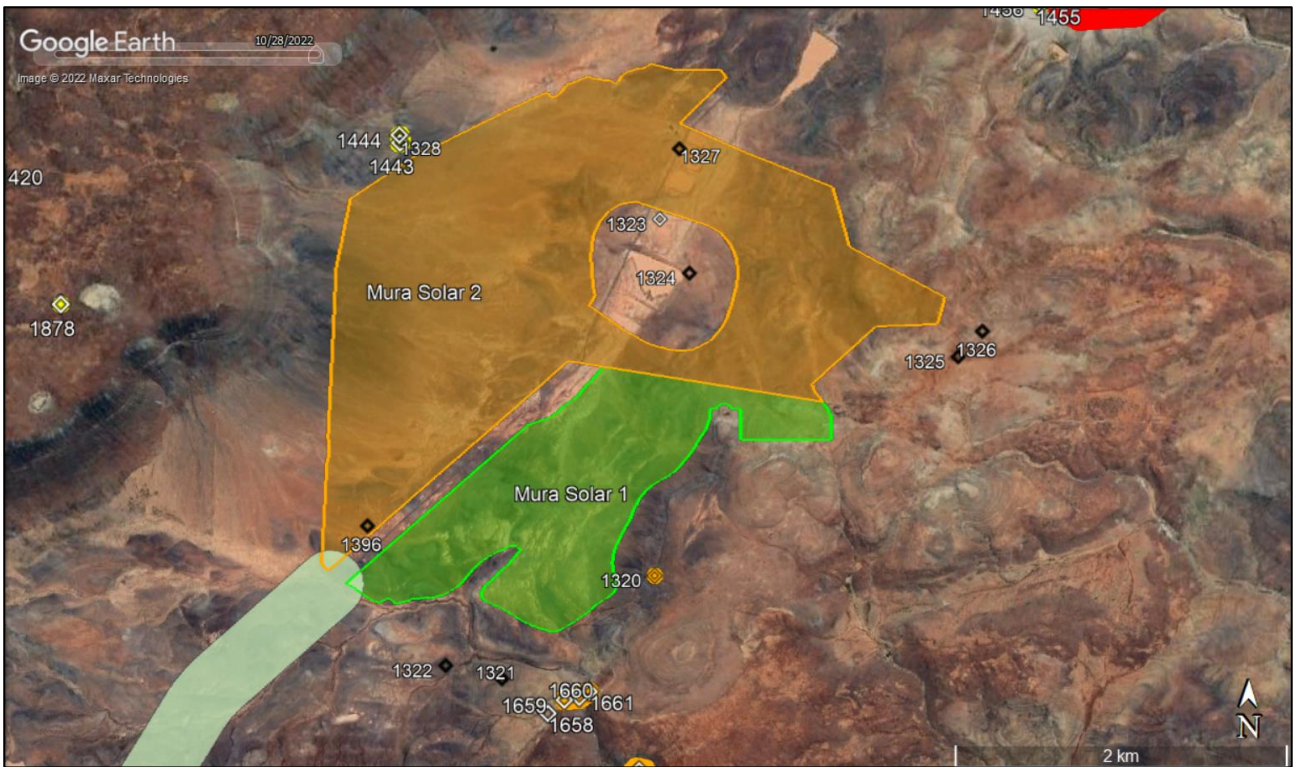
Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.

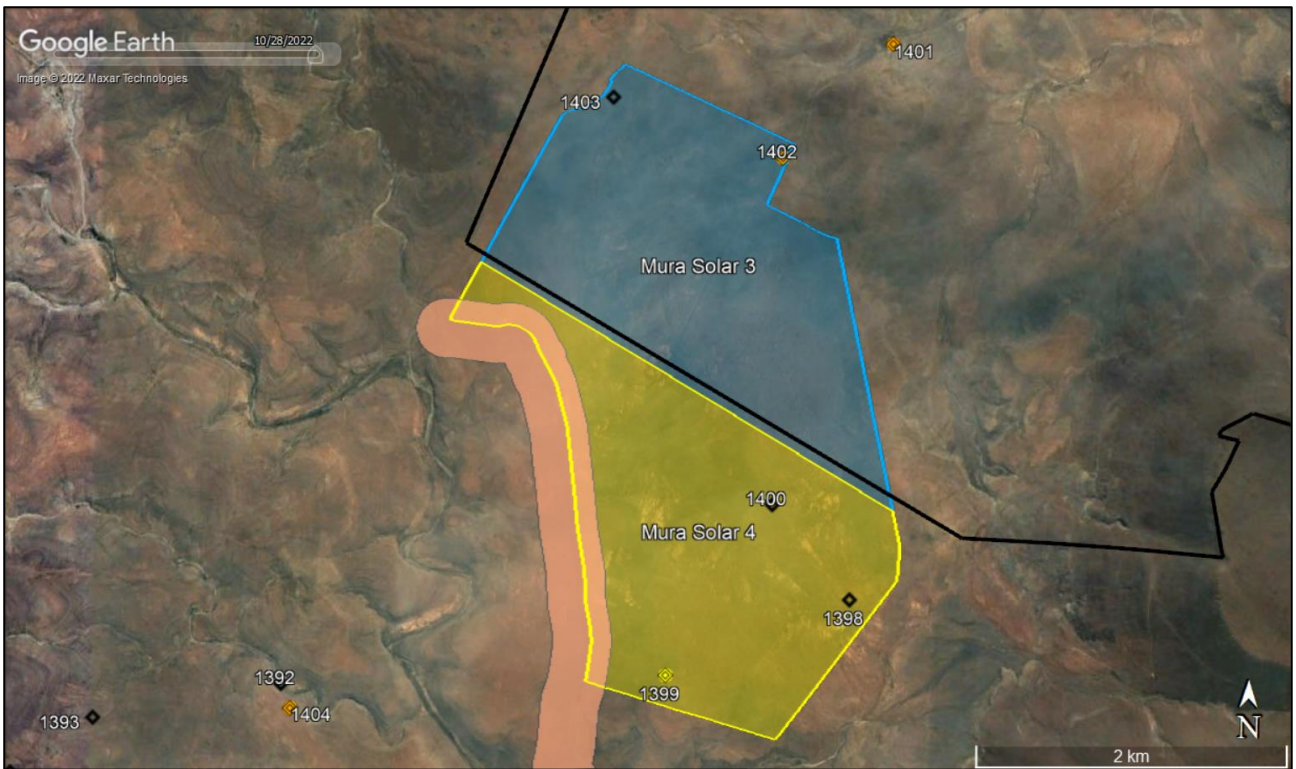
APPENDIX 2 – Mapping

In the first map the heritage gradings are shown, all with 50 m buffers. Red = IIIA, Orange = IIIB, Yellow = IIIC/GPA.

In the remaining smaller scale maps the waypoint numbers are added but note that these are from multiple projects with only those relevant to the present project listed in the report. Black symbols = NCW and no buffers are provided.









APPENDIX 3 – Palaeontological specialist study