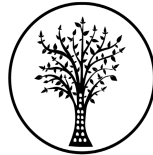


HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

Proposed development of the Brakpan 1 Solar Energy Facility (Option A) as part of the Poortjie Wes Renewable Energy Cluster near Beaufort West in the Western Cape Province

Prepared by CTS Heritage



CTS HERITAGE

For

Savannah Environmental

April 2022



CTS HERITAGE

EXECUTIVE SUMMARY

1. Site Name:

Brakpan 1 Solar Energy Facility

2. Location:

- Brakpan 1 Solar Energy Facility (Pty) Ltd (Option A) on the Farm Poortje 76

3. Locality Plan:

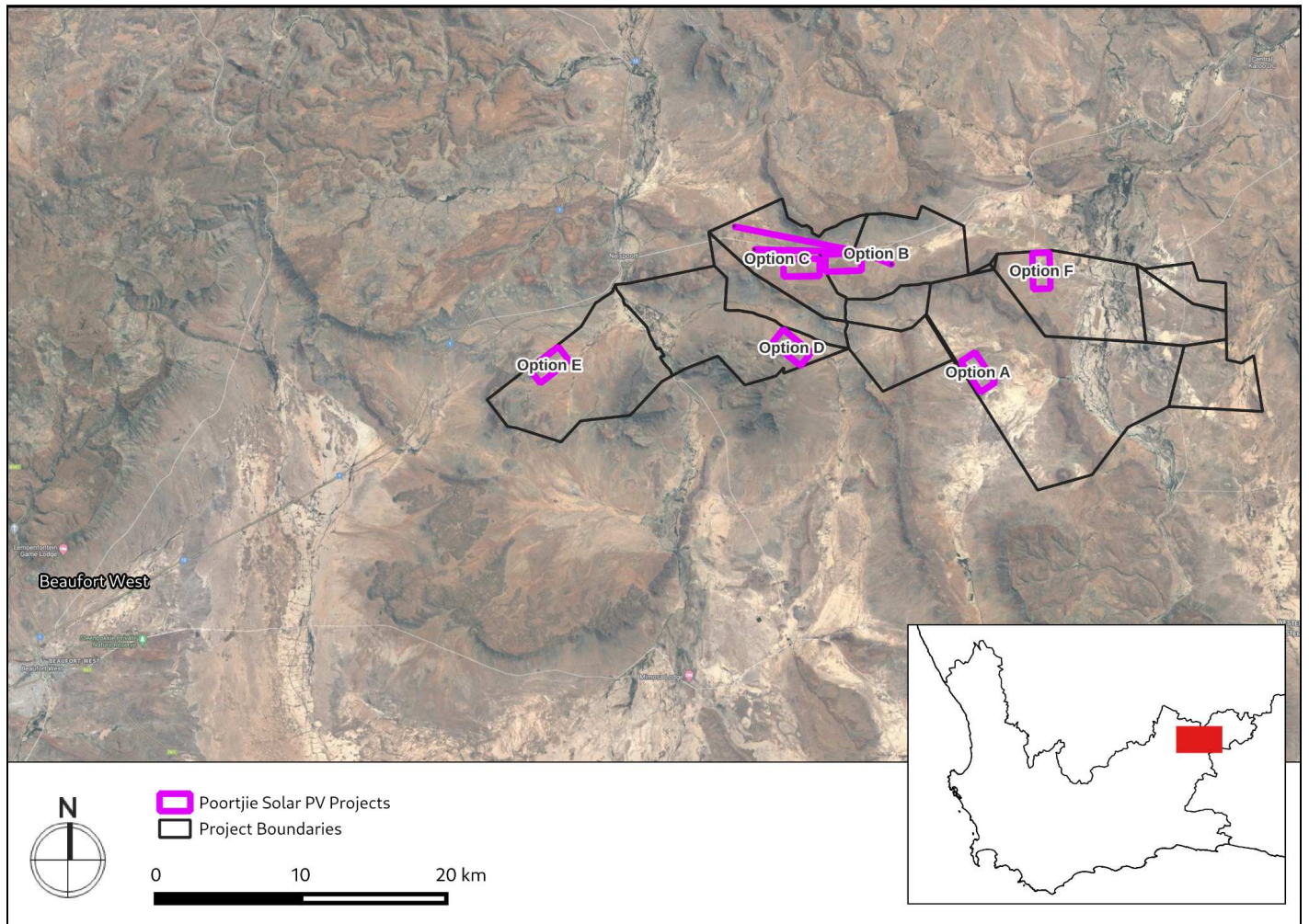


Figure A: Location of the proposed development area

4. Description of Proposed Development:

Brakpan 1 Solar Energy Facility (Pty) Ltd. the (“Independent Power Producer”) proposes to develop the Brakpan 1 Solar Energy Facility and its associated electrical infrastructure (the “Project/Facility”) approximately 15km

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north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone (“REDZ 11”) and the Central Transmission Corridor. The facility is to be developed with a maximum installed capacity of 220 MW and will have a generating capacity of 190 MW. This project is also referred to as “Option A”.

5. Heritage Resources Identified:

The area proposed for development falls within a Landscape Character Area identified as “Juriesfontein Plains”. This LCA is:

- of historical value in terms of the historical linkage route through Poortjie Wes and associated pattern of farmsteads
- of aesthetic value in terms of the vast open quality landscape framed by hills and distant mountains and possessing a sense of remoteness and stillness.
- The scenic qualities of Poortjie dam located at the southern end of the poort providing a watering place in contrast to semi-arid surroundings and attracting an abundance of birdlife.

Table A: Artefacts identified during the field assessment development area

POINT ID	Project Area	Period	Description	Co-ordinates		Grading	Mitigation
071	Option B	Historic	Stone walled kraal, historical artefacts and MSA hornfels flakes	-32.10298	23.16	IIIB	Falls within mapped sensitivity zone - see map
074	Option B	LSA	Engravings, incised geometric lines, elephant, scribbles possible handwriting, elephant scraped technique	-32.10271	23.16722	IIIA	Falls within mapped sensitivity zone - see map
075	Option B	LSA	Engravings, some historical of structures in scratched lines, incised antelope, lines, group of eland very faded, rain cloud, rhino?	-32.10388	23.16873	IIIA	Falls within mapped sensitivity zone - see map
079	Option B	LSA+MSA	Incised engravings, lines, siltstone flakes	-32.10371	23.1788	IIIB	Falls within mapped sensitivity zone - see map

In terms of the heritage resources identified in the palaeontological field assessment, see Table B below.

Table B: Palaeontological observations made during the field assessment for the development area

POINT ID	Project Area	Description	Co-ordinates		Grading	Mitigation
380	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated postcranial bone of a large tetrapod within surface float (possibly from same individual as at Loc. 381). Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 09' 43.2" S	23° 15' 57.4" E	IIIB	Collection prior to construction

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381	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Extensive scatter of numerous weathered-out postcranial (and possible cranial) remains of one or more large tetrapod within surface float. Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 09' 40.9" S	23° 15' 59.1" E	IIIB	Collection prior to construction
385	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated fragment of limb bone of a large tetrapod within sheetwash gravels. Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 10' 01.2" S	23° 15' 53.2" E	IIIB	Collection prior to construction
388	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated small chunk of pinkish rolled bone within surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	32° 10' 11.7" S	23° 16' 29.8" E	IIIC	NA
390	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Numerous pebble- to cobble-sized fragments of pinkish to lilac hued rolled tetrapod bone (largely unidentifiable) among concentrations of weathered-out ferruginous carbonate concretions. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	32° 09' 49.7" S	23° 16' 02.5" E	IIIC	NA

6. Anticipated Impacts on Heritage Resources:

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. The site possesses a number of landscape elements contributing to a composite cultural landscape. Significant from a landscape perspective is the distinctive poort and its associated dam, linkage route and topographical condition. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.

No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area. No impacts to significant archaeological heritage are anticipated.

Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded IIIB. These paleontological resources must be collected by a palaeontologist under an approved workplan prior to construction.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.



7. Recommendations:

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar PV facility and its associated grid connection infrastructure are unlikely to negatively impact on significant heritage resources on condition that the following recommendations are adhered to:

- The recommendations of the VIA must be implemented.
- Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist prior to construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC
- The HWC Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and HWC must be alerted immediately to determine an appropriate way forward.

8. Author/s and Date:

Jenna Lavin

April 2022



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Details of Specialist who prepared the HIA

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management, heads up the heritage division of the organisation, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

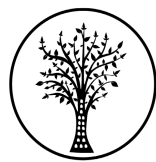
Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

Since 2016, Jenna has drafted over 250 Screening and Heritage Impact Assessments throughout South Africa.

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CONTENTS

1. INTRODUCTION	7
1.1 Background Information on Project	7
1.2 Description of Property and Affected Environment	9
2. METHODOLOGY	14
2.1 Purpose of HIA	14
2.2 Summary of steps followed	14
2.3 Assumptions and uncertainties	14
2.4 Constraints & Limitations	15
2.5 Savannah Impact Assessment Methodology	15
3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT	17
3.1 Desktop Assessment	17
4. IDENTIFICATION OF HERITAGE RESOURCES	24
4.1 Summary of findings of Specialist Reports	24
4.2 Heritage Resources identified	27
4.3 Mapping and spatialisation of heritage resources	33
5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT	38
5.1 Assessment of impact to Heritage Resources	38
5.1.1 Cultural Landscape	38
5.1.2 Archaeology	39
5.1.3 Palaeontology	40
5.1.4 Visual Impacts	41
5.2 Sustainable Social and Economic Benefit	43
5.3 Proposed development alternatives	43
5.4 Cumulative Impacts	44
6. RESULTS OF PUBLIC CONSULTATION	47
7. CONCLUSION	47
8. RECOMMENDATIONS	47
APPENDICES	
1	Archaeological Impact Assessment 2022
2	Palaeontological Impact Assessment 2022
3	Cultural Landscape Assessment 2022
4	Heritage Screening Assessment
5	Results of PPP



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1. INTRODUCTION

1.1 Background Information on Project

Brakpan 1 Solar Energy Facility (Pty) Ltd. the (“Independent Power Producer”) proposes to develop the Brakpan 1 Solar Energy Facility and its associated electrical infrastructure (the “Project/Facility”) approximately 15km north-west of Nelspoort and 60km south-west of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone (“REDZ 11”) and the Central Transmission Corridor. The facility is to be developed with a maximum installed capacity of 220 MW and will have a generating capacity of 190 MW. This project is also referred to as “Option A”.

The Project is earmarked for submission into the South African Government’s Renewable Independent Power Producer Procurement Programme (“REIPPPP”) or for a Private Off-take.

The Project (Brakpan 1 Solar Energy Facility) is part of a cluster known as the Poortjie Wes Cluster (the “Cluster”). The Cluster entails the development of six (6) solar energy facilities and a wind energy facility. All seven (7) renewable energy (“RE”) facilities will connect to the proposed 132kV Belvedere Collector Switching Station (the “Collector Switching Station”) via 132kV Overhead Lines (“OHLs”). The proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO MTS (“Poortjie Wes LILO MTS”) via a 132kV OHL.

A technically suitable project site of ~450ha has been identified by Brakpan 1 Solar Energy Facility (Pty) Ltd for the establishment of the PV facility. The project site is located on the following property:

- The Farm Poortjie No. 76, in the Kamdeboo Municipality, division of Murraysburg, Western Cape Province; and
- Portion 2 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, division of Murraysburg, Province of the Western Cape.

The development footprint for the facility allowing the facility to generate 190MWac will be approximately 395ha and will contain the following infrastructure: The

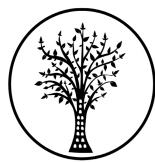
1. Solar Facility

- PV modules (mono or bifacial);
- Single axis tracking structures, Fixed Axis Tracking, or Fixed Panels;
- Fixed tilt mounting structure (to be considered during the design phase of the facility);
- Galvanised steel and/or aluminium solar module mounting structures;
- Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete and then have posts fixed inside them. Alternately, ramming may be used; and
- 60 to 65 Central Inverter stations.

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2. Building Infrastructure

- Offices;
- Operational and maintenance control centre;
- Warehouse/workshop;
- Panel maintenance and cleaning area;
- Ablution facilities;
- A conservancy tank for storage of sewage underground with a capacity of up to 35m³; and
- Guard Houses.

3. Associated Infrastructure

- On-site substation building - IPP owned (including lightening conductor poles);
- Eskom switching station, to be handed over to Eskom at Commercial Operation Date (“COD”) (this forms part of a separate BA);
- Battery storage (500MW/500MWh);
- Internal distribution lines of up to 33 kV;
- Underground low voltage cables or cable trays;
- Internal gravel roads;
- Fencing;
- Stormwater channels;
- Temporary work area during the construction phase; and an
- Access road to site from the existing District gravel road between Nelspoort and Murraysburg No. MR 587.

Part of the grid infrastructure to be built by each of the seven RE facilities will be owned and operated by Eskom Holdings (SOC) Ltd. (“Eskom”). This includes:

- an onsite Switching Station; and
- a 132kV OHL from each onsite Switching Station to the new Collector Switching Station.
- gravel service road beneath the 132 kV power line.

This forms part of a separate Basic Assessment process.

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1.2 Description of Property and Affected Environment

The six solar PV facilities are all within 10-30km of the town of Nelspoort in the Western Cape. Nelspoort is about 55km northeast of Beaufort West and lies nestled in a valley along the Soutrivier about 15km east of the N1 highway linking Three Sisters and Beaufort West. Nelspoort used to lie along the main transport route between Cape Town and Johannesburg but has largely lost its prominence when the N1 highway bypassed the town. While one proposed facility lies southwest of Nelspoort, most of the solar farms lie to the east separated by a series of 300-400m high koppies and generally level, flat plains in between. Only one site (site B) has a low 40-50m high ridge dividing the area which is covered in dolerite boulders.

At the time of surveying these areas, heavy rains had recently fallen, breaking an extensive multi-year period of drought. This provided a window into the erosional patterns present here whilst recording the archaeological material. The vegetation consists of grasslands and succulent shrubs within the Gamka Karoo and Upper Karoo Hardeveld regions while acacia thorn trees line the various stream and river systems. In many areas the topsoil consists of dark orange aeolian sand dating to the Quaternary period and calcretes were found further east. All the farms that form part of the Poortjie Wes Cluster have been used for sheep and cattle grazing with no significant amounts of irrigated crop agriculture taking place other than small-scale plots along immediately along the main river systems. Windmills and small farm dams are dotted around the farms to provide water for the livestock and these are connected by jeep tracks.

Winter and Wilson (2022) describe the character of the area as comprising:

- Regional location within the southern sector of the Great Karoo in the foothills of the Nuweveld Mountain range that defines the edge of the Great Escarpment. Very distinctive topographical fold conditions, with a combination of steep slopes, ridgelines, flat topped mesa mountains and rounded koppies punctuating open plains. Vegetation cover is low, consistent with the Nama Karoo Biome.
- A semi-arid area with a dispersed pattern of settlement along perennial and seasonal rivers, extensive stock farms, and more recent game farms and tourism.
- The distinctive nature of farming settlements within a semi-arid landscape is generally associated with a loose collection of farm buildings adjacent to watercourses and springs, and marked by clusters of tree planting, dams and wind pumps.
- The point of convergence for several linkage routes, some of which still traverse the site: to Murraysburg, Aberdeen, Beaufort West, Three Sisters and Graaf Reinet. Nelspoort town lies on an early transport route through Beaufort West (est. 1818) to Graaf Reinet (est. 1786).
- Nelspoort is located on the early transport and wagon route to the interior (mid- to late-18th century).

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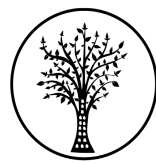
Consolidated with the Victoria West road north c1900s to bypass Nelspoort, this later became the N1.

- The mainline railway was extended from Beaufort West through Nelspoort Station to De Aar in 1884.
- Nelspoort archaeology suggests constant habitation from approximately 12 000 years ago, with a period of cohabitation between !xam San, Khoe and early settlers pre-1820 making use of perennial water, hunting and seasonal pasture. From 1841 Nelspoort became the sheep farming and wool producing seat of the Molteno family. In 1824 Nelspoort Sanatorium opened for the treatment of tuberculosis, later adding psychiatry.
- Small settlement of Poortjie Wes located on the “old post road”, in a short, deep, defensible pass between Beaufort West and Graaf Reinet (pre-1829).
- Traversed by two rivers travelling north-south: the Salt River south of the confluence with the Kromrivier and the Buffelsrivier, with an extensive central seasonal wetland.
- Traversed north-south by two generations of KVA powerlines.
- Located in the REDZ, and in proximity to other existing and proposed power facilities.

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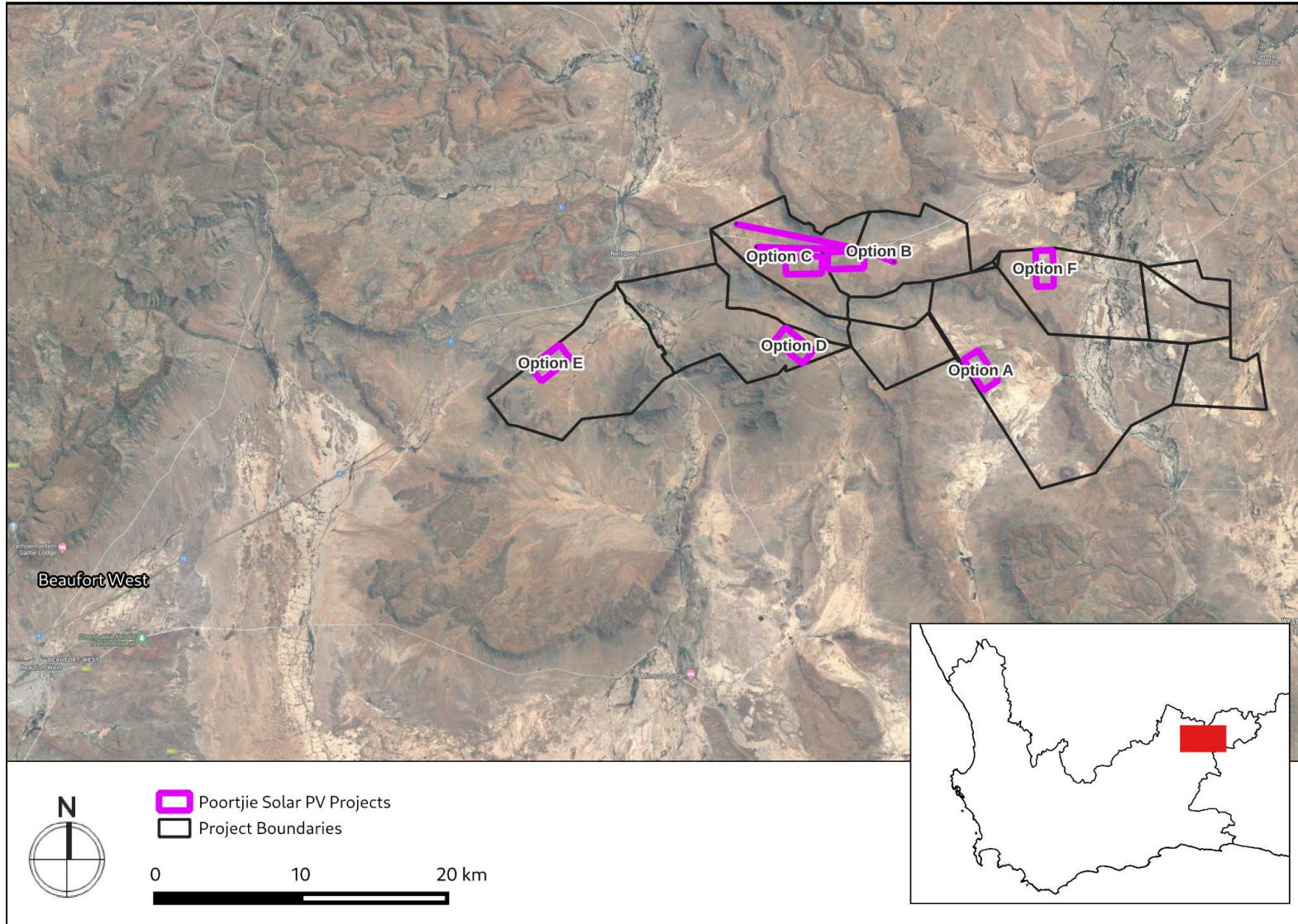
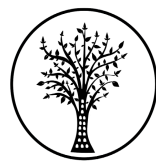


Figure 1.1: Proposed development relative to Beaufort West

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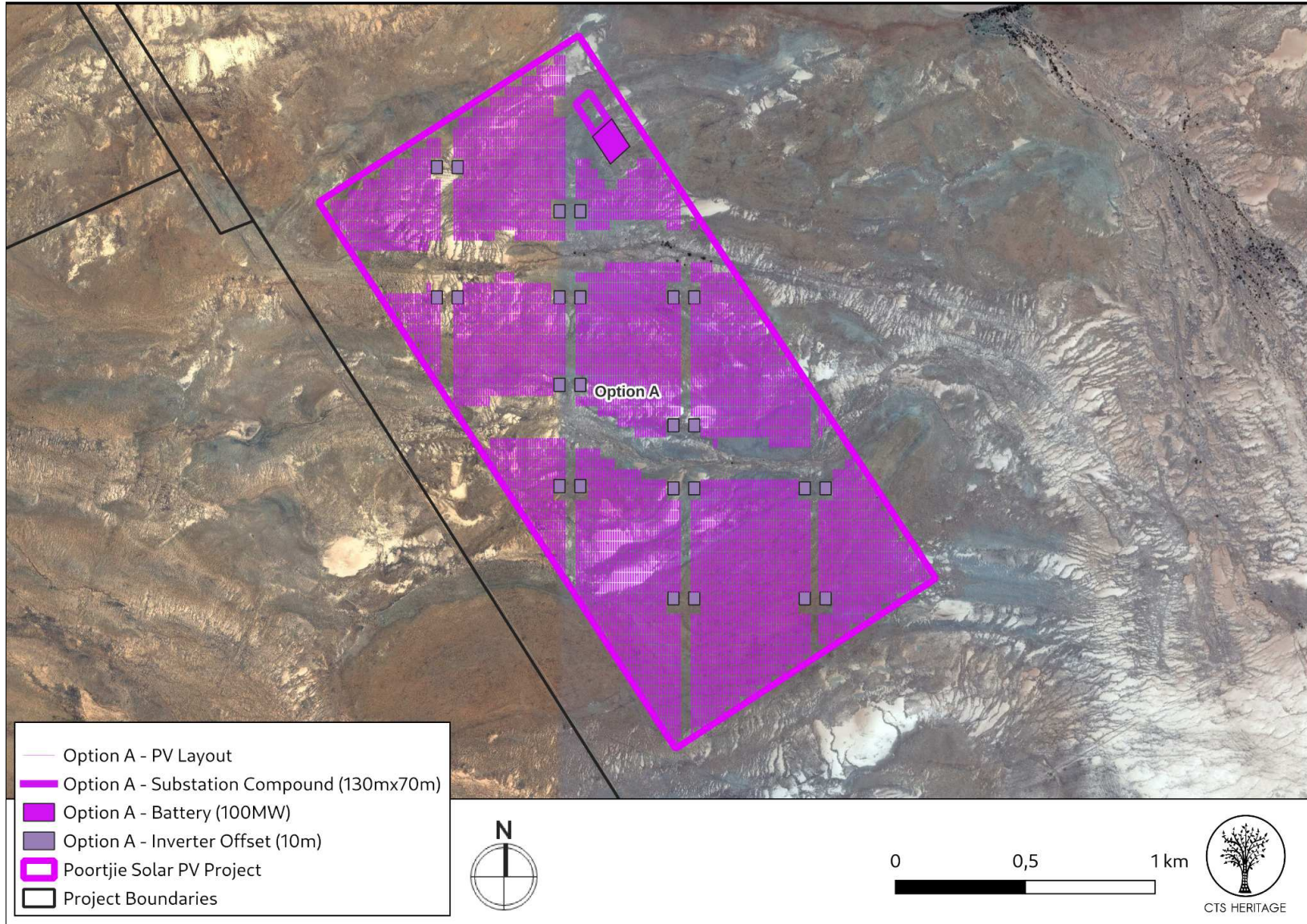


Figure 1.2: The proposed development area

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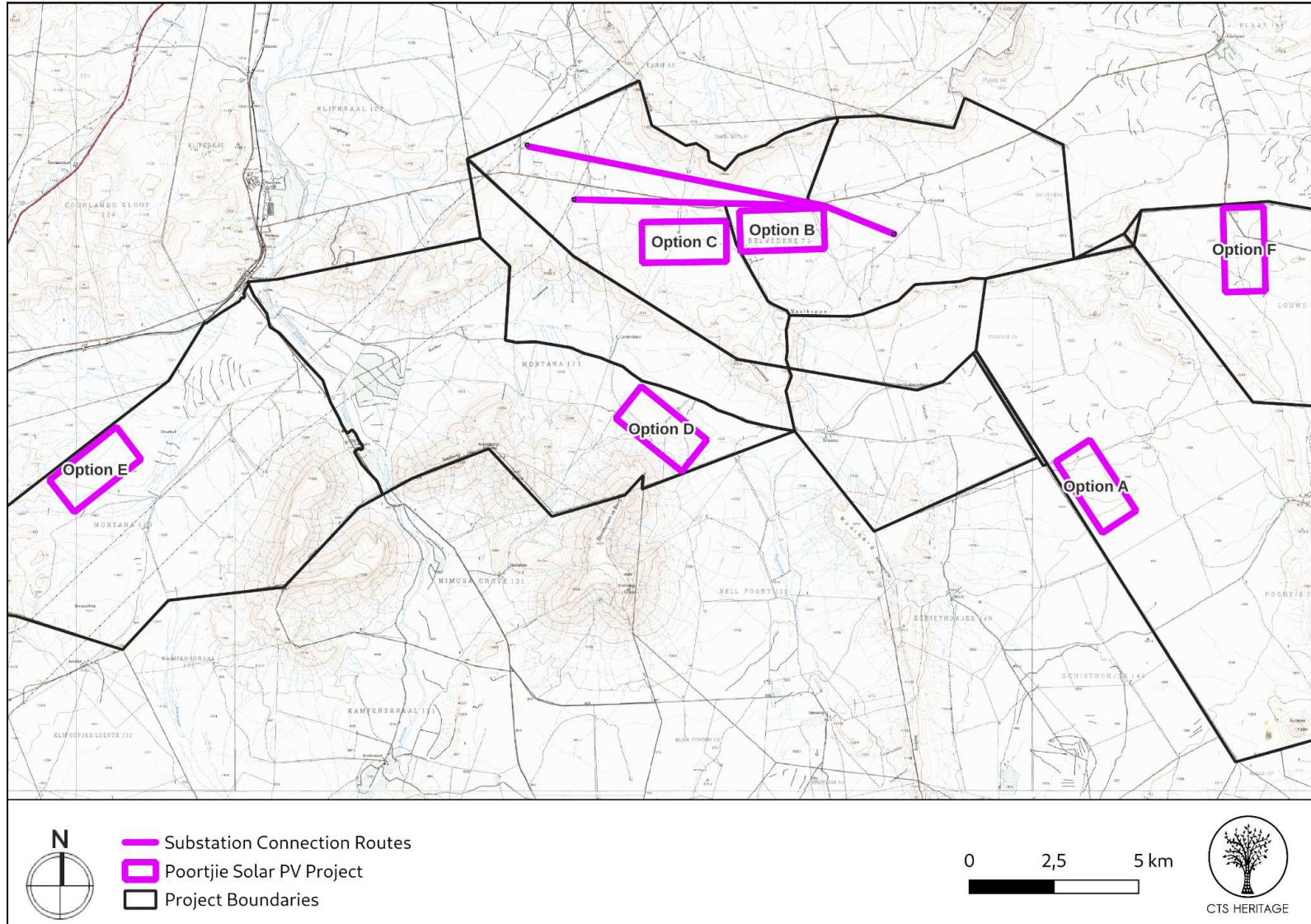
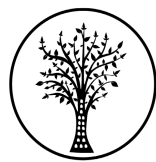


Figure 1.3: The proposed development layout of the proposed PV Facilities on an extract of the 1:50 000 Topo Map

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2. METHODOLOGY

2.1 Purpose of HIA

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 22 - 26 January and 18 March 2022.
- A palaeontologist conducted an assessment of palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted his site visit from 9 to 12 March 2022
- A cultural landscape assessment was conducted that covers the proposed development area with fieldwork completed in March 2022. The results of this assessment were incorporated into this HIA.
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

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2.4 Constraints & Limitations

The recent rains definitely increased the grass coverage in most areas quite significantly. However, the area is still within a semi-arid region of the Karoo and large areas of open ground could be inspected throughout without too much trouble. In particular, given the known sensitivity of dolerite outcrops containing rock engravings near Nelspoort, further outcrops of dolerite were inspected to record possible engravings and these were easy to reach in this context. The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the heritage sensitivity of the receiving environment.

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The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the archaeological sensitivity of the receiving environment.

2.5 Savannah Impact Assessment Methodology

Direct, indirect and cumulative impacts of the issues identified through the Scoping study, as well as all other issues identified in the EIA phase were assessed in terms of the following criteria:

- The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).
- The duration, wherein it will be indicated whether:
 - The lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1.
 - The lifetime of the impact will be of a short duration (2 – 5 years) – assigned a score of 2.
 - Medium-term (5 – 15 years) – assigned a score of 3.
 - Long term (> 15 years) – assigned a score of 4.
 - Permanent – assigned a score of 5.
- The consequences (magnitude), quantified on a scale from 0 – 10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

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- The probability of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 – 5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
- The status, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

The significance is calculated by combining the criteria in the following formula:

$$S = (E + D + M) \times P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area).
- 30 – 60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

The area proposed for the Poortjie West Renewable Energy Cluster is located approximately 40km to 70km northeast of Beaufort West, just east of Nelspoort in the Western Cape, and is located within the identified Beaufort West REDZ (Figure 2c). The town of Nelspoort lies at the foot of the Nuweveld Mountains on an old section of the N1 highway. It is near a watercourse, the Salt River, which flows from the Nuweveld mountains to a seasonal wetland to the south.

Cultural Landscape

The name 'Karoo' has its roots in the Khoisan word meaning 'place of great dryness'. It once supported large grassy flatlands and the San and Khoekhoen migrated across the region for hunting and grazing purposes. Less than two hundred years ago large herds of antelope still roamed the grass plains. With the occupation of the area by stock farmers, the sheep gradually replaced the game and the grass receded along with changing grazing and weather patterns (Winter et al 2009; Winter & Oberholzer 2013). By the late 17th century, the Khoenhoen had moved from the region into the more water-rich southern Karoo and the coastal plains. During the early colonial period, the harshness of the Karoo region formed an almost impenetrable barrier from the Cape to the interior for colonial explorers, hunters and travellers. The 18th century was characterised by a marked increase in the rate of expansion of the boundaries of the settlement at the Cape. This was associated with the emergence of the migrant stock farmer (trekboer) (Guelke 1982 In Winter et al 2009). Early routes into the interior largely followed the tracks initially used by migrating herds of game or the cattle herds and sheep flocks of the Khoekhoen on their seasonal route between coastal and inland grazing grounds. These routes were later reinforced by generations of trek farmers moving between the markets at the Cape and their farms (Winter et al 2009).

During the 1700s the VOC settlers inland push north to hunt and trade livestock came to a prolonged pause below the Nuweveld escarpment, a natural barrier to the arid central Karoo plateau. This started a period of uneasy co-habitation between the semi-nomadic trekboere, !xam San, and Khoe and Xhosa alienated from their preferred grazing to the south and east. Where the landscape allowed, settler farmers occupied land, either without formal title moving on when it ceased being productive, or in a system of renewable permits for loan farms. Expansion was fiercely opposed by the San, who resisted alienation from water sources, until they were forcibly suppressed by the 1790s.

Permanent settlement of the region only really occurred in the 19th century with towns being established near permanent water sources. The area proposed for development is located in the immediate vicinity of Nelspoort, a

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detailed history for which is provided for online¹. Nelspoort became a hub for the treatment of Tuberculosis. As far back as 1850, the famous explorer David Livingstone extolled the climate of the Karoo and noted it was "suitable for all patients with pulmonary complaints". By 1925, the Nelspoort Sanatorium opened its doors, with the official opening performed by the Prince of Wales, later Edward VIII and then Duke of Windsor in July, 1925. As part of this ceremony, a small grove of blue gums were planted. This species has subsequently established itself as an integral part of the cultural landscape of this area.

Nelspoort also has links with the Anglo-Boer War. In 1901, in an effort to prevent the northbound rail link from being destroyed, the British built hundreds of blockhouses. Two were erected to guard the bridges over the Krom River, near Nelspoort. In 1980, however, one was totally destroyed in a flash flood. The other still stands in the shade of pepper trees on the farm Smokey Grove. Guard posts and schantzes were also built on the Nelspoort koppies and soldiers were garrisoned nearby to man the lookouts and blockhouses. Their water source was a perennial fountain, to this day, called Kitchener's Well after Lord Kitchener, British Commander-in-Chief.

Archaeology

Very few heritage assessments have been completed within close proximity to the area proposed for development (Figure 2a). According to Nilssen (2014, SAHRIS NID 504763), "The Karoo houses a long and rich archaeological record dating from the earliest stages of Stone Age technology that are over a million years old, to the historic period that consists of the last few hundred years of human occupation (see Nilssen 2011 and references therein). Archaeological sites include caves and rock shelters, open air artefact scatters, rock engravings and historic structures with their associated cultural materials." According to ACO (2013, SAHRIS NID 503074), "Because of the scarcity of caves and shelters, more than 90% of Karoo archaeological sites are open sites of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved. Artefacts of both the Early and Middle Stone Age are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are considered to be significant heritage sites.

More intensive occupation of the Karoo started around 13 000 years ago during the Later Stone Age, which is essentially the heritage of Khoisan groups who lived throughout the region. The legacy of the San includes numerous open sites while traces of their presence can also be found in most large rock shelters, often in the form of rock art. They frequently settled a short distance from permanent water sources (springs or waterholes) and made use of natural shelters such as rock outcrops or large boulders or even large bushes. In the Great Karoo,

¹<https://www.beaufortwest.net/explore/central-karoo/nelspoort/>



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natural elevated features such as dolerite dykes and ridges played a significant role in San settlement patterns” and as such, this broader area is renowned for its well-preserved rock art and other artefacts from this time, including rock engravings and rock gongs.

There are currently 14 identified sites of archaeological interest with over 400 examples of rock engravings (petroglyphs) in the immediate Nelspoort area of the Klipkraal farm. All engravings are made on the flat surfaces of the dolerite rocks, with the dark outer layer scraped away leaving the image expressed in the lighter sub layer of the rock. While the precise authorship of rock art is debated (Smith, Ouzman 2004), engravings fall broadly into three types described as follows:

- !xam San hunter-gatherer rock engravings: representations include elephant, giraffe, hartebeest, jackal, zebra and rhinoceros. Images also of human figures, bird-human figures and spirit world representations.
- Khoeherder geometric engravings: patterns such as lines radiating sun-like from a centre point, zig-zag patterns and concentric circles.
- Settler engravings: these include text, symbols and direction markers such as arrows and images including a windpump and animals.

In many sites these different types of rock art co-exist, along with other evidence of habitation over an extended period of time, such as stone tools, grinding patches on stones, arranged stones, and rock gongs (Ouzman 2003). Nelspoort is the site of several rock gong complexes. The rock gong, or lithophone percussion instrument, is formed by dolerite boulders, some cracked as a result of lightning strike or extreme temperature fluctuation, balanced on each other so that they resonate with a deep ringing sound when struck in a specific way. They are believed to have been intrinsic to spiritual practices of the !xam San people. Two rock gong groupings are located on small rises across the shallow Nelspoort valley, suggesting that the gong’s sound may have been used for communication purposes (Rusch 2016).

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3122 for Victoria West, the development area is underlain by the Abrahamskraal and Teekloof Formations, both of the Adelaide Subgroup of the Beaufort Group of sediments. According to the SAHRIS Fossil Heritage Browser and the Palaeotechnic Report for the Western Cape (Almond and Pether, 2008), the Beaufort Group sediments are known to preserve diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Lystrosaurus* Biozones (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils

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(including tetrapod trackways) and sparse vascular plants (*Glossopteris* Flora, including petrified wood). Based on the known paleontological sensitivity of this area, it is very likely that activities associated with the development of the proposed PV and grid connections will negatively impact on significant fossil heritage.

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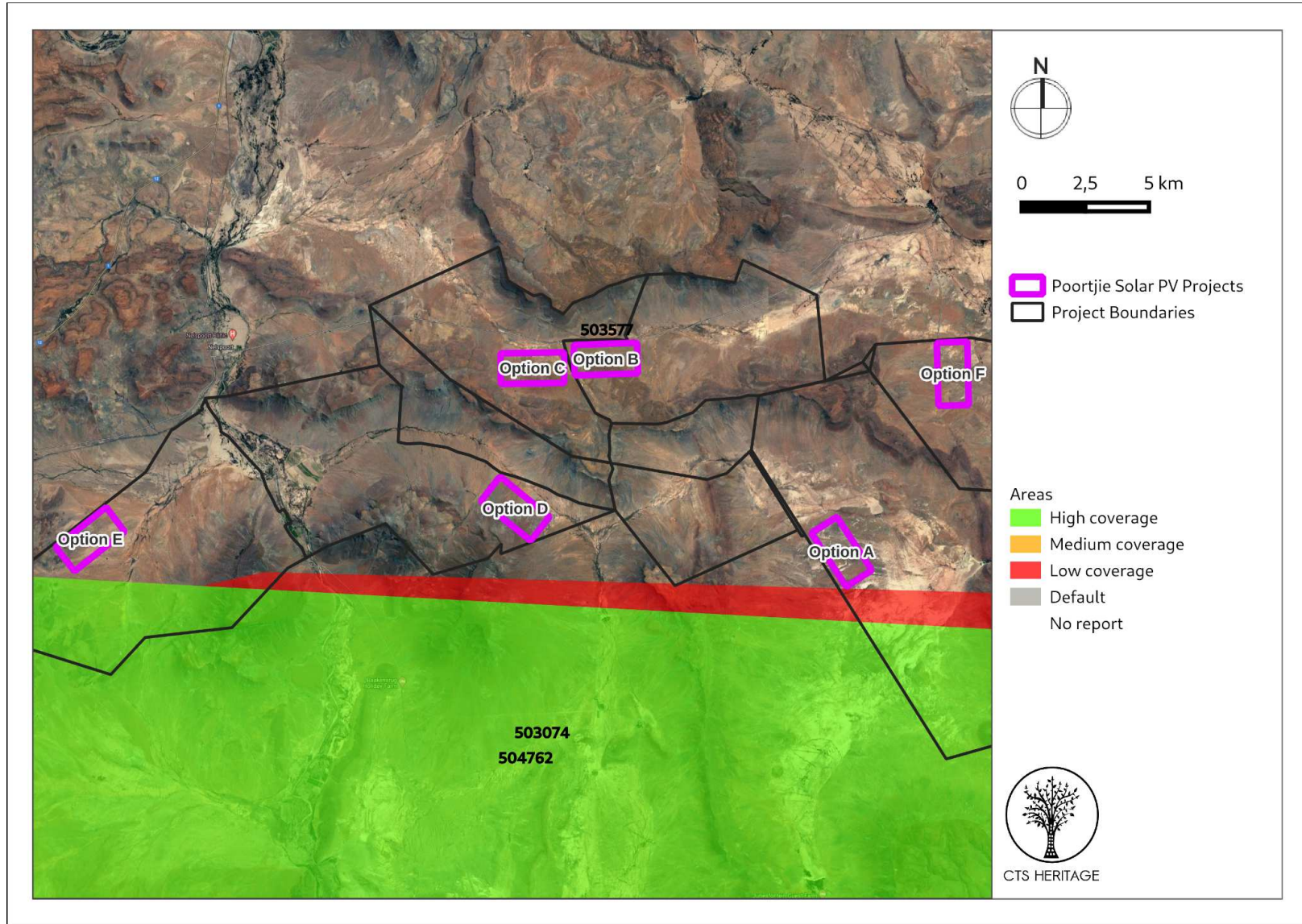
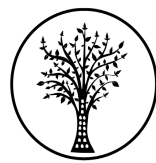


Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development

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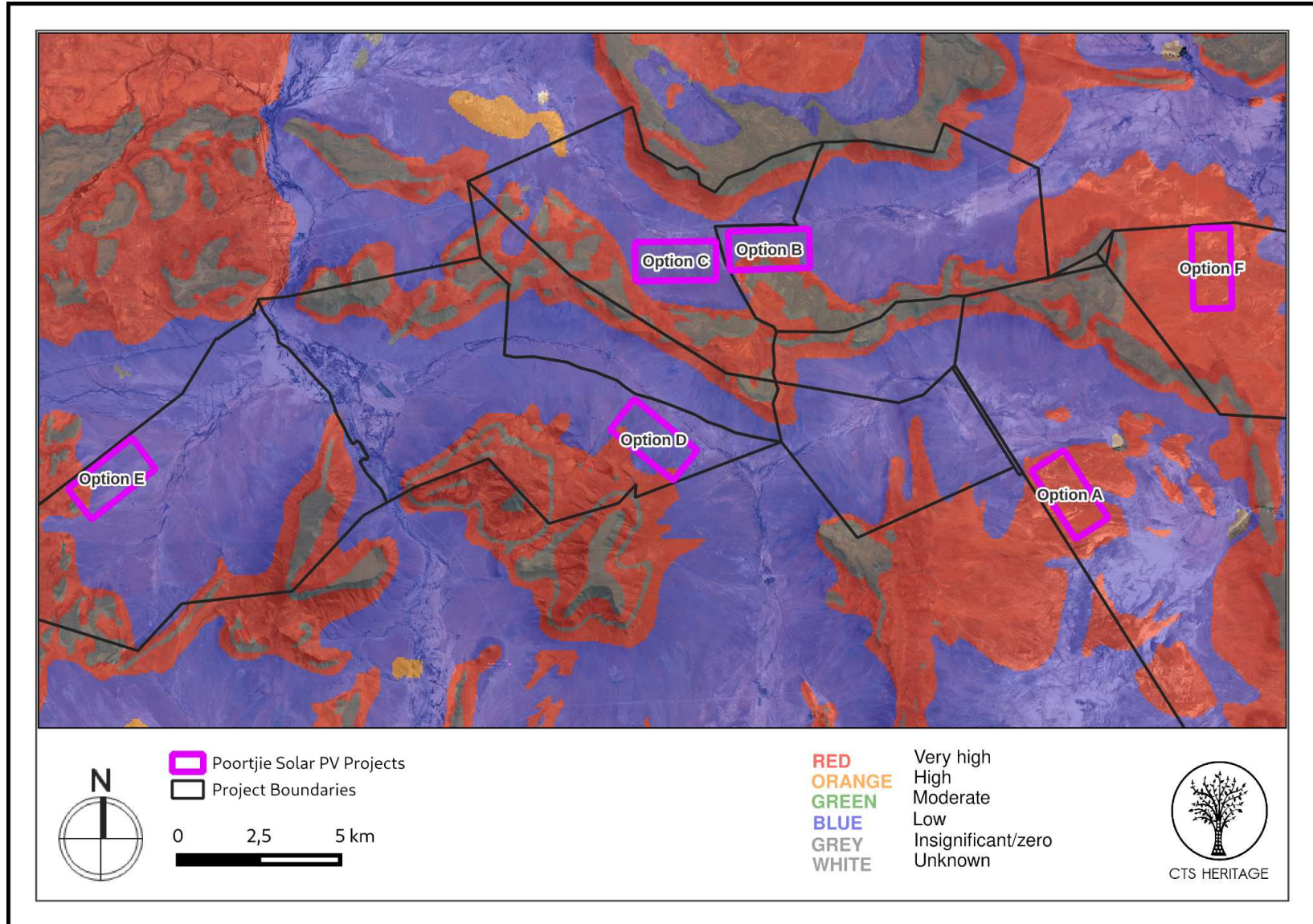
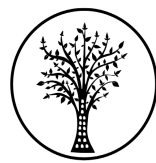


Figure 3.1: Palaeontological sensitivity of the proposed development area

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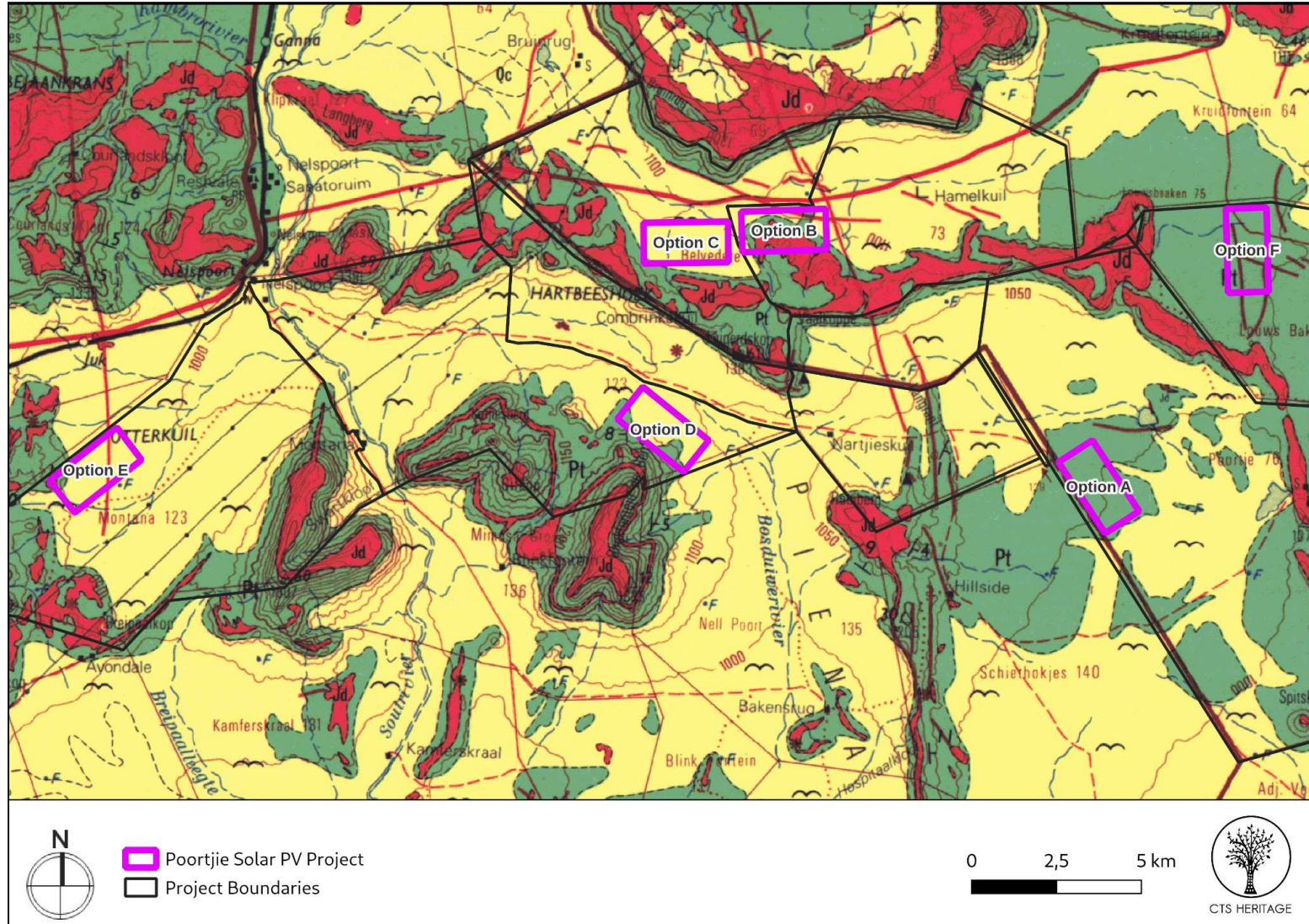


Figure 3.2: Geology Map. Extract from the CGS 3122 Victoria West Map indicating that the development area for the WEF development is underlain by sediments of Ptp: Poortjie Member and Pth: Hoedemaker Member of the Teekloof Formation of the Adelaide Subgroup and Jd: Jurassic Dolerite as well as Quaternary Sands

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Visual Impact Assessment (NuLeaf, 2022)

Sense of place refers to a unique experience of an environment by a user based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.) play a significant role.

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

In general, the landscape character of the greater study area and site itself presents as undeveloped and largely natural in character. The visual quality of the region is generally high by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area, but the landscape is not unique. As such, the entire study area is considered sensitive to visual impacts due to its generally low levels of transformation.

The anticipated visual impact on the visual character and sense of place of the study area is expected to be of **moderate** significance. The low occurrence of visual receptors and the remote location of the study area relative to tourism areas reduces the probability of this impact occurring.

Cultural Landscape and the Built Environment (Winter and Wilson, 2022, Appendix 3)

The site possesses a number of cultural landscape qualities and elements which are outlined below.

- The location of the site on the south Central Plateau of the Great Karoo, separated from the Karoo vlakte by the Great Escarpment, characterised by a combination of flat open plains punctuated by mountains and koppies. Parallel valley-ridge systems.
- The folded quality of the landscape - open plains interrupted by ridges and koppies - a function of its geology, semi-arid conditions and low vegetation cover; a relatively ephemeral pattern of human intervention on the landscape resulting in a sense of remoteness and stillness, known also for its night sky.
- Generally a widespread archaeological signature dating to the Earlier and Middle Stone Ages described as a low frequency ancient scatter across the landscape, as well as an archaeological signature dating to the Later Stone Age. In this case, dense archaeology around the dolerite koppies.
- Historical associations with colonial expansion of the northern frontier zone in the late 18th early 19th century resulting in the further displacement of transhumant pastoralism by settled agriculture and the emergence of extensive sheep farming in the early to mid-19th century; the farms Kruidfontein (pre-1890), Poortjie and Louws Baken (pre-1829), being first surveyed during this period.

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- A distinctive pattern of settlement informed by access to limited water resources with small, isolated farmsteads forming green oases in the semi-arid landscape, sheltered from the heat by exotic trees and associated with springs, streams, dams and windpumps. The manner in which homesteads are positioned at the base of hills and koppies forming distinctive topographical settings. The dry-packed stone walls historically used for kraals, are a characteristic feature of the landscape.
- The N1 corridor following the alignment of the late 18th century route to the interior and its role as a structuring element in the landscape along which dispersed settlement has occurred like “beads on a string”.
- Nelspoort, significant for its wealth of tangible remains demonstrating a continuous history of occupation from pre-history, through to its mid-19th century role in the local wool farming boom, and development as a 20th century medical sanctuary.
- Poortjie Wes, significant as an identified place on an early linkage route between Beaufort West and Graaf Reinet.

The following elements of cultural significance fall within the cadastral boundaries affected by the proposed Poortjie Wes RE development, and their spatial relationship with the proposed development is significant:

- Places (towns and settlements) including Nelspoort (Graded IIIB) and its railway station (Grade IIIC) and Poortjie Wes Settlement (Grade IIIA)
- Farmsteads including Montana (Grade IIIB), Poortjie Wes (Grade IIIA), Louws Baken (Grade IIIB) and Kruidfontein (Grade IIIB)
- Rivers, dams and water furrows including Salt River, Bufflesrivier and Poortjie Dam
- Mountain ridges and peaks which contribute to the cultural landscape including Nelspoort Koppie, Waayfontein ridge running north of and parallel to Nelspoort-Murraysburg valley, Montana ridge and Three koppies (Saalberg, Katjiesberg, Gifkop)
- Movement routes and views experienced from the routes including the Nelspoort road extension from the N1 and the Nelspoort Murraysburg linkage route
- 20th century communications and electrical infrastructure

Archaeology (Appendix 1)

A number of observations were made during the field assessment and the bulk of these were open site scatters of Middle Stone Age cores, flakes and debitage. Local siltstones and hornfels rock cores had been used in the production of the flakes with very little introduction of exotic stone sourced in other regions. While only a handful of flakes were found dispersed across a very wide area, they form a constant backdrop to the landscape rather

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than being concentrated particularly in any one area. The MSA materials tended to be heavily patinated and weathered by water and mud runoff after storms with a high clay content. Typologically diagnostic artefacts included some radial cores and a fairly common spread of retouched blades and blade blanks. Earlier MSA material was also found such as bifacial points and larger flakes but we would deduce that most of this layer of occupation is buried on the floodplains.

Most of the scatters recorded were graded as not conservation-worthy due to the ubiquity of these artefacts across the landscape and the lack of a particular focal point of landscape use. The development of solar PV facilities in these areas will have a very small impact on the archaeological record in the area as long as the sensitive areas containing engravings and their associated artefact assemblages are avoided.

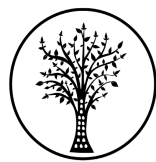
Palaeontology (Appendix 2)

The solar project areas are underlain by potentially fossiliferous sedimentary rocks of the Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) of Late Permian age. While a sparse scatter of previously recorded vertebrate fossil sites are known in the wider region, it is not known if any of these fall within the solar project sites currently under consideration. Based on the recent 3-day palaeontological site visit, the great majority of the solar project areas is mantled by thick superficial deposits (alluvium, colluvium / eluvium, calcrete, soils) of low palaeosensitivity. Apart from occasional invertebrate trace fossils of limited scientific interest, the small number of tetrapod fossils recorded from Lower Beaufort Group bedrocks here comprise reworked, fragmentary bones preserved within channel basal breccias or weathered-out into surface gravels. No well-preserved, articulated postcrania or identifiable skull material of high scientific or conservation significance was recorded, although there is still potential for such material occurring at or beneath the surface within the sites. It is concluded that all six solar site options are in practice of Low Palaeosensitivity overall. The preliminary Low to Very High palaeosensitivity sensitivity mapped here by the DFFE Screening Tool is therefore *contested*.

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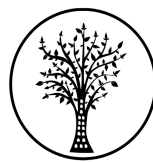


4.2 Heritage Resources identified

The landscape of the development area has been assessed for cultural heritage significance, with six distinct character areas identified. Each character area lends itself to a different carrying capacity in terms of landscape altering infrastructure development. The table below assesses each character area in terms of nature and degree of heritage significance, character forming elements and capacity to accommodate change and absorb renewable energy infrastructure.

Table 1: Cultural Landscape Character Areas

Name	Heritage Significance	Character Statement	Heritage Indicators
Nelspoort Murraysberg valley	<p>Of some historical value in terms of the historical linkage route linking Nelspoort and Murraysberg and associated pattern of settlement.</p> <p>No conservation-worthy built environment elements.</p> <p>Of aesthetic value in terms of scenic landscape qualities.</p> <p>A relatively intact valley landscape representative of the broader Karoo region.</p> <p>Possessing a sense of enclosure with a mountain backdrop immediately to the north and a hill running the length of the valley with views to distant mountains to the south.</p>	<p>Representative of the broader Karoo landscape with semi-arid conditions, low vegetation cover, dispersed settlement pattern and limited built Footprint.</p> <p>Relatively intact landscape with minimal visual intrusion besides power line infrastructure traversing the area to the West.</p> <p>A linear enclosed valley condition with a parallel system comprising a valley floor contained by topography and traversed by a linkage route between Nelspoort and Murraysberg</p>	<p>No major cultural landscape receptors from a built environment perspective.</p> <p>Low to medium sensitivity in terms of the placement of renewable energy Infrastructure.</p> <p>The principle of locating PV infrastructure is this environment is acceptable especially if occurring on the flatlands and lower slopes to the south.</p>
Buffelsrivier Plains	<p>Of historical value in terms of the historical route network and the associated pattern of farmsteads.</p> <p>The farmsteads of Kruidfontein (IIIB), Louwsbaken (IIIB) and Poortjie Wes (IIIA) worthy of formal heritage protection in terms of their historical and architectural value and relationship with their setting.</p> <p>Poortjie Wes, significant as an identified place on an early linkage route between Beaufort West and Graaf Reinet.</p> <p>Of aesthetic value in terms of vast open landscape qualities, and relatively intact nature of the landscape representative of the broader Karoo region.</p> <p>Contrasting farmstead settings ranging</p>	<p>Representative of the broader Karoo landscape with semi-arid conditions, low vegetation cover, dispersed settlement pattern and limited built footprint.</p> <p>The inherent logic in the pattern of farmsteads located in relation to water, topography and movement routes.</p> <p>Relatively intact landscape with minimal visual intrusion.</p> <p>Vast open plains framed by the northern escarpment.</p> <p>The linear hill defining the area to the south with a distinctive poort traversed by a watercourse and linkage route</p>	<p>Primary heritage receptors from a built environment perspective including the farmsteads of Kruidfontein, Louws Baken and Poortjie Wes and their landscape settings.</p> <p>Of medium to high sensitivity in terms of the placement of renewable energy infrastructure.</p> <p>The principle of locating PV infrastructure is this environment is acceptable especially if occurring on the on the flatlands and lower slopes, and avoiding the immediate landscape settings of the three conservation worthy farmsteads.</p>



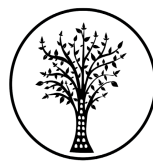
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	<p>from the vast open arid landscape setting of Louws Baken to the strategic location of Poortjie Wes at the base of a narrow poort between two hills and a threshold between two landscape conditions, and comprising a green treed riverine setting.</p>	<p>with the Poortjie Wes farmstead at the base of the poort.</p>	
<p>Juriefontein plains</p>	<p>Of historical value in terms of the historical linkage route through Poortjie Wes and associated pattern of farmsteads.</p> <p>Of aesthetic value in terms of the vast open quality landscape framed by hills and distant mountains and possessing a sense of remoteness and stillness.</p> <p>The scenic qualities of Poortjie dam located at the southern end of the poort providing a watering place in contrast to semi-arid surroundings and attracting an abundance of birdlife.</p>	<p>Representative of the broader Karoo landscape with semi-arid conditions, low vegetation cover, dispersed settlement pattern and limited built footprint.</p> <p>Relatively intact landscape with minimal visual intrusion.</p> <p>Vast open plains framed by hills and distant mountains.</p> <p>The linear hill defining the area to the north with a distinctive poort traversed by a watercourse and linkage route with the Poortjie dam at the entrance to the poort.</p>	<p>Primary heritage receptor from a landscape perspective is the distinctive poort and its associated dam, linkage route and topographical condition.</p> <p>Of medium to high sensitivity in terms of the placement of renewable energy infrastructure.</p> <p>The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.</p>
<p>Nelspoort valley</p>	<p>Of high local historical, aesthetic, social and scientific value (Grade IIIA).</p> <p>Of historical value in terms of being a confluence of early routes during the late 18th and early 19th century.</p> <p>The historical layering of the settlement; the junction of two pre-1830 farms, the centre of Marino wool farming operations established by JC Molteno in 1841, railway station dating to 1884 and the tuberculosis sanatorium dating to 1926, and current health care facility.</p> <p>The architectural value of the sanatorium buildings being the work of PWD architect Cleland and possessing distinctive design features.</p> <p>The distinctive valley setting possessing a sense of enclosure with access through a narrow poort and the linear quality of the setting based on combination of topography, movement routes and riverine corridor.</p> <p>The distinctive dolerite outcrops in the area with a number of rock engravings and rock gong complexes spanning a long period and layering of use (San, Khoe and settler engravings) and having archaeological scientific heritage value</p>	<p>Discrete valley setting and sense of topographical containment with a narrow poort through which an early route north, railway line and Salt River passes and along which settlement has occurred.</p> <p>The junction with the Murraysburg linkage route.</p> <p>Power line infrastructure traversing the landscape to the east of the Valley.</p>	<p>The valley is a highly sensitive heritage receptor.</p> <p>Limited capacity to accommodate RE infrastructure.</p> <p>The valley is located outside of the proposed development area.</p>

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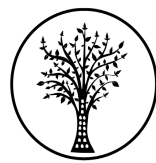
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	as well as local educational value.		
Montana valley	<p>Of some historical value in terms of the route and associated pattern of farmsteads.</p> <p>Of aesthetic value in terms of the scenic qualities of the Beaufort West linkage route as it passes through a poort between the Montana escarpment and koppies</p> <p>The Montana farmstead of suggested Grade III B heritage value in terms of its historical and architectural value and relationship with its setting.</p> <p>The strategic location of Montana at the confluence of the Salt River and its tributary and at the base of a poort in the Montana mountains through which the Beaufort West linkage route and Salt River passes</p> <p>A relatively intact valley landscape representative of the broader karoo region.</p> <p>Possessing a sense of enclosure with a mountain backdrop immediately to the south and a hill running the length of the valley to the north</p>	<p>Representative of the broader Karoo landscape with semi-arid conditions, low vegetation cover, dispersed settlement pattern and limited built footprint.</p> <p>Relatively intact landscape besides the power lines traversing the landscape to the west.</p> <p>The linear valley defined by the Vaalkoppe to the north and the Montana mountains to the south and traversed by a tributary of the Salt River.</p>	<p>Primary heritage receptors from a landscape perspective is the Montana farmstead and its immediate landscape setting.</p> <p>Of medium to high sensitivity in terms of the placement of renewable energy infrastructure.</p> <p>The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting.</p>
Western infrastructure corridor	<p>A landscape of minimal heritage value with the strong presence of an infrastructural corridor based on a combination of power lines and railway line.</p> <p>No conservation-worthy built elements.</p>	<p>Representative of the broader Karoo landscape with semi-arid conditions, low vegetation cover, dispersed settlement pattern and limited built footprint.</p> <p>Strong presence of power line infrastructure traversing the landscape.</p> <p>An open flat landscape framed by Montana mountain slopes to the east.</p>	<p>This area is suitable for the location of RE infrastructure, particularly in terms of the location of PV infrastructure.</p>

While the site has been found to have the capacity to accommodate development of this nature, the broader landscape is regarded as having a high degree of sensitivity. The landscape comprises heritage receptors of varying degrees of sensitivity to this type of development.



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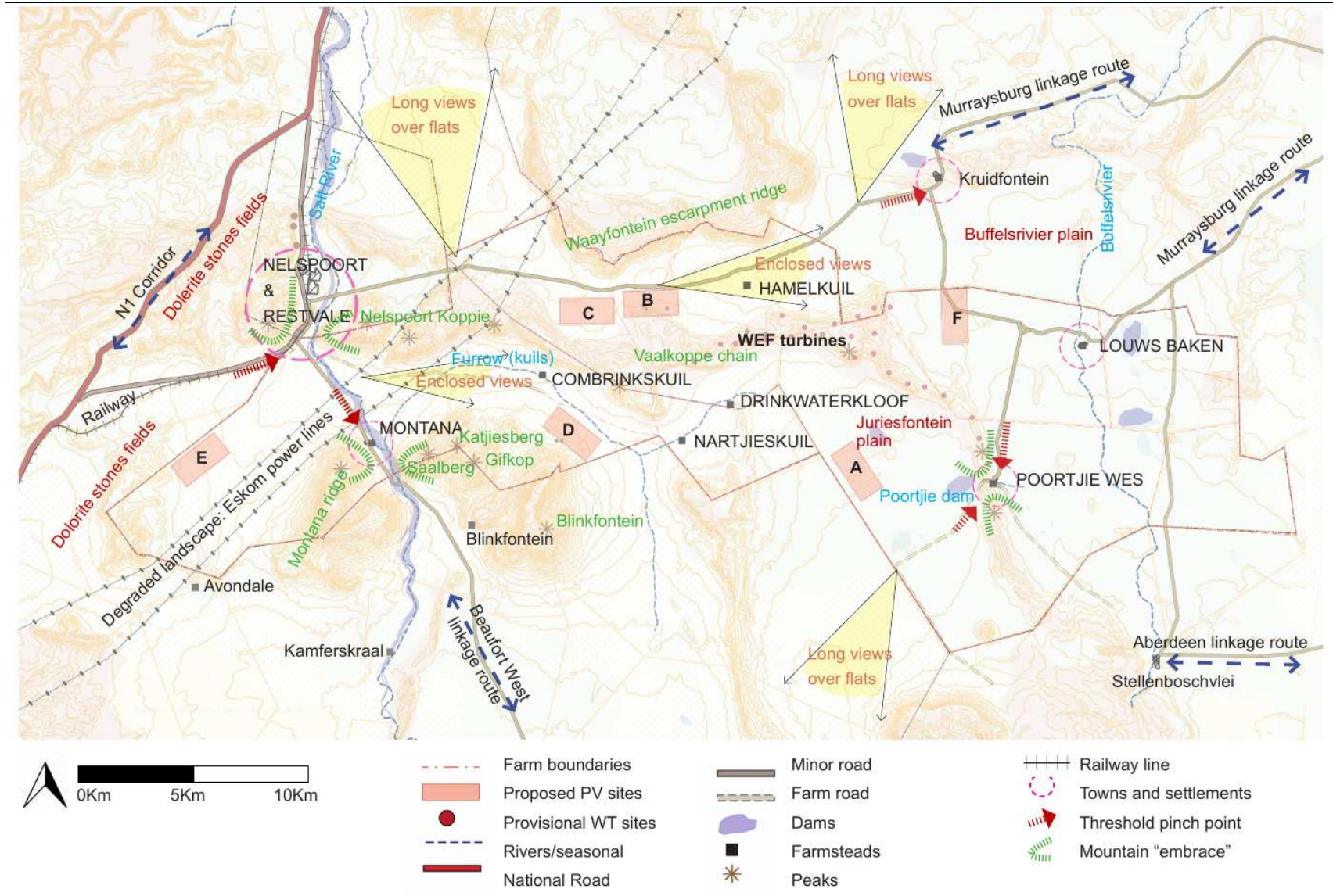
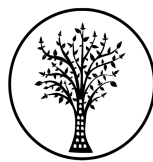


Figure 4. Cultural Landscape Elements Map from Winter et al. 2022 (Appendix 3)

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In terms of the heritage resources identified in the archaeological field assessment, see Table 2 below.

Table 2: Artefacts identified during the field assessment development area

POINT ID	Project Area	Period	Description	Co-ordinates		Grading	Mitigation
037	Option A	MSA	Hornfels point	-32.16507	23.25517	NCW	NA
038	Option A	MSA	Siltstone flakes and cores	-32.16503	23.25729	NCW	NA
039	Option A	MSA	Hornfels and siltstone flakes, cores on dry pan	-32.16513	23.26442	NCW	NA
040	Option A	MSA	Chert blade, flake, patinated, hornfels flake	-32.16311	23.26794	NCW	NA
041	Option A	MSA	Fine grained hornfels point	-32.16308	23.26941	NCW	NA
042	Option A	MSA	Hornfels flakes	-32.16531	23.26777	NCW	NA
043	Option A	MSA	Patinated hornfels flake	-32.16761	23.26293	NCW	NA
044	Option A	MSA	Early Msa siltstone flake retouched	-32.16852	23.26599	NCW	NA
045	Option A	MSA	Fine grained siltstone flake	-32.17145	23.26942	NCW	NA
046	Option A	MSA	Hornfels flake with secondary flake scars	-32.17414	23.26822	NCW	NA
047	Option A	MSA	Early Msa siltstone flake	-32.17458	23.27104	NCW	NA
048	Option A	MSA	Patinated hornfels flake	-32.17512	23.2752	NCW	NA
049	Option A	MSA	Hornfels flakes, curved bladelet	-32.17511	23.27654	NCW	NA
050	Option A	MSA	Patinated hornfels flake	-32.17609	23.27501	NCW	NA

In terms of the heritage resources identified in the palaeontological field assessment, see Table 3 below.

Table 3: Palaeontological observations made during the field assessment for the development area

POINT ID	Project Area	Description	Co-ordinates		Grading	Mitigation
355	Option F	Louws Baken 77. Hoedemaker Member, Teekloof Formation. Small blocks of rolled bone among sheet wash surface gravels. Proposed Field Rating IIIC Local Resource. No recommended mitigation.	32° 05' 56.4" S	23° 19' 15.7" E	IIIC	NA
369	Option F	Louws Baken 77. Hoedemaker Member, Teekloof Formation. Two substantial blocks of tetrapod bone (medium to large tetrapod, unidentifiable) within float overlying stream side exposure of overbank siltstones. Proposed Field Rating IIIC Local Resource. No recommended mitigation.	32° 06' 49.4" S	23° 19' 18.6" E	IIIC	NA
370	Option F	Louws Baken 77. Hoedemaker Member, Teekloof Formation. Two small, well-rounded blocks of rolled tetrapod bone (medium to large tetrapod, unidentifiable) within float overlying stream side exposure of Beaufort Group overbank siltstones. Proposed Field Rating IIIC Local Resource. No recommended mitigation.	32° 06' 44.2" S	23° 19' 22.3" E	IIIC	NA
375	Option F	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Scatter of weathered-out, poorly-preserved postcranial (and possible cranial) remains of a large tetrapod within surface float. Proposed Field Rating IIIB	32° 06' 28.7" S	23° 18' 33.7" E	IIIB	No impact permitted - 50m no development



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		Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.				buffer
380	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated postcranial bone of a large tetrapod within surface float (possibly from same individual as at Loc. 381). Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 09' 43.2" S	23° 15' 57.4" E	IIIB	Collection prior to construction
381	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Extensive scatter of numerous weathered-out postcranial (and possible cranial) remains of one or more large tetrapod within surface float. Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 09' 40.9" S	23° 15' 59.1" E	IIIB	Collection prior to construction
385	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated fragment of limb bone of a large tetrapod within sheetwash gravels. Proposed Field Rating IIIB Local Resource. Material to be sampled by professional palaeontologist in the pre-construction phase.	32° 10' 01.2" S	23° 15' 53.2" E	IIIB	Collection prior to construction
388	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Isolated small chunk of pinkish rolled bone within surface gravels. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	32° 10' 11.7" S	23° 16' 29.8" E	IIIC	NA
390	Option A	Farm Poortjie 76. Hoedemaker Member, Teekloof Formation. Numerous pebble- to cobble-sized fragments of pinkish to lilac hued rolled tetrapod bone (largely unidentifiable) among concentrations of weathered-out ferruginous carbonate concretions. Proposed Field Rating IIIC Local Resource. No mitigation recommended.	32° 09' 49.7" S	23° 16' 02.5" E	IIIC	NA

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4.3 Mapping and spatialisation of heritage resources

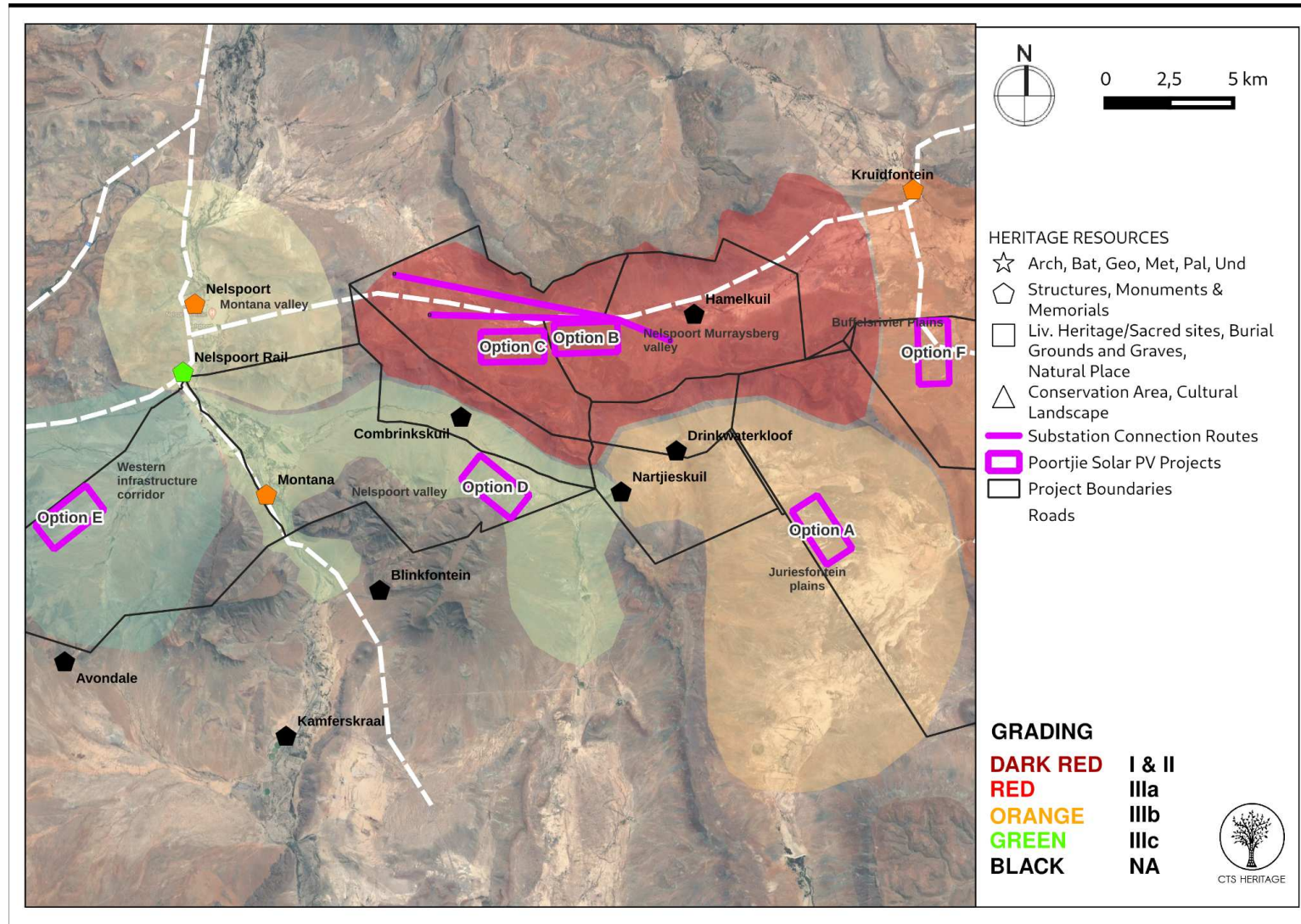
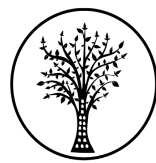


Figure 5.1: Map of Landscape Character Areas and farmsteads and settlements within proximity to the proposed development area

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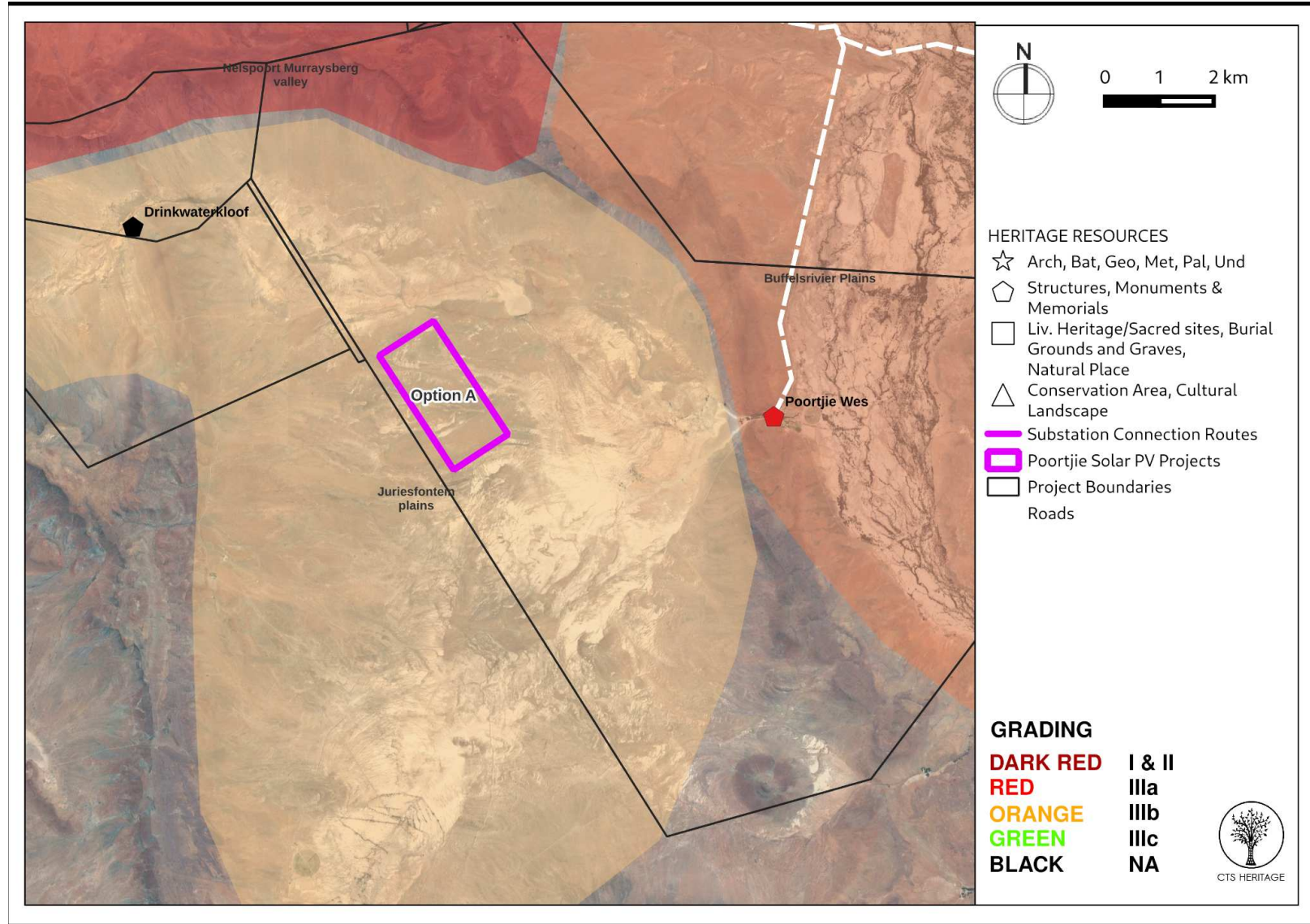
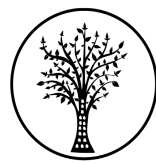


Figure 5.2: Map of Landscape Character Areas and farmsteads and settlements within proximity to Option A

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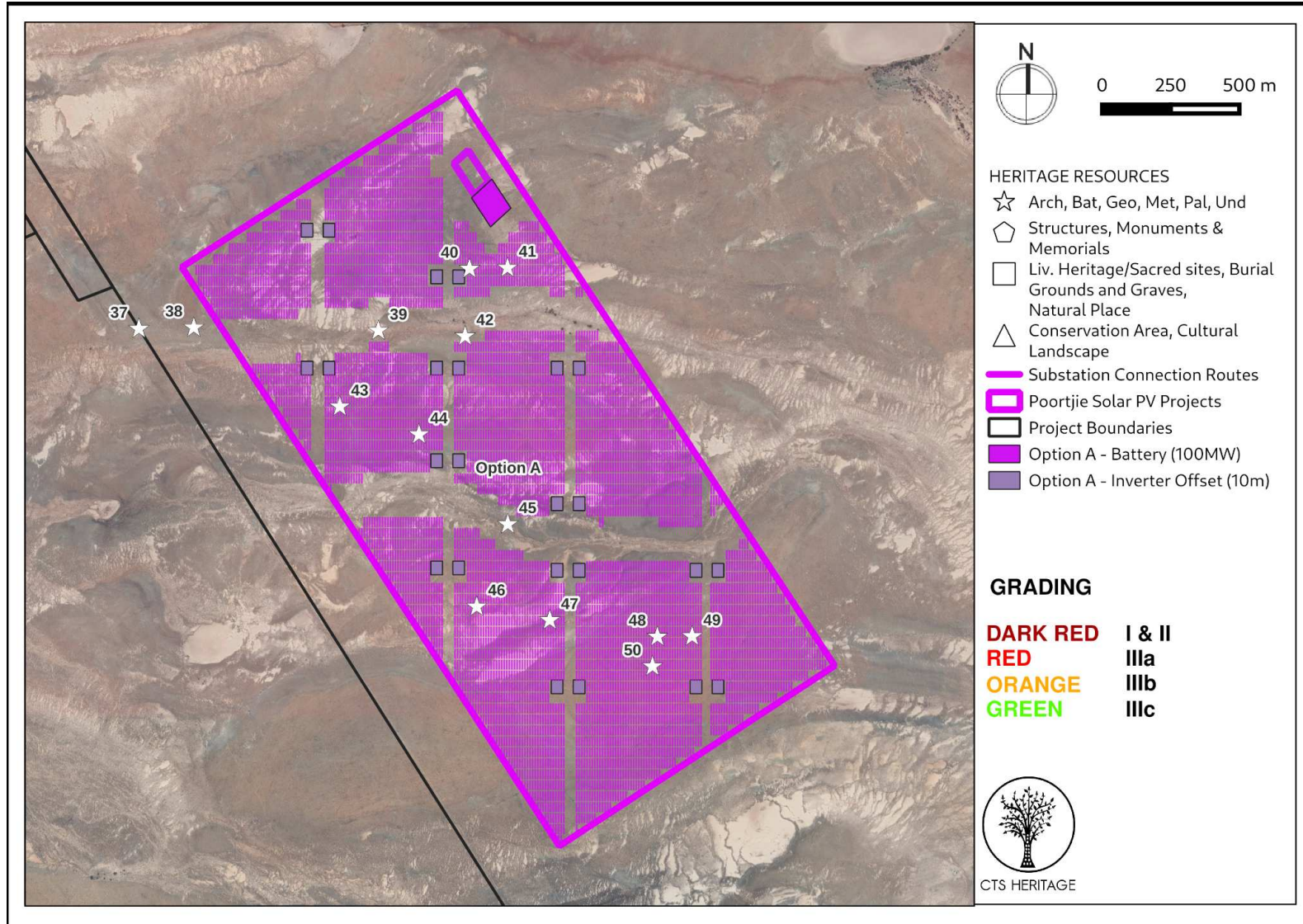
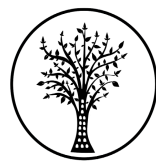


Figure 5.3: Map of archaeological heritage resources within the proposed development area

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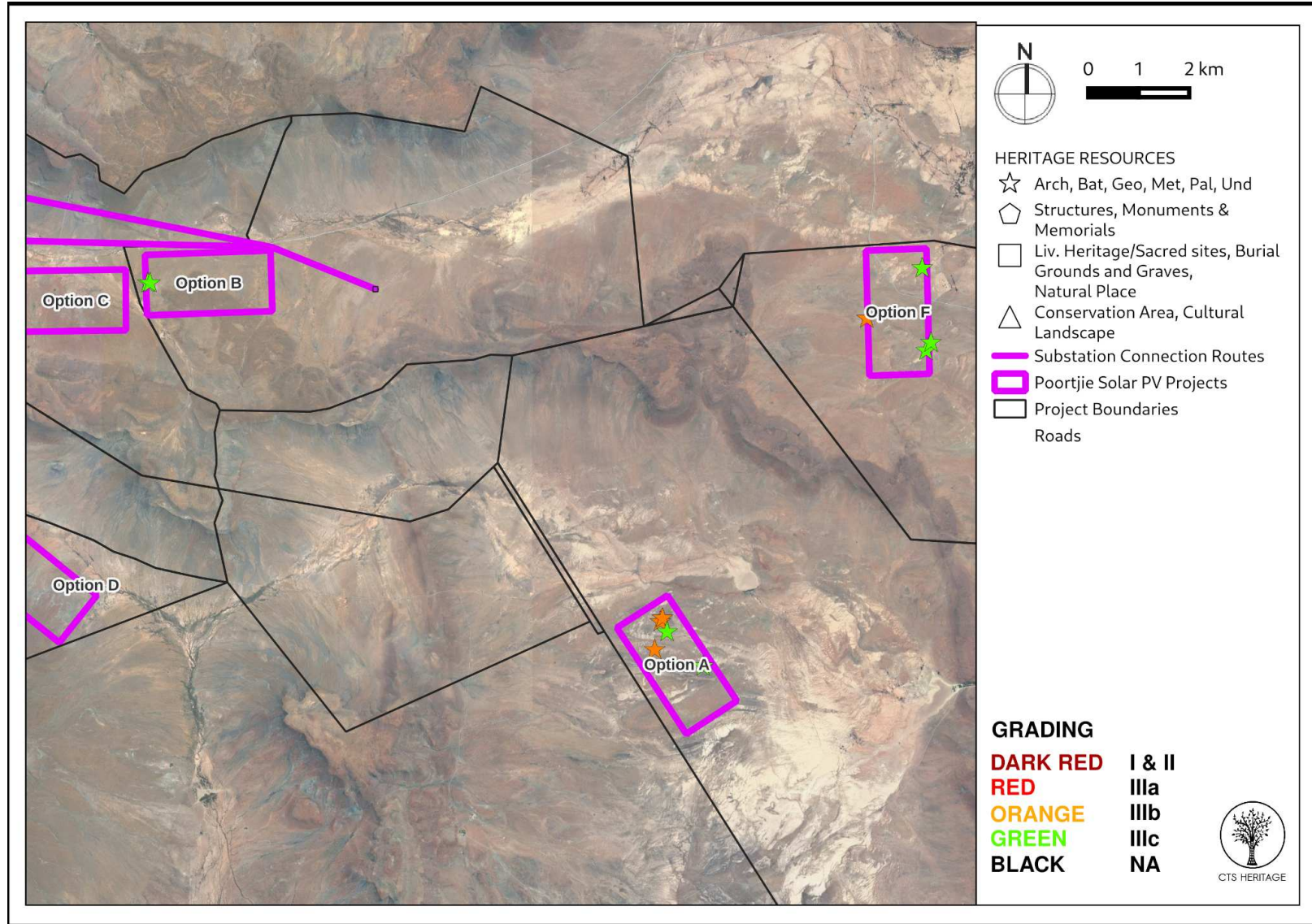


Figure 5.4: Map of palaeontological heritage resources within the proposed development area

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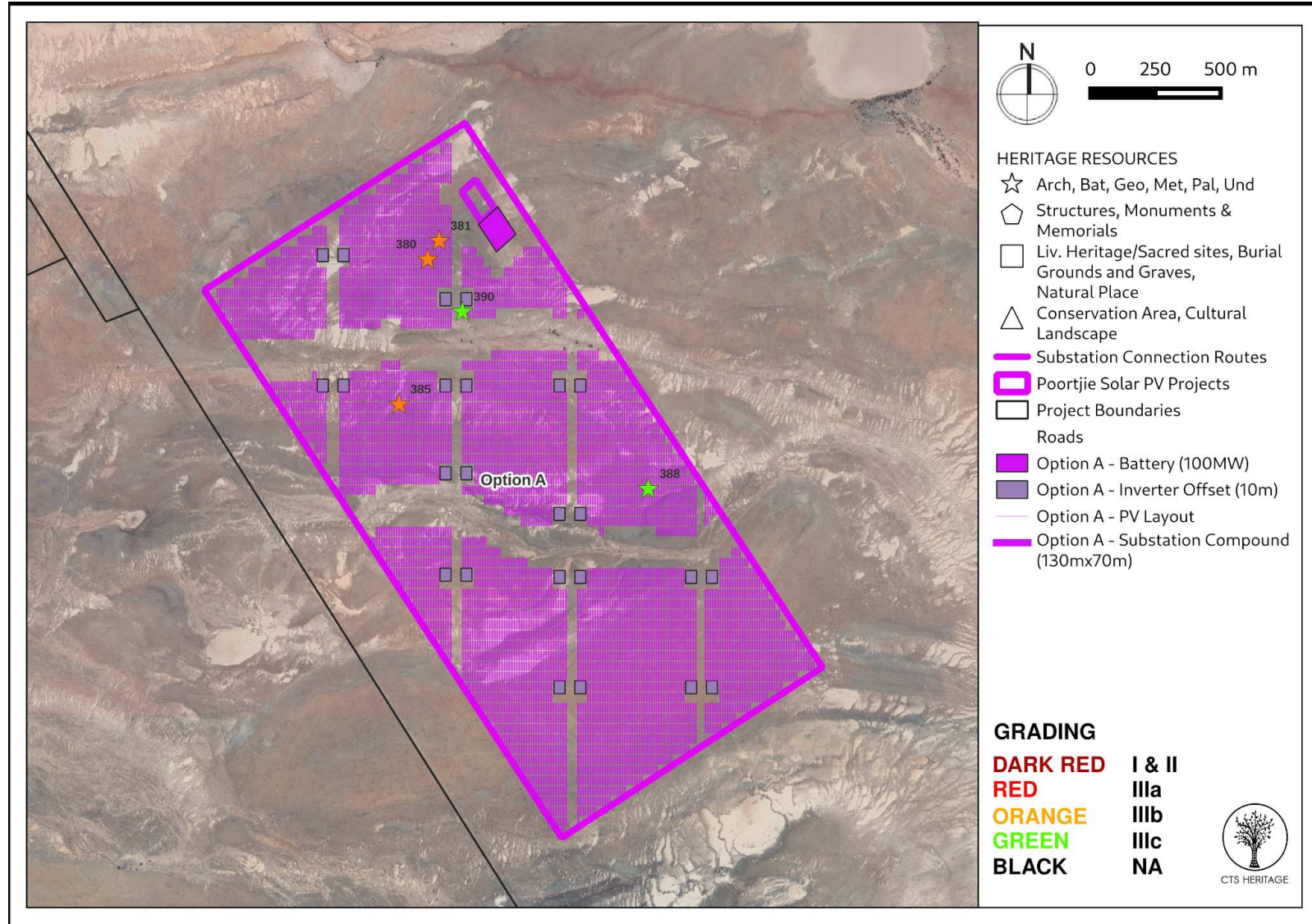
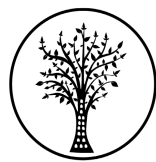


Figure 5.5: Map of palaeontological heritage resources within the proposed development area for Option A

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape

Brakpan 1 Solar Energy Facility (Option A) falls within the Juriesfontein Plains Landscape Character Area. For this Landscape Character Area, the following heritage indicators apply:

- Poortjie Wes settlement: 1Km radius buffer
- Kruidfontein, Louws Baken: 500m radius buffer
- Buffelsrivier: 250m buffer either side
- Poortjie dam: 250m radius buffer
- Poortjie koppies: 250m buffer

The proposed PV facility is aligned with the heritage indicators as it is located in the flat and lower slopes and avoids sensitive heritage receptors. No significant impact to the cultural landscape is anticipated from this proposed development.

Table 4: Impact table for Cultural Landscape Heritage Resources for the proposed Brakpan 1 PV Facilities

NATURE: The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Before Mitigation		After Mitigation
MAGNITUDE	L (4)	While the cultural value of the pristine Karoo Landscape is very high, the location of the proposed PV infrastructure means that only a slight impact to the cultural landscape will result from the proposed development.	L (4)	While the cultural value of the pristine Karoo Landscape is very high, the location of the proposed PV infrastructure means that only a slight impact to the cultural landscape will result from the proposed development.
DURATION	H (4)	Where manifest, the impact will be long term - for the duration of the PV infrastructure lifetime	H (4)	Where manifest, the impact will be long term - for the duration of the PV infrastructure lifetime
EXTENT	H (5)	Regional	H (5)	Regional
PROBABILITY	L (2)	It is unlikely that any significant cultural landscape resources will be impacted	L (2)	It is unlikely that any significant cultural landscape resources will be impacted
SIGNIFICANCE	L	(5+4+4)x2=26	L	(5+4+4)x2=26
STATUS		Neutral		Neutral
REVERSIBILITY	L	Any impacts to heritage resources that do occur are reversible once the PV infrastructure is removed	L	Any impacts to heritage resources that do occur are reversible once the PV infrastructure is removed
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	L	Unlikely
CAN IMPACTS BE MITIGATED		NA		



MITIGATION: NA

RESIDUAL RISK: NA

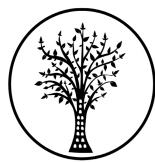
5.1.2 Archaeology

The impact on identified heritage resources will not be substantial and will have an overall negligible change on the archaeological sensitivity of the Nelspoort area. The majority of the lithic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during construction, the impact is inconsequential. No mitigation is required for archaeological material recorded in the footprint areas of the proposed developments in Option A.

Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. Despite the very high numbers of observations made, the archaeological material is ubiquitous across the entire area and in general, the results of this assessment indicate that the archaeological sensitivity of the development area is low in Option A.

Table 5: Impact table for Archaeological Heritage Resources

NATURE: The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		Before Mitigation		After Mitigation
MAGNITUDE	L (2)	No significant archaeological resources were identified within the development area	L (2)	No significant archaeological resources were identified within the development area
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Localised within the site boundary	L (1)	Localised within the site boundary
PROBABILITY	L (1)	It is extremely unlikely that any significant archaeological resources will be impacted	L (1)	It is extremely unlikely that any significant archaeological resources will be impacted
SIGNIFICANCE	L	(2+5+1)x1=8	L	(2+5+1)x1=8
STATUS		Neutral		Neutral
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	L	Unlikely
CAN IMPACTS BE MITIGATED		NA		
MITIGATION: Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and SAHRA must be contacted regarding an appropriate way forward.				
RESIDUAL RISK: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due				



to the loss of potentially scientific cultural resources

5.1.3 Palaeontology

Solar Site Option A on Farm Poortje 76 (1: 50 000 map 3222AB Kareebosch) is situated in low-lying, flattish terrain at around 990 to 1050m amsl. It lies between a N-S trending range of hills intruded by dolerite dykes in the west and a major dolerite ridge some 6 km to the east that runs near Poortje Wes Farmstead. Satellite images suggest that bedrocks here are folded along W-E axes. The area mainly comprises gravelly to sandy *vlaktes* traversed by a few shallow stream lines draining to the SE. Satellite images show several pale areas of fine-grained silty alluvium, sheetwash and pan sediments with a few darker grey areas suggesting Beaufort Group mudrock exposure. However, most of these latter areas are covered with grey-green mudrock gravels or dark brown, ferruginised sandstone rubble with very little solid bedrock exposure. Where bedrocks crop out at surface there are occasional low rocky ridges of brownish sandstone, sometimes flaggy. Most of the project area is mantled by alluvial sands and gravels, eluvial and sheetwash surface gravels of wacke, mudstone flakes, dolerite, sparse rolled bone and reworked palaeocalcrete concretions (some secondarily ferruginised). There are also sparse clasts of grey-green, greenish-brown, orange-patinated, cherty material with numerous bubble-like cavities which is probably of intrusive igneous origin. Rusty-brown, ferruginous carbonate pedocrete concretions which have weathered out from the underlying overbank mudrocks dominate eluvial surface gravels locally. Many areas of sandy alluvial soils feature dense to clumped grassy vegetation, limiting visibility.

Concentrations of weathered-out, disarticulated and fragmentary fossil remains of large-bodied tetrapods – possibly pareiasaur or large dicynodont such as *Endothiodon* – occur locally within surface float and sheetwash gravels; some of this material is potentially identifiable. There are also widely scattered chunks of pinkish to lilac, well-rounded, partially ferruginised bone material (“rolled bone”) which are probably unidentifiable. They occur especially in areas where high concentrations of ferruginous pedocrete concretions are weathering out at surface.

Three palaeontological observations of moderate local significance were identified within the footprint proposed for Option A (380, 381 and 385). These fossils must be collected by a palaeontologist prior to construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC. An additional two fossil observations of contextual significance were also identified within Option A (388 and 390) however no additional mitigation is required for these fossils.

Given the potential for the exposure or recognition of additional, scientifically valuable fossil occurrences within the project footprints, a Chance Fossil Finds Protocol, as outlined below and tabulated in Appendix 2, must be



included within the Environmental Management Programme (EMPr) and fully implemented throughout the construction phase of the solar projects.

Table 6: Impact table for Palaeontological Heritage Resources

NATURE: The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development			
		Before Mitigation	After Mitigation
MAGNITUDE	H (8)	Five significant palaeontological resources were identified within the development area, and the geology underlying the development area is very sensitive for impacts to significant fossils	H (8) Five significant palaeontological resources were identified within the development area, and the geology underlying the development area is very sensitive for impacts to significant fossils
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5) Where manifest, the impact will be permanent.
EXTENT	L (1)	Localised within the site boundary	L (1) Localised within the site boundary
PROBABILITY	H (5)	It is extremely likely that significant palaeontological resources will be negatively impacted	L (1) It is possible that any significant paleontological resources will be negatively impacted
SIGNIFICANCE	H	$(1+5+8) \times 5 = 70$	L $(1+5+8) \times 1 = 14$
STATUS		Neutral	Neutral
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	H	Likely	L Unlikely
CAN IMPACTS BE MITIGATED		Yes	
MITIGATION: Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist under an approved workplan application prior to construction The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities			
RESIDUAL RISK: Should any significant palaeontological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources			

5.1.4 Visual Impacts

Visual Impacts are assessed in the VIA (NuLeaf, 2022) and the relevant impact tables are included in the VIA report. In the Visual Impact Assessment undertaken for the proposed Brakpan 1 Solar energy Facility, it is acknowledged that the receiving environment will be visually transformed for the entire operational lifespan of the facility. The following is a summary of the impacts assessed:

- The potential visual impact of the facility on sensitive visual receptors within 1km (residents of homesteads/dwellings and users of the secondary roads), in close proximity to the proposed facility is likely to be **low**.



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- The possible visual impact of the facility on the residents' homesteads and users of secondary roads on the periphery of the 1km offset and within the region beyond is likely to be of **low** significance.
- The potential visual impact of the associated infrastructure on residents of homesteads/dwellings and users of the secondary road within close proximity of the proposed facility is likely to be of **low** significance and may be mitigated to **negligible** should the possible best practice mitigation measures be implemented.
- The potential visual impact of construction on sensitive visual receptors in close proximity to the facility is likely to be of **low** significance before mitigation and **negligible** post mitigation.
- The anticipated visual impact of operational lighting at night on sensitive visual receptors within the study area is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of the proposed development on the visual quality of the landscape and sense of place of the region is likely to be of **moderate** significance both before and after mitigation.

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5.2 Sustainable Social and Economic Benefit

The Applicant will compile a comprehensive Economic Development Plan and Socio-Economic Assessment Report as part of the REIPPP Procurement Programme submission, in which it will commit itself to the following:

- in addition to the Project Company's BEE shareholding, the local community within 50km of the Project site will hold at least 2.5% equity in the Project through a Local Community Trust, with the shareholding funded by either the Industrial Development Corporation ("IDC") or the Development Bank of Southern Africa ("DBSA"). The final equity percentage will be finalised in accordance with the REIPPP Procurement Programme rules at the time of bid submission;
- the Project Company will sponsor unique training programmes, with bursaries for local people to train them in renewable energy engineering and environmental monitoring;
- to an extent possible, the components to build the facility will be sourced from manufacturing facilities located in South Africa (also in accordance with the REIPPP Procurement Programme rules at the time of bid submission);
- the balance of plant work, civil and electrical will be performed by South African construction companies with extensive experience employing and transferring skills and know-how to previously disadvantaged people within the local community and in South Africa - skills allowing such people to be employed on similar projects in the future both within the province and elsewhere;
- every member of the workforce will have his or her employment related skills enhanced and qualified in relation to the renewable energy industry;
- the Project Company' economic development programmes will focus on the economic empowerment and skills development of women; and promotion of social programmes targeting pressing local needs including health and education. To an extent possible, these programmes will be aligned to the Municipality's Integrated Development Plans.

Based on the information available, the anticipated socio-economic benefits outweigh the potential impacts to heritage resources on condition that the recommendations articulated above are adhered to.

5.3 Proposed development alternatives

In terms of project alternatives, a pre-feasibility environmental sensitivity screening study was done before the EIA process to identify the preferred development areas for the solar facilities. The purpose of the screening was to identify preferred areas for development and allow further studies to inform the micro setting of infrastructure and components within these areas. The main alternatives considered for the projects are PV technology components, namely single axis tracking structures, Fixed axis tracking or Fixed tilted mounting structures. From a



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regional perspective, the area within which the project sites are located is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection to the national grid) and the availability of land on which the development can take place. Furthermore, other authorised solar facilities are located within the study area. Therefore, the location of the Poortjies WES Solar facilities and associated infrastructure has been identified by the applicant as a technically feasible site which has the potential for the development.

5.4 Cumulative Impacts

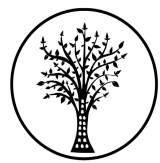
At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This project falls within a REDZ area, and it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

To address concerns about the cumulative impact of RE facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The placement of PV facilities must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development. For this particular project, the findings of the VIA are that “Overall, the post mitigation significance of the visual impacts is predominately **low to negligible**. No visual impacts with a high residual significance are anticipated.”

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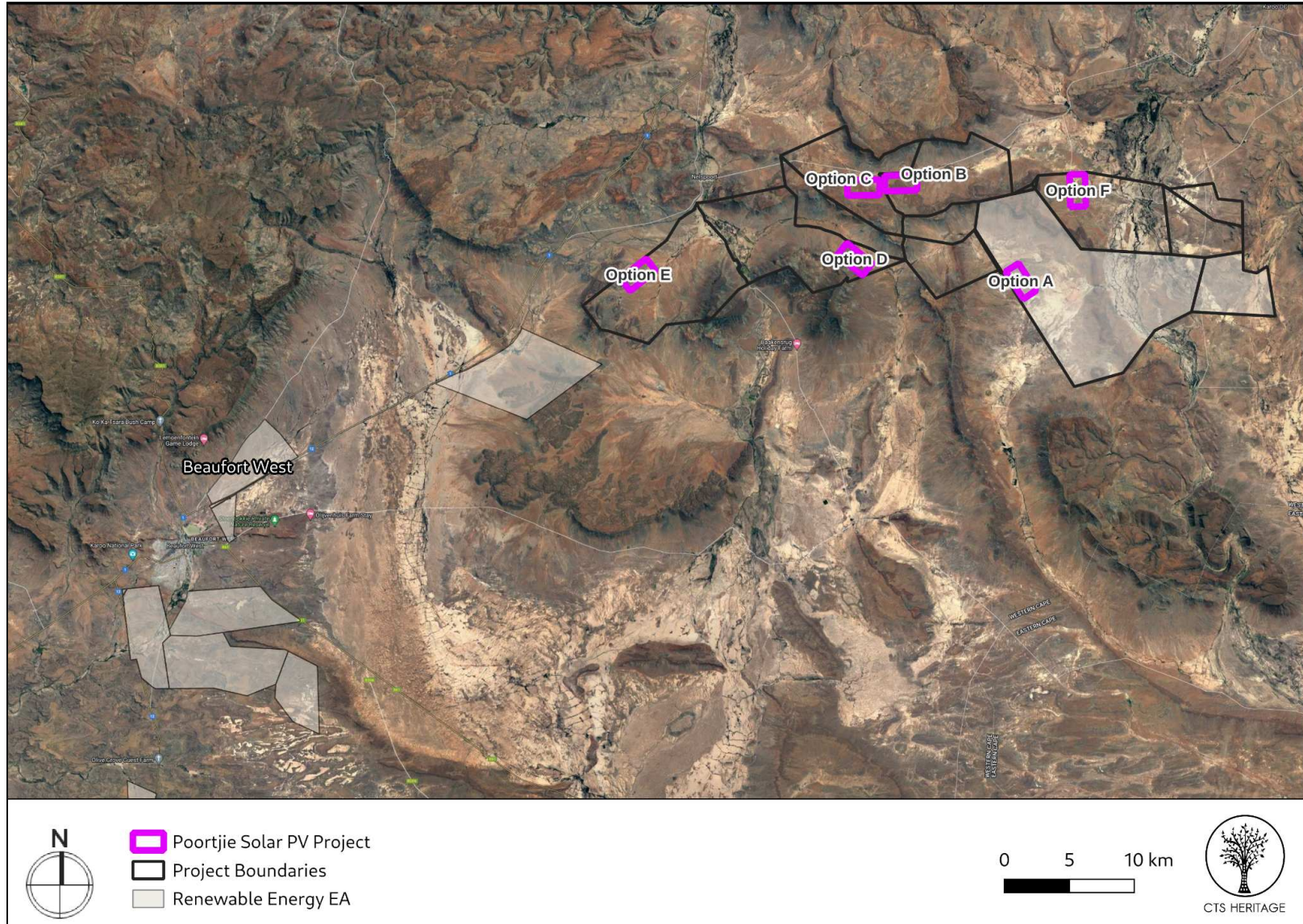
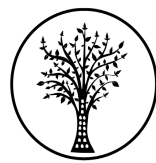


Figure 6.1: Approved REF projects within 50km of the proposed development area

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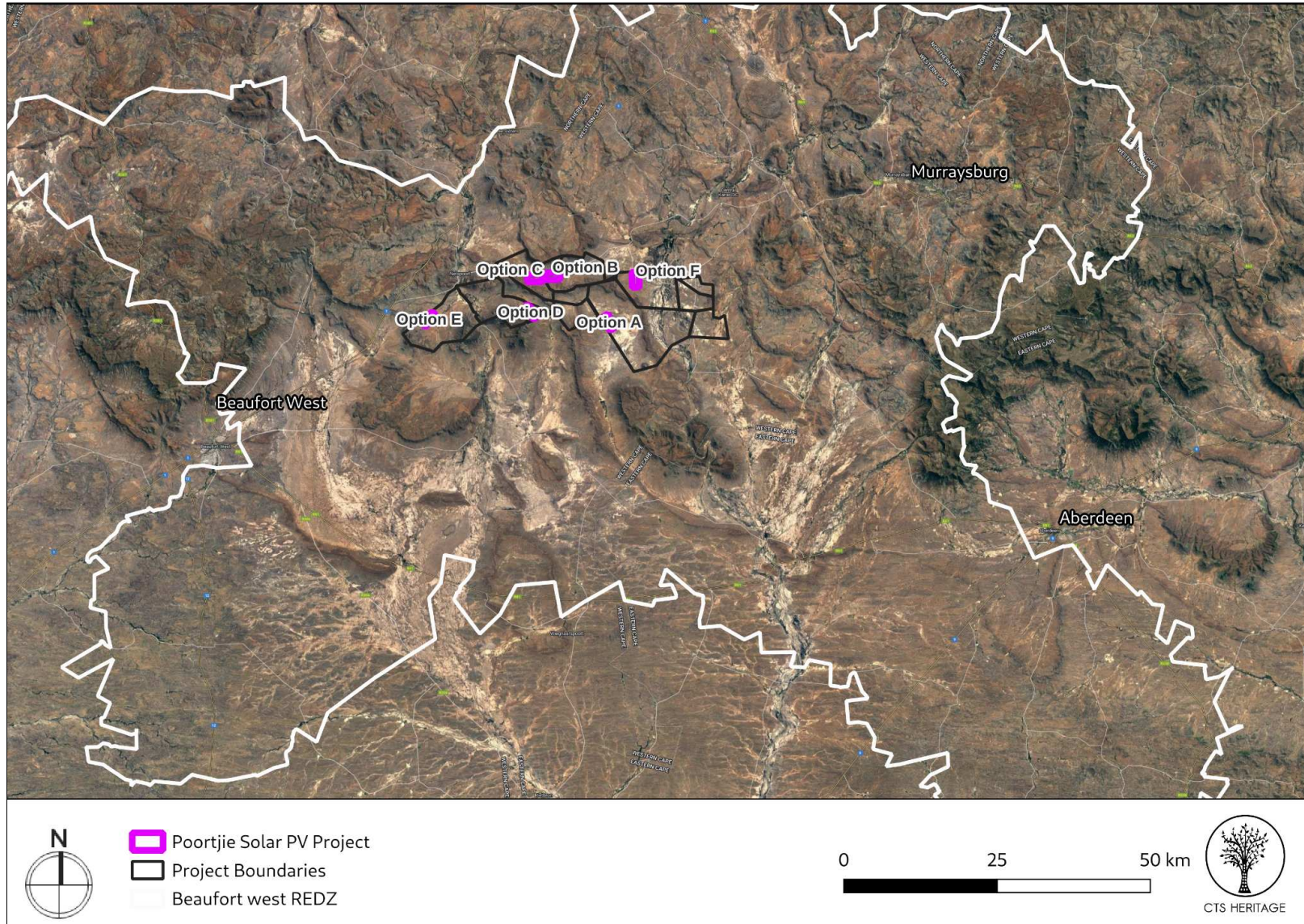


Figure 6.2: Location of proposed development area within the Beaufort West REDZ

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Table 7: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place				
		Overall impact of the proposed project considered in isolation		Cumulative impact of the project and other projects in the area
MAGNITUDE	L (4)	Low	L (4)	Low
DURATION	M (3)	Medium-term	H (4)	Long-term
EXTENT	L (1)	Low	L (1)	Low
PROBABILITY	L (2)	Improbable	H (3)	Probable
SIGNIFICANCE	L	$(4+3+1) \times 2 = 16$	L	$(4+4+1) \times 3 = 27$
STATUS		Neutral		Neutral
REVERSIBILITY	H	High	L	Low
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	L	Unlikely
CAN IMPACTS BE MITIGATED		NA		NA
CONFIDENCE IN FINDINGS: High				
MITIGATION: No impacts are anticipated and as such, no mitigation is required				

6. RESULTS OF PUBLIC CONSULTATION

There are no registered Conservation Bodies located in the area proposed for development according to the HWC Conservation Bodies Map (accessed 18/05/2022). The HIA's will be sent to the Local Authority for 30 days as per the HWC Consultation Regulations.

As this application is made in terms of NEMA, the public consultation on the HIA will take place with the broader public consultation process required for the Environmental Impact Assessment process and will be managed by the lead environmental consultants on the project. Evidence of consultation will be included in Appendix 5.

7. CONCLUSION

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. The site possesses a number of landscape elements contributing to a composite cultural landscape. Significant from a landscape perspective is the distinctive poort and its associated dam, linkage route and topographical condition. The area is of medium to high sensitivity in terms of the placement of renewable energy infrastructure. The principle of locating PV infrastructure in this environment is acceptable especially if occurring on the flatlands and lower slopes and avoiding the immediate landscape setting of the poort.



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No archaeological resources of significance were identified within the area proposed for development although the broader area has archaeological significance in terms of the sensitive dolerite outcrops in the area. No impacts to significant archaeological heritage are anticipated.

Five observations of palaeontological significance were noted within the area proposed for development. Three of these have higher levels of significance and are graded IIIB. These paleontological resources must be collected by a palaeontologist under an approved workplan prior to construction.

There are limited impacts anticipated to archaeological and palaeontological heritage from this proposed development and as such, the principle of a renewable energy facility in this location is supported from a heritage perspective provided that the infrastructure is located in areas able to tolerate the impact of the high degree of change from a cultural landscape perspective.

8. RECOMMENDATIONS

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar PV facility and its associated grid connection infrastructure will negatively impact on significant heritage resources on condition that the following recommendations are adhered to:

- The recommendations of the VIA must be implemented.
- Palaeontological observations 380, 381 and 385 must be collected by a palaeontologist prior to construction. This must be done under a workplan application in terms of section 38(8) to be submitted by a palaeontologist and approved by HWC
- The HWC Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and HWC must be alerted immediately to determine an appropriate way forward.

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9. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
6805	AIA Phase 1	Len van Schalkwyk, Elizabeth Wahl	01/09/2007	Heritage Impact Assessment of Gamma Grassridge Power Line Corridors and Substation, Eastern, Western and Northern Cape Provinces, South Africa
8222	HIA Phase 1	Lloyd Rossouw	01/02/2009	Phase 1 Palaeontological Impact Assessment of a Proposed Water Pipeline near Nelspoort, Beaufort West District, Western Cape Province
120317	AIA Phase 1	Celeste Booth, Sholeen Shanker	01/12/2012	An archaeological ground-truthing walk-through for the proposed substation and associated overhead power line for the Nobelsfontein Wind Energy Facility situated on a site south of Victoria West on the Farm Nobelsfontein 227, Northern Cape Province
360840	HIA Phase 1	Wouter Fourie	05/03/2016	Environmental Impact Assessment of the proposed amendments to the Environmental Authorisation for the Mainstream Renewable Power South Africa Wind Energy Project near Victoria West in the Northern Cape – Specialist Heritage Opinion
354681	AIA Phase 1	Lita Webley	30/11/2015	Archaeological Impact Assessment: Proposed uranium mining and associated infrastructure on portions of the farms Quaggasfontein and Ryst Kuil near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape

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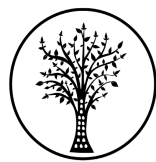
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APPENDICES

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APPENDIX 1: Archaeological Assessment (2021)



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APPENDIX 2: Palaeontological Assessment (2021)



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APPENDIX 3: Cultural Landscape Assessment (2021)



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APPENDIX 4: Heritage Screening Assessment, NID and NID Response



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APPENDIX 5: Evidence of Consultation

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