

# HERITAGE IMPACT ASSESSMENT

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

**Proposed development of Ngwedi, a solar PV facility and associated infrastructure on Portion 3 of the Farm McTaggarts Camp 453, near Upington in the Northern Cape Province.**

Prepared by CTS Heritage



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For

**Savannah Environmental**

March 2020



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## EXECUTIVE SUMMARY

Ngwedi PV (Pty) Ltd is proposing the development of a commercial solar PV facility and associated infrastructure within a study area located approximately 21km south-west of Upington within the Kai! Garib Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The study area borders the Dawid Kruiper Local Municipality to the east. The study area consists of two affected properties known as Portion 3 of the Farm McTaggarts Camp 453 and Portion 12, Portion of Portion 3 of the Farm Klip Punt 452.

A development area (located within the study area) with an extent of ~304ha has been identified by Ngwedi PV (Pty) Ltd as a technically suitable study area for the development of a solar PV facility with a contracted capacity of up to 100MW. The development area for the Ngwedi solar PV facility is located within Portion 3 of the Farm McTaggarts Camp 453 and Portion 12, Portion of Portion 3 of the Farm Klip Punt 452. The study area and the development area are located within Focus Area 7 of the Renewable Energy Development Zones (REDZ), which is known as the Upington REDZ, therefore, a Basic Assessment (BA) process will be undertaken and a BA Report compiled for the project in accordance with the EIA Regulations, 2014 (as amended), as well as GNR 114 as formally gazetted on 16 February 2018.

The proposed development will not have a negative impact on the heritage resources situated within the footprint of proposed Ngwedi PV Facility. The lithic and historic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during the construction phase, the impact is inconsequential. No mitigation is required. Furthermore, as the proposed access road alternatives run along existing access tracks, neither alternative is likely to impact significant archaeological heritage, other than Site ID 44977 which is described as a single LSA tool and is graded IIIC, near to Main Access Road Alternative 2. No further mitigation for this site is necessary. Due to the low significance impact to heritage resources, there is no preferred alternative regarding the Main Access Route in terms of impacts to heritage. No formal or informal graves were identified within the development footprint.

Based on experience and the lack of any previously recorded fossils from the broader study area, it is extremely unlikely that any fossils would be preserved in the loose Quaternary sands. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation and as such a Chance Fossil Finds Protocol should be added to the Environmental Management Programme (EMPr). All proposed infrastructure lie on the Gordonia Formation dune and aeolian sands and as far as the palaeontology is concerned impact to significant palaeontological resources is unlikely.

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According to the VIA, the proposed project will generally result in a relatively limited level of visual impact within an area that is already impacted significantly by other solar projects (existing, under construction and proposed). The level of impact within the region is also likely to increase. In general terms therefore the proposed project is in keeping with its surroundings and will not impact significantly on receptors that are likely to be sensitive to landscape change associated with the project. In addition, the proposed development is located within a REDZ and Power Corridor. Due to the REDZ, there are a number of similar existing and/or proposed PV facilities in the area (and within the broader study area) and as such, there is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial, however, due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.

The heritage impact assessment has identified no resources of heritage significance that are likely to be impacted by the proposed development. Therefore, no further mitigation is required, and from a heritage point of view, there is no objection to the proposed development in this area.

There is no objection to the proposed development on heritage grounds and the following is recommended:

- There is no preferred alternative in terms of impacts to heritage for the Main Access Route and as such, the preferred alternative of the developer is preferred in terms of impacts to heritage.
- A Chance Fossil Finds Procedure must be implemented (see attached as part of Appendix 2)
- The mitigation recommendations included in the VIA are implemented (Section 6 of the VIA)
- 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 or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted.
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA.

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- The above recommendations must be included in the Environmental Management Programme (EMPr) for the project.

### **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.

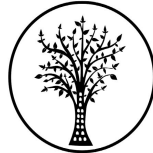
Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has 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 40 Heritage Impact Assessments throughout South Africa.

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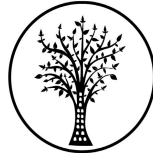
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## 1. INTRODUCTION

### 1.1 Background Information on Project

Ngwedi PV (Pty) Ltd is proposing the development of a commercial solar PV facility and associated infrastructure within a study area located approximately 21km south-west of Upington within the Kail! Garib Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The study area borders the Dawid Kruiper Local Municipality to the east. The study area consists of two affected properties known as Portion 3 of the Farm McTaggarts Camp 453 and Portion 12, Portion of Portion 3 of the Farm Klip Punt 452.

A development area (located within the study area) with an extent of ~304ha has been identified by Ngwedi PV (Pty) Ltd as a technically suitable site for the development of a solar PV facility with a contracted capacity of up to 100MW. The development area for the Ngwedi solar PV facility is located within Portion 3 of the Farm McTaggarts Camp 453 and Portion 12, Portion of Portion 3 of the Farm Klip Punt 452. The study area and the development area are located within Focus Area 7 of the Renewable Energy Development Zones (REDZ), which is known as the Upington REDZ, therefore, a Basic Assessment (BA) process will be undertaken and a BA Report compiled for the project in accordance with the EIA Regulations, 2014 (as amended), as well as GNR 114 as formally gazetted on 16 February 2018.

The Ngwedi PV facility is located immediately adjacent to the proposed Naledi PV facility (undergoing a separate environmental assessment process), as well as the Khunab PV Projects which include Klip Punt PV (SAHRIS Case ID 14574), McTaggarts PV1 (SAHRIS Case ID 14582), McTaggarts PV2 (SAHRIS Case ID 14590) and McTaggarts PV 3 (SAHRIS Case ID 14645). See Figure 1b.

Ngwedi PV is proposed to accommodate the following infrastructure which will enable the solar PV facility to supply a contracted capacity of up to 100MW:

- » Fixed-tilt or tracking solar PV panels with a maximum height of 3.5m.
- » Centralised inverter stations or string inverters.
- » A laydown area.
- » Cabling between the panels, to be laid underground where practical.
- » A 22kV or 33kV/132kV on-site facility substation of up to 1ha in extent to facilitate the connection between the solar PV facility and the electricity grid.
- » A 6m wide access road to the development area, using existing gravel roads

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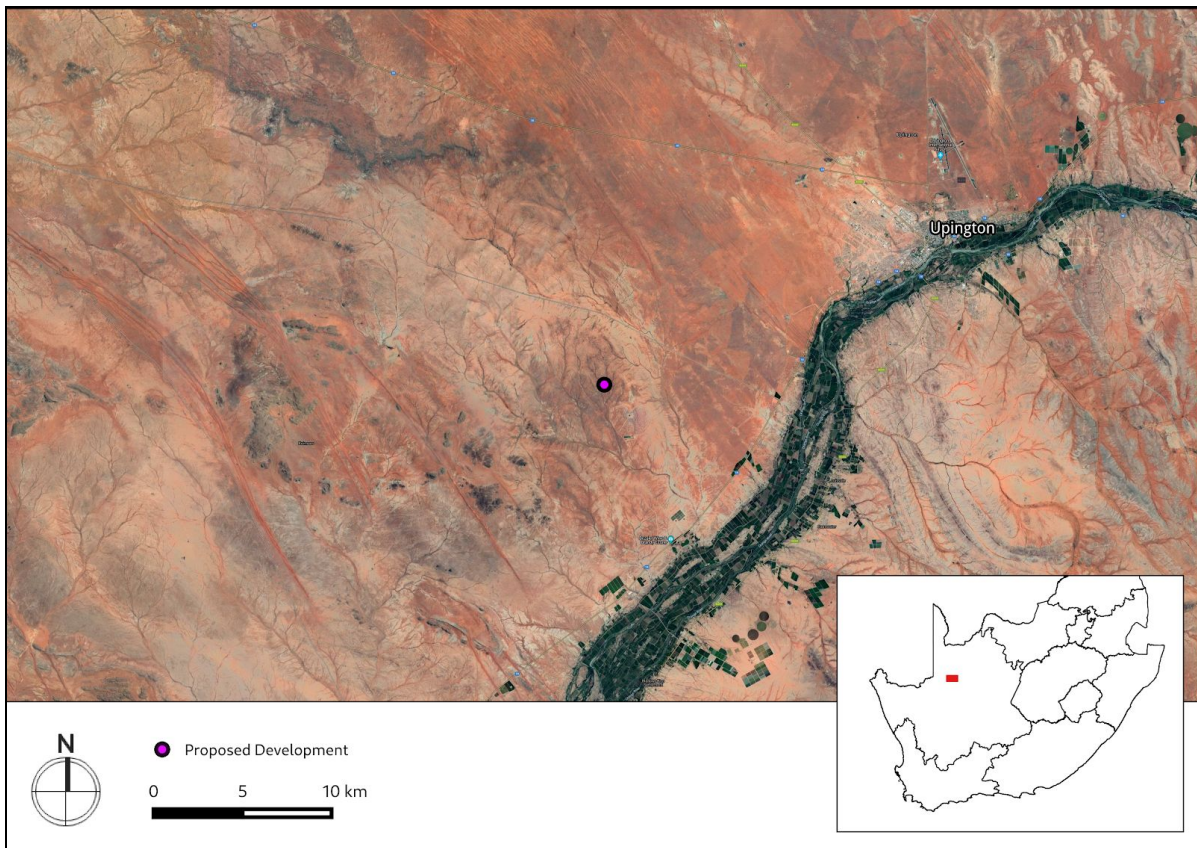


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- » Internal access roads within the PV panel array and between project components with a maximum width of 5m.
- » Operation and maintenance buildings, including a gate and security house, control centre, offices, warehouses, a workshop and visitors centre.

The power generated by Ngwedi PV will be sold to Eskom and will feed into the national electricity grid. Ultimately, Ngwedi PV is intended to be part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resources Plan (IRP) and will be under the Department of Mineral Resource and Energy 's Renewable Independent Power Producers Procurement Programme (REIPPPP).

A separate BA process has been undertaken for the grid connection infrastructure required to connect Ngwedi PV to the existing Upington Main Transmission Substation (MTS) (SAHRIS Case ID 14708).

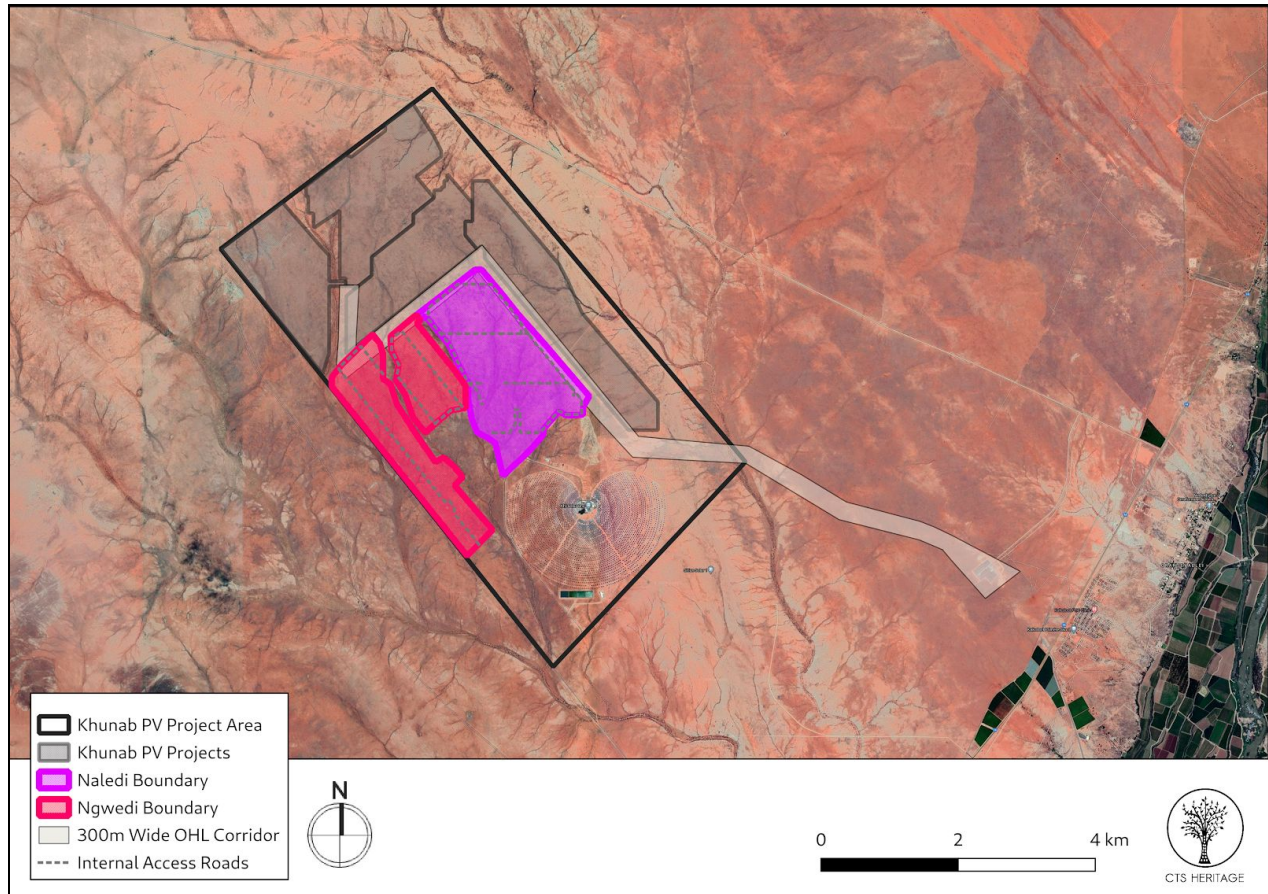


**Map 1a: The proposed development area of the Ngwedi PV Development Project**

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**Map 1b: The proposed development area for the Ngwedi PV Project relation to the Khunab PV Project area and the proposed Naledi PV Project**

## 1.2 Description of Property and Affected Environment

The area proposed for development is rather flat and sandy with some vegetation cover. It has a slight slope from south to north. The development area is still utilised for agricultural purposes (livestock farming) and several internal fences cross over the study area. Several quartz and quartzite outcrops are scattered throughout the development area. Dolomite outcrops were also identified, however these were not as numerous. A number of Limestone (calcrete) outcrops were noted as well.

The development area is covered by various types of vegetation including Camel Thorn trees (*Vachellia erioloba*), Thorn trees (*Acacia mellifera*), Three Thorn/Driedoring (*Rhigozum trichotomum*), Skaapbossie (*Aizoon schellenbergii*), Shepherd tree (*Boscia albitrunca*), Suurgras (*Enneapogon desvauxii*), Pencil Milkbush (*Euphorbia*

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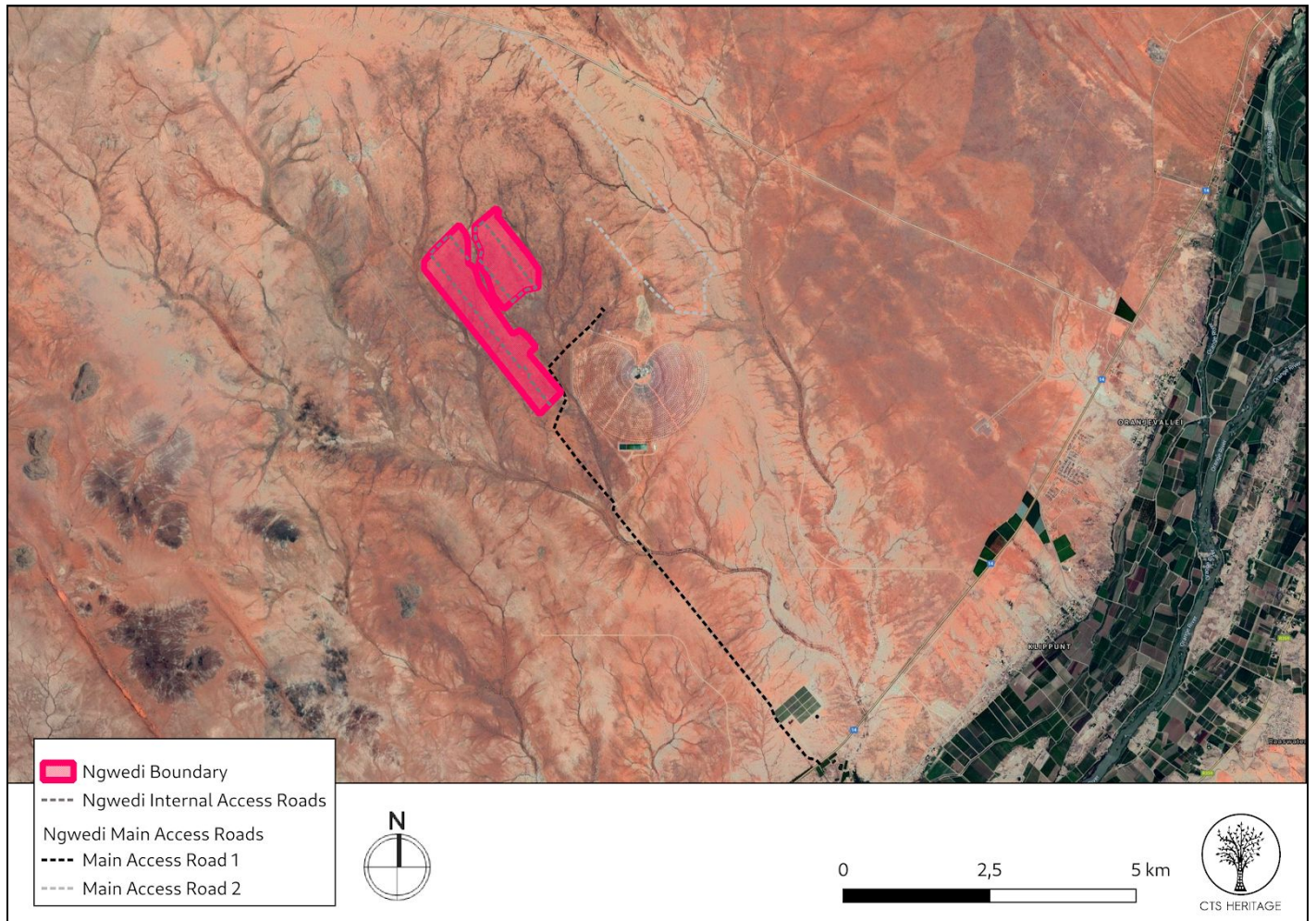
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*lignose*), *Helichrysum tomentosulum* (*Prosopis glandilosa*), Tall Bushman grass (*Stipagrostis hirtigluma*), Silky Bushman grass (*Stipagrostis uniplumis*) and Kortbeen Boesmangras. There are several dry river beds that are present on the study area flowing from north to south and from west to east. No perennial rivers or riverines were evident within the development area.



Map 1c: The proposed development area for Ngwedi

## 2. METHODOLOGY

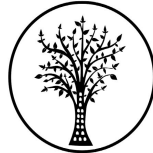
### 2.1 Purpose of HIA

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).

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## 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 and palaeontologist were contracted to conduct an assessment of archaeological and palaeontological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 25 to 27 February 2020.
- The palaeontologist conducted a desktop assessment for the study area as part of a previous assessment
- The identified resources were assessed to evaluate their heritage significance
- The VIA was integrated into the HIA.
- 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 during construction, such activities should be halted, and it would be required that 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.

## 2.4 Constraints & Limitations

No constraints were experienced. The knowledge of the heritage practitioner, and observations made during the study therefore allow us to predict with some accuracy the archaeological sensitivity of the receiving environment.

A PIA that was drafted for a separate development on the same property was used to assess the impacts to palaeontology for this proposed development. As such, the layout, the maps in the Desktop PIA are different to the layout maps in this report, although it is evident that the PIA conducted for the Khunab PV Projects covers the study area. The relevant palaeontology maps are updated in this report. Importantly, this difference in layout does not impact on the findings or conclusions of the PIA report, which are also applicable for this development.

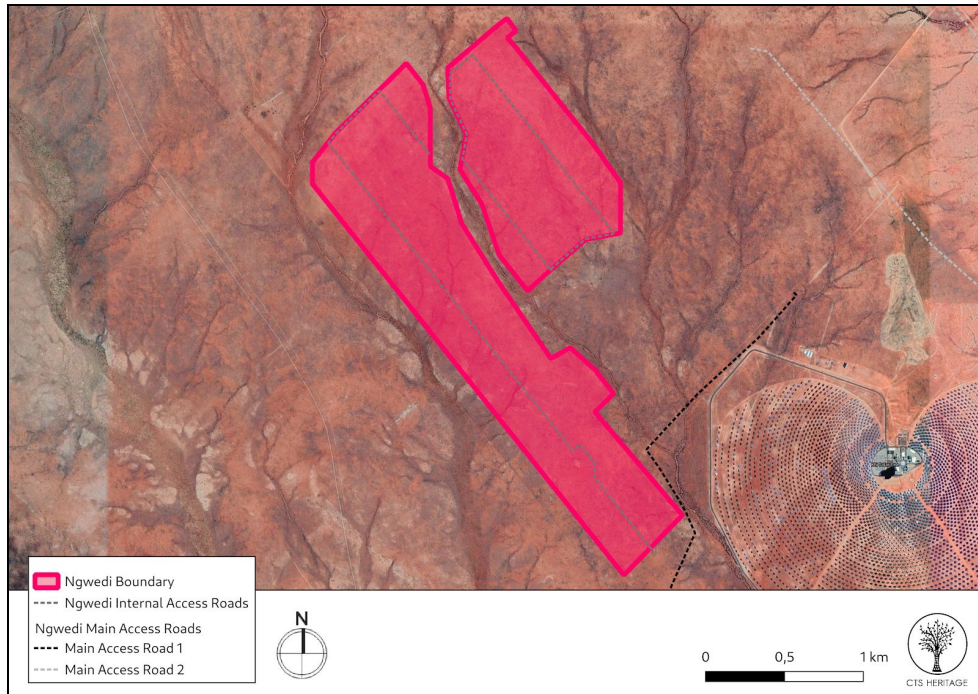
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Map 1d: The proposed development area for the Ngwedi PV Project



Map 1e: The proposed layout for the Ngwedi PV Project

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## 2.5 Savannah Impact Assessment Methodology

Direct, indirect and cumulative impacts of the issues identified 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.
- 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:

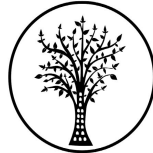
$$S = (E + D + M) \times P$$

S = Significance weighting

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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).

### **3. HISTORY AND EVOLUTION OF THE STUDY AREA AND CONTEXT**

#### **3.1 Previous Heritage Impact Assessments**

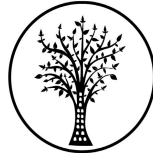
##### **Cultural Landscape**

According to Van Schalkwyk (2014 SAHRIS NID 170520), “The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (stone age) component and a later colonial (farmer) component. This rural landscape has always been sparsely populated. The second component is an urban one, consisting of a number of smaller towns, most of which developed during the last 150 years or less.” According to Von Vollenhoven (2012 SAHRIS NID 117902), “the environment of the area is mostly undisturbed although it is being used for sheep farming... The natural topography... is reasonably flat, but in the north-west a hill dominates the area resulting in an even slope up to the crest. This area also is very rocky. The stones here are dark in colour and may be of a basaltic origin. However in the flat areas adjacent to the hill the rocks are white coloured and most likely are soft calcrete, which would not have been suitable for the manufacture of stone tools. Different non-perennial streams run through the area...” According to Fourie’s assessment of the impacts of similar infrastructure in this area (2014), due to the landscape’s topography the solar PV infrastructure will be prominent in the landscape and alter the rural appearance. Due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.

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### **Archaeology and the Built Environment**

Many farm portions in the immediate vicinity of the area proposed for development have been assessed in terms of impacts to heritage resources (Map 4). It has been found that the area surrounding Upington has a rich historical and archaeological past (Fourie, 2014 SAHRIS NID 174335). Based on the outcomes of these assessments, it is noted that most of the heritage resources identified are stone age artefact scatters of varying significance. In Fourie's assessment (2014), the field work identified numerous areas where low density scatters of Middle and Later Stone Age lithics were found. As no context and *in situ* preservation were identified these sites were graded as having low heritage significance. In addition, one possible herder site was identified during the Fourie's (2014) survey, also of low heritage significance. No other material or deposits were identified but does not exclude the possibility of subsurface material. The ruins of old mining infrastructure were also identified. In Von Vollenhoven's assessment (2012 SAHRIS NID 117902), he identified a number of very interesting and significant rock art engravings depicting various animals including giraffes and an aardvark. In addition, he identified a significant historical site known as the "Rebellion Tree" as well as graves associated with farmers in this area.

Five sites of moderate local significance are located just beyond the border of the proposed development area. These sites are highlighted in orange in Appendix 1. Site 24972 is linked to Von Vollenhoven's (2012) report and may well be the location of the rock art engravings described above. Site 45523 is described as consisting of ostrich egg shell (OES) fragments and stone flakes scattered around the base of a hill in low densities. Flakes are micro lithic supporting an ascription to the Later Stone Age (LSA) utilising quartzite as raw material. A lead sealed bully beef can was also found here dated to the late 1800's or early 1900's. Sites 19977 to 19979 describe Middle Stone Age (MSA) artefact scatter sites. In addition, there is a historical structure located within the development area of unknown heritage significance.

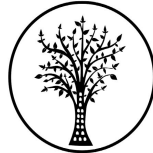
### **Palaeontology**

According to the SAHRIS Palaeosensitivity Map (Map 2), the extract from the CGS Sheet 2820 Map 3a and 3b), this area is underlain by the Gordonia Formation (Quaternary coversands of moderate palaeontological sensitivity), the Bethesda Formation, the Jannelsepan Formation, the Keimoes Formation and the Straussburg Granite, of zero palaeontological sensitivity. The primary risk associated with impacts to palaeontological heritage is related to impacting fossils preserved within the Quaternary coversands of the Gordonia Formation (wind-blown alluvial sands).

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According to Almond's assessment for similar infrastructure development in this area (2011 SAHRIS NID 174335), "overall impact significance of the proposed solar park development is likely to be LOW because: Most of the study area is underlain by unfossiliferous igneous and metamorphic basement rocks (granites, gneisses etc.) or mantled by superficial sediments (wind-blown sands, alluvium etc.) of low palaeontological sensitivity; extensive, deep excavations are unlikely to be involved in this sort of solar park project. Significant negative impacts on local fossil heritage are therefore unlikely to result from the proposed solar park development and in the author's opinion no further specialist palaeontological studies for this project are necessary."

### **3.2 Geomorphology, climate, vegetation**

The Namaqua sector of the Namaqua-Natal Province is the geological setting of the region around Upington. These are igneous and metamorphic rocks that were formed or metamorphosed during the Namaqua Orogeny approximately 1200 – 1000 million years ago. The Namaqua-Natal Province has been divided into a number of tectonostratigraphic terranes based on common rock types and bounded by shear zones. There have also been some mafic or ultramafic intrusions into the terranes. Upington falls in the Areachap terrane and is bounded to the northeast by the Brakbosch-Trooilaspan Shear Zone and to the southwest by the Boven Rugzeer Shear Zone (Cornell et al., 2006).

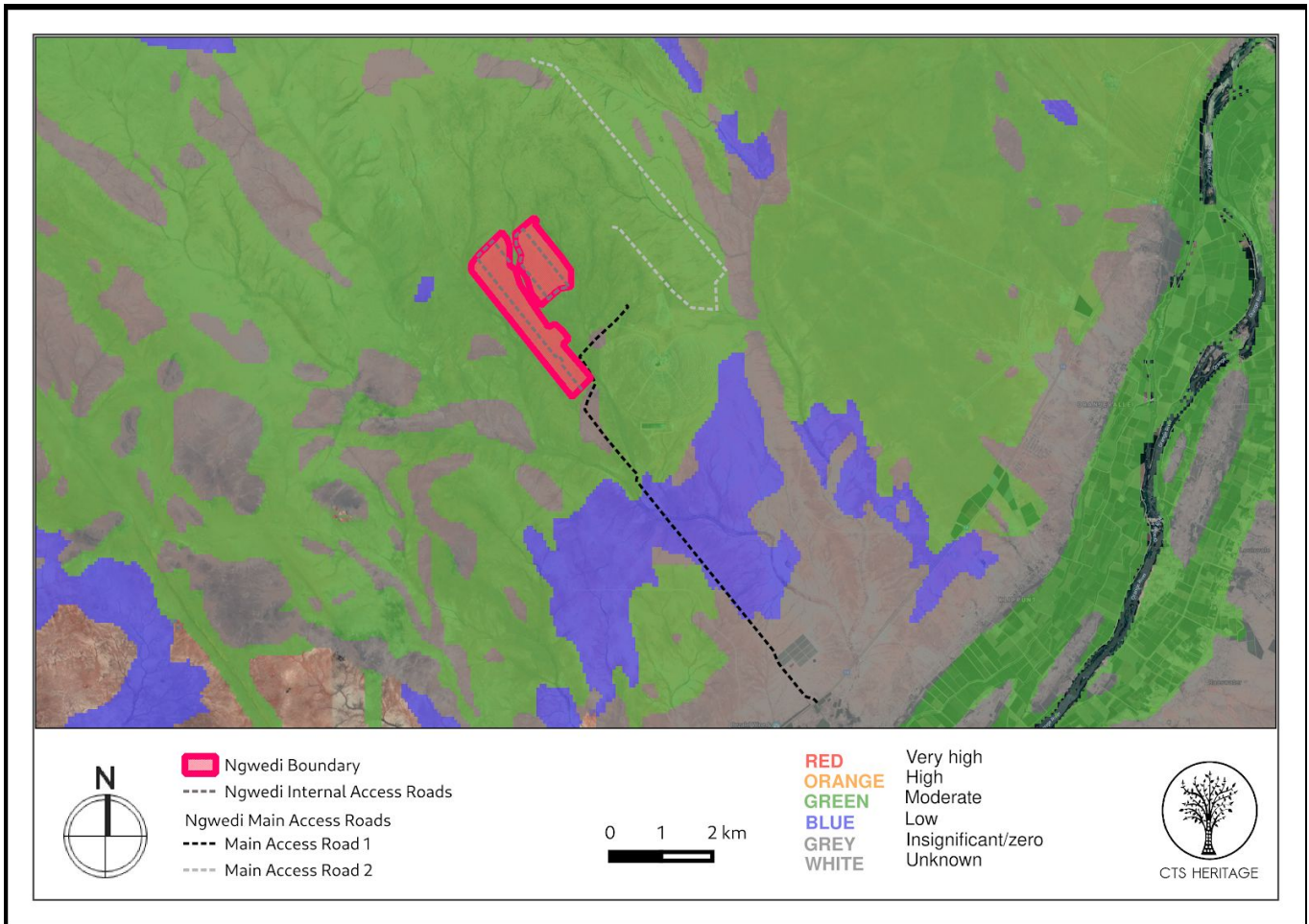
There are scattered outcrops of the intrusive Louisvale Granites, Bethesda Formation gneisses and Toeslaan Formation Gneisses (Figure 2). Apart from the age of these rocks pre-dating body fossils, these are all volcanic rocks and have been metamorphosed, so they do not preserve any fossils. They will not be considered any further.

Overlying these complex ancient rocks are much younger sediments of the Tertiary and Quaternary, in particular calcretes that indicate drying out of the surface, and alluvial and aeolian sands of the Gordonia Formation.

The palaeontological sensitivity of the area under consideration is presented in Map 2. The proposed broader study area for the Khunab Solar Development lies on the alluvial and aeolian sands of the Gordonia Formation that is Quaternary in age.



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Map 2: Palaeontological sensitivity of the proposed development area

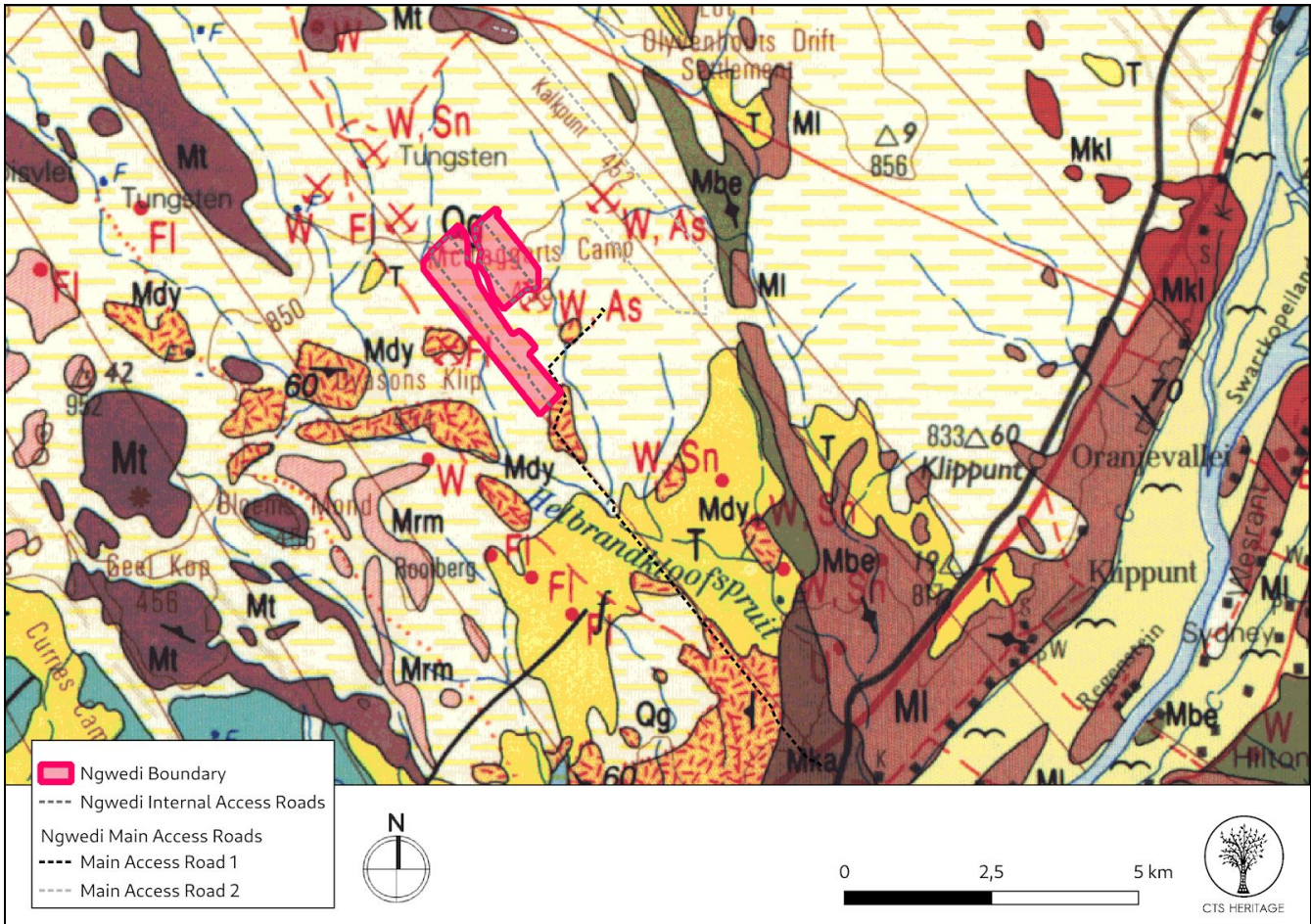
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Map 3a: Geology underlying the proposed development area extracted from the Council of Geoscience Map (1:250 000) 2820 Upington

Table 1: Explanation of symbols for the geological map and approximate ages

Symbol	Group/Formation	Lithology	Approximate Age
Qg	Gordonia Formation	Red brown wind blown sand and dunes	Last 2.5 Ma
T	Tertiary	Calcrete	Last 65 Ma
MI	Louisvale Granite, Keimos Suite, Natal-Namaqua Province	Light-grey moderately to well foliated granite	Ca 1000 Ma
Mbe	Bethesda Fm, Areachap Sequence, Natal-Namaqua Province	Migmatitic biotite-rich and aluminous gneisses	1200 - 1000 Ma
Mt	Toeslaan Fm, Biesjpoort Group, Korannaland Sequence, Natal-Namaqua Province	Kinzigite, politic gneisses, biotite gneiss, leucocratic paragneisses	1200 - 1000 Ma

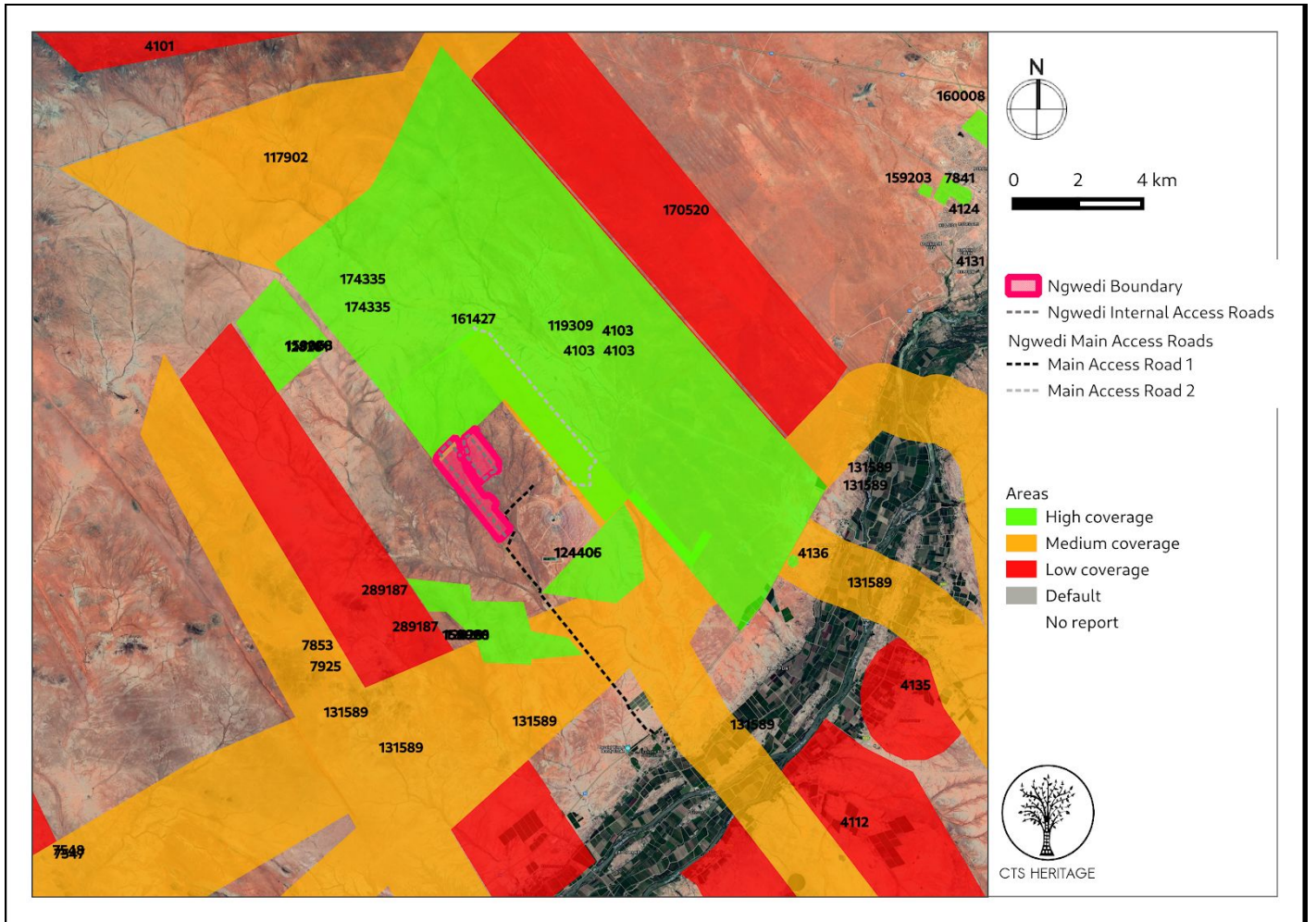
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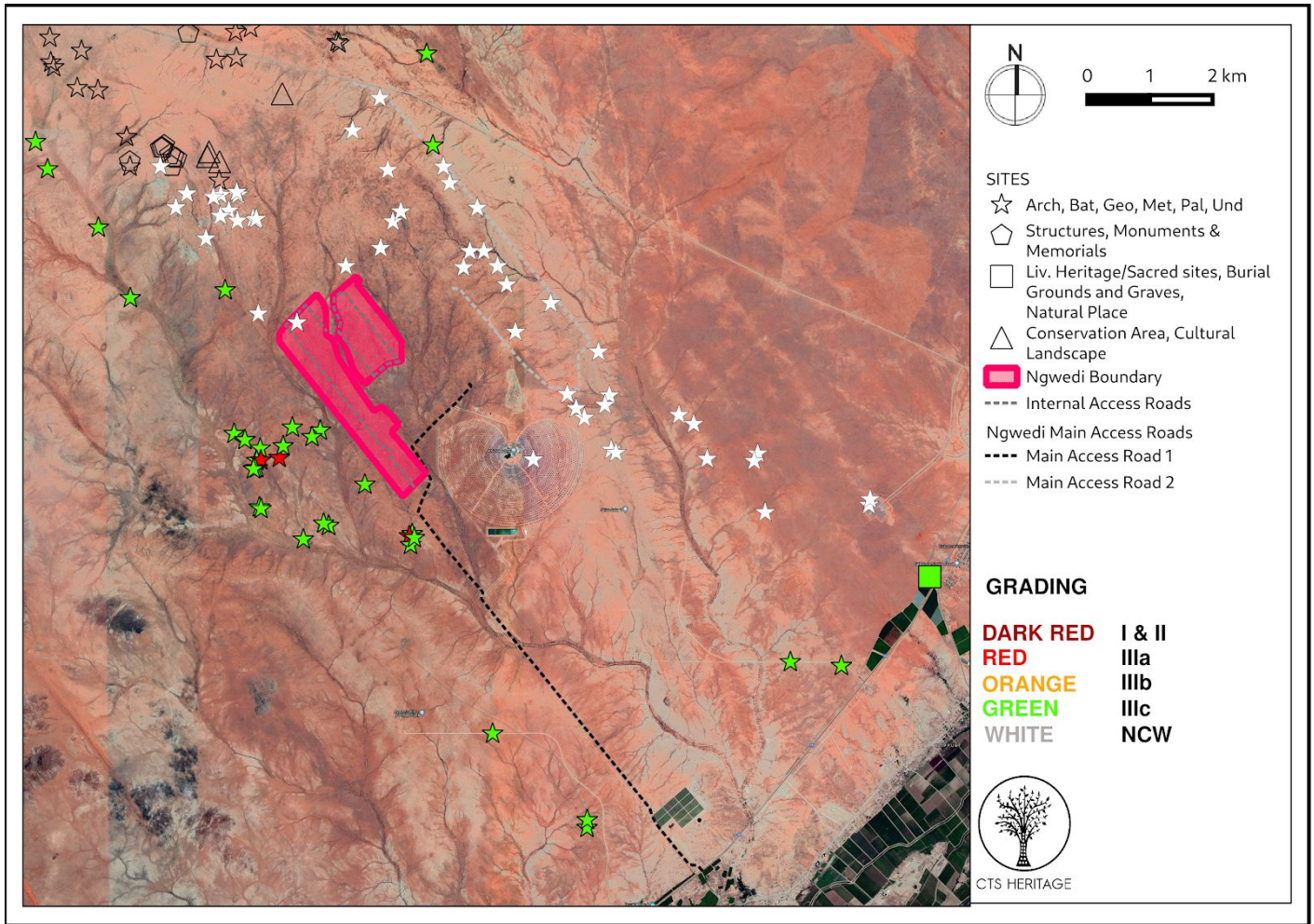
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Map 4: Spatialisation of heritage assessments conducted in proximity to the proposed development (see Appendices for insets)



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Map 5: Spatialisation of known heritage resources within close proximity to the proposed development

#### 4. IDENTIFICATION OF HERITAGE RESOURCES

##### 4.1 Summary of findings of Specialist Reports

###### *Archaeology*

In general, the archaeological resources identified in this area consist of low density surface scatters of Early and Middle Stone Age chunks, cores, flakes and scrapers made from Banded Ironstone Formation (BIF) and Crypto-Crystalline Silicates (CCS). The identified resources indicate various degrees of weathering and are without substantial archaeological context or matrix, and are therefore of limited scientific significance. As such, these resources are deemed to be Not Conservation-Worthy (NCW).

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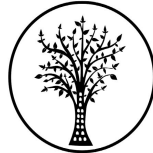
No formal or informal graves were identified within the development footprint. The area assessed is by no means pristine as the existing Oasis/Oranje 132kV overhead power line runs south of the development footprint in the south-south-east from east to west. Furthermore, as the proposed access road alternatives run along existing access tracks, neither alternative is likely to impact significant archaeological heritage, other than Site ID 44977 which is described as a single LSA tool and is graded IIIC.



Map 6: Track paths walked by archaeologist as part of the February 2020 assessment (Appendix 1)

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### ***Palaeontology***

The Gordonia Formation rests on calcretes or directly on pre-Kalahari bedrock (Partridge et al., 2006). The sands can be up to 30m thick and frequently are linear dunes that have been stabilised by vegetation (ibid). In areas to the south there is evidence of palaeo-rivers, for example the Koa Valley where the so called Kalahari River flowed during wetter Cenozoic times before continental uplift occurred together with global aridity. After the mid Miocene pluvial phases the Koa River was captured by the Orange River and only palaeochannels remain (de Wit et al., 2000; Partridge et al., 2006). Some palaeochannels contain gravel clasts, diamonds, silicified wood and vertebrate bones (Dingle and Hendey, 1984; Pickford et al., de Wit and Bamford, 1993; De Wit et al., 2009).

Some Quaternary pans have fossil fauna and artefacts preserved within them, such as Kath Pan and Townlands near Kuruman (Beaumont, 2004; Walker et al., 2014) but no pans are visible on Google Earth and none have been reported from here.

### ***Visual Impact Assessment***

A Visual Impact Assessment (VIA) was completed for the proposed Ngwedi PV Project. According to the VIA, the proposed solar project is located within an arid plateau landscape area which is within approximately 9.0km from the closest section of the verdant Orange River Corridor. The difference between these landscape areas is marked with the semi desert of the plateau contrasting strongly with the green arable landscape of the River Valley. The ZTV (Zone of Theoretical Visibility) analysis indicates that the development is unlikely to be visible from this Landscape Character Area (LCA). Therefore, the proposed project is unlikely to have any major impact on this LCA, it may however be visible from upper sections of the valley slopes. From these areas however vegetation generally softens or screens views.

Views of the bulk of the proposed development within the plateau landscape will be largely limited to areas in the immediate vicinity of the affected properties by minor ridgelines. These ridgelines will limit views of the development to approximately 5km to the north east and east and approximately 8.6km to the west and south west. To the north visibility is more extensive as the topography flattens. There are however only limited locations from where the proposed development may be viewed from as the majority of land is in private ownership. To the south and south east, views of the project will be limited to a maximum distance of approximately 9km. Views of the development may be possible from ridgelines extending as far as the N14. The landscape change will be viewed in the context of other solar projects within the area including the Khi Solar I CSP project which is located immediately to the south of the proposed project.

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## 4.2 Heritage Resources identified

### *Archaeology*

No significant heritage resources were identified within the footprint for the proposed Ngwedi PV facility. Furthermore, no formal or informal graves were identified within the development footprint.

The archaeological field assessment covered the area proposed development thoroughly (Map 6). Two Stone Age archaeological resources were identified within the development footprint for Ngwedi during this field assessment (MTG 5/01 and MTG 5/05) and one was identified during the field assessment conducted in 2019 (MTG 1/11). Additional sites located just outside the development footprint were also identified during the 2019 assessment (Map 5). However all of these sites are considered to be not conservation-worthy as they are widely scattered and have no associated contextual material.

Several occurrences of archaeological surface material dating to the 19th and early 20th century were recorded in the general vicinity. One such resource consists of a machine-soldered fish tin and was one of the sites recorded in 2019 (MTG 1/12). This finding too has limited scientific significance as it is without any substantial context and is therefore considered to be Not Conservation-Worthy (NCW).

Additional resources from the 19th and early 20th century include two Martini-Henry bullet casings dating between 1870 and the turn of the century (MTG 1/13). The area around the development area is well known for conflict between British forces and the Koranna people living on the Orange River islands. The region was also actively monitored by the Cape Colonial Police as from the 1890s, and military operation during the South African War (Anglo Boer War 1899- 1902). The spent cartridges, though exciting, are of little scientific value, as they are without context and only a small sample. These heritage finds are considered Not Conservation-Worthy (NCW).

**Table 2: Artefacts identified during the field assessment within Ngwedi PV development area**

Site No	Site Name	Description	Co-ordinates		Grading	Mitigation
MTG 5/01	Ngwedi PV	Low-density open scatter with BIF flakes, chips and one point. N=7/100m2 MSA	28° 31' 07.8" S	21° 02' 47.2" E	NCW	None
MTG 5/05	Ngwedi PV	Low-density open scatter with BIF and CSS flakes. N=10/100m2 ESA/MSA	28° 31' 13.6" S	21° 03' 30.9" E	NCW	None
MTG 1/11	Ngwedi PV	Low-density open scatter with BIF flakes and debris. N=2/100 m2. MSA Recorded during 2019 survey.	28° 31' 05.80" S	21° 02' 33.87" E	NCW	None

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MTG 1/12	<b>Ngwedi PV</b>	Machine soldered square fish tin. Probably associated with 1930-1940s mining activities Recorded during 2019 survey.	28° 31' 05.87" S	21° 02' 33.73" E	NCW	None
MTG 1/13	<b>Located outside footprint</b>	Empty/fired cartridge: Positively identified as Marthini Henry round. Colonial	28° 30' 36.770" S	21° 03' 02.473" E	NCW	None
MTG 2/ 1	<b>Main Access Road 2</b>	Retouched flakes debris. BIS. 2 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 29' 45.391" S	21° 03' 59.893" E	NCW	None
MTG 2/ 2	<b>Main Access Road 2</b>	Core/chunk. BIS. 1 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 29' 53.838" S	21° 04' 03.547" E	NCW	None
MTG 2/31	<b>Main Access Road 2</b>	Retouched flakes deris. BIS. 5 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 29' 09.920" S	21° 03' 22.523" E	NCW	None
MTG 2/32	<b>Main Access Road 2</b>	Chunks debris. BIS and quartzite. 5 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 30' 06.562" S	21° 04' 19.819" E	NCW	None
MTG 3/35	<b>Main Access Road 2</b>	Core, retouched flakes debris and one hollow scraper. BIS and quartzite. 4 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 31' 42.795" S	21° 05' 12.752" E	NCW	None
MTG 2/42	<b>Main Access Road 2</b>	Retouched flakes, chips and hollow scraper debris. BIS and quartzite. 8 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 31' 20.894" S	21° 05' 31.087" E	NCW	None
MTG 2/43	<b>Main Access Road 2</b>	Retouched flakes debris. BIS and quartzite. 9 per 100 m <sup>2</sup> . Surface scatter: no context.	28° 30' 55.823" S	21° 05' 02.979" E	NCW	None
44977	<b>Main Access Road 2</b>	LSA Single Tool			IIC	None

### ***Palaeontology***

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either igneous and much too old to contain fossils, or are alluvial and aeolian sands. The Gordonia Formation alluvial and aeolian sands are young and have been transported so are unlikely to preserve any fossils. Only if palaeo-pans or palaeo-channels are present is there a small chance of finding fossils, however none have been recorded and the geological maps and Google Earth imagery do not indicate the presence of these features in the project footprint. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

Based on experience and the lack of any previously recorded fossils from the broader study area, it is extremely unlikely that any fossils would be preserved in the loose Quaternary sands. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation and as such a Chance Fossil Finds Protocol should be added to the Environmental Management Programme (EMPr). All proposed



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infrastructure lie on the Gordonia Formation dune and aeolian sands and as far as the palaeontology is concerned impact to significant palaeontological resources is unlikely.

### **Visual Impacts**

In the VIA, Landscape Character Areas (LCAs) are defined as “single unique areas which are the discrete geographical areas of a particular landscape type”. Visual Absorption Capacity (VAC) is *defined* as the landscape’s ability to absorb physical changes without transformation in its visual character and quality. Where elements that contrast with existing landscape character are proposed, VAC is dependent on elements such as landform, vegetation and other development to provide screening of a new element. The scale and texture of a landscape is also critical in providing VAC, for example; a new large scale industrial development located within a rural small scale field pattern is likely to be all the more obvious due to its scale. The affected landscape can generally be divided into the following LCAs that are largely defined by vegetation and drainage patterns.

- **Plateau LCA** which includes the gently undulating, arid plateau above the Orange River Valley. This area is generally natural in character with very little settlement. The character of this area is in transition in that solar projects are likely to create an industrial aesthetic within a matrix of natural vegetation. VAC within this area is only provided by the regular, low, dune formation as well as slopes of the slightly larger minor valleys that are associated with the non-perennial water courses that flow into the Orange River Valley.
- **The River Corridor LCA** which is comprised of the shallow valley area surrounding the Orange River. This area is generally inward looking, drawing little character influence from the surrounding plateau. Landform, vegetation and development all play a role in screening views of surrounding areas and contribute to significant VAC.

Visual Receptors are defined as “individuals and / or defined groups of people who have the potential to be affected by the proposal”. It is possible that an area might be sensitive due to an existing use. The nature of an outlook is generally more critical to areas that are associated with recreation, tourism and in areas where outlook is critical to land values. This section highlights possible Receptors within the landscape which due to use could be sensitive to landscape change. They include:

- Area Receptors which include the minor urban settlement areas that are located within the Orange River Corridor LCA. It appears that the majority of settlement areas relate to agricultural use of the River Valley. It is likely that the residents of these minor settlements are predominantly focused on agricultural

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production of the area. As these settlements are located within the River Valley LCA, it is likely that views of the proposed development particularly from the northern side of the valley will be difficult. It is also likely that vegetation within the River Valley will help screen views of the proposed development that may be possible from the valley;

- Linear Receptors or routes through the area include the N14, the R359, the Lutzputs road and the Upington to Kakamas Spur Railway Line. Both of the N14 and the R359 roads have tourism significance, although the N14 is possibly the most important in this regard. The Lutzputs road is an un-surfaced road that runs approximately 2.0km to the north east of the subject property, and is likely to be mainly used by local people. The Upington to Kakamas Spur Railway Line, located to the south of the subject property is used for transporting goods and so is not considered further;
- Point Receptors that include individual homesteads are located both within the River Valley LCA and the Plateau LCA. From the site visit, it is unlikely that settlements on the northern side of the Orange River will have views over the proposed development. It is however possible that settlements on the higher sections of the southern side of the valley could have views of the proposed development. These however will be distance views and they are likely to be softened by vegetation on the fringes of the River Valley.

These LCAs and Visual Receptors are mapped in Figure 7 in the VIA.

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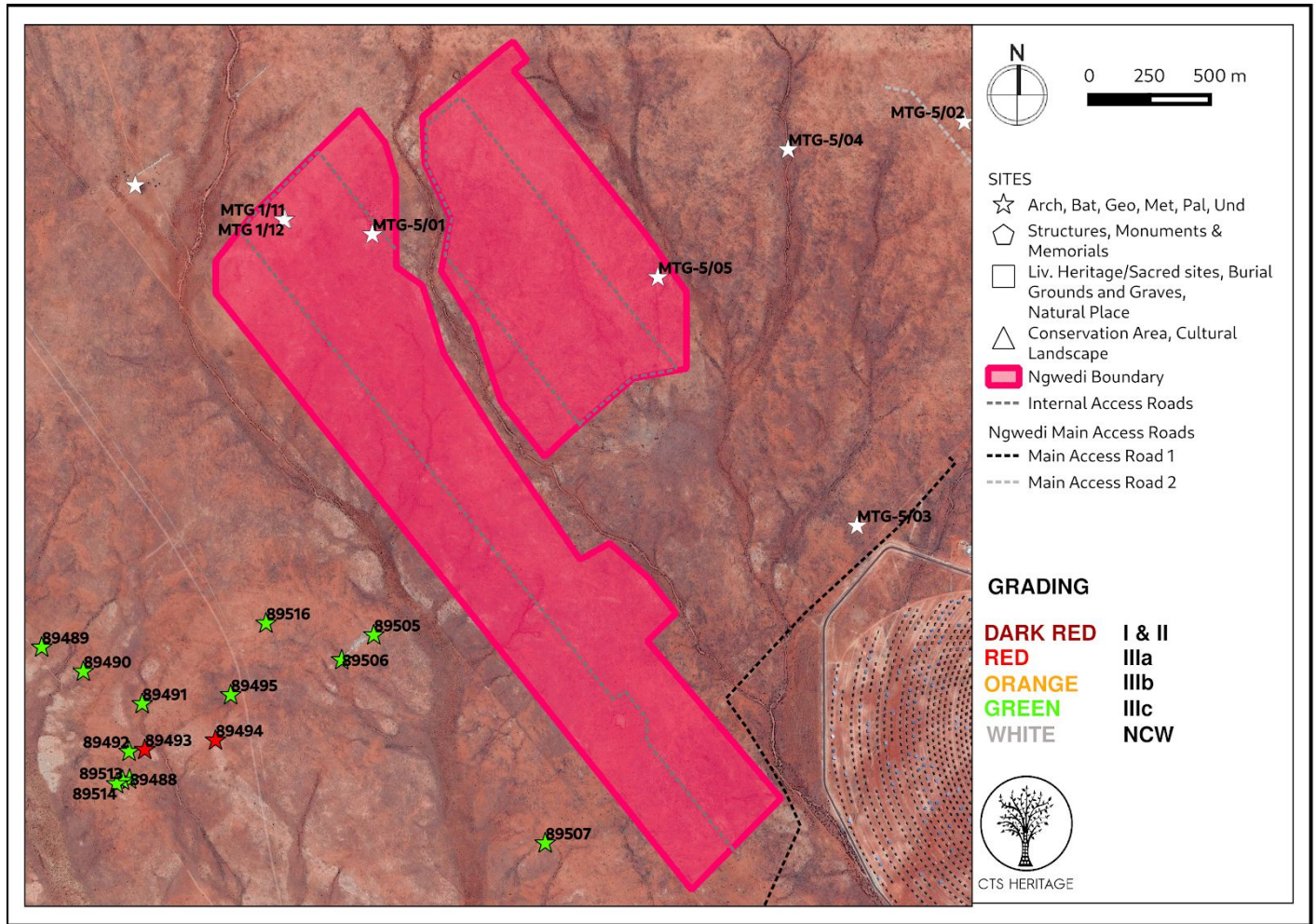
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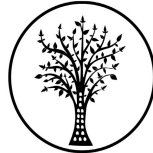
### 4.3 Mapping and spatialisation of heritage resources



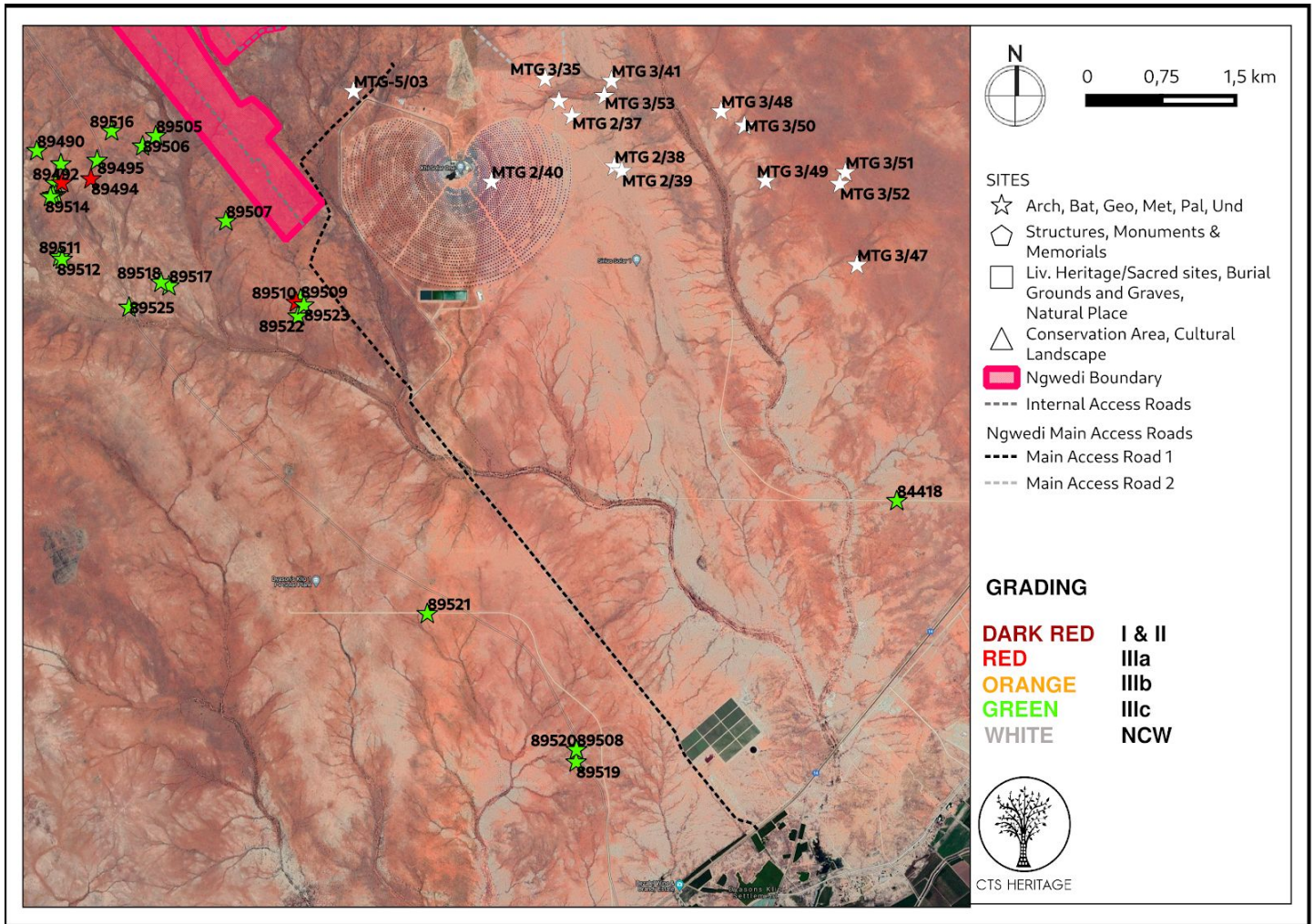
Map 7.1: Heritage resources in the vicinity of the proposed development

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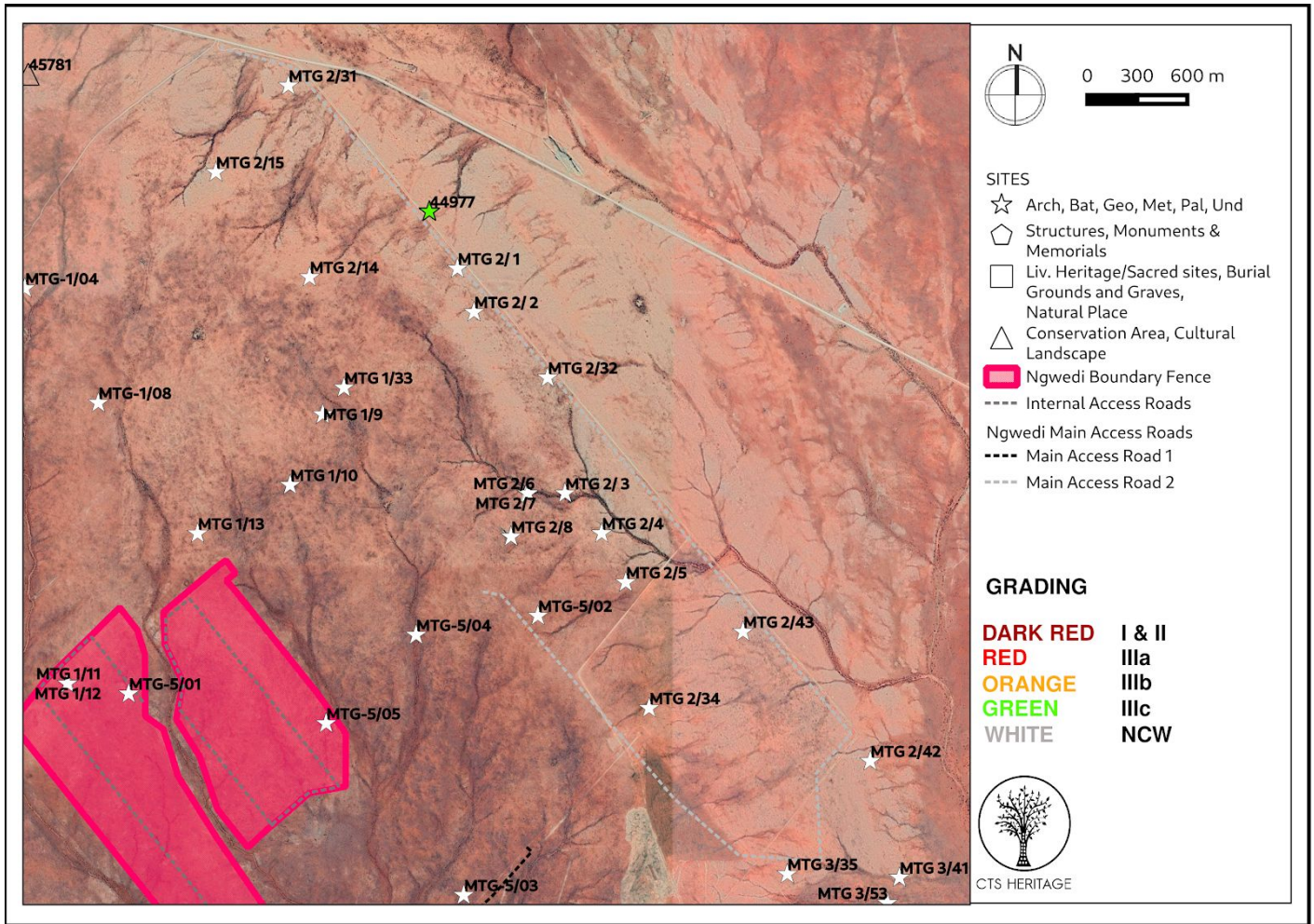
Map 7.2: Heritage resources in the vicinity of the proposed access road Alternative 1

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Map 7.3: Heritage resources in the vicinity of the proposed access road Alternative 2

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## 5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

### 5.1 Assessment of impact to Heritage Resources

The proposed development will not have a negative impact on the heritage resources situated within the footprint of proposed Ngwedi PV Facility. The lithic and historic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during the construction phase, the impact is inconsequential. No mitigation is required. Furthermore, no formal or informal graves were identified within the development footprint.

Based on experience and the lack of any previously recorded fossils from the broader study area, it is extremely unlikely that any fossils would be preserved in the loose Quaternary sands. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation and as such a Chance Fossil Finds Protocol should be added to the Environmental Management Programme (EMPr). All proposed infrastructure lie on the Gordonia Formation dune and aeolian sands and as far as the palaeontology is concerned impact to significant palaeontological resources is unlikely.

**Table 3: Impacts of the Ngwedi PV project on heritage resources**

<b>NATURE:</b>		No heritage resources of significance were identified during the field assessments for archaeology and palaeontology within the development footprint of the proposed Ngwedi PV Facility.	
		<b>Archaeology</b>	<b>Palaeontology</b>
<b>MAGNITUDE</b>	<b>L (2)</b>	No significant archaeological resources were identified within the development area, however a number of archaeological resources of low significance were identified.	<b>L (2)</b> Fluvial and aeolian sands do not preserve fossils; only palaeo-pans might but none has been recorded. Palaeo-channels might contain fossil wood and bones but none has been recorded from this study area. The impact would be very unlikely.
<b>DURATION</b>	<b>H (5)</b>	Where manifest, the impact will be permanent.	<b>H (5)</b> Where manifest, the impact will be permanent.
<b>EXTENT</b>	<b>L (1)</b>	Localised within the study area boundary	<b>L (1)</b> Since only the possible fossils within the area would be from palaeo-pans or palaeo-channels if present so the spatial scale will be localised within the study area boundary.
<b>PROBABILITY</b>	<b>L (1)</b>	It is extremely unlikely that any significant archaeological resources will be impacted	<b>L (1)</b> It is extremely unlikely that any fossils would be found in the alluvial and aeolian sand s but the study area is indicated as moderately sensitive.
<b>SIGNIFICANCE</b>	<b>L</b>	(2+5+1)x1=8	<b>L</b> (2+5+1)x1=8
<b>STATUS</b>		Neutral	Neutral
<b>REVERSIBILITY</b>	<b>L</b>	Any impacts to heritage resources that do occur are irreversible	<b>L</b> Any impacts to heritage resources that do occur are irreversible
<b>IRREPLACEABLE</b>	<b>L</b>	Unlikely due to the low significance of the heritage	<b>L</b> Unlikely due to the nature of the geology in this

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<b>LOSS OF RESOURCES?</b>		resources identified		area
<b>CAN IMPACTS BE MITIGATED</b>		NA		Yes
<b>MITIGATION:</b> No impact is anticipated with the implementation of the development footprint assessed within this HIA. A Chance Fossil Finds protocol should be added to the eventual EMPr.				
<b>RESIDUAL RISK:</b> Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

In terms of Visual Impacts, the limited height of the bulk of the proposed development helps to limit visibility. The natural grain of the landform is formed by small ridgelines that are remnants of an historic dune field running approximately north north-west to south south-east. This landform channels views to the north of the study area. Due also to the relatively low height of the bulk of the proposed development this subtle landform is likely to play a major role in moderating views of the proposed development.

Also due to its location and its general low profile, mitigation due to distance is likely to mean that the development is unlikely to be obvious for most receptors particularly those located to the south. Views of the proposed on-site facility substation may extend the visibility of the project however, the relative transparency of the upper sections of the substation is likely to mean that these elements are not highly obvious.

According to the VIA, the proposed project will generally result in a relatively limited level of visual impact within an area that is already impacted significantly by other solar projects (existing, under construction and proposed). The level of impact within the region is also likely to increase. In general terms therefore the proposed project is in keeping with its surroundings and will not impact significantly on receptors that are likely to be sensitive to landscape change associated with the project.

## 5.2 Sustainable Social and Economic Benefit

A Social Impact Assessment (SIA) has been conducted for this proposed development. The SIA focused on the collection of data to provide an understanding of the current social environment associated with the area within which the Ngwedi PV Facility is proposed and identify and assess social issues and potential social impacts associated with the development of such a project. According to the SIA, settlement areas located in the vicinity of the proposed development includes Ses Brugge, Klippunt, Dyasons Klip Settlement, Oranjevallei, Louisvale, Kalksloot and Kanoneiland. These communities are considered to be low-income communities housed in low cost and informal housing. The residents of these settlements are employed largely by the local agricultural sector,



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specifically viticulture and fruit farms and associated manufacturing facilities. The employment opportunities are therefore largely seasonal.

The primary socio-economic benefits of the proposed development relate to the creation of direct and indirect employment and skills development opportunities, as well as the contribution of the proposed development to supplementing energy requirements through renewables.

The SIA concludes that the social impacts identified (including all positive and negative impacts) will be either of a low or medium significance. No negative impacts with a high significance rating has been identified to be associated with the development of Ngwedi PV. All negative social impacts are within acceptable limits with no impacts considered as unacceptable from a social perspective. The recommendations proposed for the project are considered to be appropriate and suitable for the mitigation of the negative impacts and the enhancement of the positive impacts.

As such, it is concluded that the proposed socio-economic benefits of the proposed development out-weigh the negative impacts to heritage resources.

### **5.3 Proposed development alternatives**

Based on site-specific attributes such as location, access, topography, extent and solar resource, the applicant considers the development area located within the broader study area as highly preferred in terms of the development of a solar PV facility, and expects that Ngwedi PV will be able to draw on synergies with the projects proposed and/or currently authorised within the vicinity of the broader study area. As a result, no site location/property alternatives are proposed as part of this BA process.

The only alternatives that have been proposed are for the Main Access Roads into the study area. Two alternatives have been proposed:

#### **Main Access Road 1 (preferred):**

- Along an existing track
- 6m wide and 8,5km long
- No impacts to heritage resources anticipated

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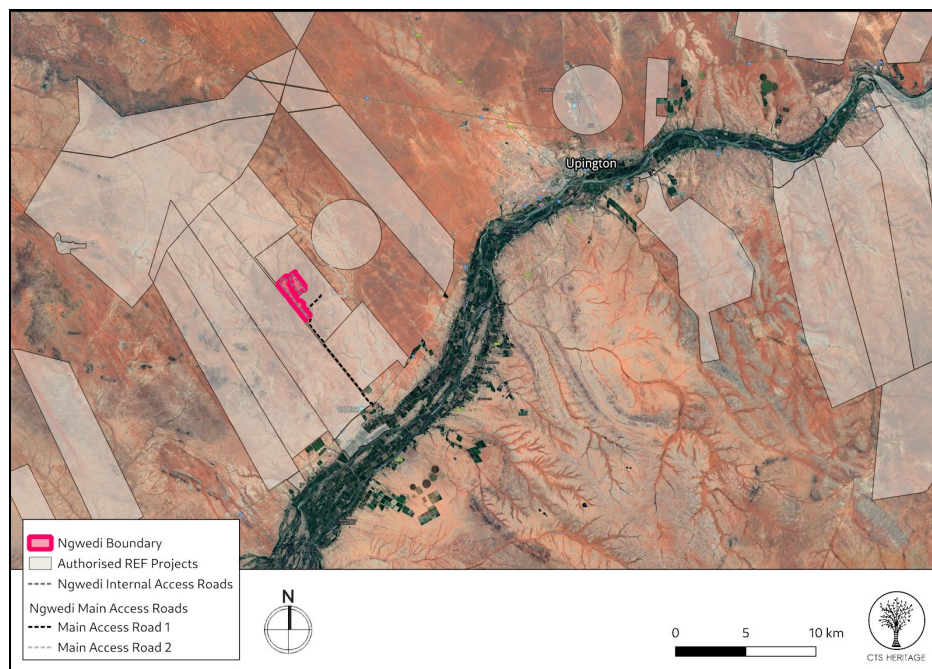
**Main Access Road 2:**

- Along an existing track
- 6m wide and 18,5km long
- No impacts to significant heritage resources anticipated

There is no preferred alternative in terms of impacts to heritage resources for the proposed Main Access Road to the study area. As such, the technically preferred alternative by the Developer is the nominated alternative from a heritage perspective.

**5.4 Cumulative Impacts**

Cumulative impact in terms of heritage was assessed by reviewing the Environmental Authorisations granted for Renewable Energy Facilities within 20km of the proposed development area (Map 8). Due to the high number of approved Renewable Energy Facilities in this area, the character of the landscape has been changed from natural wilderness to semi-industrial with special emphasis on renewable energy. As such, the proposed development fits in with the other approved developments in this area. In principle, it is more appropriate to cluster such developments together rather than have them spread across the landscape in order to minimise the impact on significant cultural landscapes.



**Map 8: Renewable Energy Facilities that have received Environmental Authorisation in proximity to the proposed development**





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**Table 4: Cumulative Impact Table**

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

## 6. RESULTS OF PUBLIC CONSULTATION

The public consultation process will be undertaken by the Environmental Assessment Practitioner (EAP) during the BA process. No heritage-related comments have been received to-date. In terms of section 38(8) of the National Heritage Resources Act (Act 25 of 1999), the South African Heritage Resources Agency (SAHRA) is required to comment on this HIA and make recommendations prior to the granting of the Environmental Authorisation.

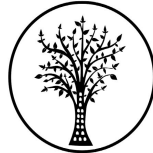
## 7. CONCLUSION

The proposed development will not have a negative impact on the heritage resources situated within the footprint of proposed Ngwedi PV Facility. The lithic and historic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during the construction phase, the impact is inconsequential. No mitigation is required. Furthermore, as the proposed access road alternatives run along existing access tracks, neither alternative is likely to impact significant archaeological heritage, other than Site ID 44977 which is described as a single LSA tool and is graded IIIC. No further mitigation for this site is necessary. Due to the low significance impact to heritage resources, there is no preferred alternative in terms of impacts to heritage regarding the Main Access Route. No formal or informal graves were identified within the development footprint.

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Based on experience and the lack of any previously recorded fossils from the broader study area, it is extremely unlikely that any fossils would be preserved in the loose Quaternary sands. There is a very small chance that fossils may occur in the adjacent shales of the early Permian Vryheid Formation and as such a Chance Fossil Finds Protocol should be added to the Environmental Management Programme (EMPr). All proposed infrastructure lie on the Gordonia Formation dune and aeolian sands and as far as the palaeontology is concerned impact to significant palaeontological resources is unlikely.

According to the VIA, the proposed project will generally result in a relatively limited level of visual impact within an area that is already impacted significantly by other solar projects (existing, under construction and proposed). The level of impact within the region is also likely to increase. In general terms therefore the proposed project is in keeping with its surroundings and will not impact significantly on receptors that are likely to be sensitive to landscape change associated with the project. In addition, the proposed development is located within a REDZ and Power Corridor. Due to the REDZ, there are a number of similar existing and/or proposed PV facilities in the area (and within the broader study area) and as such, there is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial, however, due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.

The heritage impact assessment has identified no resources of heritage significance that are likely to be impacted by the proposed development. Therefore, no further mitigation is required, and from a heritage point of view, there is no objection to the proposed development in this area.

## 8. RECOMMENDATIONS

There is no objection to the proposed development on heritage grounds and the following is recommended:

- There is no preferred alternative in terms of impacts to heritage for the Main Access Route and as such, the preferred alternative of the developer is preferred in terms of impacts to heritage.
- A Chance Fossil Finds Procedure must be implemented (see attached as part of Appendix 2)
- The mitigation recommendations included in the VIA are implemented (Section 6 of the VIA)
- 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.

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remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted.

- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA.
- The above recommendations must be included in the Environmental Management Programme (EMPr) for the project.

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4112	AIA	Peter Beaumont	29/01/2008	Phase 1 Heritage Impact Assessment Report on a Portion of the Farm Keboes 37, near Kanoneiland, Siyanda District Municipality, Northern Cape Province
4123	AIA	Peter Beaumont	01/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Residential Development Flanking Dakota Drive in Upington, //Khara Hais Municipality, Northern Cape Province
4101	AIA	Peter Beaumont	22/10/2005	Archaeological Impact Assessment at and in the Vicinity of a Quartzite Quarry on Portion 4 of the Farm Droogehout 442 near Upington
4135	AIA	Peter Beaumont	20/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension of the Raaswater Township, Siyanda District Municipality, Northern Cape Province
4136	AIA	Peter Beaumont	22/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension of Kalksloot Settlement, Siyanda District Municipality, Northern Cape
7547	AIA	Jaco van der Walt	30/10/2011	AIA for the proposed OfriZX Photovoltaic Plant, Keimoes, Northern Cape
7548	AIA	Jaco van der Walt	31/07/2011	Heritage Scoping Report for the proposed Ofir ZX Photovoltaic Plant near Keimoes, Northern Cape
4124	AIA	Peter Beaumont	24/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension of the Rosedale Settlement in Upington, //Khara Hais Municipality, Northern Cape Province
4131	AIA	Peter Beaumont	18/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Township Extension Flanking Keimoesweg, //Khara Hais Municipality, Northern Cape Province
4133	AIA	Peter Beaumont	19/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Township Extension Flanking Lemoendraai in Upington, //Khara Hais Municipality, Northern Cape Province
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119309	HIA	Stephan Gaigher	10/10/2012	HERITAGE IMPACT ASSESSMENT REPORT Proposed Establishment of Several Electricity Distribution Lines within the Northern Cape Province
124405	HIA	Stephan Gaigher	29/10/2013	Heritage Impact Assessment Report for the Proposed Sirius Solar Project near Upington in the Northern Cape Province
124406	PIA	JF Durand	02/04/2013	Palaeontology Scoping Report
128281	HIA	David Morris	30/07/2013	RE Capital 3 Solar Development on the property Dyasons Klip west of Upington,

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7841	AIA	Peter Beaumont	17/08/2006	Phase 1 Heritage Impact Assessment Report on a Planned Extension of the Rosedale Township, //Khara Hais Municipality, Northern Cape Province
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7925	AIA	Jaco van der Walt	31/10/2011	AIA for the proposed S-Kol Photovoltaic Plant, Keimoes, Northern Cape
117902	HIA	Anton van Vollenhoven	25/05/2012	A REPORT ON A HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED SASOL CSP PROJECT NEAR UPINGTON IN THE NORTHERN CAPE PROVINCE
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160008	HIA	Johnny Van Schalkwyk	15/03/2014	Cultural Heritage Impact Assessment for the proposed township development, Paballelo, Upington, //Khara Hais Municipality
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