HERITAGE IMPACT ASSESSMENT

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

PROPOSED DEVELOPMENT OF KOTULO TSATSI ENERGY PV 1 NEAR KENHARDT, NORTHERN CAPE

SAHRIS Ref: 15671

Prepared by CTS Heritage

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For

Savannah Environmental (Pty) Ltd

January 2021

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THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I Jenna Lavin, as the appointed independent specialist hereby declare that I:

• act/ed as the independent specialist in this application;

• regard the information contained in this report as it relates to my specialist input/study to be true and correct, and

• do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;

• have and will not have no vested interest in the proposed activity proceeding;

• have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;

• am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;

• have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;

• have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;

• have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;

• have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and

• am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

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Signature of the specialist

CTS Heritage
Name of company

January 2021
Date

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EXECUTIVE SUMMARY

1. Site Name:

Kotulo Tsatsi PV 1

2. Location:

Portion 3 of Farm Styns Vley 280, Hantam Local Municipality, Northern Cape

3. Locality Plan:

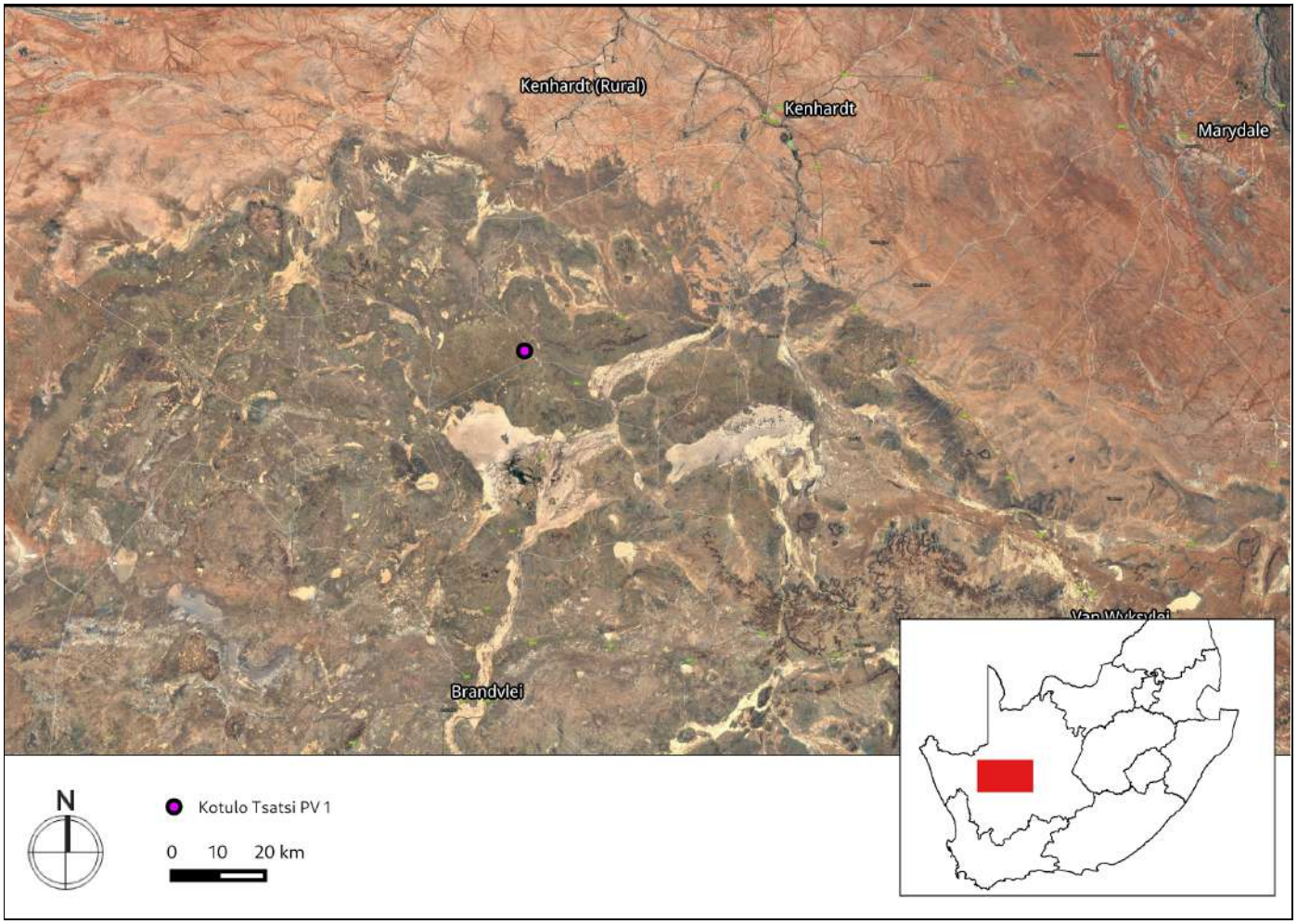

Figure 1: Location of the proposed development area

4. Description of Proposed Development:

The Applicant, Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV1) located on a site located approximately 70km south-west of the town of Kenhardt and 60km north east of Brandvlei in the Northern Cape Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for CSP project infrastructure. The project site 1 falls under the Hantam Local Municipality which is part of Namakwa District Municipality.

5. Heritage Resources Identified:

Archaeology

Despite detailed inspection of the dolerite outcrops, no engravings were found. Furthermore, the generally low density of artefacts found on the farms was notable. As found by Van der Walt in 2014, the regular distribution of sparse artefacts and isolated finds can be detected across the entire study area but dense site concentrations are virtually absent and, in this case, even the dolerite outcrops offered only moderately dense artefact scatters. The dolerite outcrops here are much smaller than the major ones in neighbouring areas containing engravings and no perennial streams or rivers are found here. Based on the evidence, it does not appear that the study area was used extensively during the Stone Age.

Palaeontology

Almond (2015) found that “Desktop analysis of the fossil records of the various sedimentary rock units underlying the broader Solar Reserve Kotulo Tsatsi Energy study area, including the solar energy facility development area and transmission/distribution overhead power line corridor, combined with field assessment of numerous representative rock exposures within and close to this area, indicate that all of these units are of low to very low palaeontological sensitivity. The potentially fossiliferous Karoo Supergroup bedrocks (Dwyka and Ecca Groups) are deeply weathered and extensively calcretised near-surface. Over the majority of their outcrop areas the bedrocks are mantled by various superficial deposits that may reach thicknesses of several meters and that are of low palaeontological sensitivity.” Two palaeontological sites are present within the proposed development area assessed in this report - SAHRIS Site ID 90934 and 90935, each graded IIIC, however Almond (2015) does not recommend any mitigation in terms of impact to these resources. Amond (2015) further recommends that “During the construction phase all deeper (> 1 m) bedrock excavations should be monitored for fossil remains by the responsible ECO. Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses or

dense fossil burrow assemblages be exposed during construction, the responsible Environmental Control Officer should safeguard these, preferably in situ, and alert SAHRA. Based on the work completed by Almond (2015) for this area, it is recommended that no further palaeontological assessment is necessary, but that the attached Chance Fossil Finds Procedure be implemented for all deep bedrock excavations.

6. Anticipated Impacts on Heritage Resources:

The area proposed for the development of the Kotulo Tsatsi PV1 Solar Energy facility and its associated grid infrastructure was thoroughly assessed in the field assessment described in this report. The field assessment conducted found no significant archaeological or other heritage resources of cultural significance located within the proposed development footprints, which corroborates the findings of previous assessments conducted in this area. Furthermore, the dolerite outcrops evident in the geology map located to the east of the study area do not form hills or koppies and are therefore unlikely to have been used in rain-making activities.

According to the palaeontological assessment completed by Almond (2015), although the geology of the proposed development area is highly sensitive for impacts to palaeontology, the conditions on the ground are such that the actual palaeontological sensitivity is low. As such, it is unlikely that the proposed development will negatively impact on significant palaeontological heritage on condition that the Chance Fossil Finds Procedure is implemented during excavation activities (Appendix 3).

As such, it is unlikely that the proposed development will negatively impact on significant archaeological or palaeontological heritage resources and as such, there is no objection to the proposed development.

7. Recommendations:

There is no objection to the proposed development on heritage grounds on condition that:

- All excavation activities are subject to the Palaeontological Chance Finds Procedure (attached as Appendix 3)
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

8. Author/s and Date:

Jenna Lavin, January 2021

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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 50 Heritage Impact Assessments throughout South Africa.

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APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

The Applicant, Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV1) located on a site located approximately 70km south-west of the town of Kenhardt and 60km northeast of Brandvlei in the Northern Cape Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 200MW. The facility will be located within the farm Portion 3 of Farm Styns Vley 280. The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for CSP project infrastructure. The project site 1 falls under the Hantam Local Municipality which is part of Namakwa District Municipality.

The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site. The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorised generation technology for the facility located on the farm Portion 3 of Farm Styns Vley 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a previously authorised grid connection solution 2, which consists of a collector substation, switching station and a power line to the Eskom Aries Substation located north-east of the project site.

Kotulo Tsatsi Energy PV1 is planned to be bid into the Department of Mineral Resources and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Kotulo Tsatsi Energy PV1 set to inject up to 200MW AC into the national grid.

A development envelope of ~847ha was defined through the Scoping evaluation of the site, and has now been assessed for the project which includes the PV infrastructure required to generate 200MW of electricity. The infrastructure to be developed within the development envelope will be known as the development footprint and will have an extent of ~810ha. The infrastructure associated with this PV development includes:

» Solar PV array footprint comprising of:

- PV modules and mounting structures
- Inverters and transformers
- Integrated Energy Storage System (IESS)

- Cabling between the project components
- Internal access roads

» Access roads, internal distribution roads and fencing around the development footprint

» Admin block comprising of:

- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Assembly plant
- Laydown areas

The assessment of the PV facility on the site is to support the technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the following previously authorised infrastructure will be retained for use for the planned PV facility, and the associated footprint areas of the following previously authorised infrastructure have not been reassessed in this EIA:

» Complete grid connection to Aries Substation:

- Grid connection via a previously authorised grid connection solution, which consists of internal grid reticulation, a collector substation, switching substation and a power line to the Eskom Aries Substation located north-east of the project site.

1.2 Description of Property and Affected Environment

Portion 3 of Styns Vley 280 lies south of the gravel road that links these farms back to the R27 main road in the east. There is very little change in topography in this landscape as the ground is nearly completely flat, dotted with dry vleis and streams that only run shortly after heavy rainfall. A number of windmills and associated concrete dams have been constructed in the past to provide water for grazing animals such as the Dorper sheep farmed in this area. Bushmanland Basin Shrubland dominates this area and a series of naturally occurring shale bands were found exposed at ground level with a small, limited and confined area of dolerite boulders near the main Styns Vley farmhouse complex.

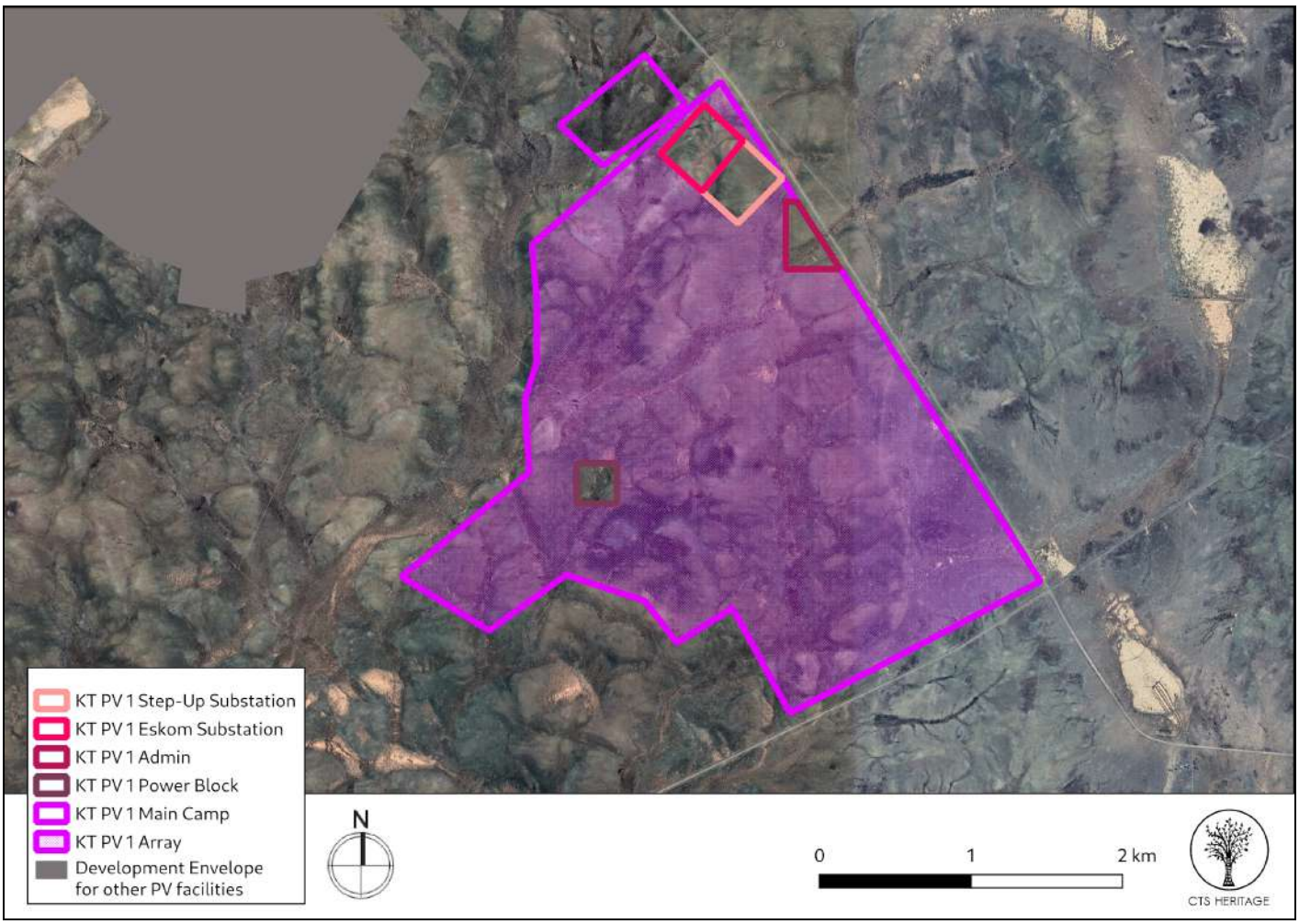


Figure 1: The proposed development area including all proposed Solar Energy Facilities

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 5 to 6 January 2021.
- As a palaeontologist has previously conducted an assessment of palaeontological resources known from the exact project area (Almond 2015), this information was used to inform the likely impacts of this proposed development on palaeontological heritage
- The identified resources were assessed to evaluate their heritage significance
- 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.

2.4 Constraints & Limitations

No constraints or limitations were experienced in the heritage assessment process for this project. The experience of the heritage practitioner, the archaeological specialists and palaeontological specialist as well as observations made during the study, allow us to predict with some accuracy the heritage 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.
- 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) x 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).

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Background

The area proposed for development is located approximately halfway between Kenhardt and Brandvlei in the Northern Cape. In 2015, a process was followed to secure authorisation for the proposed development of a concentrated solar plant and associated infrastructure with a generating capacity of up to 200MW to be located on the farm Styns Vley 280. As part of this previous process, various archaeological specialist assessments (Van der Walt, 2014, SAHRIS NID 169885, 6035) and palaeontological specialist assessments (Almond, 2015, SAHRIS NID 340296), each with fieldwork components, were completed. The location of the proposed development of the Kotulo Tstatsi PV 1 assessed in this desktop report overlaps with the area assessed previously. As such, the reports previously drafted by Van der Walt and Almond are referred to below in order to inform this desktop screening assessment.

3.2 Cultural Landscape

According to Gaigher (2012, SAHRIS ID 34135), prior to colonial settlement, this area was occupied by the Korana who had been forced to the outskirts of the Cape Colony along the Gariep River. In 1868, colonial forces were sent to deal with the conflicts arising with the Korana. The colonial forces set up camp beneath a camelthorn tree and with time the town of Kenhardt developed from under this tree, becoming a municipality in 1909. When this area was eventually settled by colonists, war broke out between the colonial settlers and the Korana, who were then dispursed upon their defeat. Kenhardt has for a long time been the most remote settlement in the Northern Cape.

The area between Kenhardt and Brandvlei has previously been described as “a huge landscape of nothingness”,

however this is misleading as this area was occupied for thousands of years by the Korana and their ancestors. Evidence of this is available in the distribution of stone age artefacts across the landscape, the rock engravings known from this area located on dolerite boulders that occur throughout the region between Kenhardt, Brandvlei and Vanwyksvlei. as well as in the accounts of Khoe and San culture available from the interviews by Bleek and Lloyd with /Xam men from the Kenhardt district (Deacon, 1997; Beaumont and Vogel, 1989; Skinner, 2017). Deacon (1997) notes that "the symbolism (of the /Xam) tends to be earth-bound in linking people to the land through ritual. The importance of the landscape can also be seen in the personification of geographical features through myths and legends that explain their form. As I have suggested elsewhere, rock art enhanced this symbolic linkage by marking those landscape features that were used in rituals over many generations".

According to Deacon (1997), "The landscape of the Upper Karoo where the /Xam lived appears to the stranger to be flat, and indeed the /Xam who lived between Kenhardt and Vanwyksvlei called themselves the "Flat Bushmen". To find one's way it is often necessary to climb a vantage point and such points are offered by dolerite dykes that snake across the plains." Such a dolerite outcrop is located in the eastern section of the proposed development area (Figure 4b). According to Deacon (1997), these dolerite outcrops may have provided protection from the wind and scatters of artefacts can be found there confirming that people made use of them. Furthermore, Deacon (1997) posits that these dolerite hills were strongly culturally linked to rain-making activities, and may have played a role in men's initiation.

3.3 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 (Figure 2.1). 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. Van der Walt completed two field assessments immediately adjacent to the proposed development area (2015, SAHRIS NID 6035 and 2017, SAHRIS NID 397221). While Van der Walt (2015) had anticipated that quantities of Early, Middle and Later Stone Age artefacts would be present within the area surveyed, he noted a marked paucity of sites resulting from systematic field survey. He noted that "In fact no Stone Age sites (knapping, quarry or habitation site) were recorded. Stone Age Material was restricted to isolated widely dispersed low density scatters (less than 2 artefacts per m^2)".

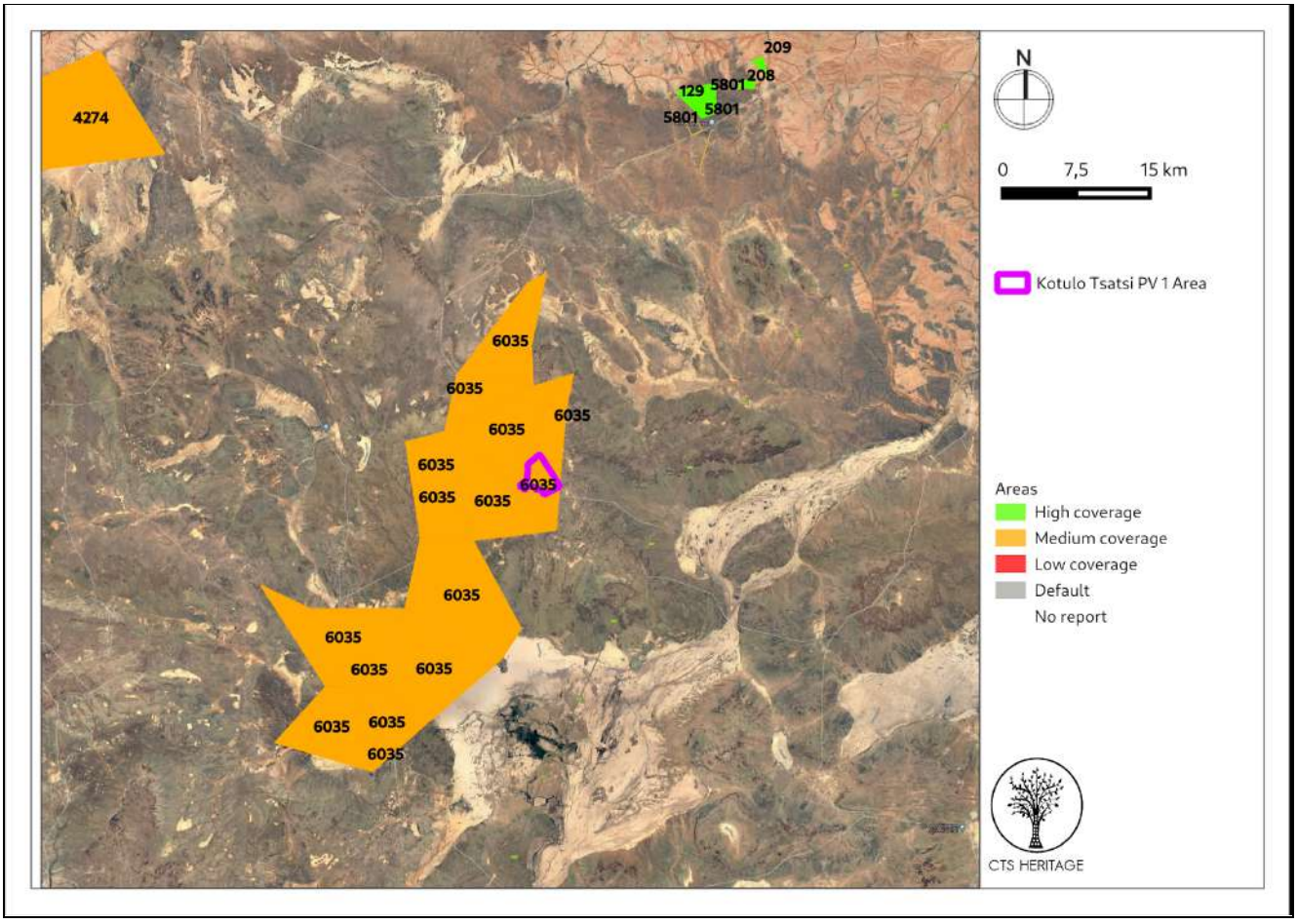
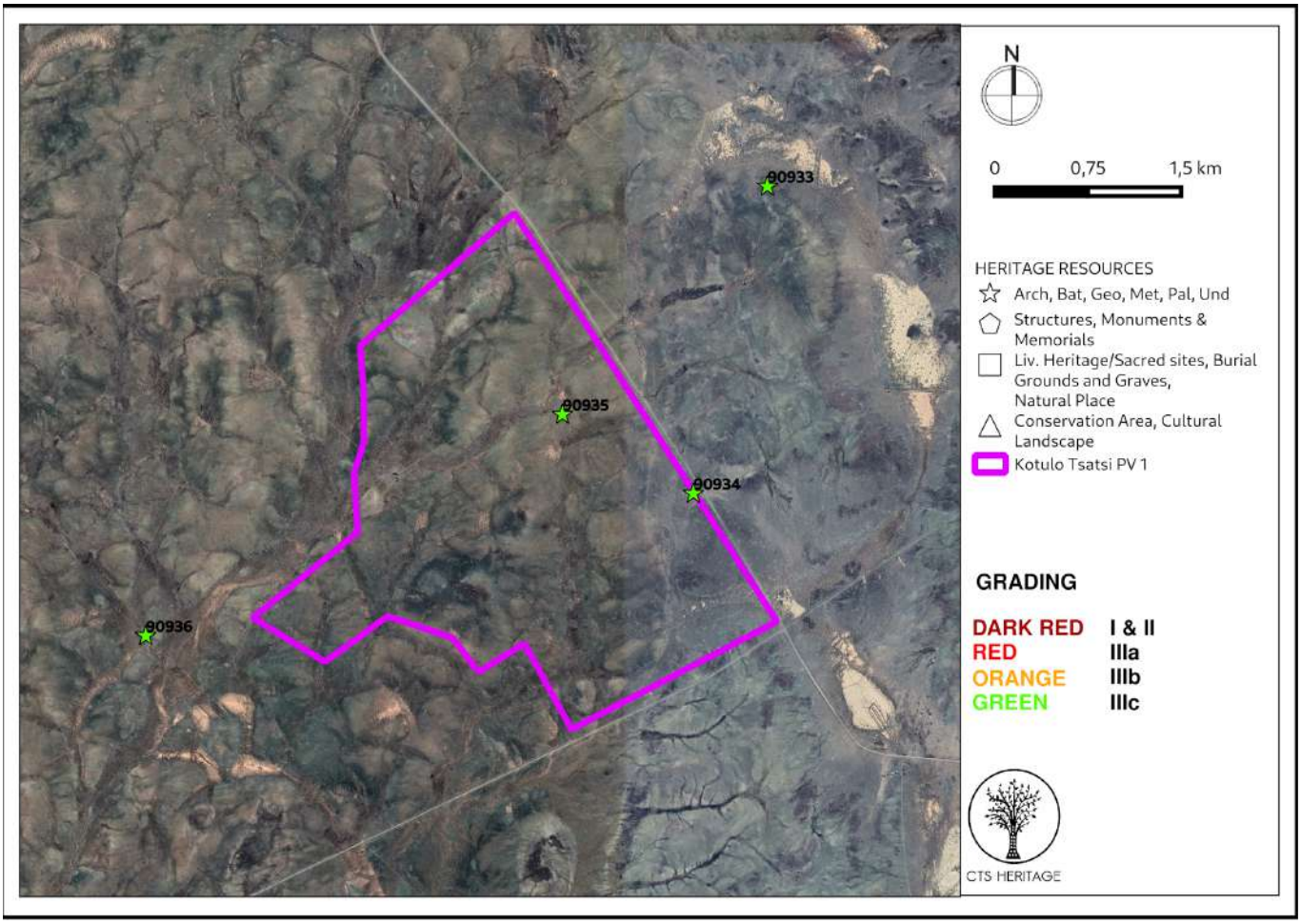


Figure 2.1: Spatialisation of heritage assessments conducted in proximity to the proposed development

With regard to the farm Steyns Vley 280, Van der Walt (2017) notes "In the study area there were only a few areas where surface material was noted. Artefact density is so low that they do not represent individual sites but rather background scatter or find spots. All observations are on the surface and there are no indicators that would suggest deeply stratified material anywhere in the study area. No associated organic remains (such as bone or ostrich eggshell) were noted with any of the stone scatters. Most of the material observed can probably be ascribed to the Middle Stone Age although some can be ascribed to the LSA and are smaller in size (< 5 cm in length). Miscellaneous Flakes, blades and chunks make up the majority of the scatters, and retouch was present on some items. The most predominant raw material was grey/white quartzite, although hornfel, banded ironstone and quartz were also recorded." He further indicates that widely distributed stone artefacts were noted across the farm Steyns Vley 280.

Van der Walt (2015) identified a site known as “Site 3” located on the farm Steyn’s Vley 280. This site consists of a farm house and associated outbuildings as well as a grave/memorial dated to 2010. This site was determined to have little to no heritage significance. Van der walt (2015) and (2017) makes no recommendations in terms of mitigating impacts to any of the resources identified. As such, while the presence of low density scatters of stone age, likely Middle Stone Age, artefacts across the study area is almost guaranteed, these observations are of low heritage significance and are unlikely to warrant mitigation interventions.

However, based on the proximity of the proposed development area to a dolerite outcrop, and the likelihood of impacts to significant engraved rock art as well as other elements of the cultural landscape, additional specialist archaeological investigation was undertaken.



Map 2.3: Spatialisation of heritage resources known in proximity to the proposed development

3.4 Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 3.1), the area proposed for development is underlain by sediments of moderate and high sensitivity for impacts to palaeontological heritage. According to the extract from the Council of GeoScience Map 2920 for Kenhardt (Figure 3.2), the area proposed for development is underlain by sediments from the Prince Albert Formation from the Ecca Group which have high palaeontological sensitivity. Impacts to palaeontology for the proposed Kotulo Tsatsi Solar Reserve, which overlaps the proposed development area, were assessed by Almond (2015, SAHRIS NID 340296) and as such, his findings for Farm Styns Vley 280 are pertinent to this application.

Almond (2015) found that "Desktop analysis of the fossil records of the various sedimentary rock units underlying the broader Solar Reserve Kotulo Tsatsi Energy study area, including the solar energy facility development area and transmission/distribution overhead power line corridor, combined with field assessment of numerous representative rock exposures within and close to this area, indicate that all of these units are of low to very low palaeontological sensitivity. The potentially fossiliferous Karoo Supergroup bedrocks (Dwyka and Ecca Groups) are deeply weathered and extensively calcretised near-surface. Over the majority of their outcrop areas the bedrocks are mantled by various superficial deposits that may reach thicknesses of several meters and that are of low palaeontological sensitivity." Two palaeontological sites are present within the proposed development area assessed in this report - SAHRIS Site ID 90934 and 90935, each graded IIIC, however Almond (2015) does not recommend any mitigation in terms of impact to these resources. Amond (2015) further recommends that "During the construction phase all deeper (> 1 m) bedrock excavations should be monitored for fossil remains by the responsible ECO. Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible Environmental Control Officer should safeguard these, preferably in situ, and alert SAHRA. Based on the work completed by Almond (2015) for this area, it is recommended that no further palaeontological assessment is necessary, but that the attached Chance Fossil Finds Procedure be implemented for all deep bedrock excavations.

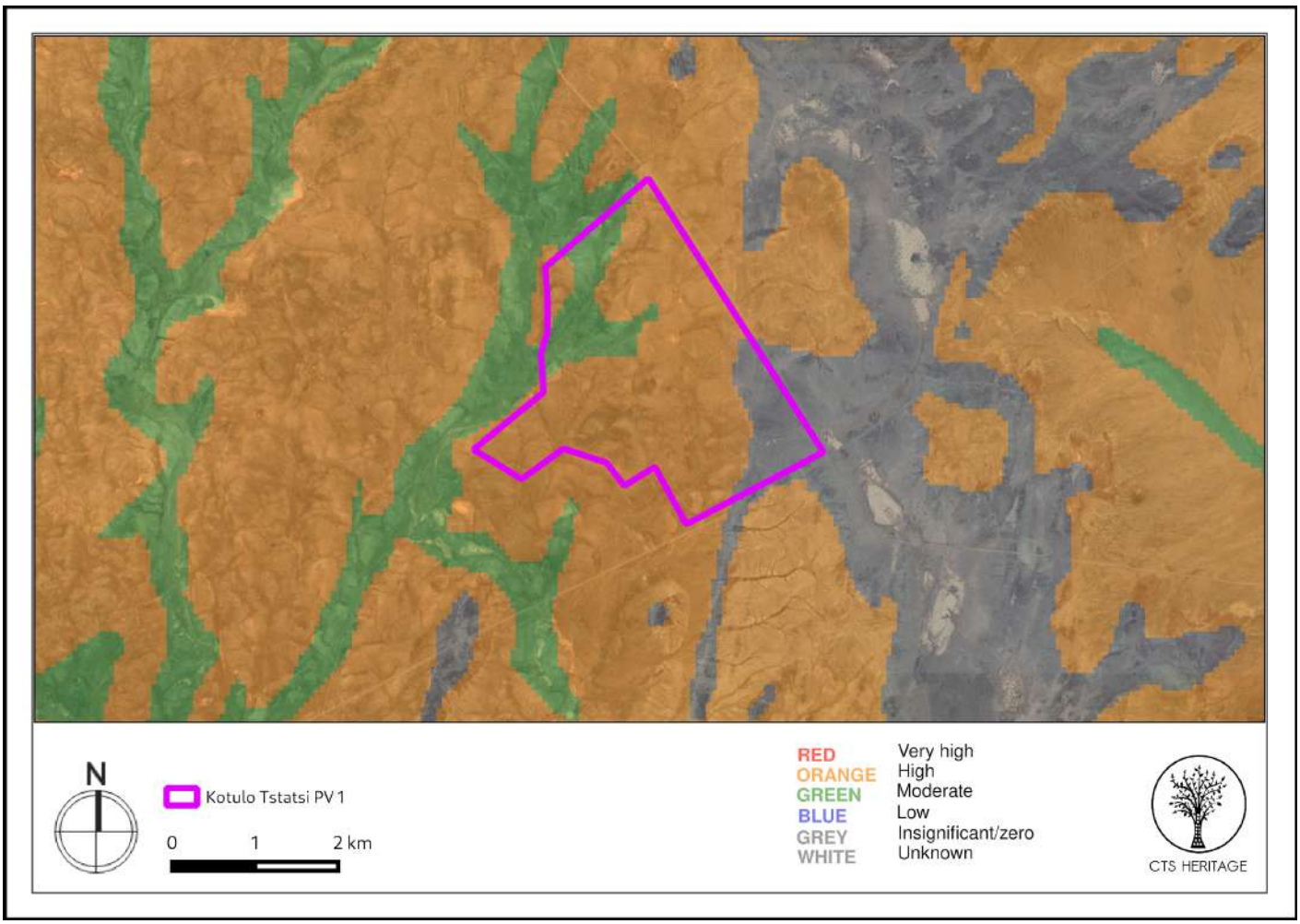


Figure 3.1: Palaeontological sensitivity of the proposed development area

3.5 Geology

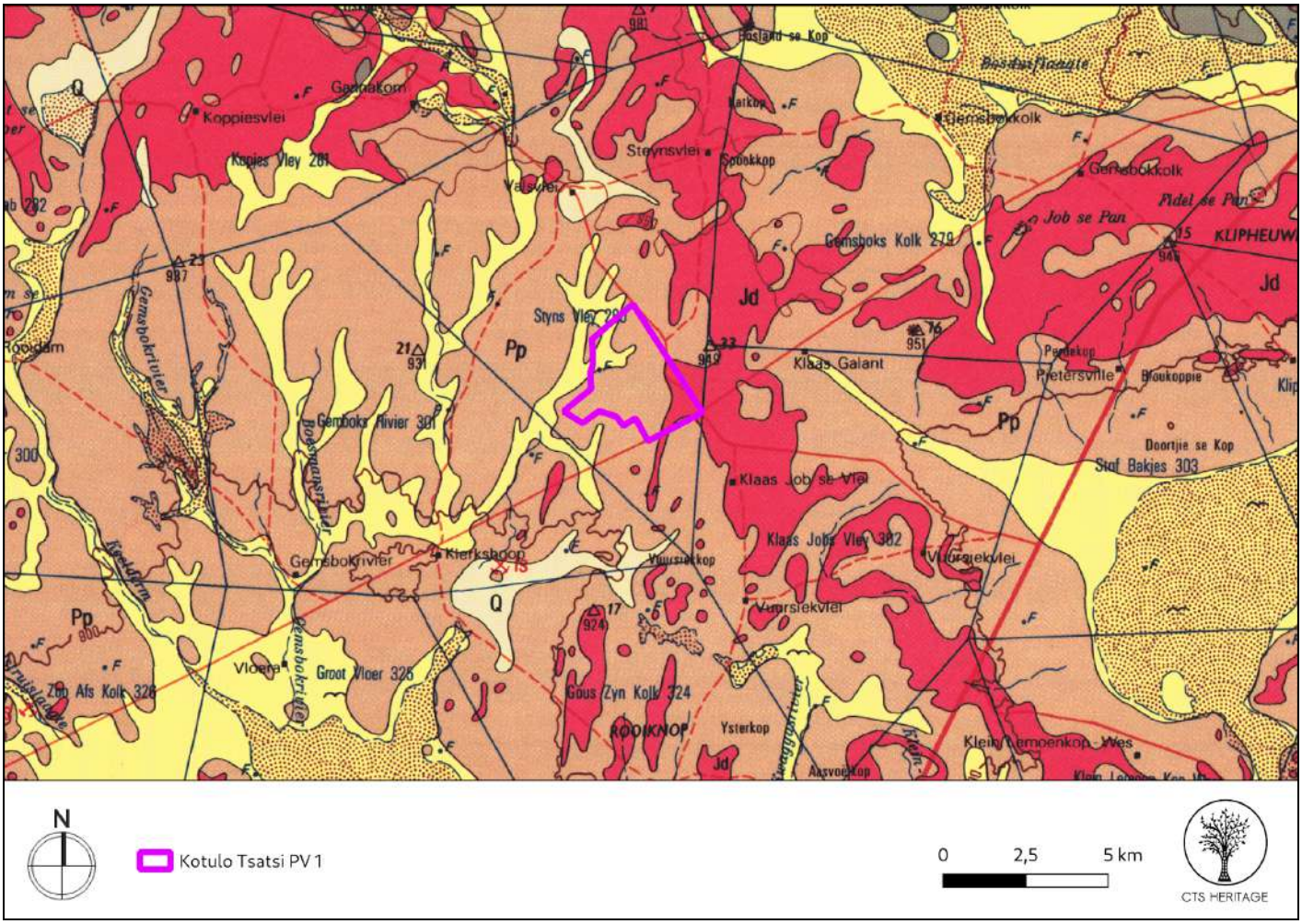
According to Almond (2015, SAHRIS NID 340296); " the north-eastern two thirds or so of the broader study area are underlain by glacially-related sediments of the PermoCarboniferous Dwyka Group (Karoo Supergroup, C-Pd). However, only the northernmost sector of the solar energy facility study area itself is underlain by Dwyka rocks. The majority of the solar facility study area, including the entire development footprint on Styns Vlei 280, is underlain by postglacial basinal mudrocks of the Prince Albert Formation (Karoo Supergroup, Ecca Group, Pp) of Early Permian age. The Karoo Supergroup sediments have been locally intruded and baked by extensive intrusive sheets or sills of the Karoo Dolerite Suite (Jd) which build a north-south trending zone of rocky terrain running along the eastern border of Styns Vlei 280 as well as scattered outcrops further to the northeast and east (e.g.

Klipheuwels). Small exposures of much older Precambrian (Mokolian / Mid Proterozoic) basement rocks of the Namaqua-Natal Province (e.g. De Bakken Granite, Mdk) are mapped to the east of the present broader study area on the farm Karee Boom Kolk 248 and similar outcrops may also occur subsurface in the broader study area itself. These comprise two billion year old granitoid intrusions and highly metamorphosed sediments (cf Cornell et al. 2006)…they are entirely unfossiliferous…"

Almond (2015, SAHRIS NID 340296) further notes that "the Karoo Supergroup sediments, Karoo dolerites and any older basement rocks within the broader study area, including the solar energy facility development footprint, are almost entirely mantled with a range of Late Caenozoic superficial deposits, mostly of Late Tertiary to Quaternary age. They include alluvium, pan sediments, calcrete hard pans as well as surface and subsurface gravels and may reach thicknesses of several meters or more. Where exposed in borrow pits along the major roads and the Sishen-Saldanha railway line and in other artificial excavations (e.g. farm dams), the bedrocks are often weathered and calcretised to a depth of several meters, reflecting periods of both drier and wetter climates in the geologically recent past. The projecting small koppies within the area consist largely of dolerite and occasionally of associated baked (thermally metamorphosed) country rocks."

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

Symbol	Group/Formation	Notes
Qs	Kalahari Group, wind-blown sand (Gordonia Formation)	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (S*truthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *unio*) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils
Jd	Jurassic dolerite	intrusive dolerites (dykes, sills), associated diatremes EARLY JURASSIC No palaeontological sensitivity
Pp	Prince Albert Formation, Ecca Group	low diversity marine invertebrates (bivalves, nautiloids, brachiopods), palaeoniscoid fish, sharks, fish coprolites, protozoans (foraminiferans, radiolarians), petrified wood, palynomorphs (spores, acritarchs), non-marine trace fossils (especially arthropods, fish, also various "worm" burrows), possible stromatolites, oolites



Map 3.2: Geology Map. Extract from the CGS 2920 Kenhardt Map indicating that the development area for development is underlain by Pp: Prince Albert Formation of the Ecca Group, Jd: Jurassic Dolerites and Quaternary Sands (yellow)

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology

The area proposed for the development of the Kotulo Tsatsi PV1 facility and associated infrastructure has yielded some cultural remains but with varied value and preservation. The isolated and scattered lithic artefacts are typical of a deflated landscape and have very limited cultural value given that they have been accumulated and modified by various natural processes to their current *ex situ* state. None of the archaeological resources identified in this field assessment are considered worthy of conservation.

These findings correlate with the findings of Van der Walt (2014, 2015 and 2017) from the same area and it is agreed that, as per his findings; "In the study area there were only a few areas where surface material was noted. Artefact density is so low that they do not represent individual sites but rather background scatter or find spots. All observations are on the surface and there are no indicators that would suggest deeply stratified material anywhere in the study area. No associated organic remains (such as bone or ostrich eggshell) were noted with any of the stone scatters. Most of the material observed can probably be ascribed to the Middle Stone Age although some can be ascribed to the LSA and are smaller in size (< 5 cm in length). Miscellaneous Flakes, blades and chunks make up the majority of the scatters, and retouch was present on some items".

4.2 Heritage Resources identified

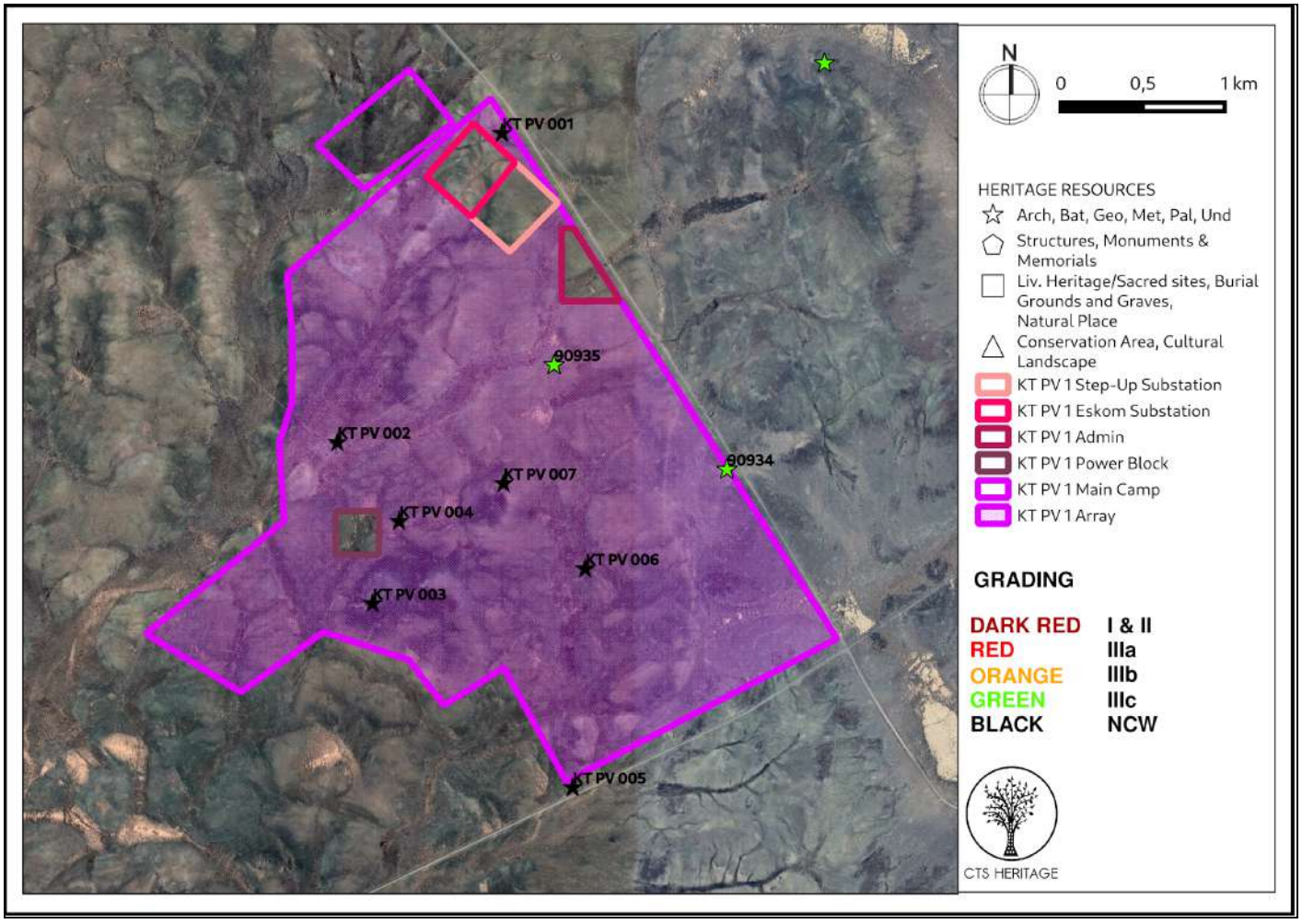
Despite detailed inspection of the dolerite outcrops, no engravings were found. Furthermore, the generally low density of artefacts found on the farms was notable. As found by Van der Walt in 2014, the regular distribution of sparse artefacts and isolated finds can be detected across the entire study area but dense site concentrations are virtually absent and, in this case, even the dolerite outcrops offered only moderately dense artefact scatters. The dolerite outcrops here are much smaller than the major ones in neighbouring areas containing engravings and no perennial streams or rivers are found here. Based on the evidence, it does not appear that the study area was used extensively during the Stone Age.

As previously mentioned, a number of windmills and associated concrete farm dams and kraals dot the landscape to bring up subterranean water to sustain sheep farming. Two main, modern farmhouse complexes lie along the north-northwest gravel road on the northern end of the study area.

Table 2: Observations from the field assessments and sites from SAHRIS for the Kotulo Tsatsi PV1 SEF

POINT ID	Site Name	Description	Co-ordinates		Grading	Mitigation
KT PV 001	**KT PV1**	Hornfels flakes, lower and upper grindstones, granite UG, mostly MSA. Grindstones could be younger (LSA)	-29.79456	20.60874	NCW	None
KT PV 002	**KT PV1**	Concrete tank, kraal complex, Some MSA isolated flakes are around here too	-29.81149	20.59833	NCW	None
KT PV 003	**KT PV1**	Chert MSA flake cores	-29.82032	20.60056	NCW	None
KT PV 004	**KT PV1**	Quartzite flake, notched	-29.81581	20.60223	NCW	None
KT PV 005	**KT PV1**	Heavily patinated hornfels flake	-29.83039	20.6132	NCW	None
KT PV 006	**KT PV1**	Quartzite and hornfels flakes	-29.81842	20.61399	NCW	None
KT PV 007	**KT PV1**	Milky quartzite flake	-29.81374	20.60883	NCW	None
90934	**KT PV1**	**Palaeo-Wolmaransstad75MWSEF 007 - Borrow pit into calcretised silty sediments overlying weathered dolerite, west of dust road, Steyns Vlei 280**	**-29,812972**	**20,622944**	**IIIC**	**None**
90935	**KT PV1**	**Palaeo-Wolmaransstad75MWSEF 008 - Brown-patinated platy surface gravels overlying Prince Albert Fm, Steyns Vlei 280**	**-29,80725**	**20,612028**	**IIIC**	**None**

4.3 Mapping and spatialisation of heritage resources



Map 5: Observations made during the field assessment and extracted from SAHRIS

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

The area proposed for the development of the Kotulo Tsatsi PV1 facility and associated infrastructure has yielded some cultural remains but with varied value and preservation. The isolated and scattered lithic artefacts are typical of a deflated landscape and have very limited cultural value given that they have been accumulated and modified by various natural processes to their current *ex situ* state. None of the archaeological resources identified in this field assessment are considered worthy of conservation.

These findings correlate with the findings of Van der Walt (2014, 2015 and 2017) from the same area and it is agreed that, as per his findings; "In the study area there were only a few areas where surface material was noted. Artefact density is so low that they do not represent individual sites but rather background scatter or find spots. All observations are on the surface and there are no indicators that would suggest deeply stratified material anywhere in the study area. No associated organic remains (such as bone or ostrich eggshell) were noted with any of the stone scatters." In our study the predominant raw material was hornfels instead of grey/white quartzite and this was potentially due to the additional time we had to spend on the properties taking the previous findings into account before the new study was completed. This does not, however, materially change the overall assessment made by Van der Walt (2014) as quartzite artefacts are widely found in the area.

No engraved rock art was identified in this assessment, nor was it identified by Van der Walt (2015 and 2017) despite the proximity of the study area to known rock art sites. Furthermore, the dolerite outcrops evident in the geology map located to the east of the study area do not form hills or koppies and are therefore unlikely to have been used in rain-making activities. As such, it is unlikely that the proposed development of the Kotulo Tsatsi PV1 solar energy facility will negatively impact any significant archaeological heritage resources.

Almond (2015) found that the potentially fossiliferous Karoo Supergroup bedrocks (Dwyka and Ecca Groups) are deeply weathered and extensively calcretised near-surface in this area. Over the majority of their outcrop areas the bedrocks are mantled by various superficial deposits that may reach thicknesses of several meters and that are of low palaeontological sensitivity." Two palaeontological sites are present within the proposed development area assessed in this report - SAHRIS Site ID 90934 and 90935, each graded IIIC, however Almond (2015) does not recommend any mitigation in terms of impact to these resources. Amond (2015) further recommends that "During the construction phase all deeper (> 1 m) bedrock excavations should be monitored for fossil remains by the responsible ECO. Should substantial fossil remains such as vertebrate bones and teeth, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible Environmental Control Officer should safeguard these, preferably in situ, and alert SAHRA. Based on the work completed by Almond (2015) for

this area, it is recommended that no further palaeontological assessment is necessary, but that the attached Chance Fossil Finds Procedure be implemented for all deep bedrock excavations.

Table 3: Impacts of the Kotulo Tsatsi PV 1 Solar Energy facility and associated infrastructure to archaeological resources

NATURE: It is possible that buried archaeological resources may be impacted by the proposed development				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (1)**	No significant archaeological resources were identified within the development area.	**L (1)**	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**	(1+5+1)x1=7	**L**	(1+5+1)x1=7
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		Yes		
MITIGATION: ECO monitor for impacts to archaeological resources				
RESIDUAL RISK: Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.				

Table 4: Impacts of the Kotulo Tsatsi PV 1 Solar Energy facility and associated infrastructure to palaeontological resources

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (1)**	Although no palaeontological resources were identified within the development area, the palaeontological sensitivity of the study area is rated as low by Almond (2015).	**L (1)**	Although no palaeontological resources were identified within the development area, the palaeontological sensitivity of the study area is rated as low by Almond (2015).
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Limited to the development footprint	**L (1)**	Limited to the development footprint
PROBABILITY	**I (2)**	It is improbable that significant fossils will be impacted by excavations that are greater than 1m deep	**I (1)**	It is improbable that significant fossils will be impacted by excavations that are greater than 1m deep
SIGNIFICANCE	**L**	(1+5+1)x2=14	**L**	(1+5+1)x1=7

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**	Possible	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: All excavations into bedrock are monitored by the ECO and governed by the attached Chance Fossil Finds Procedure				
RESIDUAL RISK: None				

5.2 Sustainable Social and Economic Benefit

According to the Social Impact Assessment (SIA) conducted for this project, a workforce for the construction of the facility will be required and therefore direct employment will be generated. The two closest towns(i.e. Kenhardt and Brandvlei) have a relatively large economically active population. It is estimated that during the construction phase (for the period of 12-18 months) approximately ~200-250 employment opportunities will be generated for the PV facility. In terms of skills requirements, it is common that highly skilled or skilled labour such as engineers, technical staff and project managers will make up approximately 20% of the work force; semi-skilled staff would typically be required to operate machinery and this will constitute about 30% of employees; while unskilled staff such as construction and security workers will constitute about 50% of the work force. Employment opportunities for the proposed development will peak during the construction phase and significantly decline during the operation phase.

The SIA further notes that the project has the potential to create several job opportunities for low skilled (construction, security and maintenance workers) and semi-skilled workers, which could potentially be sourced from the surrounding towns and area. However due to the small population sizes of these towns; the number of employees required and the limited skills available at local level, the required labour may need to be sourced from outside the immediate local areas within the Hantam Local Municipality. Therefore, it could be expected that some of the workers will be sourced from the region rather than only the closest towns. While the local labour pool may be qualified for less-skilled jobs, often local hiring will not meet the demands in professional, technical and supervisory areas. A number of specialist contractors would most likely be brought in from other areas.

Projects which form part of the DMRE's REIPPP Programme are required as part of their bidding requirements to contribute towards LED and social upliftment initiatives within the area in which they are proposed. In addition, they are required to spend a percentage of their revenue on socio-economic and enterprise development, as well as allocate ownership shares to local communities that benefit previously disadvantaged communities around the project. A portion of the dividends generated by each development also need to be invested into LED projects and programmes. Kotulo Tsatsi Energy PV1 therefore has the potential to contribute positively towards socio-economic development and improvements within the local area.

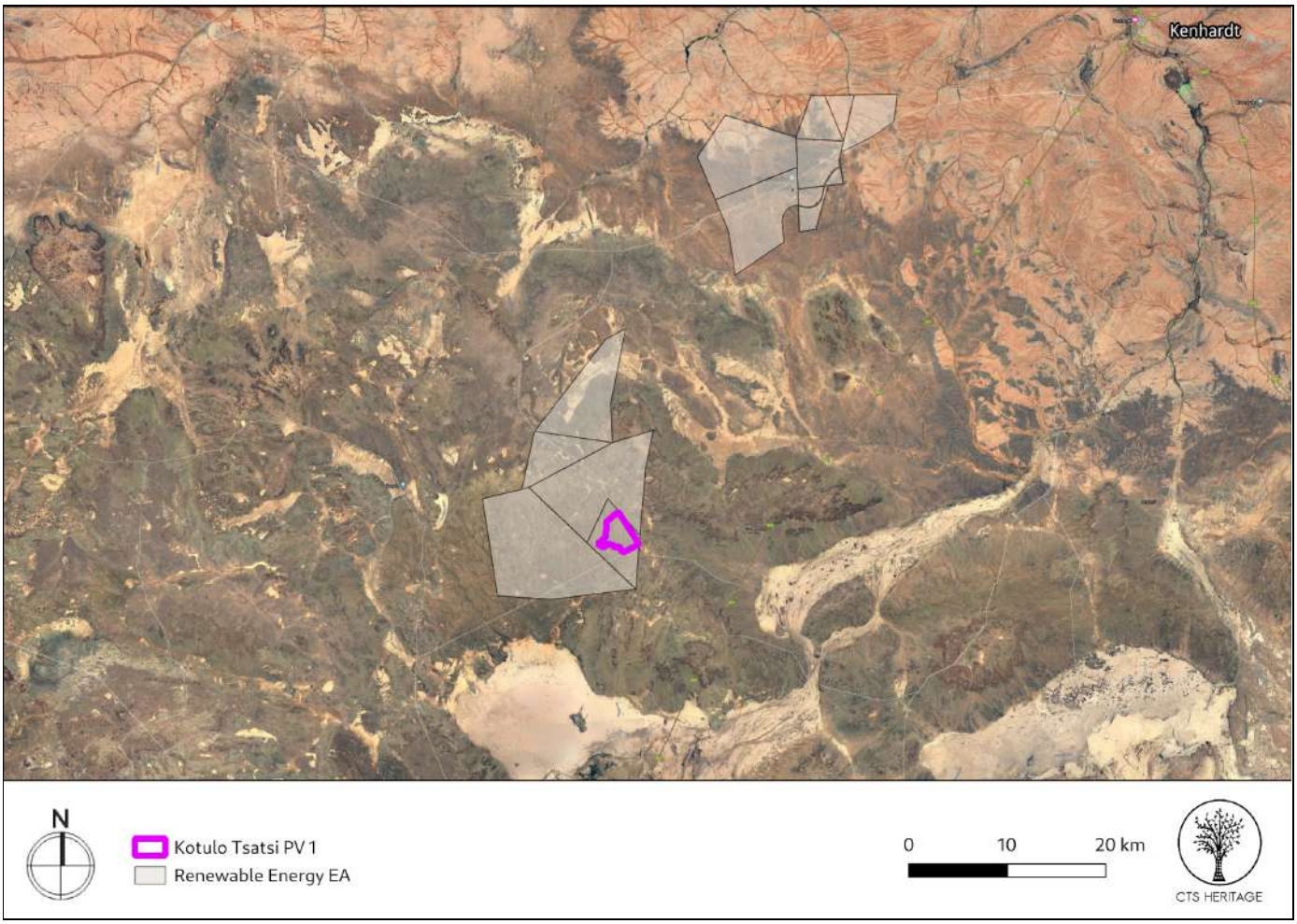
As such, based on the assessment of heritage impacts included herein, the anticipated socio-economic benefits that will result from the proposed development outweigh the anticipated impacts to heritage resources.

5.3 Proposed development alternatives

At this stage there are no site or location alternatives considered for this project, and only technology alternatives are considered. Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this area, based on the site location, ambient conditions and energy resource availability. Solar PV was therefore determined as the most suitable option for further assessment.

5.4 Cumulative Impacts

Cumulative impact in terms of heritage was assessed by reviewing the renewable energy facilities and other development infrastructure that are proposed or developed within 20km of the development area. The PV facility is planned to be located adjacent to the authorised 100MW Kotulo Tsatsi PV2 facility, and within an area previously authorised for CSP project infrastructure. Two previously approved CSP facilities are located on properties adjacent to the project site (on Portion 2 of Farm Kopjes Vley 281, and Portion 2 of Farm Styns Vley 280). The area previously approved for the CSP Project Infrastructure is evident in Figure 6 below. The area proposed for development falls completely within this previously authorised area. Additional renewable energy facilities located approximately 40km to the northeast of the proposed development area have also been previously authorised. At this stage, 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 rural agriculture to semi-industrial, however, due to the limited nature of the development the impact on the experience of the cultural landscape is not foreseen to be significant.



Map 6: Cumulative Impact Map. Map indicating all of the authorised renewable energy facilities (as of 2018) in proximity to the proposed development

Table 5: 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)x2=16	**L**	(4+4+1)x3=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

The public consultation process will be undertaken by the EAP during the EIA. No heritage-related comments have been received to-date. SAHRA is required to comment on this HIA and make recommendations prior to the granting of the Environmental Authorisation.

7. CONCLUSION

The area proposed for the development of the Kotulo Tsatsi PV1 Solar Energy facility and its associated grid infrastructure was thoroughly assessed in the field assessment described in this report. The field assessment conducted found no significant archaeological or other heritage resources of cultural significance located within the proposed development footprints, which corroborates the findings of previous assessments conducted in this area. Furthermore, the dolerite outcrops evident in the geology map located to the east of the study area do not form hills or koppies and are therefore unlikely to have been used in rain-making activities.

According to the palaeontological assessment completed by Almond (2015), although the geology of the proposed development area is highly sensitive for impacts to palaeontology, the conditions on the ground are such that the actual palaeontological sensitivity is low. As such, it is unlikely that the proposed development will negatively

impact on significant palaeontological heritage on condition that the Chance Fossil Finds Procedure is implemented during excavation activities (Appendix 3).

As such, it is unlikely that the proposed development will negatively impact on significant archaeological or palaeontological heritage resources and as such, there is no objection to the proposed development.

8. RECOMMENDATIONS

There is no objection to the proposed development on heritage grounds on condition that:

- All excavation activities are subject to the Palaeontological Chance Finds Procedure (attached as Appendix 3)
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
6035	Archaeological Specialist Reports	Jaco van der Walt	03/08/2015	Revised Archaeological Impact Assessment Report for the proposed Kotulo Tsatsi CSP 3 Facility
5801	PIA Phase 1	John Pether	23/04/2012	BRIEF PALAEONTOLOGICAL IMPACT ASSESSMENT PROPOSED ORLIGHT SA DEVELOPMENT OF A SOLAR PHOTOVOLTAIC POWER PLANT NEAR AGGENEYS, NORTHERN CAPE PROVINCE Portion 1 of Farm Aroams 57 RD
129	HIA Phase 1	Lita Webley, Dave Halkett, John Pether	01/04/2012	Heritage Impact Assessment: Proposed Kenhardt Photo-voltaic Solar Power Plant on Remainder of the Farm Klein Zwart Bast 188, Northern Cape
208	AIA Phase 1	Jonathan Kaplan	01/11/2012	Archaeological Impact Assessment for the proposed Green Continent Partners 75 MW Photovoltaiv Electricity Generation Facility on Portion 8 of the Farm Olyvenkolk No. 187, Kenhardt, Northern Cape
209	AIA Phase 1	Jonathan Kaplan	01/11/2012	AIA: PROPOSED WINE ESTATE CAPITAL MANAGEMENT 75MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY ON PORTION 12 OF THE FARM OLYVENKOLK NO. 187, KENHARDT
4274	AIA Phase 1	David Morris	01/04/2004	Archaeological Resources at Geel Vloer, Bushmanland: A Phase 1 Archaeological Impact Assessment
340296	Palaeontological Specialist Report	John Almond	02/03/2015	Palaeontological Heritage Assessment: Combined Desktop and Field Based Study for the Proposed SolarReserve Kotulo Tsatsi Energy CSP and PV Solar Energy Facilities near Kenhardt, NC Province
397221	Heritage Impact Assessment Specialist Report	Jaco van der Walt	31/03/2017	HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED SOLARRESERVE KOTULO TSATSI PHOTOVOLTAIC POWER PLANT 2
169885	Archaeological Specialist Reports	Jaco van der Walt	12/05/2014	Archaeological Scoping Report for the Proposed Kotulo Tsatsi Energy Solar Park including Concentrated Solar Power (Tower & Through Technologies) and Photovoltaic (PV) Solar Facilities, Northern Cape

257586	Archaeological Specialist Reports	Jaco van der Walt	05/02/2015	Archaeological Impact Assessment for the Proposed Kotulo Tsatsi CSP 3 Facility, located close to Kenhardt in the Northern Cape

Other Sources:

Beaumont and Vogel. 1989. Patterns in the age and context of Rock Art in the Northern Cape. *The South African Archaeological Bulletin*. Vol 44, No. 150. Pp 73 to 81

Deacon, J. 1997. "My heart stands in the hill": Rock engravings in the Northern Cape. *Kronos*. No. 24. Pp 18 to 29

Skinner, 2017. The Changer of Ways: Rock Art and Frontier ideologies on the Standberg, Northern Cape, South Africa. Unpublished Thesis in fulfillment of MSc, University of the Witwatersrand.

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APPENDICES

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APPENDIX 1: Archaeological Assessment

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APPENDIX 2: Heritage Screening Assessment

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APPENDIX 3: Chance Fossil Finds Procedure