HERITAGE IMPACT ASSESSMENT

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

Proposed development of the Red Sands PV 2 Facility in the Northern Cape

SAHRIS Ref:

Prepared by CTS Heritage

CTS HERITAGE

For

Savannah Environmental (Pty) Ltd

March 2022

CTS HERITAGE

EXECUTIVE SUMMARY

1. Site Name:

Red Sands PV 2

2. Location:

Farm Tities Poort 386

3. Locality Plan:

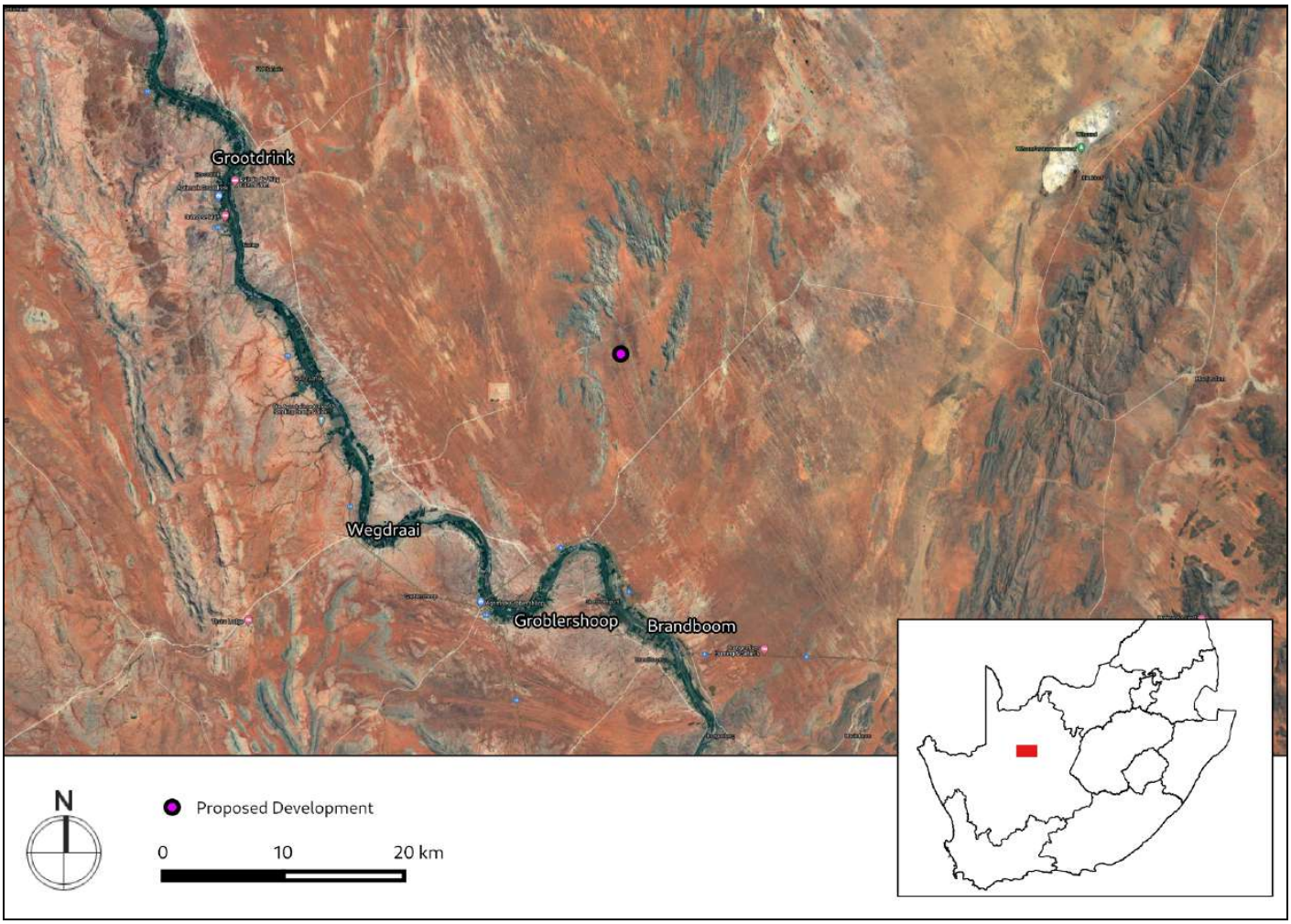

Figure 1: Location of the proposed study area

4. Description of Proposed Development:

AGV Projects (Pty) Ltd is proposing the development of a solar PV facility (known as the Red Sands PV2 facility) and associated infrastructure on a site located approximately 26km northeast of Groblershoop, within the Tsantsabane Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The project is to be known as Red Sands PV2 and will have a contracted capacity of up to 75MW.

5. Heritage Resources Identified in and near the study area:

Site No.	Site Name	Description	Density m²	Period	Co-ordinates		Grading	Mitigation
022	Red Sands 022	Lower and upper grindstone, quartz	0 to 5	LSA	-28.6667	22.09754	NCW	NA
023	Red Sands 023	Quartz core	0 to 5	MSA	-28.66756	22.10105	NCW	NA
024	Red Sands 024	Quartz cores and flakes	0 to 5	MSA	-28.6684	22.09952	NCW	NA
025	Red Sands 025	Quartz flake	0 to 5	MSA	-28.671	22.09693	NCW	NA
026	Red Sands 026	Quartz cores and flakes	0 to 5	MSA	-28.67228	22.09537	NCW	NA
027	Red Sands 027	Quartz cores and flakes	0 to 5	MSA	-28.67269	22.09572	NCW	NA
028	Red Sands 028	Quartz cores and flakes	0 to 5	MSA	-28.67288	22.10002	NCW	NA
029	Red Sands 029	Quartz cores and flakes	0 to 5	MSA	-28.6743	22.09763	NCW	NA
030	Red Sands 030	Quartzite flake and quartz cores, flakes	0 to 5	MSA	-28.67465	22.0981	NCW	NA
031	Red Sands 031	Quartz cores and flakes	0 to 5	MSA	-28.67446	22.09916	NCW	NA
032	Red Sands 032	Quartz cores and flakes	0 to 5	MSA	-28.67332	22.10342	NCW	NA
040	Red Sands 040	Silcrete point, very finely made	0 to 5	MSA	-28.68114	22.1021	NCW	NA

6. Anticipated Impacts on Heritage Resources:

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are the dominant archaeological signature of the area. All of the archaeological resources identified within the areas proposed for the development of the Red Sands PV Cluster have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facilities in these locations from an archaeological perspective.

According to Almond's Desktop PIA for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132 kV Powerline (2013), the area is "*underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are* ***entirely unfossiliferous***.

These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity". This study area is right next to the area assessed by Almond and has the same geological context and as such, no impacts to fossil material are anticipated.

7. Recommendations:

There is no objection to the proposed development of the Red Sands PV 2 in terms of impacts to heritage resources on condition that:

- The mitigation measures proposed in the VIA (2021) are implemented
- A no-go buffer area of 100m must be implemented around Site Red Sands-045 and Red Sands-046 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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 80 Heritage Impact Assessments throughout South Africa.

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CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

AGV Projects (Pty) Ltd is proposing the development of a solar PV facility (known as the Red Sands PV2 facility) and associated infrastructure on a site located approximately 26km northeast of Groblershoop, within the Tsantsabane Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The project is to be known as Red Sands PV2 and will have a contracted capacity of up to 75MW.

A preferred project site with an extent of ~7023ha and a development area of ~220ha within the project site has been identified by AGV Projects (Pty) Ltd as a technically suitable area for the development of the Red Sands PV2 facility. The development area for the PV facility is located on Portion 2 of the Farm Tities Poort 386. The project site is accessible via an existing gravel farm road from an existing main gravel road off the N8 which is located southeast of the project site.

The Red Sands PV2 project site is proposed to accommodate the following infrastructure, which will enable the PV facility to supply a contracted capacity of up to 75MW AC:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation 2 .
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads (up to 6m) and internal distribution roads (up to 4m).

The solar PV facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the Red Sands PV2 Facility under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme (or a similar 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, in line with the objectives of the Integrated Resource Plan (IRP) with the Red Sands PV2 Facility set to inject up to 75MW into the national grid.

1.2 Description of Property and Affected Environment

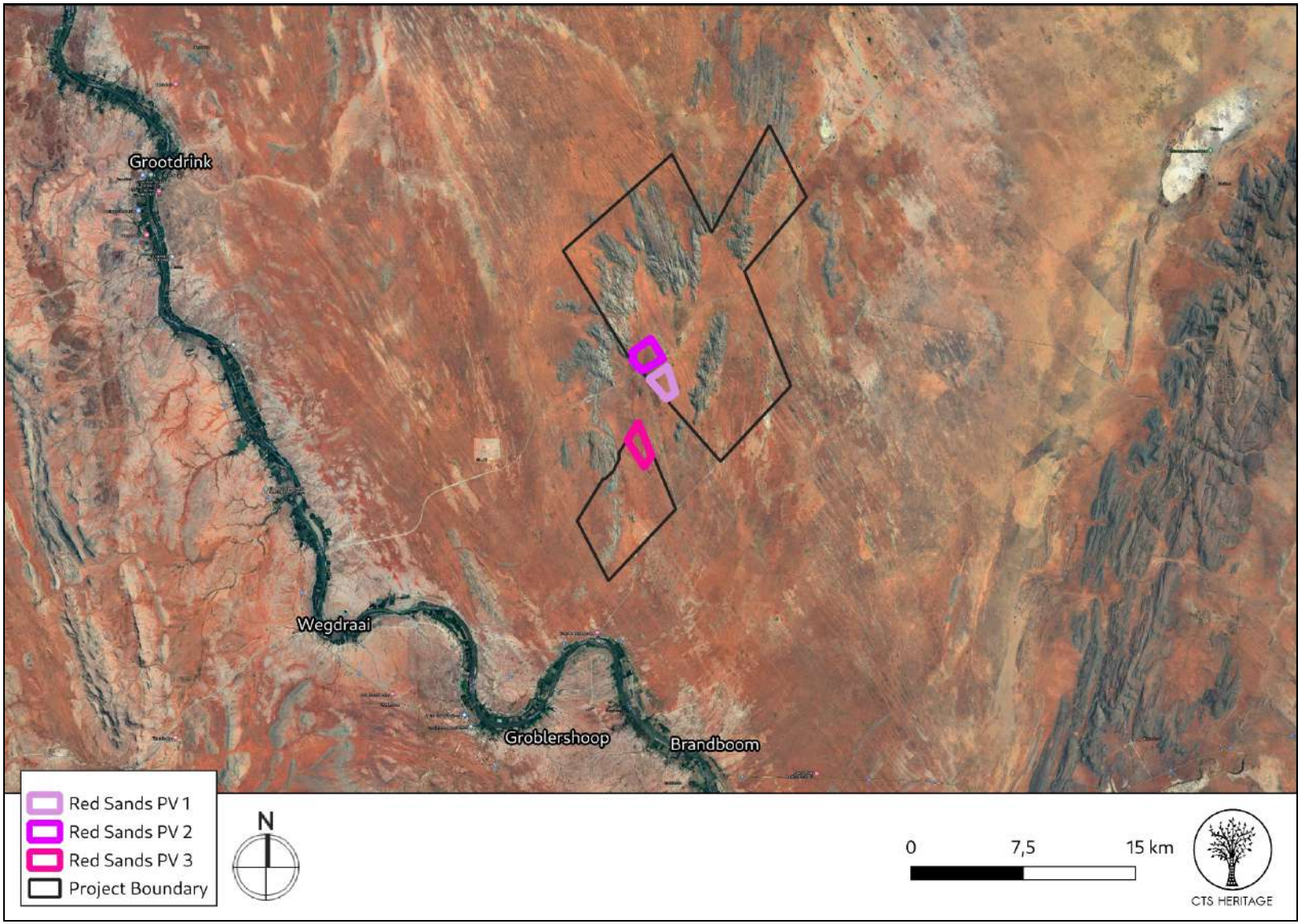
Red Sands PV 2 straddles the Sishen-Saldanha Bay railway line which runs along a northeast to southwest trajectory on the farm Titiespoort 386. Various long trains carrying iron ore make their way slowly through the area during the day and a service road runs along the northern edge of the railway line with crossings available at regular intervals spread across the farms. A guest house lodge has been set up at the La Gratitude farm to the west of the PV area and is currently signposted as "Safric Safaris". A public servitude access road joins the lodge to the main service road running along the eastern side of the study area and wild game are kept on this property including kudu, gemsbok, springbok and eland. At the time of survey the lodge appeared to be closed. Large 765kV powerlines run parallel to the railway line and part of the game farm is enclosed by a high electric fence on the northern side of the railway line.

The owner of the development area runs his stock farming operations from Prynnsberg farm on a level area on the eastern side of the Prynnsberg koppies. The solar PV area is located on generally level ground and overlooked by the Kurweberg and Prynnsberg koppies as well as some lower ridges on the Rooisand farm. The valley basin is entirely covered in red Kalahari sand dunes that run up the sides of the koppies in certain places. The vegetation in this area falls within the Orange River Nama Karoo biome and consists of acacia thorn trees, grassland, shrubs and succulents. Conditions are extremely arid and windmills, kraals and farm dams dot the area serving the stock farms.

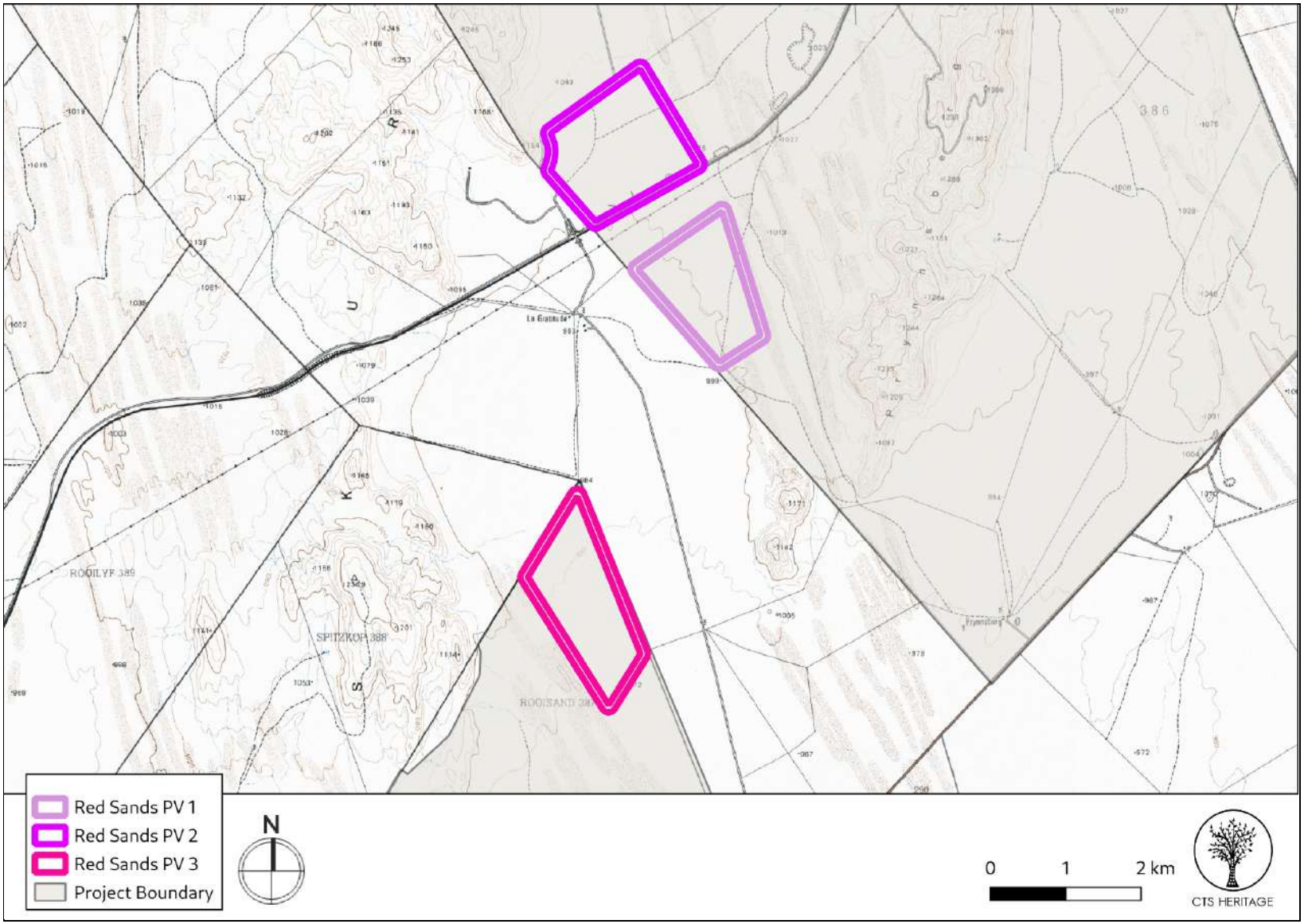
As noted in the VIA (2021), "The region has a strong agricultural character, interspersed with human settlements. The town of Upington has a population of approximately 47000 people *(Stats SA, 2007)*, and lies 40km south-west of the proposed site. Key tourism features in the area include the Augrabies Falls National Park (approximately 170km west), the Kalahari Gemsbok National Park (approximately 280km north-west) and the Orange River to the south.

Infrastructure includes a number of power lines distributed throughout the study area, and the Kathu to Saldanha Bay railway line which passes close to the proposed project.

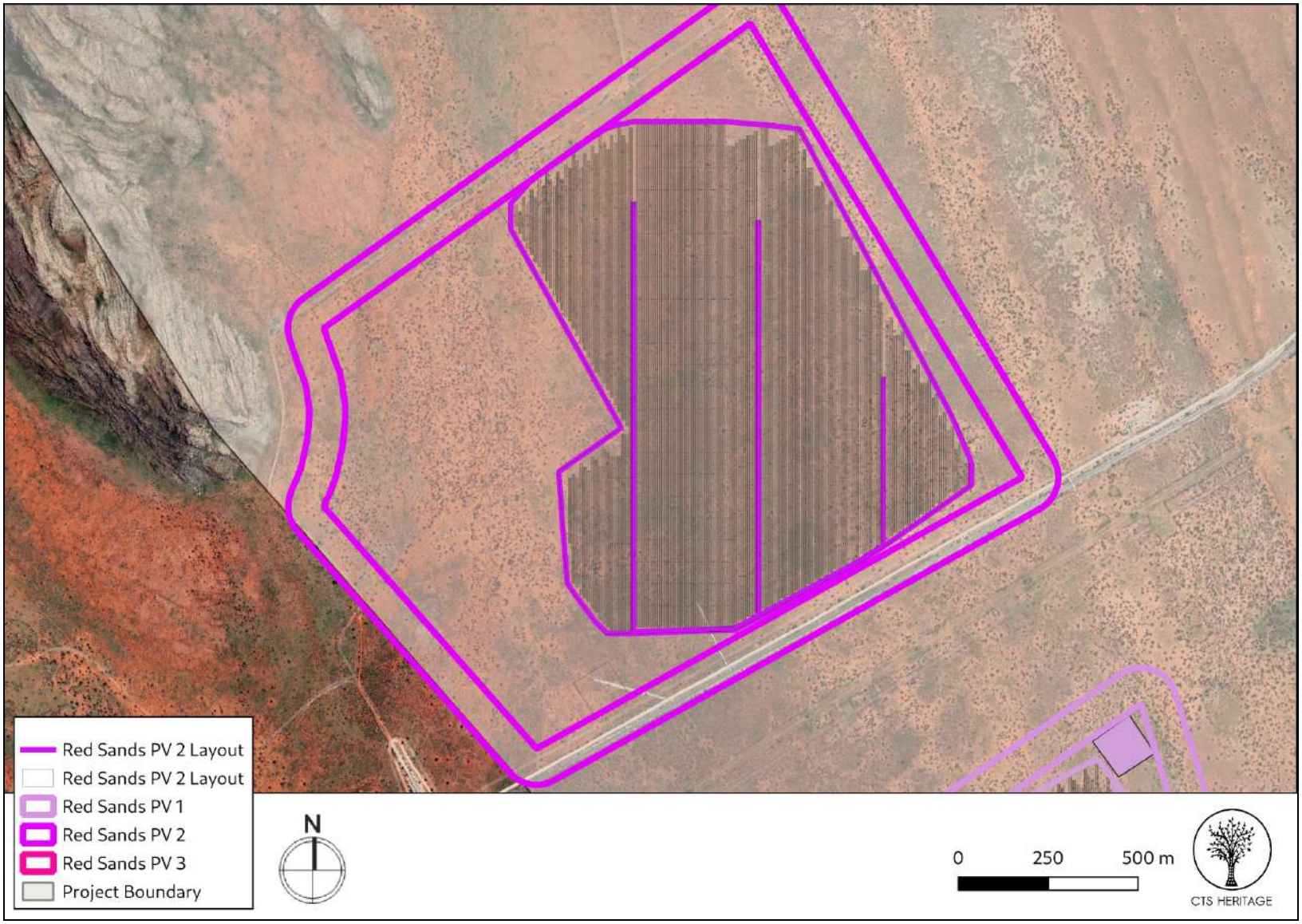
In addition, the National Government has prioritised the delivery of electrical infrastructure to the Upington area to encourage development of solar power facilities. The proposed site is also located within the Upington Renewable Energy Development Zone (REDZ). The identification of REDZ throughout the country is an initiative which is intended to encourage renewable energy projects to be developed in the most appropriate areas."



Map 1a: The proposed development relative to Groblershoop



Map 1b: The proposed development area reflected on the 1:50 000 Topo Map



Map 1c: The proposed layout area for Red Sands PV 2

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2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used) (Appendix 1)
- An archaeologist conducted an assessment of the broader study area in order to determine the archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit on 14 to 17 November 2021 (Appendix 2)
- A desktop palaeontological assessment was completed (Appendix 3)
- 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

There were no major limitations or constraints to the survey carried out and the visibility is excellent due to high aridity and low levels of vegetation cover, particularly in areas covered in acacia thorn trees. In some areas lower levels of archaeological visibility were encountered where grassland and shrubveld was dense enough to cover the ground.. We are confident that the assessment provided an accurate report on the archaeological sensitivity of the area.

2.5 Savannah Impact Assessment Methodology

Direct, indirect and cumulative impacts of the issues identified through the Basic Assessment process 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 Desktop Assessment

Cultural Landscape

The area proposed for development is located approximately 80km east south east of Upington and 25km north east of Groblershoop. Upington originated as a mission station established along the banks of the Orange River in 1871 and run by Reverend Christiaan Schröder, and was founded as a town in 1873. Groblershoop was founded in 1914 on the farm Sternham, but was renamed in 1939 after Piet Grobler, a former Minister of Agriculture. The region became more developed after the construction of the Boegoeberg Dam and water channels in 1929.

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. 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. Upington has been noted as being the sunniest location on the planet for three months of the year, from November through to January, which is likely why this area has been earmarked for the development of renewable energy facilities as part of the Red Sands Solar PV development. The geomorphology of the area has been described by Van Schalkwyk (2011, SAHRIS ID 162266) as irregular plains with hills occurring to the south. The vegetation is described as Orange River Nama Karoo.

According to Webley (2013), the Cultural Landscape in this area can be characterised as a region which "*consists of intensive agriculture in a narrow belt along the Orange River surrounded by the red Aeolian sands of the Kalahari.*" At the time of compiling her assessment in 2013, most of the renewable energy facilities had not yet been built in the Upington area which is located within a RED zone (area 7). The Cultural Landscape has since changed significantly over the last 8 years as a number of very large solar PV projects (including CSP) have been completed and are in construction. This form of development has therefore very much become a part of the

Cultural Landscape today.

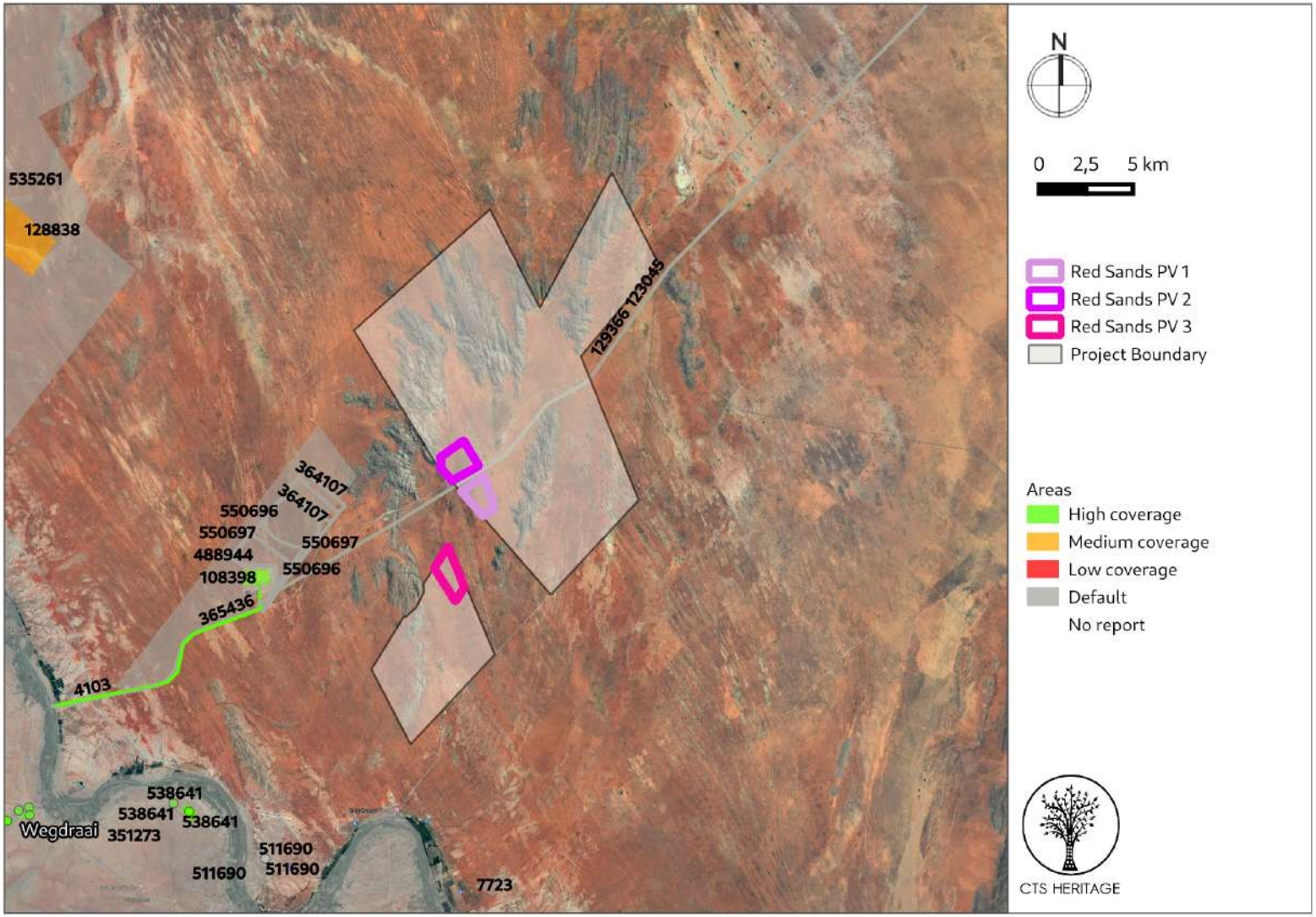
The construction of another solar PV development will therefore be in keeping with the ongoing development of the general Upington area as an intensive solar power generating area. A few farm buildings are also expected on the farms that have been identified in the desktop study and these should be assessed during a field survey as there may be other structures or ruins on the farms.

Archaeology and Built Environment Heritage

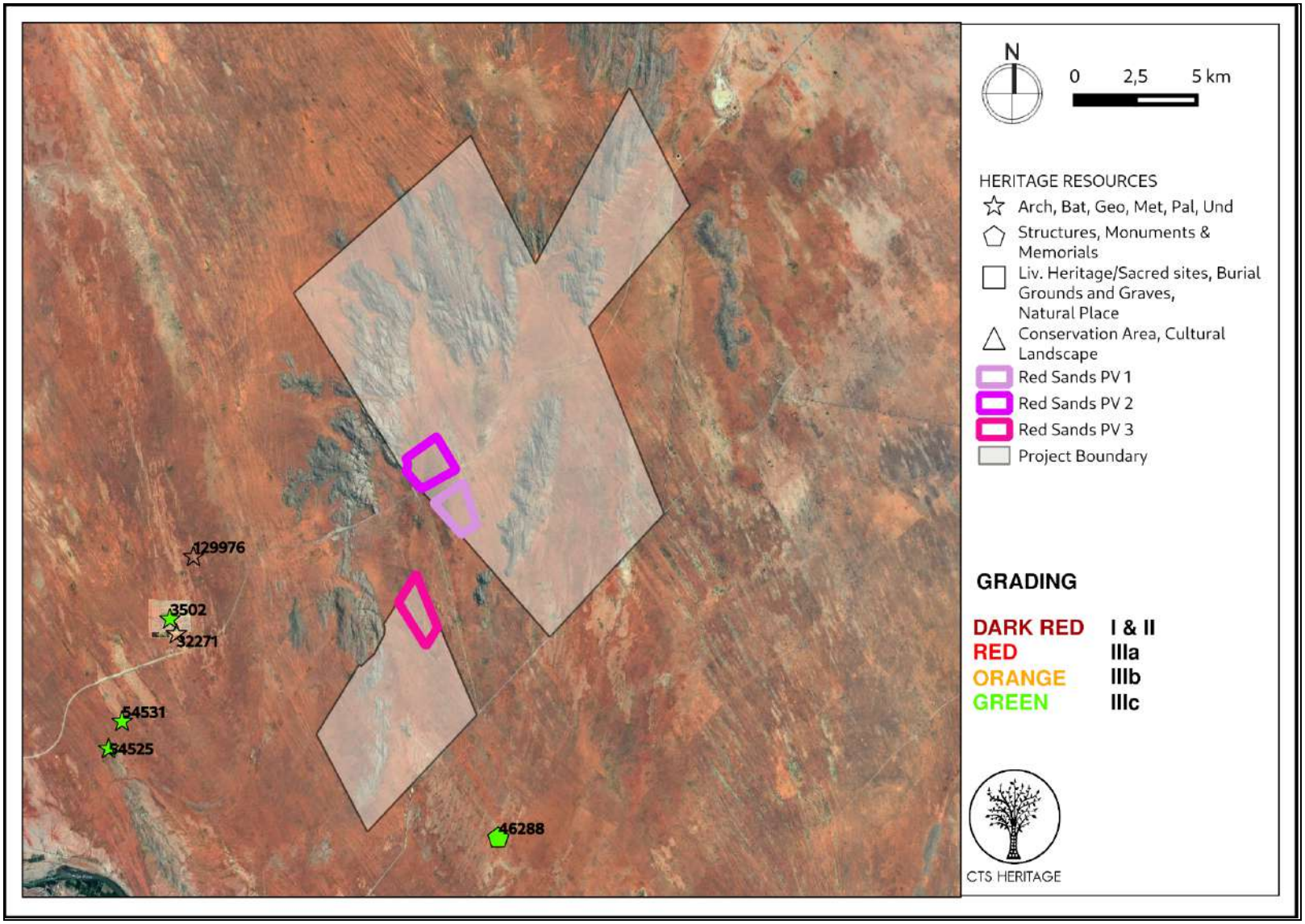
Numerous Renewable Energy developments have been proposed for this area and each of these proposed developments have undergone assessments for impacts to archaeological resources (Map 2a). Areas located to the south west of the study area were surveyed by Webley (2013), revealing a number of MSA sites, as well as ruined historical stone structures recorded by Morris (2015). Dreyer (2012) carried out an archaeological survey just to the west of this development area and found stone tools made from banded ironstone, chalcedony and quartzites. These were predominantly MSA in age and showed few pieces with retouch as most of the flakes were discarded without being further reduced and retouched.

Areas located to the west of the study area were surveyed by Sampson (1985), revealing a number of Karoo stone age sites, however similar densities of stone age sites are not known from the proposed development area. In his assessment, Van Schalkwyk (2011) identified a number of Later Stone Age artefacts associated with a non-perennial stream. He also identified two small historic structures made of clay bricks of low heritage significance. Gaigher (2012, SAHRIS ID 34135) also completed an archaeological assessment in the broader area. Gaigher identified “limited scatterings of Middle to Later Stone Age tools found in various areas”. He notes that these finds in themselves do not constitute sites, but do indicate the possible occurrence of such sites. Further archaeological impact assessment work has been completed in this area by Van der Walt (2015 and 2016). Van der Walt notes that the various assessments conducted in this area provide a robust baseline for the archaeology expected in this area. Van der Walt notes that “Although artefacts dating to the Early, Middle and Later Stone Age were recorded in the larger area, they occur as isolated finds that are temporally mixed, in deflated and un-stratified contexts without organic remains and other cultural materials. As a result, the archaeological record of the larger area is considered to be of low significance.”

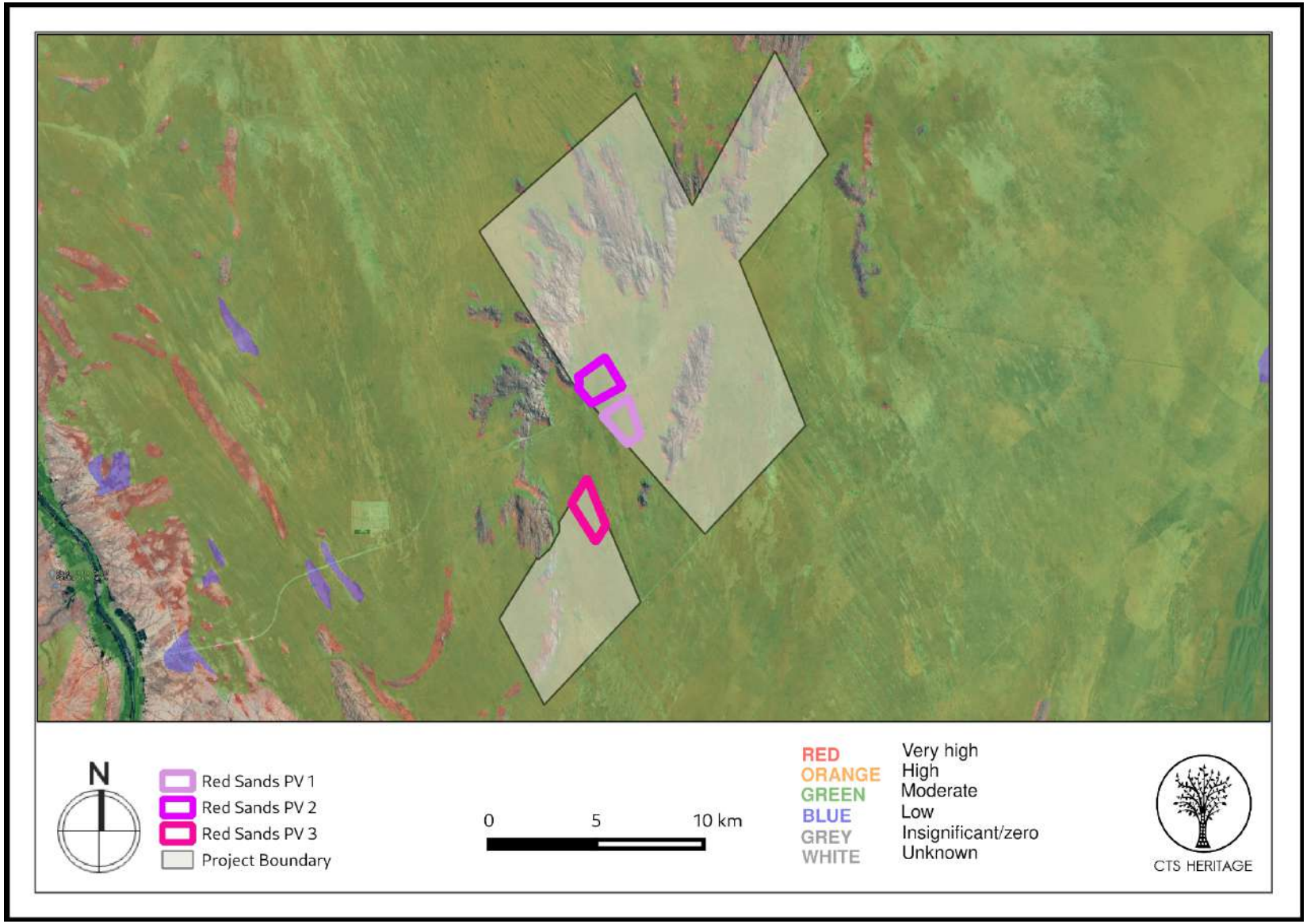
Given the ubiquity of Stone Age material recorded on farms to the west and south west of this development area it is highly likely that more Stone Age material, particularly Middle Stone Age, of a similar nature to that described above will be found in a field survey of the proposed development area.



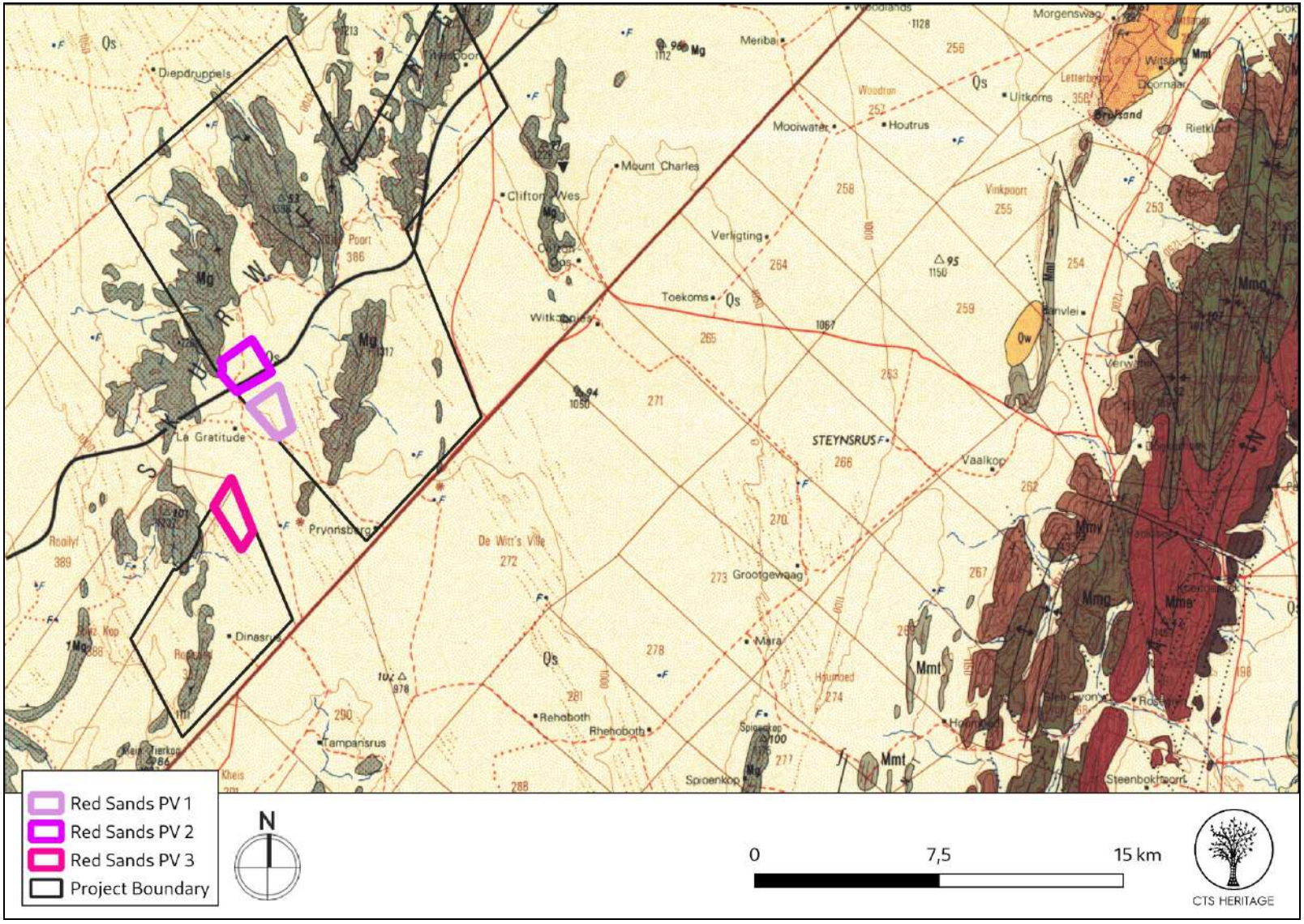
Map 2a: Spatialisation of heritage assessments conducted in proximity to the broader study area



Map 2b: Spatialisation of heritage resources known in proximity to the broader study area



Map 3a: Palaeontological sensitivity of the area surrounding the broader study area



Map 3b: Geology Map. Indicating the underlying geology across the proposed project sites for the Red Sands PV1-PV3 developments through overlaying the geology maps from the CGS series 2822 Postmasburg (Mg: Prynnsberg (muscovite quartzite schist), Qs: Gordonia (Red-brown, wind-blown sand and dunes)

3.2 Palaeontology

According to Almond's Desktop PIA for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132 kV Powerline (2013), the area is "*underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are* ***entirely unfossiliferous****. These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity*". This study area is right next to the area assessed by Almond and has the same geological context.

The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. **Porous dune sands are not generally conducive to fossil preservation**. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (*e.g. Hodotermes*, the harvester termite), ostrich egg shells (*Struthio*) and shells of land snails (*e.g. Trigonephrus*) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (*e.g. Corbula, Unio*) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and **the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low and the Prynnsberg quartzites are unfossiliferous**.

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

According to the Desktop PIA completed for this project (Bamford, 2021), the aeolian sands of the Gordonia Formation, Kalahari Group, do not preserve fossils because they have been transported and reworked, but in some regions these too may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts.

Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). These tufas may contain evidence of algal mats and stromatolites and may also be associated with calcified reed and root tubes (Lancaster, 1986).Many of the pans are characterised by diatomaceous earth, diatomite or kieselguhr, a white or grey, porous, light-weight, fine-grained sediment composed mainly of the fossilised skeletons of diatoms. Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape. In in this region under study is the Kathu Complex.

There are some good examples of fossils and artefacts in the Quaternary palaeopans and palaeosprings of the Kalahari. The Kathu Complex includes the excavated sites of Kathu Pan1 (KP1), Kathu Townlands and Bestwood 1 (BW 1). At Kathu Pan, evidence of early hominin occupation has been observed at multiple locations within the pan, but ESA deposits have only been excavated at KP 1. Stratum 4a at KP1 was dated by a combination of OSL and ESR/U-series to ca. 500 k BP. The lithic assemblage from St. 4a is characterized by a prepared core technology that produced both blades and points, and has been attributed to the Fauresmith industry. The lithic assemblage of the underlying Stratum 4b at Kathu Pan 1 is characterized by well-made handaxes, some bones and other tools (Walker et al., 2014; Lukich et al., 2020).

Palaeo-pans and palaeo-springs are visible in satellite imagery because of their topography and often are associated with lunette dunes. Vegetation changes are also common. No such features are seen in the Google Earth images. Aeolian sediments that cover most of the region, do not preserve fossils because they have been reworked and windblown. Usually these geomorphological features can be detected using satellite imagery. No such features are visible.

In terms of impacts to archaeological heritage, cores and sources of this material are spread right across the study area and it appears that extensive use was made of locally available raw materials. The density of archaeological material increased towards the areas lining the base of the koppies where shade, shelter and

strategic views could be obtained over the generally flat valley basin. Scatters of hornfels, cherts, CCS and silcretes were rare in the middle of the valley plains but these imported materials were more common near the koppies.

The VIA (2021) identified a number of Landscape Character Areas that are relevant to the proposed development. Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type".

The affected landscape can be broadly divided into the following LCAs that are largely defined by landform and vegetation.

- **Low Undulating plain.** Gently undulating topography with low intensity grazing / game farming, low level grassland / shrub land, occasional non perennial streams, occasional farmstead. This LCA is characteristic of the Nama Karoo. It is important as both an agricultural and a tourism resource.
- **The Orange River Corridor** which is generally lower than the proposed development area and is comprised of open cultivated land with numerous agricultural buildings. The fringes of the LCA and areas around farm structures are also largely covered with taller woody vegetation. This LCA provides a marked contrast to the arid plain that surrounds it. Its primary importance is as an agricultural resource. It also has significant importance for tourism and recreation.
- **Upland Areas** consisting of low north south running ridgelines in the vicinity of the site and slightly taller east west running ridgelines to the south of the Orange River. These areas have little direct agricultural or tourism significance. In visual terms, they provide dramatic contrast with the flat plain that surrounds them.
- **Urban Area of Roblershoop** which is important as a living and working area. This is a relatively dense urban area that has probably grown due to its location as a bridging on the Orange River. It is also important as an agricultural service centre.

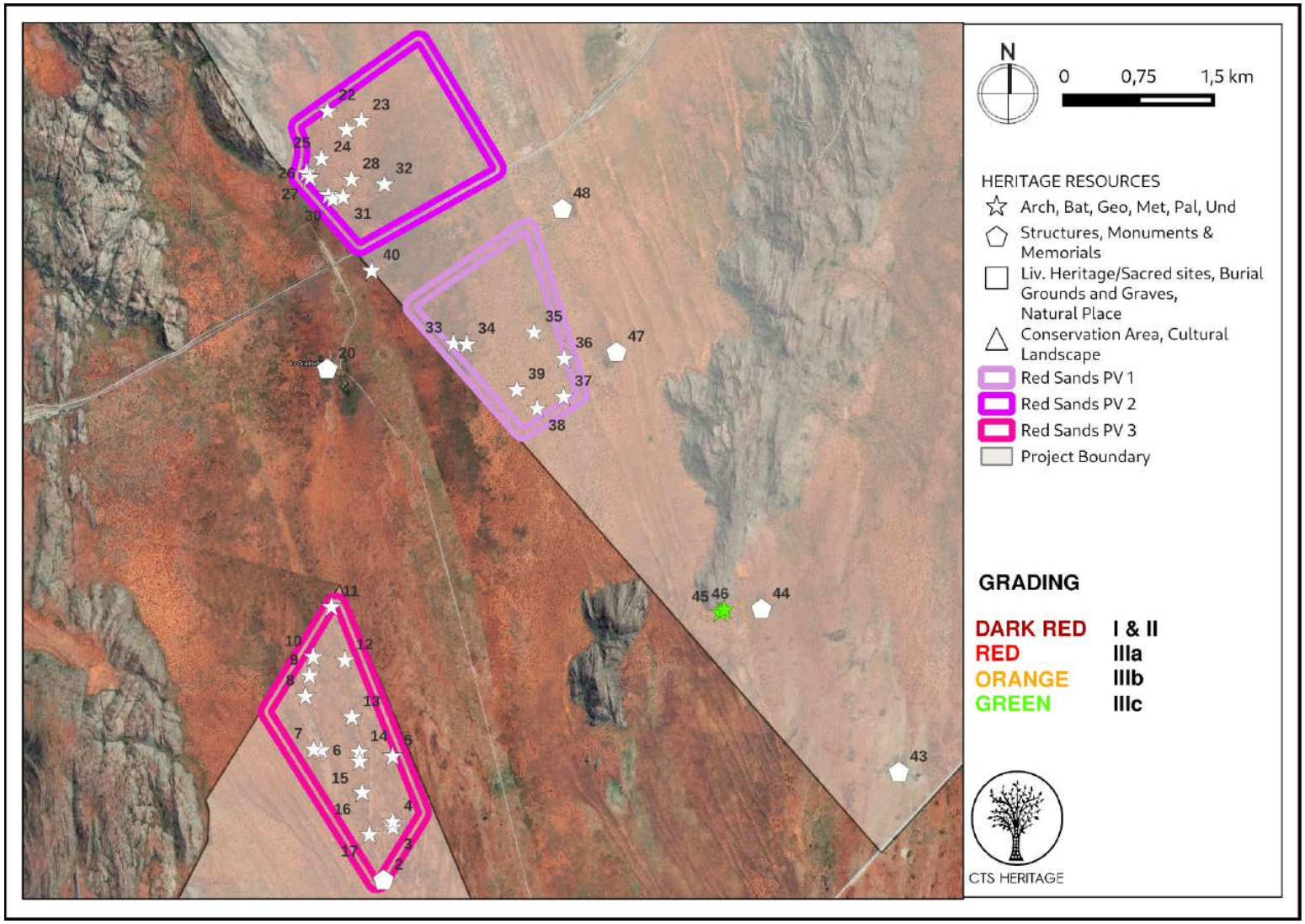
The two protected areas (Witsand and Glen Lyon) in the vicinity of the proposed project are part of the low Undulating Plain LCA. Because these areas are likely to be important for tourism and visitors might expect to experience a natural environment, this elevates their significance.

4.2 Heritage Resources identified

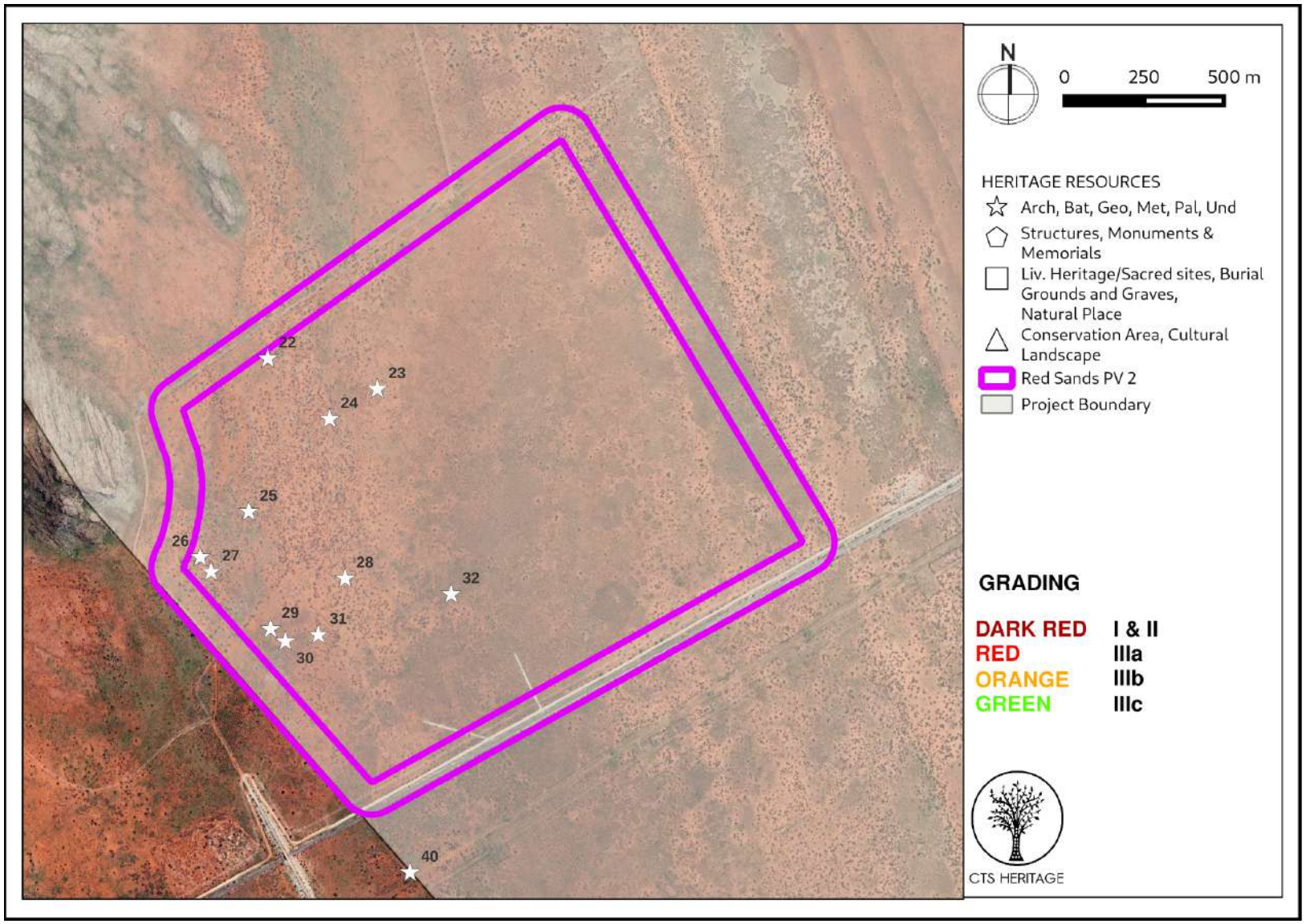
Table 1: Heritage resources identified in the study area

Site No.	Site Name	Description	Density m²	Period	Co-ordinates		Grading	Mitigation
022	Red Sands 022	Lower and upper grindstone, quartz	0 to 5	LSA	-28.6667	22.09754	NCW	NA
023	Red Sands 023	Quartz core	0 to 5	MSA	-28.66756	22.10105	NCW	NA
024	Red Sands 024	Quartz cores and flakes	0 to 5	MSA	-28.6684	22.09952	NCW	NA
025	Red Sands 025	Quartz flake	0 to 5	MSA	-28.671	22.09693	NCW	NA
026	Red Sands 026	Quartz cores and flakes	0 to 5	MSA	-28.67228	22.09537	NCW	NA
027	Red Sands 027	Quartz cores and flakes	0 to 5	MSA	-28.67269	22.09572	NCW	NA
028	Red Sands 028	Quartz cores and flakes	0 to 5	MSA	-28.67288	22.10002	NCW	NA
029	Red Sands 029	Quartz cores and flakes	0 to 5	MSA	-28.6743	22.09763	NCW	NA
030	Red Sands 030	Quartzite flake and quartz cores, flakes	0 to 5	MSA	-28.67465	22.0981	NCW	NA
031	Red Sands 031	Quartz cores and flakes	0 to 5	MSA	-28.67446	22.09916	NCW	NA
032	Red Sands 032	Quartz cores and flakes	0 to 5	MSA	-28.67332	22.10342	NCW	NA
040	Red Sands 040	Silcrete point, very finely made	0 to 5	MSA	-28.68114	22.1021	NCW	NA

4.3 Mapping and spatialisation of heritage resources



Map 4: Map of heritage resources identified during the field assessment, relative to the proposed development of Red Sands PV Cluster



Map 4a: Map of heritage resources identified during the field assessment, relative to the proposed development of Red Sands PV 2

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are the dominant archaeological signature of the area. All of the archaeological resources identified within the areas proposed for the development of the Red Sands PV Cluster have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facilities in these locations from an archaeological perspective.

One archaeological site of significance was identified outside of the areas proposed for the PV cluster development - Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts). Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site.

Other than LSA and MSA artefacts, the field assessment identified a number of structures. These are predominantly agricultural in nature in the form of farm dams, kraals and old farm complexes. Only one structure was determined to have heritage significance - Red Sands-042. This structure has been graded IIIB and is located well away from the proposed PV cluster developments. As such, no impact to this structure or its context is anticipated.

Based on the information available, the proposed development is unlikely to directly impact on any significant archaeological heritage resources.

As indicated above, according to Almond's Desktop PIA for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132 kV Powerline (2013), the area is "*underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are* ***entirely unfossiliferous****. These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity*". This study area is right next to the area assessed by Almond and has the same geological context and as such, no impacts to fossil material are anticipated.

This result is confirmed in the Desktop PIA completed for this project (Bamford, 2021). “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 much too old to contain fossils or are transported sands. Furthermore, the material to be excavated is sand and this does not preserve fossils. Since there is an extremely small chance that fossils might be trapped in palaeo-springs or dunes, and be disturbed a Fossil Chance Find Protocol has been added to this report. 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 area, it is extremely unlikely that any fossils would be preserved in the aeolian sands of the Quaternary Kalahari Group. There is a very small chance that fossils may occur in such features as palaeo-pans, dunes or springs, but none is evident from the satellite imagery.”

As per the VIA (2021) completed for this project, the following in noted:

- The proposed array and substation are likely to be visible over similar areas;
- Views of the proposed array and the substation will be significantly constrained to the north, east and west by a series of ridgelines that are located well within the ALVs of the proposed elements;
- The surrounding ridgelines are likely to constrain views to the extent that views of the proposed project are only likely to be obvious from within the valley in which it is located. Possible views will only extend as far as the ALVs from areas to the south. From the site visit, natural vegetation that occurs in this area is likely to screen the array from the unsurfaced local road that runs to the south and east of the project. It is possible that taller elements could be visible over this vegetation, however, this too is likely to be largely screened;
- Due to topography, existing vegetation and distance, the proposed project is highly unlikely to be visible from protected areas and urban areas;
- Due to topography and existing vegetation, the proposed project is unlikely to be highly obvious from the unsurfaced local road to the south and east of the proposed project. If it is visible it will only be visible from a short section of the road to the south of the proposed project. Only the higher sections including substation, BESS and Bus Bars may be visible.
- Two homesteads could be affected including:
- The project is likely to be visible from a homestead that is located approximately 1.1km to the east of the proposed solar plant. This homestead appears to have tourism importance (Safric Safaris / La Gratitude Farm Stays)
- The project may be visible from a homestead approximately 8.4km to the south of the proposed project. However, both landform and vegetation is likely to mean that only the higher sections (bus bars) of the project may be visible. These are unlikely to be highly obvious.

- The proposed project is unlikely to be visible to any other sensitive receptors.

The VIA concludes that, subject to the implementation of the recommended mitigation measures included in the VIA (2021), there is no visual objection to the proposed development.

Table 2a: Impacts of the proposed development to archaeological resources

NATURE: It is possible that significant archaeological resources may be impacted by the proposed development				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**M (6)**	12 archaeological sites of low scientific significance were identified within the area proposed for development	**L (2)**	12 archaeological sites of low scientific significance were identified within the area proposed for development
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	**M (3)**	It is possible that significant archaeological resources will be impacted	**L (1)**	It is unlikely that significant archaeological resources will be impacted
SIGNIFICANCE	**M**	(6+5+1)x5 = 60	**L**	(2+5+1)x1 = 8
STATUS		Negative		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?	**P**	Possible	**L**	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: • Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.				
RESIDUAL RISK: None				

Table 2b: Impacts of the proposed development to palaeontological resources

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (4)**	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have moderate palaeontological sensitivity.	**L (2)**	According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have moderate palaeontological sensitivity.
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	**L (1)**	It is unlikely that significant fossils will be impacted	**L (1)**	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	**H**	(4+5+1)x1=10	**H**	(2+5+1)x1=8
STATUS		Negative		Negative
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur	**L**	Any impacts to heritage resources that do occur

		are irreversible		are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**P**	Possible	**L**	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: ● The attached Chance Fossil Finds procedure must be implemented during the course of construction activities				
RESIDUAL RISK: None				

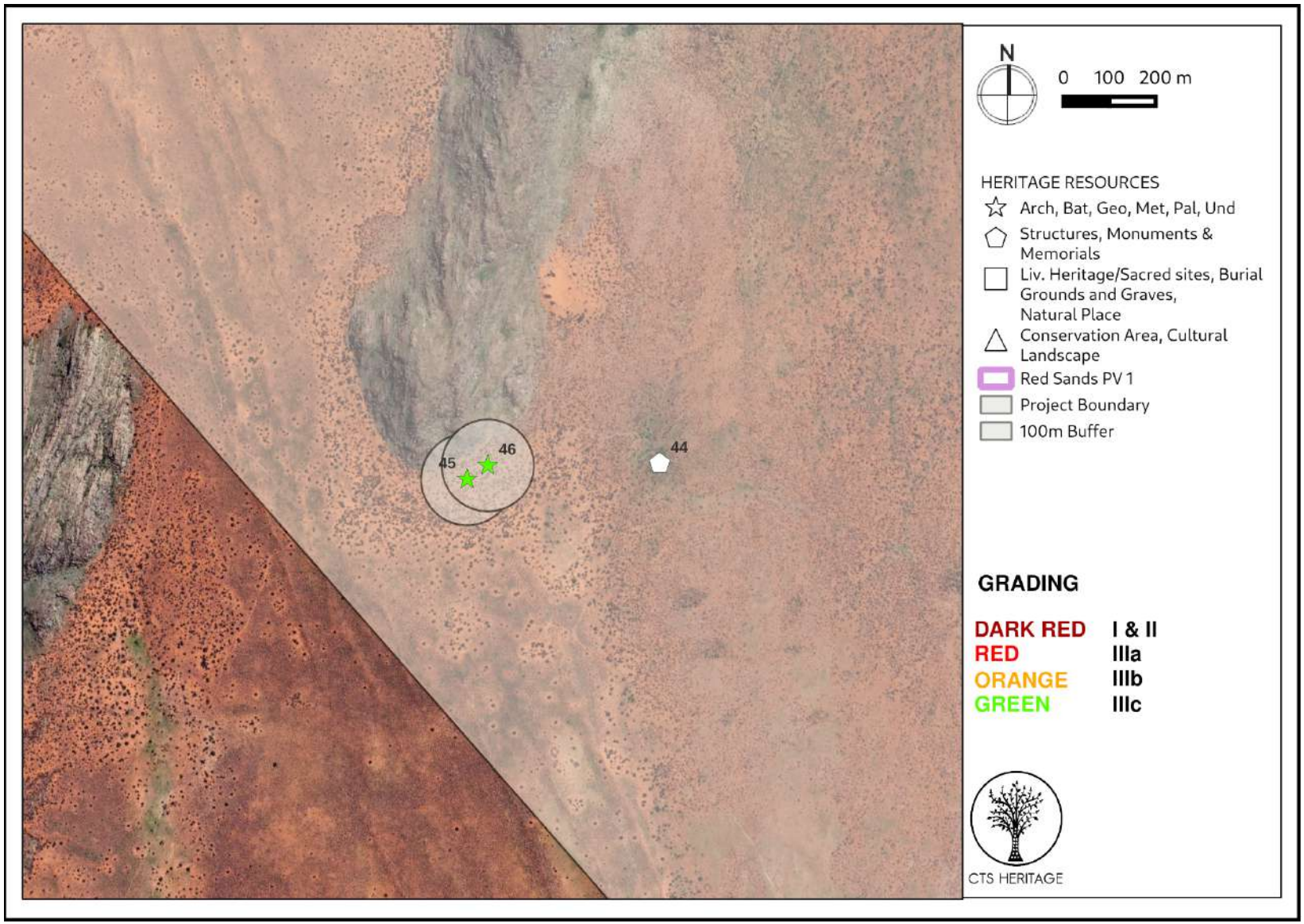
5.2 Sustainable Social and Economic Benefit

Socio-economic Benefits of the Red Sands PVs include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the preconstruction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected properties which is considered as a more efficient use of the land and provides an opportunity for financial benefits to the current land use.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy.
- The water requirement for a wind farm is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.
- South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The Red Sands PVs will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

5.3 Proposed development alternatives

No alternatives are proposed at this stage. In addition, as no impacts to significant heritage resources are proposed, no alternatives are put forward in this assessment.



Map 5: Map of heritage resources identified during the field assessment, relative to the study area and associated archaeological sensitivity

5.4 Cumulative Impacts

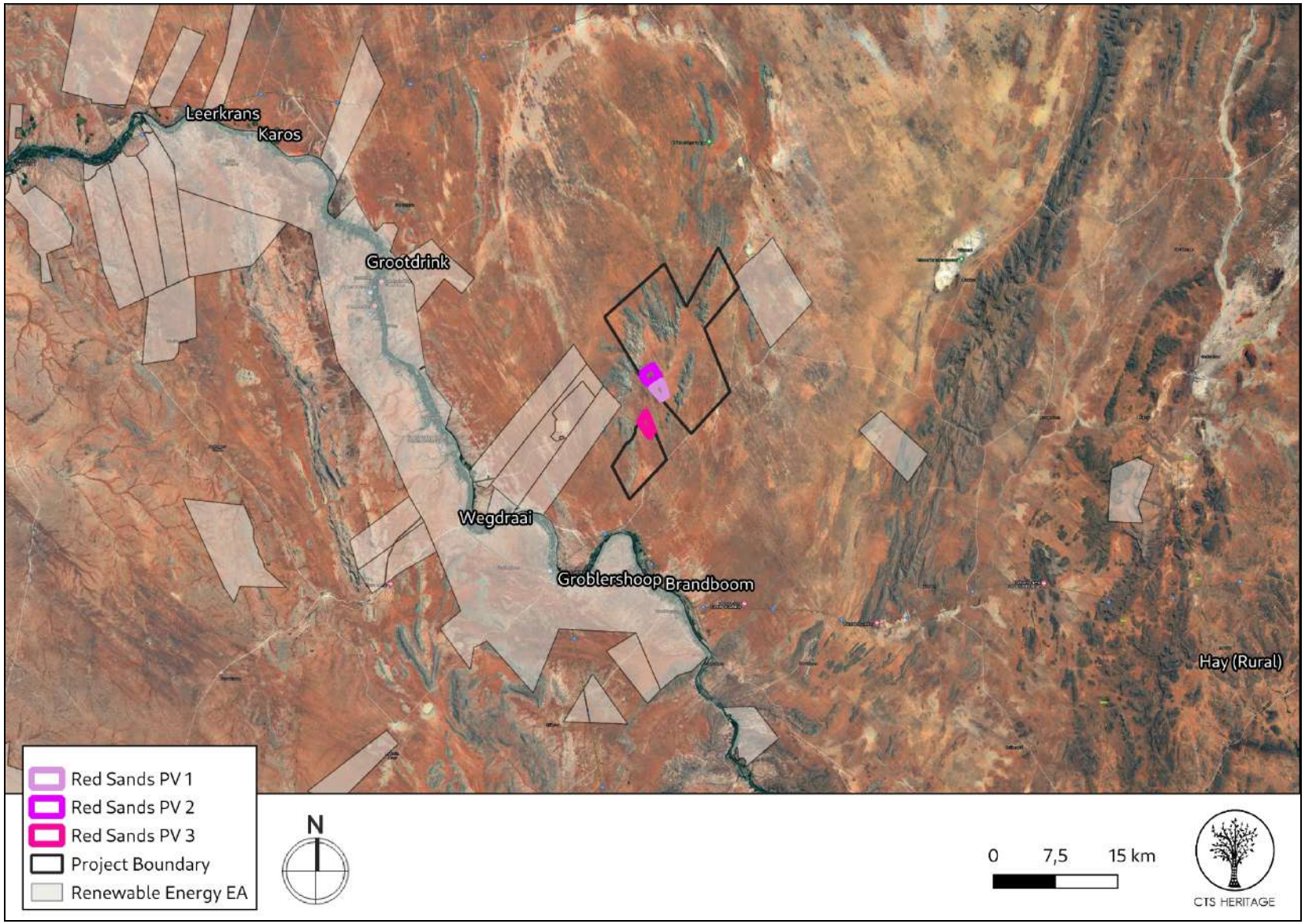
The proposed renewable energy facilities are located within a belt of approved renewable energy facilities (Map 6) located along the Orange River from Kakamas, through Upington until Groblershoop. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact due to its location as one of many renewable energy facilities in this area.

As noted in the VIA (2021), "Future landscape change appears to be inevitable due to the potential development of solar power projects in the area. This development is exacerbated by the fact that the area falls within a Renewable Energy Development Zone.

One project, the Boxpoort Solar CSP facility, has been constructed. This facility is approximately 11km to the south-west of the proposed site. There are also two additional Solar PV projects (Red Sands PV 2 and 3) that are located and within close proximity and within the same valley as Red Sands PV 1 project. These projects could add a number of industrial elements to the local landscape."

Table 3: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place and known archaeological and palaeontological resources				
		Overall impact of the proposed project considered in isolation		**Cumulative impact of the project and other projects in the area**
MAGNITUDE	**L (4)**	Low	**M (5)**	Moderate
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**	(5+4+1)x3=30
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: None				



Map 6: Map indicating the location of authorised renewable energy facilities in proximity to the proposed development

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 results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are the dominant archaeological signature of the area. All of the archaeological resources identified within the areas proposed for the development of the Red Sands PV Cluster have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facilities in these locations from an archaeological perspective.

Based on the information available, the proposed development is unlikely to directly impact on any significant archaeological heritage resources.

According to the Desktop PIA (Bamford, 2021), "Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the aeolian sands of the Quaternary Kalahari Group. There is a very small chance that fossils may occur in such features as palaeo-pans, dunes or springs, but none is evident from the satellite imagery." Mitigation measures for this risk are proposed below.

8. RECOMMENDATIONS

There is no objection to the proposed development of the Red Sands PV 2 in terms of impacts to heritage resources on condition that:

- The mitigation measures proposed in the VIA (2021) are implemented
- A no-go buffer area of 100m must be implemented around Site Red Sands-045 and Red Sands-046 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African

Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
NID	**Author(s)**	**Date**	**Type**	**Title**
128827	Barry Millsteed	12/02/2014	AIA Phase 1	Full Palaeontological Heritage Impact Assessment Report on the site of Proposed Solar Energy Generation Facilities (Kheis Solar projects 1-3) to be located on the farm Namkwari 656 near Upington, Northern Cape
351273	Barry Millsteed	01/12/2015	Palaeontological Specialist Reports	FULL PALAEONTOLOGICAL HERITAGE IMPACT ASSESSEMENT REPORT ON THE SITE OF PROPOSED SOLAR ENERGY GENERATION FACILITIES (TEWA ISITHA SOLAR 1 AND 2) TO BE LOCATED ON THE REMAINING EXTENT OF THE FARM ALBANY 405 NEAR KAROS, NORTHERN CAPE PROVINCE
104308	Cobus Dreyer	06/11/2012	HIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Water Pipeline from Sanddraai 391 to Bokpoort 390, Groblershoop, Northern Cape
4103	Cobus Dreyer	10/03/2006	AIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Concentrated Solar Thermal Plant (Csp) at the Farms Olyvenhouts Drift, Upington, Bokpoort 390 and Tampansrus 294/295, Groblershoop, Northern Cape
108398	David Morris	01/12/2012	HIA Phase 1	Archaeological Impact Assessment Phase 1: 15 km Water Pipeline across farms Sand Draai 391 and Bok Poort 390 near Groblershoop, Northern Cape
128838	David Morris	03/02/2014	Heritage Scoping	Proposed Kheis Solar Park Phases 1-3 on portions 7 and 9 of the farm Namakwari 656, south-east of Upington in Northern Cape: Scoping phase Heritage Input
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline, Groblershoop, Northern Cape.
351279	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 1 PV Facility East Of Upington, Northern Cape Province.
351311	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 2 PV Facility East Of Upington, Northern Cape Province.
7723	Peter Beaumont	09/10/2008	AIA Phase 1	Phase 1 Archaeological Impact Assessment Report on Portion of the Farm 292 near Groblershoop, Karoo District Municipality, Northern Cape Province
123045	Cobus Dreyer	26/06/2013	Archaeological	Report Eskom Garona Ferrum Mercury

			Specialist Reports	
129366	Cobus Dreyer	28/08/2013	AIA Phase 1B	First Phase Archaeological & Heritage Assessment of the Proposed Garona-Ferrum Transmission Line, Northern Cape
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline, Groblershoop, Northern Cape.
364107	Cobus Dreyer	16/09/2015	HIA Phase 1	First Phase Archaeological & Heritage Assessment of the Proposed Bokpoort II 300 MW Combined 2 x 75 PV & 150 MW CSP Tower Solar Development on the Remainder of the Farm Bokpoort 390, Groblershoop, Northern Cape Province.
365436	John E. Almond	29/06/2016	PIA Desktop	Palaeontological Impact Assessment: Desktop Study - Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province.
115034	Lita Webley	25/03/2015	HIA Phase 1	Heritage Impact Assessment for Proposed Construction of the Eskom Groblershoop substation and the Garona-Groblershoop 132 kV powerline, Groblershoop, Northern Cape

APPENDICES

APPENDIX 1: Heritage Screening Assessment (2021)

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS21_229**
SAHRIS CaseID:	
Client:	**SavannahSA**
Date:	**October 2021**
Title:	**Kheis Solar PV**

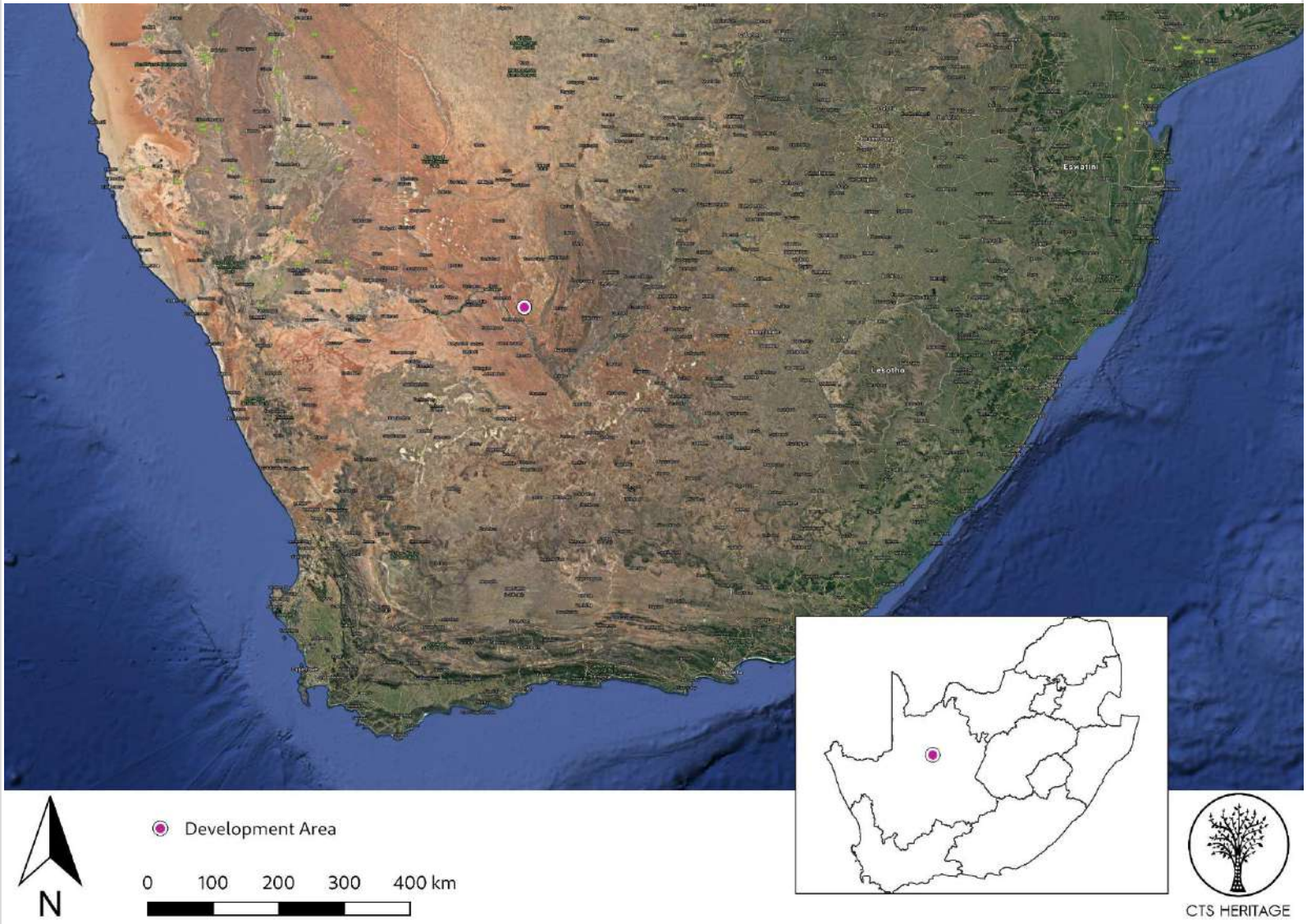


Figure 1a. Satellite map indicating the location of the proposed development in the Northern Cape Province

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CTS HERITAGE

1. Proposed Development Summary

The proposed Kheis Solar PV projects are located approximately 17 km northeast Groblershoop in the Northern Cape Province. The three proposed project development areas (Kheis PV1 – Kheis PV3) occupy a combined area of about 430 Ha of undeveloped land. The project site is best accessed by a combination of paved route (N8) and an unnamed gravel route leading to the project site. The turn-off to the project site is approximately 13 km from Groblershoop along the N8.

The three (3) solar facilities would use photovoltaic (PV) fixed-tilt rack electric generation system technology to produce solar energy at the utility scale, including inverters, an on-site substation, an O&M building, and possibly a battery storage facility. The planned total installed capacity of the Kheis Solar PV project is 225 MWac which consists of three (3) 75 MWac Solar PV facilities. The proposed developments require Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998) from the Department of Forestry, Fisheries, and the Environment (DFFE).

2. Application References

Name of relevant heritage authority(s)	SAHRA
Name of decision making authority(s)	DFFE

3. Property Information

Latitude / Longitude	-28.66197695, 22.12266833
Erf number / Farm number	Rooisand 387 & Tities Poort 386
Local Municipality	Kheis & Tsantsabane
District Municipality	Z F Mgcawu
Province	Northern Cape
Current Use	Vacant
Current Zoning	Agricultural

4. Nature of the Proposed Development

Total Surface Area of development	430 ha

Depth of excavation (m)	<5m
Height of development (m)	<4m

5. Category of Development

x	**Triggers: Section 38(8) of the National Heritage Resources Act**
x	**Triggers: Section 38(1) of the National Heritage Resources Act**
x	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
x	a) exceeding 5 000m^2 in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m^2
	5. Other (state):

6. Additional Infrastructure Required for this Development

Interconnecting roads, power lines, solar PV arrays, inverters, on site substation, O&M building and a possible battery storage facility (BESS).

7. Mapping (please see Appendix 3 and 4 for a full description of our methodology and map legends)

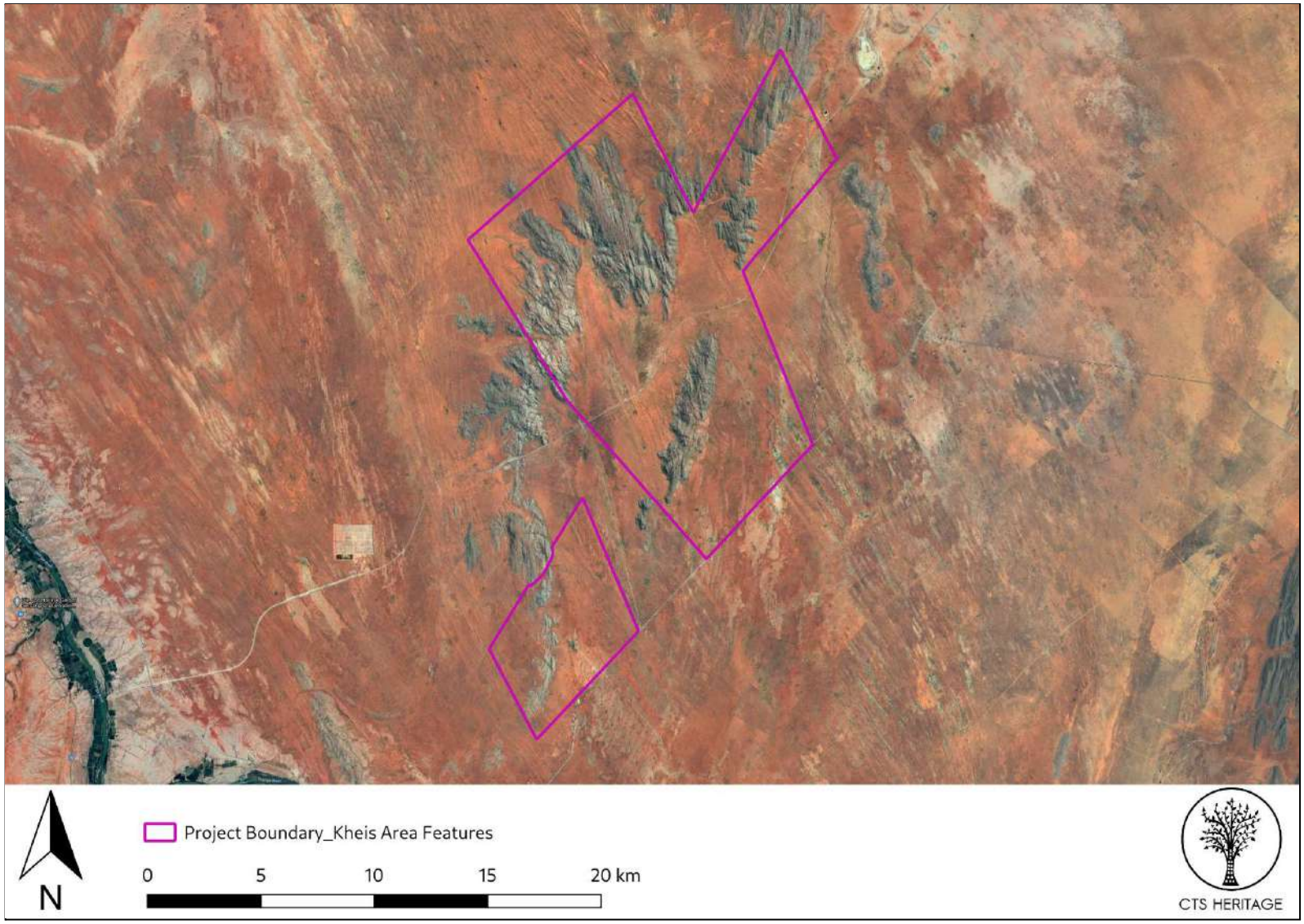

Figure 1b Overview Map. Satellite image (2019) indicating the proposed development area at closer range.

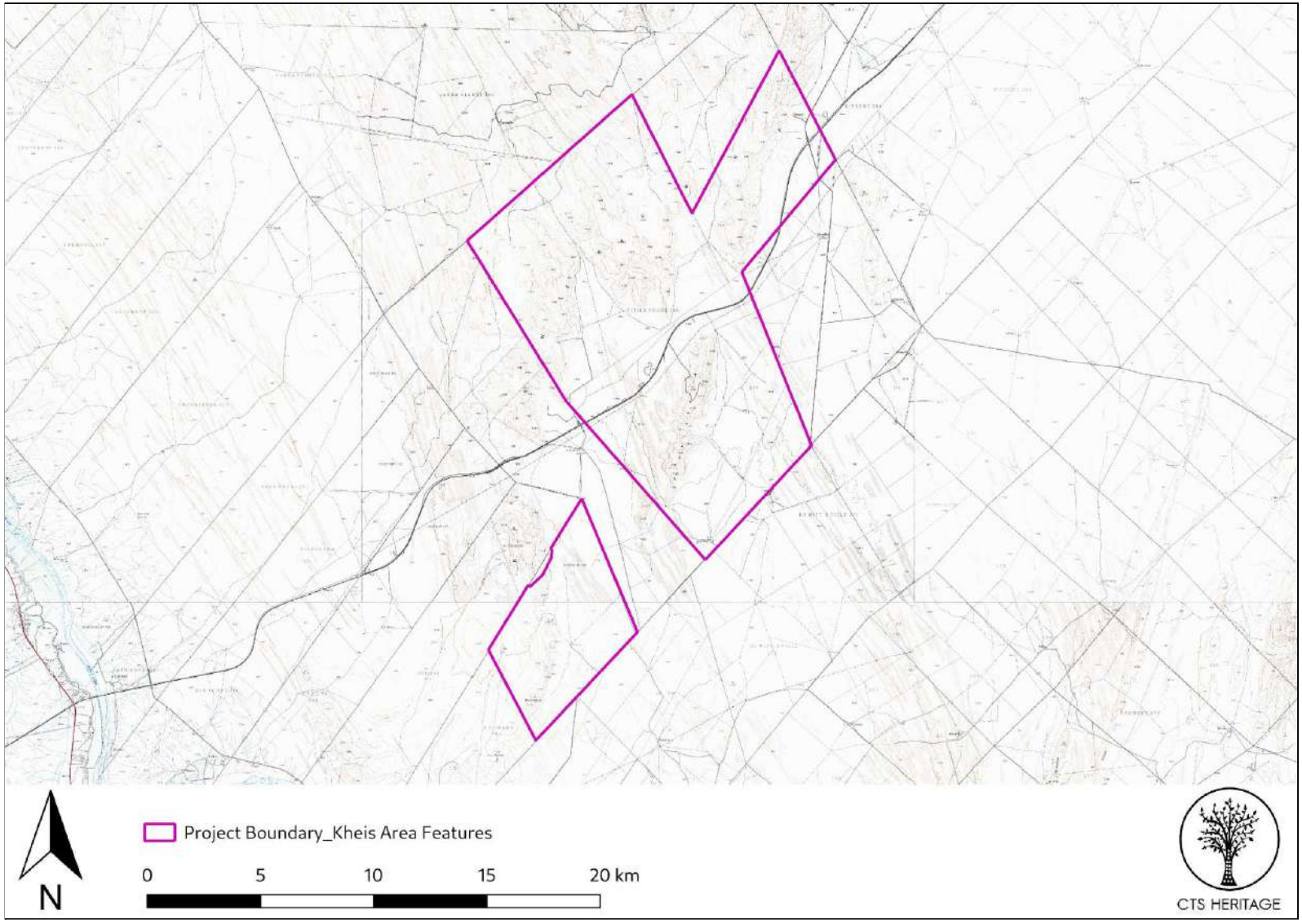

Figure 1c. Overview Map. 1:50 000 Topo Map for the development area

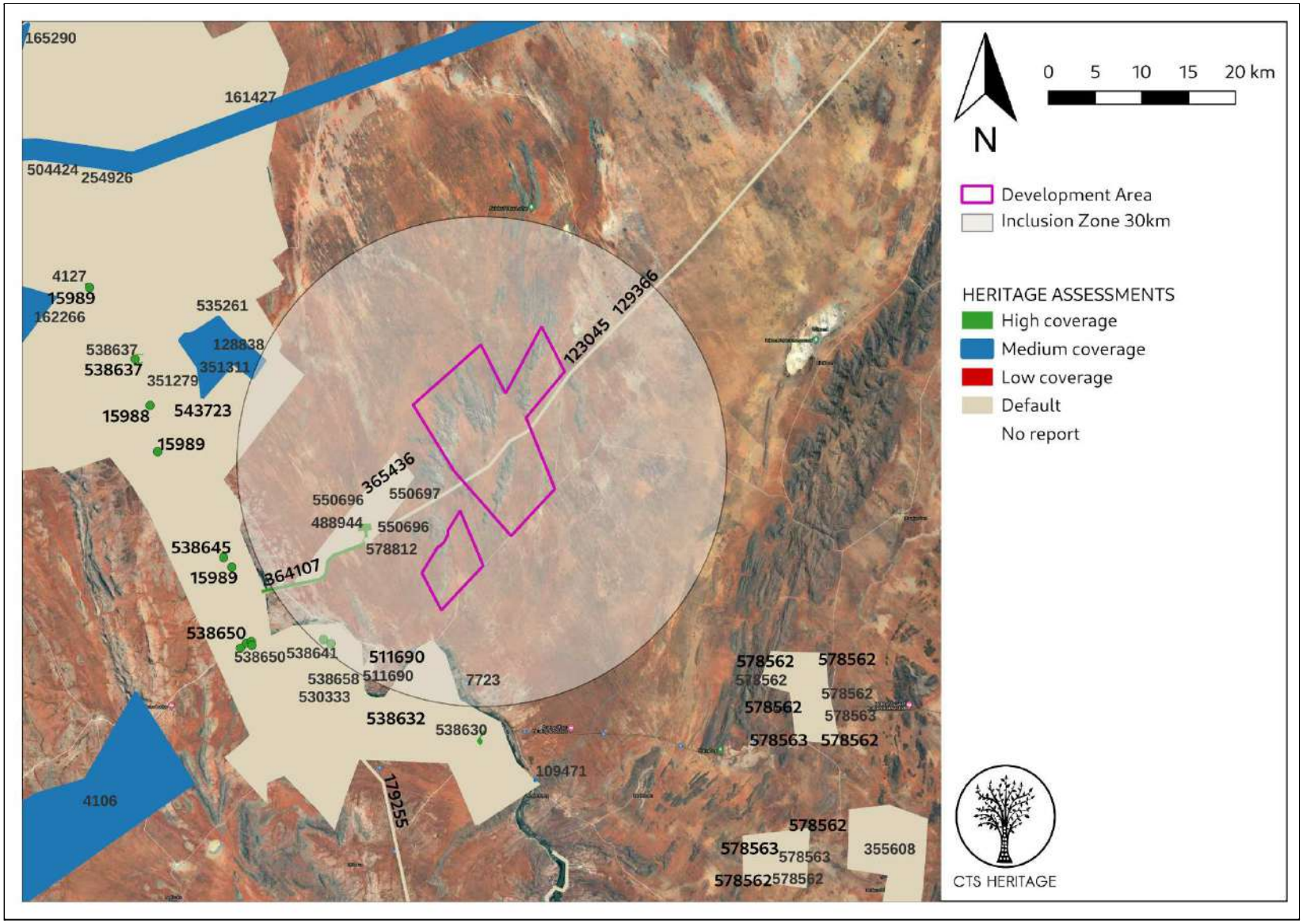

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

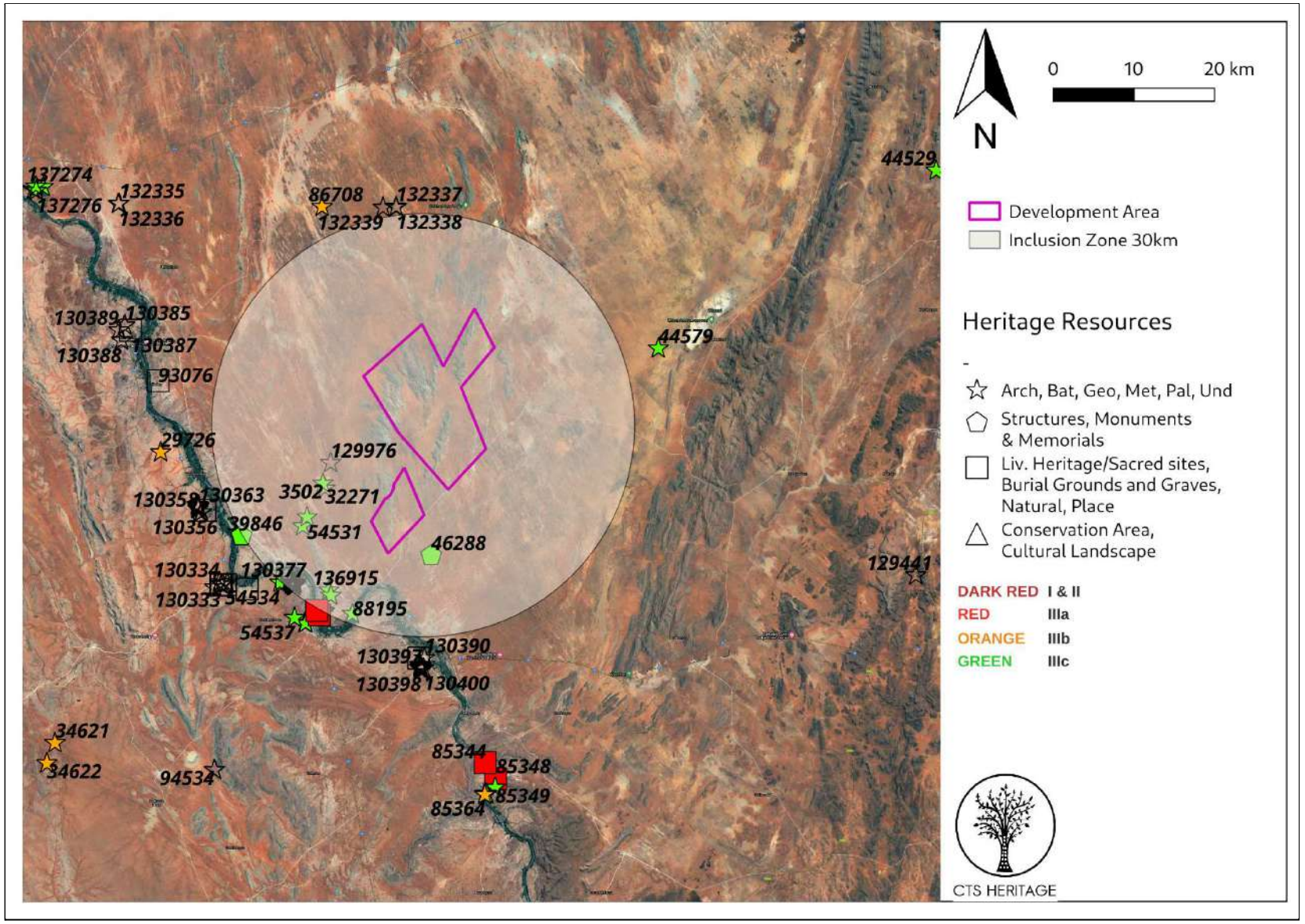

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.

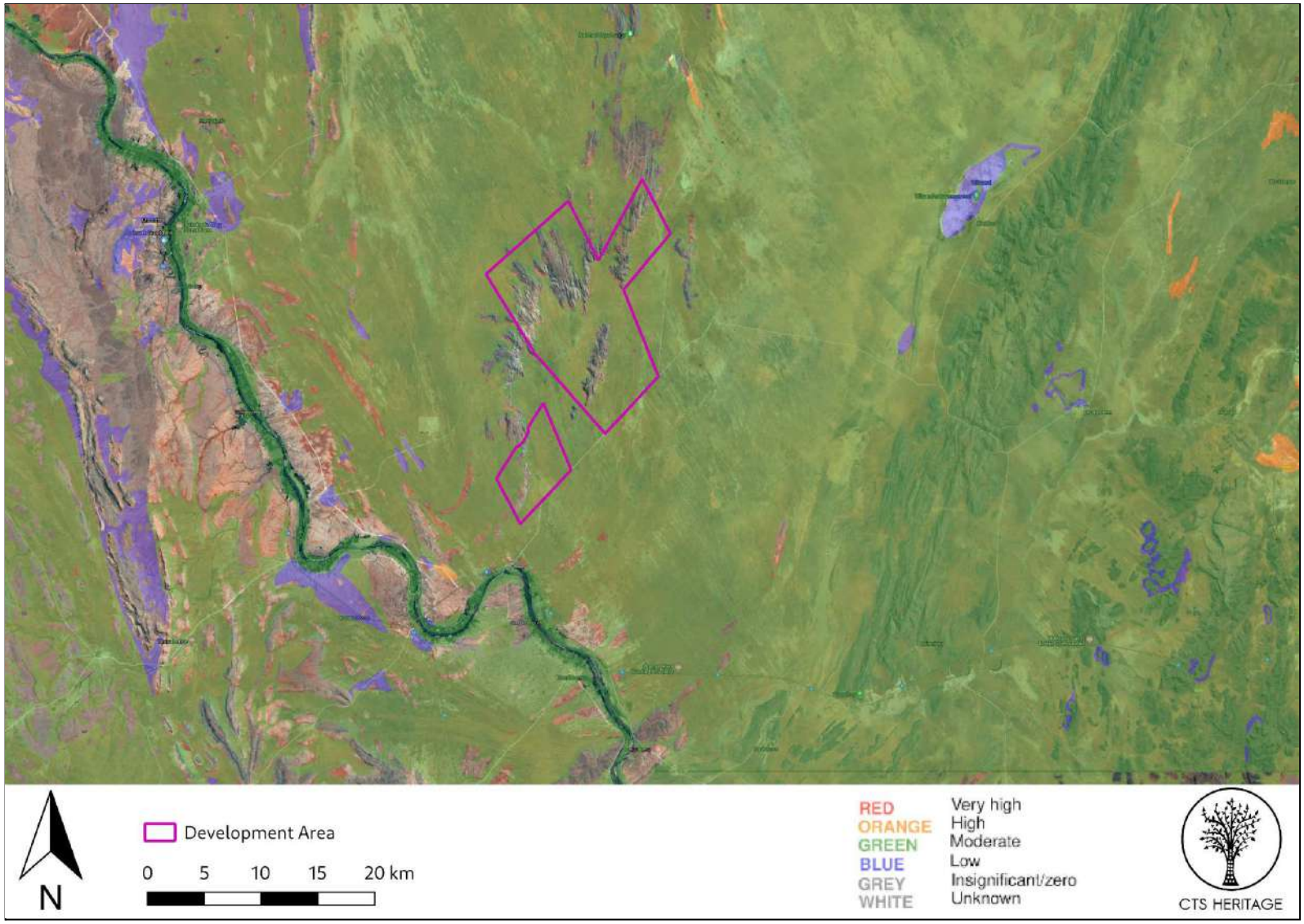

Figure 4. Palaeosensitivity Map. Indicating Moderate fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

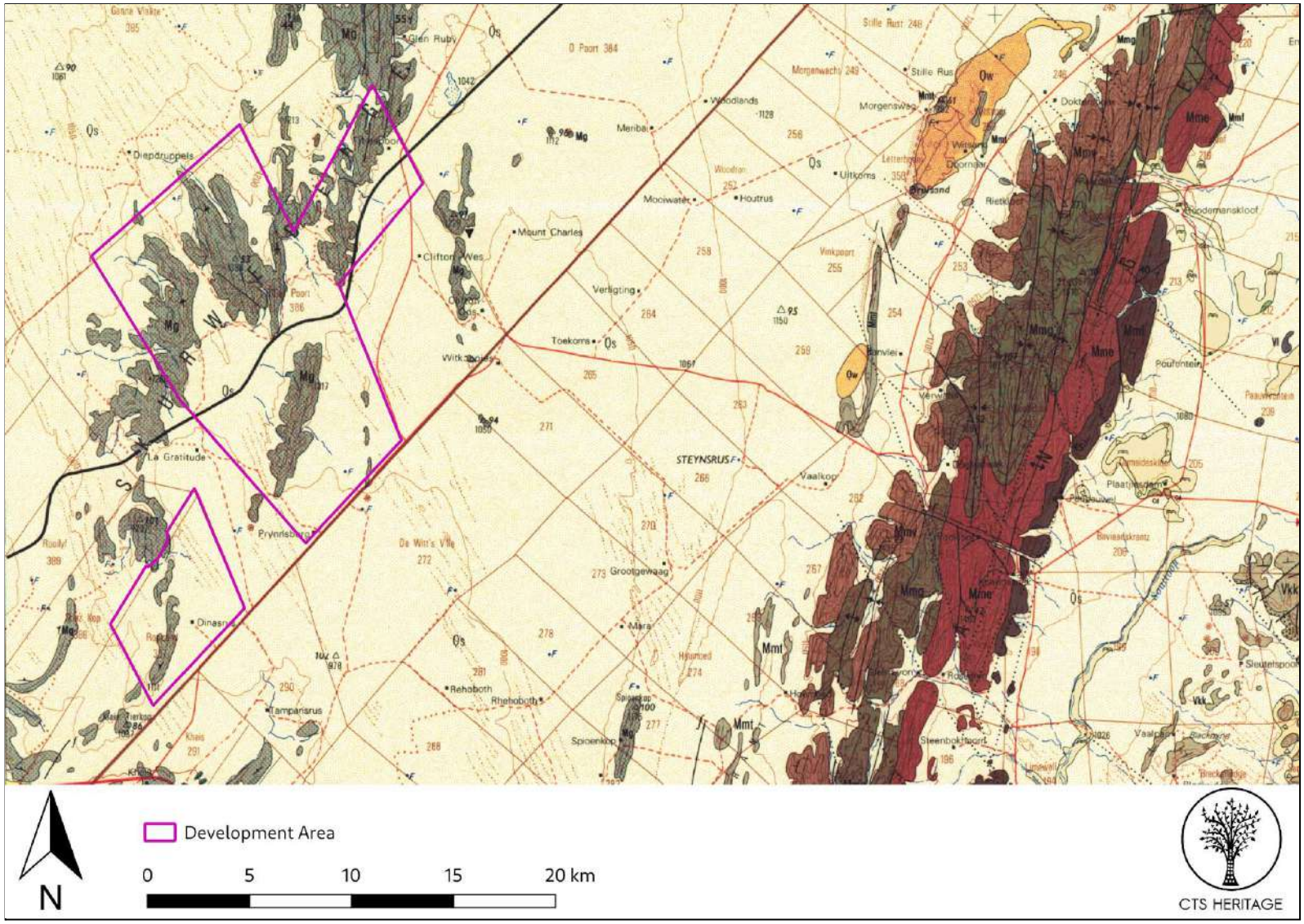

Figure 5. Geology Map. Indicating the underlying geology across the study area through overlaying the geology maps from the CGS series 2822 Postmasburg (Mg: Prynnsberg (muscovite quartzite schist), Qs: Gordonia (Red-brown, wind-blown sand and dunes)

CTS HERITAGE

8. Heritage statement and character of the area

Background

The proposed Kheis Solar PV projects are located approximately 17 km northeast Groblershoop in the Northern Cape Province. The three proposed project development areas (Kheis PV1 – Kheis PV3) occupy a combined area of about 430 Ha of undeveloped land. The project site is best accessed by a combination of paved route (N8) and an unnamed gravel route leading to the project site. The turn-off to the project site is approximately 13 km from Groblershoop along the N8.

The three (3) solar facilities would use photovoltaic (PV) fixed-tilt rack electric generation system technology to produce solar energy at the utility scale, including inverters, an on-site substation, an O&M building, and possibly a battery storage facility. The planned total installed capacity of the Kheis Solar PV project is 225 MWac which consists of three (3) 75 MWac Solar PV facilities. The proposed developments require Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998) from the Department of Forestry, Fisheries, and the Environment (DFFE).

The area proposed for development is located approximately 80km east of Upington and 12.5 north east of Groblershoop. Upington originated as a mission station established along the banks of the Orange River in 1871 and run by Reverend Christiaan Schröder, and was founded as a town in 1873. Groblershoop was founded in 1914 on the farm Sternham, but was renamed in 1939 after Piet Grobler, a former Minister of Agriculture. The region became more developed after the construction of the Boegoeberg Dam and water channels in 1929. Known as the gateway to the Green Kalahari, the Groblershoop region is a major wine-producing area[1]. 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. 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. Upington has been noted as being the sunniest location on the planet for three months of the year, from November through to January, which is likely why this area has been earmarked for the development of renewable energy facilities as part of the Kheis Solar PV development. The geomorphology of the area has been described by Van Schalkwyk (2011, SAHRIS ID 162266) as irregular plains with hills occuring to the south. The vegetation is described as Orange River Nama Karoo.

Archaeology

Numerous Renewable Energy developments have been proposed for this area and each of these proposed developments have undergone assessments for impacts to archaeological resources (Figure 2). Areas located to the south west of the study area were surveyed by Webley (2013), revealing a number of MSA sites, as well as ruined historical stone structures recorded by Morris (2015). Dreyer (2012) carried out an archaeological survey just to the west of this development area and found stone tools made from banded ironstone, chalcedony and quartzites. These were predominantly MSA in age and showed few pieces with retouch as most of the flakes were discarded without being further reduced and retouched. Given the ubiquity of Stone Age material recorded on farms to the west and south west of this development area it is highly likely that more Stone Age material, particularly Middle Stone Age, will be found in a field survey of the proposed development area.

Built Environment & Cultural Landscapes

According to Webley (2013), the Cultural Landscape in this area can be characterised as a region which "*consists of intensive agriculture in a narrow belt along the Orange River surrounded by the red Aeolian sands of the Kalahari*." At the time of compiling her assessment in 2013, most of the renewable energy facilities had not yet been built in the Upington area which is located within a RED zone (area 7). The Cultural Landscape has since changed significantly over the last 8 years as a number of very large solar PV projects (including CSP) have been completed and are in construction. This form of development has therefore very much become a part of the Cultural Landscape today.

The construction of another solar PV development will therefore be in keeping with the ongoing development of the general Upington area as an intensive solar power generating

[1] https://en.wikipedia.org/wiki/Groblershoop

area. A few farm buildings are also expected on the farms that have been identified in the desktop study and these should be assessed during a field survey as there may be other structures or ruins on the farms.

Palaeontology

According to Almond's Desktop PIA for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132 kV Powerline (2013), the area is "*underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are* ***entirely unfossiliferous****. These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity*". This study area is right next to the area assessed by Almond and has the same geological context.

The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. **Porous dune sands are not generally conducive to fossil preservation**. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (*e.g. Hodotermes*, the harvester termite), ostrich egg shells (*Struthio*) and shells of land snails (*e.g. Trigonephrus*) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (*e.g. Corbula, Unio*) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and **the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low and the Prynnsberg quartzites are unfossiliferous**.

The proposed development will therefore have a low to negligible impact on fossils.

RECOMMENDATIONS

As it is possible that any proposed development within the study area may negatively impact on significant archaeological heritage resources, it is recommended that a Heritage Impact Assessment that satisfies section 38(3) of the NHRA is completed.

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APPENDIX 1

List of heritage resources within close proximity to the development area from SAHRIS

Site ID	Site no	Full Site Name	Site Type	Grading
88195	GRO292/ 001	Farm 292 Groblershoop/ 001	Artefacts	Grade IIIc
32271	TSPP-001	Thermal Solar Power Plant	Archaeological	
3502	Bokpoort 390	Bokpoort 390 scatter	Artefacts	Grade IIIc
46288	TAMP01	TAMPANSRUS 294/295 -01	Artefacts, Structures	Grade IIIc
54525	GROB007	Groblershoop 007	Artefacts	Grade IIIc
54531	GROB008	Groblershoop 008	Archaeological	Grade IIIc
129976	Bokpoort		Archaeological	
130365	OPW001	OPWAG	Burial Grounds & Graves	
130366	OPW002	OPWAG	Artefacts	
130367	OPW003	OPWAG	Artefacts	
130368	OPW004	OPWAG	Artefacts	
130369	OPW005	OPWAG	Artefacts	
130370	OPW006	OPWAG	Artefacts	
130371	OPW007	OPWAG	Artefacts	
130372	OPW008	OPWAG	Artefacts	
130373	OPW009	OPWAG	Artefacts	

130374	OPW010	OPWAG	Artefacts	
130375	OPW011	OPWAG	Artefacts	
130376	OPW012	WEGDRAAI	Artefacts	
130377	OPW013	OPWAG	Artefacts	
130378	OPW014	OPWAG	Artefacts	
130379	OPW015	OPWAG	Artefacts	
130381	OPW016	OPWAG	Artefacts	
130382	OPW017	OPWAG	Artefacts	
130383	OPW018	OPWAG	Artefacts	
130384	OPW019	OPWAG	Artefacts	
136915	GBP-001	GROBLERSHOOP	Artefacts	Grade IIIc
136920	GBP-002	GROBLERSHOOP	Artefacts	Grade IIIc
136921	GBP-003	GROBLERSHOOP	Artefacts	Grade IIIc
136955	GBP-011	GROBLERSHOOP	Artefacts	Grade IIIc
136960	GBP-015	GROBLERSHOOP	Artefacts	Grade IIIc
136961	GBP-016	GROBLERSHOOP	Artefacts	Grade IIIc
136963	GBP-017	GROBLERSHOOP	Artefacts	Grade IIIc
136966	GBP-019	GROBLERSHOOP	Artefacts	Grade IIIc

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APPENDIX 2

Reference List from SAHRIS

NID	Author(s)	Date	Type	Title
128827	Barry Millsteed	12/02/2014	AIA Phase 1	Full Palaeontological Heritage Impact Assessment Report on the site of Proposed Solar Energy Generation Facilities (Kheis Solar projects 1-3) to be located on the farm Namkwari 656 near Upington, Northern Cape
351273	Barry Millsteed	01/12/2015	Palaeontological Specialist Reports	FULL PALAEONTOLOGICAL HERITAGE IMPACT ASSESSEMENT REPORT ON THE SITE OF PROPOSED SOLAR ENERGY GENERATION FACILITIES (TEWA ISITHA SOLAR 1 AND 2) TO BE LOCATED ON THE REMAINING EXTENT OF THE FARM ALBANY 405 NEAR KAROS, NORTHERN CAPE PROVINCE
104308	Cobus Dreyer	06/11/2012	HIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Water Pipeline from Sanddraai 391 to Bokpoort 390, Groblershoop, Northern Cape
4103	Cobus Dreyer	10/03/2006	AIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Concentrated Solar Thermal Plant (Csp) at the Farms Olyvenhouts Drift, Upington, Bokpoort 390 and Tampansrus 294/295, Groblershoop, Northern Cape
108398	David Morris	01/12/2012	HIA Phase 1	Archaeological Impact Assessment Phase 1: 15 km Water Pipeline across farms Sand Draai 391 and Bok Poort 390 near Groblershoop, Northern Cape
128838	David Morris	03/02/2014	Heritage Scoping	Proposed Kheis Solar Park Phases 1-3 on portions 7 and 9 of the farm Namakwari 656, south-east of Upington in Northern Cape: Scoping phase Heritage Input
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline, Groblershoop, Northern Cape.
351279	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 1 PV Facility East Of Upington, Northern Cape Province.
351311	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 2 PV Facility East Of Upington, Northern Cape Province.

7723	Peter Beaumont	09/10/2008	AIA Phase 1	Phase 1 Archaeological Impact Assessment Report on Portion of the Farm 292 near Groblershoop, Karoo District Municipality, Northern Cape Province
123045	Cobus Dreyer	26/06/2013	Archaeological Specialist Reports	Report Eskom Garona Ferrum Mercury
129366	Cobus Dreyer	28/08/2013	AIA Phase 1B	First Phase Archaeological & Heritage Assessment of the Proposed Garona-Ferrum Transmission Line, Northern Cape
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline, Groblershoop, Northern Cape.
364107	Cobus Dreyer	16/09/2015	HIA Phase 1	First Phase Archaeological & Heritage Assessment of the Proposed Bokpoort II 300 MW Combined 2 x 75 PV & 150 MW CSP Tower Solar Development on the Remainder of the Farm Bokpoort 390, Groblershoop, Northern Cape Province.
365436	John E. Almond	29/06/2016	PIA Desktop	Palaeontological Impact Assessment: Desktop Study - Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province.
115034	Lita Webley	25/03/2015	HIA Phase 1	Heritage Impact Assessment for Proposed Construction of the Eskom Groblershoop substation and the Garona-Groblershoop 132 kV powerline, Groblershoop, Northern Cape

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

AIA	Archaeological Impact Assessment
DARD	Department of Agriculture and Rural Development (KwaZulu-Natal)
DEA	Department of Environmental Affairs (National)
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape)
DEDECT	Department of Economic Development, Environment, Conservation and Tourism (North West)
DEDT	Department of Economic Development and Tourism (Mpumalanga)
DEDTEA	Department of economic Development, Tourism and Environmental Affairs (Free State)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DMR	Department of Mineral Resources (National)
GDARD	Gauteng Department of Agriculture and Rural Development (Gauteng)
HIA	Heritage Impact Assessment
LEDET	Department of Economic Development, Environment and Tourism (Limpopo)
MPRDA	Mineral and Petroleum Resources Development Act, no 28 of 2002
NEMA	National Environmental Management Act, no 107 of 1998
NHRA	National Heritage Resources Act, no 25 of 1999
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
VIA	Visual Impact Assessment

Full guide to Palaeosensitivity Map legend

	RED:	VERY HIGH - field assessment and protocol for finds is required
	ORANGE/YELLOW:	HIGH - desktop study is required and based on the outcome of the desktop study, a field assessment is likely
	GREEN:	MODERATE - desktop study is required
	BLUE/PURPLE:	LOW - no palaeontological studies are required however a protocol for chance finds is required
	GREY:	INSIGNIFICANT/ZERO - no palaeontological studies are required
	WHITE/CLEAR:	UNKNOWN - these areas will require a minimum of a desktop study.

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APPENDIX 4 - Methodology

The Heritage Screener summarises the heritage impact assessments and studies previously undertaken within the area of the proposed development and its surroundings. Heritage resources identified in these reports are assessed by our team during the screening process.

The heritage resources will be described both in terms of **type**:

- Group 1: Archaeological, Underwater, Palaeontological and Geological sites, Meteorites, and Battlefields
- Group 2: Structures, Monuments and Memorials
- Group 3: Burial Grounds and Graves, Living Heritage, Sacred and Natural sites
- Group 4: Cultural Landscapes, Conservation Areas and Scenic routes

and **significance** (Grade I, II, IIIa, b or c, ungraded), as determined by the author of the original heritage impact assessment report or by formal grading and/or protection by the heritage authorities.

Sites identified and mapped during research projects will also be considered.

DETERMINATION OF THE EXTENT OF THE INCLUSION ZONE TO BE TAKEN INTO CONSIDERATION

The extent of the inclusion zone to be considered for the Heritage Screener will be determined by CTS based on:

- the size of the development,
- the number and outcome of previous surveys existing in the area
- the potential cumulative impact of the application.

The inclusion zone will be considered as the region within a maximum distance of 50 km from the boundary of the proposed development.

DETERMINATION OF THE PALAEONTOLOGICAL SENSITIVITY

The possible impact of the proposed development on palaeontological resources is gauged by:

- reviewing the fossil sensitivity maps available on the South African Heritage Resources Information System (SAHRIS)
- considering the nature of the proposed development
- when available, taking information provided by the applicant related to the geological background of the area into account

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

Each report assessed for the compilation of the Heritage Screener is colour-coded according to the level of coverage accomplished. The extent of the surveyed coverage is labeled in three categories, namely low, medium and high. In most instances the extent of the map corresponds to the extent of the development for which the specific report was undertaken.

Low coverage will be used for:

- desktop studies where no field assessment of the area was undertaken;
- reports where the sites are listed and described but no GPS coordinates were provided.
- older reports with GPS coordinates with low accuracy ratings;
- reports where the entire property was mapped, but only a small/limited area was surveyed.
- uploads on the National Inventory which are not properly mapped.

Medium coverage will be used for

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage such as thick vegetation, etc.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover up to around 50% of the property.

High coverage will be used for

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates. This category will also apply to permit reports.

RECOMMENDATION GUIDE

The Heritage Screener includes a set of recommendations to the applicant based on whether an impact on heritage resources is anticipated. One of three possible recommendations is formulated:

(1) The heritage resources in the area proposed for development are sufficiently recorded - The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No further heritage work is recommended for the proposed development.

This recommendation is made when:

- enough work has been undertaken in the area
- it is the professional opinion of CTS that the area has already been assessed adequately from a heritage perspective for the type of development proposed

(2) The heritage resources and the area proposed for development are only partially recorded - The surveys undertaken in the area have not adequately captured the heritage resources and/or there are sites which require mitigation or management plans. Further specific heritage work is recommended for the proposed development.

This recommendation is made in instances in which there are already some studies undertaken in the area and/or in the adjacent area for the proposed development. Further studies in a limited HIA may include:

- improvement on some components of the heritage assessments already undertaken, for instance with a renewed field survey and/or with a specific specialist for the type of heritage resources expected in the area
- compilation of a report for a component of a heritage impact assessment not already undertaken in the area
- undertaking mitigation measures requested in previous assessments/records of decision.

(3) The heritage resources within the area proposed for the development have not been adequately surveyed yet - Few or no surveys have been undertaken in the area proposed for development. A full Heritage Impact Assessment with a detailed field component is recommended for the proposed development.

APPENDIX 2: Archaeological Assessment (2021)

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Red Sands PV Cluster in the Northern Cape

Prepared by

CTS HERITAGE

In Association with

Savannah Environmental

November 2021

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EXECUTIVE SUMMARY

The proposed Red Sands Solar PV Cluster projects are located approximately 17 km northeast Groblershoop in the Northern Cape Province. The three proposed project development areas (Red Sands PV1 - PV3) occupy a combined area of about 751 Ha of undeveloped land. The project site is best accessed by a combination of paved route (N8) and an unnamed gravel route leading to the project site. The turn-off to the project site is approximately 13 km from Groblershoop along the N8.

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are the dominant archaeological signature of the area. All of the archaeological resources identified within the areas proposed for the development of the Red Sands PV Cluster have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facilities in these locations from an archaeological perspective.

One archaeological site of significance was identified outside of the areas proposed for the PV cluster development - Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts). Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site.

One rock art site was identified which has high heritage significance (Red sands-019). Although this site is located well away from the proposed PV cluster developments, it is recommended that this significant site is demarcated on relevant development maps and that a no-go buffer of 300m is implemented around this site.

Other than LSA and MSA artefacts, the field assessment identified a number of structures. These are predominantly agricultural in nature in the form of farm dams, kraals and old farm complexes. Only one structure was determined to have heritage significance - Red Sands-042. This structure has been graded IIIB and is located well away from the proposed PV cluster developments. As such, no impact to this structure or its context is anticipated.

Based on the information available, the proposed development is unlikely to directly impact on any significant archaeological heritage resources.

There is no objection to the proposed development of the Red Sands PV Cluster in terms of impacts to archaeological heritage on condition that:

- A no-go buffer area of 100m must be implemented around Site Red Sands-045 and Red Sands-046 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.

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- A no-go buffer area of 300m must be implemented around Site Red Sands-019 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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CONTENTS

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1. INTRODUCTION

1.1 Background Information on Project

The proposed Red Sands Solar PV Cluster projects are located approximately 17 km northeast Groblershoop in the Northern Cape Province. The three proposed project development areas (Red Sands PV1 - PV3) occupy a combined area of about 751 Ha of undeveloped land. The project site is best accessed by a combination of paved route (N8) and an unnamed gravel route leading to the project site. The turn-off to the project site is approximately 13 km from Groblershoop along the N8.

The three (3) solar facilities would use photovoltaic (PV) electric generation system technology to produce solar energy at the utility scale, including inverters, an on-site substation, an O&M building, and possibly a battery storage facility. The planned total installed capacity of the Red Sands Solar PV project is 225 MWac which consists of three (3) 75 MWac Solar PV facilities. The proposed developments require Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998) from the Department of Forestry, Fisheries, and the Environment (DFFE).

1.2 Description of Property and Affected Environment

The first two proposed solar PV areas (1 & 2) straddle the Sishen-Saldanha Bay railway line which runs along a northeast to southwest trajectory on the farm Titiespoort 386. Various long trains carrying iron ore make their way slowly through the area during the day and a service road runs along the northern edge of the railway line with crossings available at regular intervals spread across the farms. A guest house lodge has been set up at the La Gratitude farm to the west of these two PV areas and is currently signposted as “Safric Safaris”. A public servitude access road joins the lodge to the main service road running along the eastern side of the study area and wild game are kept on this property including kudu, gemsbok, springbok and eland. At the time of survey the lodge appeared to be closed. Large 765kV powerlines run parallel to the railway line and part of the game farm is enclosed by a high electric fence on the northern side of the railway line. The third solar PV area lies on the farm Rooisand 387 and this is about 2.5km southwest of area 1 on the opposite side of the service road. All three areas are roughly the same size.

The owner of areas 1 & 2 runs his stock farming operations from Prynnsberg farm on a level area on the eastern side of the Prynnsberg koppies. Area 3 is accessed via the Rooisand farm further to the south. Both farmers are farming with sheep and goats with some cattle. The solar PV areas are all on generally level ground and overlooked by the Kurweberg and Prynnsberg koppies as well as some lower ridges on the Rooisand farm. The valley basin is entirely covered in red Kalahari sand dunes that run up the sides of the koppies in certain places. The vegetation in this area falls within the Orange River Nama Karoo biome and consists or acacia thorn trees, grassland, shrubs and succulents. Conditions are extremely arid and windmills, kraals and farm dams dot the area serving the stock farms.

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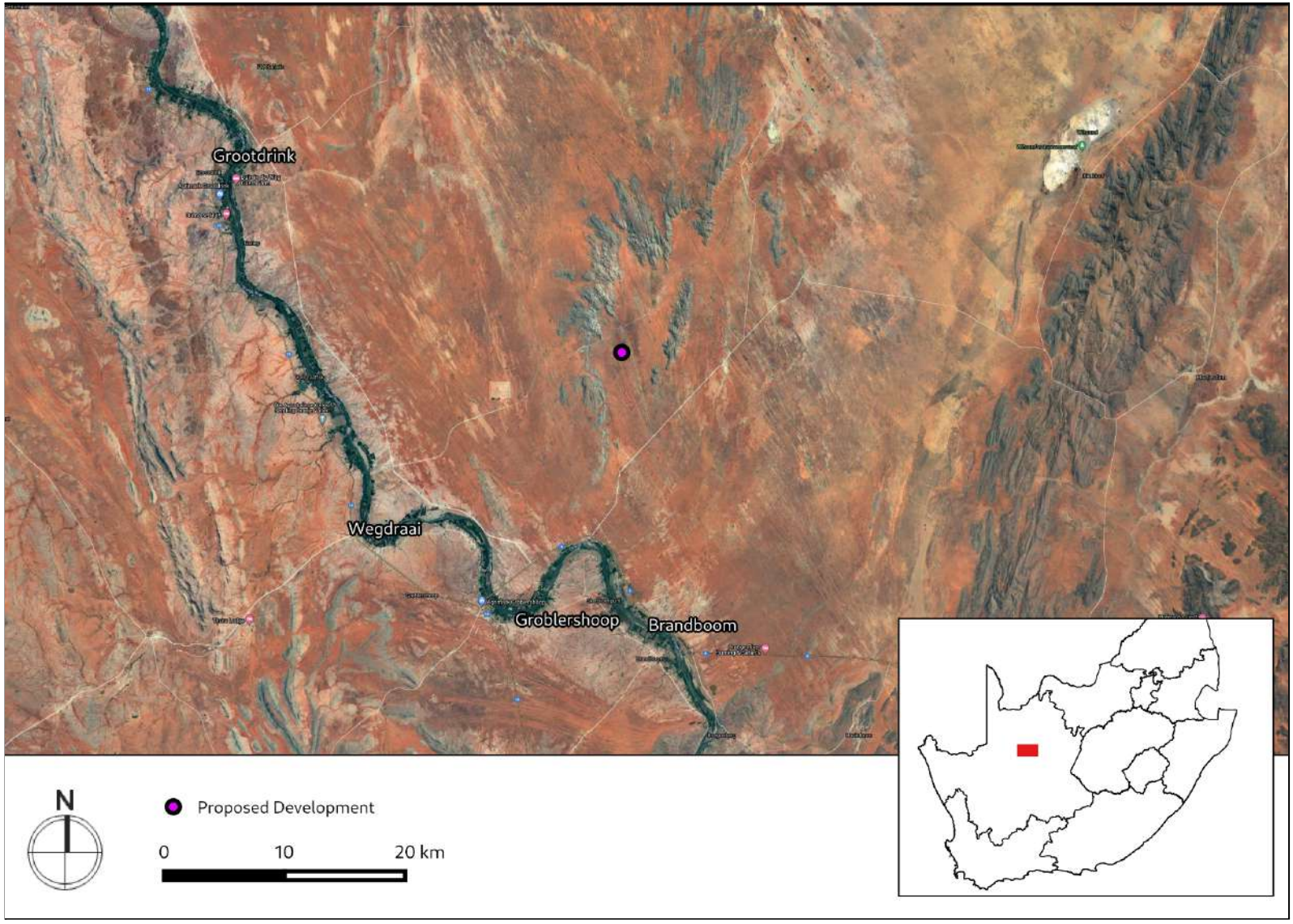

Figure 1.1: Close up satellite image indicating proposed location of study area

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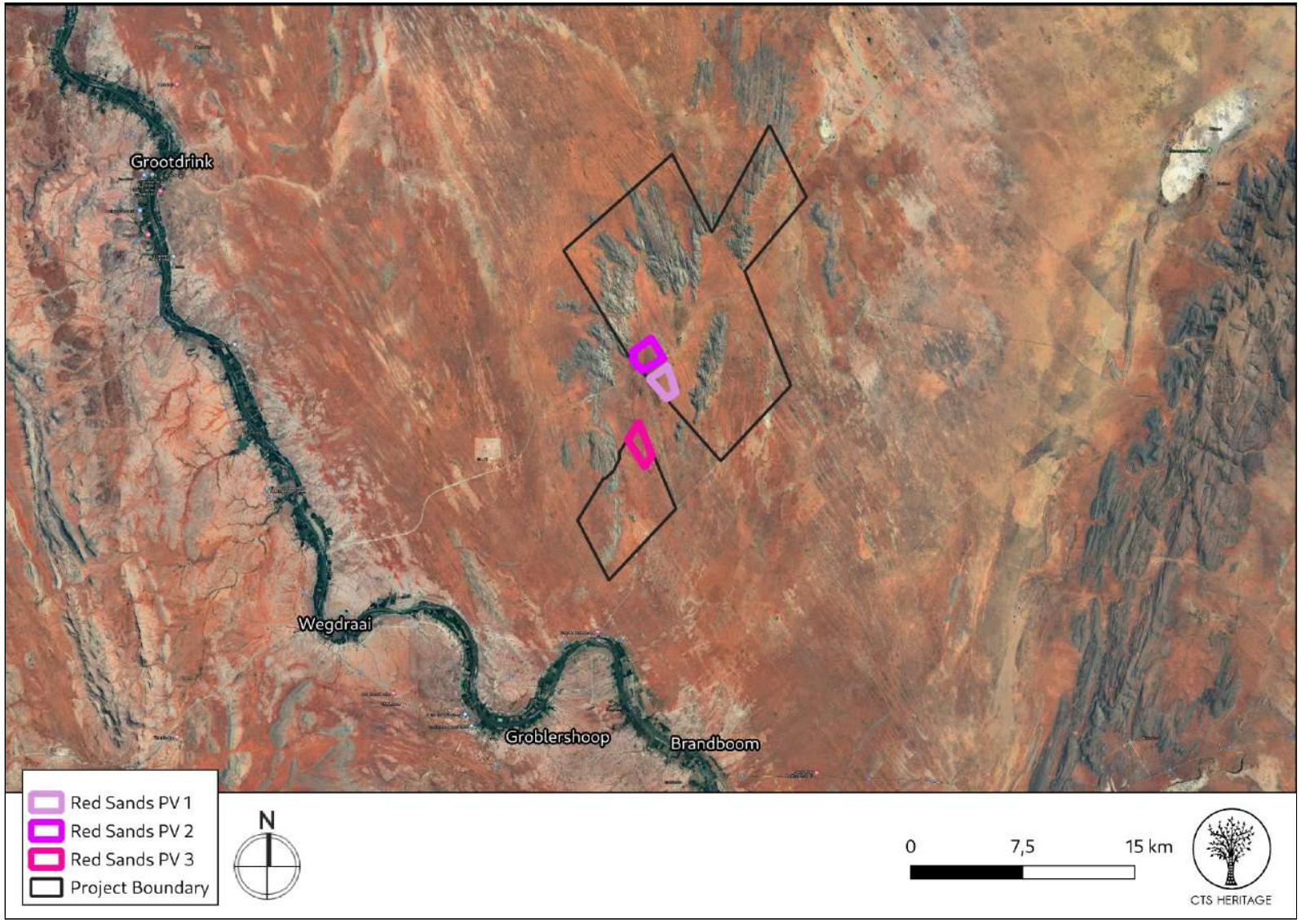

Figure 1.2: Study Area

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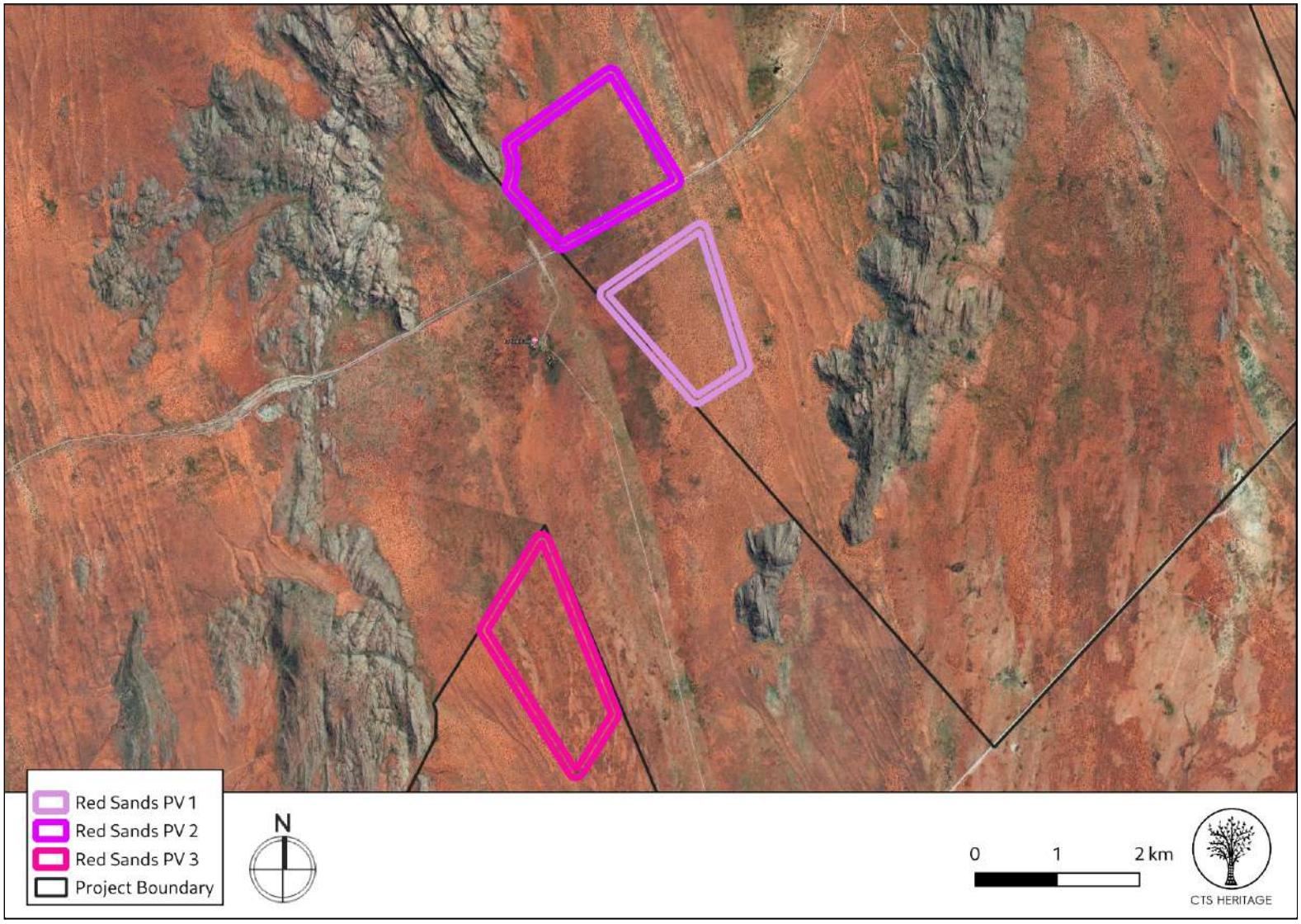

Figure 1.3: Study Area

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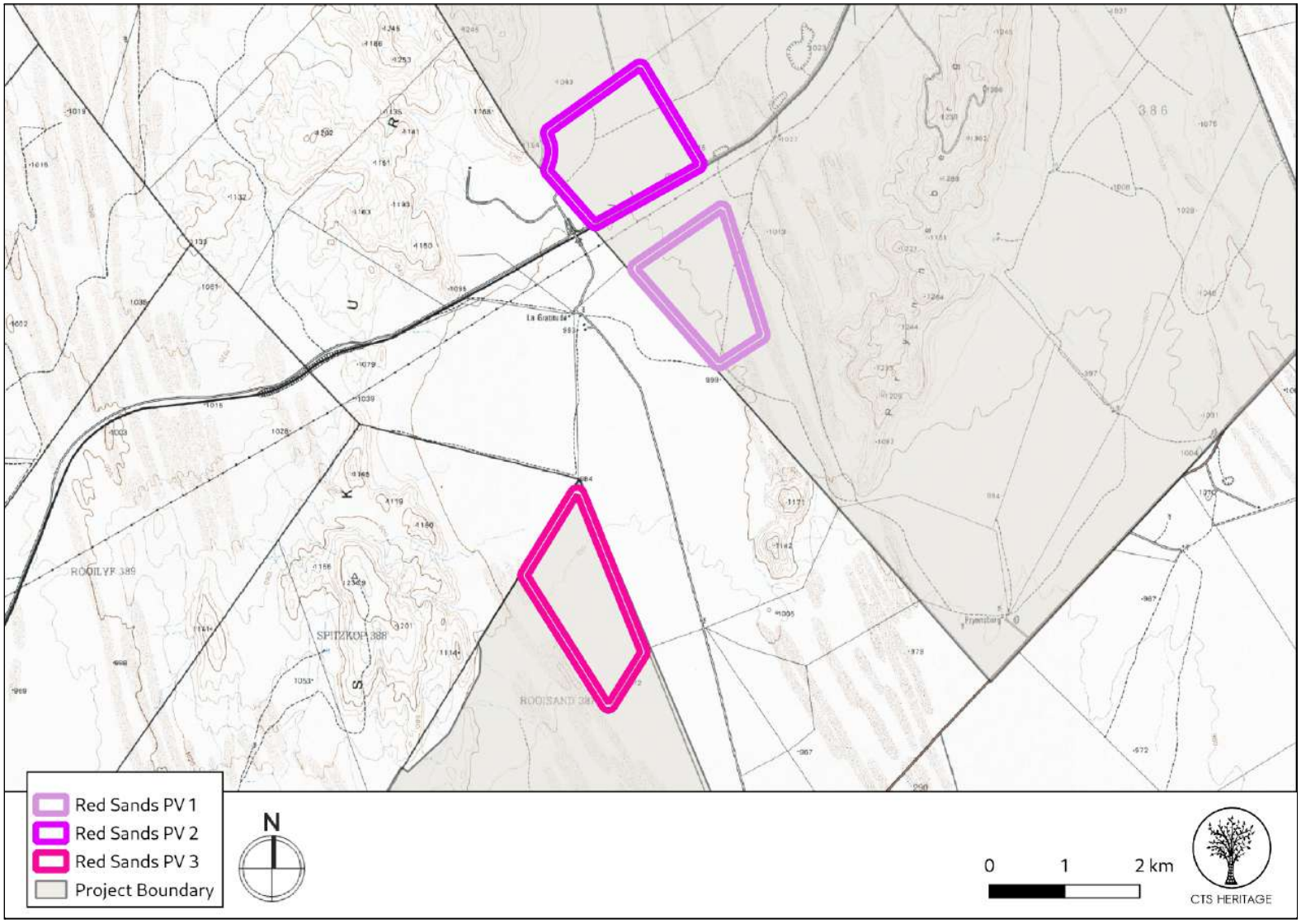

Figure 1.4: Study Area reflected on the 1:50 000 Topo Map

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2. METHODOLOGY

2.1 Purpose of Archaeological Study

The purpose of this archaeological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 14-17 November 2021 to determine what archaeological resources are likely to be impacted by the proposed development.
- The study area was assessed on foot in transects, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

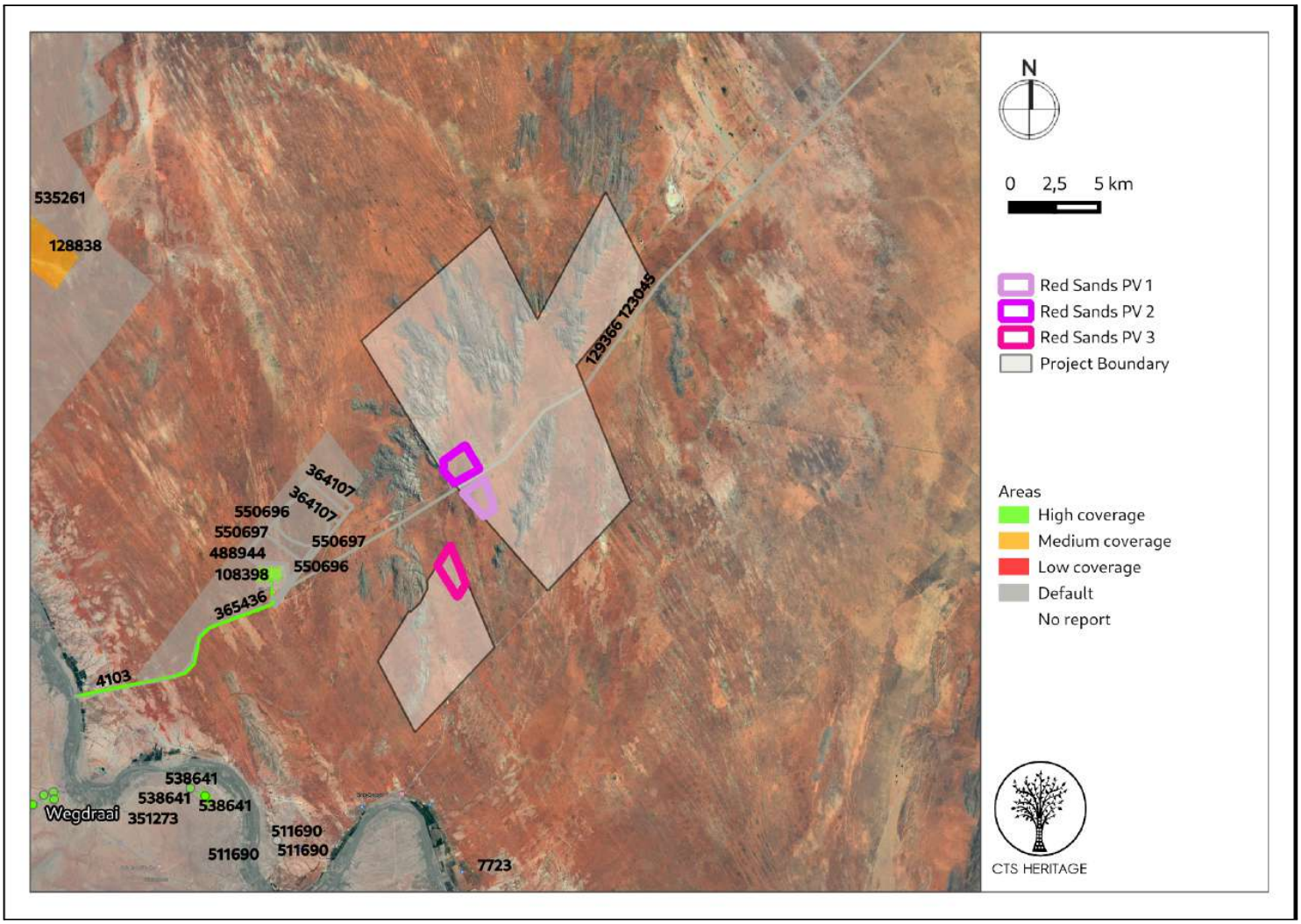

Figure 2: Close up satellite image indicating proposed location of the study area in relation to heritage studies previously conducted

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2.3 Constraints & Limitations

There were no major limitations or constraints to the survey carried out and the visibility is excellent due to high aridity and low levels of vegetation cover, particularly in areas covered in acacia thorn trees. In some areas lower levels of archaeological visibility were encountered where grassland and shrubveld was dense enough to cover the ground.. We are confident that the assessment provided an accurate report on the archaeological sensitivity of the area.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

The area proposed for development is located approximately 80km east south east of Upington and 25km north east of Groblershoop. Upington originated as a mission station established along the banks of the Orange River in 1871 and run by Reverend Christiaan Schröder, and was founded as a town in 1873. Groblershoop was founded in 1914 on the farm Sternham, but was renamed in 1939 after Piet Grobler, a former Minister of Agriculture. The region became more developed after the construction of the Boegoeberg Dam and water channels in 1929.

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. 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. Upington has been noted as being the sunniest location on the planet for three months of the year, from November through to January, which is likely why this area has been earmarked for the development of renewable energy facilities as part of the Red Sandsd Solar PV development. The geomorphology of the area has been described by Van Schalkwyk (2011, SAHRIS ID 162266) as irregular plains with hills occuring to the south. The vegetation is described as Orange River Nama Karoo.

Numerous Renewable Energy developments have been proposed for this area and each of these proposed developments have undergone assessments for impacts to archaeological resources (Figure 2). Areas located to the south west of the study area were surveyed by Webley (2013), revealing a number of MSA sites, as well as ruined historical stone structures recorded by Morris (2015). Dreyer (2012) carried out an archaeological survey just to the west of this development area and found stone tools made from banded ironstone, chalcedony and quartzites. These were predominantly MSA in age and showed few pieces with retouch as most of the flakes were discarded without being further reduced and retouched.

Areas located to the west of the study area were surveyed by Sampson (1985), revealing a number of Karoo stone age sites, however similar densities of stone age sites are not known from the proposed development area. In his assessment, Van Schalkwyk (2011) identified a number of Later Stone Age artefacts associated with a non-perennial stream. He also identified two small historic structures made of clay bricks of low heritage significance. Gaigher (2012, SAHRIS ID 34135) also completed an archaeological assessment in the broader area. Gaigher identified “limited scatterings of Middle to Later Stone Age tools found in various areas”. He notes that these finds in themselves do not constitute sites, but do indicate the possible occurrence of such sites. Further archaeological impact assessment work has been completed in this area by Van der Walt (2015 and 2016). Van der Walt notes that the various assessments

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conducted in this area provide a robust baseline for the archaeology expected in this area. Van der Walt notes that "Although artefacts dating to the Early, Middle and Later Stone Age were recorded in the larger area, they occur as isolated finds that are temporally mixed, in deflated and un-stratified contexts without organic remains and other cultural materials. As a result, the archaeological record of the larger area is considered to be of low significance."

Given the ubiquity of Stone Age material recorded on farms to the west and south west of this development area it is highly likely that more Stone Age material, particularly Middle Stone Age, of a similar nature to that described above will be found in a field survey of the proposed development area.

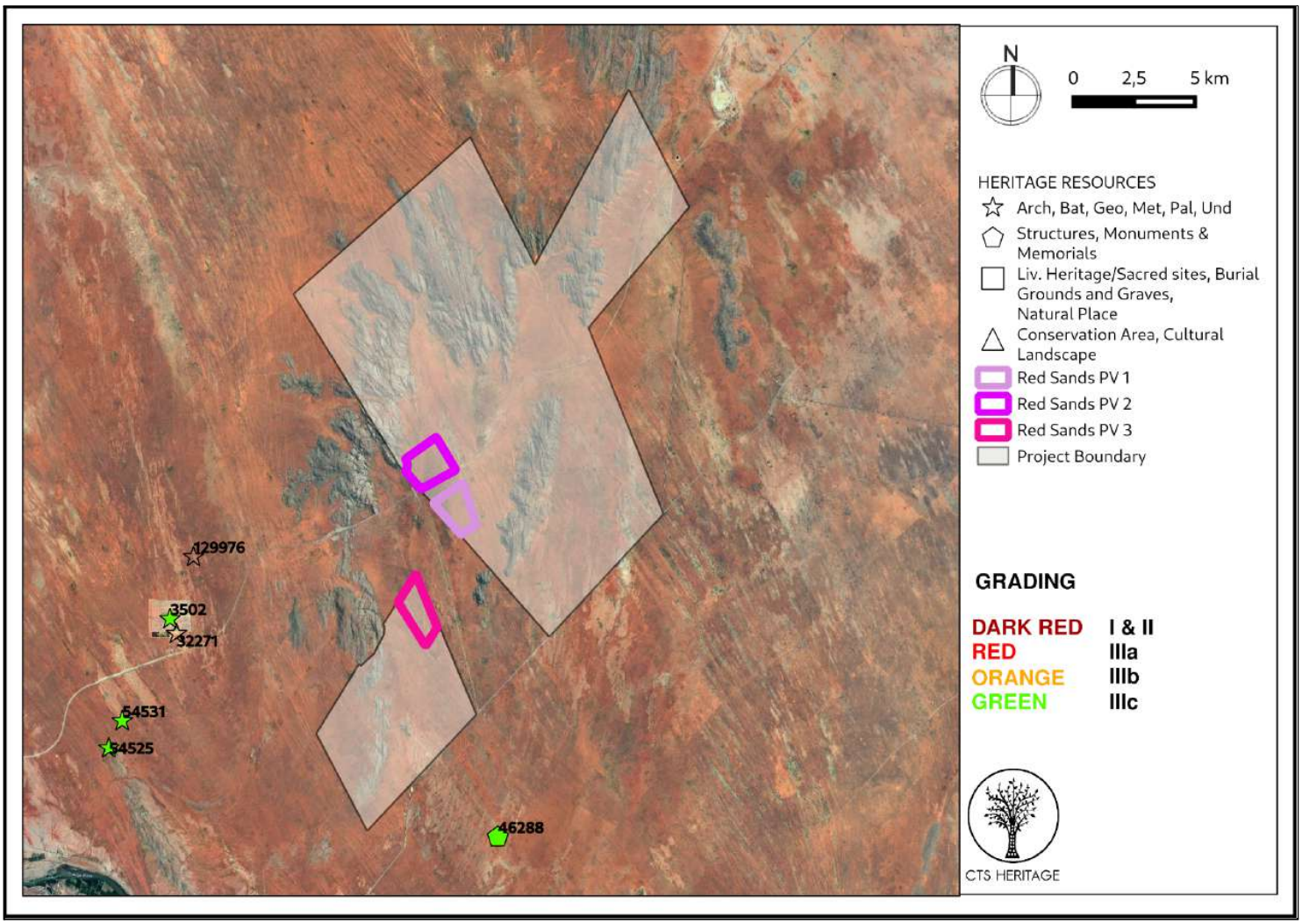

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

More than 50 observations were made across the study area and these mostly consisted of Middle Stone Age stone artefacts made of quartz. Cores and sources of this material are spread right across the study area and it appears that extensive use was made of locally available raw materials. The density of archaeological material increased towards the areas lining the base of the koppies where shade, shelter and strategic views could be obtained over the generally flat valley basin. In PV area 3 a series of broken calcrete surfaces were observed that likely formed areas of standing water in the past. These were also associated with slightly higher densities of archaeological material but not as high as the areas surrounding the koppies. Scatters of hornfels, cherts, CCS and silcretes were rare in the middle of the valley plains but these imported materials were more common near the koppies. In particular, one rock art site at Rooisand farm was recorded that is tucked into the ridge band in a deep overhang with an ashy deposit that has sampling potential. This site has an extensive array of archaeological material and a number of finger paintings. The paintings consisted of daubs and streaks, areas with red smearing and red wash, as well as a couple of grid shapes typical of a possible pastoralist period site in the last 2000 years. However, a much older Middle Stone Age component was also evident due to the high numbers of MSA artefacts littering the talus area.

Figure 4.1: Contextual Images

Figure 4.2: Contextual Images

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Figure 4.3: Contextual Images

Figure 4.4: Contextual Images

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Figure 4.5: Contextual Images

Figure 4.6: Contextual Images

Figure 4.7: Contextual Images - existing electrical infrastructure

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Figure 4.8: Contextual Images

Figure 4.9: Contextual Images

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Figure 4.10: Contextual Images

Figure 4.11: Contextual Images

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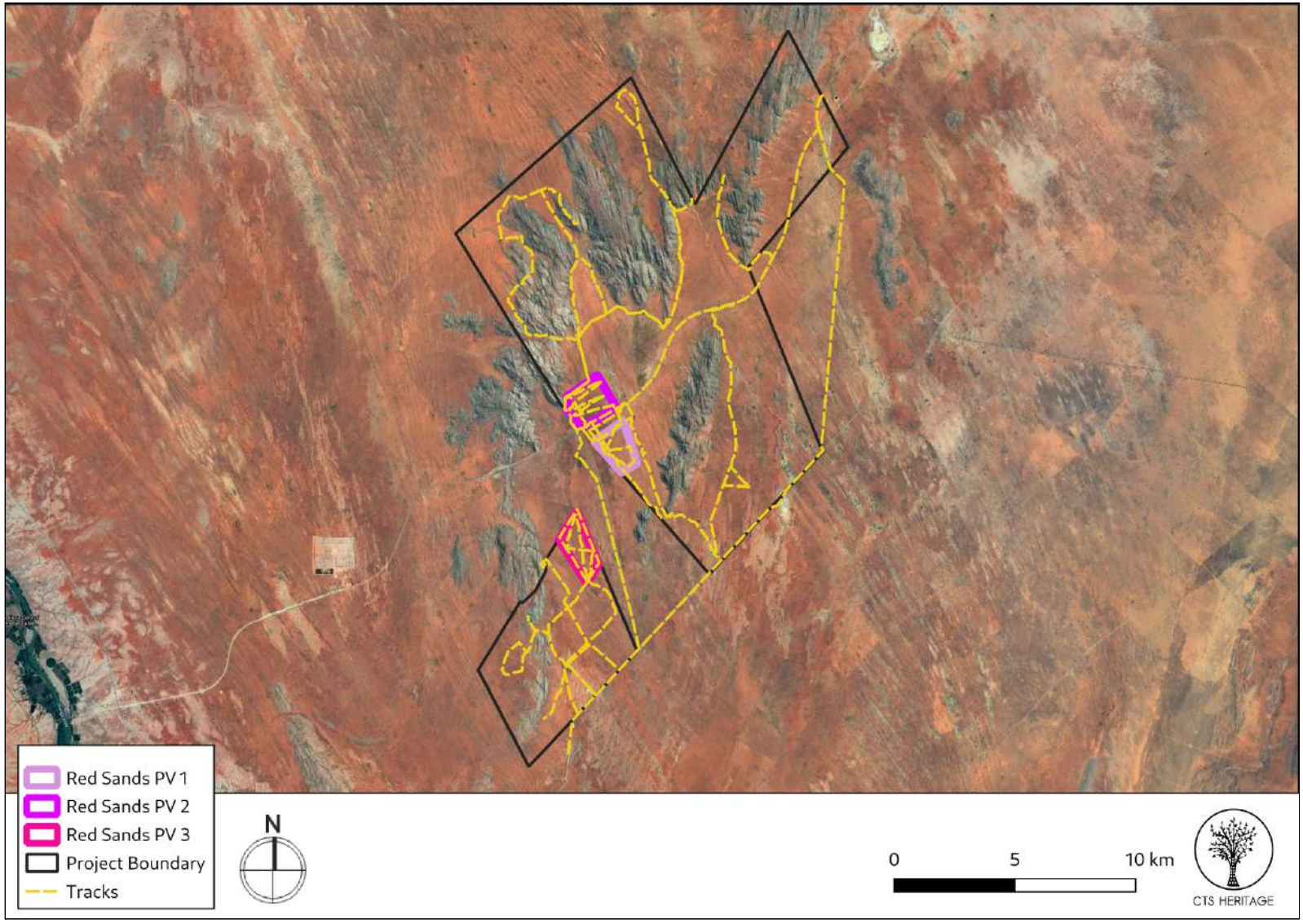

Figure 5.1: Overall track paths of foot survey

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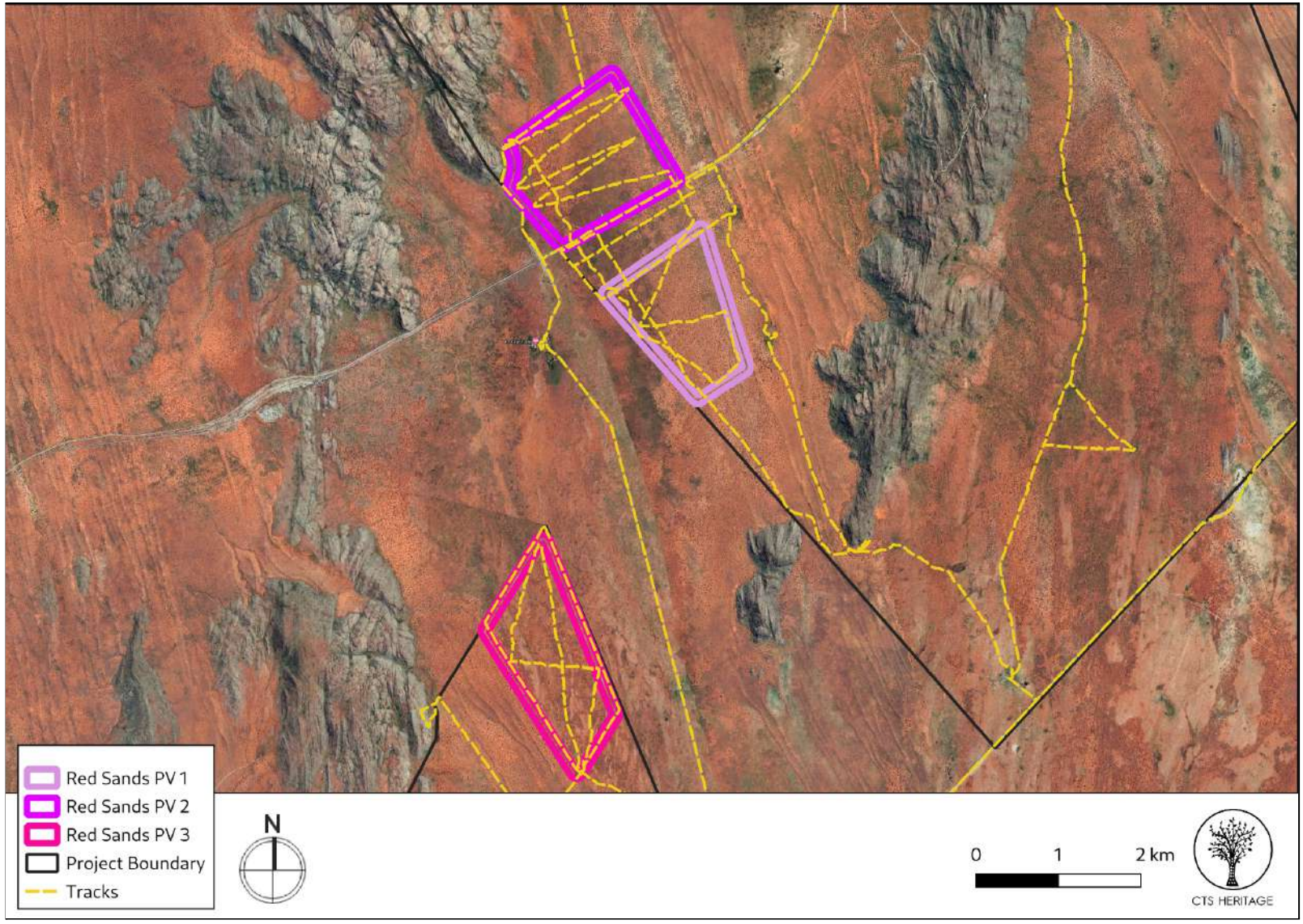

Figure 5.2: Overall track paths of foot survey

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4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

Site No.	Site Name	Description	Density m²	Period	Co-ordinates		Grading	Mitigation
001	Red Sands 001	Red Sands farmhouse complex modern (Dinasrus)	n/a	Modern	-28.76787	22.09355	NCW	NA
002	Red Sands 002	Farm dam and kraal	n/a	Modern	-28.73621	22.10333	NCW	NA
003	Red Sands 003	Hornfels flake unworked ; granite flakes debitage	0 to 5	MSA	-28.73142	22.10428	NCW	NA
004	Red Sands 004	Higher grade hornfels flake with hinge terminations	0 to 5	MSA	-28.73091	22.10428	NCW	NA
005	Red Sands 005	Quartz flake with two dorsal flake scars	0 to 5	MSA	-28.72501	22.10428	NCW	NA
006	Red Sands 006	Quartz core and flake	0 to 5	MSA	-28.72445	22.09691	NCW	NA
007	Red Sands 007	Granite radial core	0 to 5	MSA	-28.72441	22.09612	NCW	NA
008	Red Sands 008	Quartz flake and quartz porphyry biface	0 to 5	MSA	-28.7196	22.09527	NCW	NA
009	Red Sands 009	Quartz flakes, core, hornfels	0 to 5	MSA	-28.71772	22.09568	NCW	NA
010	Red Sands 010	Quartz segment flake	0 to 5	MSA	-28.71604	22.09607	NCW	NA
011	Red Sands 011	Quartz radial core very large, and flake	0 to 5	MSA	-28.71152	22.09795	NCW	NA
012	Red Sands 012	Quartz flakes, one very long	0 to 5	MSA	-28.71634	22.09934	NCW	NA
013	Red Sands 013	Quartz flake	0 to 5	MSA	-28.72147	22.10006	NCW	NA
014	Red Sands 014	Hornfels flake with rounded edge retouch	0 to 5	MSA	-28.72463	22.10083	NCW	NA
015	Red Sands 015	Quartz core flake	0 to 5	MSA	-28.72547	22.10086	NCW	NA
016	Red Sands 016	Green quartzite point	0 to 5	LSA	-28.72828	22.10113	NCW	NA
017	Red Sands 017	Area with natural quartz cobbles, cores, flakes showing ubiquity of the material. Fine grained hornfels retouched flake	0 to 5	MSA	-28.73207	22.10187	NCW	NA
018	Red Sands 018	Farm dam	n/a	Modern	-28.7461	22.09524	NCW	NA
019	**Red Sands 019**	**Rock art site, possible herder paintings. Lots of msa and LSA artefacts, quartzite, quartz, hornfels, ccs, phyllite, cores, flakes, many formal tools. Archaeological deposit maybe 50cm deep, lower grindstones and upper grindstones. 10x6x2m, faces north in kloof on left hand side as you enter from south**	**30+**	**LSA+MSA**	**-28.74943**	**22.07776**	**IIIA**	**No-go buffer of 300m**
020	Red Sands 020	Safric Safaris Guesthouse facilities	n/a	Modern	-28.69003	22.09752	NCW	NA
021	Red Sands 021	Strauss farmhouse burnt down	n/a	Modern	-28.64645	22.09721	NCW	NA
022	Red Sands 022	Lower and upper grindstone, quartz	0 to 5	LSA	-28.6667	22.09754	NCW	NA
023	Red Sands 023	Quartz core	0 to 5	MSA	-28.66756	22.10105	NCW	NA
024	Red Sands 024	Quartz cores and flakes	0 to 5	MSA	-28.6684	22.09952	NCW	NA
025	Red Sands 025	Quartz flake	0 to 5	MSA	-28.671	22.09693	NCW	NA
026	Red Sands 026	Quartz cores and flakes	0 to 5	MSA	-28.67228	22.09537	NCW	NA
027	Red Sands 027	Quartz cores and flakes	0 to 5	MSA	-28.67269	22.09572	NCW	NA
028	Red Sands 028	Quartz cores and flakes	0 to 5	MSA	-28.67288	22.10002	NCW	NA
029	Red Sands 029	Quartz cores and flakes	0 to 5	MSA	-28.6743	22.09763	NCW	NA
030	Red Sands 030	Quartzite flake and quartz cores, flakes	0 to 5	MSA	-28.67465	22.0981	NCW	NA

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031	Red Sands 031	Quartz cores and flakes	0 to 5	MSA	-28.67446	22.09916	NCW	NA
032	Red Sands 032	Quartz cores and flakes	0 to 5	MSA	-28.67332	22.10342	NCW	NA
033	Red Sands 033	Quartz core	0 to 5	MSA	-28.68771	22.11056	NCW	NA
034	Red Sands 034	Quartz core	0 to 5	MSA	-28.68778	22.11193	NCW	NA
035	Red Sands 035	Quartz flakes	0 to 5	MSA	-28.68669	22.11887	NCW	NA
036	Red Sands 036	Quartz flakes	0 to 5	MSA	-28.68908	22.122	NCW	NA
037	Red Sands 037	Quartz flakes	0 to 5	MSA	-28.69253	22.12193	NCW	NA
038	Red Sands 038	Quartz cores	0 to 5	MSA	-28.69358	22.1192	NCW	NA
039	Red Sands 039	Quartz cores and flakes	0 to 5	MSA	-28.69189	22.1171	NCW	NA
040	Red Sands 040	Silcrete point, very finely made	0 to 5	MSA	-28.68114	22.1021	NCW	NA
041	Red Sands 041	Stock farming staff accommodation	n/a	Modern	-28.606184	22.207528	NCW	NA
042	**Red Sands 042**	**Titiespoort farmhouse**	**n/a**	**Historic**	**-28.55739**	**22.1941246**	**IIIB**	**No impact**
043	Red Sands 043	Prynns Berg farmhouse complex	n/a	Modern	-28.72645	22.15656	NCW	NA
044	Red Sands 044	Kraal and farm tanks	n/a	Modern	-28.71172	22.14236	NCW	NA
045	**Red Sands 045**	**Hornfels and quartz flakes, quartz schist (specularite?), phyllite Along floor lining edges of ridge**	**10 to 30**	**LSA+MSA**	**-28.71203**	**22.13808**	**IIIC**	**No go buffer of 100m**
046	**Red Sands 046**	**Very fine grained quartzite msa pointed flake, slightly retouched, hornfels flake Not far from previous scatter**	**0 to 5**	**LSA+MSA**	**-28.71176**	**22.13854**	**IIIC**	**No go buffer of 100m**
047	Red Sands 047	Kraal and farm tanks	n/a	Modern	-28.6885	22.1274	NCW	NA
048	Red Sands 048	Farm dam	n/a	Modern	-28.67556	22.12178	NCW	NA
049	Red Sands 049	Quartz flake	0 to 5	MSA	-28.59699	22.092	NCW	NA
050	Red Sands 050	Kraal, windmill	n/a	Modern	-28.63749	22.10792	NCW	NA
051	Red Sands 051	Quartz flake, entrance to gentle sheltered kloof with likelihood of higher sensitivity	0 to 5	MSA	-28.63667	22.1221	NCW	NA
052	Red Sands 052	Kraal, Farm dam	n/a	Modern	-28.63603	22.12705	NCW	NA
053	Red Sands 053	Kraal, Farm dam	n/a	Modern	-28.63984	22.13728	NCW	NA
054	Red Sands 054	Ccs, quartz, fine grained quartzite, dolerite flakes	10 to 30	LSA+MSA	-28.63907	22.13661	NCW	NA
055	Red Sands 055	Kraal, Farm dam	n/a	Modern	-28.62709	22.14199	NCW	NA
056	Red Sands 056	Kraal, Farm dam	n/a	Modern	-28.61597	22.14211	NCW	NA

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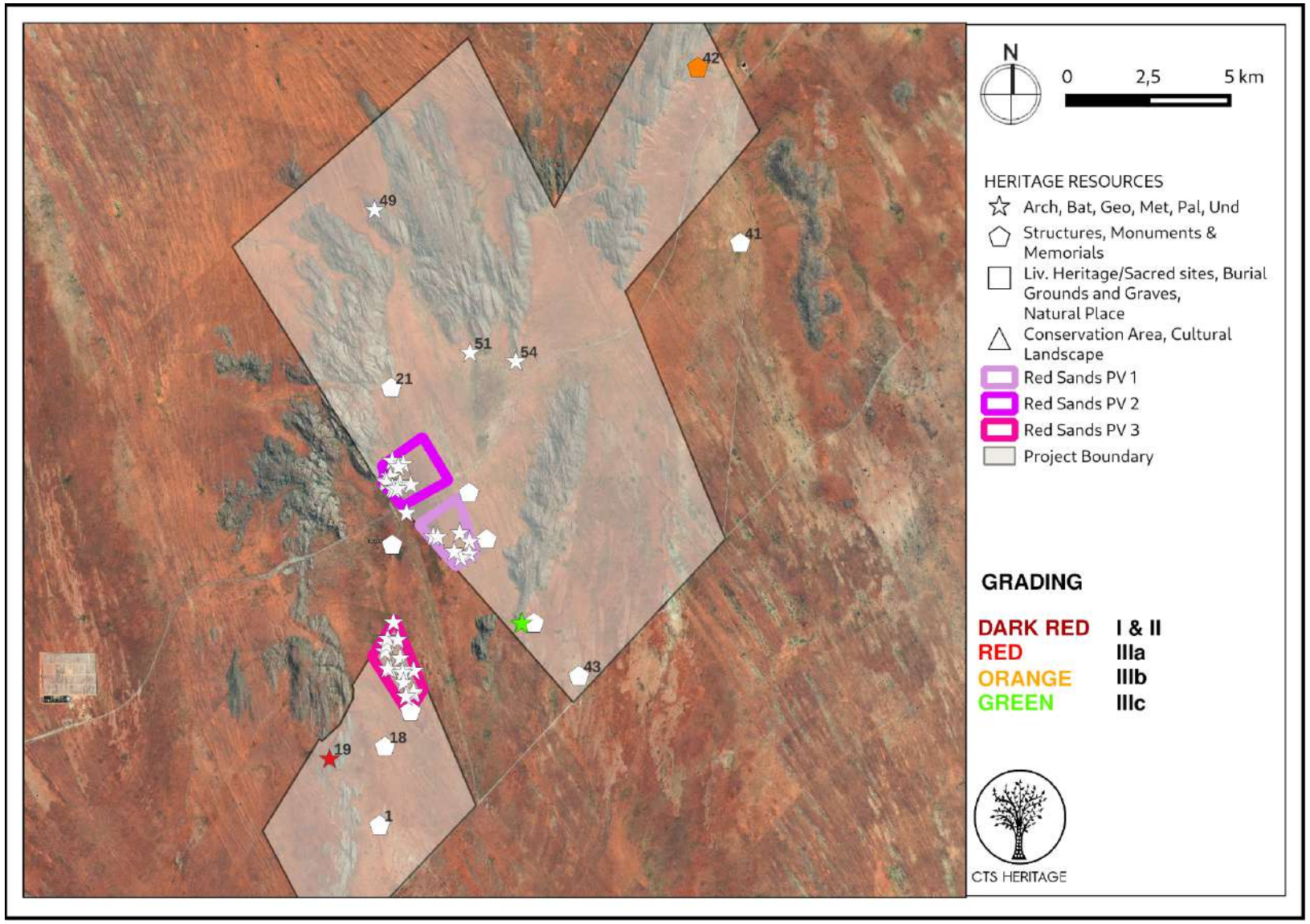

Figure 6.1: Map of field observations relative to the proposed development

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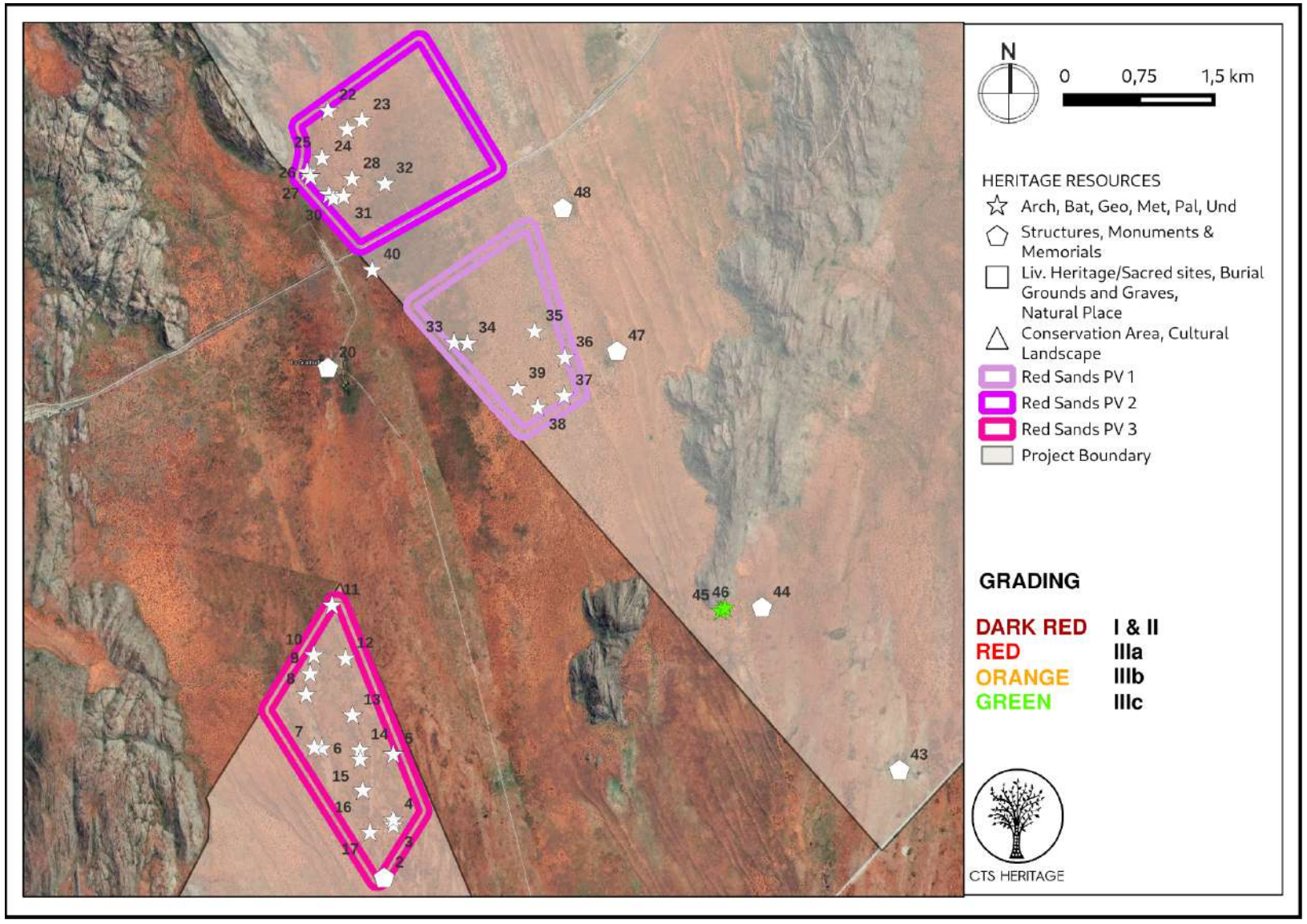

Figure 6.2: Map of field observations relative to the proposed development

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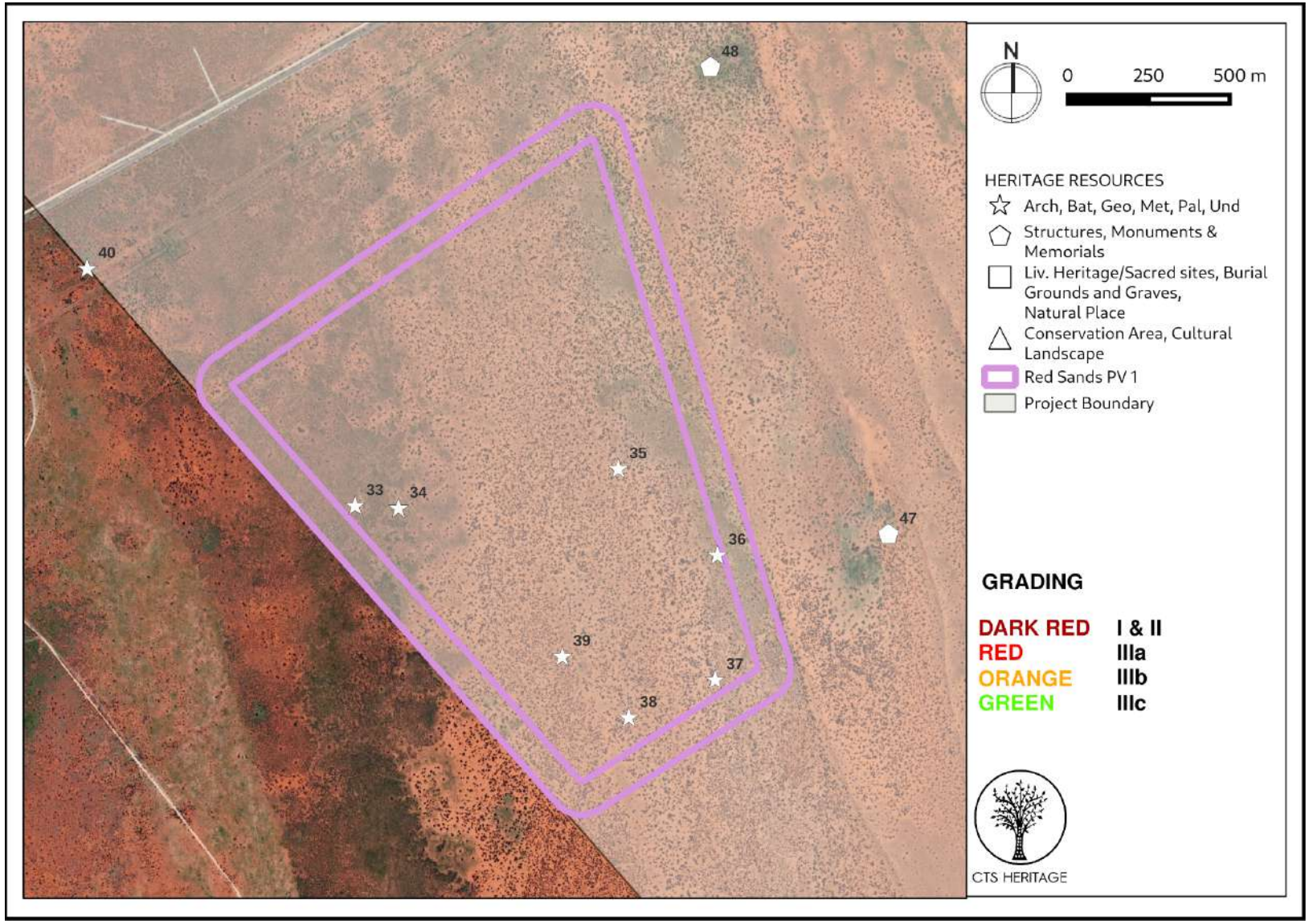

Figure 6.3: Map of field observations relative to the proposed development for Red Sands PV 1

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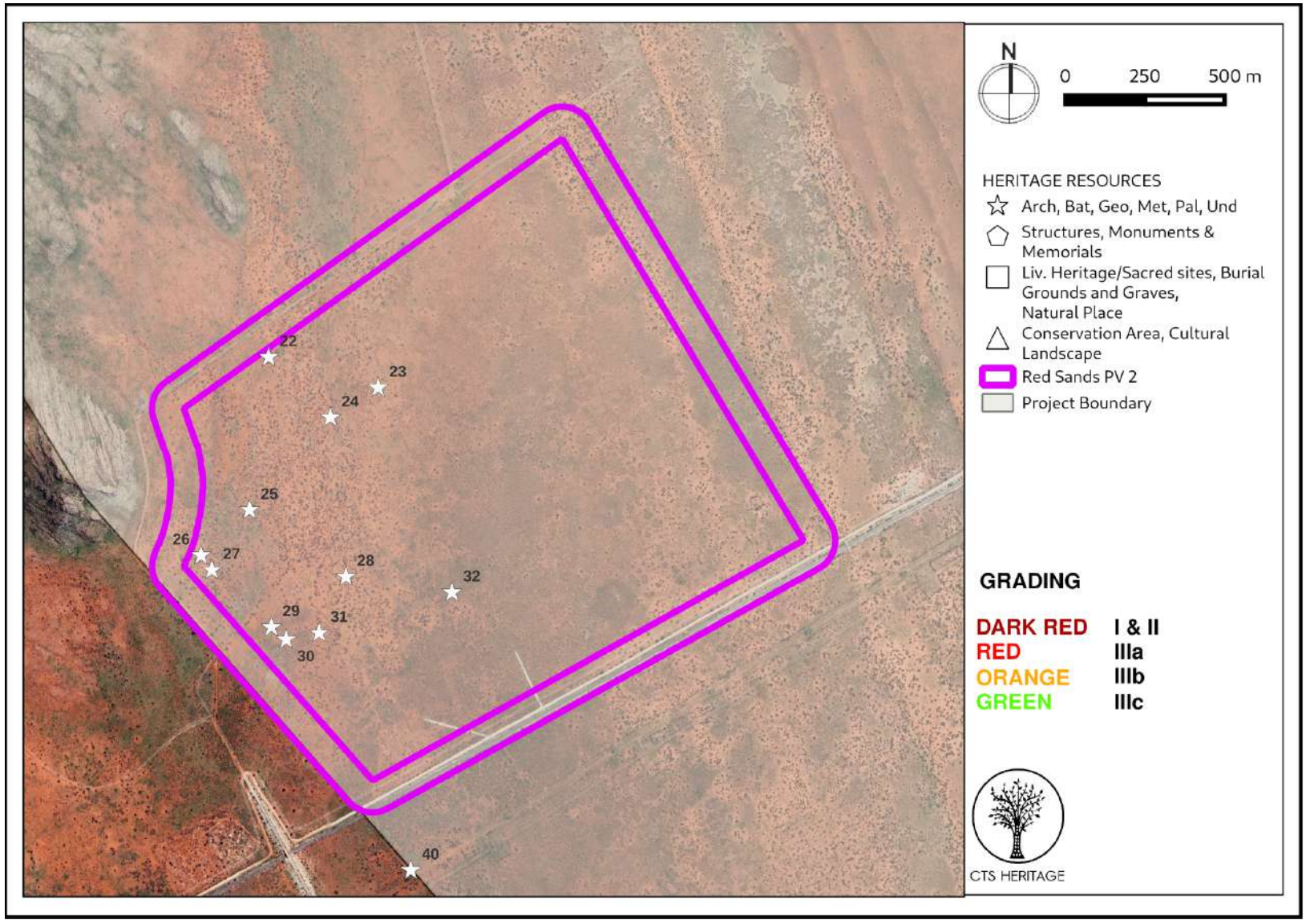

Figure 6.4: Map of field observations relative to the proposed development for Red Sands PV 2

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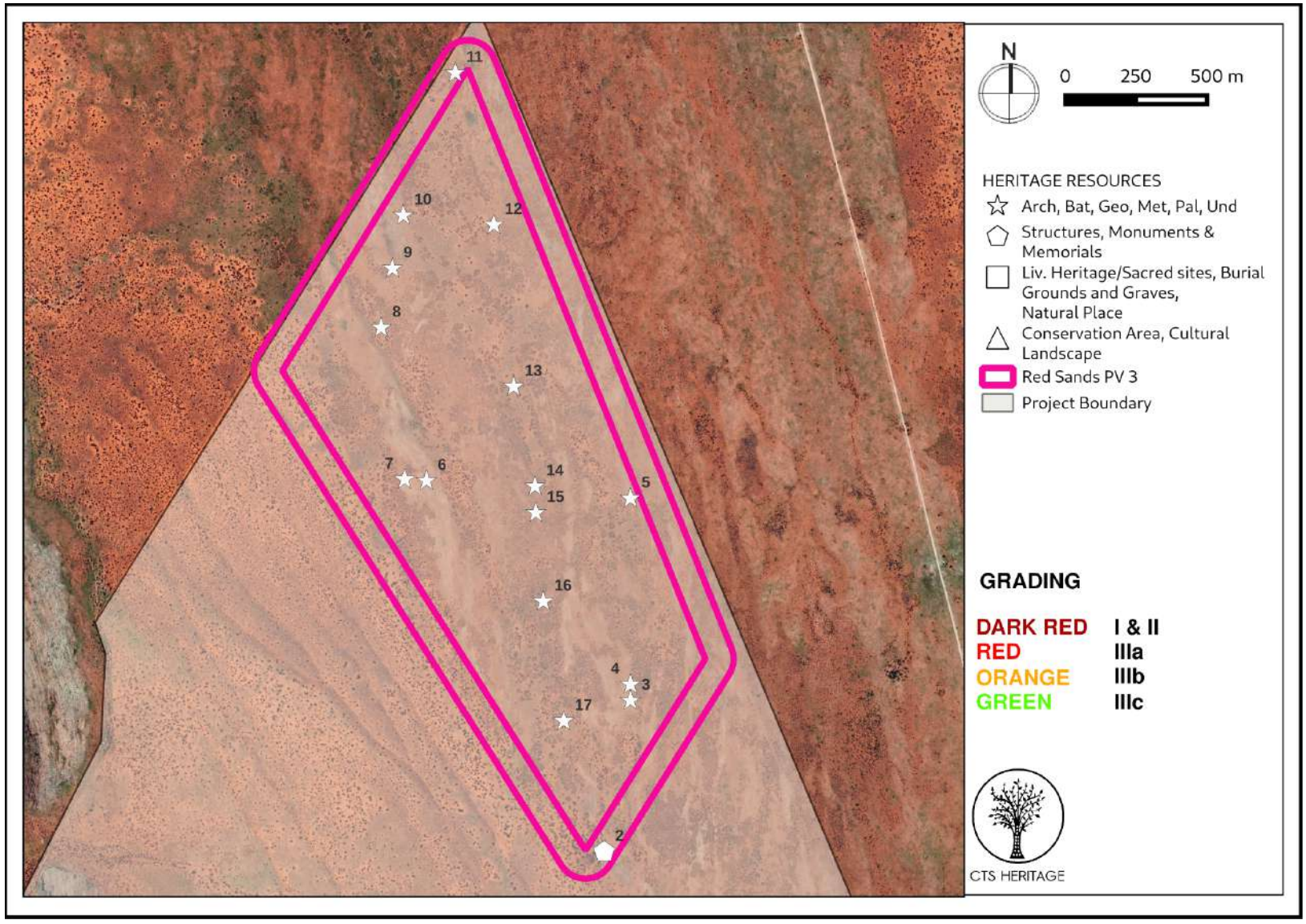

Figure 6.5: Map of field observations relative to the proposed development for Red Sands PV 3

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1: Observation Red Sands-001

Figure 7.2: Observation Red Sands-002

Figure 7.3: Observation Red Sands-003

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Figure 7.4: Observation Red Sands-003

Figure 7.5: Observation Red Sands-007

Figure 7.6: Observation Red Sands-012

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Figure 7.7: Rock Art site Red Sands-019 Graded IIIA

Figure 7.8: Rock Art site Red Sands-019 Graded IIIA

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Figure 7.9: Rock Art site Red Sands-019 Graded IIIA

Figure 7.10: Rock Art site Red Sands-019 Graded IIIA

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Figure 7.11: Observation Red Sands-030

Figure 7.12: Site Red Sands-045 graded IIIC

Figure 7.13: Site Red Sands-045 graded IIIC

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Figure 7.14: Site Red Sands-046 graded IIIC

Figure 7.15: Observation Red Sands-054

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are the dominant archaeological signature of the area. All of the archaeological resources identified within the areas proposed for the development of the Red Sands PV Cluster have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facilities in these locations from an archaeological perspective.

One archaeological site of significance was identified outside of the areas proposed for the PV cluster development - Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts). Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site.

One rock art site was identified which has high heritage significance (Red Sands-019). Although this site is located well away from the proposed PV cluster developments, it is recommended that this significant site is demarcated on relevant development maps and that a no-go buffer of 300m is implemented around this site.

Other than LSA and MSA artefacts, the field assessment identified a number of structures. These are predominantly agricultural in nature in the form of farm dams, kraals and old farm complexes. Only one structure was determined to have heritage significance - Red Sands-042. This structure has been graded IIIB and is located well away from the proposed PV cluster developments. As such, no impact to this structure or its context is anticipated.

Based on the information available, the proposed development is unlikely to directly impact on any significant archaeological heritage resources.

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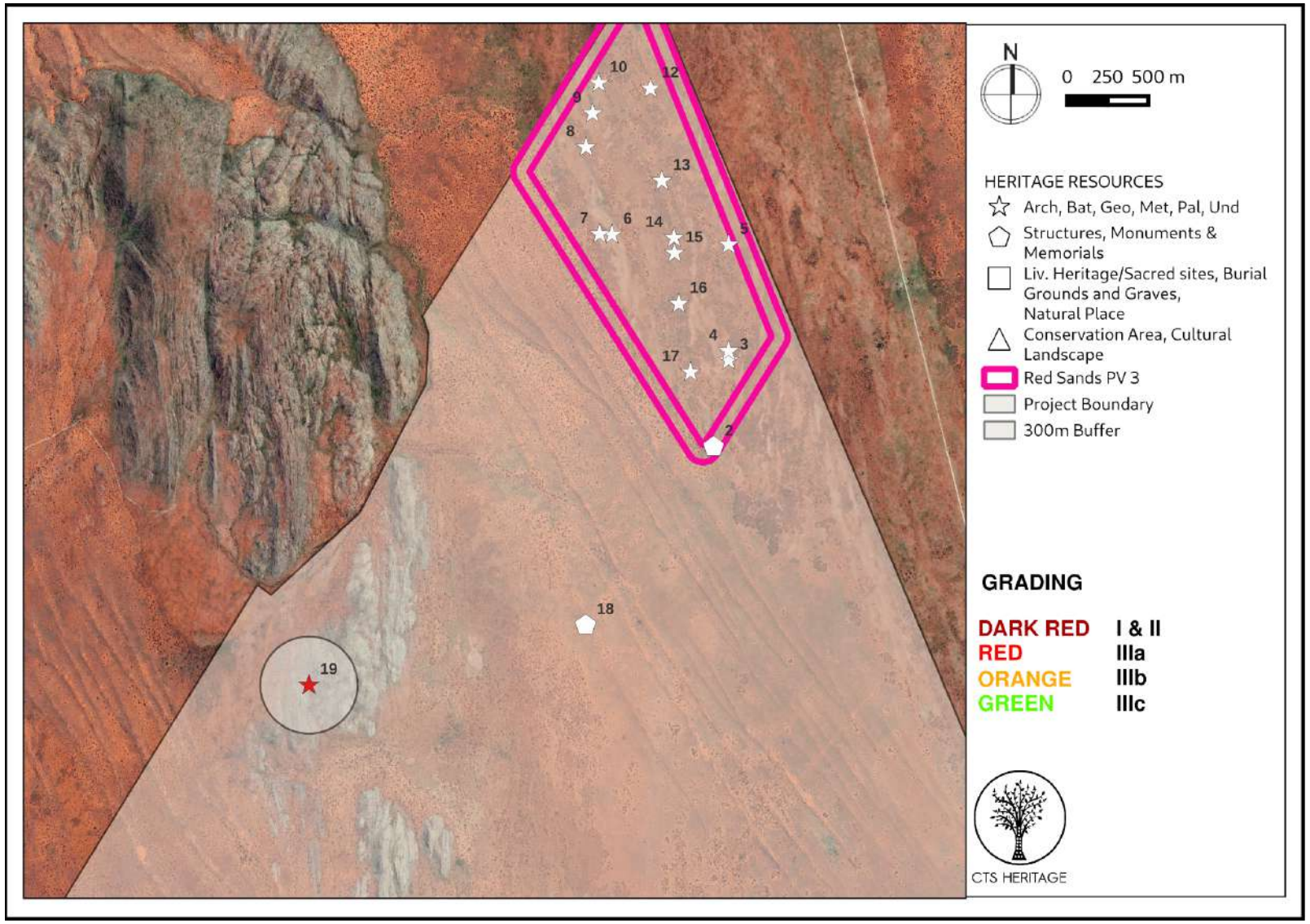

Figure 8.1: Map of heritage resources identified during the field assessment, relative to the study area and 300m buffer indicated

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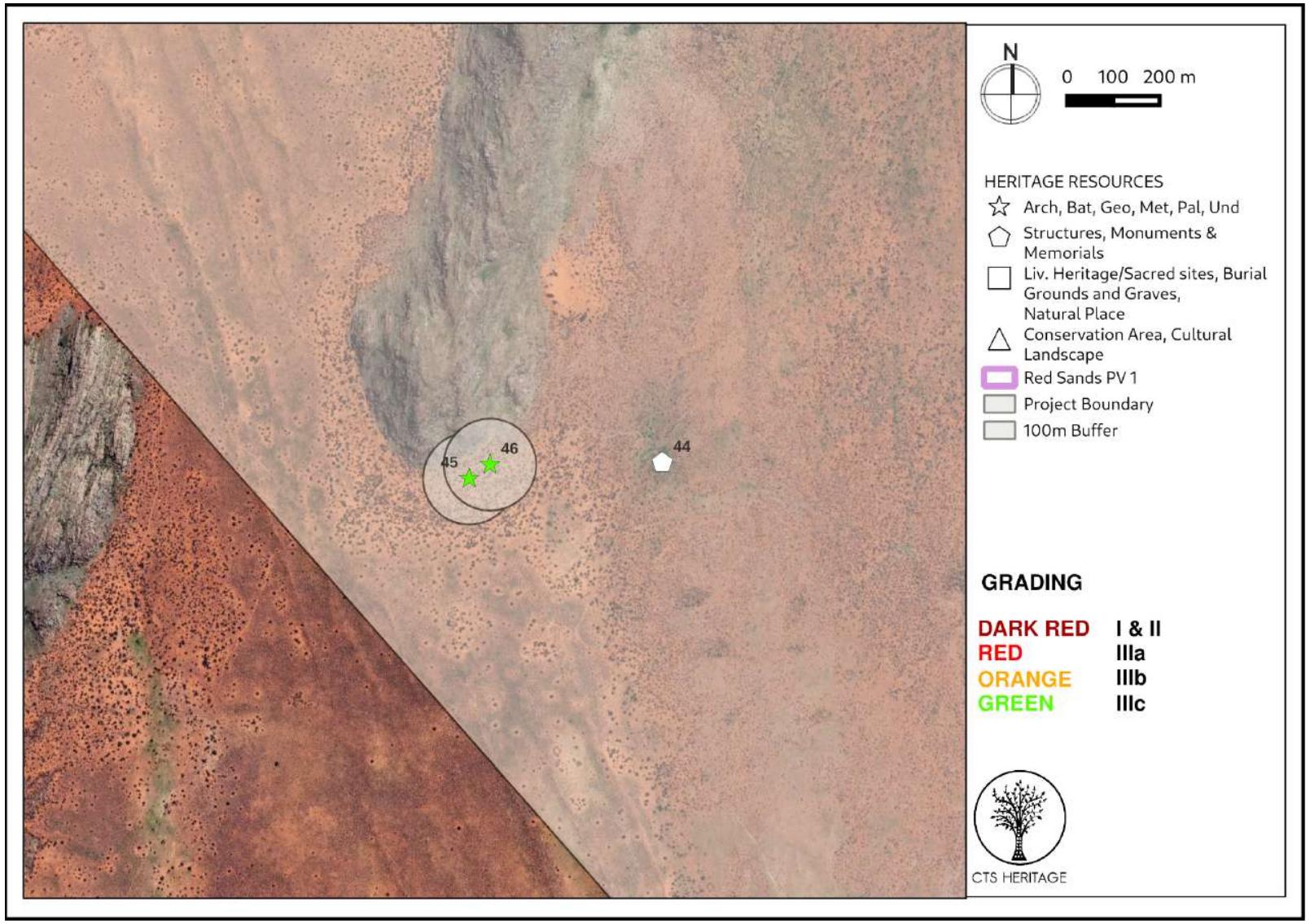

Figure 8.2: Map of heritage resources identified during the field assessment, relative to the study area and 100m buffer indicated

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6. CONCLUSION AND RECOMMENDATIONS

The overall archaeological sensitivity of the Namaqualand with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high. Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage.

As indicated above, the results of this assessment align with the findings of other specialists in the area such as Morris (2011) who notes that ephemeral MSA and LSA scatters are the dominant archaeological signature of the area and are therefore not archaeologically significant.

Recommendations

There is no objection to the proposed development of the Red Sands PV Cluster in terms of impacts to archaeological heritage on condition that:

- A no-go buffer area of 100m must be implemented around Site Red Sands-045 and Red Sands-046 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.
- A no-go buffer area of 300m must be implemented around Site Red Sands-019 to ensure that no indirect impact takes place. This site should also be marked as no-go on all development maps and SDPs.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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7. REFERENCES

Heritage Impact Assessments				
NID	**Author(s)**	**Date**	**Type**	**Title**
128827	Barry Millsteed	12/02/2014	AIA Phase 1	Full Palaeontological Heritage Impact Assessment Report on the site of Proposed Solar Energy Generation Facilities (Kheis Solar projects 1-3) to be located on the farm Namkwari 656 near Upington, Northern Cape
351273	Barry Millsteed	01/12/2015	Palaeontological Specialist Reports	FULL PALAEONTOLOGICAL HERITAGE IMPACT ASSESSEMENT REPORT ON THE SITE OF PROPOSED SOLAR ENERGY GENERATION FACILITIES (TEWA ISITHA SOLAR 1 AND 2) TO BE LOCATED ON THE REMAINING EXTENT OF THE FARM ALBANY 405 NEAR KAROS, NORTHERN CAPE PROVINCE
104308	Cobus Dreyer	06/11/2012	HIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Water Pipeline from Sanddraai 391 to Bokpoort 390, Groblershoop, Northern Cape
4103	Cobus Dreyer	10/03/2006	AIA Phase 1	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Concentrated Solar Thermal Plant (Csp) at the Farms Olyvenhouts Drift, Upington, Bokpoort 390 and Tampansrus 294/295, Groblershoop, Northern Cape
108398	David Morris	01/12/2012	HIA Phase 1	Archaeological Impact Assessment Phase 1: 15 km Water Pipeline across farms Sand Draai 391 and Bok Poort 390 near Groblershoop, Northern Cape
128838	David Morris	03/02/2014	Heritage Scoping	Proposed Kheis Solar Park Phases 1-3 on portions 7 and 9 of the farm Namakwari 656, south-east of Upington in Northern Cape: Scoping phase Heritage Input
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline, Groblershoop, Northern Cape.
351279	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 1 PV Facility East Of Upington, Northern Cape Province.
351311	Jaco van der Walt	02/12/2015	Archaeological Specialist Reports	Archaeological Impact Assessment for the proposed Tewa Isitha Solar 2 PV Facility East Of Upington, Northern Cape Province.
7723	Peter Beaumont	09/10/2008	AIA Phase 1	Phase 1 Archaeological Impact Assessment Report on Portion of the Farm 292 near Groblershoop, Karoo District Municipality, Northern Cape Province
123045	Cobus Dreyer	26/06/2013	Archaeological Specialist Reports	Report Eskom Garona Ferrum Mercury
129366	Cobus Dreyer	28/08/2013	AIA Phase 1B	First Phase Archaeological & Heritage Assessment of the Proposed Garona-Ferrum Transmission Line, Northern Cape
180264	David Morris	01/08/2014	AIA Phase 1	Archaeological Impact Assessment - ACWA Power Solafrica Bokpoort CSP Power Plant (PTY) LTD: Amended Alignment: Bokpoort Water Pipeline,

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				Groblershoop, Northern Cape.
364107	Cobus Dreyer	16/09/2015	HIA Phase 1	First Phase Archaeological & Heritage Assessment of the Proposed Bokpoort II 300 MW Combined 2 x 75 PV & 150 MW CSP Tower Solar Development on the Remainder of the Farm Bokpoort 390, Groblershoop, Northern Cape Province.
365436	John E. Almond	29/06/2016	PIA Desktop	Palaeontological Impact Assessment: Desktop Study - Proposed Bokpoort II Solar Power Facility on the Remaining Extent of Farm Bokpoort 390 near Groblershoop, Northern Cape Province.
115034	Lita Webley	25/03/2015	HIA Phase 1	Heritage Impact Assessment for Proposed Construction of the Eskom Groblershoop substation and the Garona-Groblershoop 132 kV powerline, Groblershoop, Northern Cape

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APPENDIX 3: Palaeontological Assessment (2021)

Palaeontological Impact Assessment for the proposed Red Sands Solar PV projects northeast of Groblershoop, Northern Cape Province

Desktop Study (Phase 1)

For

CTS Heritage
Project No: CTS21_229

05 December 2021

Prof Marion Bamford
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 32 years research; 24 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by CTS Heritage, Cape Town, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A Palaeontological Impact Assessment was requested for the three proposed Red Sands Solar PV projects to be located approximately 17 km northeast of the town Groblershoop in the Northern Cape Province. They will occupy a combined area of about 430 ha of undeveloped land on the farms Rooisand 387 and Tities Poort 386 in the Kheis and Tsantsabane Local Municipalities.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The proposed site lies on the non-fossiliferous Groblershoop Formation and the moderately fossiliferous Quaternary Kalahari sands. Aeolian sands do not preserve fossils but might entrap them if there are such features as palaeo-pans, palaeo-dunes or palaeo-springs. No such features, however, are visible in the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the developer, environmental officer or other designated responsible person once excavations/drilling for foundations have commenced. As far as the palaeontology is concerned, the project should be authorised.

Table of Contents

i. Background

The proposed Red Sands Solar PV projects will be located approximately 17 km northeast of the town Groblershoop in the Northern Cape Province. There are three proposed project development areas (Red Sands PV1 – Red Sands PV3) that will occupy a combined area of about 430 ha of undeveloped land. The farms are Rooisand 387 and Tities Poort 386 in the Kheis and Tsantsabane Local Municipalities, Z F Mgcawu District Municipality.

The project site is best accessed by a combination of paved route (N8) and an unnamed gravel route leading to the project site. The turn-off to the project site is approximately 13 km from Groblershoop along the N8.

The three solar facilities would use photovoltaic (PV) fixed-tilt rack electric generation system technology to produce solar energy at the utility scale, including inverters, an on-site
sub-station, an O&M building, and possibly a battery storage facility. The planned total installed capacity of the Red Sands Solar PV project is 225 MW which consists of three 75
MW Solar PV facilities. The proposed developments require Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998) from the
Department of Forestry, Fisheries, and the Environment (DFFE).

A Palaeontological Impact Assessment was requested for the Red Sands Solar project. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (amended 2017)

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ai	Details of the specialist who prepared the report	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
c	An indication of the scope of, and the purpose for which, the report was prepared	Section i.
ci	An indication of the quality and age of the base data used for the specialist report:	Yes

	SAHRIS palaeosensitivity map accessed – date of this report	
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section ii.
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4
g	An identification of any areas to be avoided, including buffers	N/A
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section vii.
j	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section vi.
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies if any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A

Figure 1: Google Earth map of the proposed development of three Red Sands Solar facilities about 17km north of Grobershoop, Northern Cape Province. The area is indicated within the yellow polygon.

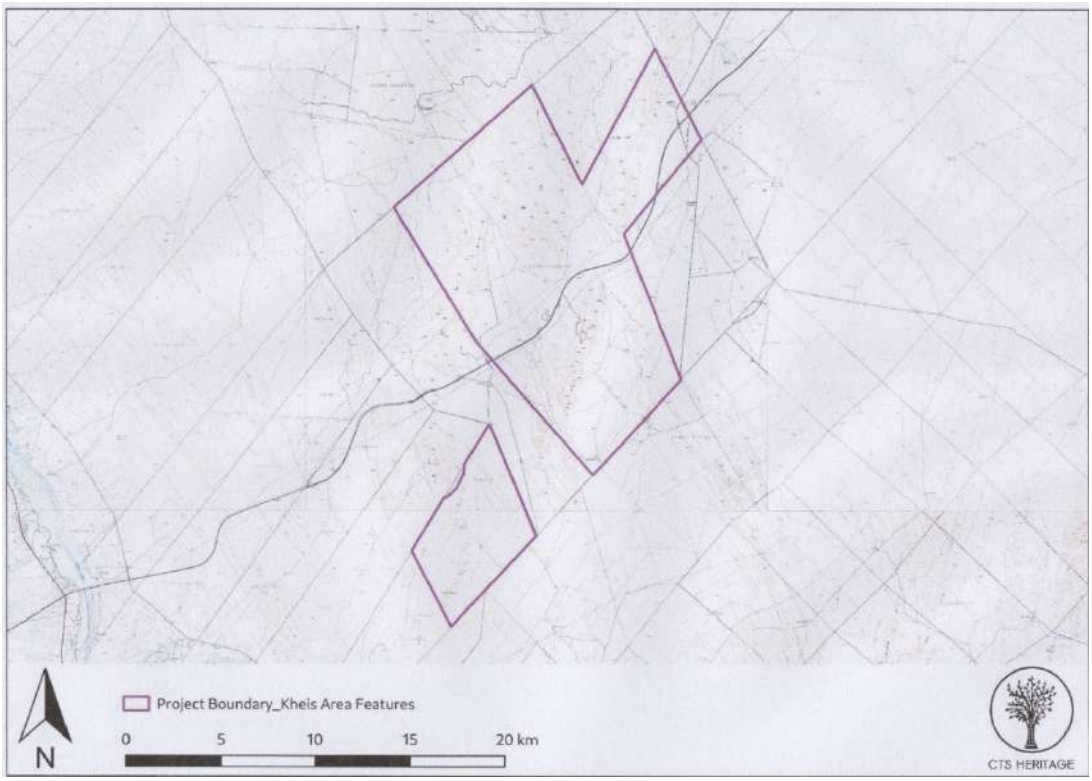

Figure 2: Topographic map to show the farm boundaries for the Red Sands Solar projects, north of Groblershoop. Northern Cape Province.

ii. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

iii. Geology and Palaeontology

iv. Project location and geological context

The Rooisand and Tities Poort Farms lie in the Namaqua-Natal Province in the Namaqua section (Figure 3, Table 2). The Namaqua-Natal Province is a tectono-stratigraphic province and forms the southern and western boundary of the ancient Kaapvaal Craton, and extends below the Karoo Basin sediments to the south (Cornell et al., 2006). It comprises rocks that were formed during the Namaqua Orogeny (mountain-building) some 1200 – 1000 million years ago. It has been divided by geologists into a number of terranes (similar lithology and bounded by shear zones). There are three main lithologic units used to separate the terranes as well as the shear zones but still there is some debate about the terranes (ibid). Very simply, the lithologic units are older reworked rocks, juvenile rocks formed during tectonic activities and metamorphosed, and intrusive granitoids.

According to Cornell et al. (2006) the five terranes are:
A - Richtersveld Subprovince (undifferentiated terranes)
B – Bushmanland Terrane (granites)
C – Kakamas Terrane (supracrustal metapelite ca 2000 Ma
D – Areachap Terrane (supracrustal rocks and granitoids)
E – Kaaien Terrane (Keisian aged metaquartzites and deformed volcanic rocks).

The farm lies in the Kaaien Terrane and it has a more or less northwest-southeast extent, bounded on the eastern side by the Kheis Province and

on the western side by the Areachap Terrane. There are large outcrops of quartz-muscovite-schist and sericitic quartzite that are known as the Groblershoop Formation (Brulpan Group). This formation overlies the Uitdraai and Prynnsberg Formations. The entire area is intensely foliated (Cornell et al., 2006). Since these rocks are metamorphosed volcanic rocks they do not contain any fossils at all and will not be considered further.

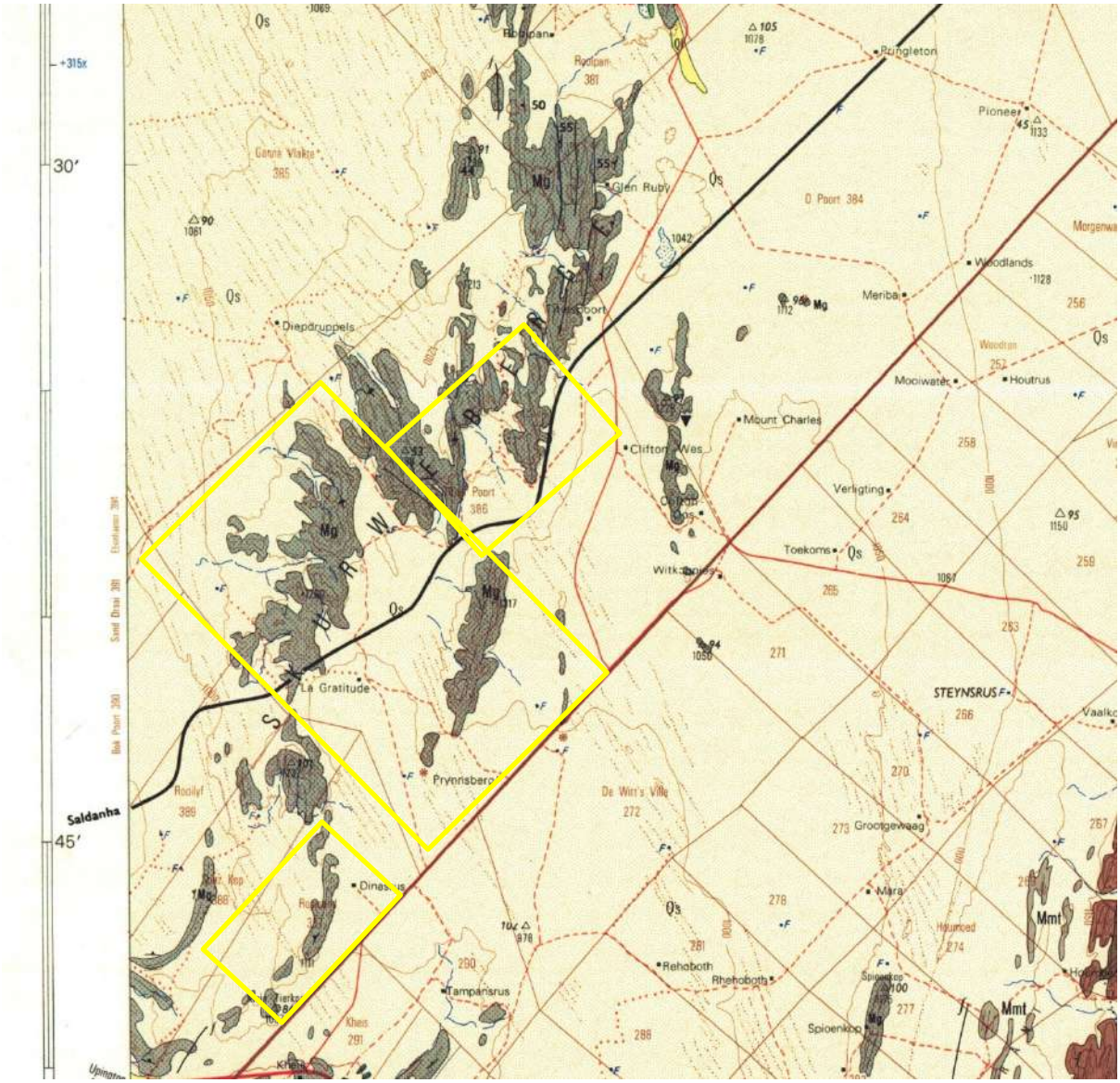

Figure 3: Geological map of the area around the Farms Rooisand and Tities Poort with the approximate location of the three Red Sands Solar facilities indicated within the yellow rectangles. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2822 Potchefstroom.

Table 2: Explanation of symbols for the geological map and approximate ages (Cornell et al., 2006. Partridge et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Qs	Quaternary Kalahari Group sands	Red-brown aeolian sand and sand dunes	Late Quaternary ca 1 Ma to present
Mg	Groblershoop Fm, Brulpan Group, Kaaien Terrane	Quartz-sericite, schist, quartzite	Palaeoproterozoic, ca 1780 Ma

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

Haddon and McCarthy (2005) proposed that the Kalahari basin formed as a response to down-warp of the interior of the southern Africa, probably in the Late Cretaceous. This, along with possible uplift along epeirogenic axes, back-tilted rivers into the newly formed Kalahari basin and deposition of the Kalahari Group sediments began. Sediments included basal gravels in river channels, sand and finer sediments. A period of relative tectonic stability during the mid-Miocene saw the silcretisation and calcretisation of older Kalahari Group lithologies, and this was followed in the Late Miocene by relatively minor uplift of the eastern side of southern Africa and along certain epeirogenic axes in the interior. More uplift during the Pliocene caused erosion of the sand that was then reworked and redeposited by aeolian processes during drier periods, resulting in the extensive dune fields that are preserved today.

New cosmogenic burial ages obtained from a 55 m section of Kalahari Group sediments (Matmon et al., 2015), South Africa, indicate that in the southern Kalahari, the majority of deposition occurred rapidly at 1.0–1.2 Ma. All earlier sediments in this region were eroded during previous sedimentary cycles. In summary, they showed that the stratigraphy, sedimentology, and cosmogenic nuclide data indicate:
1) the existence of a stable, shallow and low-energy water body over the southern Kalahari for at least 450 ka prior to 1–1.2 Ma;
2) rapid sediment accumulation that filled up the basin at 1–1.2 Ma; and
3) the establishment of the Kalahari sand cover shortly thereafter.
The authors acknowledge that this timeframe is far younger than expected from the conventional estimates for the Kalahari Group sediments (Haddon and McCarthy, 2005). The significant hiatus between the Pleistocene sequence and the underlying Archaean basement implies that evidence of earlier cycles of deposition and erosion are no longer preserved in the sedimentary record.

v. Palaeontological context

The aeolian sands of the Gordonia Formation, Kalahari Group, do not preserve fossils because they have been transported and reworked, but in some regions these too may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts.

Most pans in the Kalahari Basin are filled by a layer of clayey sand or calcareous clays and are flanked by lunette dunes formed as a result of deflation of the pan floor during arid periods (Lancaster, 1978a, b; Haddon and McCarthy, 2005). At some localities in the south western Kalahari spring-fed tufas have formed at the margins of pans during periods where groundwater discharge was high (Lancaster, 1986). These tufas may contain evidence of algal mats and stromatolites and may also be associated with calcified reed and root tubes (Lancaster, 1986).Many of the pans are characterised by diatomaceous earth, diatomite or kieselguhr, a white or grey, porous, light-weight, fine-grained sediment composed mainly of the fossilised skeletons of diatoms. Associated with some palaeo-pans and palaeo-springs are fossil bones, root casts, pollen and archaeological artefacts. Well-known sites are Florisbad and Deelpan in the Free State, Wonderkrater in Limpopo and Bosluispan in the Northern Cape. In in this region under study is the Kathu Complex.

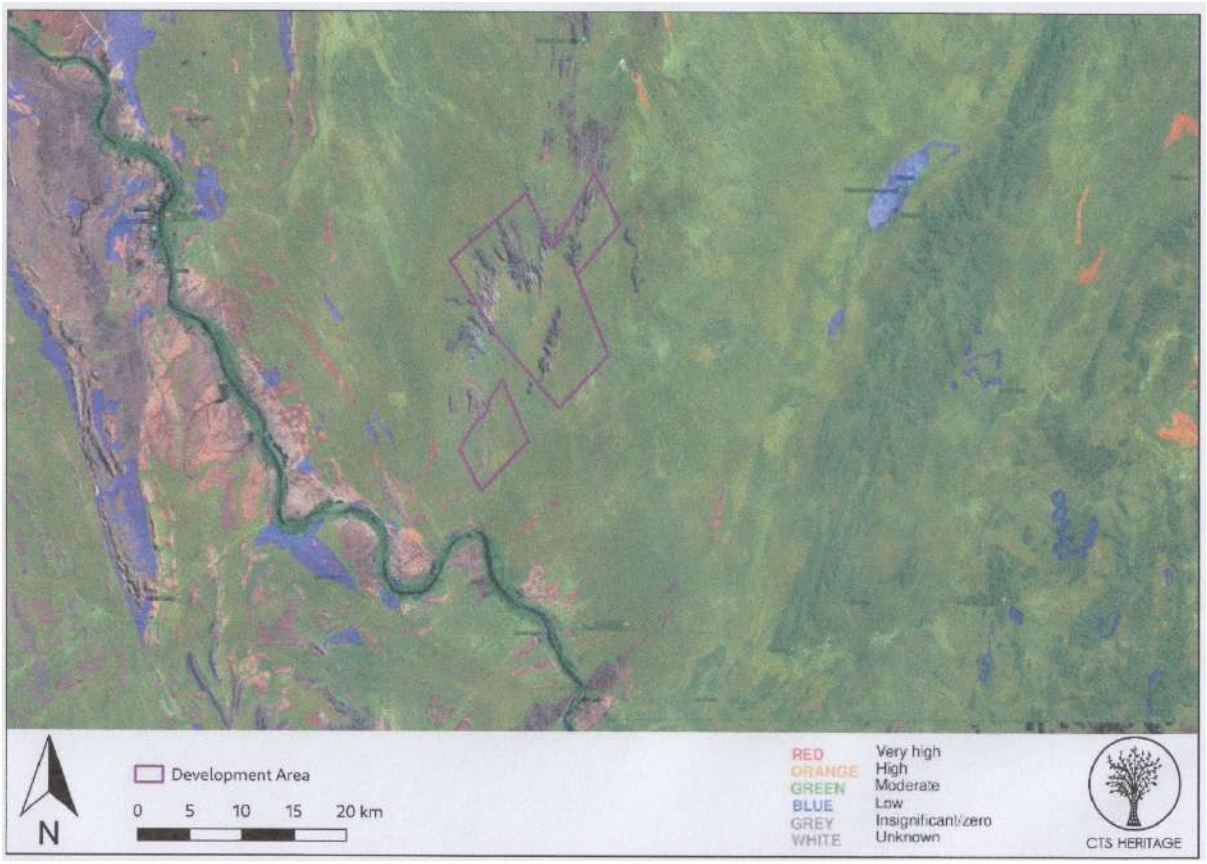

Figure 4: SAHRIS palaeosensitivity map for the site for the proposed Red Sands Solar projects shown within the purple rectangles. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

There are some good examples of fossils and artefacts in the Quaternary palaeopans and palaeosprings of the Kalahari. The Kathu Complex includes the excavated sites of Kathu Pan1 (KP1), Kathu Townlands and Bestwood 1 (BW 1). At Kathu Pan, evidence of early hominin occupation has been observed at multiple locations within the pan, but ESA deposits have only been excavated at KP 1. Stratum 4a at KP1 was dated by a combination of OSL and ESR/U-series to ca. 500 k BP. The lithic assemblage from St. 4a is characterized by a prepared core technology that produced both blades and points, and has been attributed to the Fauresmith industry. The lithic assemblage of the underlying Stratum 4b at Kathu Pan 1 is characterized by well-made handaxes, some bones and other tools (Walker et al., 2014; Lukich et al., 2020).

Palaeo-pans and palaeo-springs are visible in satellite imagery because of their topography and often are associated with lunette dunes. Vegetation changes are also common. No such features are seen in the Google Earth images. Aeolian sediments that cover most of the region, do not preserve fossils because they have been reworked and windblown. Usually these

geomorphological features can be detected using satellite imagery. No such features are visible.

vi. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

TABLE 3A: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	**H**	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

TABLE 3B: IMPACT ASSESSMENT

PART B: ASSESSMENT		
SEVERITY/NATURE	**H**	-
	M	-
	L	Aeolian sands do not preserve plant fossils but they could be trapped in palaeo-pans; so far there are no records from the site so it is very unlikely that fossils occur on the site. The impact would be very unlikely.
	L+	-
	M+	-
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be robust but fragmentary bones or silicified wood trapped in pans or dunes, the spatial scale will be localised within the site boundary.
	M	-
	H	-

PART B: ASSESSMENT		
PROBABILITY	H	-
	M	-
	L	It is extremely unlikely that any fossils would be found in the loose sand that will be excavated for foundations. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

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 much too old to contain fossils or are transported sands. Furthermore, the material to be excavated is sand and this does not preserve fossils. Since there is an extremely small chance that fossils might be trapped in palaeo-springs or dunes, and be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

vii. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the metamorphosed rocks of the Brulpan Group are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils but if there such features as palaeo-pans, dunes or springs present they could entrap robust but fragmentary fossils.

viii. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the aeolian sands of the Quaternary Kalahari Group. There is a very small chance that fossils may occur in such features as palaeo-pans, dunes or springs, but none is evident from the satellite imagery. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample (See section 8, Appendix A). As far as the palaeontological heritage is concerned, the project should be authorised.

ix. References

Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L., Moore, J.M., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser,

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Goudie, A.S., Wells, G.L., 1995. The nature, distribution and formation of pans in arid zones. Earth Science Reviews 38, 1–69.

Haddon. I.G., McCarthy, T.S., 2005. The Mesozoic–Cenozoic interior sag basins of Central Africa: The Late-Cretaceous–Cenozoic Kalahari and Okavango basins. Journal of African Earth Sciences 43, 316–333.

Lancaster, I.N., 1978a. The pans of the southern Kalahari, Botswana. Geographical Journal 144, 80–98.

Lancaster, I.N., 1978b. Composition and formation of southern Kalahari pan margin dunes. Zeitschrift fu¨ r Geomorphologie 22, 148–169.

Lancaster, N., 1986. Pans in the southwestern Kalahari: a preliminary report. Palaeoecology of Africa 17, 59–67.

Lukich, V., Cowling, S., Chazan, M., 2020. Palaeoenvironmental reconstruction of Kathu Pan, South Africa, based on sedimentological data. Quaternary Science Reviews 230, 106153. https://doi.org/10.1016/j.quascirev.2019.106153

Matmon, A., Hidy, A.J., Vainer, S., Crouvi, O., Fink, D., Erel, Y., ASTER Team, Horwitz, L.K., Chazan. M., 2015. New chronology for the southern Kalahari Group sediments with implications for sediment-cycle dynamics and early hominin occupation. Quaternary Research 84, 118–132.

Partridge, T.C., Botha, G.A., Haddon, I.G., 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 585-604.

Walker, S.J.H., Lukich, V., Chazan, M., 2014. Kathu Townlands: A High Density Earlier Stone Age Locality in the Interior of South Africa. PLoS ONE 9(7): e103436. doi:10.1371/journal.pone.0103436.

x. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.

2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, wood) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones (for example see Figure 5). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Appendix A – Examples of fossils from the Quaternary.

Figure 5: Examples of robust and fragmented fossils that can be found in Quaternary fluvial and pan deposits.

Appendix B – Details of specialist

Curriculum vitae (short) - Marion Bamford PhD July 2021

I) Personal details

Surname : **Bamford**
First names : **Marion Kathleen**
Present employment : Professor; Director of the Evolutionary Studies Institute.

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Fax : +27 11 717 6694
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

vii) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/ completed	Current
Honours	11	0
Masters	10	4
PhD	11	4
Postdoctoral fellows	10	5

viii) Undergraduate teaching
Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 2-8 students per year.

ix) Editing and reviewing
Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –

Review of manuscripts for ISI-listed journals: 25 local and international journals

x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT

- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO
- Eastlands Residential 2019 for HCAC
- Fairview MR 2019 for Cabanga
- Graspan project 2019 for HCAC
- Lieliefontein N&D 2019 for EnviroPro
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala
- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC
- Madadeni mixed use 2020 for EnviroPro
- Frankfort-Windfield Eskom Powerline 2020 for 1World
- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe

xi) Research Output

Publications by M K Bamford up to July 2021 peer-reviewed journals or scholarly books: over 150 articles published; 5 submitted/in press; 10 book chapters.
Scopus h-index = 29; Google scholar h-index = 35; -i10-index = 92
Conferences: numerous presentations at local and international conferences.

APPENDIX 4: Chance Fossil Finds Procedure

CTS HERITAGE

CHANCE FINDS OF PALAEONTOLOGICAL MATERIAL

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent.Procedure to follow if it is likely that the material identified is a fossil:

- The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;
- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
    - The date
    - A description of the discovery
    - A description of the fossil and its context (e.g. position and depth of find)
    - Where and how the find has been stored
    - Photographs to accompany the preliminary report (the more the better):
        - A scale must be used
        - Photos of location from several angles
        - Photos of vertical section should be provided
        - Digital images of hole showing vertical section (side);
        - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.

- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find until SAHRA has indicated, in writing, that it is appropriate to proceed.

CTS HERITAGE

FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	*Lat:*	*Long:*
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	*Digital image of vertical section (side)*	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		

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