HERITAGE IMPACT ASSESSMENT

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

PROPOSED VREDE SOLAR PV FACILITY NEAR PETRUSVILLE, DE AAR & PHILLIPSTOWN IN THE NORTHERN CAPE

Prepared by CTS Heritage

CTS HERITAGE

For

Savannah Environmental

April 2023

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EXECUTIVE SUMMARY

1. Site Name:

Vrede Solar PV Facility as part of the Crossroads Green Energy Cluster

2. Location:

Portion 5 of the Farm Bas Berg 88

3. Locality Plan:

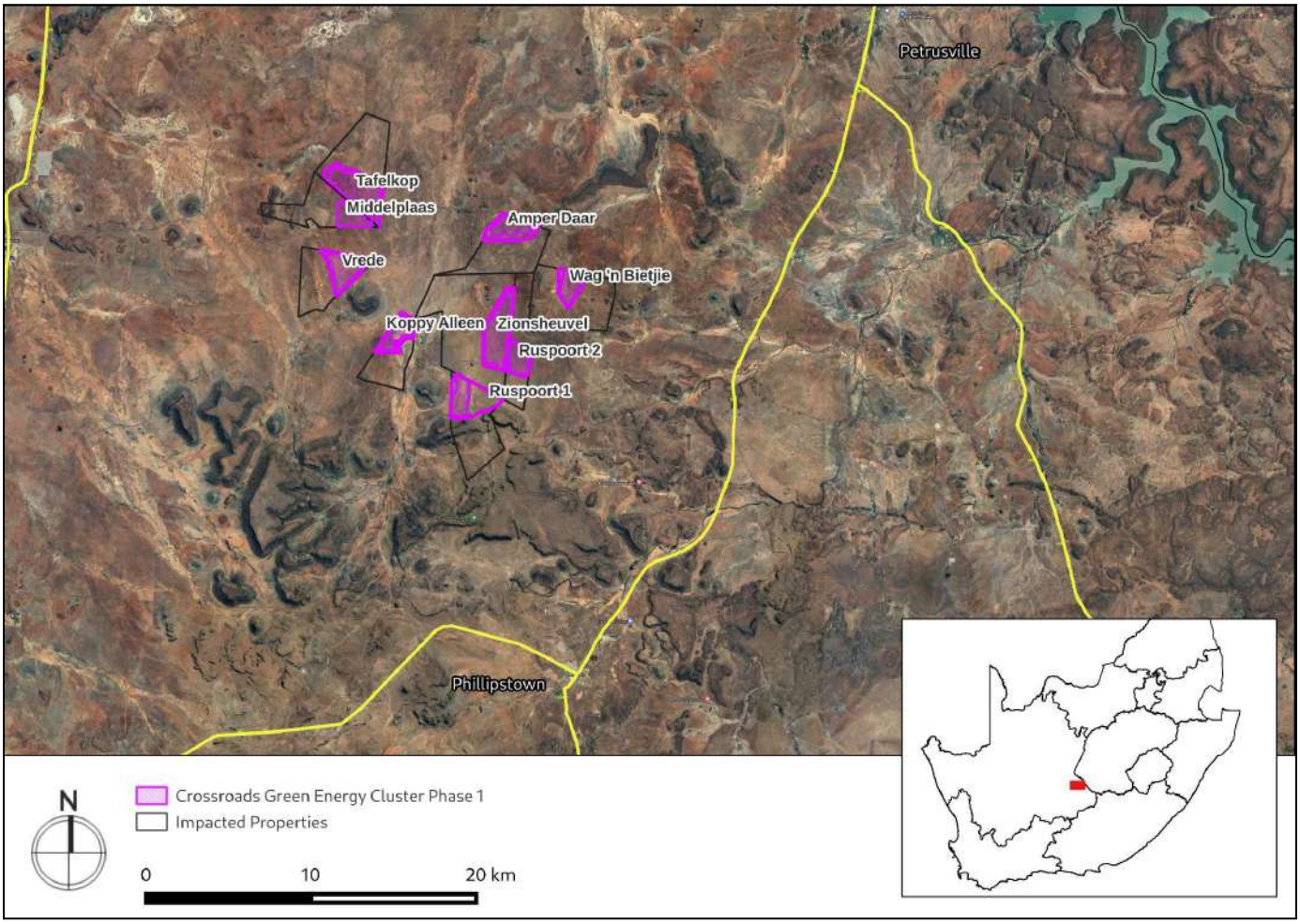

Figure A: Location of the proposed development area

4. Description of Proposed Development:

Vrede Solar Energy (Pty) Ltd proposed to develop the Vrede Solar PV Facility and its associated electrical infrastructure on Portion 5 of the Farm Bas Berg 88 in the Renosterberg Local Municipality in the greater Pixley ka

Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor.

The Project (Vrede Solar PV Facility) is part of a cluster of solar facilities known as the Crossroads Green Energy. The Cluster entails the development of up to 21 solar energy facilities, each up to 240MW in capacity, and each including grid connection infrastructure connecting the facilities to the proposed Hydra B Substation. The Vrede Solar PV Facility is intended to have a capacity of 150MW and is included in the Phase 1 roll out of the project.

5. Anticipated Impacts on Heritage Resources:

The overall archaeological sensitivity of the development area 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 areas proposed for development have an overall low sensitivity for impacts to significant archaeological heritage.

As indicated above, the results of this assessment align with the findings of other specialists 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. Specific mitigation measures are proposed for the few sensitive sites identified. Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present within the areas proposed for development therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided.

Based on previous surveys in the area, the land use (for grazing by sheep), the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (probably Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE.** However, any excavations > 1.5m could disrupt Ecca and Beaufort Group sediments which are highly fossiliferous and would increase the impact of the development to **MODERATE to HIGH**.

There are no objections on palaeontological heritage grounds, granted the excavations do not exceed 1m in depth. Any fossil finds, most likely in the superficial Quaternary sediments, are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented.

6. Recommendations:

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

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

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

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APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

Vrede Solar Energy (Pty) Ltd (a consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading) proposed to develop the Vrede Solar PV Facility and its associated electrical infrastructure on Portion 5 of the Farm Bas Berg 88 in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor.

The Project (Vrede Solar PV Facility) is part of a cluster of solar facilities known as the Crossroads Green Energy. The Cluster entails the development of up to 21 solar energy facilities, each up to 240MW in capacity, and each including grid connection infrastructure connecting the facilities to the proposed Hydra B Substation. The Vrede Solar PV Facility is intended to have a capacity of 150MW and is included in the Phase 1 roll out of the project.

1.2 Description of Property and Affected Environment

Vrede Solar PV Facility forms part of the Crossroads Green Energy Cluster which are spread out across an area roughly 30x30km northeast of De Aar in the Northern Cape. Houtkraal lies on the southwestern corner, Phillipstown on the southeastern corner, Petrusville on the northeastern corner and Potfontein on the northwestern corner. Each laydown area holds around 100-240MW of proposed solar PV capacity spread across 21 projects. The project facilities will be linked up via a proposed MTS and onwards to the national grid. To the south around De Aar, a number of renewable energy projects, particularly solar PV farms, have been completed with several new projects proposed such as Wag ‘n Bietjie, De Aar Solar and Paarde Valley. A completed 144MW wind farm lies on the plateau south east of the development and can be seen from the study area. Existing 765kV powerlines run through the study area along the southwest - northeast trajectory. Most of the study area is covered in vlaktes covered in grassland in order to take advantage of level ground suitable for solar PV facilities. The Tierberg and Basberg koppies lie prominently in the middle of the study area in otherwise predominantly flat and level terrain. Outcrops of dolerite boulders were found at Pro Deo, Uitkyk and Roodekraal where the likelihood of rock engravings was thoroughly surveyed.

The farms are currently used for grazing by sheep. The grass stood high and densely covered many areas due to the recent heavy rainfall this year. Farm kraals, dams and windmills were observed throughout the study area interconnected by secondary gravel roads and farm jeep tracks, many of which were water logged at the time of survey. The vegetation is typical of the Karoo and shrubs, succulents and grassland cover the study area.

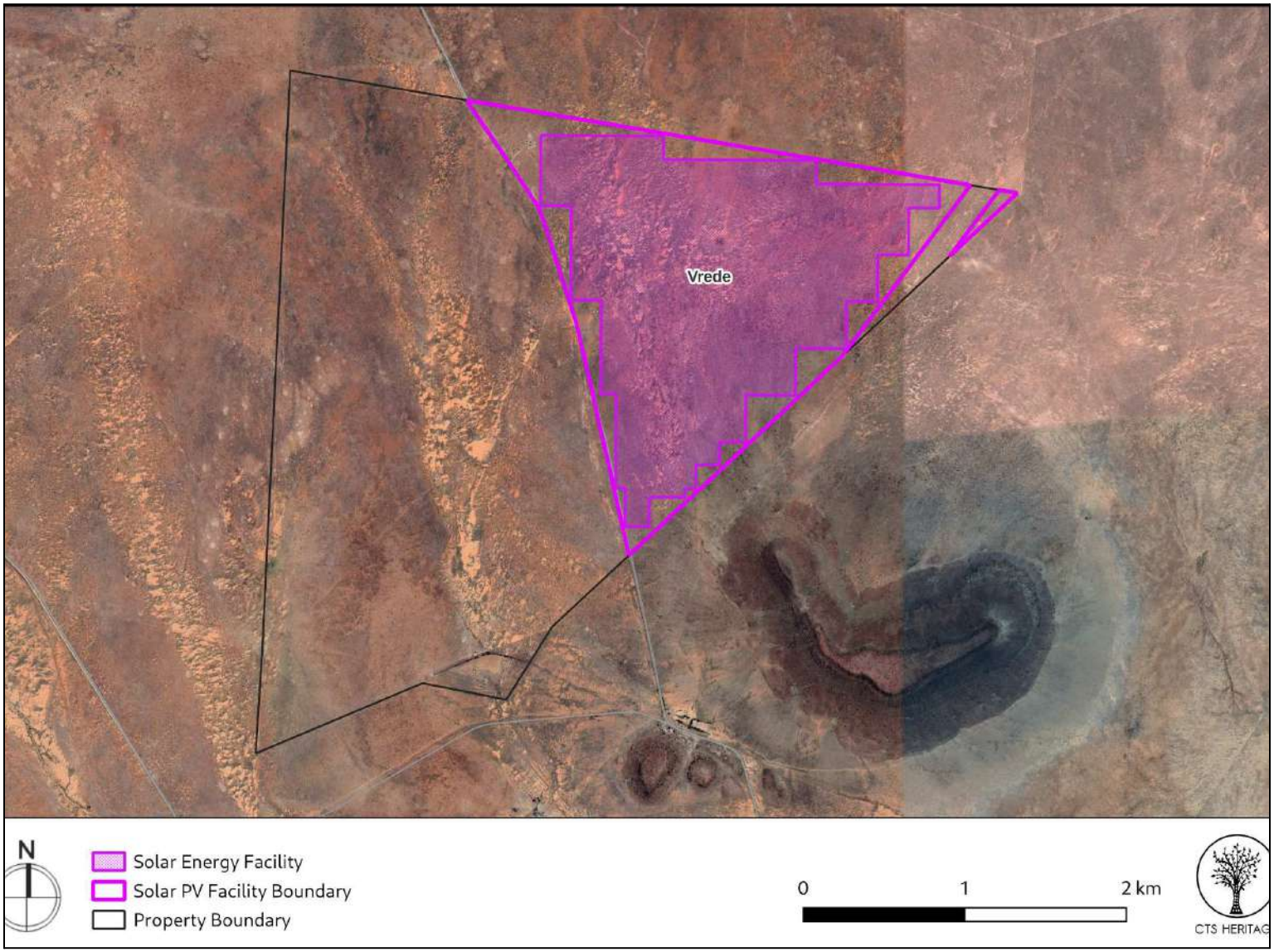

Figure 1.1: The proposed development layout of the Solar PV Facilities

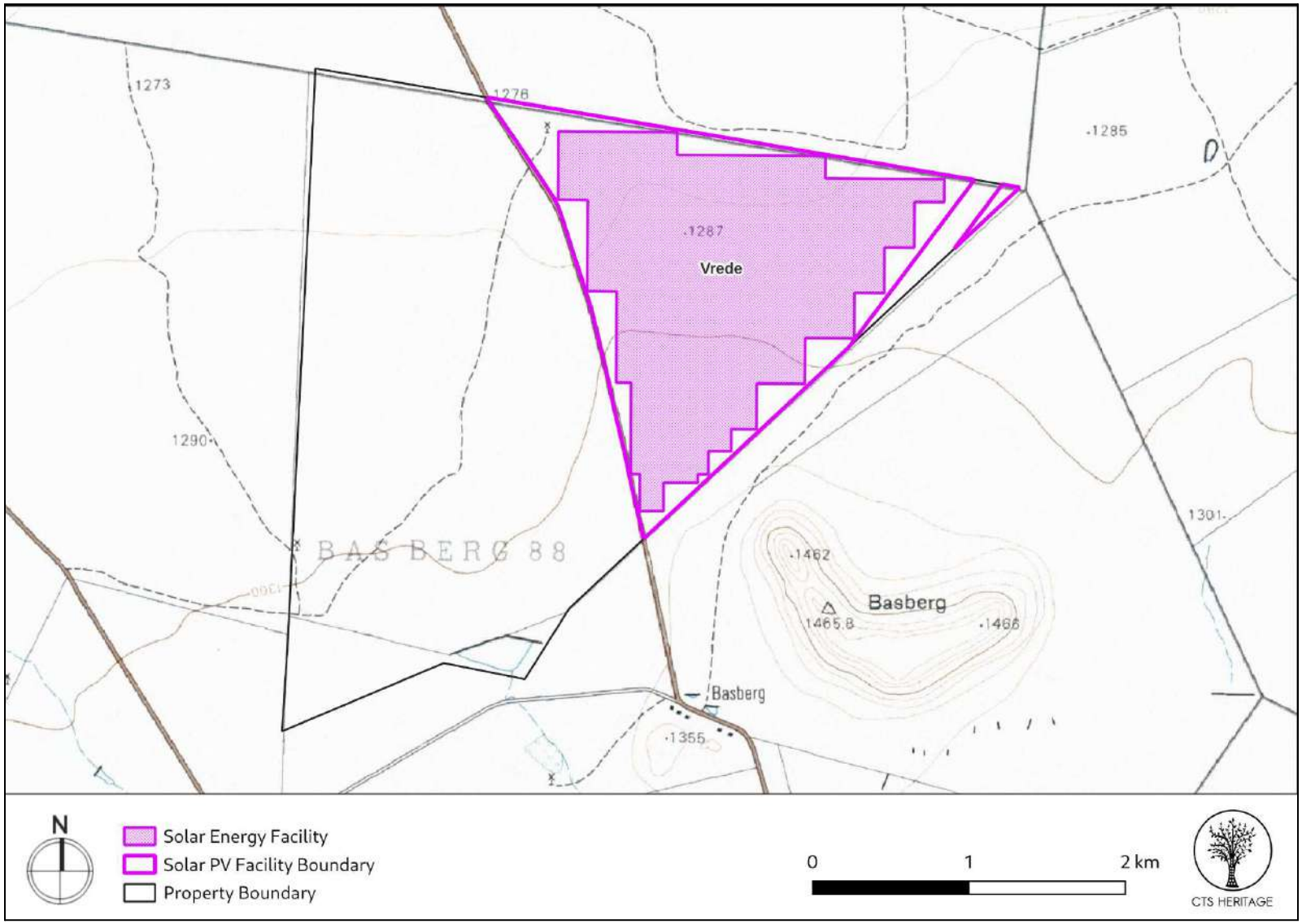

Figure 1.2: The proposed development layout of the PV Facilities on an extract of the 1:50 000 Topo Map

2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologists conducted their site visit from 23 May to 3 June 2022
- A palaeontologist conducted a desktop assessment of palaeontological resources likely to be disturbed by the proposed development
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

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

2.4 Constraints & Limitations

The grassland areas could be quite densely covered in places spread throughout the site which certainly contributed to obscuring the archaeological material on the surface. However, enough patches of exposed and

open ground were encountered throughout the study area and scatters of artefacts were easily recorded in these spots. There were therefore no major limitations or constraints to the survey carried out and 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

De Aar was originally established on the Farm "De Aar." The name means "the artery," a reference to its underground water supply. The Cape Government Railways were founded in 1872, and the route that the government chose for the line to connect the Kimberley diamond fields to Cape Town on the coast, ran directly through De Aar. Because of its central location, the government also selected the location for a junction between this first railway line, and the other Cape railway networks further east, in 1881. In 1899 two brothers who ran a trading store and hotel at the junction, Isaac and Wulf Friedlander, purchased the farm of De Aar. Following the Anglo Boer War, the Friedlander brothers surveyed the land for the establishment of a town. The municipality was created a year later in 1900.

The area proposed for development is located in the same context as the approved Vetlaagte Solar Energy Facility (SAHRIS Case ID 192). The studies completed for the Vetlaagte Solar Energy Facility are referred to below in order to provide heritage context to the proposed development area. The heritage impact assessment (Kruger, 2012 SAHRIS ID 49745) and palaeontology assessment (Almond, 2012 SAHRIS ID 49843) are referred to extensively below.

Kruger (2012) describes the development area as “characterised by flat undulating Karoo vegetation comprised out of relatively sparse scrub and grasses, with dolerite hills in the surrounding landscape. Large portions of the land is currently devoted to livestock farming but a number of solar energy facilities are to be constructed on farms around De Aar. Shallow soils covers a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone is present, while exotic rocks occur in the gravel of the Orange River bed and terraces. These provided suitable material for stone tool production during the Earlier, Middle and Later Stone Ages. “

Archaeology

As part of the 2012 process for approval of the Vetlaagte Solar Energy Facility, Kruger conducted a detailed Heritage Impact Assessment. According to Kruger (2012), “During the survey, widespread Middle Stone Age (MSA) material, including characteristic formal MSA stone tools such as points, blades and scrapers were documented in the survey area along a north-south oriented drainage on the eastern periphery of the property. The lithic remains occur in three large scatters and, almost without exception, in low lying areas along non-perennial drainage lines and wetland areas where precipitation and groundwater have exposed the stone tools, originally deposited on a decomposed calcrete rock layer approximately 30cm sub surface. Preliminary examinations of

some of the lithics indicated that a number of flakes displayed facetted platforms, characteristic of the MSA."

Kruger (2012) also documented historical period remains, "specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden and labourers quarters, as well as a dilapidated dam wall constructed in the drainage line east of the farmstead are present on the property. The date of construction of the farm house is denoted by a year count ("1930") on the front gable of the structure. The entire farmstead is situated in an area excluded from the solar farm development. A small family graveyard, associated with the farmstead at Vetlaagte, also occurs in the exclusion zone about 100m north of the farm house."

The approved Castle Wind Energy Facility lies on the hills just to the south east of the Hydra B project area. The development area has been subject to a previous heritage impact assessment process (Van der Walt, 2014, SAHRIS ID 183142) and a palaeontology assessment (Milsteed, 2014, SAHRIS ID 183143). A number of San engravings can be found on the dolerite boulders spread throughout the area and a more recent historical set of engravings has been made since the establishment of diamond mining at Kimberley and the spread of stock farming in the area.

In a recent (2021) assessment of Wag n Bietjie PV Facility completed by CTS Heritage, over 25 archaeological observations were made. Hornfels dominated the assemblages with smaller components of CCS and siltstones. While the vast majority of the scatters were made during the Middle Stone Age, there was also a relatively clear Later Stone Age presence in the study area. Many examples of blade forms were found which is typical of the Still Bay period (>70 000 years BP). The neighbouring Vetlaagte farm was also surveyed whilst conducting an HIA for a similar solar PV facility there. Relatively dense Later Stone Age sites were found on the far eastern end of Wag 'n Bietjie and these date within the last 2000 years due to the presence of pottery in these sites. The increasing density of material as one moved eastwards was probably due to the shortening distance from the Brakrivier which runs around Caroluspoort (4km northeast of Wag 'n Bietjie).

Two sites warranted protection with an interesting scatter of Still Bay tools on top of a dolerite outcrop with excellent views of the surrounding area. Another site was found warranting a IIIB rating with pottery, bone and an extensive stone tool assemblage amongst the dolerite outcrops on the eastern end of the property. The rest of the observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. Much of the archaeological material will be well conserved within a series of areas that can't be developed for the solar PV arrays while the flat, grassy vlaktes that are ideal for the solar PV areas also have the lowest archaeological sensitivity.

The area also played a part in the South African War from 1899-1902. According to Cloete (2010), a Boer party led by Generals Fourie and De Wet had to abandon ammunition and goods near Houtkraal when they encountered British troops guarding the railway line.

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of high and very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3024 for Colesburg, the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group.

As part of the Vetlaagte project in 2012, Almond completed a field-based palaeontological assessment. Almond (2012) found that "The potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Ecca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Ecca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian Glossopteris Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area. Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age. The diverse superficial deposits within the three study areas (e.g. soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole. Abundant fragments of reworked fossil wood material of Ecca provenance occur widely within subsurface and surface gravels overlying the Ecca Group outcrop area."

In Bamford's assessment completed for the area in 2021, she notes that "Based on experience, other reports and the lack of any significant previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the Tierberg Formation or Adelaide Subgroup. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr."

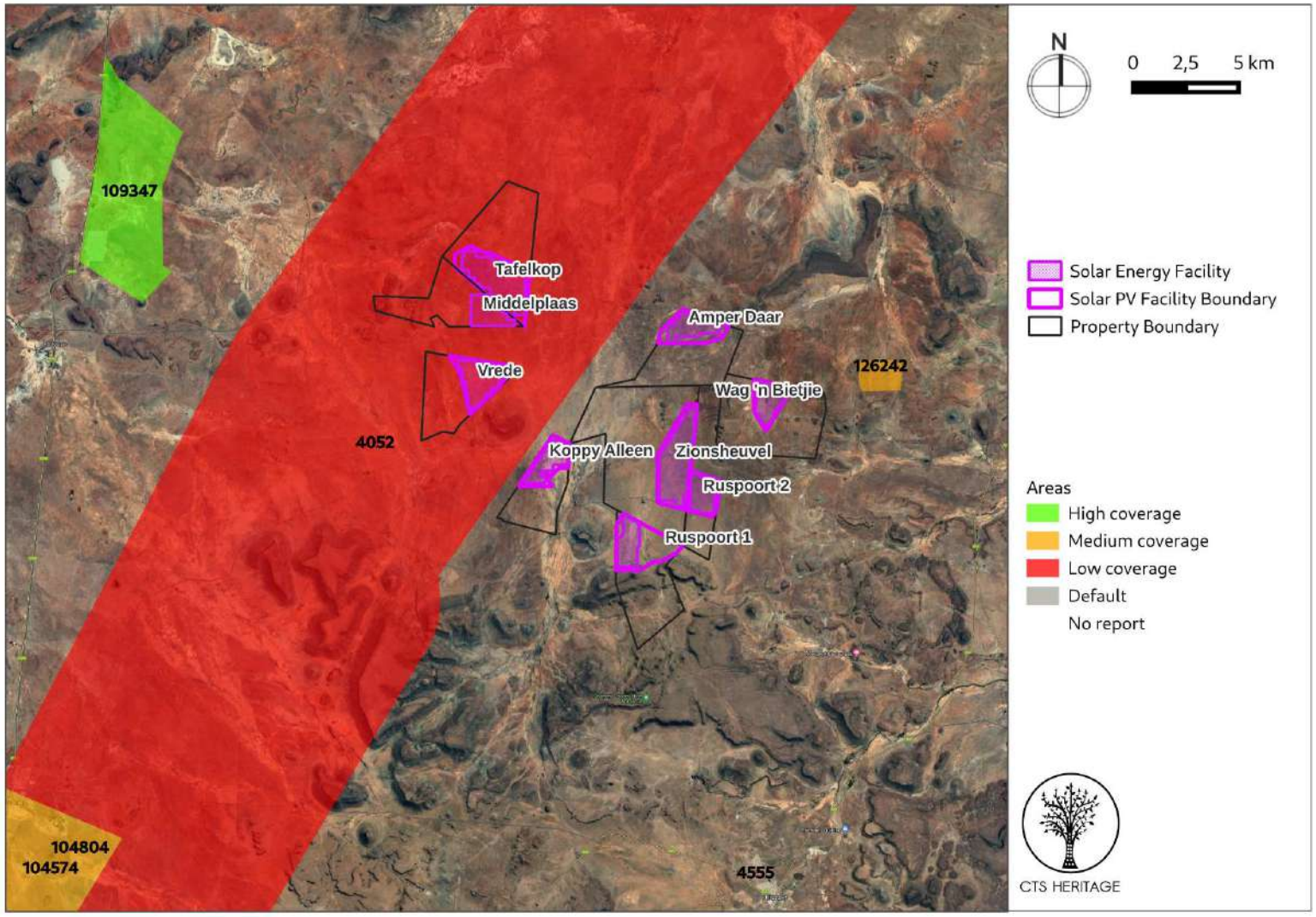

Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development

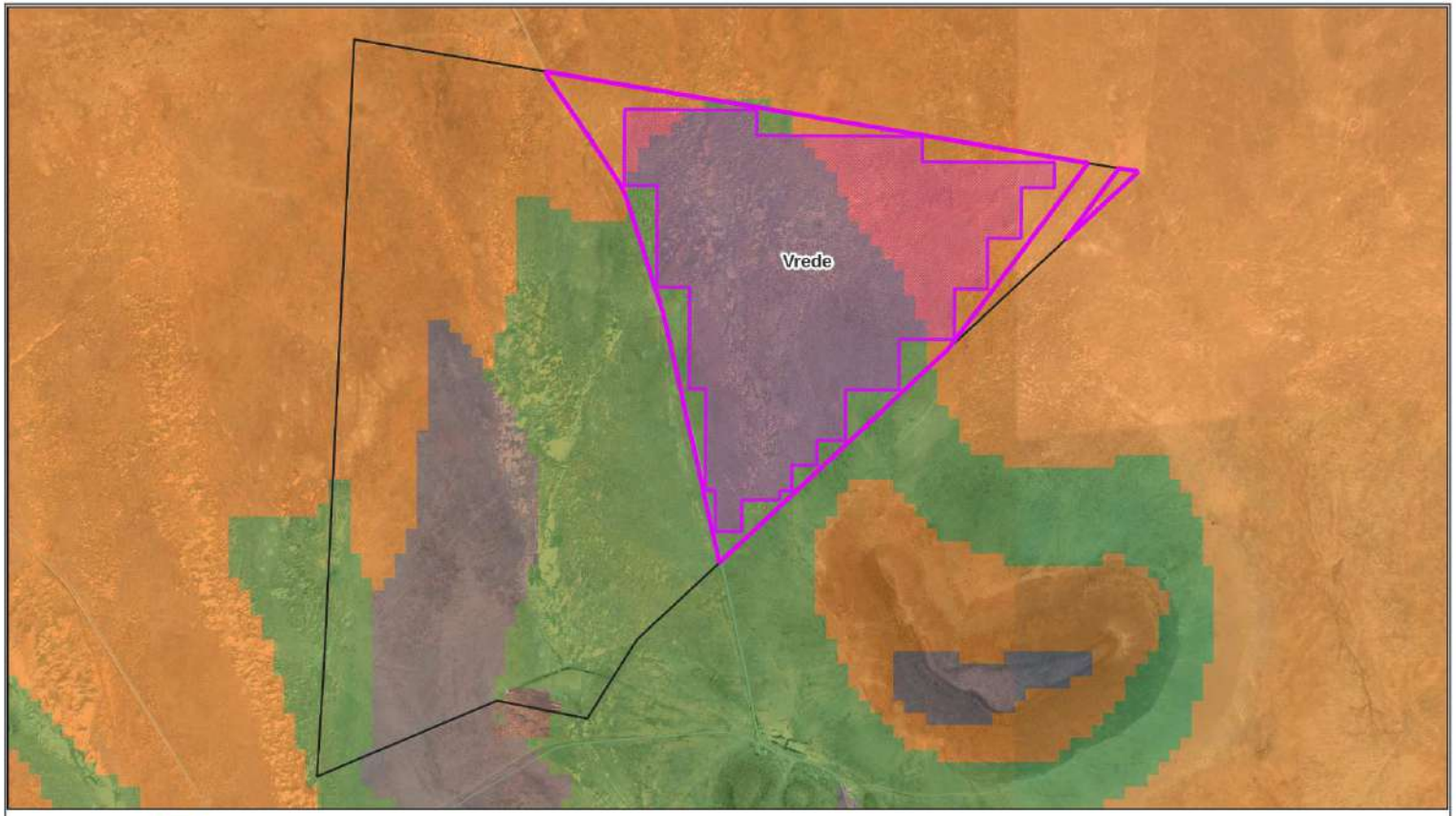

Figure 3.1: Palaeontological sensitivity of the proposed development area

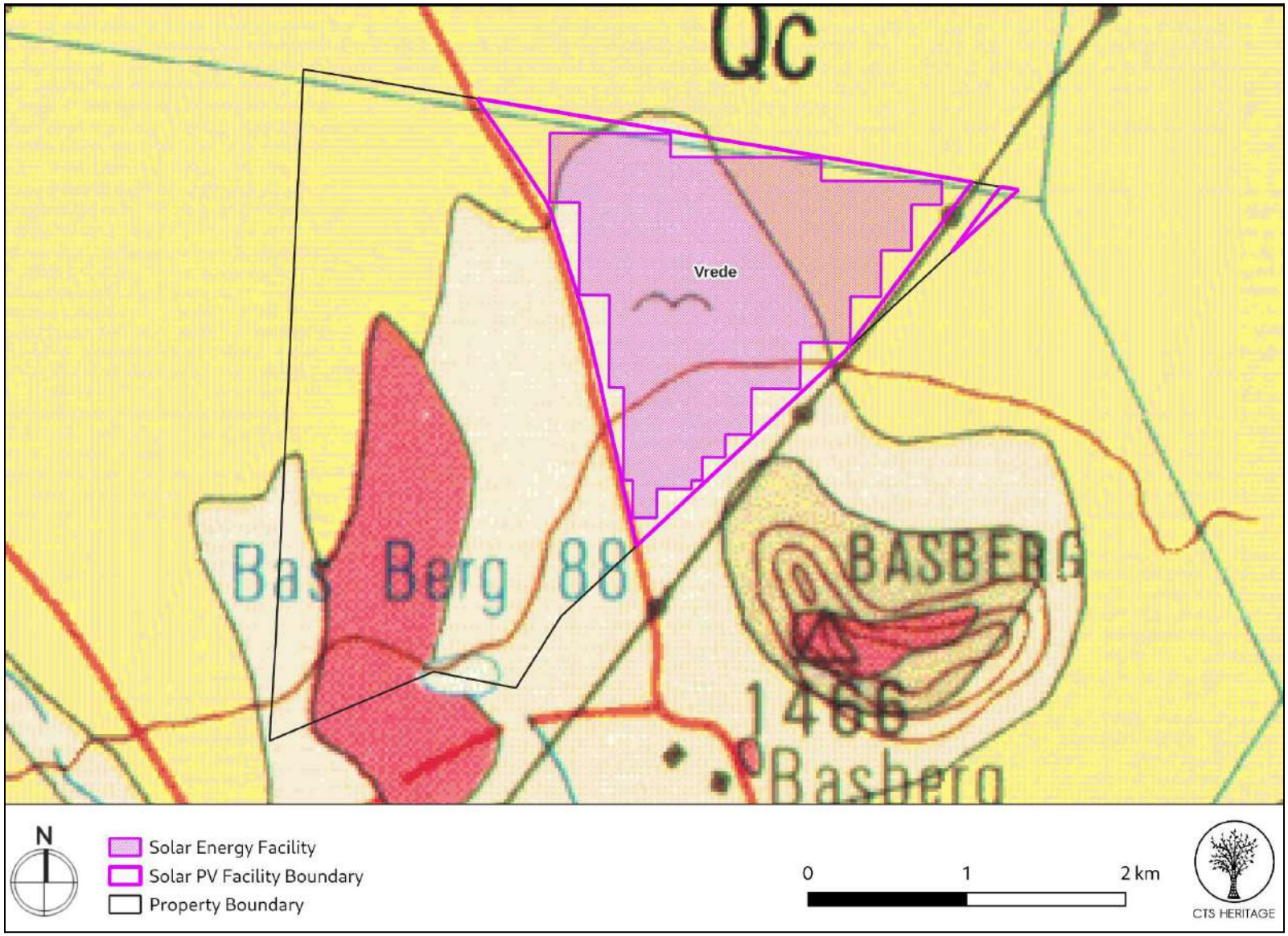

Figure 3.2: Extract from the Council of GeoScience Geology Map tile 3024 for Colesberg indicating that the area proposed for development is underlain by Quaternary Sands.

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

Nearly 400 observations were made during the field assessments of the 21 project areas. These were predominantly MSA open air scatters of hornfels and siltstone flakes that were made from locally abundant raw materials. Given the ubiquity of available quarrying and sourcing areas, the flaked material is spread widely and thinly across a very wide area of the landscape and some good examples of radial cores and backed tools were found.

The various Later Stone Age sites held higher grade and unpatinated hornfels flakes, many retouched in microlithic form (bladelets, points, scrapers and reduced cores). The sites of significance include the identification of the possible Houtkraal South African War site where Gen. de Wet abandoned a munitions wagon to the south west of the Driefontein facility. Engravings, one of a very well engraved eland, were found at Roodekraal, Pro Deo and Uitkyk and careful buffers and micro siting of the solar PV facility at Uitkyk and Pro Deo will need to be done to avoid any disturbance of these sites. The engravings were done during the Later Stone Age, most likely in the last 10 000 years, as well as a number of more recent engravings that fall within the historical period of the last 150 years.

The built environment history of the area became more established between the 1930s to 1950s and the farms have largely remained unchanged in their layout and extent since then. The location of the solar PV facilities have been positioned well away from any farm werfs and will not have an impact on the zone of sensitivity surrounding the werfs.

No archaeological resources of significance were identified within the area proposed for the Vrede Solar PV Facility.

Palaeontology (Appendix 2)

The Palaeontological Sensitivity of the **Jurassic Dolerite** is classified as **Insignificant/Zero** by SAHRIS. The igneous intrusive origin of the Jurassic dolerite dykes makes it unlikely that they contain fossils.

The Palaeontological Sensitivity of the **Quaternary deposits** is classified as **Moderate to High** by SAHRIS. Although present, the fossil record of the Quaternary Sands is sporadic and not very diverse. Aeolian dunes are not likely to preserve fossil material, however, calcretisation of burrows (including termites) and root casts (rhizoliths) can occur. Fossils that have been recorded include ostrich eggshells (*Struthio*), rare vertebrate remains (e.g. tortoise, mammal teeth and bones), shells of land snails (e.g. *Trigonephrus*), 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). The Mokolanen clacretes have also yielded calcretised burrows (including termites), root casts (rhizoliths) as well as mammalian ichnofossils (Malherbe, 1984; Almond & Pether, 2008).

Previous surveys in the De Aar area have identified possible calcretized rhizoliths (solid plant root casts), hollow subhorizontal root moulds and / or invertebrate burrows exposed below the calcrete hardpan in a quarry near the N10 to the southeast of De Aar (Almond, 2012; Almond, 2013a). Reworked clasts of cherty fossil wood are locally common both in subsurface gravels as well as sheetwash gravels at the soil surface (Almond, 2012; Almond, 2013a)

4.2 Heritage Resources identified

In terms of the heritage resources identified in the archaeological field assessment, see Table 2 below and Appendix 1 for full descriptions and images.

Table 2: Artefacts identified during the field assessment development area

Site No.	Site Name	Description	Density m²	Period	Co-ordinates		Grading	Mitigation
VRD001	Vrede	Kraal, dam, broken windmill	n/a	Modern, historical	-30.2083906	24.31516593	NCW	NA
VRD002	Vrede	Patinated hornfels flake	0 to 5	MSA	-30.2052453	24.31940868	NCW	NA
VRD003	Vrede	Hornfels flakes, no retouch	5 to 10	MSA	-30.21134165	24.34137166	NCW	NA
VRD004	Vrede	Hornfels flakes, pointed end on one	0 to 5	MSA	-30.2097885	24.33082838	NCW	NA
VRD005	Vrede	Patinated hornfels flake	0 to 5	MSA	-30.21481003	24.31840825	NCW	NA
VRD006	Vrede	Hornfels flake, patinated, hornfels core flake,	0 to 5	MSA	-30.21516365	24.32193218	NCW	NA
VRD007	Vrede	Patinated hornfels blade flake	0 to 5	MSA	-30.21513324	24.32967428	NCW	NA
VRD008	Vrede	Very patinated hornfels flakes	0 to 5	MSA	-30.2156577	24.3340628	NCW	NA
VRD009	Vrede	Kraal, jojo	n/a	Modern	-30.21118757	24.3173473	NCW	NA
VRD010	Vrede	Hornfels unifacial point	0 to 5	MSA	-30.21752331	24.33794295	NCW	NA
VRD011	Vrede	Hornfels blade and triangular flake	0 to 5	MSA	-30.2180863	24.33580104	NCW	NA
VRD012	Vrede	Hornfels flake, prominent bulb of percussion	0 to 5	MSA	-30.2185698	24.33366416	NCW	NA
VRD013	Vrede	Patinated hornfels flakes	0 to 5	MSA	-30.2193709	24.32919502	NCW	NA
VRD014	Vrede	Thin hornfels blade	0 to 5	MSA	-30.22014321	24.32558945	NCW	NA
VRD015	Vrede	Patinated hornfels flakes, possibly worked for hafting	5 to 10	MSA	-30.2202569	24.32287078	NCW	NA
VRD016	Vrede	Curved hornfels flake, flake with fine edge retouch	0 to 5	MSA	-30.2204523	24.32229966	NCW	NA
VRD017	Vrede	Leaf shaped hornfels flakes patinated	0 to 5	MSA	-30.22344172	24.32090377	NCW	NA
VRD018	Vrede	Hornfels flake with longitudinal scars on dorsal	0 to 5	MSA	-30.2240909	24.32498744	NCW	NA
VRD019	Vrede	Large hornfels blade flake, early MSA	0 to 5	MSA	-30.2258088	24.3270897	NCW	NA
VRD020	Vrede	Small notched, pointed hornfels flake	0 to 5	MSA	-30.2285938	24.32231696	NCW	NA

4.3 Mapping and spatialisation of heritage resources

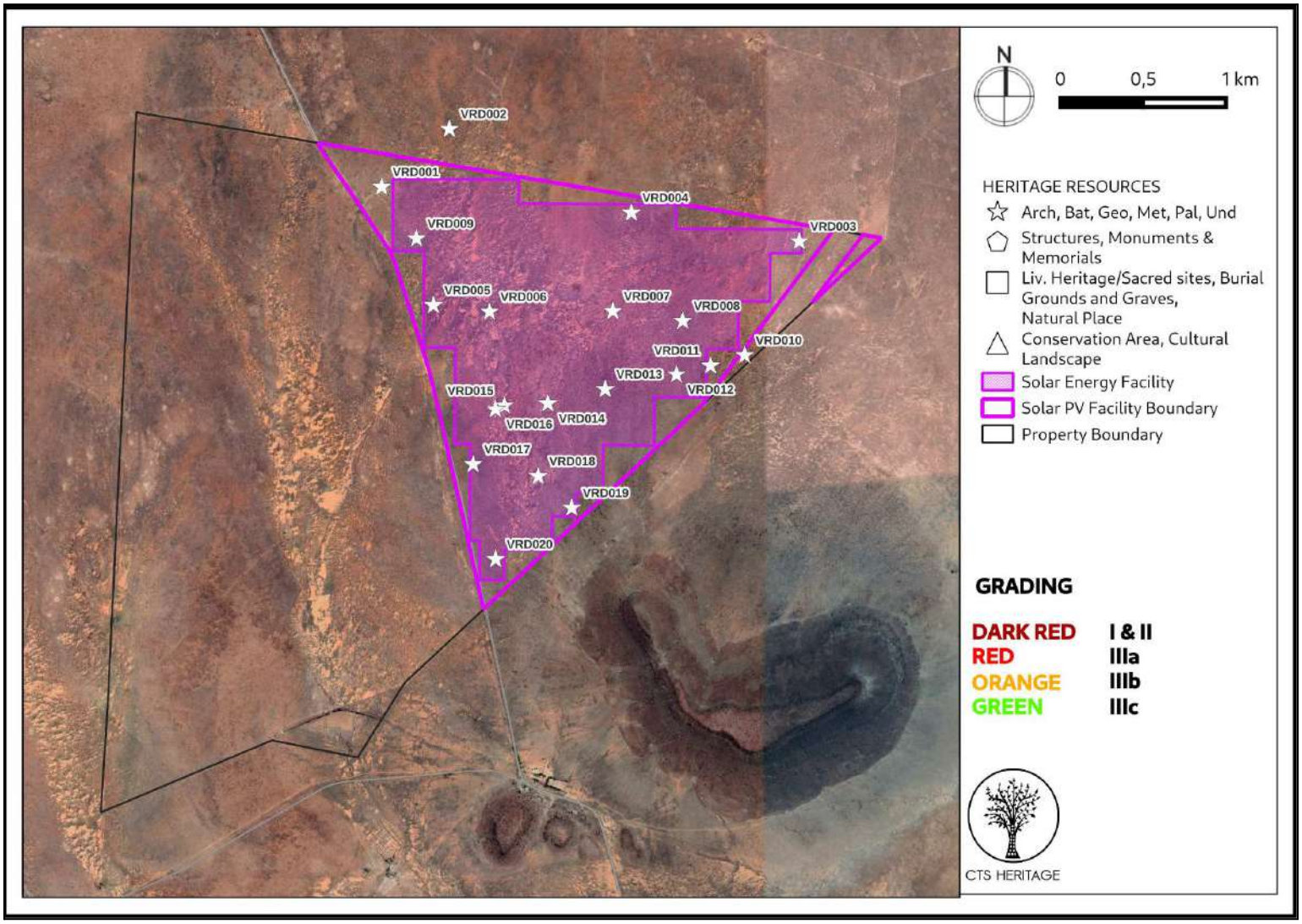

Figure 5.1: All heritage resources within proximity to the development area

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape and VIA

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

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

In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character. The visual quality of the region is generally high and large tracts of intact vegetation and rolling hills characterise most of the visual environment.

The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6km radius of the development and within the greater region) is expected to be of **moderate** significance."

As noted above, to the south around De Aar, a number of renewable energy projects, particularly solar PV farms, have been completed with several new projects proposed such as Wag 'n Bietjie, De Aar Solar and Paarde Valley. A completed 144MW wind farm lies on the plateau south east of the development and can be seen from the study area. Existing 765kV powerlines run through the study area along the southwest - northeast trajectory. Most of the study area is covered in vlaktes covered in grassland in order to take advantage of level ground suitable for solar PV facilities. The Tierberg and Basberg koppies lie prominently in the middle of the study area in otherwise predominantly flat and level terrain.

The following recommendations are adapted from Winter and Wilson (2021) in terms of Solar PV placement ("where" and "how"). The following general principles apply to the PV layout:

- Avoid steep slopes.
- Avoid proximity to historic corridors.
- Avoid placement within viewshed of farmsteads.

The layouts provided comply with the above general principles. The impact tables for this impact are fully addressed in the VIA.

5.1.2 Archaeology

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 (Kruger, 2012). The majority of the archaeological resources identified within the area proposed for the development in this field assessment have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from an archaeological perspective. No archaeological resources of significance were identified within the areas proposed for the Vrede Solar PV Facility.

Table 4.1 Impacts of the proposed development to archaeological resources

NATURE: The construction phase of the project will require excavation, which may impact on archaeological heritage resources if present.				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**M (3)**	No archaeological heritage resources of significance were identified within the development footprint, however some were identified within the broader development area	**L (1)**	No archaeological heritage resources of significance were identified within the development footprint, however some were identified within the broader development area
DURATION	**H (5)**	Where an impact to a resource occurs, the impact will be permanent.	**H (5)**	Where an impact to resources occurs, the impact will be permanent.
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Since only the possible fossils within the area would be microscopic blue-green algae in some stromatolites, the spatial scale will be localised within the site boundary.
PROBABILITY	**L (1)**	It is possible that significant heritage resources will be impacted if the layout provided is followed	**L (1)**	It is unlikely that significant heritage resources will be impacted if the layout provided is followed
SIGNIFICANCE	**L**	(3+5+1)x1=9	**L**	(1+5+1)x1=7
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**M**	Possible	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATION: - 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.				
RESIDUAL RISK: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.				

5.1.3 Palaeontology

Based on previous surveys in the area, the land use (for grazing by sheep), the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (probably Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE.** However, any excavations > 1m could disrupt Ecca and Beaufort Group sediments which are highly fossiliferous and would increase the impact of the development to **MODERATE to HIGH**.

Table 4.2: Impacts of the proposed development of the PV facilities to palaeontological resources

NATURE: The construction phase of the project will require excavation, which may impact on palaeontological heritage resources if present.				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**M (4)**	The area proposed for development is underlain by sediments of moderate palaeontological sensitivity	**M (4)**	The area proposed for development is underlain by sediments of moderate palaeontological sensitivity
DURATION	**H (5)**	Where an impact to resources occurs, the impact will be permanent.	**H (5)**	Where an impact to resources occurs, the impact will be permanent.
EXTENT	**L (1)**	The spatial scale will be localised within the site boundary.	**L (1)**	The spatial scale will be localised within the site boundary.
PROBABILITY	**L (1)**	The potential impact to fossil heritage resources is low	**L (1)**	The potential impact to fossil heritage resources is low
SIGNIFICANCE	**H**	(4+5+1)x1=9	**H**	(4+5+1)x1=9
STATUS		Negative		Positive
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**H**	Possible	**H**	Possible
CAN IMPACTS BE MITIGATED		Yes		Yes
MITIGATION: - The attached Chance Fossil Finds Procedure must be implemented				
RESIDUAL RISK: Should any significant resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources.				

5.2 Sustainable Social and Economic Benefit

- Construction Phase
  - Creation of employment and business opportunities, and opportunity for skills development and on-site training.
- Operational Phase
  - The establishment of infrastructure to improve energy security and support the renewable sector.
  - Creation of employment opportunities.
  - Benefits to the affected landowners.
  - Benefits associated with the socio-economic contributions to community development.

Based on the information available, the anticipated socio-economic benefits outweigh the negative impacts to heritage resources.

5.3 Proposed development alternatives

- no property/location alternatives are proposed as part of this Scoping and EIA process.
- no activity alternatives are considered within this Scoping Report.
- PV technology was identified as being the preferred option for the study area. No other technology alternatives are being assessed for development on the proposed site.

As no impacts to significant heritage resources are anticipated, no alternatives are proposed from a heritage perspective.

5.4 Site Verification Statement

According to the DFFE Screening Tool analysis, the development area has High levels of sensitivity for impacts to palaeontological heritage and Low levels of sensitivity for impacts to archaeological and cultural heritage resources. The results of this assessment in terms of site sensitivity are summarised below:

- No significant archaeological resources were identified within the broader area (Low)
- The limited excavations associated with the PV facility development should not impact significant palaeontological heritage (Moderate)

As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification confirms the results of the DFFE Screening Tool for Archaeology and disputes the results of the screening tool for Palaeontology - this should be considered to be Moderate. This evidence is provided in the body of this report and in the appendices (Appendix 1 and 2).

5.5 Cumulative Impacts

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 agricultural 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, outside of De Aar.

Table 8: Cumulative Impact Table

NATURE: Cumulative Impact to the sense of place				
		Overall impact of the proposed project considered in isolation		**Cumulative impact of the project and other projects in the area**
MAGNITUDE	**H (7)**	High	**H (7)**	High
DURATION	**M (3)**	Medium-term	**H (4)**	Long-term
EXTENT	**L (1)**	Low	**L (1)**	Low
PROBABILITY	**H (3)**	Probable	**H (3)**	Probable
SIGNIFICANCE	**M**	(7+3+1)x3=33	**M**	(7+4+1)x3=36
STATUS		Negative		Negative
REVERSIBILITY	**H**	High	**L**	Low
IRREPLACEABLE LOSS OF RESOURCES?	**M**	Possible	**M**	Possible
CAN IMPACTS BE MITIGATED		NA		NA
CONFIDENCE IN FINDINGS: High				
MITIGATION: Implementation of recommendations in the VIA				

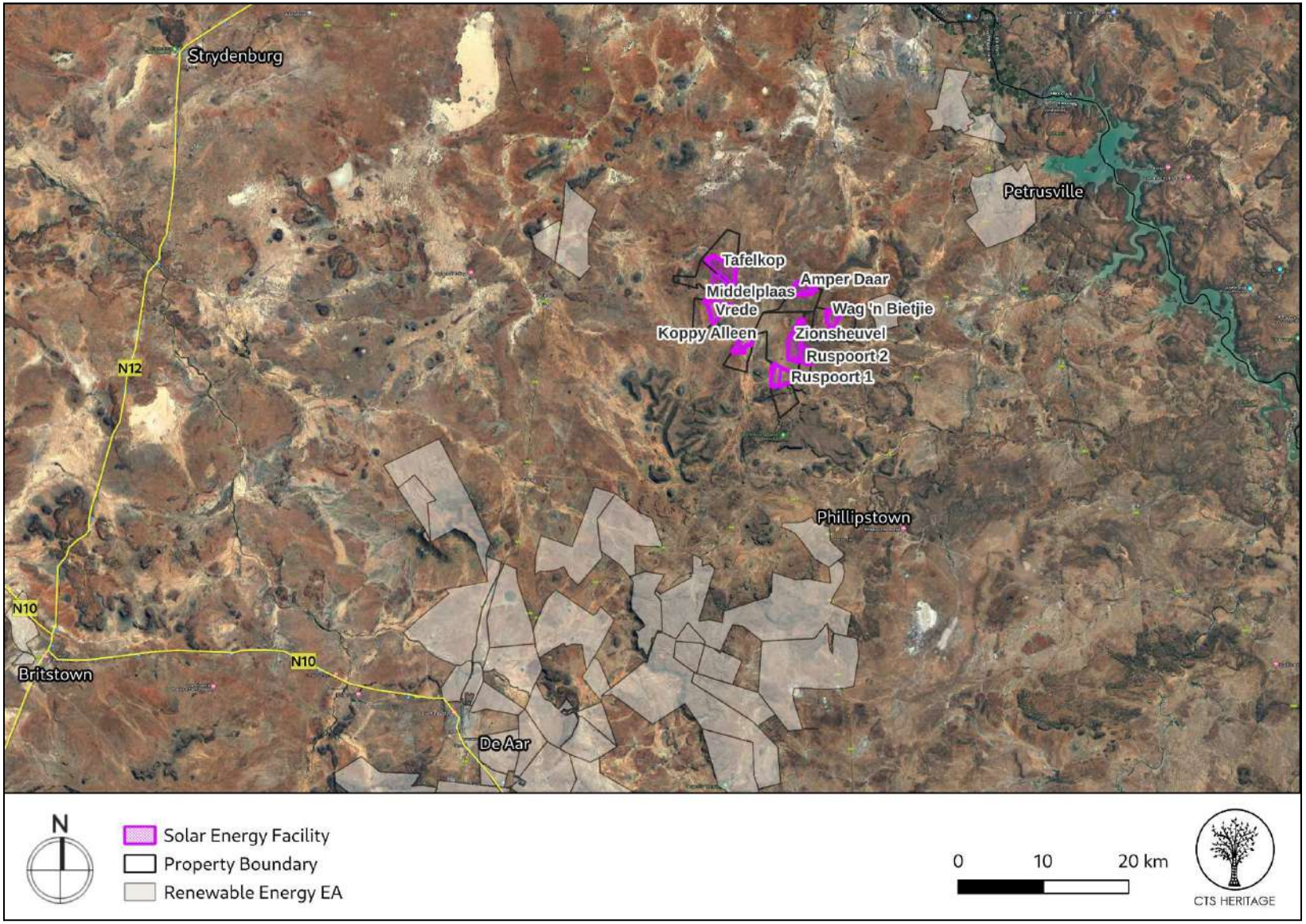

Figure 6: All approved renewable energy developments within close proximity to the area proposed for development

6. RESULTS OF PUBLIC CONSULTATION

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

7. CONCLUSION

The overall archaeological sensitivity of the development area 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 areas proposed for development have an overall low sensitivity for impacts to significant archaeological heritage.

As indicated above, the results of this assessment align with the findings of other specialists 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. Specific mitigation measures are proposed for the few sensitive sites identified. Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present within the areas proposed for development therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided.

Based on previous surveys in the area, the land use (for grazing by sheep), the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (probably Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE.** However, any excavations > 1.5m could disrupt Ecca and Beaufort Group sediments which are highly fossiliferous and would increase the impact of the development to **MODERATE to HIGH**.

There are no objections on palaeontological heritage grounds, granted the excavations do not exceed 1.5m in depth. Any fossil finds, most likely in the superficial Quaternary sediments, are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented.

8. RECOMMENDATIONS

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

- The attached Chance Fossil Finds Procedure must be implemented
- 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	**Report Type**	**Author/s**	**Date**	**Title**
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
109347	AIA Phase 1	David Morris	01/12/2012	ARCHAEOLOGY SPECIALIST INPUT ON THE PROPOSED ACCESS ROAD FOR THE VANDERLINDESKRAAL PHOTOVOLTAIC SITE SITUATED NEAR HANOVER, NORTHERN CAPE
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339820	Heritage Impact Assessment Specialist Reports	Lita Webley, Jayson Orton	01/12/2011	Proposed De Aar Wind Energy Facility on the North and South Plateau, Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
384330	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofsig 1 Solar PV Energy Facility on the remainder of Farm Kalkpoort 18, Renosterberg Local Municipality near Petrusville, Northern Cape
384331	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofisg 2 Solar PV Energy Facility on the remainder of Farm Kalkpoort 18, Renosterberg Local Municipality near Petrusville, Northern Cape
384332	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofsig 3 Solar PV Energy Facility on the remainder of farm Kalkpoort 18, Resnosterberg Local Municipality near Petrusville, Northern Cape
384452	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Assessment Screening of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384456	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384469	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Screening Assessment - Proposed Kloofsig Solar Pv Facility On The Remainder Of Farm Kalk Poort 18, Renosterberg Local Municipality Near Colesberg, Northern Cape
384497	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 2 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
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	cal Specialist Reports	Almond		Exemption From Further Specialist Palaeontological Studies Proposed Kloofsig Solar PV Facility On The Remainder Of Farm Kalk Poort 18, Renosterberg Local Municipality Near Colesberg, Northern Cape
384554	Archaeologica l Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources
4555	AIA Phase 1	Cobus Dreyer	10/06/2005	Archaeological and Historical Investigation of the Proposed Pipeline Installation at Philipstown, Northern Cape
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8167	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Vanderlindeskraal Photovoltaic construction site near Hanover, Northern Cape
8992	PIA Phase 1	John E Almond	29/01/2012	Palaeontological Specialist Study: Combined Desktop and Field -based Assessments. Two wind energy facilities on the Eastern Plateau near De Aar, Northern Cape Province proposed by Mulilo Renewable Eneergy (Pty) Ltd
116245	AIA Phase 1	David Morris	08/01/2013	ARCHAEOLOGY SPECIALIST INPUT ON THE SITE OF THE PROPOSED POTFONTEIN PHOTOVOLTAIC CONSTRUCTION SITE NORTH OF DE AAR,

				NORTHERN CAPE
118851	PIA Desktop	Gideon Groenewald	29/04/2013	PALAEONTOLOGICAL DESKTOP REPORT PROPOSED POTFONTEIN PHOTOVOLTAIC FACILITY Potfontein Photovoltaic Facility, Farm: Koens Draai 36, Emthanjeni Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province of South Africa
356810	HIA Phase 1	Lita Webley	15/02/2016	Desktop Heritage Impact Assessment: Proposed mining of two borrow pits on the remainder of farm Enkeldebult 150, south of Phillipstown, Northern Cape
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114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel to Kimberley, Northern Cape
114929	HIA Phase 1	Elize Becker	25/02/2013	Transnet Capital Projects Ngqura 16 Mtpa Manganese Rail Phase 1 Heritage Impact Assessment Rail Kimberley to De Aar
115026	PIA Phase 1	John E Almond	01/02/2013	Proposed 16 Mtpa expansion of Transnet's existing manganese ore export railway line and associated infrastructure between Hotazel and the Port of Ngqura, Northern and Eastern Cape. Part 3: Kimberley to De Aar, Northern Cape
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129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
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93185	HIA Phase 1	Elize Becker	01/11/2012	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port Ngqura

APPENDICES

APPENDIX 1: Archaeological Assessment (2022)

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed Development of the Hydra B Solar PV Facilities near De Aar in the Northern Cape

Prepared by

CTS HERITAGE
Jenna Lavin, Nic Wiltshire
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In Association with

Savannah

August 2022

CTS HERITAGE

EXECUTIVE SUMMARY

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Hydra B Solar Energy Cluster located on various farms in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Cluster entails the development of up to nineteen (19) solar energy facilities.

A technically suitable project site of ~1020ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 100MW and will include the following infrastructure:

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system)
- Inverters and transformers
- Cabling between the project components
- Battery Energy Storage System (BESS)
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process)
- Site offices, Security office, operations and control, and maintenance and storage laydown areas
- Access roads, internal distribution roads

The overall archaeological sensitivity of the development area 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 areas proposed for development have an overall low sensitivity for impacts to significant archaeological heritage.

As indicated above, the results of this assessment align with the findings of other specialists 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. Specific mitigation measures are proposed for the few sensitive sites identified. Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present within the areas proposed for development therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided. It is recommended that the high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.

Recommendations

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

- The high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.
- The mitigation measures outlined in Table 2 above are implemented. These sites and their respective buffers should be indicated on site development maps during the construction phase of the project. Furthermore,

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during the operational phase of the projects, relevant staff of the facility should be made aware of these sites and proper training provided regarding appropriate behaviour at archaeological sites.

- 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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1. INTRODUCTION

1.1 Background Information on Project

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Hydra B Solar Energy Cluster located on various farms in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Cluster entails the development of up to nineteen (19) solar energy facilities.

A technically suitable project site of ~1020ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 100MW and will include the following infrastructure:

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system)
- Inverters and transformers
- Cabling between the project components
- Battery Energy Storage System (BESS)
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process)
- Site offices, Security office, operations and control, and maintenance and storage laydown areas
- Access roads, internal distribution roads

1.2 Description of Property and Affected Environment

The Hydra B solar PV facilities are spread out across an area roughly 30x30km northeast of De Aar in the Northern Cape. Houtkraal lies on the southwestern corner, Phillipstown on the southeastern corner, Petrusville on the northeastern corner and Potfontein on the northwestern corner. Each laydown area holds around 100-200MW of proposed solar PV capacity spread across 21 projects. The project facilities will be linked up via the proposed Hydra B MTS and onwards to the national grid. To the south around De Aar, a number of renewable energy projects, particularly solar PV farms, have been completed with several new projects proposed such as Wag ‘n Bietjie, De Aar Solar and Paarde Valley. A completed 144MW wind farm lies on the plateau south east of the development and can be seen from the study area. Existing 765kV powerlines run through the study area along the southwest - northeast trajectory. Most of the study area is covered in vlaktes covered in grassland in order to take advantage of level ground suitable for solar PV facilities. The Tierberg and Basberg koppies lie prominently in the middle of the study area in otherwise predominantly flat and level terrain. Outcrops of dolerite boulders were found at Pro Deo, Uitkyk and Roodekraal where the likelihood of rock engravings was thoroughly surveyed.

The farms are currently used for grazing by sheep. The grass stood high and densely covered many areas due to the recent heavy rainfall this year. Farm kraals, dams and windmills were observed throughout the study area interconnected by secondary gravel roads and farm jeep tracks, many of which were water logged at the time of survey. The vegetation is typical of the Karoo and shrubs, succulents and grassland cover the study area.

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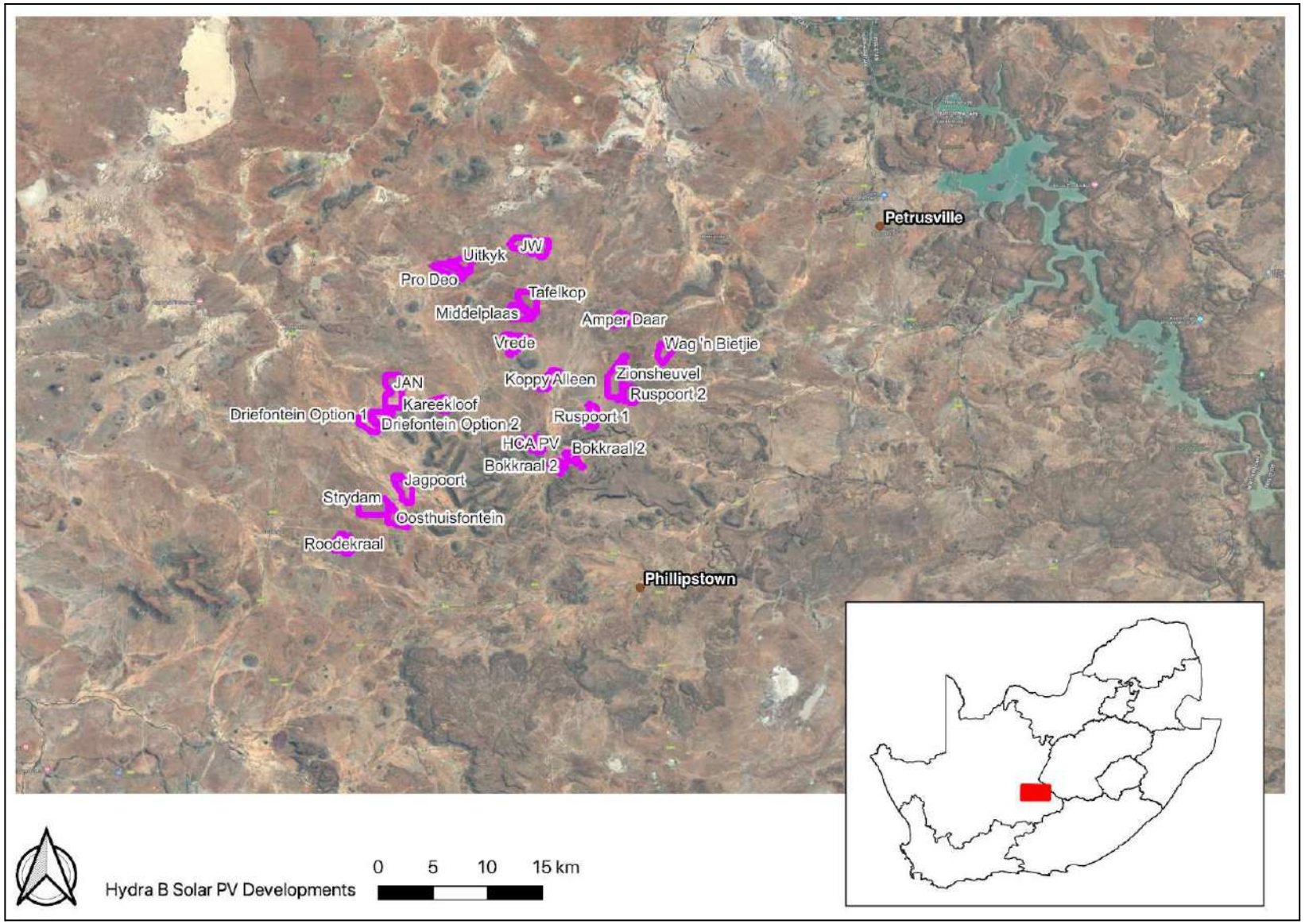

Figure 1.1: Close up satellite image indicating proposed location of study area

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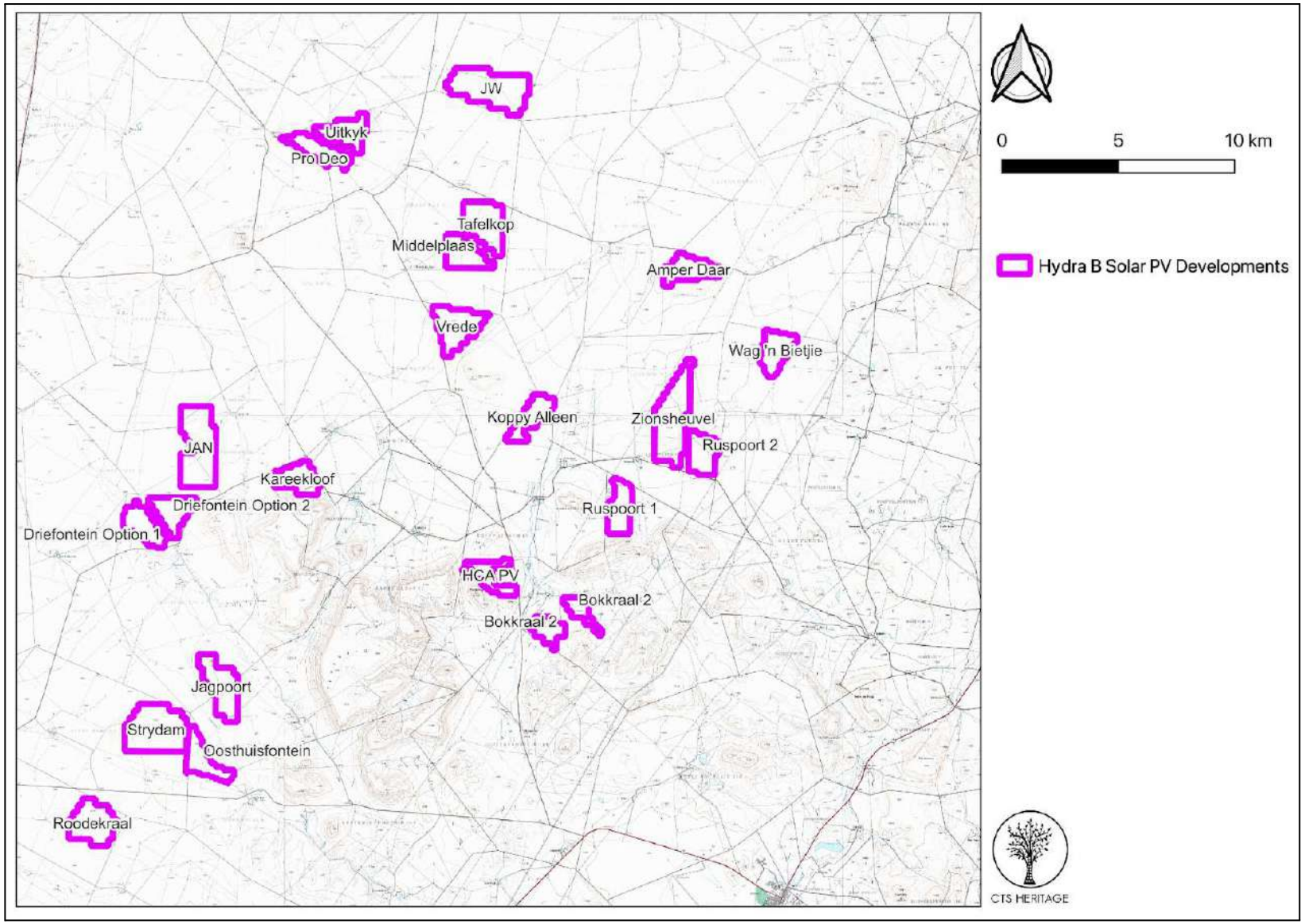

Figure 1.2: Study Area reflected on the 1:50 000 Topo Map

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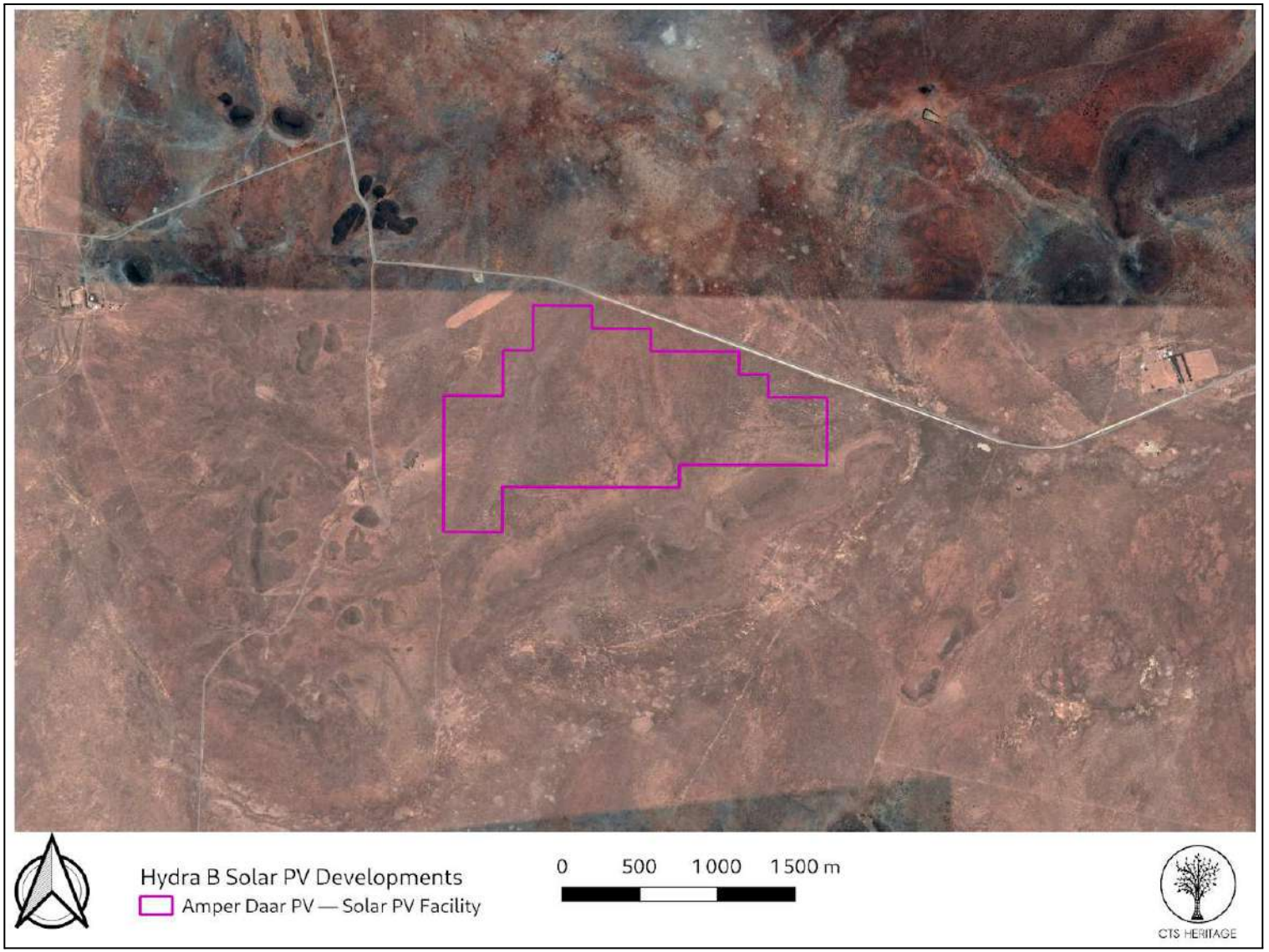

Figure 1.3.1: Amper Daar Solar PV Facility Study Area

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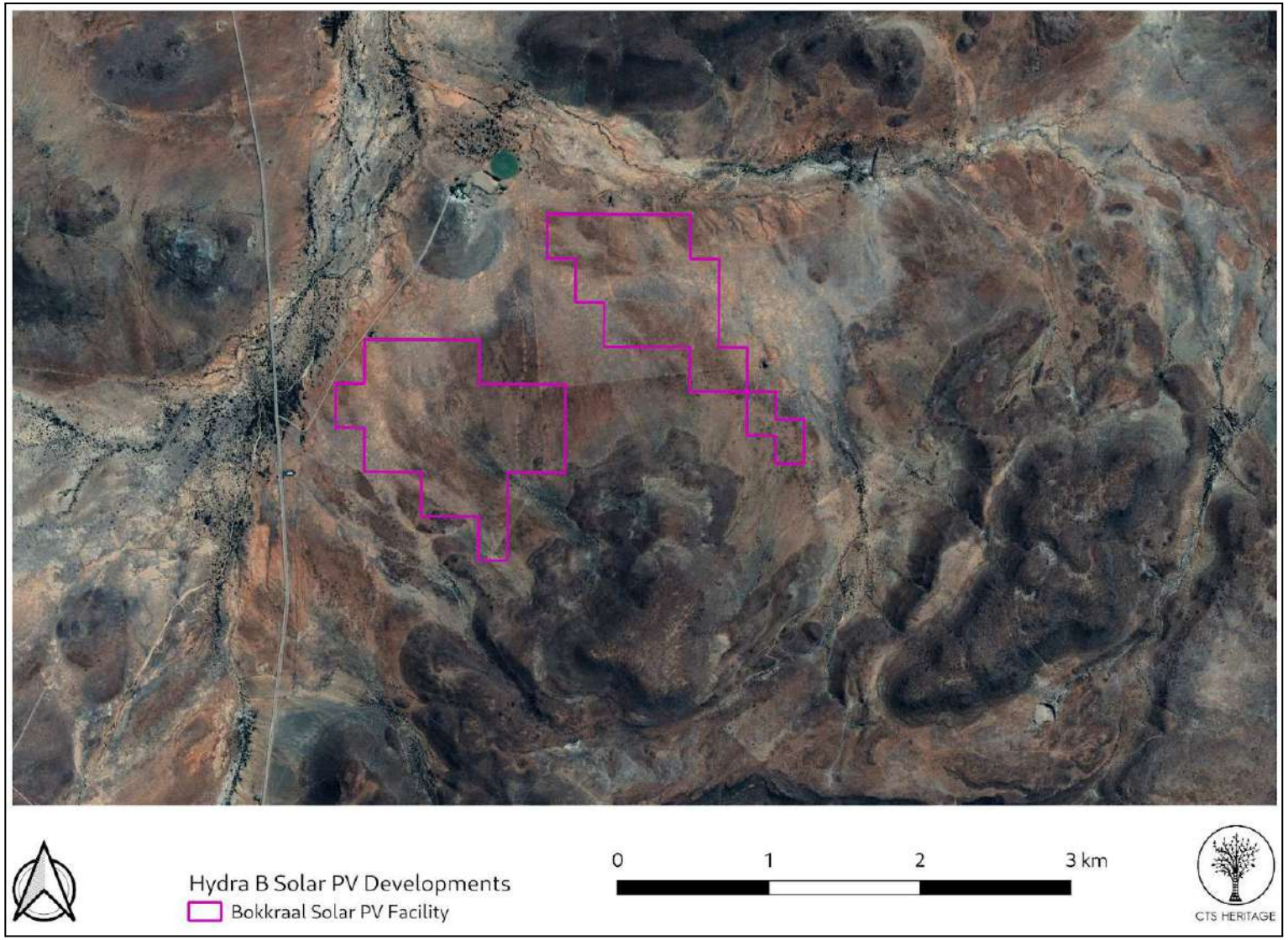

Figure 1.3.2: Bokkraal Solar PV Facility Study Area

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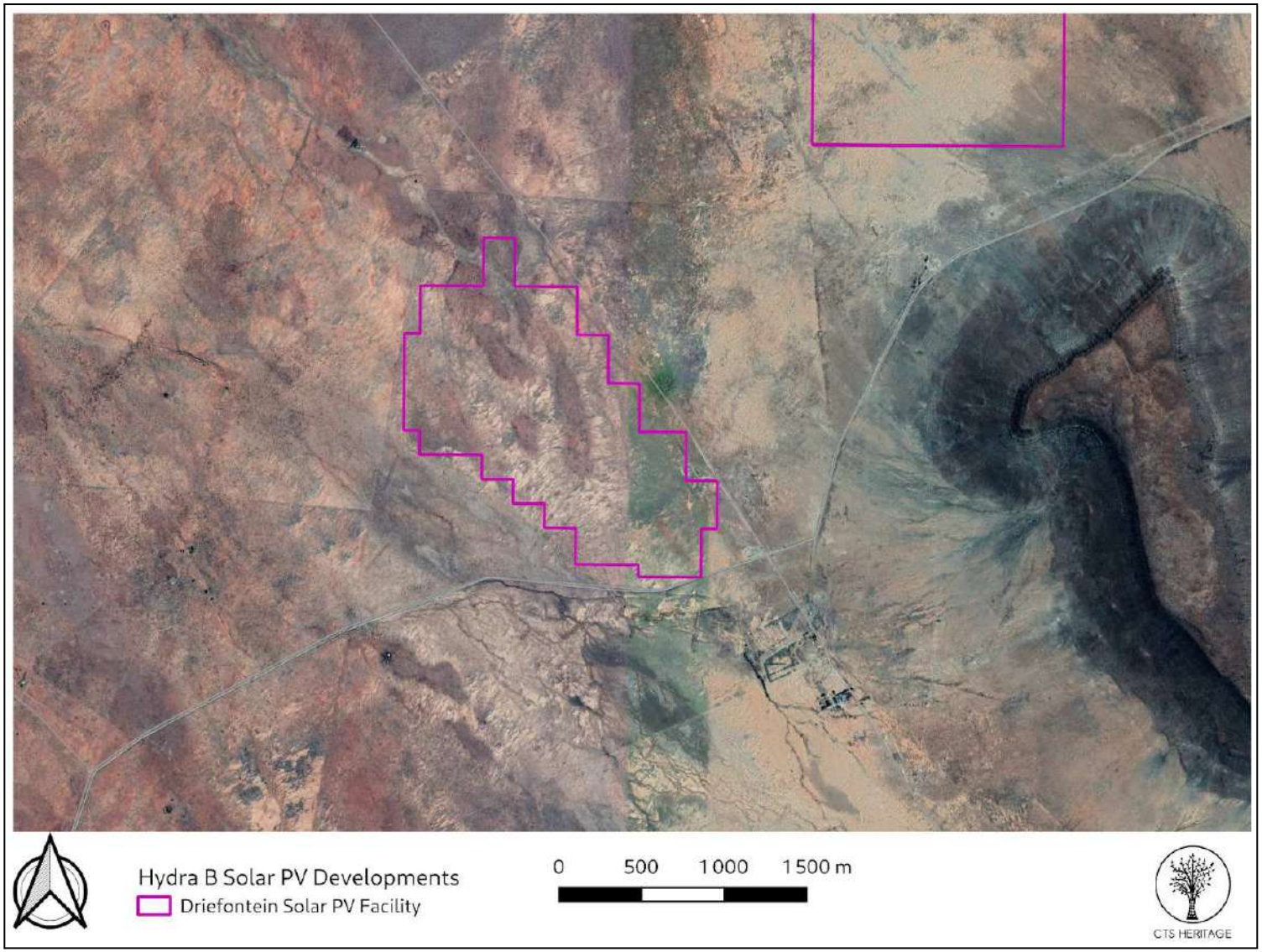

Figure 1.3.3: Driefontein Solar PV Facility Study Area

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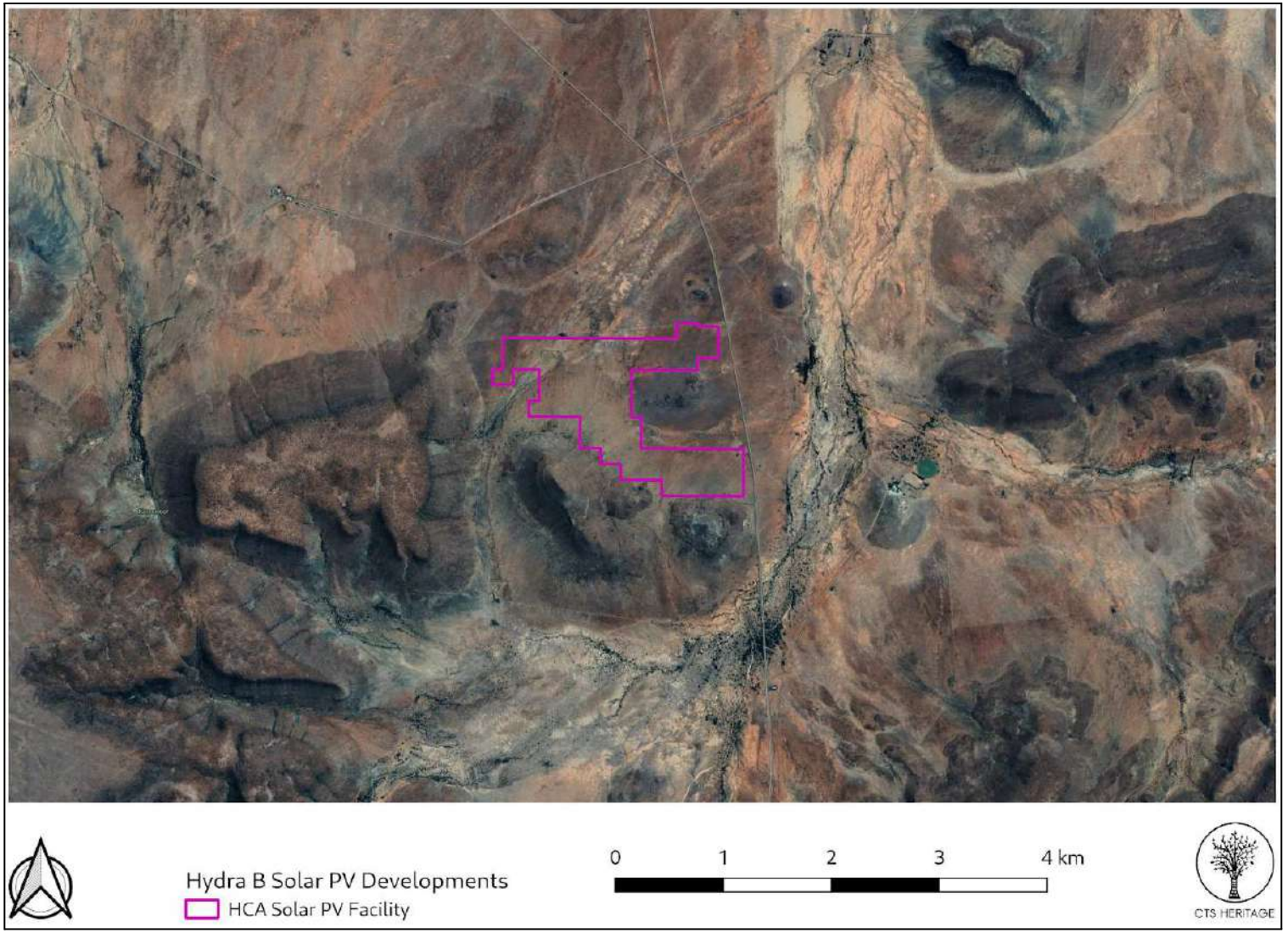

Figure 1.3.4: HCA Solar PV Facility Study Area

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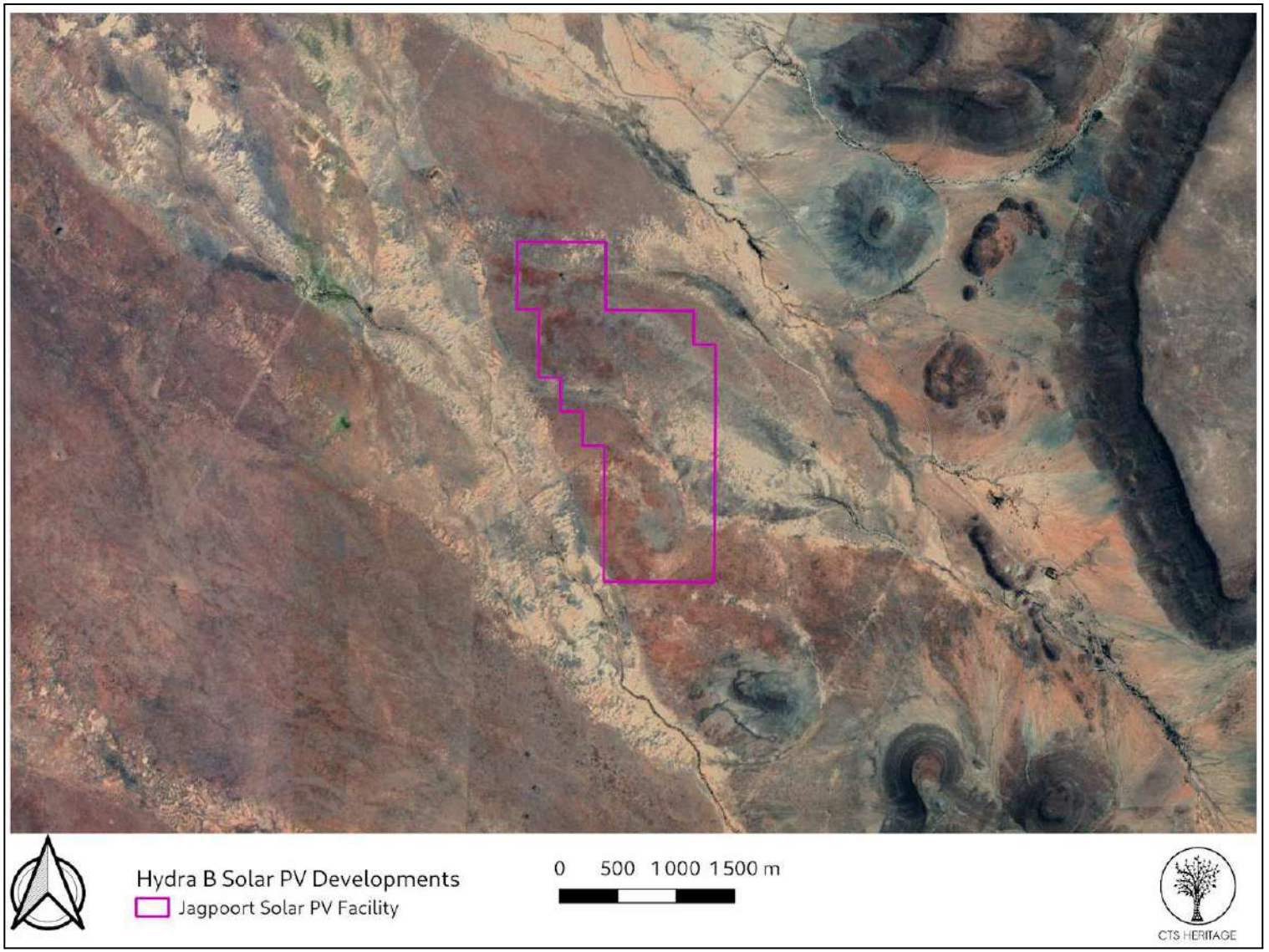

Figure 1.3.5: Jagpoort Solar PV Facility Study Area

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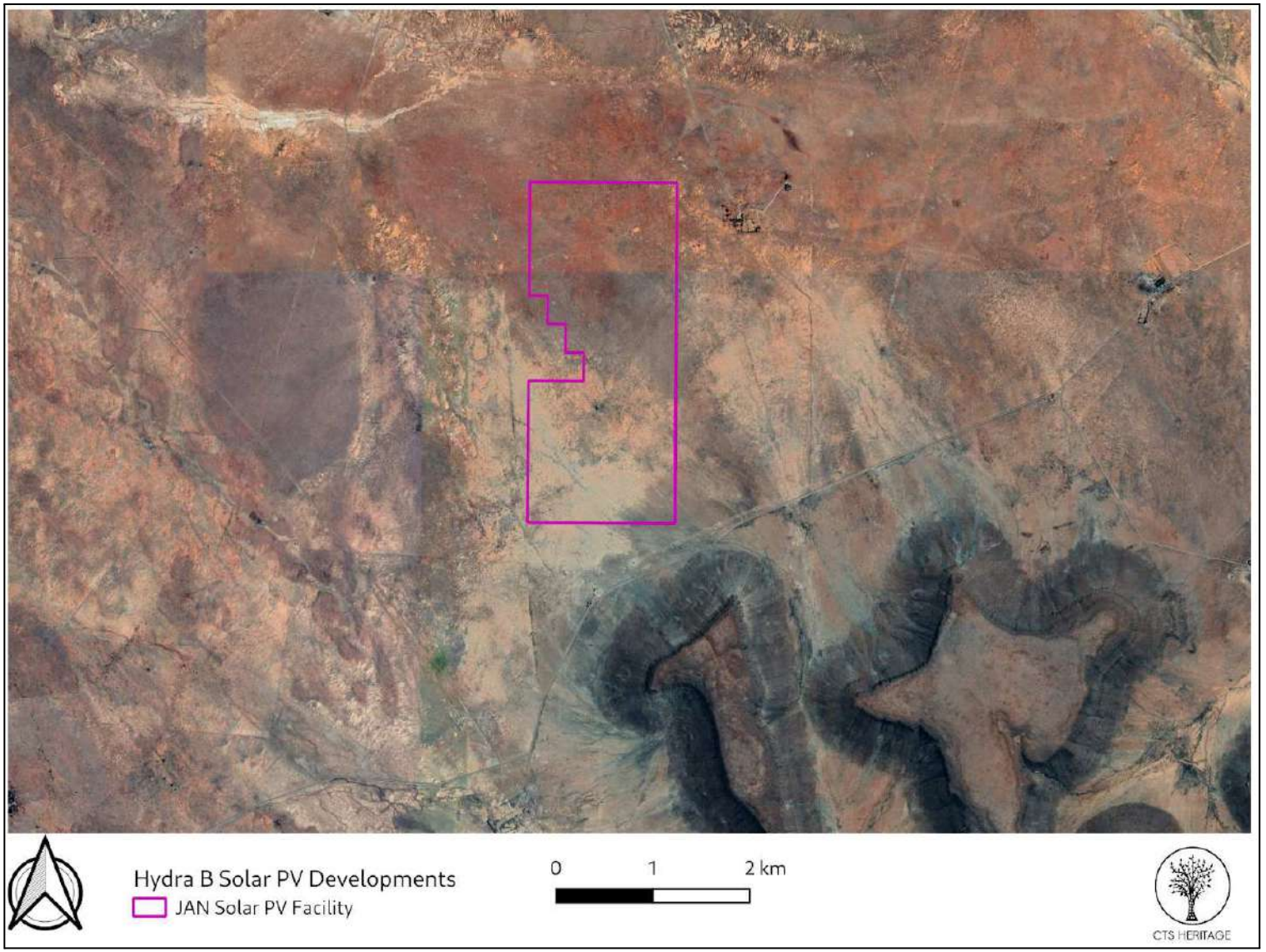

Figure 1.3.6: JAN Solar PV Facility Study Area

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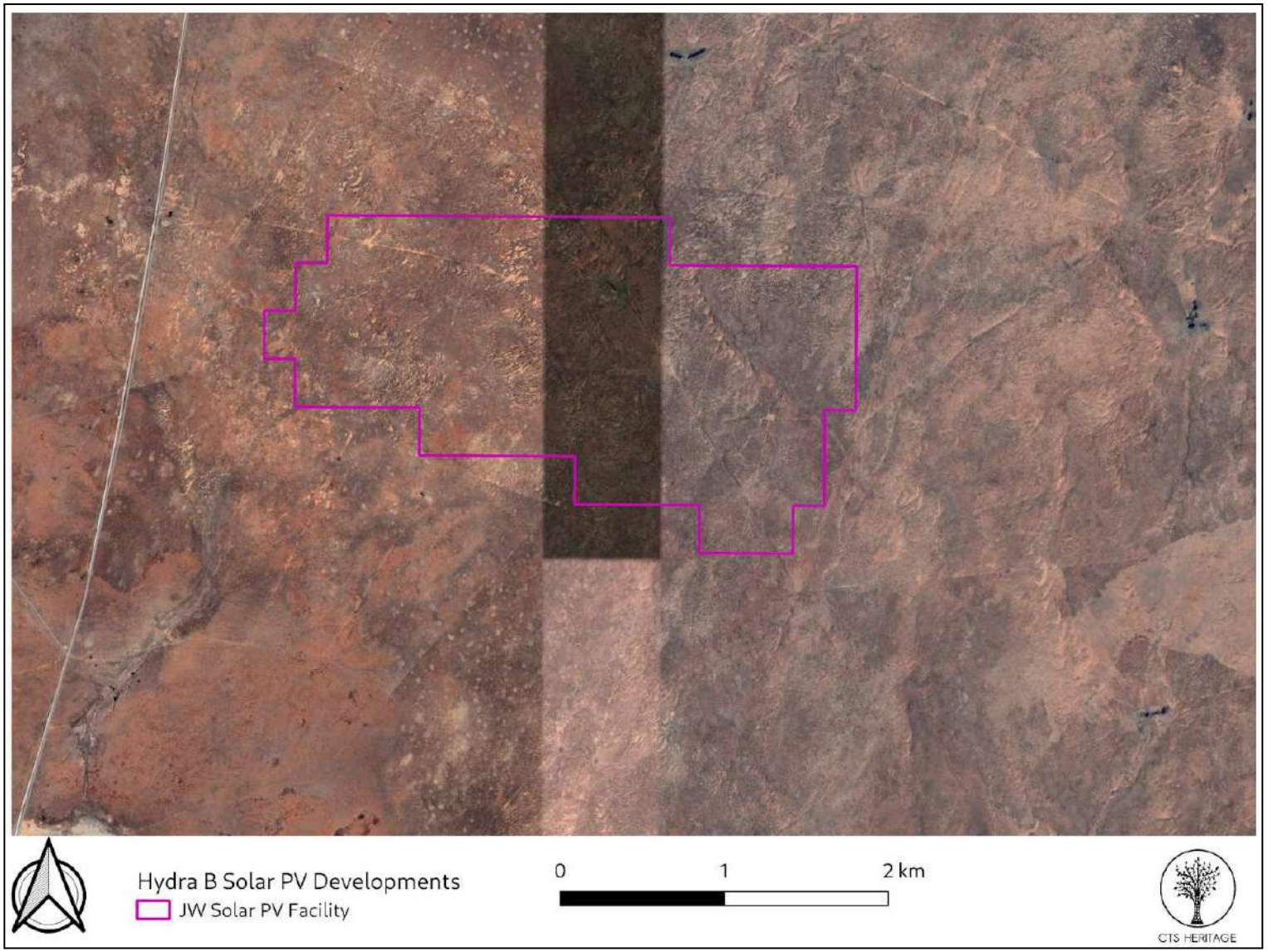

Figure 1.3.7: JW Solar PV Facility Study Area

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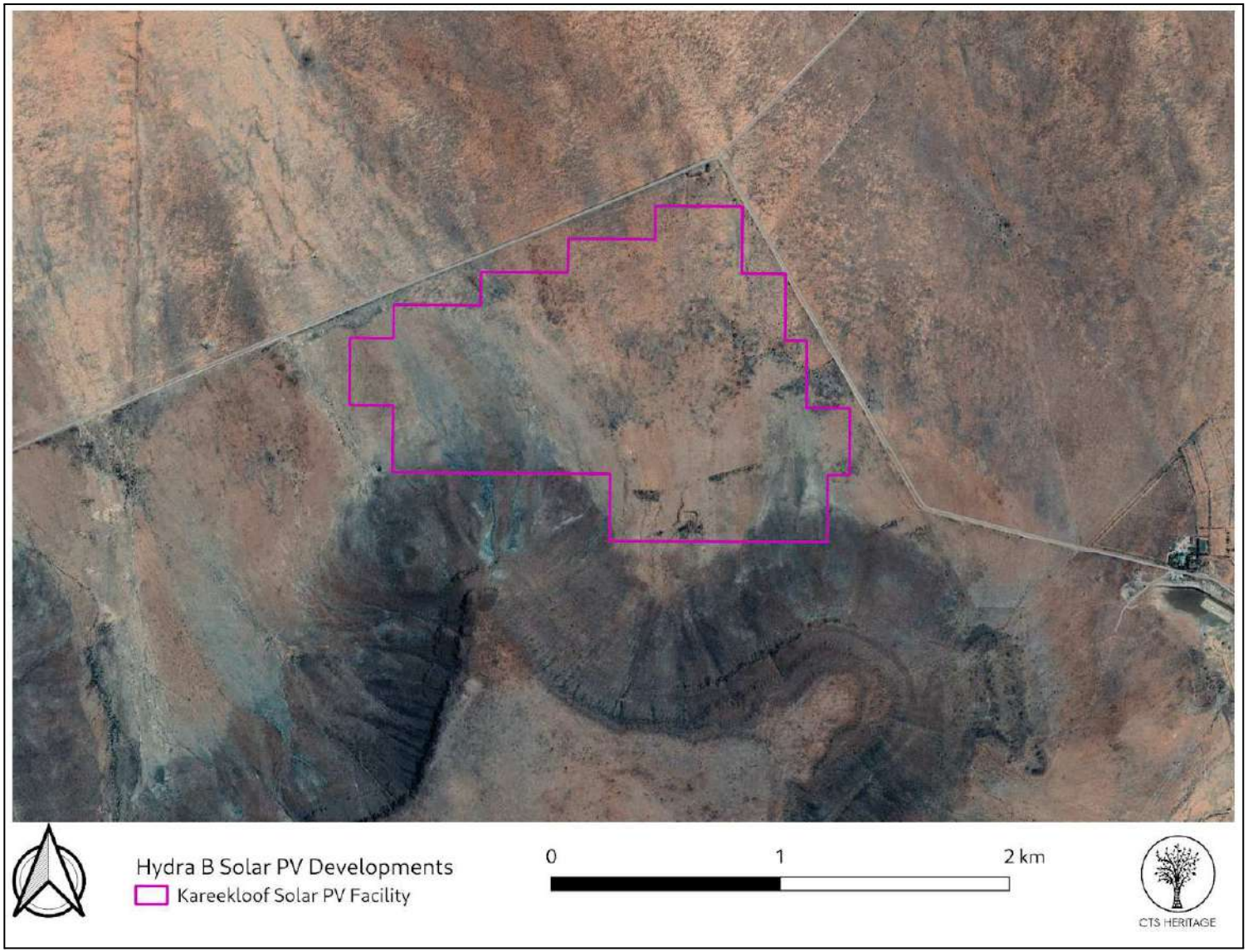

Figure 1.3.8: Kareekloof Solar PV Facility Study Area

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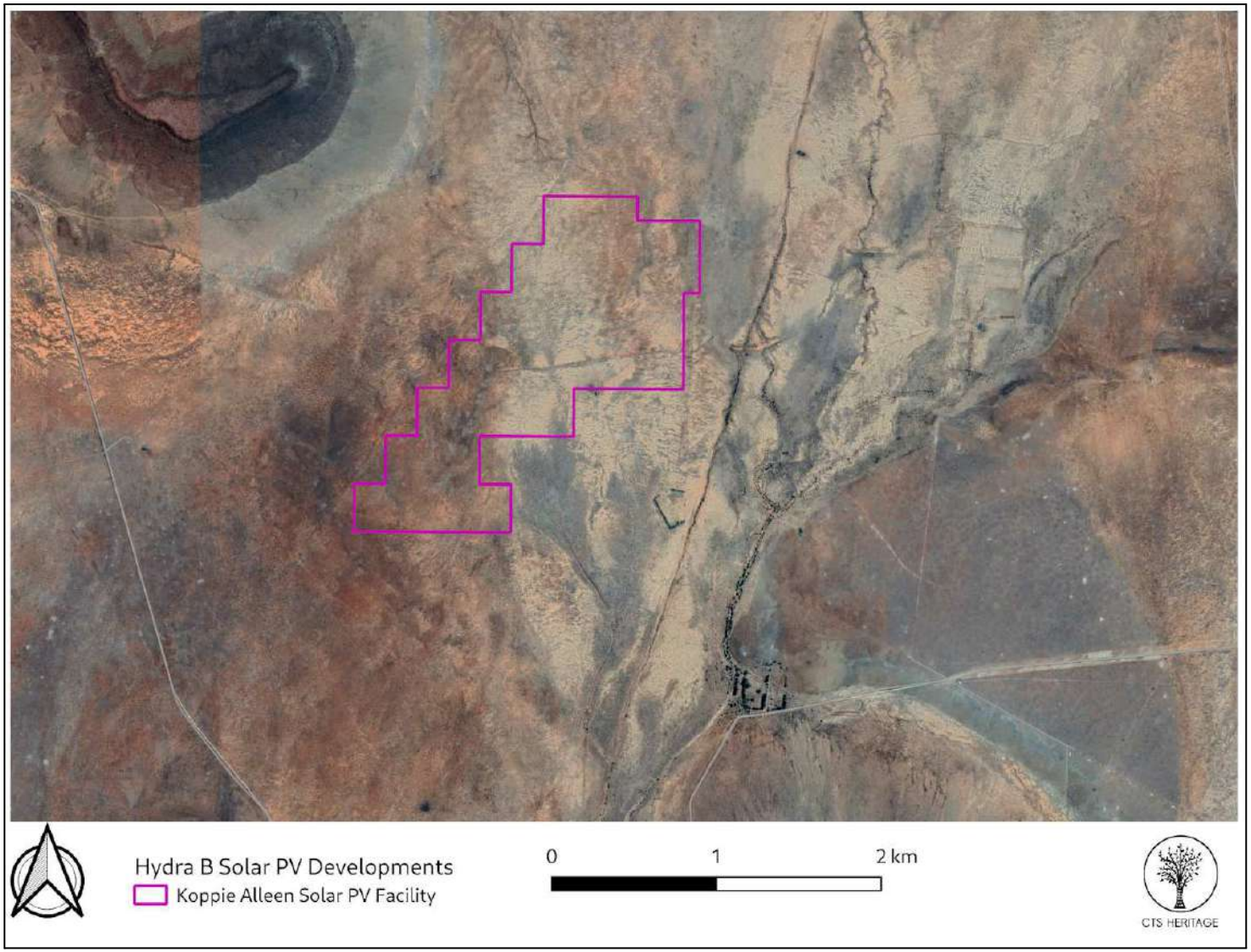

Figure 1.3.9: Koppy Alleen Solar PV Facility Study Area

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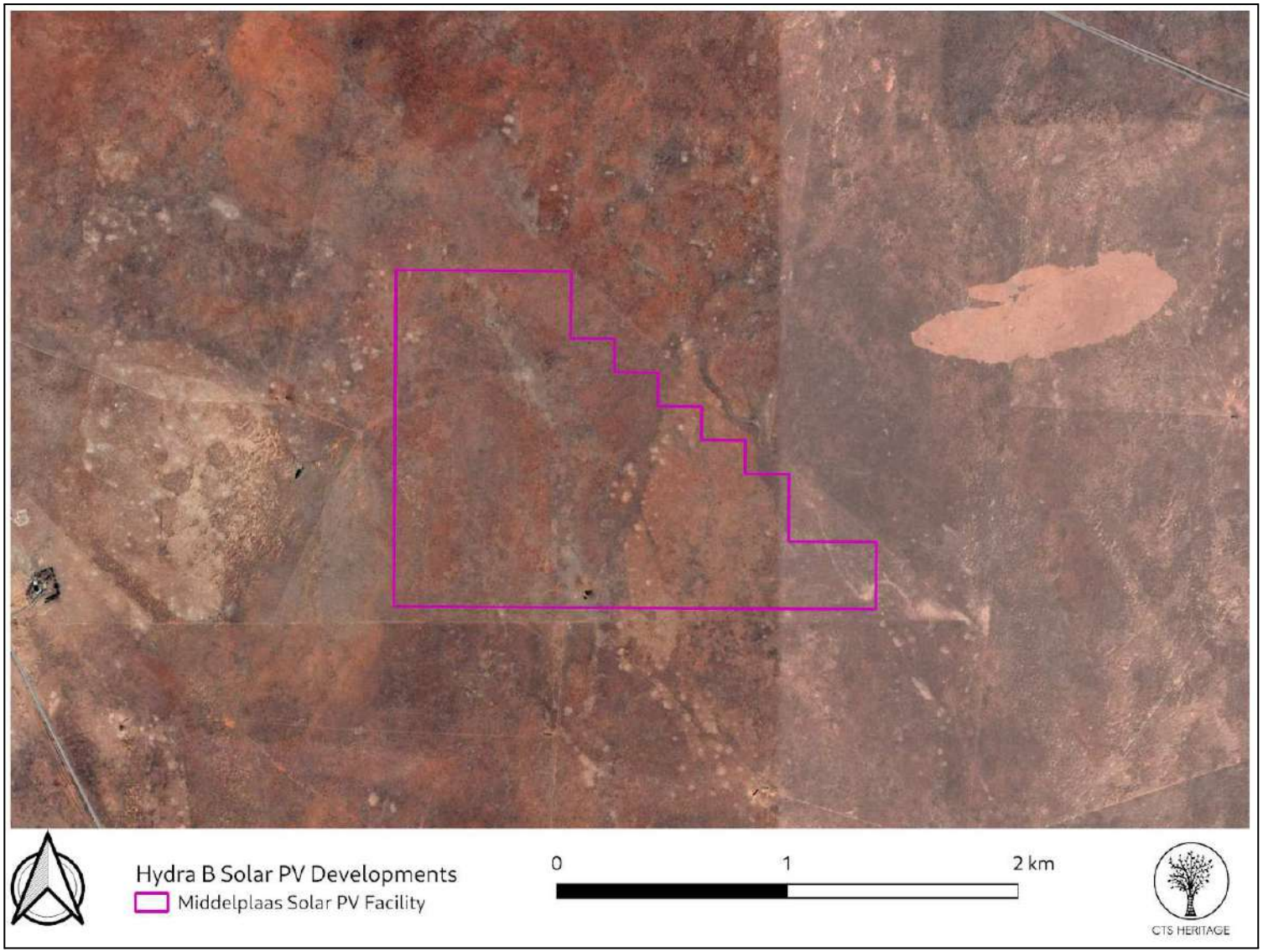

Figure 1.3.10: Middelplaas Solar PV Facility Study Area

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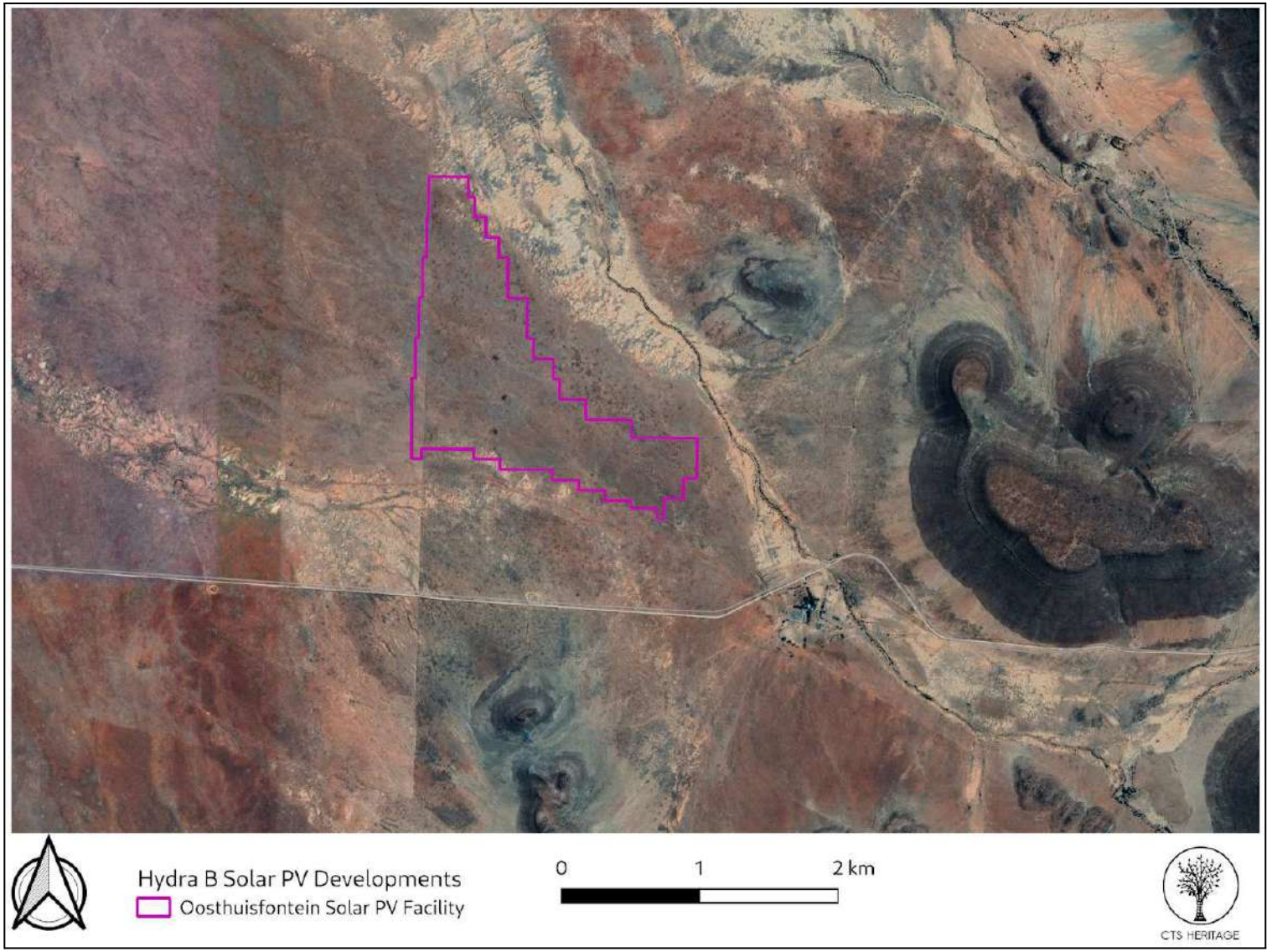

Figure 1.3.11: Oosthuisfontein Solar PV Facility Study Area

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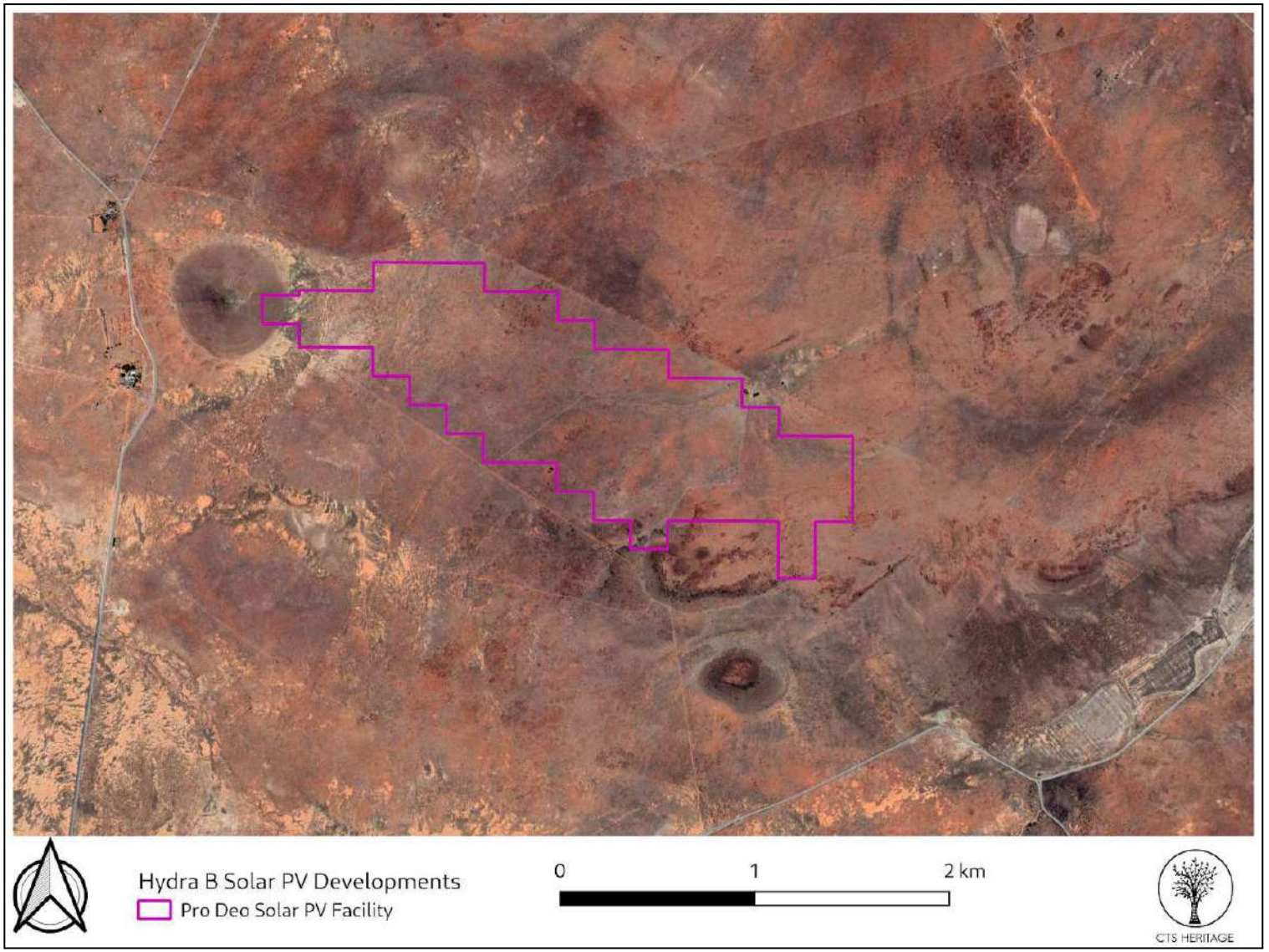

Figure 1.3.12: Pro Deo Solar PV Facility Study Area

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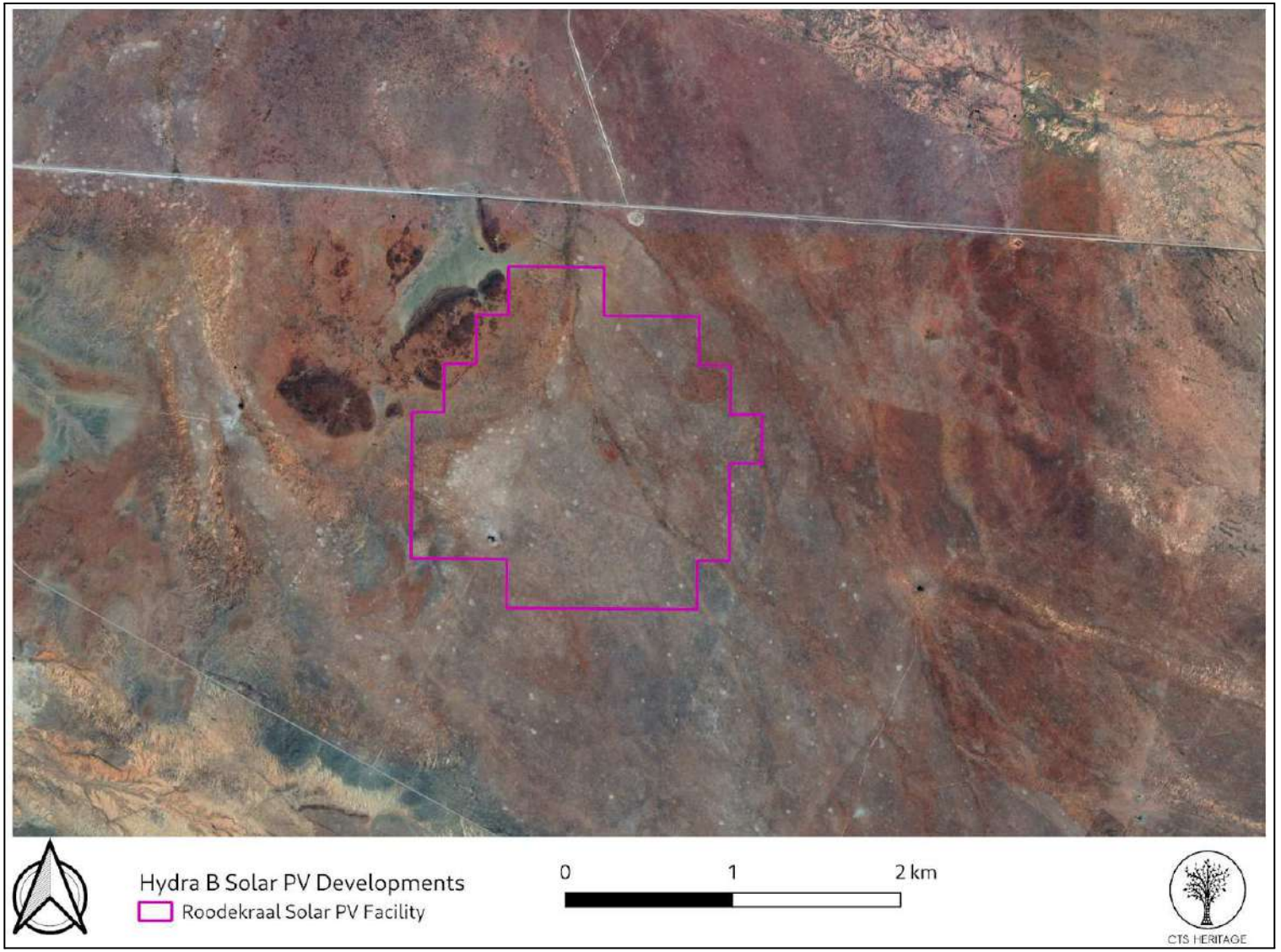

Figure 1.3.13: Roodekraal Solar PV Facility Study Area

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Figure 1.3.14: Ruspoort 1 Solar PV Facility Study Area

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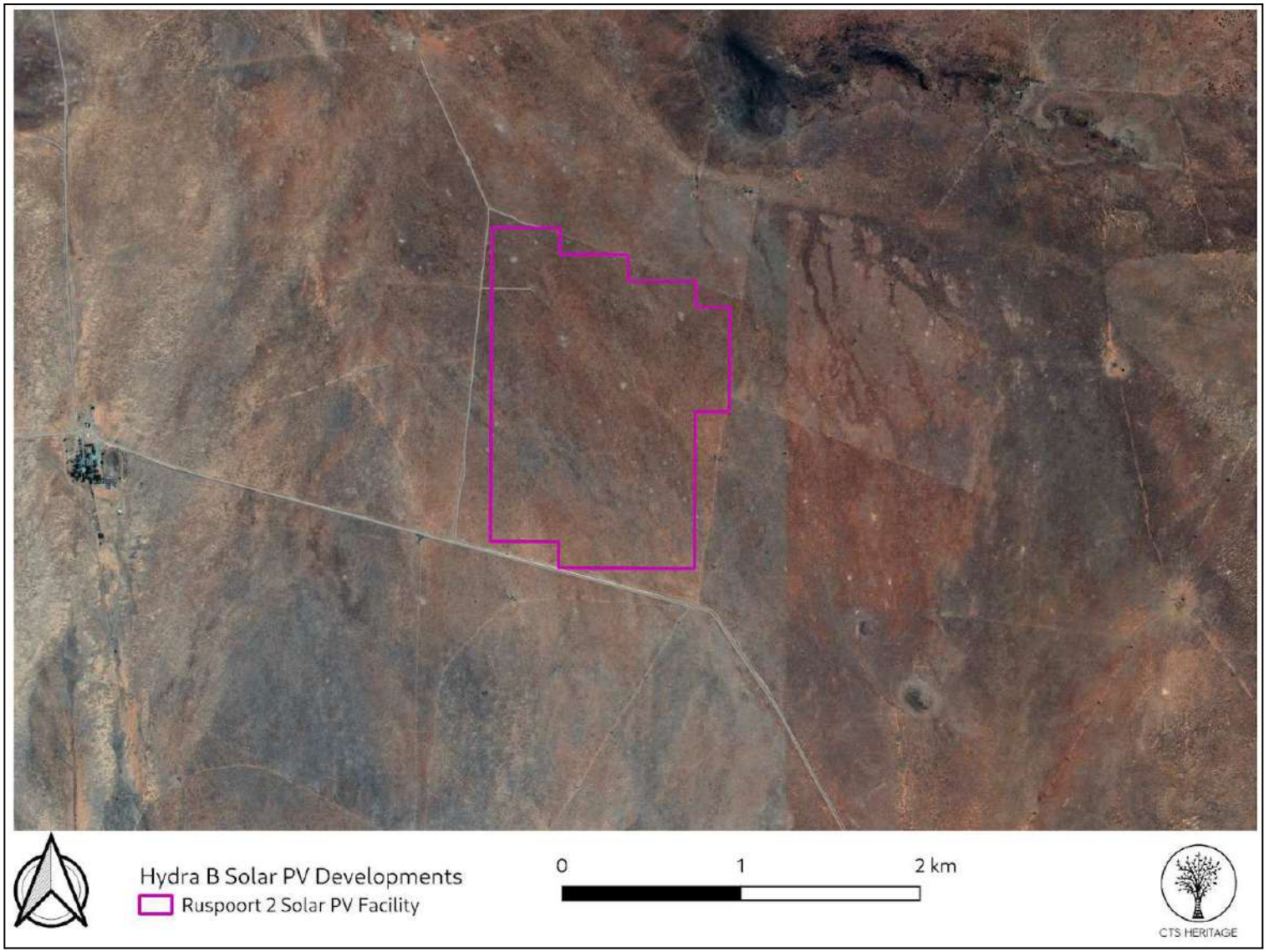

Figure 1.3.15: Ruspoort 2 Solar PV Facility Study Area

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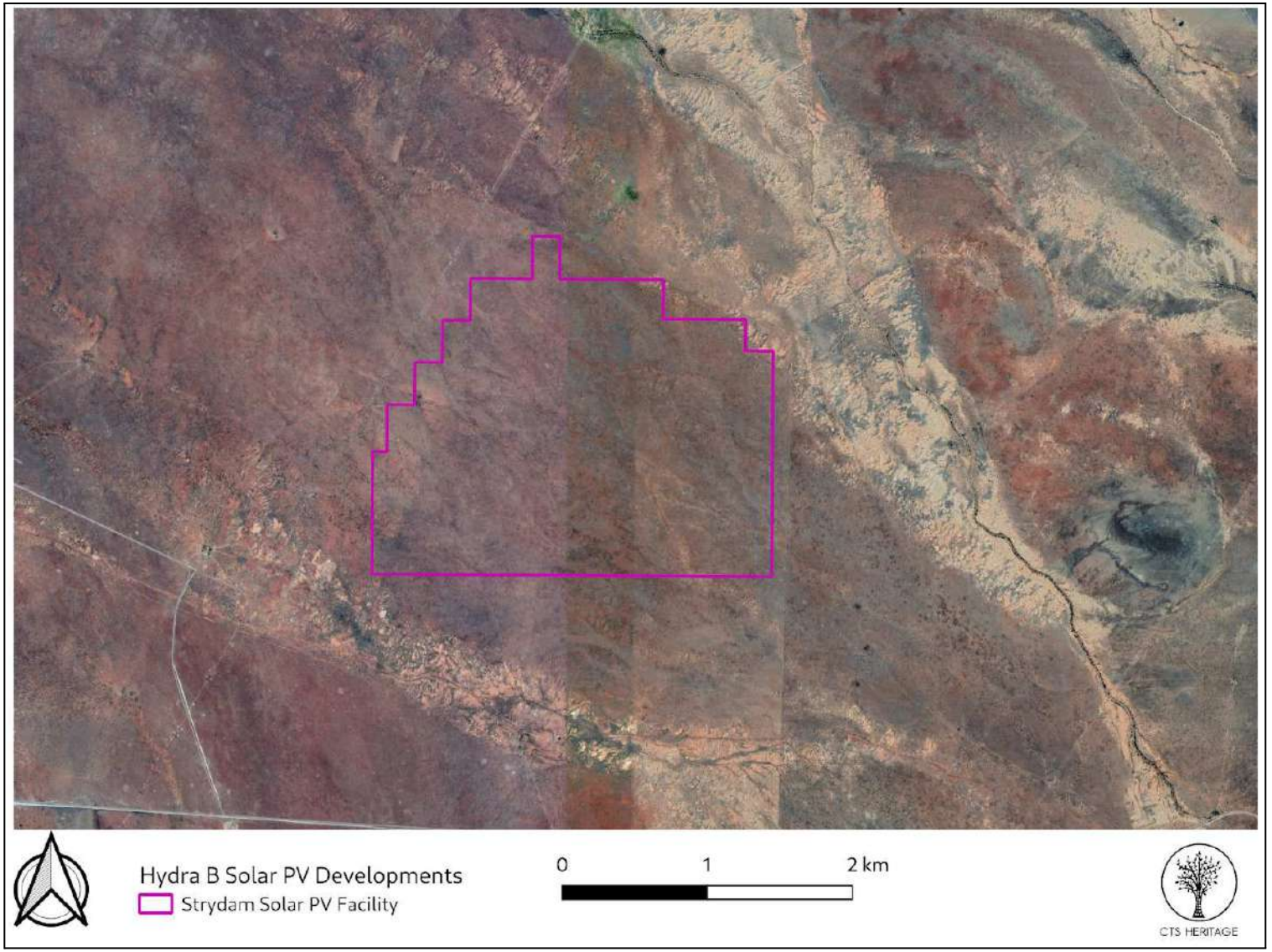

Figure 1.3.16: Strydam Solar PV Facility Study Area

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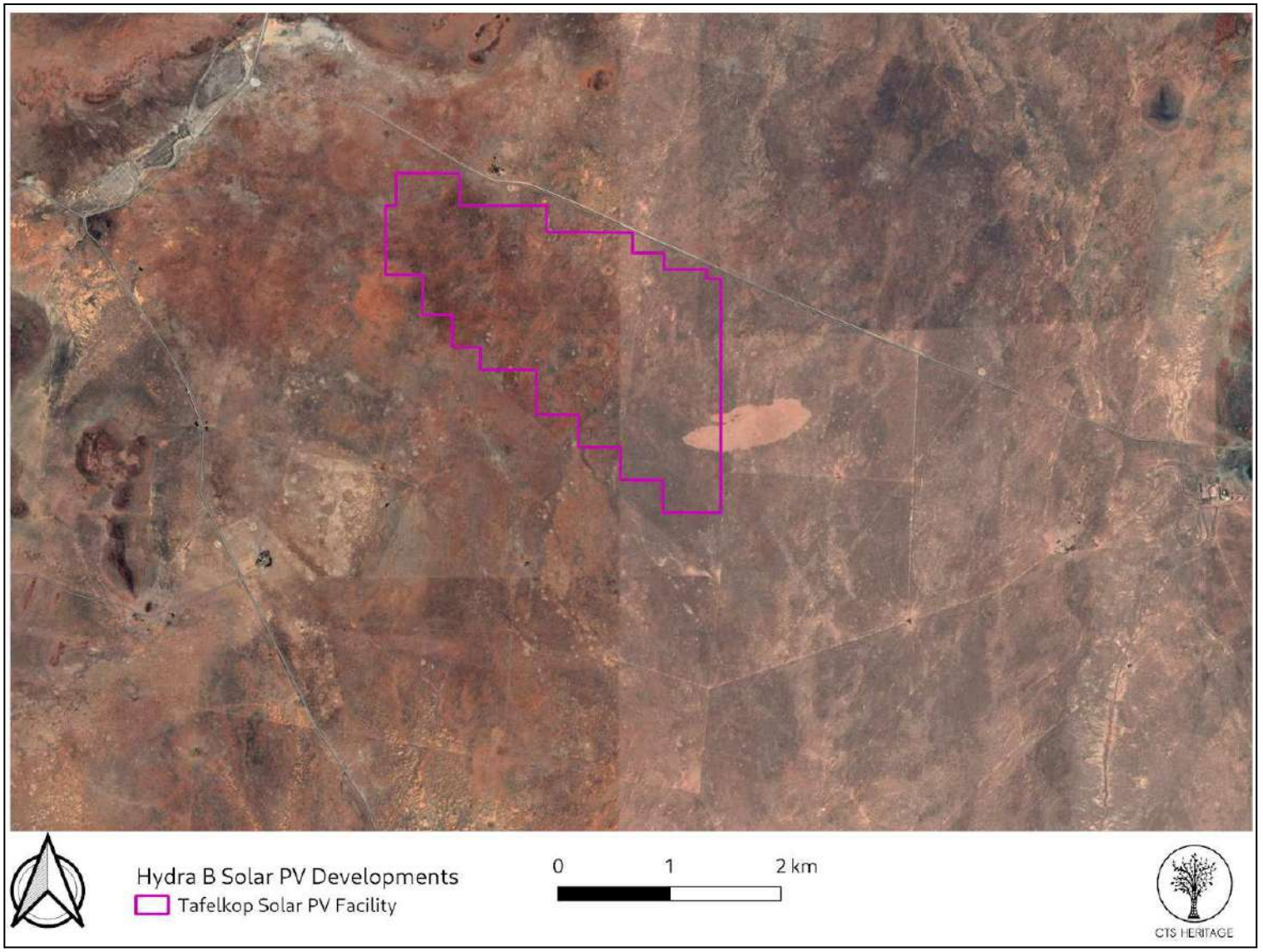

Figure 1.3.17: Tafelkop Solar PV Facility Study Area

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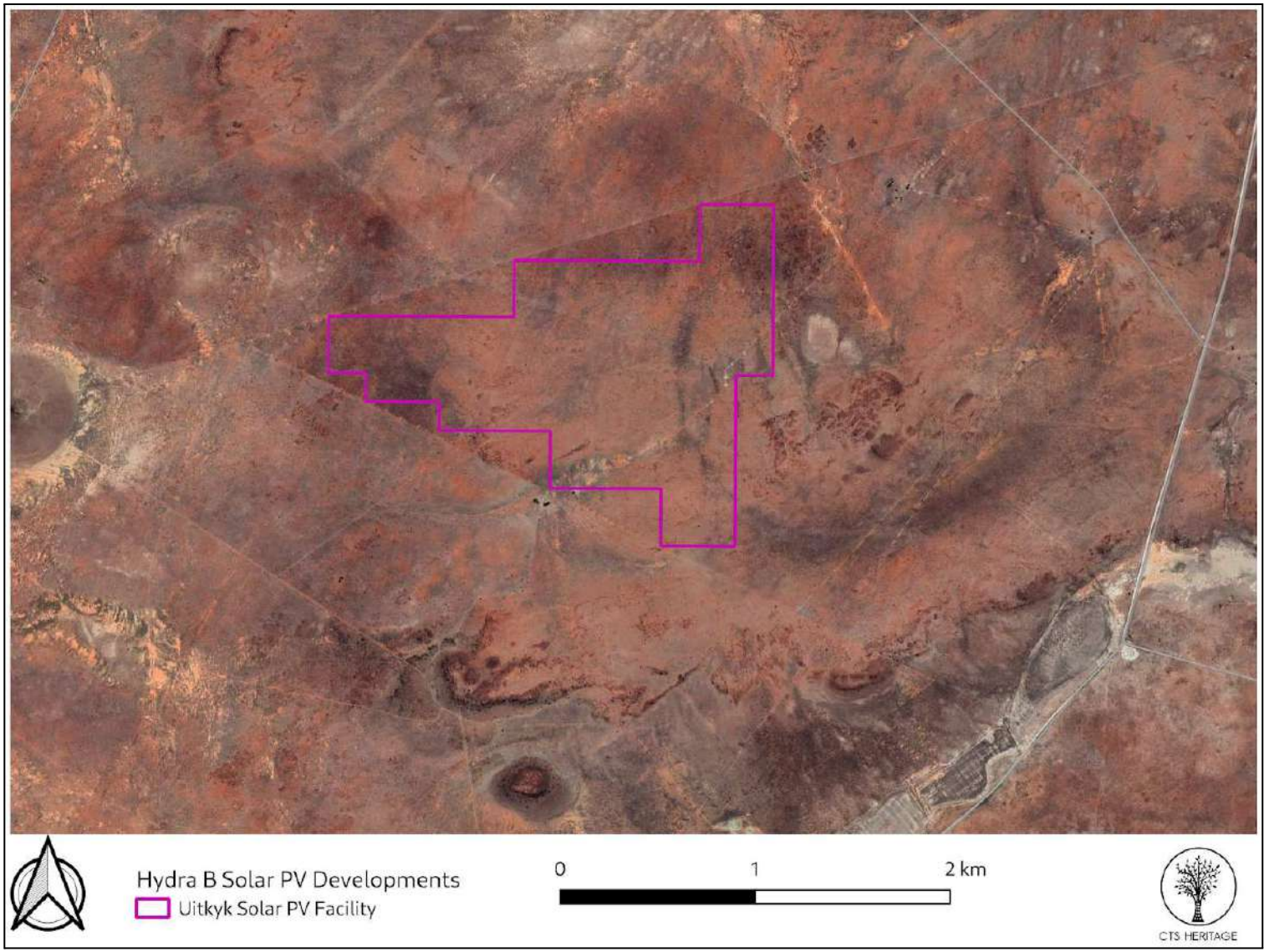

Figure 1.3.18: Uitkyk Solar PV Facility Study Area

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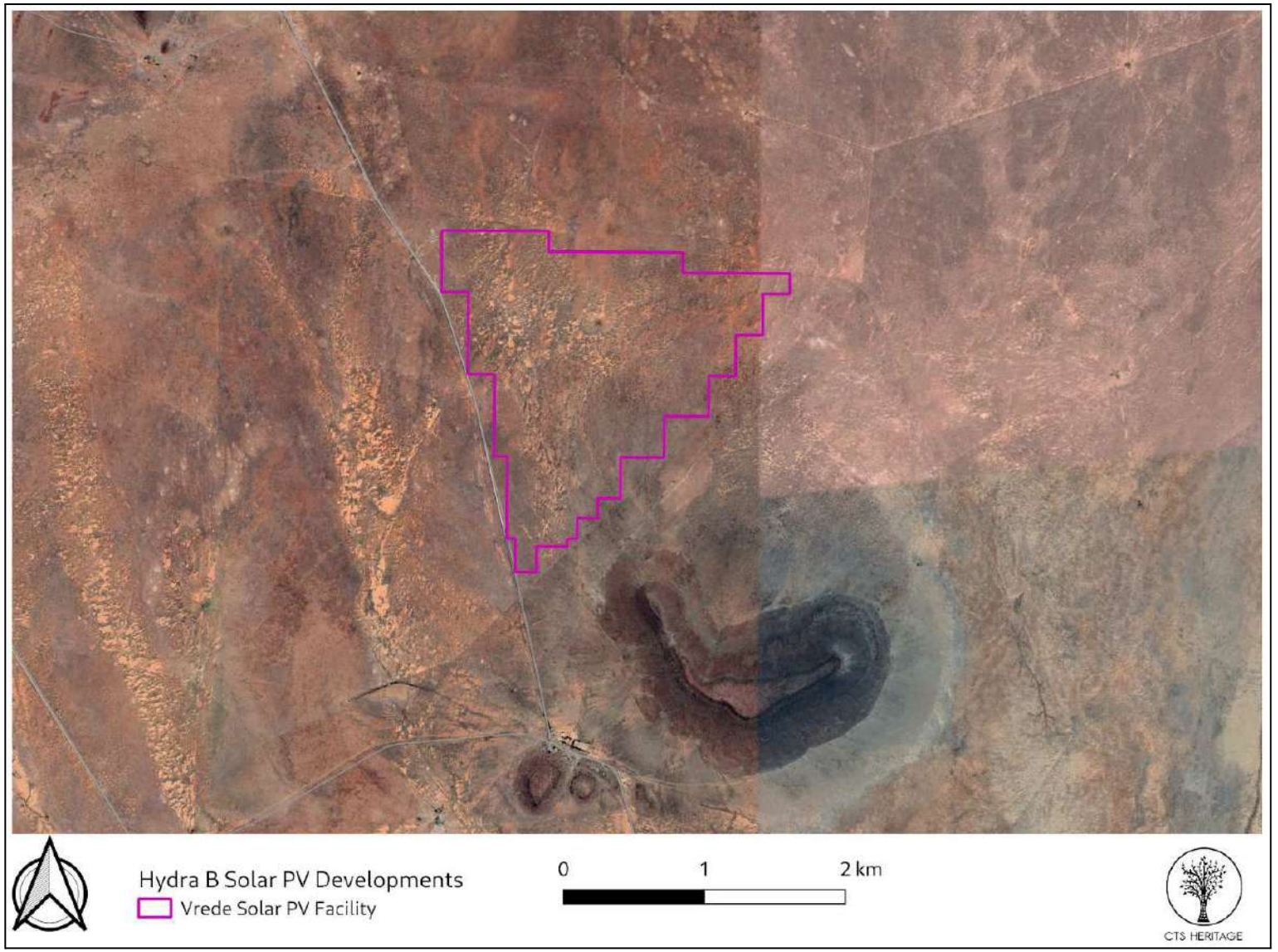

Figure 1.3.19: Vrede Solar PV Facility Study Area

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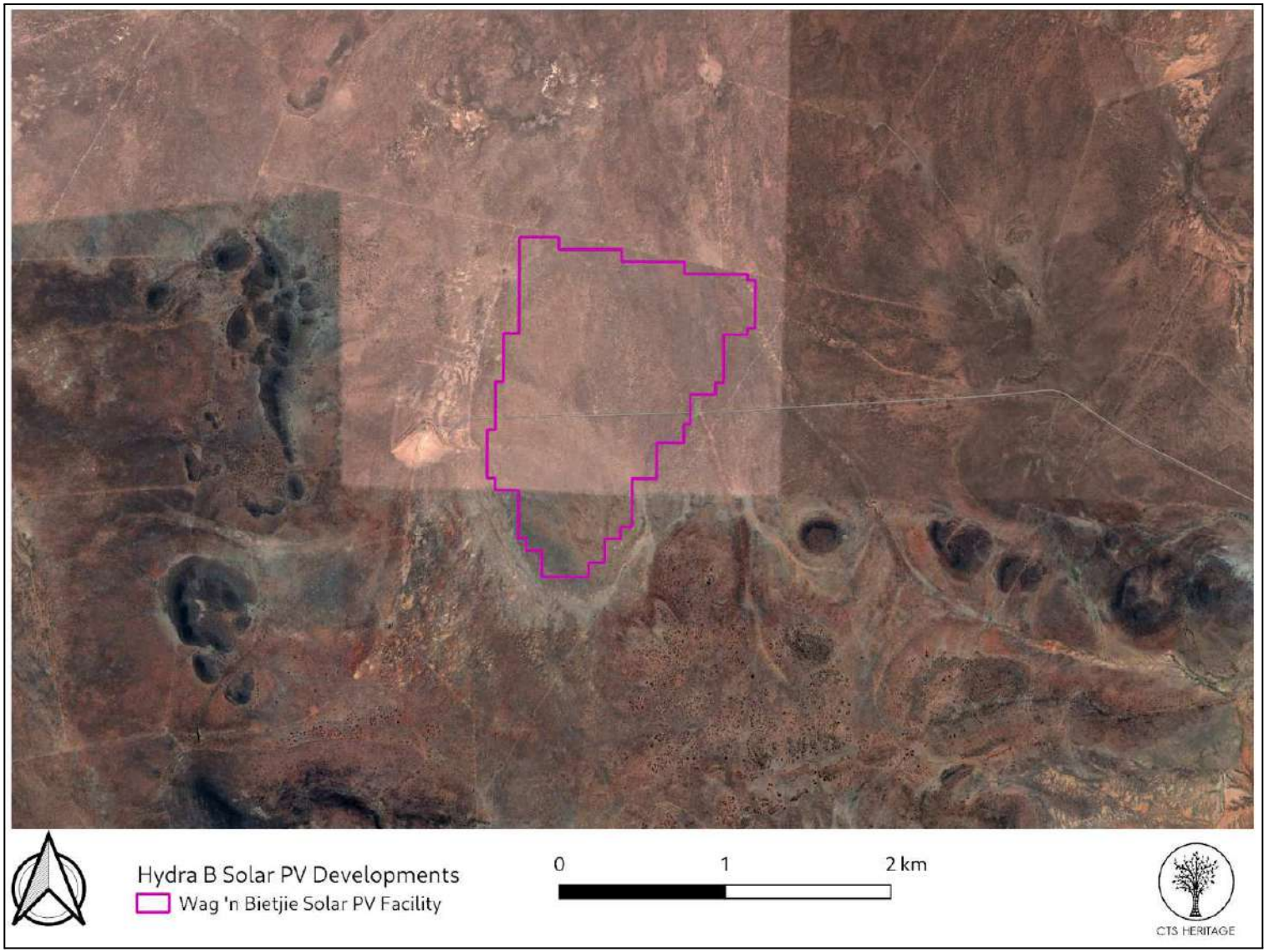

Figure 1.3.20: Wag 'n Bietjie Solar PV Facility Study Area

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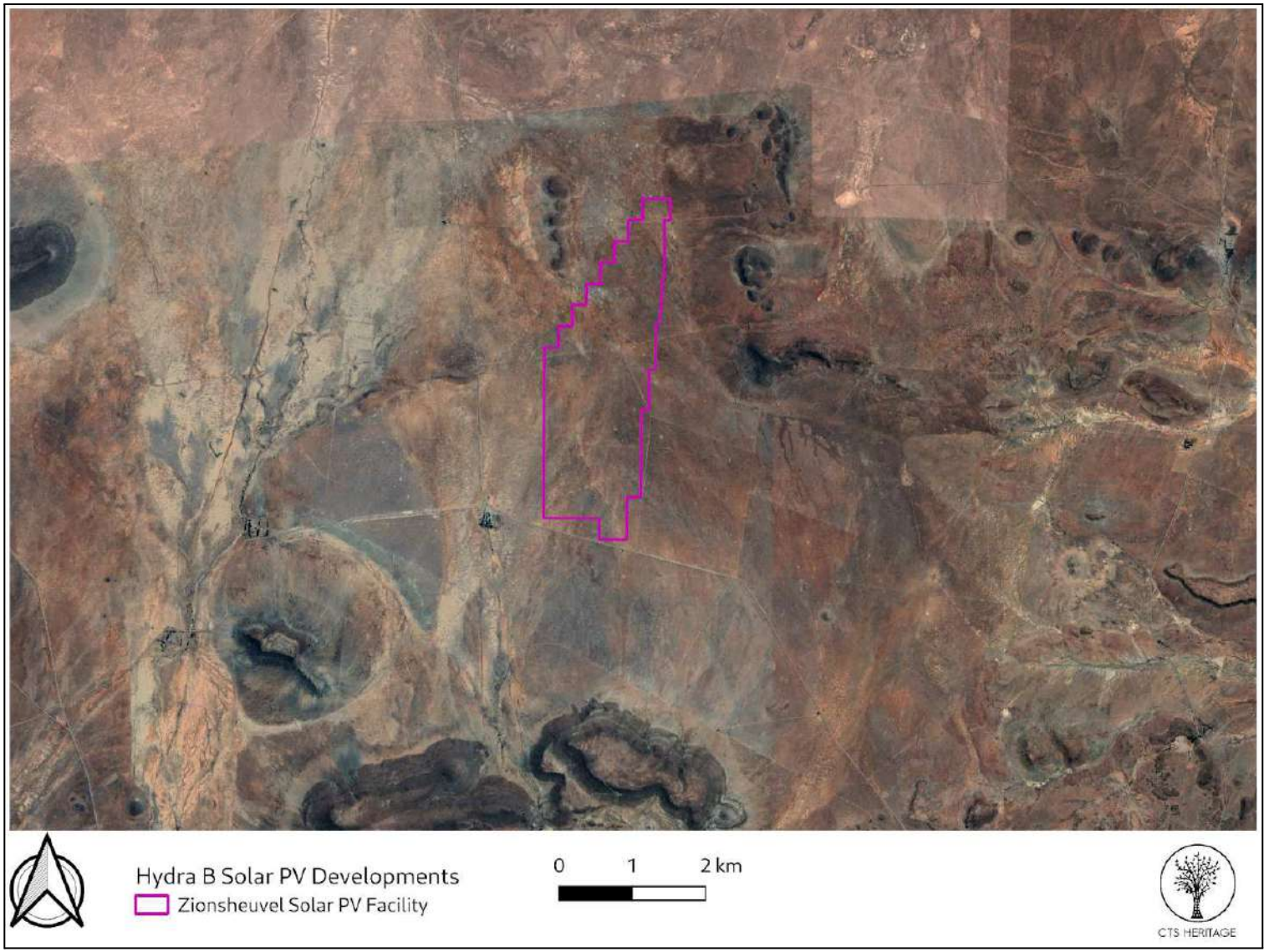

Figure 1.3.21: Zionsheuvel Solar PV Facility Study Area

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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 from 23 May to 3 June 2022 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.

2.3 Constraints & Limitations

The grassland areas could be quite densely covered in places spread throughout the site which certainly contributed to obscuring the archaeological material on the surface. However, enough patches of exposed and open ground were encountered throughout the study area and scatters of artefacts were easily recorded in these spots. There were therefore no major limitations or constraints to the survey carried out and we are confident that the assessment provided an accurate report on the archaeological sensitivity of the area.

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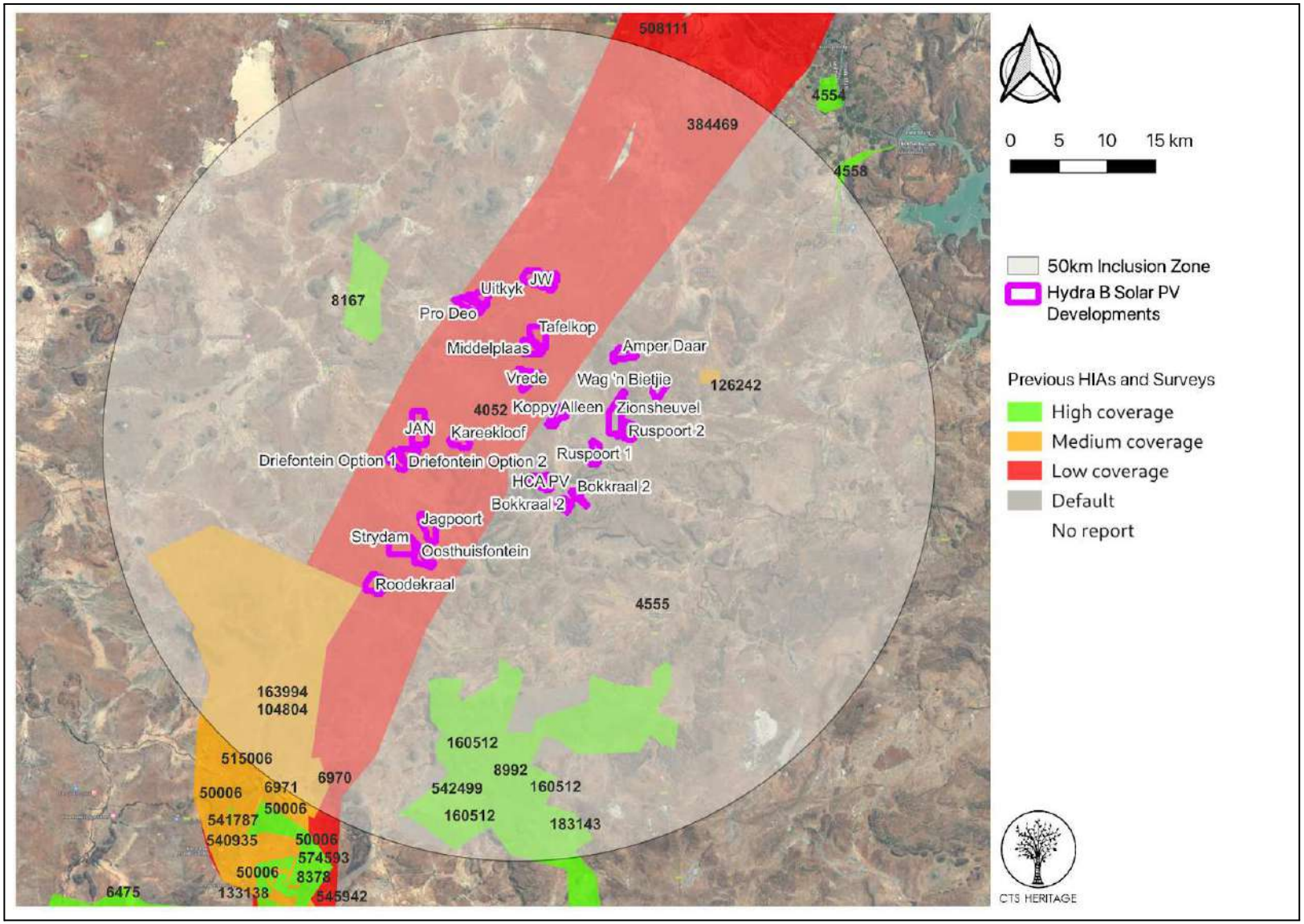

Figure 2: Close up satellite image indicating proposed location of the study area in relation to heritage studies previously conducte

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

De Aar was originally established on the Farm "De Aar." The name means "the artery," a reference to its underground water supply. The Cape Government Railways were founded in 1872, and the route that the government chose for the line to connect the Kimberley diamond fields to Cape Town on the coast, ran directly through De Aar. Because of its central location, the government also selected the location for a junction between this first railway line, and the other Cape railway networks further east, in 1881. In 1899 two brothers who ran a trading store and hotel at the junction, Isaac and Wulf Friedlander, purchased the farm of De Aar. Following the Anglo Boer War, the Friedlander brothers surveyed the land for the establishment of a town. The municipality was created a year later in 1900.

The area proposed for development is located in the same context as the approved Vetlaagte Solar Energy Facility (SAHRIS Case ID 192). The studies completed for the Vetlaagte Solar Energy Facility are referred to below in order to provide heritage context to the proposed development area. The heritage impact assessment (Kruger, 2012 SAHRIS ID 49745) and palaeontology assessment (Almond, 2012 SAHRIS ID 49843) are referred to extensively below.

Kruger (2012) describes the development area as “characterised by flat undulating Karoo vegetation comprised out of relatively sparse scrub and grasses, with dolerite hills in the surrounding landscape. Large portions of the land is currently devoted to livestock farming but a number of solar energy facilities are to be constructed on farms around De Aar. Shallow soils covers a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone is present, while exotic rocks occur in the gravel of the Orange River bed and terraces. These provided suitable material for stone tool production during the Earlier, Middle and Later Stone Ages. “

Archaeology

As part of the 2012 process for approval of the Vetlaagte Solar Energy Facility, Kruger conducted a detailed Heritage Impact Assessment. According to Kruger (2012), “During the survey, widespread Middle Stone Age (MSA) material, including characteristic formal MSA stone tools such as points, blades and scrapers were documented in the survey area along a north-south oriented drainage on the eastern periphery of the property. The lithic remains occur in three large scatters and, almost without exception, in low lying areas along non-perennial drainage lines and wetland areas where precipitation and groundwater have exposed the stone tools, originally deposited on a decomposed calcrete rock layer approximately 30cm sub surface. Preliminary examinations of some of the lithics indicated that a number of flakes displayed facetted platforms, characteristic of the MSA.”

Kruger (2012) also documented historical period remains, “specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden and labourers quarters, as well as a dilapidated dam wall constructed in the drainage line east of the farmstead are present on the property. The date of construction of the farm house is denoted by a year count (“1930”) on the front gable of the structure. The entire farmstead is situated in an area excluded from the solar farm development. A small family graveyard, associated with the farmstead at Vetlaagte, also occurs in the exclusion zone about 100m north of the farm house.”

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The approved Castle Wind Energy Facility lies on the hills just to the south east of the Hydra B project area. The development area has been subject to a previous heritage impact assessment process (Van der Walt, 2014, SAHRIS ID 183142) and a palaeontology assessment (Milsteed, 2014, SAHRIS ID 183143). A number of San engravings can be found on the dolerite boulders spread throughout the area and a more recent historical set of engravings has been made since the establishment of diamond mining at Kimberley and the spread of stock farming in the area.

In a recent (2021) assessment of Wag n Bietjie PV Facility completed by CTS Heritage, over 25 archaeological observations were made. Hornfels dominated the assemblages with smaller components of CCS and siltstones. While the vast majority of the scatters were made during the Middle Stone Age, there was also a relatively clear Later Stone Age presence in the study area. Many examples of blade forms were found which is typical of the Still Bay period (>70 000 years BP). The neighbouring Vetlaagte farm was also surveyed whilst conducting an HIA for a similar solar PV facility there. Relatively dense Later Stone Age sites were found on the far eastern end of Wag ‘n Bietjie and these date within the last 2000 years due to the presence of pottery in these sites. The increasing density of material as one moved eastwards was probably due to the shortening distance from the Brakrivier which runs around Caroluspoort (4km northeast of Wag ‘n Bietjie).

Two sites warranted protection with an interesting scatter of Still Bay tools on top of a dolerite outcrop with excellent views of the surrounding area. Another site was found warranting a IIIB rating with pottery, bone and an extensive stone tool assemblage amongst the dolerite outcrops on the eastern end of the property. The rest of the observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. Much of the archaeological material will be well conserved within a series of areas that can’t be developed for the solar PV arrays while the flat, grassy vlaktes that are ideal for the solar PV areas also have the lowest archaeological sensitivity.

The area also played a part in the South African War from 1899-1902. According to Cloete (2010), a Boer party led by Generals Fourie and De Wet had to abandon ammunition and goods near Houtkraal when they encountered British troops guarding the railway line.

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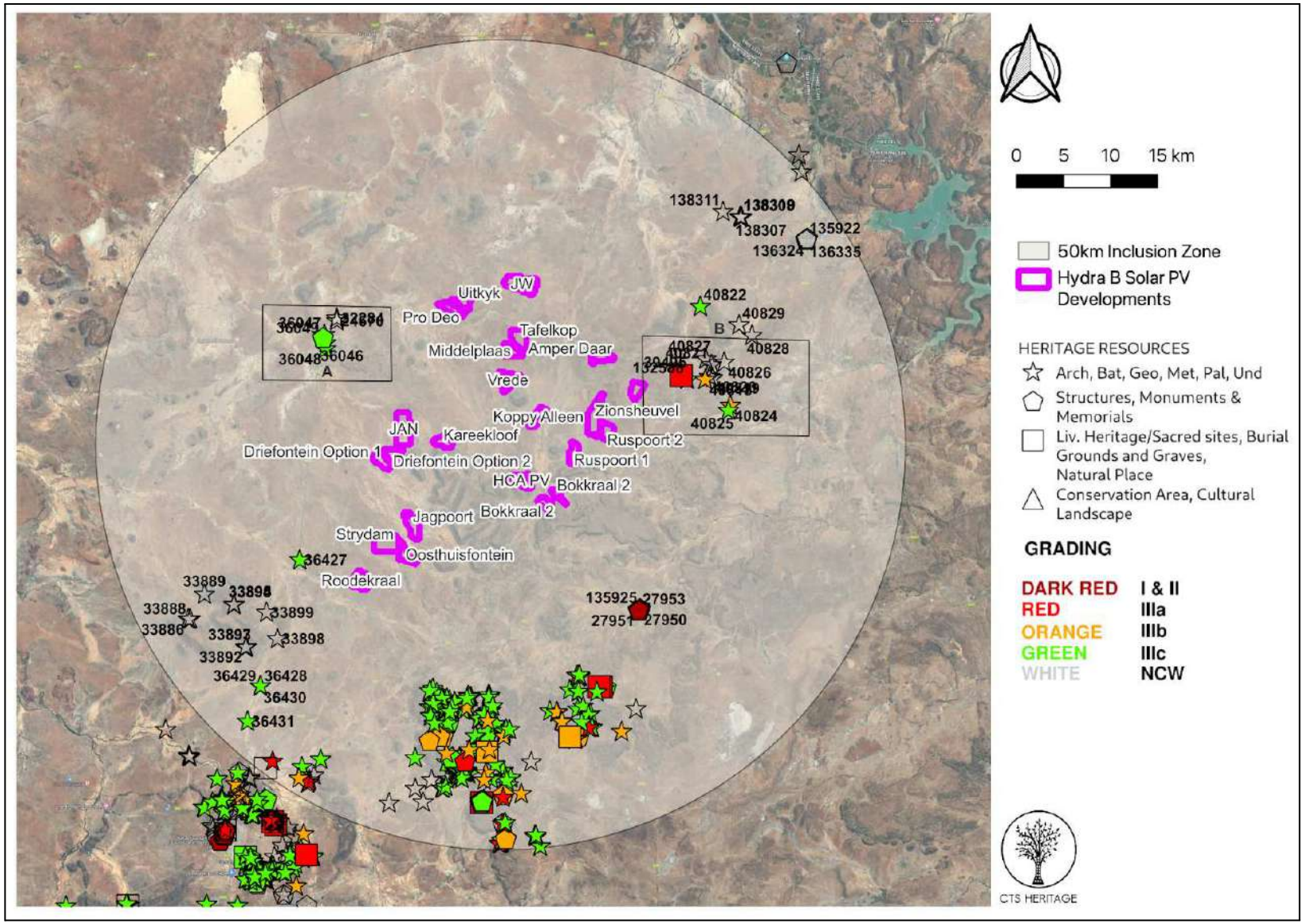

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

Nearly 400 observations were made during the field assessments of the 21 project areas. These were predominantly of MSA open air scatters of hornfels and siltstone flakes that were made from locally abundant raw materials. Given the ubiquity of available quarrying and sourcing areas, the flaked material is spread widely and thinly across a very wide area of the landscape and some good examples of radial cores and backed tools were found.

The various Later Stone Age sites held higher grade and unpatinated hornfels flakes, many retouched in microlithic form (bladelets, points, scrapers and reduced cores). The sites of significance include the identification of the possible Houtkraal South African War site where Gen. de Wet abandoned a munitions wagon to the south west of the Driefontein facility. Engravings, one of a very well engraved eland, were found at Roodekraal, Pro Deo and Uitkyk and careful buffers and micro siting of the solar PV facility at Uitkyk and Pro Deo will need to be done to avoid any disturbance of these sites. The engravings were done during the Later Stone Age, most likely in the last 10 000 years, as well as a number of more recent engravings that fall within the historical period of the last 150 years.

The built environment history of the area became more established between the 1930s to 1950s and the farms have largely remained unchanged in their layout and extent since then. The location of the solar PV facilities have been positioned well away from any farm werfs and will not have an impact on the zone of sensitivity surrounding the werfs.

Figure 4.1: Contextual Images of Amper Daar

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Figure 4.2: Contextual Images of Bokkraal

Figure 4.3: Contextual Images of Driefontein

Figure 4.4: Contextual Images of HCA

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Figure 4.5: Contextual Images of Jagpoort

Figure 4.6: Contextual Images of JAN

Figure 4.7: Contextual Images of JW

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Figure 4.8: Contextual Images of Kareekloof

Figure 4.9: Contextual Images of Koppy Alleen

Figure 4.10: Contextual Images of Middelplaas

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Figure 4.11: Contextual Images of Oosthuisfontein

Figure 4.12: Contextual Images of Pro Deo

Figure 4.13: Contextual Images of Roodekraal

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Figure 4.14: Contextual Images of Ruspoort 1

Figure 4.15: Contextual Images of Ruspoort 2

Figure 4.16: Contextual Images of Strydam

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Figure 4.17: Contextual Images of Tafelkop

Figure 4.18: Contextual Images of Uitkyk

Figure 4.19: Contextual Images of Vrede

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Figure 4.20: Contextual Images of Wag 'n Bietjie

Figure 4.21: Contextual Images of Zionsheuvel

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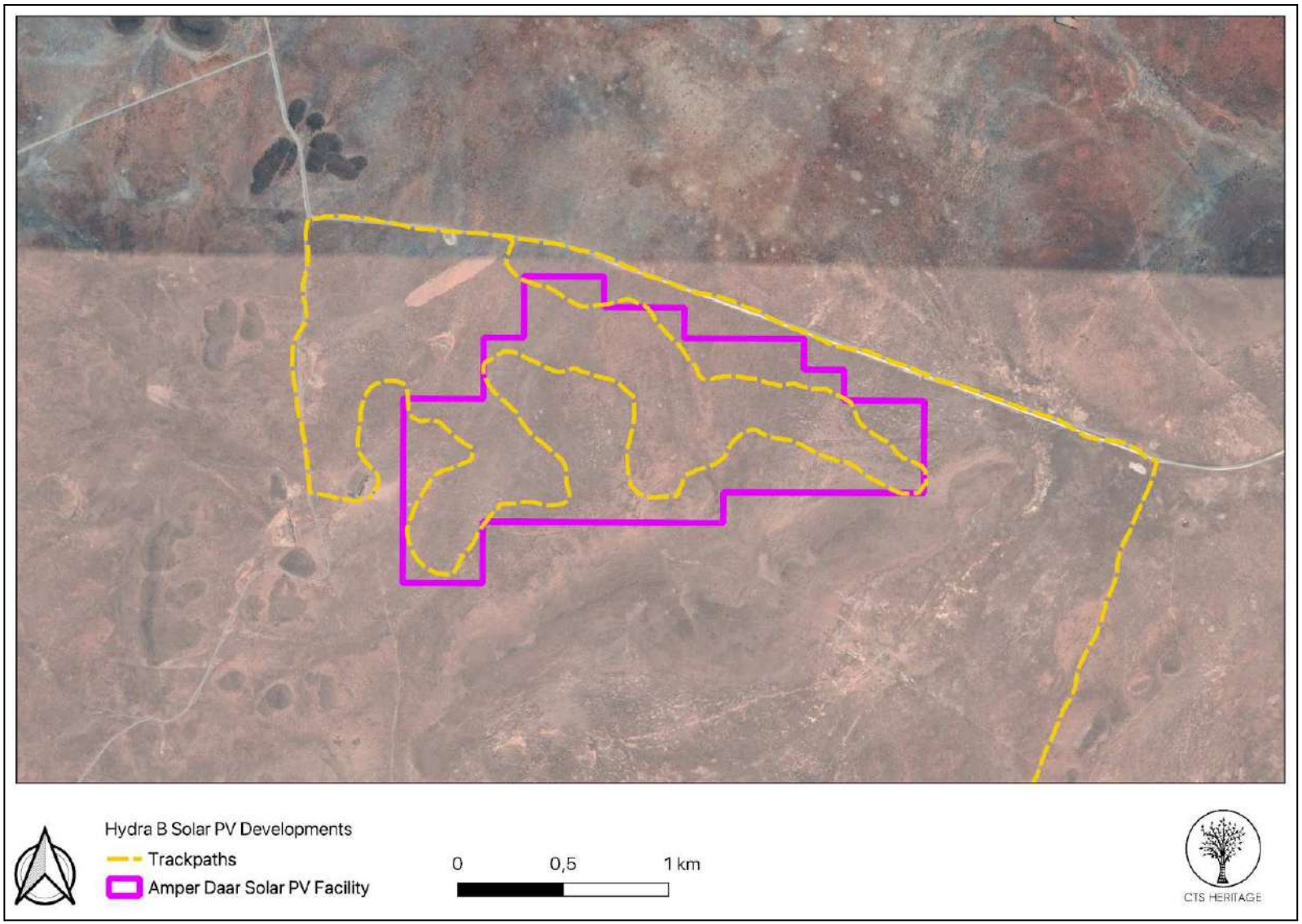

Figure 5.1: Overall track paths of foot survey

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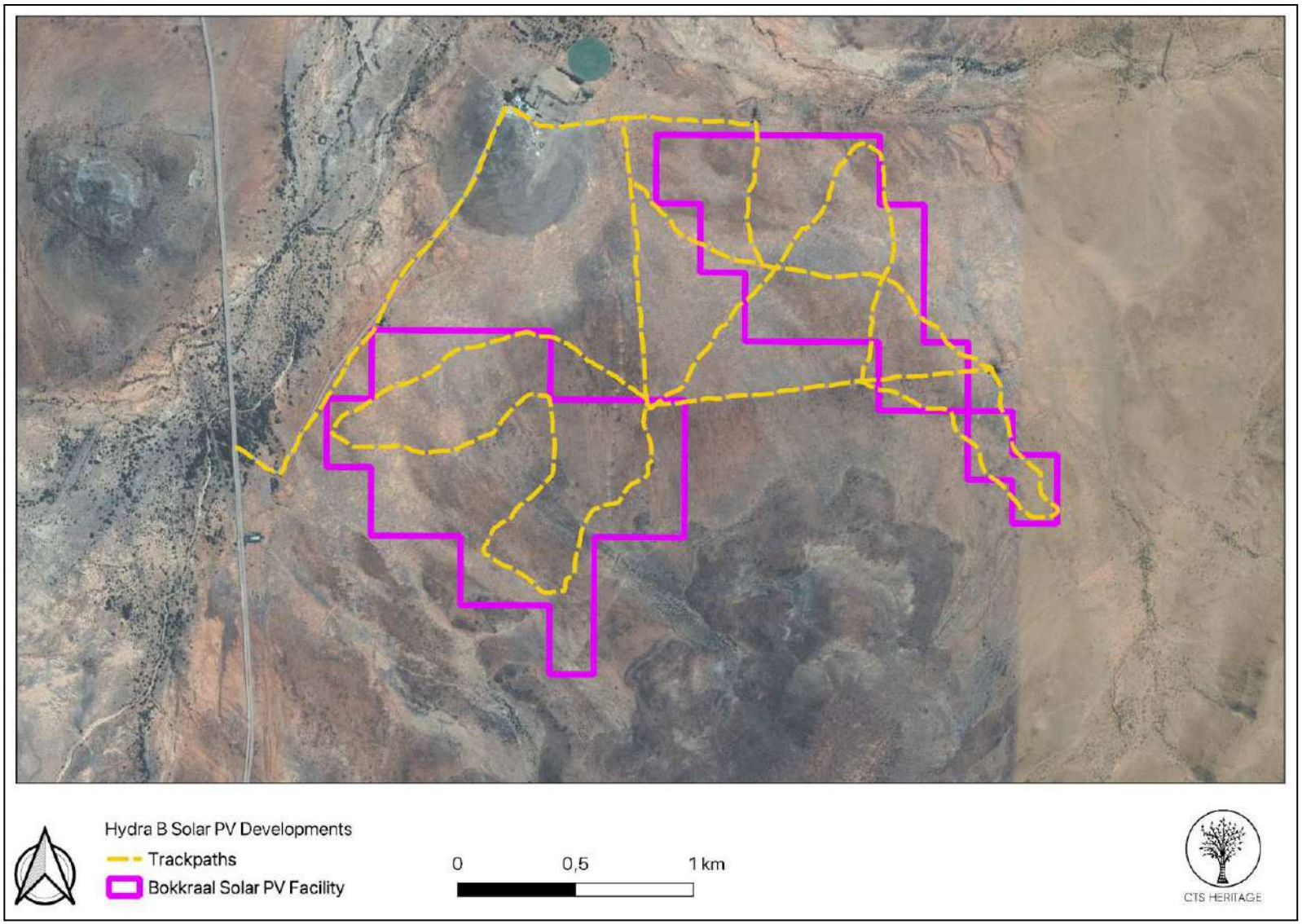

Figure 5.2: Overall track paths of foot survey

CTS Heritage
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Tel: +27 (0)82 303 7870 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

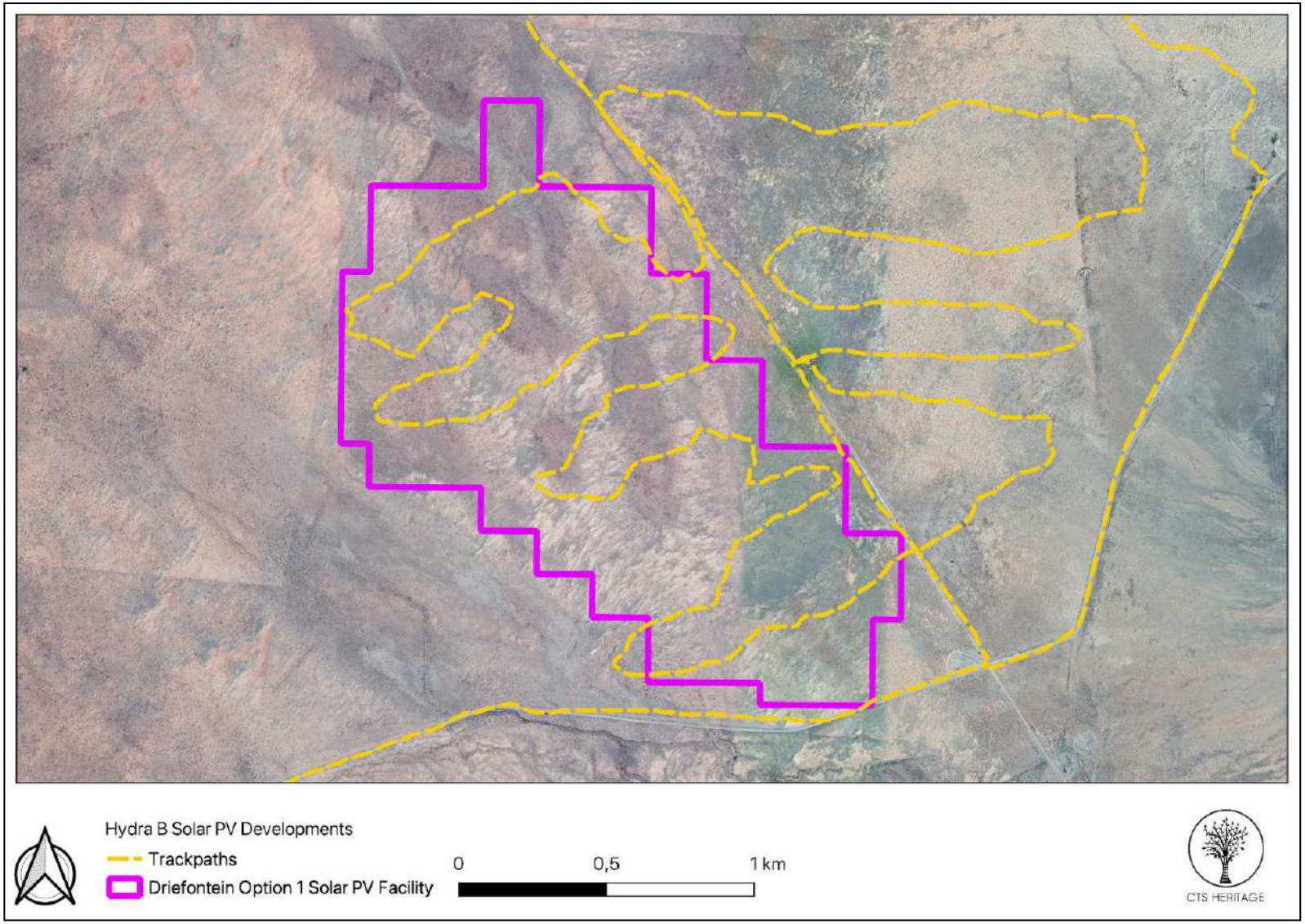

Figure 5.3: Overall track paths of foot survey

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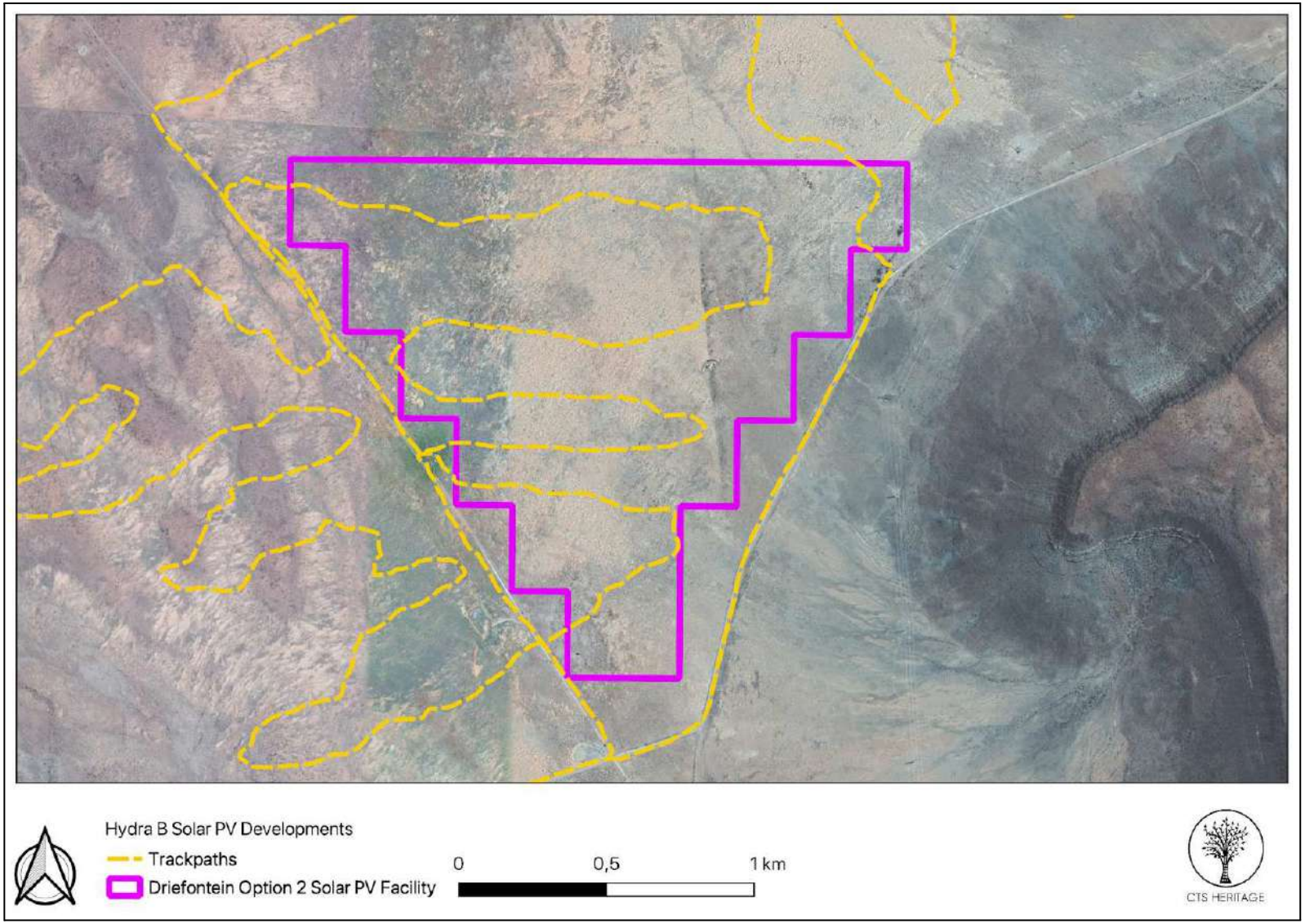

Figure 5.4: Overall track paths of foot survey

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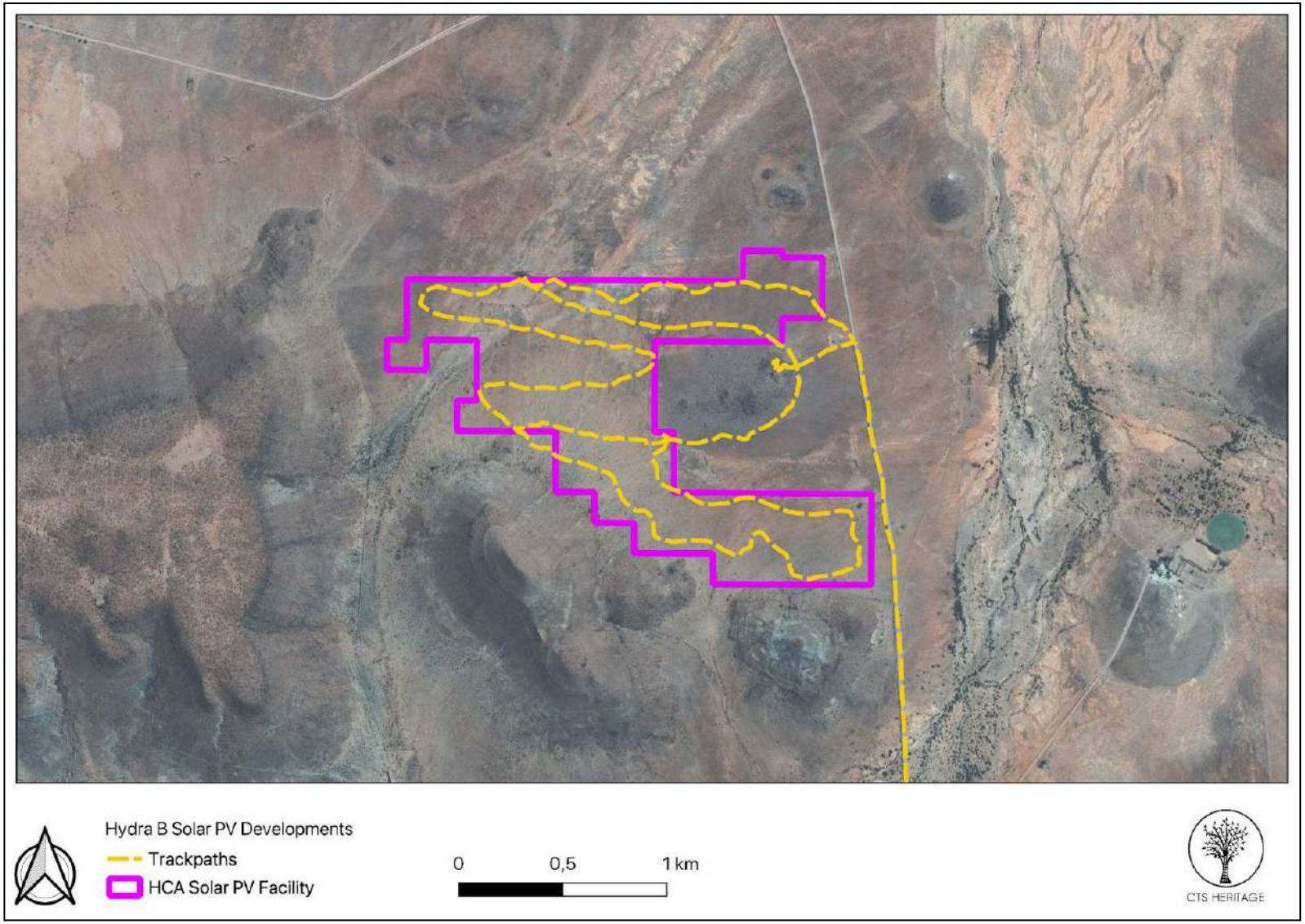

Figure 5.5: Overall track paths of foot survey

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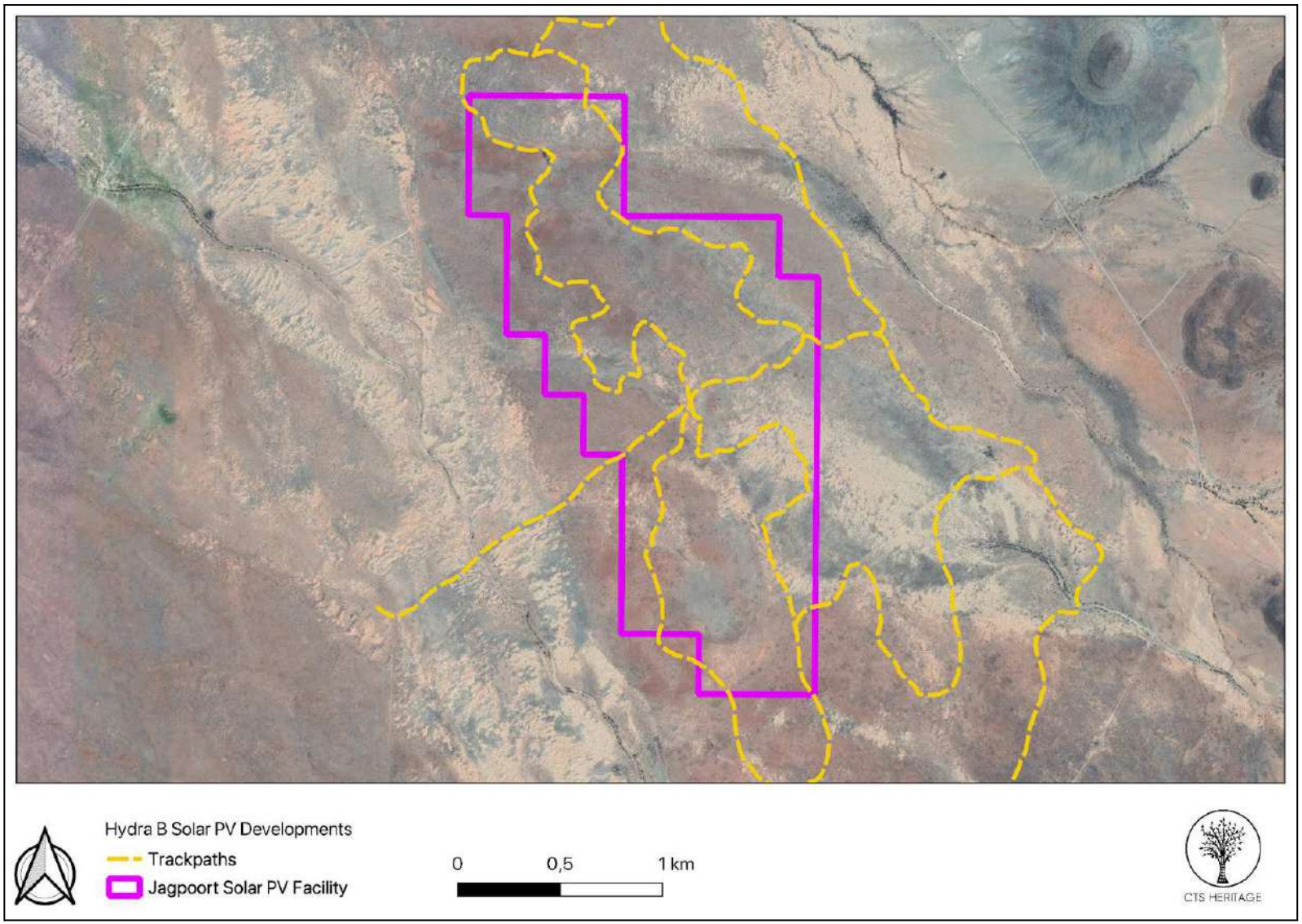

Figure 5.6: Overall track paths of foot survey

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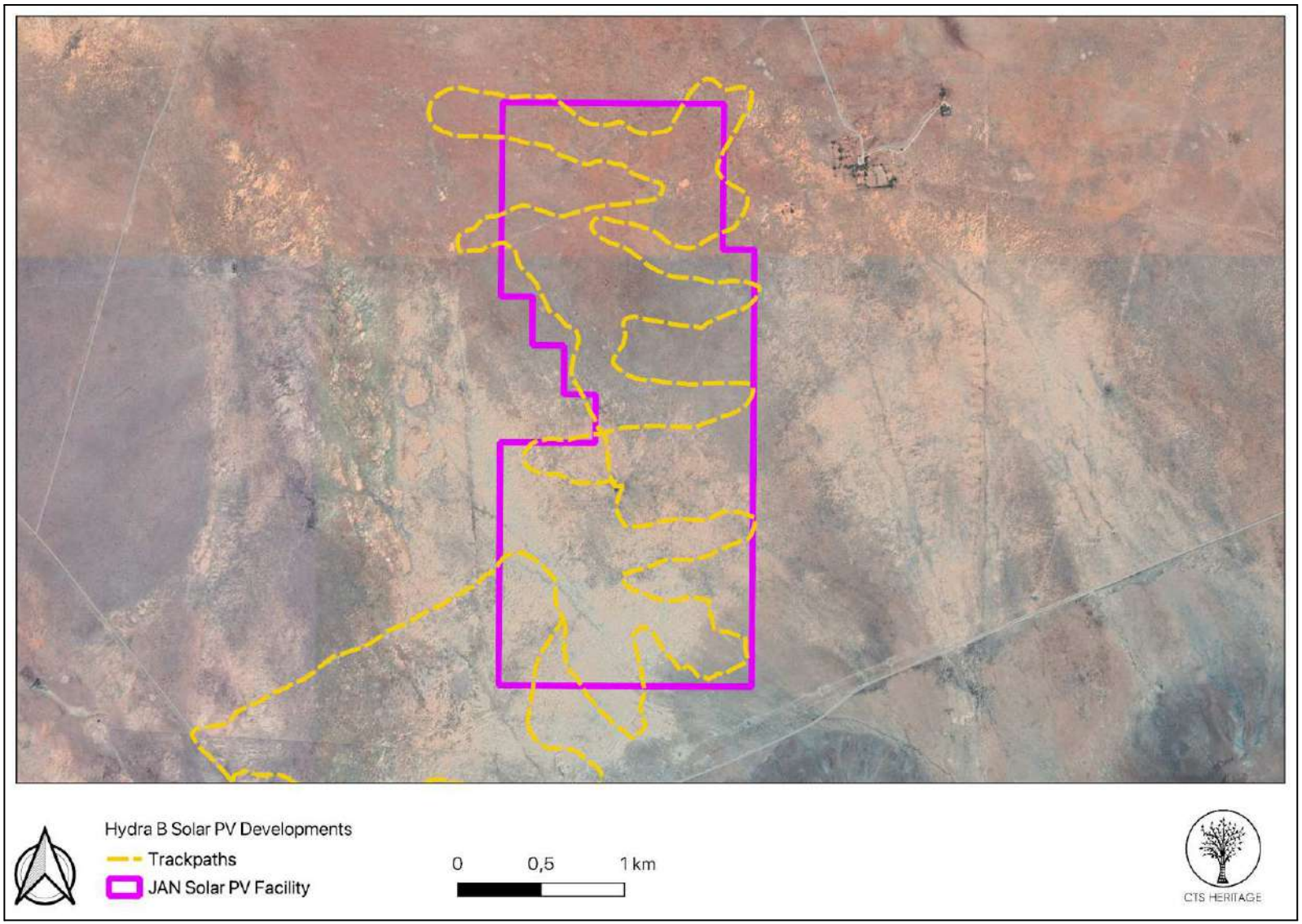

Figure 5.7: Overall track paths of foot survey

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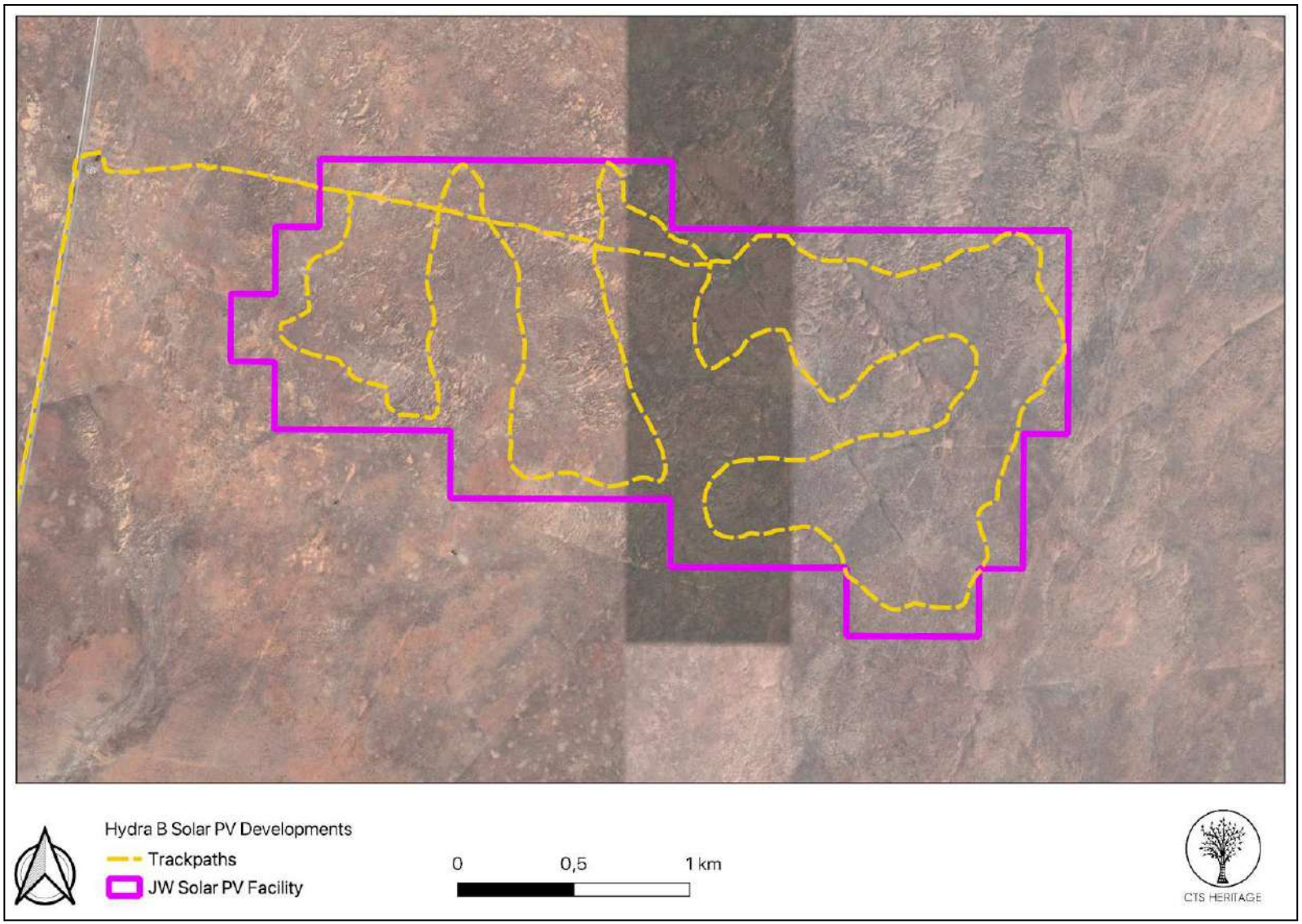

Figure 5.8: Overall track paths of foot survey

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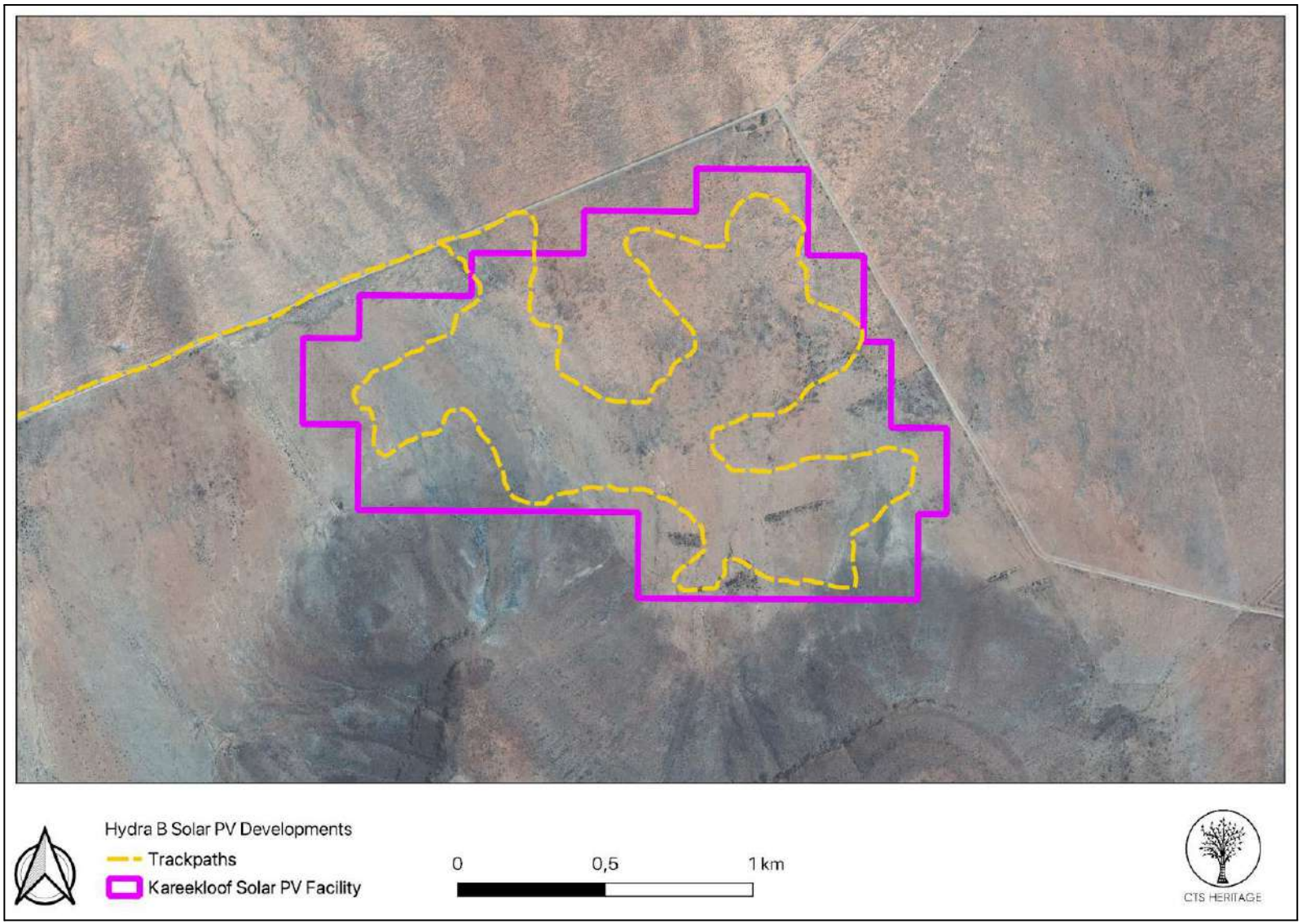

Figure 5.9: Overall track paths of foot survey

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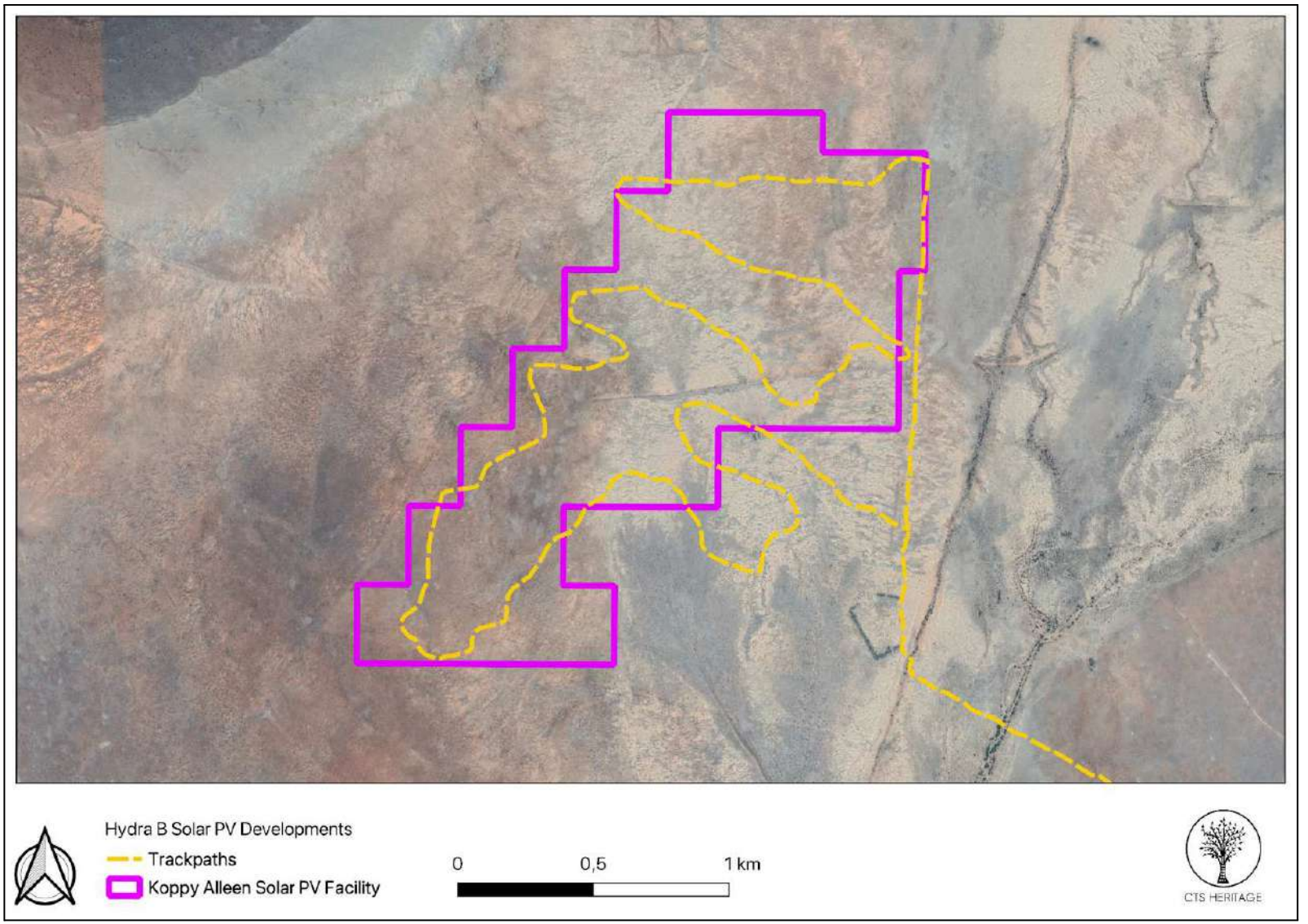

Figure 5.10: Overall track paths of foot survey

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Figure 5.11: Overall track paths of foot survey

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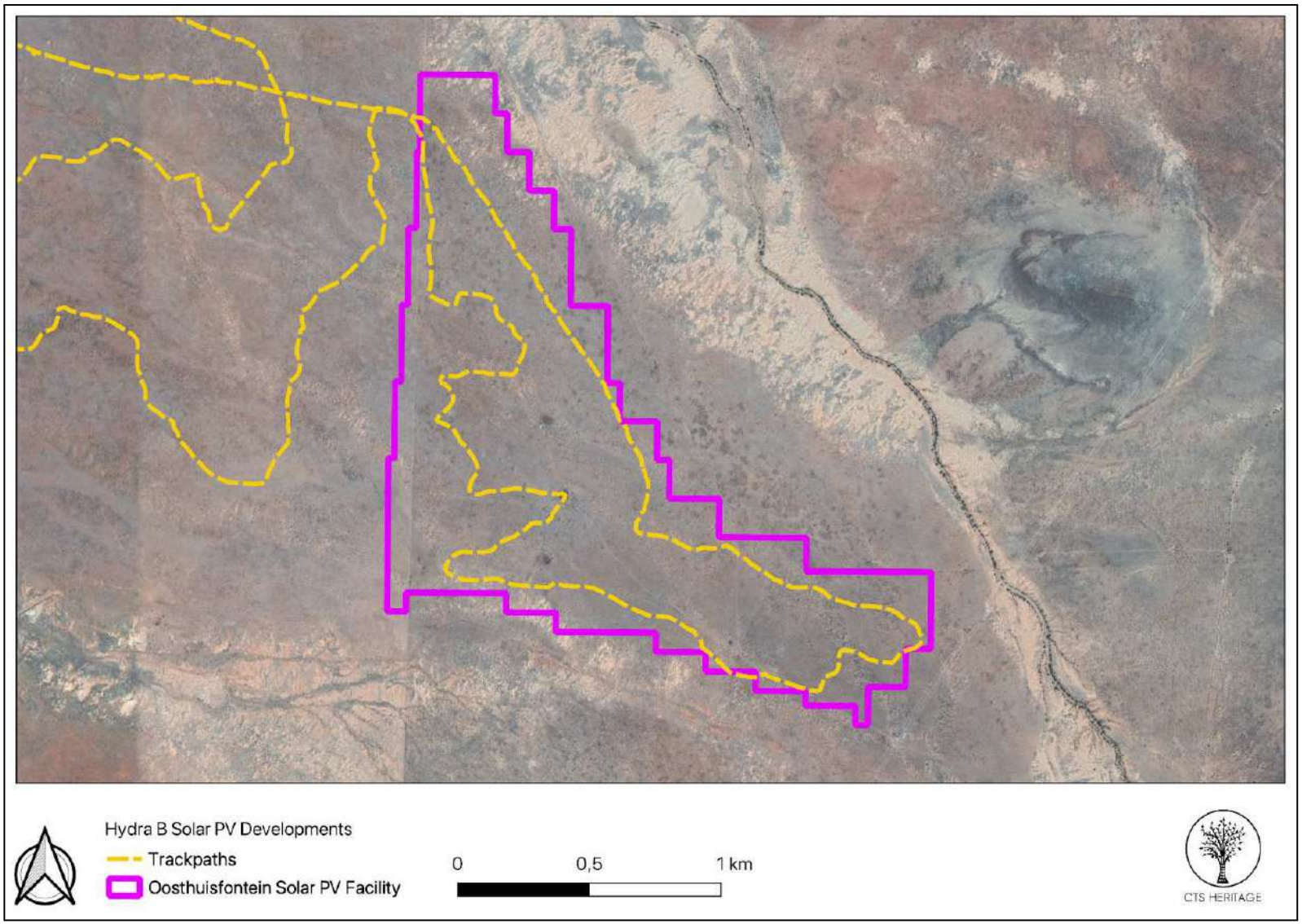

Figure 5.12: Overall track paths of foot survey

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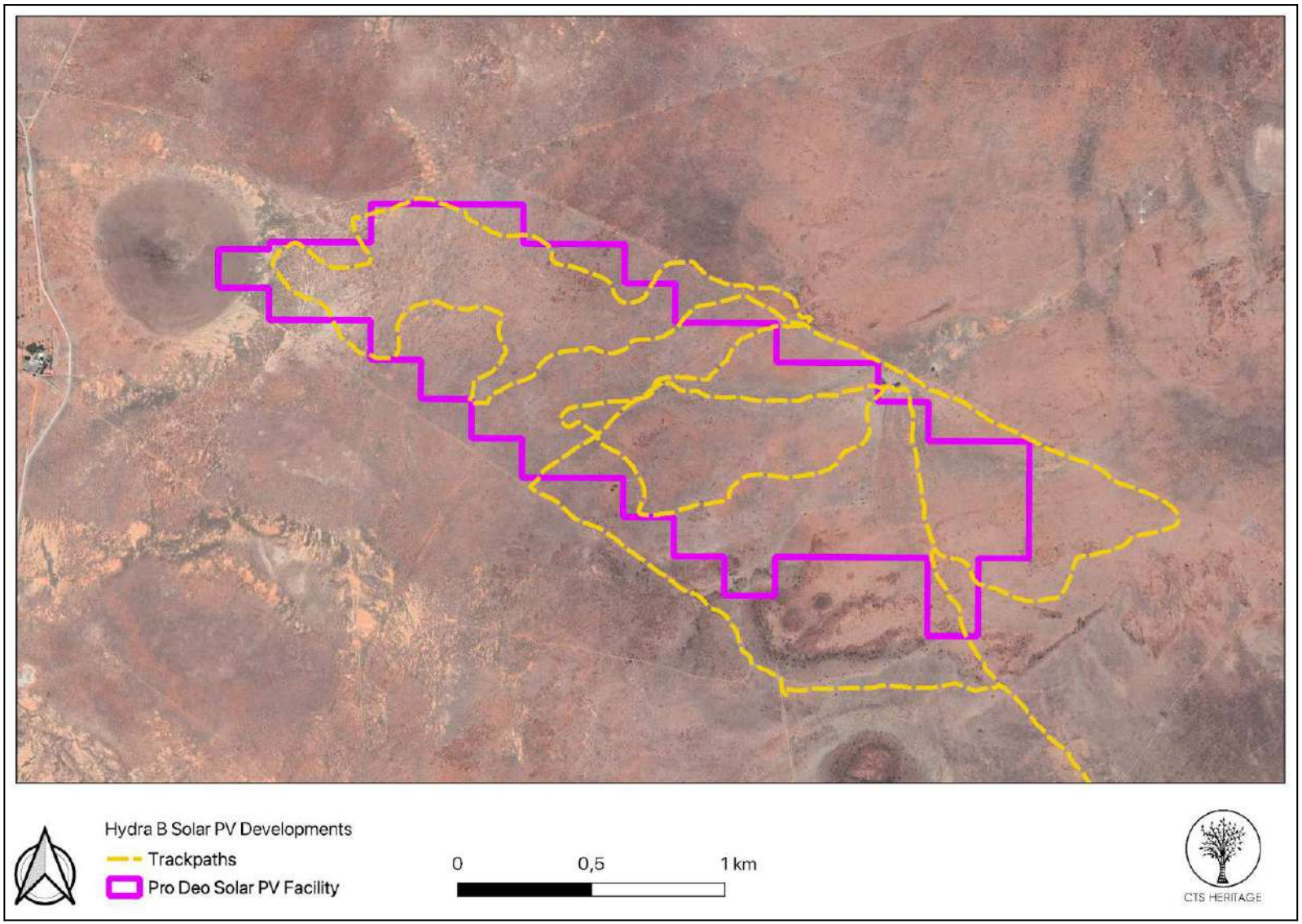

Figure 5.13: Overall track paths of foot survey

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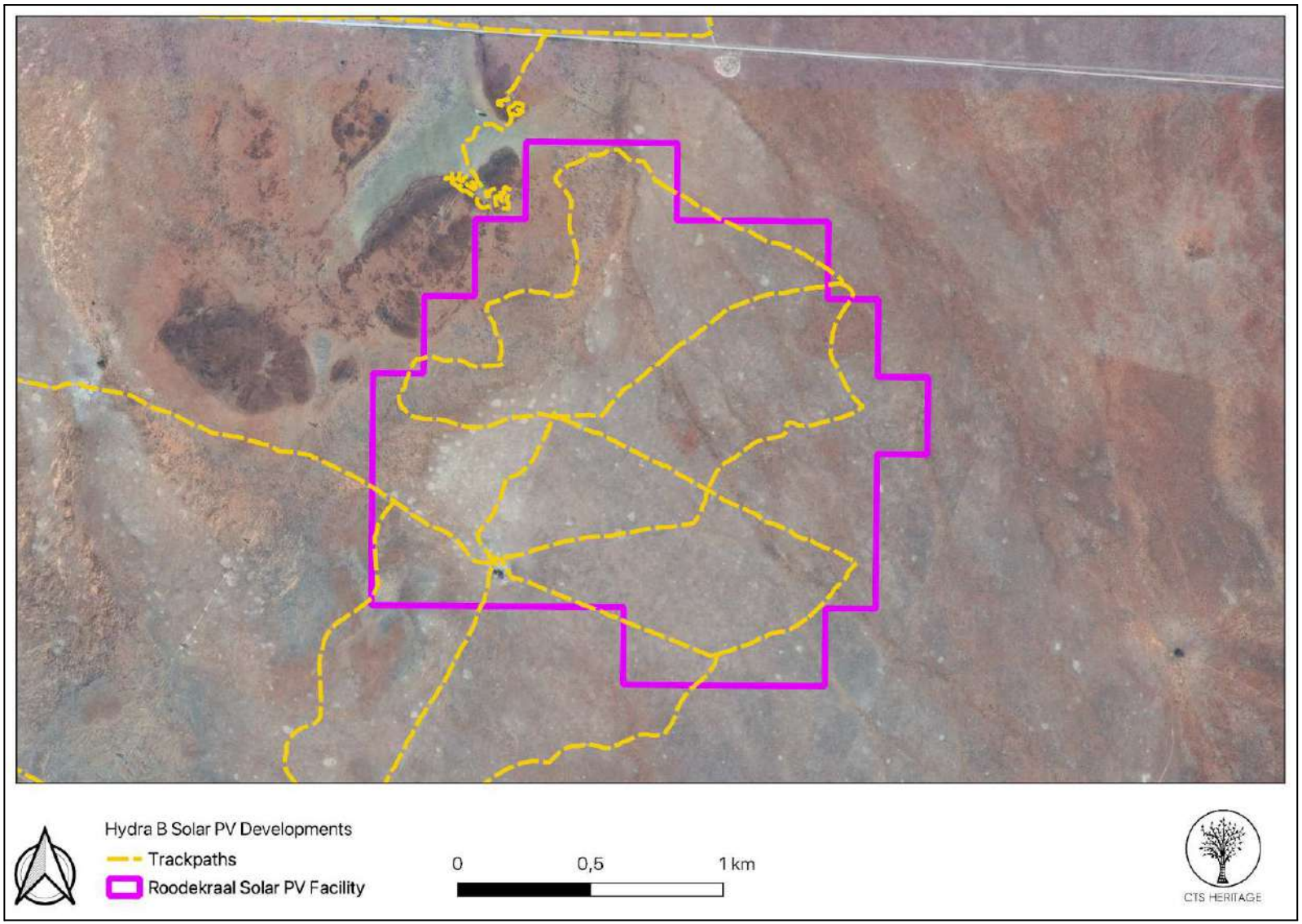

Figure 5.14: Overall track paths of foot survey

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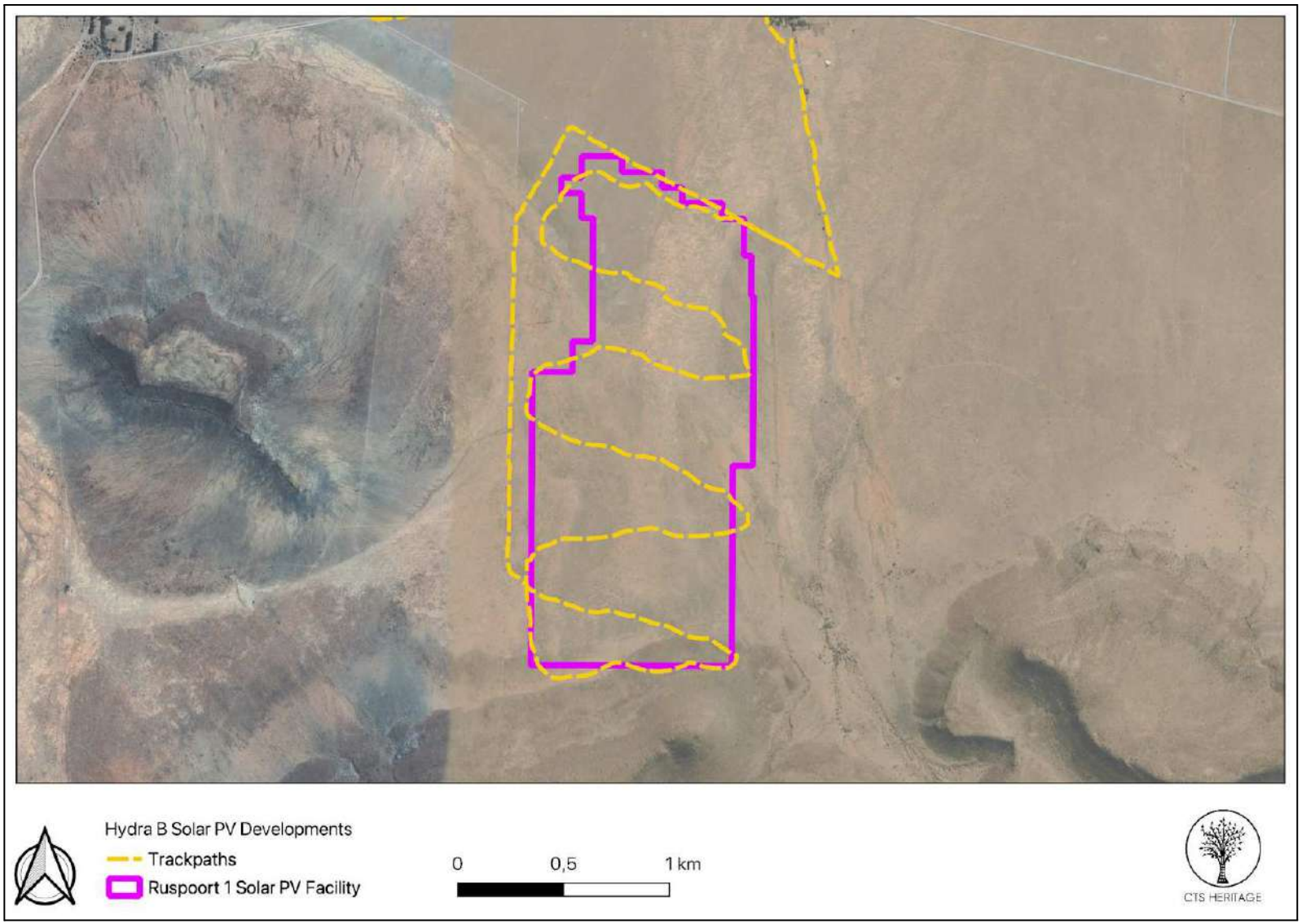

Figure 5.15: Overall track paths of foot survey

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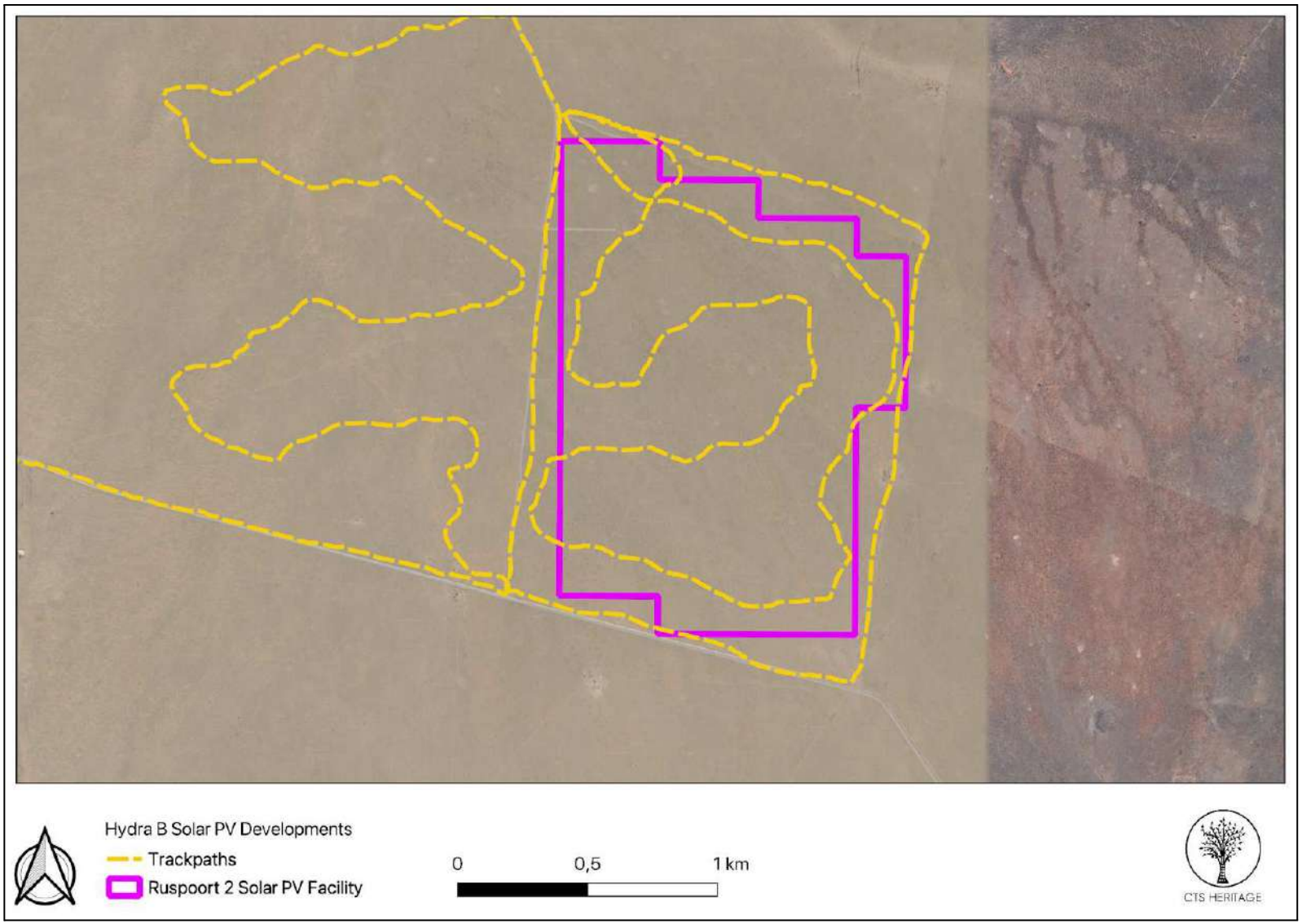

Figure 5.16: Overall track paths of foot survey

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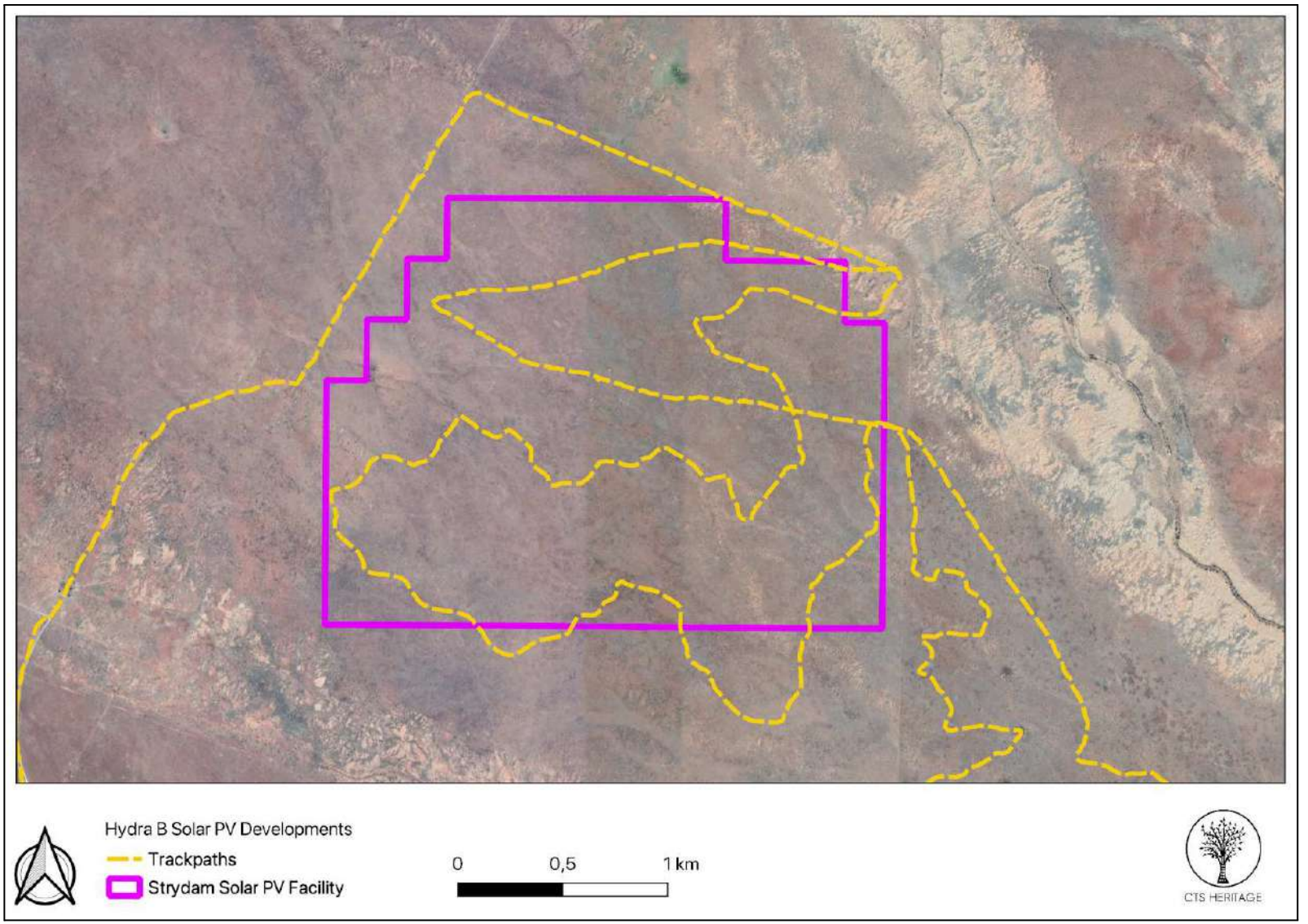

Figure 5.17: Overall track paths of foot survey

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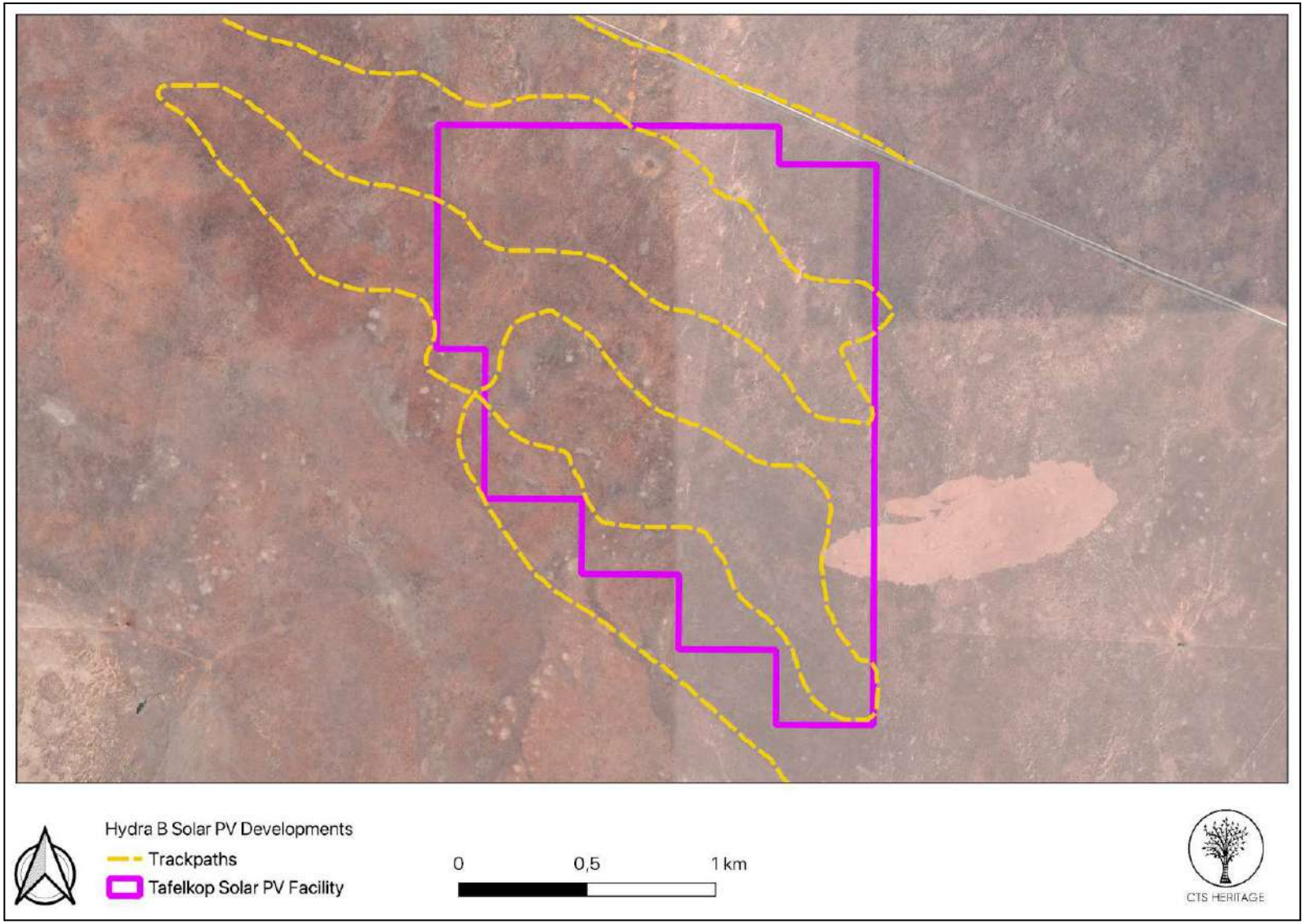

Figure 5.18: Overall track paths of foot survey

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Tel: +27 (0)82 303 7870 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

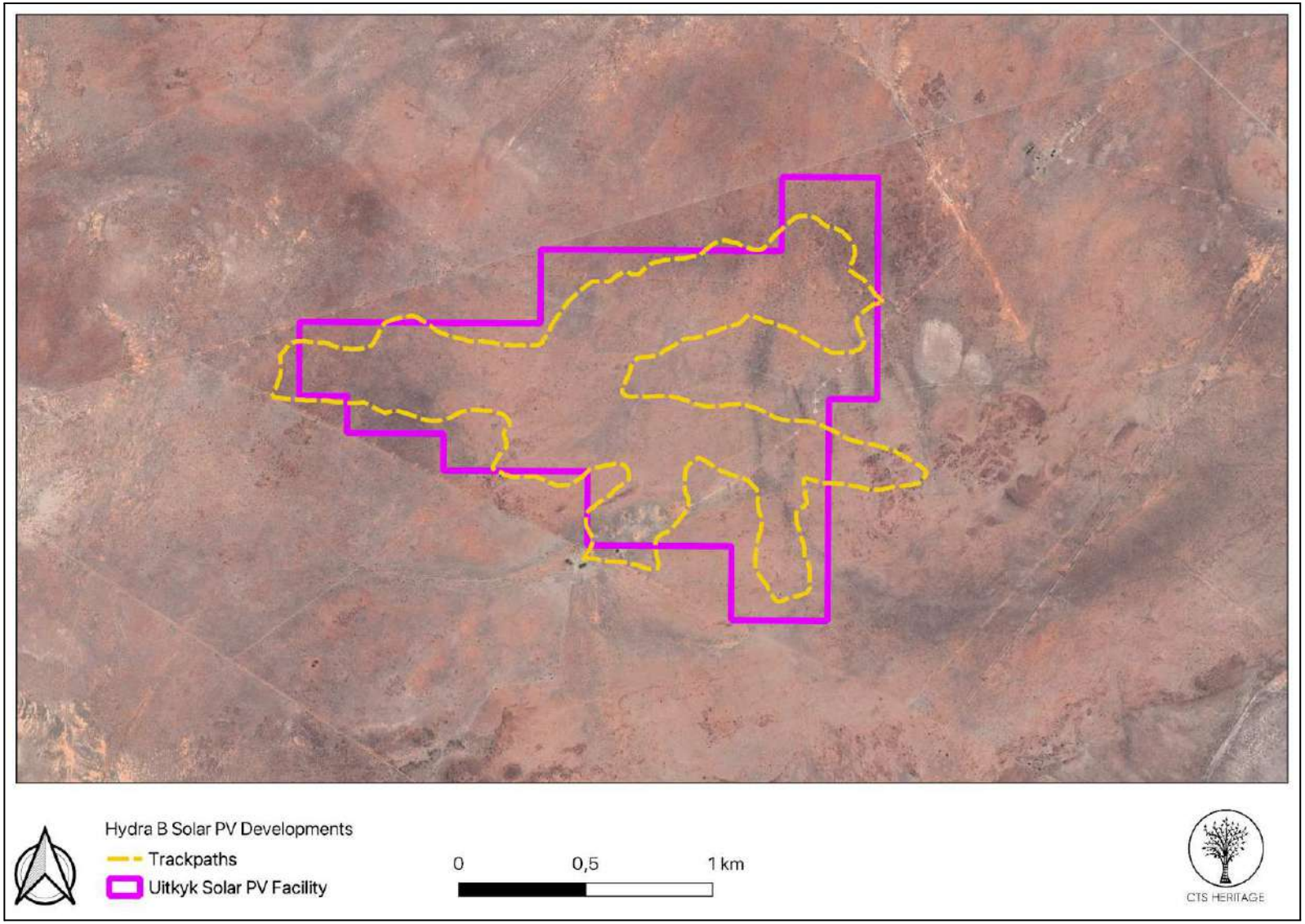

Figure 5.19: Overall track paths of foot survey

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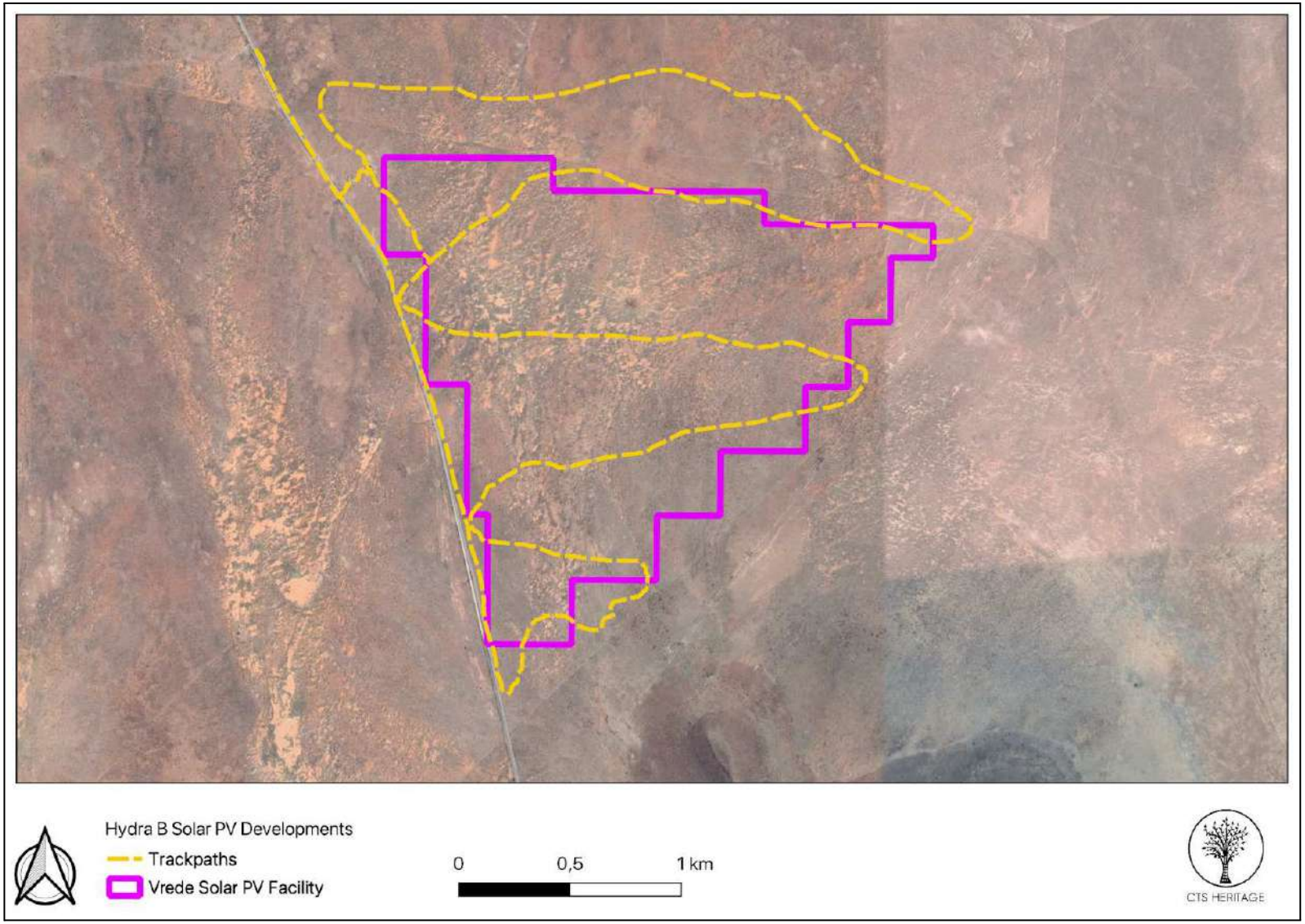

Figure 5.20: Overall track paths of foot survey

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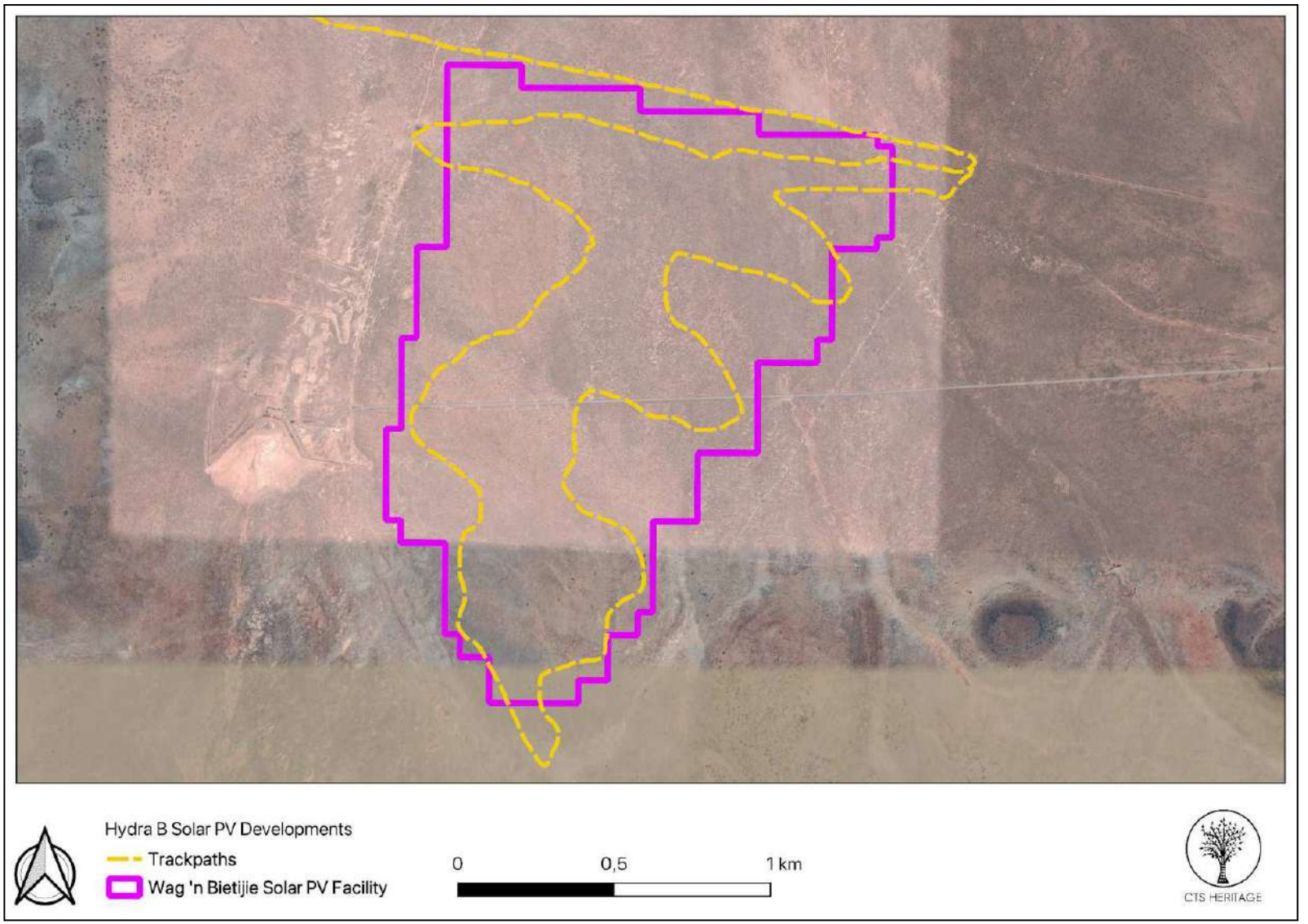

Figure 5.21: Overall track paths of foot survey

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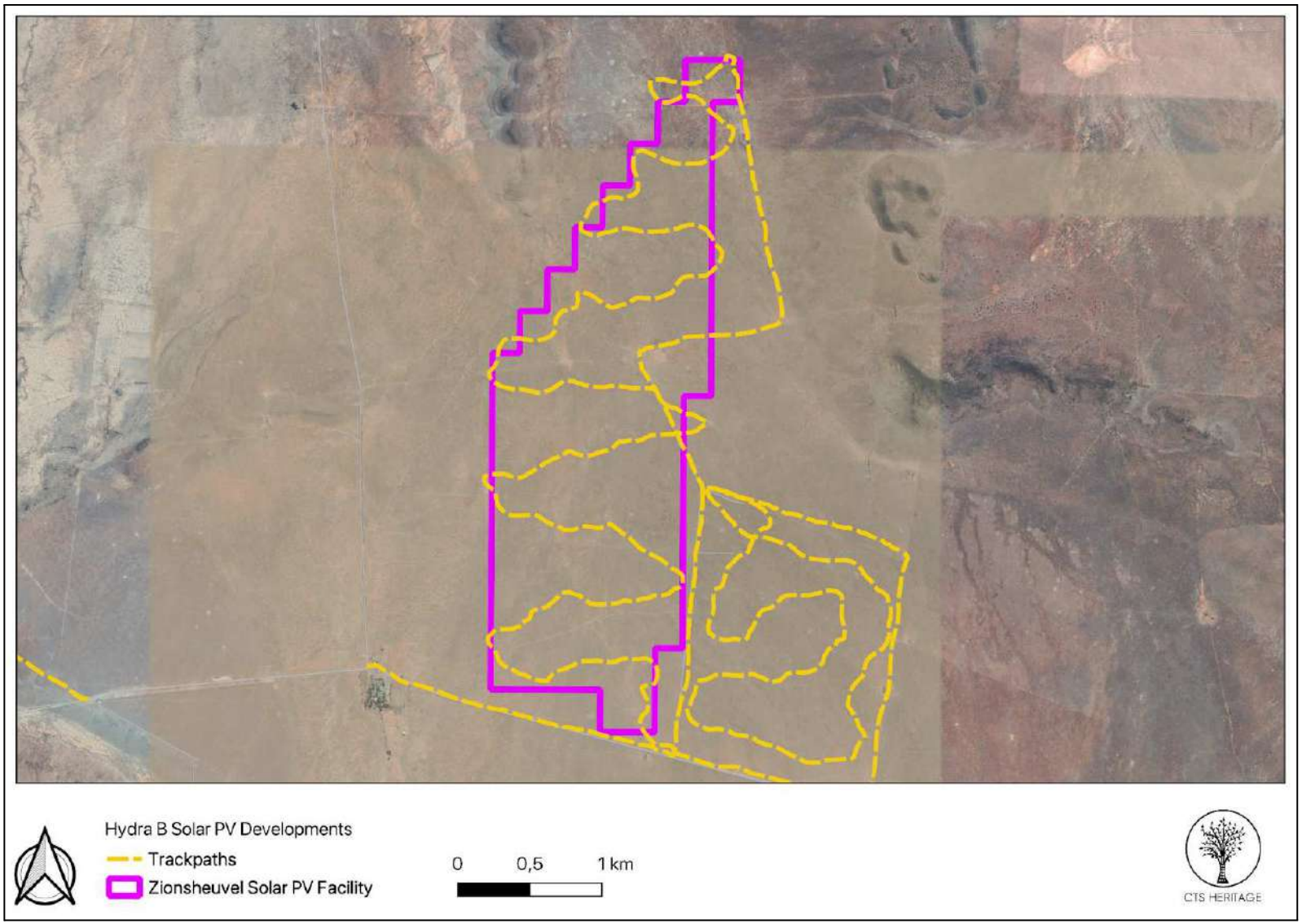

Figure 5.22: Overall track paths of foot survey

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4.2 Archaeological Resources identified

Table 2: Observations noted during the field assessment

Site No.	Site Name	Description	Density m²	Period	Co-ordinates		Grading	Mitigation
AD001	Amper Daar	Hornfels microlith and core	0 to 5	LSA	-30.18884	24.42827	NCW	NA
AD002	Amper Daar	Patinated hornfels flake and large flake with old flake scars	0 to 5	MSA	-30.19165	24.43399	NCW	NA
AD003	Amper Daar	Patinated hornfels flakes	0 to 5	MSA	-30.19358	24.44148	NCW	NA
AD004	Amper Daar	Hornfels points and flakes	5 to 10	MSA	-30.19514	24.44374	NCW	NA
AD005	Amper Daar	Hornfels burin and microliths	0 to 5	LSA	-30.19541	24.44019	NCW	NA
AD006	Amper Daar	Patinated hornfels flakes	0 to 5	MSA	-30.19409	24.43654	NCW	NA
AD007	Amper Daar	Hornfels blades, points	5 to 10	MSA	-30.1958	24.43388	NCW	NA
AD008	Amper Daar	Hornfels radial core and large finely struck flake	0 to 5	MSA	-30.19629	24.43064	NCW	NA
AD009	Amper Daar	Hornfels core and blade flakes	5 to 10	MSA	-30.19254	24.43052	NCW	NA
AD010	Amper Daar	Patinated hornfels flakes	0 to 5	MSA	-30.19155	24.42698	NCW	NA
AD011	Amper Daar	Hornfels long blade and patinated flake	0 to 5	MSA	-30.19312	24.42444	NCW	NA
AD012	Amper Daar	Hornfels blades and flakes	5 to 10	MSA	-30.19512	24.42677	NCW	NA
AD013	Amper Daar	Hornfels point	0 to 5	MSA	-30.19724	24.42635	NCW	NA
AD014	Amper Daar	Hornfels flakes, retouched	0 to 5	MSA	-30.19743	24.42415	NCW	NA
AD015	Amper Daar	Hornfels points	0 to 5	MSA	-30.19938	24.42208	NCW	NA
AD016	Amper Daar	Hornfels core and flake, blady	0 to 5	MSA	-30.19856	24.41973	NCW	NA
AD017	Amper Daar	Hornfels microliths	5 to 10	LSA	-30.19651	24.42049	NCW	NA
AD018	Amper Daar	Unworked hornfels blade	0 to 5	MSA	-30.1953	24.42265	NCW	NA
AD019	Amper Daar	Hornfels bladelet and points	0 to 5	LSA	-30.19361	24.42068	NCW	NA
BK001	Bokkraal	Hornfels core and patinated flake	0 to 5	MSA	-30.3337994	24.3733573	NCW	NA
BK002	Bokkraal	Long hornfels blade	0 to 5	MSA	-30.33629112	24.37077371	NCW	NA
BK003	Bokkraal	Siltstone core and patinated hornfels blade	5 to 10	MSA	-30.3359080	24.36684218	NCW	NA
BK004	Bokkraal	Siltstone point	0 to 5	MSA	-30.3338803	24.3692336	NCW	NA
BK005	Bokkraal	Hornfels cores, bladelet	0 to 5	LSA	-30.3327990	24.36971138	NCW	NA
BK006	Bokkraal	Siltstone flake no retouch	0 to 5	MSA	-30.33110453	24.3695653	NCW	NA
BK007	Bokkraal	Hornfels blade flake	0 to 5	MSA	-30.3325490	24.3653913	NCW	NA
BK008	Bokkraal	Large hornfels flake with pointed end	0 to 5	MSA	-30.3308438	24.36143023	NCW	NA
BK009	Bokkraal	Hornfels core	0 to 5	MSA	-30.3282639	24.36761744	NCW	NA
BK010	Bokkraal	Kraal	n/a	Modern	-30.3294487	24.38919474	NCW	NA
BK011	Bokkraal	Hornfels cores	0 to 5	MSA	-30.3287457	24.38742629	NCW	NA
BK012	Bokkraal	Hornfels blade, patinated	0 to 5	MSA	-30.3274394	24.38372465	NCW	NA
BK013	Bokkraal	Hornfels microlith	0 to 5	LSA	-30.3325649	24.38843896	NCW	NA
BK014	Bokkraal	Large retouched hornfels flake	0 to 5	MSA	-30.3235526	24.38452335	NCW	NA
BK015	Bokkraal	Hornfels point, platform completely worked away	0 to 5	MSA	-30.3209297	24.38334863	NCW	NA
BK016	Bokkraal	Long unifacial hornfels blade	0 to 5	MSA	-30.32518762	24.37990464	NCW	NA
BK017	Bokkraal	Hornfels point	0 to 5	LSA	-30.3248902	24.37861519	NCW	NA
BK018	Bokkraal	Retouched hornfels flake with dorsal spine	0 to 5	MSA	-30.3236263	24.37823393	NCW	NA

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BK019	Bokkraal	Hornfels flake with minor retouch	0 to 5	MSA	-30.3223528	24.37859517	NCW	NA
BK020	Bokkraal	Hornfels flakes, patinated, hinge terminations	5 to 10	MSA	-30.3215404	24.37857679	NCW	NA
BK021	Bokkraal	Kraal	n/a	Modern	-30.3200157	24.37847708	NCW	NA
DF001	Driefontein	Kraal	n/a	Modern	-30.29097	24.19389	NCW	NA
DF002	Driefontein	Patinated hornfels point	0 to 5	MSA	-30.29173	24.19431	NCW	NA
DF003	Driefontein	Hornfels flake	0 to 5	MSA	-30.29226	24.19741	NCW	NA
DF004	Driefontein	Patinated hornfels flakes	0 to 5	MSA	-30.29247	24.19958	NCW	NA
DF005	Driefontein	Patinated hornfels flake, pyramidal core bladelets	5 to 10	MSA, LSA	-30.2952	24.19961	NCW	NA
DF006	Driefontein	Thin finely struck hornfels flake with edge retouch	0 to 5	MSA	-30.29701	24.19686	NCW	NA
DF007	Driefontein	Hornfels point	0 to 5	MSA	-30.29874	24.19397	NCW	NA
DF008	Driefontein	Hornfels cores and flakes, some retouch	5 to 10	MSA, LSA	-30.29918	24.19172	NCW	NA
DF009	Driefontein	Hornfels flake worth 50% cortex	0 to 5	MSA	-30.2985	24.19031	NCW	NA
DF010	Driefontein	Hornfels bladelet and flake	0 to 5	MSA	-30.29651	24.19117	NCW	NA
DF011	Driefontein	Hornfels bladelet points	0 to 5	MSA	-30.29468	24.19188	NCW	NA
DF012	Driefontein	Hornfels flakes	0 to 5	MSA	-30.29347	24.19168	NCW	NA
DF013	Driefontein	Patinated hornfels flakes	0 to 5	MSA	-30.29296	24.18984	NCW	NA
DF014	Driefontein	Siltstone core, hornfels flakes	5 to 10	MSA	-30.29235	24.18653	NCW	NA
DF015	Driefontein	Hornfels debitage	0 to 5	MSA	-30.29179	24.18426	NCW	NA
DF016	Driefontein	Hornfels blade and flake	0 to 5	MSA	-30.29108	24.1818	NCW	NA
DF017	Driefontein	Various hornfels flakes, Point forms	5 to 10	MSA	-30.29066	24.18015	NCW	NA
DF018	Driefontein	Curved hornfels flake flake inner edge retouched, worked back, adze possible	0 to 5	MSA	-30.28967	24.17751	NCW	NA
DF019	Driefontein	Patinated hornfels blade	0 to 5	MSA	-30.28876	24.17887	NCW	NA
DF020	Driefontein	Hornfels flake	0 to 5	MSA	-30.28708	24.18102	NCW	NA
DF021	Driefontein	Small bladelet flake and patinated flake with old flake scars on edge	0 to 5	MSA, LSA	-30.28536	24.18466	NCW	NA
DF022	Driefontein	Blade and point, hornfels	0 to 5	MSA	-30.28627	24.18609	NCW	NA
DF023	Driefontein	Unifacial flake, pointed side hornfels	0 to 5	MSA	-30.28344	24.1904	NCW	NA
DF024	Driefontein	Siltstone core and hornfels flakes	5 to 10	MSA	-30.28392	24.19676	NCW	NA
DF025	Driefontein	Patinated hornfels blade	0 to 5	MSA	-30.28356	24.20124	NCW	NA
DF026	Driefontein	Hornfels points	0 to 5	MSA	-30.28647	24.20531	NCW	NA
DF027	Driefontein	Hornfels core and patinated larger flake	0 to 5	MSA, LSA	-30.28778	24.19977	NCW	NA
DF028	Driefontein	Hornfels flake with two curved notches either side	0 to 5	MSA	-30.2871	24.19422	NCW	NA
DF029	Driefontein	Hornfels point retouched for hafting	0 to 5	MSA	-30.28984	24.20179	NCW	NA
DF030	Driefontein	Long hornfels blade points	0 to 5	MSA	-30.28275	24.20929	NCW	NA
DF031	Driefontein	Kraal	n/a	Modern	-30.284455	24.209632	NCW	NA
DF032	Driefontein	Site of De Wet's abandoned gear – see South African War information	n/a	Historical	-30.30108	24.18414	IIIA	100m Buffer
HCA001	HCA	Quarry/borrow pit	n/a	Modern	-30.3094813	24.35181491	NCW	NA
HCA002	HCA	Kraal, stone walled	n/a	Historical	-30.31059	24.34916	IIIC	50m Buffer
HCA003	HCA	More walling and hornfels artefacts	0 to 5	LSA, historical	-30.31042	24.34859	IIIC	50m Buffer
HCA004	HCA	Hornfels points	5 to 10	LSA	-30.3087193	24.34616692	NCW	NA

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HCA005	HCA	Hornfels core	0 to 5	MSA	-30.3085575	24.3415106	NCW	NA
HCA006	HCA	Hornfels flakes retouched	0 to 5	LSA	-30.30714779	24.3495072	NCW	NA
HCA007	HCA	Patinated hornfels flake, one with no cortex	0 to 5	MSA	-30.3142096	24.34293596	NCW	NA
HCA008	HCA	Hornfels triangular pointed flake, unifacial	0 to 5	MSA	-30.31616214	24.34723416	NCW	NA
HCA009	HCA	Hornfels unifacial flake and core	5 to 10	MSA	-30.31875935	24.35294418	NCW	NA
HCA010	HCA	Hornfels microliths	0 to 5	LSA	-30.3184525	24.34715551	NCW	NA
HCA011	HCA	Kraal, earthen dam surrounding it	n/a	Historical /modern	-30.3067009	24.33602342	NCW	NA
HCA012	HCA	Hornfels flake, retouched, prepared platform	0 to 5	MSA	-30.3166304	24.34162147	NCW	NA
HCA013	HCA	Hornfels flake, most cortex still remains	0 to 5	MSA	-30.31448091	24.33809722	NCW	NA
HCA014	HCA	Weathered hornfels flakes and core	0 to 5	MSA	-30.31307334	24.33767244	NCW	NA
HCA015	HCA	Hornfels flakes	0 to 5	MSA	-30.31139119	24.33432593	NCW	NA
HCA016	HCA	Patinated unifacial point, hornfels	0 to 5	MSA	-30.3108752	24.34197424	NCW	NA
HCA017	HCA	Hornfels bladelet, flakes	5 to 10	LSA	-30.3096383	24.34121925	NCW	NA
HCA018	HCA	Patinated hornfels flake	0 to 5	MSA	-30.3094029	24.33898445	NCW	NA
HCA019	HCA	Pointed hornfels flake with reddish tint on cortex	0 to 5	MSA	-30.3081659	24.33174083	NCW	NA
JG001	Jagpoort	Hornfels core and blade with secondary scars on dorsal	0 to 5	MSA	-30.35852	24.21859	NCW	NA
JG002	Jagpoort	Patinated hornfels flakes and one with no cortex	0 to 5	MSA	-30.35742	24.22051	NCW	NA
JG003	Jagpoort	Dam/ditch	n/a	Modern	-30.35649	24.22209	NCW	NA
JG004	Jagpoort	Dark patinated hornfels flake	0 to 5	MSA	-30.360053	24.235568	NCW	NA
JG005	Jagpoort	Early Msa siltstone core	0 to 5	MSA	-30.366554	24.227866	NCW	NA
JG006	Jagpoort	Patinated hornfels flakes	0 to 5	MSA	-30.36431423	24.2208653	NCW	NA
JG007	Jagpoort	Leaf shaped hornfels flake	0 to 5	MSA	-30.3572292	24.22711448	NCW	NA
JG008	Jagpoort	Hornfels bladelet flake	0 to 5	MSA	-30.353613	24.229394	NCW	NA
JG009	Jagpoort	Hornfels large flake with retouch on platform	0 to 5	MSA	-30.3490777	24.2226093	NCW	NA
JG010	Jagpoort	Hornfels flakes with hafted end	0 to 5	MSA	-30.343785	24.226149	NCW	NA
JG011	Jagpoort	Siltstone core	0 to 5	MSA	-30.339929	24.214995	NCW	NA
JG012	Jagpoort	Hornfels chunk and blade	0 to 5	MSA	-30.3444373	24.212291	NCW	NA
JG013	Jagpoort	Hornfels flakes, bladelet	0 to 5	MSA	-30.3502691	24.2143256	NCW	NA
JG014	Jagpoort	Patinated hornfels flake	0 to 5	MSA	-30.376429	24.228667	NCW	NA
JG015	Jagpoort	Hornfels core	0 to 5	LSA	-30.368773	24.235198	NCW	NA
JG016	Jagpoort	Hornfels blades, one with hinge terminations	0 to 5	MSA	-30.3544076	24.22181	NCW	NA
JG017	Jagpoort	Kraal	n/a	Modern	-30.345179	24.215188	NCW	NA
JG018	Jagpoort	Silcrete core and hornfels very thin flake	5 to 10	MSA	-30.371913	24.239131	NCW	NA
JG019	Jagpoort	Patinated dark hornfels flakes, some retouch	0 to 5	MSA	-30.365251	24.241621	NCW	NA
JG020	Jagpoort	Hornfels core and thin flake retouched	0 to 5	MSA	-30.37561	24.236645	NCW	NA
JG021	Jagpoort	Hornfels point	0 to 5	MSA	-30.368725	24.224465	NCW	NA
JN001	Jan	Hornfels microlith	0 to 5	LSA	-30.271	24.20385	NCW	NA
JN002	Jan	Hornfels blade flake	0 to 5	MSA	-30.27443	24.20663	NCW	NA
JN003	Jan	Hornfels point and siltstone manuport	0 to 5	MSA	-30.27547	24.21129	NCW	NA

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JN004	Jan	Patinated hornfels flake with longitudinal scarring	0 to 5	MSA	-30.2751	24.2163	NCW	NA
JN005	Jan	Hornfels blade and rounded flake	0 to 5	MSA	-30.27122	24.2162	NCW	NA
JN006	Jan	Hornfels microliths	5 to 10	LSA	-30.26966	24.21106	NCW	NA
JN007	Jan	Kraal	n/a	Modern	-30.2673	24.21071	NCW	NA
JN008	Jan	Very patinated hornfels flakes	0 to 5	MSA	-30.26664	24.20583	NCW	NA
JN009	Jan	Patinated hornfels flakes, hinge terminations, some edge retouch	0 to 5	MSA	-30.26411	24.21529	NCW	NA
JN010	Jan	Various hornfels flakes, points	5 to 10	MSA	-30.26163	24.21166	NCW	NA
JN011	Jan	Hornfels flake with slight retouch, quartz porphyry poss. Flake	0 to 5	MSA	-30.25374	24.20933	NCW	NA
JN012	Jan	Hornfels cores	0 to 5	MSA	-30.25464	24.215	NCW	NA
JN013	Jan	Patinated hornfels flakes, one with curve	5 to 10	MSA	-30.25036	24.21676	NCW	NA
JN014	Jan	Hornfels point	0 to 5	MSA	-30.24827	24.21159	NCW	NA
JN015	Jan	Hornfels core and flake	0 to 5	MSA	-30.24769	24.20837	NCW	NA
JN016	Jan	Hornfels radial cores	0 to 5	MSA	-30.24871	24.20504	NCW	NA
JN017	Jan	Hornfels blade and patinated flake	5 to 10	MSA	-30.25219	24.20482	NCW	NA
JN018	Jan	Hornfels flakes, hinge terminations, slight retouch	0 to 5	MSA	-30.2578	24.20614	NCW	NA
JW001	JW	Patinated hornfels flake, dorsal scars	0 to 5	MSA	-30.11836	24.32714	NCW	NA
JW002	JW	Hornfels bladelets	5 to 10	LSA	-30.12164	24.32548	NCW	NA
JW003	JW	Curved patinated hornfels flake	0 to 5	MSA	-30.12384	24.32714	NCW	NA
JW004	JW	Patinated leaf shaped hornfels flakes	0 to 5	MSA	-30.12476	24.329	NCW	NA
JW005	JW	Long hornfels flake with flake scars along lateral	0 to 5	MSA	-30.12171	24.33106	NCW	NA
JW006	JW	Hornfels microliths	5 to 10	LSA	-30.11658	24.33267	NCW	NA
JW007	JW	Patinated hornfels point	0 to 5	MSA	-30.1202	24.3346	NCW	NA
JW008	JW	Hornfels flake and bladelet	5 to 10	MSA, LSA	-30.12421	24.33485	NCW	NA
JW009	JW	Hornfels points	0 to 5	MSA	-30.12808	24.33638	NCW	NA
JW010	JW	Hornfels flake with dorsal scars	0 to 5	MSA	-30.12813	24.34025	NCW	NA
JW011	JW	Patinated hornfels points	0 to 5	MSA	-30.12344	24.33944	NCW	NA
JW012	JW	Hornfels blade and flakes	0 to 5	MSA	-30.1174	24.33962	NCW	NA
JW013	JW	Kraal	n/a	Modern	-30.11982	24.34322	NCW	NA
JW014	JW	Hornfels chunk, Point and bladelet	0 to 5	MSA	-30.12031	24.35149	NCW	NA
JW015	JW	Finely struck hornfels flake retouched for hafting	0 to 5	MSA	-30.12041	24.35788	NCW	NA
JW016	JW	Hornfels point, chunk, retouched flake	5 to 10	MSA	-30.12489	24.35806	NCW	NA
JW017	JW	Hornfels point and awl	0 to 5	MSA	-30.12896	24.35595	NCW	NA
JW018	JW	Hornfels blade, patinated flake	0 to 5	MSA	-30.13304	24.35254	NCW	NA
JW019	JW	Rounded hornfels flake, prepared platform	0 to 5	MSA	-30.13016	24.34813	NCW	NA
JW020	JW	Patinated hornfels point and flakes	5 to 10	MSA	-30.1277	24.34432	NCW	NA
JW021	JW	Hornfels blade and point	0 to 5	MSA	-30.12644	24.35091	NCW	NA
JW022	JW	Long blade flake finely made, hornfels	0 to 5	MSA	-30.12267	24.35336	NCW	NA
JW023	JW	Very patinated hornfels flakes, blady	5 to 10	MSA	-30.12255	24.34673	NCW	NA
KK001	Kareekloof	Patinated hornfels points	0 to 5	MSA	-30.27034	24.2482	NCW	NA
KK002	Kareekloof	Siltstone triangular core flake	0 to 5	MSA	-30.27602	24.24752	NCW	NA

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KK003	Kareekloof	Patinated hornfels flake	0 to 5	MSA	-30.27723	24.25027	NCW	NA
KK004	Kareekloof	Thin hornfels flakes	0 to 5	LSA	-30.27767	24.25335	NCW	NA
KK005	Kareekloof	Silcrete flake and chunk, hornfels core	5 to 10	LSA	-30.27829	24.25628	NCW	NA
KK006	Kareekloof	Early Msa hornfels flakes	0 to 5	MSA	-30.28009	24.25632	NCW	NA
KK007	Kareekloof	Historical refuse, porcelain, glass, metal items, late 19th c?	30+	Historical	-30.27981	24.25791	IIIB	100m Buffer
KK008	Kareekloof	Farm dam	n/a	Historical	-30.27994	24.25847	NCW	NA
KK009	Kareekloof	Porcelain	0 to 5	Historical	-30.27913	24.26234	NCW	NA
KK010	Kareekloof	Quartz porphyry flake	0 to 5	MSA	-30.27536	24.25975	NCW	NA
KK011	Kareekloof	Hornfels core	0 to 5	LSA	-30.27228	24.26149	NCW	NA
KK012	Kareekloof	Patinated hornfels point	0 to 5	MSA	-30.27009	24.25783	NCW	NA
KK013	Kareekloof	Hornfels microliths	0 to 5	LSA	-30.26993	24.25446	NCW	NA
KK014	Kareekloof	Patinated hornfels blade	0 to 5	MSA	-30.27407	24.25595	NCW	NA
KK015	Kareekloof	Hornfels flake	0 to 5	MSA	-30.2729	24.25164	NCW	NA
KK016	Kareekloof	Patinated hornfels flake, poss core	0 to 5	MSA	-30.270605	24.251245	NCW	NA
KA001	Koppie Alleen	Hornfels debitage and point	0 to 5	LSA	-30.2445	24.36824	NCW	NA
KA002	Koppie Alleen	Hornfels points	0 to 5	LSA	-30.24454	24.36327	NCW	NA
KA003	Koppie Alleen	Hornfels chunk and points	5 to 10	MSA	-30.24618	24.36146	NCW	NA
KA004	Koppie Alleen	Blade, hornfels	0 to 5	MSA	-30.24794	24.36717	NCW	NA
KA005	Koppie Alleen	Curved hornfels point	0 to 5	MSA	-30.24989	24.36853	NCW	NA
KA006	Koppie Alleen	Patinated hornfels flakes	0 to 5	MSA	-30.25143	24.3664	NCW	NA
KA007	Koppie Alleen	Hornfels core	0 to 5	MSA	-30.24967	24.36337	NCW	NA
KA008	Koppie Alleen	Patinated hornfels bladelets, edge retouched	0 to 5	MSA	-30.24804	24.3601	NCW	NA
KA009	Koppie Alleen	Hornfels flakes, one very thin	5 to 10	MSA	-30.24944	24.35822	NCW	NA
KA010	Koppie Alleen	Patinated hornfels point	0 to 5	MSA	-30.25276	24.35612	NCW	NA
KA011	Koppie Alleen	Patinated early MSA flake	0 to 5	MSA	-30.25383	24.35403	NCW	NA
KA012	Koppie Alleen	Patinated hornfels flakes	0 to 5	MSA	-30.25883	24.35106	NCW	NA
KA013	Koppie Alleen	Patinated hornfels flakes	0 to 5	MSA	-30.25944	24.35356	NCW	NA
KA014	Koppie Alleen	Hornfels blade, notched on the side	0 to 5	MSA	-30.2564	24.35616	NCW	NA
KA015	Koppie Alleen	Thin hornfels flake with retouch	5 to 10	MSA	-30.25413	24.35921	NCW	NA
KA016	Koppie Alleen	Patinated hornfels blade and chunk	0 to 5	MSA	-30.2536	24.36185	NCW	NA
KA017	Koppie Alleen	Hornfels bladelets and flake	5 to 10	LSA	-30.2519	24.36157	NCW	NA
KA018	Koppie Alleen	Hornfels point	0 to 5	LSA	-30.24628	24.3645	NCW	NA
MP001	Middelplaas	Large finely struck hornfels flake	0 to 5	MSA	-30.19213	24.34083	NCW	NA
MP002	Middelplaas	Hornfels core and blade flake	0 to 5	MSA	-30.19177	24.33553	NCW	NA
MP003	Middelplaas	Hornfels points, blades	5 to 10	MSA	-30.19097	24.32784	NCW	NA
MP004	Middelplaas	Hornfels blade and flake, prominent bulb of percussion	0 to 5	MSA	-30.1866	24.32404	NCW	NA
MP005	Middelplaas	Hornfels bladelet point	0 to 5	LSA	-30.18166	24.32353	NCW	NA
MP006	Middelplaas	Hornfels rounded edge retouch point and flake	0 to 5	MSA	-30.18178	24.3276	NCW	NA
MP007	Middelplaas	Hornfels points	0 to 5	MSA	-30.184	24.32837	NCW	NA
MP008	Middelplaas	Hornfels blade flake and point	0 to 5	MSA	-30.18615	24.32849	NCW	NA
MP009	Middelplaas	Hornfels points	0 to 5	MSA	-30.18593	24.33224	NCW	NA
MP010	Middelplaas	Very patinated large hornfels flake	0 to 5	MSA	-30.18855	24.33167	NCW	NA

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OHF001	Oosthuisfontein	Unworked siltstone flakes	0 to 5	MSA	-30.38767	24.21379	NCW	NA
OHF002	Oosthuisfontein	Patinated hornfels points	0 to 5	MSA	-30.3895	24.21785	NCW	NA
OHF003	Oosthuisfontein	Hornfels flake	0 to 5	MSA	-30.38989	24.22351	NCW	NA
OHF004	Oosthuisfontein	Hornfels blades and cores, debitage	5 to 10	MSA	-30.3877	24.22123	NCW	NA
OHF005	Oosthuisfontein	Thinned hornfels flake	0 to 5	MSA	-30.38663	24.21783	NCW	NA
OHF006	Oosthuisfontein	Small hornfels flake, no retouch	0 to 5	LSA	-30.38473	24.20906	NCW	NA
OHF007	Oosthuisfontein	Very patinated hornfels core	0 to 5	MSA	-30.38091	24.20768	NCW	NA
OHF008	Oosthuisfontein	Patinated hornfels flake	0 to 5	MSA	-30.37882	24.21018	NCW	NA
OHF009	Oosthuisfontein	Patinated hornfels blade	0 to 5	MSA	-30.37702	24.20715	NCW	NA
OHF010	Oosthuisfontein	Patinated hornfels flake	0 to 5	MSA	-30.38045	24.21054	NCW	NA
OHF011	Oosthuisfontein	Patinated hornfels flake with edge retouch	0 to 5	MSA	-30.37844	24.20208	NCW	NA
OHF012	Oosthuisfontein	Hornfels flake with hinge terminations	0 to 5	MSA	-30.37804	24.19289	NCW	NA
OHF013	Oosthuisfontein	Kraal, jojos, concrete yank	n/a	Modern	-30.37791	24.18143	NCW	NA
OHF014	Oosthuisfontein	Patinated hornfels point	0 to 5	MSA	-30.37413	24.17886	NCW	NA
OHF015	Oosthuisfontein	Side struck hornfels flake with prominent bulb of percussion	0 to 5	MSA	-30.37341	24.18228	NCW	NA
OHF016	Oosthuisfontein	Patinated hornfels point	0 to 5	MSA	-30.37309	24.18823	NCW	NA
OHF017	Oosthuisfontein	Patinated hornfels flakes prepared platform	0 to 5	MSA	-30.37268	24.19482	NCW	NA
OHF018	Oosthuisfontein	Early Msa siltstone flake	0 to 5	MSA	-30.36808	24.19723	NCW	NA
PD001	Pro Deo	Hornfels blades, flakes in amongst dolerite outcrop	10 to 30	MSA	-30.15254	24.2759	IIIB	Shift development away from outcrop
PD002	Pro Deo	Kraal	n/a	Modern	-30.147	24.2742	NCW	NA
PD003	Pro Deo	Hornfels bladelet and segment	0 to 5	MSA	-30.14487	24.27096	NCW	NA
PD004	Pro Deo	Hornfels point	0 to 5	LSA	-30.14972	24.27211	NCW	NA
PD005	Pro Deo	Hornfels core and point	0 to 5	MSA	-30.15072	24.2679	NCW	NA
PD006	Pro Deo	Patinated hornfels points	5 to 10	MSA	-30.14877	24.2627	NCW	NA
PD007	Pro Deo	Hornfels segment and point	0 to 5	MSA	-30.14695	24.26673	NCW	NA
PD008	Pro Deo	Engraving, historical, farm scene, stick figures and kraal, animals	n/a	Historical	-30.14533	24.26882	IIIA	100m buffer
PD009	Pro Deo	Patinated hornfels point	0 to 5	MSA	-30.14424	24.2644	NCW	NA
PD010	Pro Deo	Unworked hornfels point	0 to 5	MSA	-30.14315	24.26168	NCW	NA
PD011	Pro Deo	Patinated hornfels flakes	5 to 10	MSA	-30.14154	24.25769	NCW	NA
PD012	Pro Deo	Hornfels blades and flakes	0 to 5	MSA	-30.14292	24.25394	NCW	NA
PD013	Pro Deo	Hornfels blades, prominent bulb of percussion	0 to 5	MSA	-30.14396	24.25075	NCW	NA
PD014	Pro Deo	Hornfels flake with pointed end	0 to 5	LSA	-30.14598	24.25481	NCW	NA
PD015	Pro Deo	Patinated hornfels flakes	5 to 10	MSA	-30.1447	24.25888	NCW	NA
PD016	Pro Deo	Hornfels bladelets, hinge terminations	0 to 5	MSA	-30.14734	24.25884	NCW	NA
PD017	Pro Deo	Hornfels flake, thinned platform	0 to 5	MSA	-30.14589	24.26225	NCW	NA
RK001	Roodekraal	Hornfels core and debitage near kraal	0 to 5	MSA	-30.41238	24.15778	NCW	NA
RK002	Roodekraal	Patinated hornfels assemblage, LSA and MSA cores, flakes	5 to 10	MSA, LSA	-30.41431	24.16267	NCW	NA
RK003	Roodekraal	Siltstone and hornfels flakes	0 to 5	MSA	-30.41562	24.16648	NCW	NA
RK004	Roodekraal	Patinated hornfels flakes, blades, flake with step hinge disconformity	0 to 5	MSA	-30.41428	24.17021	NCW	NA

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RK005	Roodekraal	Large early MSA hornfels flake, retouched, core	0 to 5	MSA	-30.41165	24.17014	NCW	NA
RK006	Roodekraal	Patinated hornfels point and core flake worth edge retouched	0 to 5	MSA	-30.41035	24.16689	NCW	NA
RK007	Roodekraal	Hornfels flakes, prepared platform, siltstone curved notched flake	0 to 5	MSA	-30.40912	24.16437	NCW	NA
RK008	Roodekraal	Patinated hornfels flakes	0 to 5	MSA	-30.40807	24.16187	NCW	NA
RK009	Roodekraal	Patinated hornfels flakes	0 to 5	MSA	-30.40752	24.16037	NCW	NA
RK010	Roodekraal	Various blade forms, hornfels	0 to 5	MSA	-30.40667	24.16284	NCW	NA
RK011	Roodekraal	Thin hornfels flake with slight retouch but looks discarded	0 to 5	MSA	-30.40534	24.16476	NCW	NA
RK012	Roodekraal	Various blades and points, patinated hornfels	5 to 10	MSA	-30.40384	24.16711	NCW	NA
RK013	Roodekraal	More hornfels blades and flakes	0 to 5	MSA	-30.40338	24.16859	NCW	NA
RK014	Roodekraal	Hornfels core with edge worked	0 to 5	MSA	-30.40225	24.1704	NCW	NA
RK015	Roodekraal	Hornfels flake with no cortex, popped ventral scar	0 to 5	MSA	-30.40177	24.16929	NCW	NA
RK016	Roodekraal	Notched core flake, hornfels, bladelet	5 to 10	MSA, LSA	-30.40086	24.16671	NCW	NA
RK017	Roodekraal	Hornfels points unifacial	0 to 5	MSA	-30.39955	24.16426	NCW	NA
RK018	Roodekraal	Hornfels flake, very patinated	0 to 5	MSA	-30.39979	24.16044	NCW	NA
RK019	Roodekraal	Fine grained hornfels blade and flake	0 to 5	MSA	-30.40431	24.15763	NCW	NA
RK020	Roodekraal	Rounded and thin hornfels flake with retouch around	0 to 5	MSA	-30.41876	24.160636	NCW	NA
RK021	Roodekraal	Fine grained hornfels flake	0 to 5	MSA	-30.422895	24.165284	NCW	NA
RK022	Roodekraal	Hornfels blade with lateral retouch	0 to 5	MSA	-30.420194	24.150724	NCW	NA
RK023	Roodekraal	Hornfels blade and flake, patinated	0 to 5	MSA	-30.415033	24.151247	NCW	NA
RK024	Roodekraal	Historical engraving – J v.d. B. 1909 apr 14	n/a	Historical	-30.39728	24.15837	IIIA	100m buffer
RK025	Roodekraal	Historical engraving, wagon, field etched in lines	n/a	Historical	-30.39959	24.15663	IIIA	100m buffer
RK026	Roodekraal	eland engraving, very clear; possible human and additional scratches on boulder next to this	n/a	LSA	-30.39933	24.15733	IIIA	100m buffer
RK027	Roodekraal	scratches and grids	n/a	LSA	-30.39926	24.1579	IIIA	100m buffer
RK028	Roodekraal	another scratching	n/a	LSA	-30.39882	24.15822	IIIA	100m buffer
RK029	Roodekraal	letter m vv	n/a	Historical	-30.39875	24.15848	IIIA	100m buffer
RP1001	Ruspoort 1	Patinated hornfels blade	0 to 5	MSA	-30.2770569	24.40415332	NCW	NA
RP1002	Ruspoort 1	Large pointed triangular hornfels flake edge retouched	0 to 5	MSA	-30.2756230	24.3998540	NCW	NA
RP1003	Ruspoort 1	Hornfels blade flakes	0 to 5	MSA	-30.2756968	24.3963506	NCW	NA
RP1004	Ruspoort 1	Hornfels rounded edge flake, retouched, smaller LSA flake	5 to 10	MSA, LSA	-30.2791951	24.39784591	NCW	NA
RP1005	Ruspoort 1	Patinated hornfels point	0 to 5	MSA	-30.2792871	24.39907001	NCW	NA
RP1006	Ruspoort 1	Light brown hornfels flake, dorsal spine	0 to 5	MSA	-30.2810399	24.40346872	NCW	NA
RP1007	Ruspoort 1	Unifacial hornfels points	5 to 10	MSA	-30.28281461	24.40499535	NCW	NA
RP1008	Ruspoort 1	Patinated hornfels flakes, edge retouched	0 to 5	MSA	-30.2837641	24.40362986	NCW	NA
RP1009	Ruspoort 1	Hornfels chunk	0 to 5	MSA	-30.2827735	24.3996900	NCW	NA
RP1010	Ruspoort 1	Patinated hornfels point	0 to 5	MSA	-30.28266118	24.39920175	NCW	NA
RP1011	Ruspoort 1	Hornfels core and microliths	5 to 10	LSA	-30.2856870	24.39482165	NCW	NA

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RP1012	Ruspoort 1	Patinated hornfels core and blade flake	0 to 5	MSA	-30.2866997	24.39814821	NCW	NA
RP1013	Ruspoort 1	Large patinated hornfels flake, edge retouched	0 to 5	MSA	-30.28723441	24.4008004	NCW	NA
RP1014	Ruspoort 1	Curved hornfels segment, patinated	0 to 5	MSA	-30.2885634	24.40405133	NCW	NA
RP1015	Ruspoort 1	Hornfels core and point	5 to 10	MSA	-30.2904957	24.40154724	NCW	NA
RP1016	Ruspoort 1	Hornfels point, core and debitage	0 to 5	LSA	-30.2906027	24.39601118	NCW	NA
RP1017	Ruspoort 1	Very patinated hornfels flakes	0 to 5	MSA	-30.29112927	24.39468817	NCW	NA
RP1018	Ruspoort 1	Hornfels core flake	0 to 5	LSA	-30.2931985	24.39563151	NCW	NA
RP1019	Ruspoort 1	Hornfels core	0 to 5	LSA	-30.2936731	24.3983025	NCW	NA
RP1020	Ruspoort 1	Siltstone core	0 to 5	MSA	-30.2946435	24.40187527	NCW	NA
RP2001	Ruspoort 2	Unifacial large flake	0 to 5	MSA	-30.25735	24.43238	NCW	NA
RP2002	Ruspoort 2	Hornfels core	0 to 5	MSA	-30.25888	24.43661	NCW	NA
RP2003	Ruspoort 2	Patinated hornfels flakes	0 to 5	MSA	-30.26153	24.44317	NCW	NA
RP2004	Ruspoort 2	Hornfels core and microliths	5 to 10	LSA	-30.26507	24.44369	NCW	NA
RP2005	Ruspoort 2	Hornfels blade flake, core flake	0 to 5	MSA	-30.26839	24.44099	NCW	NA
RP2006	Ruspoort 2	Various hornfels flakes	5 to 10	MSA	-30.27227	24.43983	NCW	NA
RP2007	Ruspoort 2	Hornfels core	0 to 5	MSA	-30.27081	24.43368	NCW	NA
RP2008	Ruspoort 2	Patinated hornfels flake	0 to 5	MSA	-30.2671	24.43173	NCW	NA
RP2009	Ruspoort 2	Hornfels core	0 to 5	MSA	-30.26726	24.43679	NCW	NA
RP2010	Ruspoort 2	Hornfels core and microliths	5 to 10	LSA	-30.26468	24.44015	NCW	NA
RP2011	Ruspoort 2	Hornfels bifacial flakes	0 to 5	MSA	-30.26213	24.44076	NCW	NA
RP2012	Ruspoort 2	Hornfels microliths	0 to 5	LSA	-30.26197	24.43777	NCW	NA
RP2013	Ruspoort 2	Hornfels flakes, lateral retouch	5 to 10	MSA	-30.26274	24.43475	NCW	NA
RP2014	Ruspoort 2	Triangular hornfels flakes	0 to 5	MSA	-30.26313	24.43149	NCW	NA
RP2015	Ruspoort 2	Patinated hornfels flakes	0 to 5	MSA	-30.26127	24.4321	NCW	NA
RP2016	Ruspoort 2	Repatinated hornfels point	0 to 5	MSA	-30.25945	24.4337	NCW	NA
RP2017	Ruspoort 2	Curved hornfels flake with edge retouch	0 to 5	MSA	-30.25789	24.43517	NCW	NA
RP2018	Ruspoort 2	Hornfels microliths	0 to 5	LSA	-30.25787	24.43039	NCW	NA
SD001	Strydam	Hornfels flakes in deflation bay	0 to 5	MSA	-30.36479	24.20372	NCW	NA
SD002	Strydam	Patinated hornfels chunk	0 to 5	MSA	-30.36376	24.19597	NCW	NA
SD003	Strydam	Very patinated hornfels flake	0 to 5	MSA	-30.36496	24.19151	NCW	NA
SD004	Strydam	Patinated hornfels flakes, unworked	0 to 5	MSA	-30.36561	24.18838	NCW	NA
SD005	Strydam	Broken silcrete point	0 to 5	LSA	-30.36624	24.18338	NCW	NA
SD006	Strydam	Hornfels blade flake with prominent dorsal spine	0 to 5	MSA	-30.36871	24.18792	NCW	NA
SD007	Strydam	Hornfels flakes with minor retouch	0 to 5	MSA	-30.36955	24.1917	NCW	NA
SD008	Strydam	Hornfels point with retouched hafted end	0 to 5	MSA	-30.37094	24.20218	NCW	NA
SD009	Strydam	Early Msa unifacial, hornfels	0 to 5	MSA	-30.37178	24.2071	NCW	NA
SD010	Strydam	Hornfels flake with hinge terminations	0 to 5	MSA	-30.37304	24.2083	NCW	NA
SD011	Strydam	Hornfels flake worth pointed end and some retouch along edge	0 to 5	MSA	-30.37472	24.20972	NCW	NA
SD012	Strydam	Patinated hornfels flakes	0 to 5	MSA	-30.37565	24.21037	NCW	NA
SD013	Strydam	Hornfels point flake with prepared platform	0 to 5	MSA	-30.37722	24.21154	NCW	NA

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SD014	Strydam	Thin hornfels microlith	5 to 10	LSA	-30.38072	24.21417	NCW	NA
SD015	Strydam	Laterally retouched hornfels flake	0 to 5	MSA	-30.38593	24.21539	NCW	NA
SD016	Strydam	Hornfels core	0 to 5	MSA	-30.38468	24.21264	NCW	NA
TK001	Tafelkop	Farmhouse complex, Victorian double pitched roof	n/a	Historical	-30.1608	24.328	IIIB	100m buffer
TK002	Tafelkop	Patinated hornfels blade flake	0 to 5	MSA	-30.16426	24.32108	NCW	NA
TK003	Tafelkop	Very patinated hornfels flake	0 to 5	MSA	-30.1659	24.32625	NCW	NA
TK004	Tafelkop	Hornfels microlithic point and core	0 to 5	LSA	-30.16706	24.3307	NCW	NA
TK005	Tafelkop	Hornfels blade and point	5 to 10	MSA	-30.16768	24.33694	NCW	NA
TK006	Tafelkop	Large leaf shaped hornfels flake, possibly hafted	0 to 5	MSA	-30.17005	24.34098	NCW	NA
TK007	Tafelkop	Patinated hornfels segment and point	0 to 5	MSA	-30.17553	24.34606	NCW	NA
TK008	Tafelkop	Hornfels early MSA flake	0 to 5	MSA	-30.17427	24.33893	NCW	NA
TK009	Tafelkop	Patinated hornfels points	0 to 5	MSA	-30.17146	24.33147	NCW	NA
TK010	Tafelkop	Patinated hornfels flakes, rounded and blade	0 to 5	MSA	-30.16907	24.32478	NCW	NA
TK011	Tafelkop	Hornfels flake derived from radial core	0 to 5	MSA	-30.16856	24.32038	NCW	NA
TK012	Tafelkop	Hornfels blade and point, dorsal scar terminations	0 to 5	MSA	-30.17314	24.32486	NCW	NA
TK013	Tafelkop	Retouched hornfels points	5 to 10	MSA, LSA	-30.17447	24.32949	NCW	NA
TK014	Tafelkop	Curved hornfels flake	0 to 5	MSA	-30.17429	24.33442	NCW	NA
TK015	Tafelkop	Kraal	n/a	Modern	-30.16931	24.33807	NCW	NA
TK016	Tafelkop	Hornfels flake with prepared platform	0 to 5	MSA	-30.1799	24.34603	NCW	NA
TK017	Tafelkop	Patinated hornfels points	0 to 5	MSA	-30.1786	24.34076	NCW	NA
TK018	Tafelkop	Hornfels blade flake	0 to 5	MSA	-30.17908	24.33468	NCW	NA
TK019	Tafelkop	Very patinated hornfels flakes	0 to 5	MSA	-30.18218	24.34066	NCW	NA
TK020	Tafelkop	Hornfels flakes prominent platform	0 to 5	MSA	-30.18449	24.34552	NCW	NA
UK001	Uitkyk	Hornfels point and chunk	0 to 5	MSA	-30.14369	24.27614	NCW	NA
UK002	Uitkyk	Patinated hornfels flake	0 to 5	MSA	-30.14227	24.27125	NCW	NA
UK003	Uitkyk	Hornfels core flake	0 to 5	MSA	-30.13948	24.26471	NCW	NA
UK004	Uitkyk	Hornfels flake	0 to 5	MSA	-30.13913	24.27088	NCW	NA
UK005	Uitkyk	Patinated hornfels points	0 to 5	MSA	-30.1367	24.27613	NCW	NA
UK006	Uitkyk	Hornfels flakes	0 to 5	MSA	-30.13491	24.28372	NCW	NA
UK007	Uitkyk	Thin hornfels blade flake	0 to 5	MSA	-30.13861	24.2855	NCW	NA
UK008	Uitkyk	Patinated hornfels flakes	0 to 5	MSA	-30.13822	24.28131	NCW	NA
UK009	Uitkyk	Very patinated hornfels blades, flakes	5 to 10	MSA	-30.13931	24.27795	NCW	NA
UK010	Uitkyk	Hornfels microliths	0 to 5	LSA	-30.14124	24.27943	NCW	NA
UK011	Uitkyk	Retouched hornfels flakes, one triangular	0 to 5	MSA	-30.14202	24.28329	NCW	NA
UK012	Uitkyk	Hornfels flakes, platform thinned away	0 to 5	MSA	-30.14411	24.28405	NCW	NA
UK013	Uitkyk	Hornfels points	0 to 5	MSA	-30.14716	24.28349	NCW	NA
UK014	Uitkyk	Trapezoidal hornfels flake	0 to 5	MSA	-30.14697	24.28158	NCW	NA
UK015	Uitkyk	Large hornfels flake	0 to 5	MSA	-30.14464	24.28166	NCW	NA
UK016	Uitkyk	Hornfels segment and flake	0 to 5	MSA	-30.1434	24.27935	NCW	NA
VRD001	Vrede	Kraal, dam, broken windmill	n/a	Modern, historical	-30.2083906	24.31516593	NCW	NA
VRD002	Vrede	Patinated hornfels flake	0 to 5	MSA	-30.2052453	24.31940868	NCW	NA

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VRD003	Vrede	Hornfels flakes, no retouch	5 to 10	MSA	-30.21134165	24.34137166	NCW	NA
VRD004	Vrede	Hornfels flakes, pointed end on one	0 to 5	MSA	-30.2097885	24.33082838	NCW	NA
VRD005	Vrede	Patinated hornfels flake	0 to 5	MSA	-30.21481003	24.31840825	NCW	NA
VRD006	Vrede	Hornfels flake, patinated, hornfels core flake,	0 to 5	MSA	-30.21516365	24.32193218	NCW	NA
VRD007	Vrede	Patinated hornfels blade flake	0 to 5	MSA	-30.21513324	24.32967428	NCW	NA
VRD008	Vrede	Very patinated hornfels flakes	0 to 5	MSA	-30.2156577	24.3340628	NCW	NA
VRD009	Vrede	Kraal, jojo	n/a	Modern	-30.21118757	24.3173473	NCW	NA
VRD010	Vrede	Hornfels unifacial point	0 to 5	MSA	-30.21752331	24.33794295	NCW	NA
VRD011	Vrede	Hornfels blade and triangular flake	0 to 5	MSA	-30.2180863	24.33580104	NCW	NA
VRD012	Vrede	Hornfels flake, prominent bulb of percussion	0 to 5	MSA	-30.2185698	24.33366416	NCW	NA
VRD013	Vrede	Patinated hornfels flakes	0 to 5	MSA	-30.2193709	24.32919502	NCW	NA
VRD014	Vrede	Thin hornfels blade	0 to 5	MSA	-30.22014321	24.32558945	NCW	NA
VRD015	Vrede	Patinated hornfels flakes, possibly worked for hafting	5 to 10	MSA	-30.2202569	24.32287078	NCW	NA
VRD016	Vrede	Curved hornfels flake, flake with fine edge retouch	0 to 5	MSA	-30.2204523	24.32229966	NCW	NA
VRD017	Vrede	Leaf shaped hornfels flakes patinated	0 to 5	MSA	-30.22344172	24.32090377	NCW	NA
VRD018	Vrede	Hornfels flake with longitudinal scars on dorsal	0 to 5	MSA	-30.2240909	24.32498744	NCW	NA
VRD019	Vrede	Large hornfels blade flake, early MSA	0 to 5	MSA	-30.2258088	24.3270897	NCW	NA
VRD020	Vrede	Small notched, pointed hornfels flake	0 to 5	MSA	-30.2285938	24.32231696	NCW	NA
WB001	Wag n Bietjie	Hornfels blade with some flake scars, patinated	0 to 5	MSA	-30.22006	24.47843	NCW	NA
WB002	Wag n Bietjie	Fine grained hornfels flake, platform worked away	0 to 5	MSA	-30.21972	24.47363	NCW	NA
WB003	Wag n Bietjie	Hornfels microlith	0 to 5	LSA	-30.21858	24.46878	NCW	NA
WB004	Wag n Bietjie	Kraal	n/a	Modern	-30.21899	24.46385	NCW	NA
WB005	Wag n Bietjie	Patinated hornfels flake and blade edge retouch	0 to 5	MSA	-30.22219	24.46924	NCW	NA
WB006	Wag n Bietjie	Hornfels core and microliths	5 to 10	LSA	-30.225	24.46659	NCW	NA
WB007	Wag n Bietjie	Weathered hornfels flakes	0 to 5	MSA	-30.22976	24.46569	NCW	NA
WB008	Wag n Bietjie	Hornfels flakes, retouched around distal end	0 to 5	MSA	-30.23461	24.46784	NCW	NA
WB009	Wag n Bietjie	Hornfels blade, flake and hammerstone	5 to 10	MSA	-30.23426	24.4694	NCW	NA
WB010	Wag n Bietjie	Hornfels microliths	0 to 5	LSA	-30.23053	24.47014	NCW	NA
WB011	Wag n Bietjie	Hornfels blade and patinated flake	0 to 5	MSA	-30.22686	24.47023	NCW	NA
WB012	Wag n Bietjie	Hornfels flakes, prominent bulbs of percussion	0 to 5	MSA	-30.22643	24.47403	NCW	NA
WB013	Wag n Bietjie	Hornfels point and flake	0 to 5	MSA	-30.2246	24.47223	NCW	NA
WB014	Wag n Bietjie	Hornfels flake, patinated	0 to 5	MSA	-30.22291	24.47275	NCW	NA
WB015	Wag n Bietjie	Hornfels point and patinated flake	0 to 5	MSA	-30.22388	24.476	NCW	NA
WB016	Wag n Bietjie	Hornfels hammerstone and flake	0 to 5	MSA	-30.22235	24.47711	NCW	NA
WB017	Wag n Bietjie	Large hornfels flake with prominent bulb of percussion	0 to 5	MSA	-30.22095	24.47562	NCW	NA
WB018	Wag n Bietjie	Patinated hornfels flake	0 to 5	MSA	-30.22107	24.48068	NCW	NA
ZH001	Zionsheuvel	Hornfels core and flakes, blade	0 to 5	MSA	-30.26606	24.42482	NCW	NA
ZH002	Zionsheuvel	Fine grained hornfels flake edge retouched	0 to 5	LSA	-30.26405	24.41775	NCW	NA

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ZH003	Zionsheuvel	Patinated hornfels flakes	0 to 5	MSA	-30.26203	24.42126	NCW	NA
ZH004	Zionsheuvel	Long hornfels core	0 to 5	MSA	-30.25999	24.42762	NCW	NA
ZH005	Zionsheuvel	Hornfels flakes	0 to 5	MSA	-30.25761	24.42284	NCW	NA
ZH006	Zionsheuvel	Quartzite and hornfels flakes	5 to 10	MSA	-30.25698	24.41827	NCW	NA
ZH007	Zionsheuvel	Hornfels core and thinned flake, narrow platform	0 to 5	MSA	-30.25469	24.41706	NCW	NA
ZH008	Zionsheuvel	Patinated hornfels flakes	0 to 5	MSA	-30.25216	24.42554	NCW	NA
ZH009	Zionsheuvel	Patinated hornfels points	5 to 10	MSA	-30.25082	24.42922	NCW	NA
ZH010	Zionsheuvel	Hornfels flake with worked platform	0 to 5	MSA	-30.24942	24.42715	NCW	NA
ZH011	Zionsheuvel	Early Msa hornfels curved flake	0 to 5	MSA	-30.24898	24.42388	NCW	NA
ZH012	Zionsheuvel	Very patinated hornfels flakes	5 to 10	MSA	-30.24873	24.42058	NCW	NA
ZH013	Zionsheuvel	Hornfels points, one triangular, sharp pointed end	0 to 5	MSA	-30.2445	24.42062	NCW	NA
ZH014	Zionsheuvel	Very patinated hornfels flake and blade	0 to 5	MSA	-30.244	24.42405	NCW	NA
ZH015	Zionsheuvel	Hornfels core	0 to 5	MSA	-30.2424	24.42899	NCW	NA
ZH016	Zionsheuvel	Patinated hornfels flake and core	0 to 5	MSA	-30.23962	24.4312	NCW	NA
ZH017	Zionsheuvel	Hornfels debitage, flakes	5 to 10	MSA	-30.23898	24.4295	NCW	NA
ZH018	Zionsheuvel	Patinated hornfels blade	0 to 5	MSA	-30.23732	24.42478	NCW	NA
ZH019	Zionsheuvel	Hornfels flake, 50% cortex, prepared platform, core	5 to 10	MSA	-30.23467	24.42625	NCW	NA
ZH020	Zionsheuvel	Patinated hornfels flakes	0 to 5	MSA	-30.23471	24.43112	NCW	NA
ZH021	Zionsheuvel	Larger hornfels flake	0 to 5	MSA	-30.2325	24.43198	NCW	NA
ZH022	Zionsheuvel	Patinated hornfels radial core, Point	0 to 5	MSA	-30.23115	24.42823	NCW	NA
ZH023	Zionsheuvel	Lsa hornfels debitage	0 to 5	MSA	-30.23022	24.42968	NCW	NA
ZH024	Zionsheuvel	Patinated hornfels blade, flake with retouched distal end	0 to 5	MSA	-30.22888	24.4327	NCW	NA
ZH025	Zionsheuvel	Kraal	n/a	Modern	-30.24704	24.42612	NCW	NA

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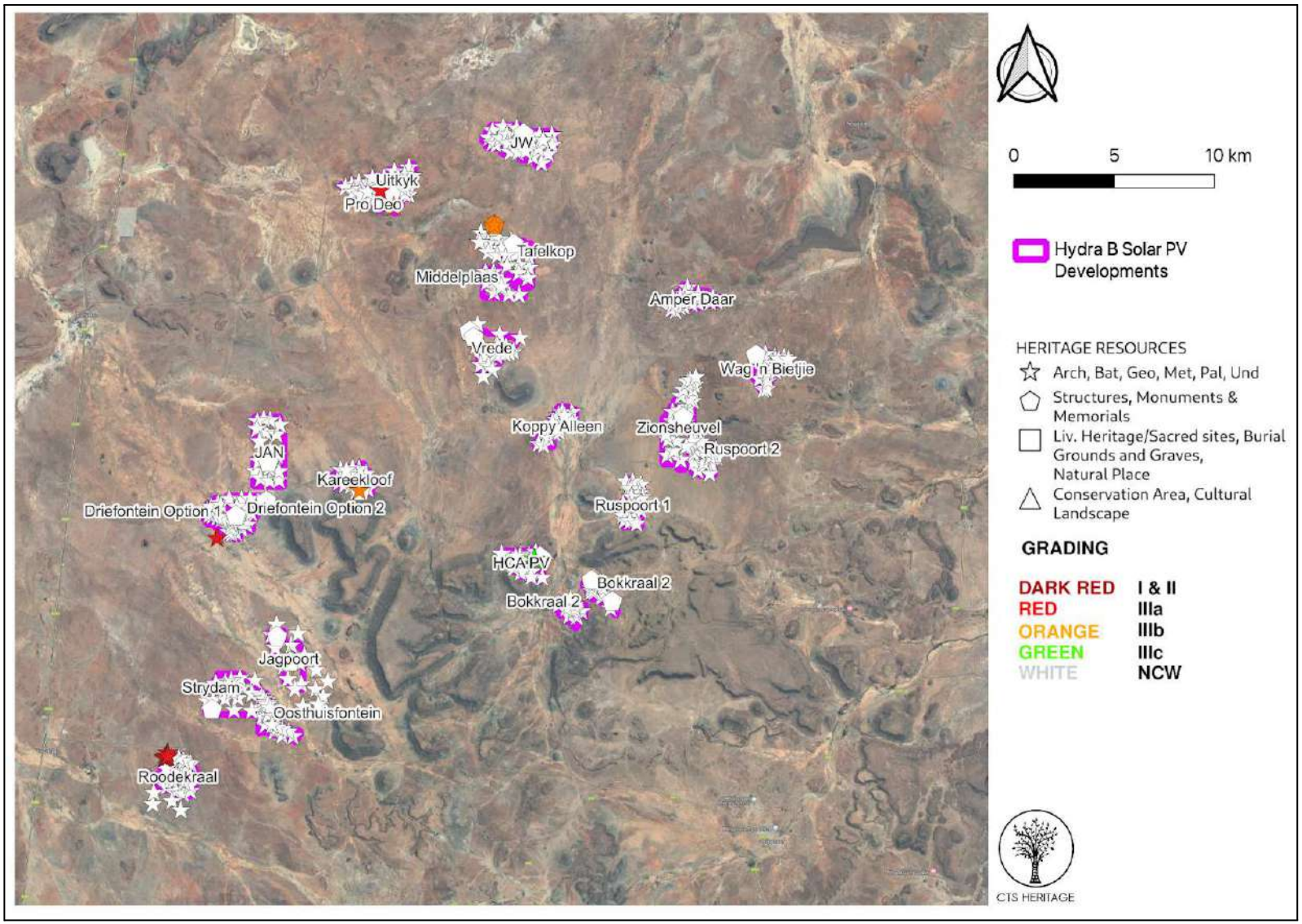

Figure 6: Map of field observations relative to the proposed development

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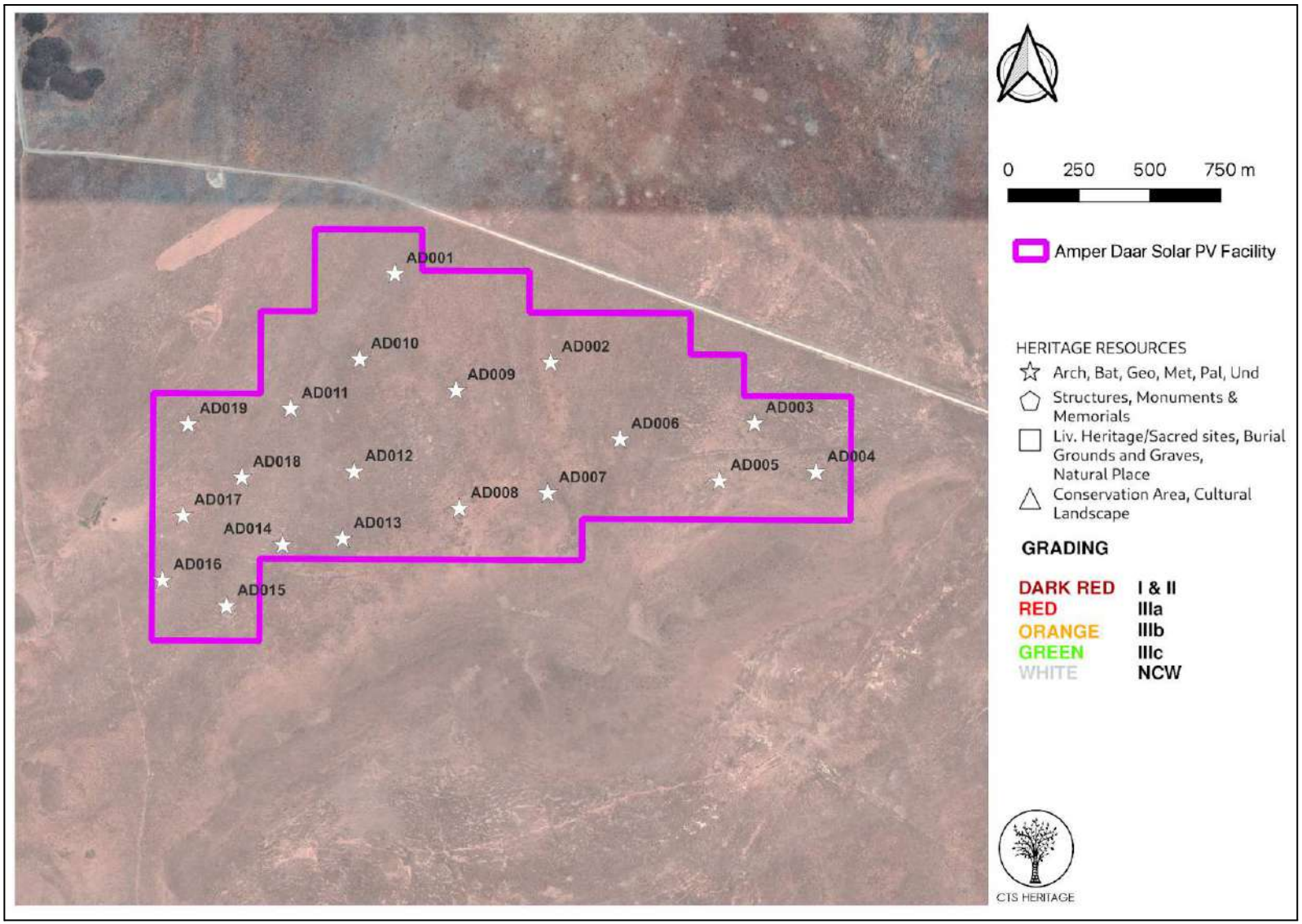

Figure 6.1: Map of field observations relative to the proposed development

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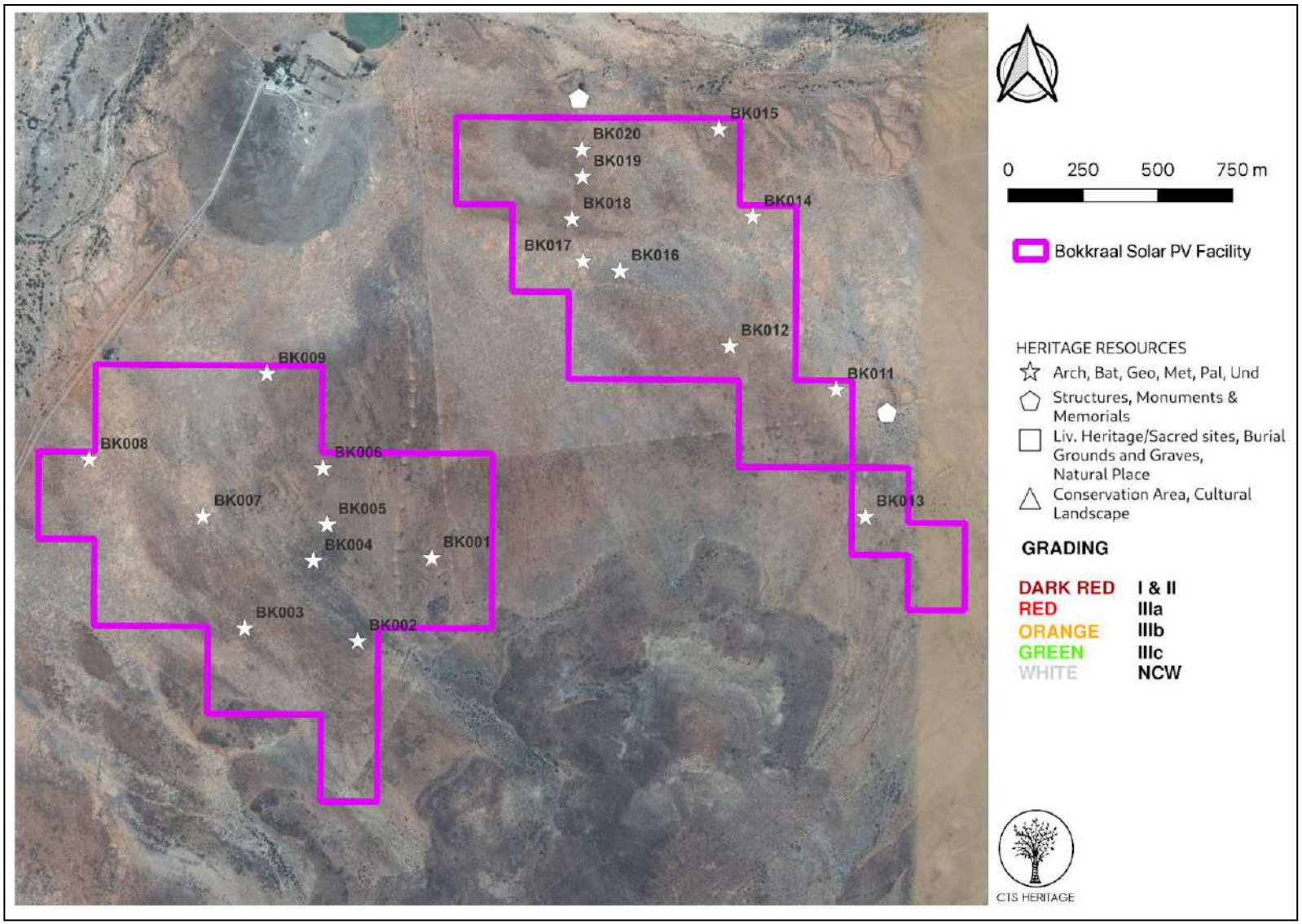

Figure 6.2: Map of field observations relative to the proposed development

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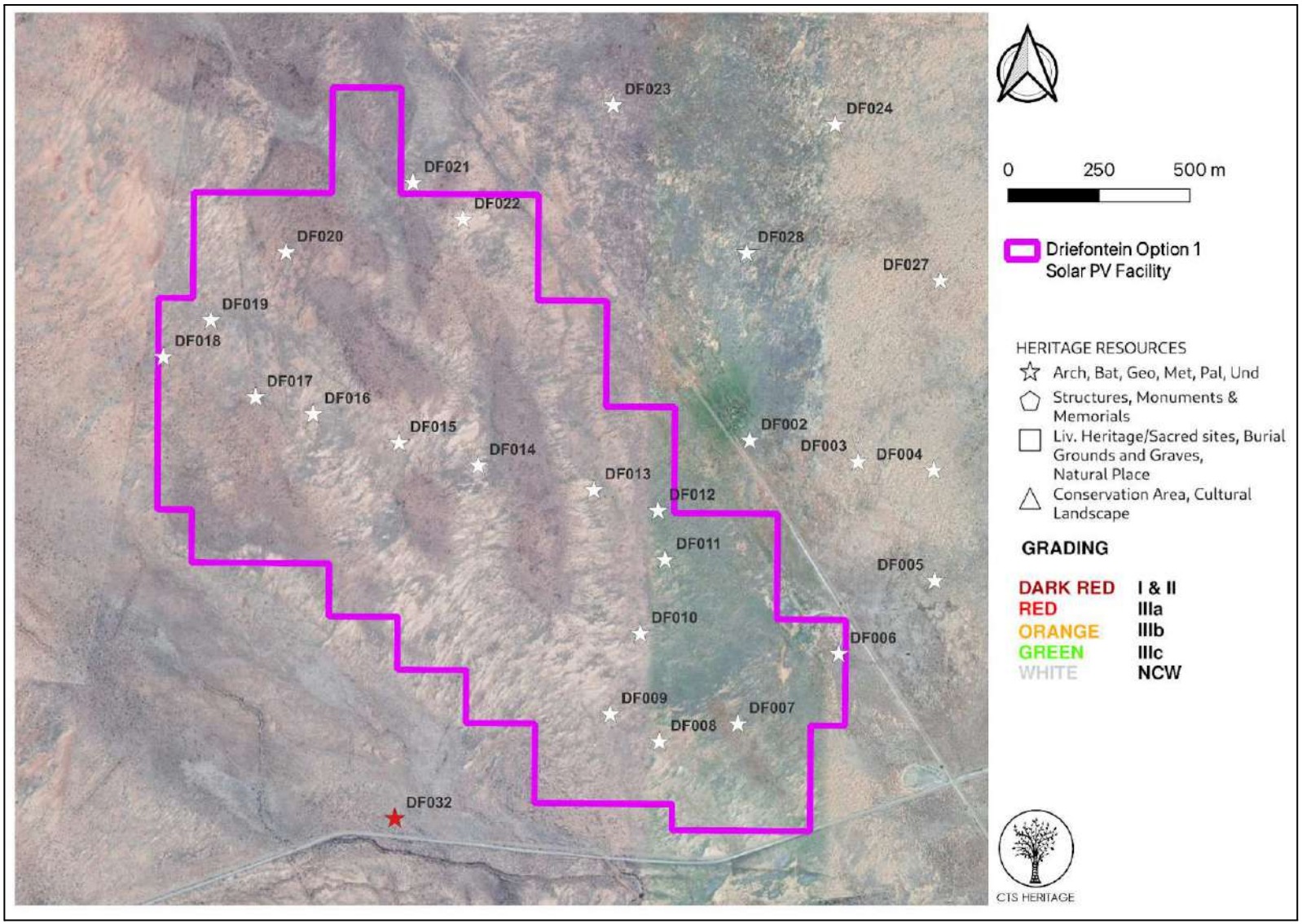

Figure 6.3: Map of field observations relative to the proposed development

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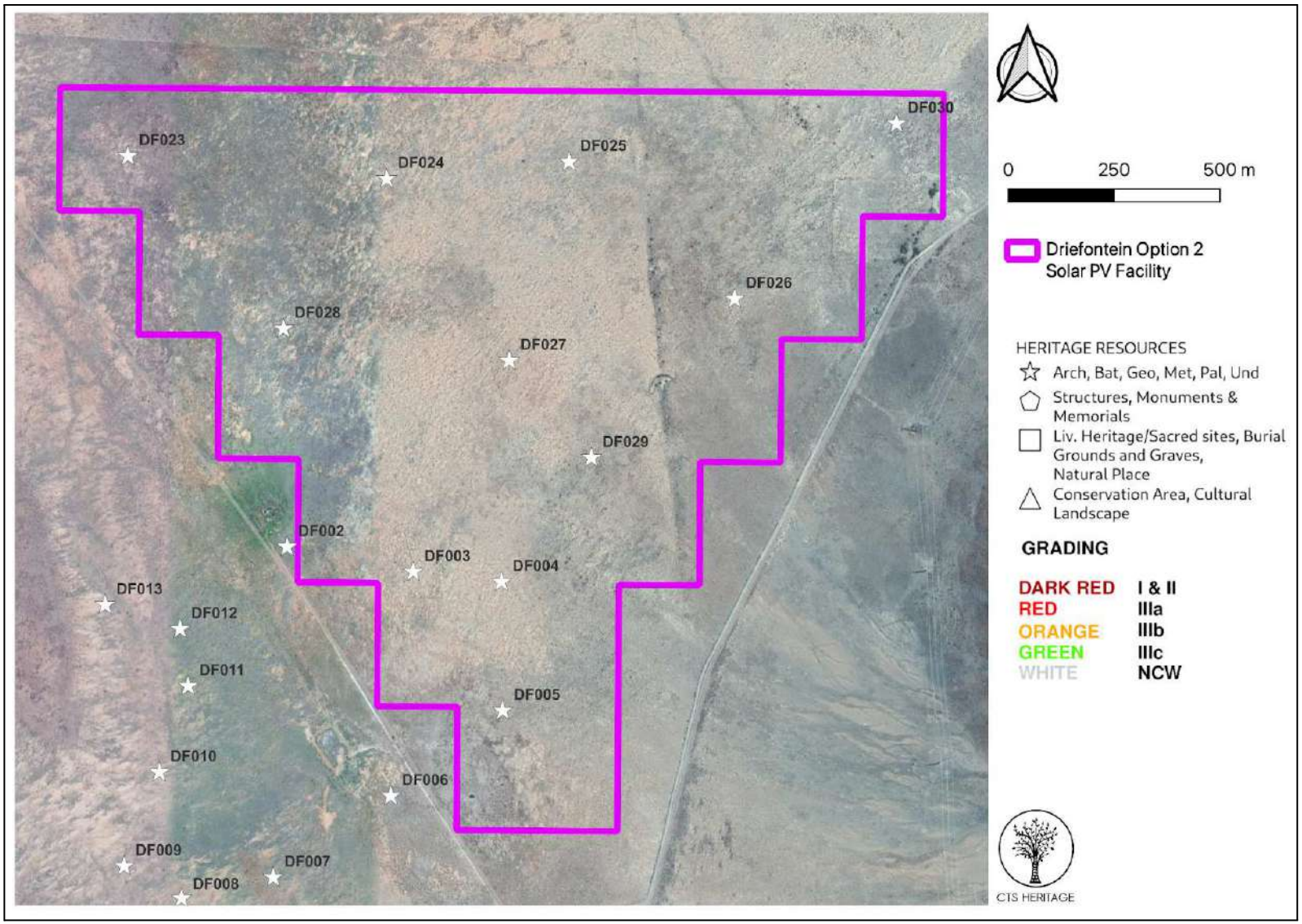

Figure 6.4: Map of field observations relative to the proposed development

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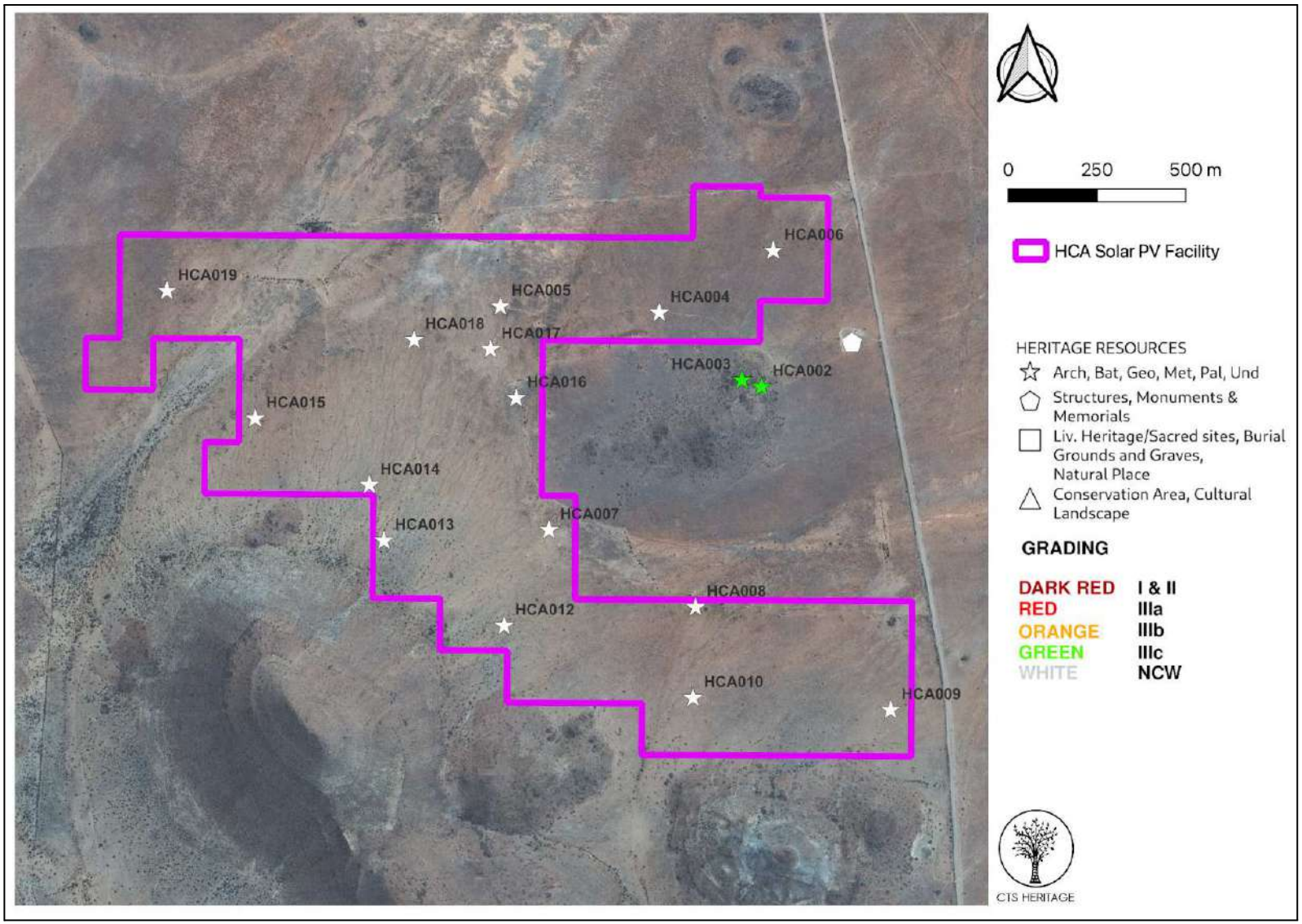

Figure 6.5: Map of field observations relative to the proposed development

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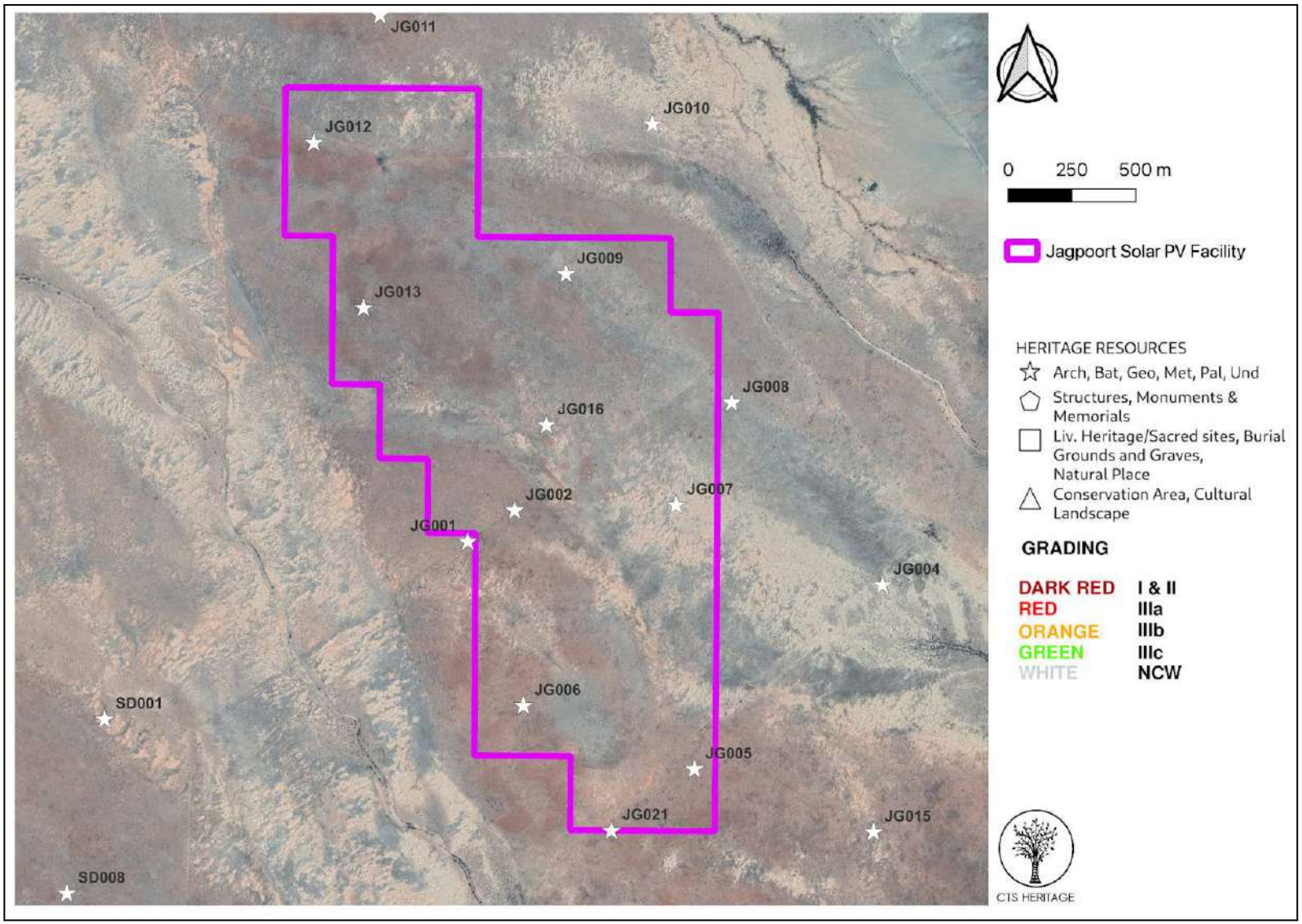

Figure 6.6: Map of field observations relative to the proposed development

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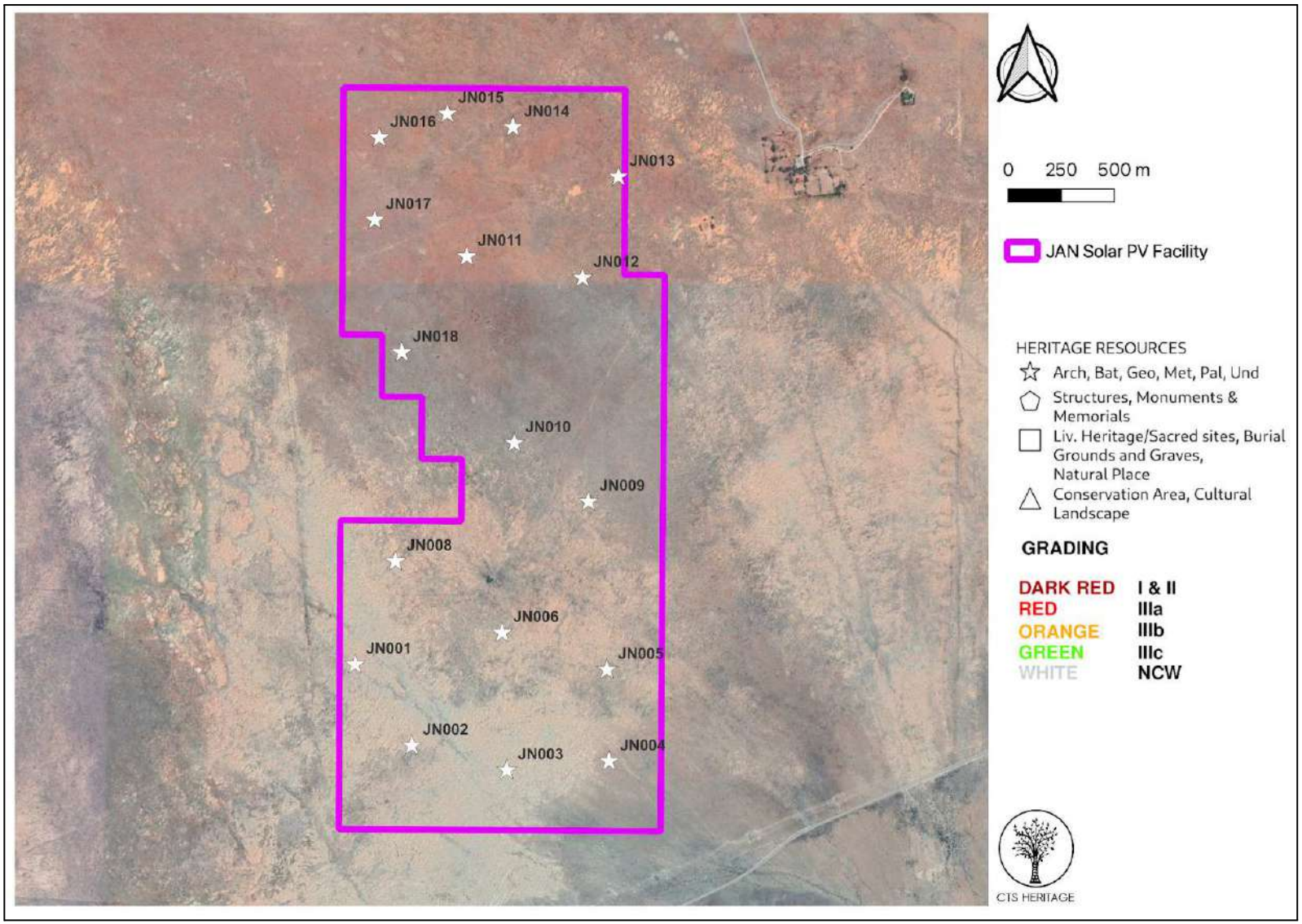

Figure 6.7: Map of field observations relative to the proposed development

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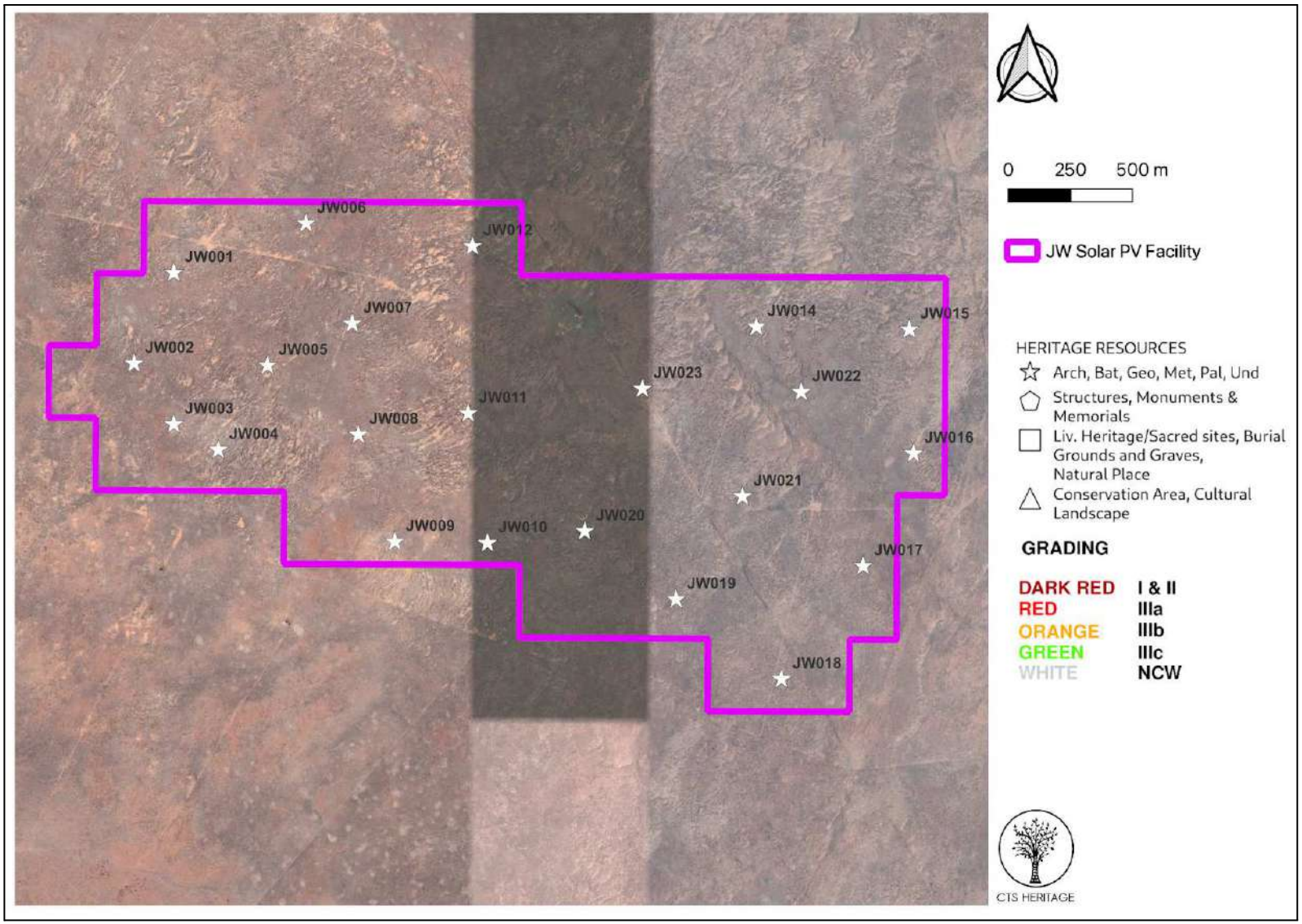

Figure 6.8: Map of field observations relative to the proposed development

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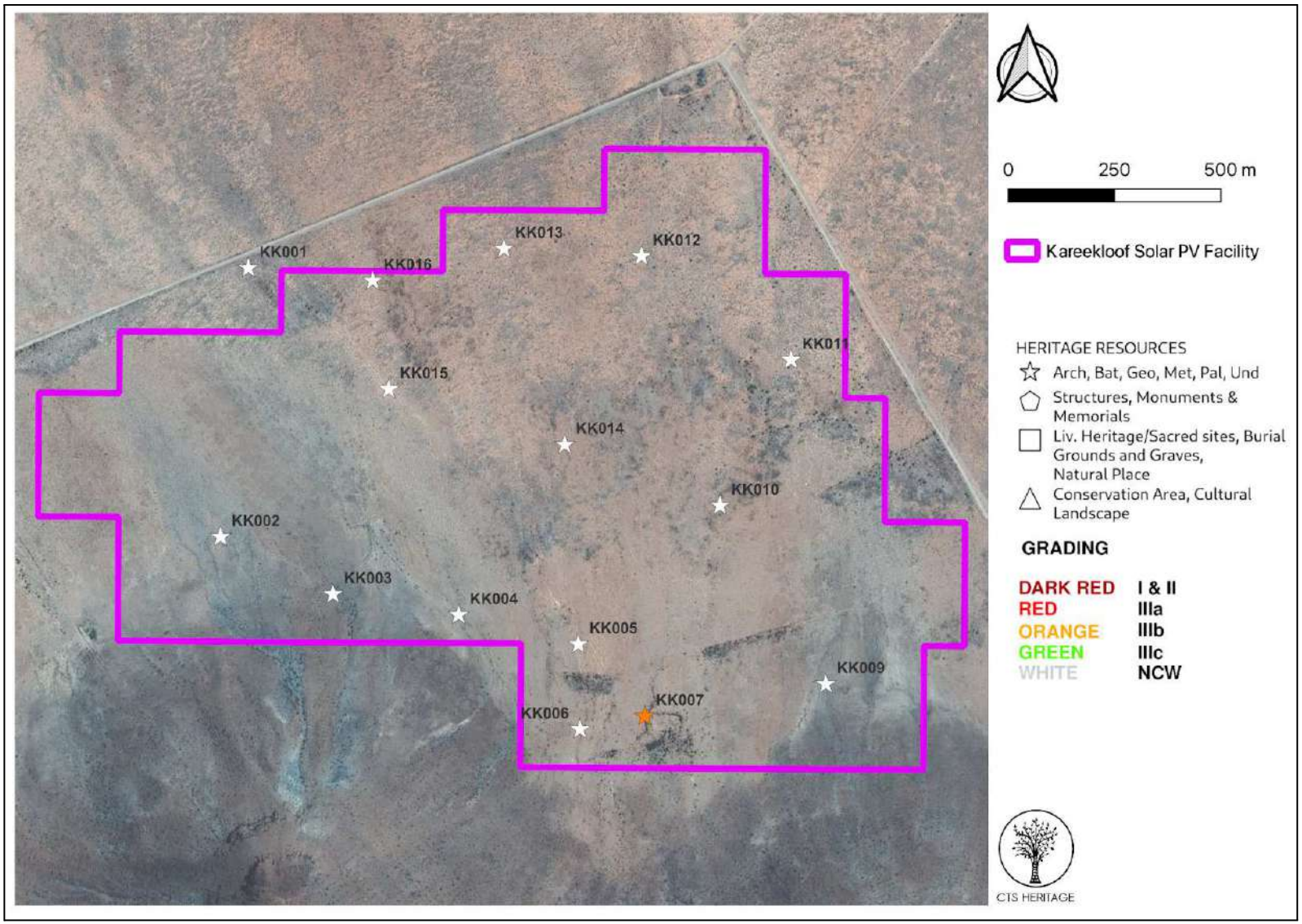

Figure 6.9: Map of field observations relative to the proposed development

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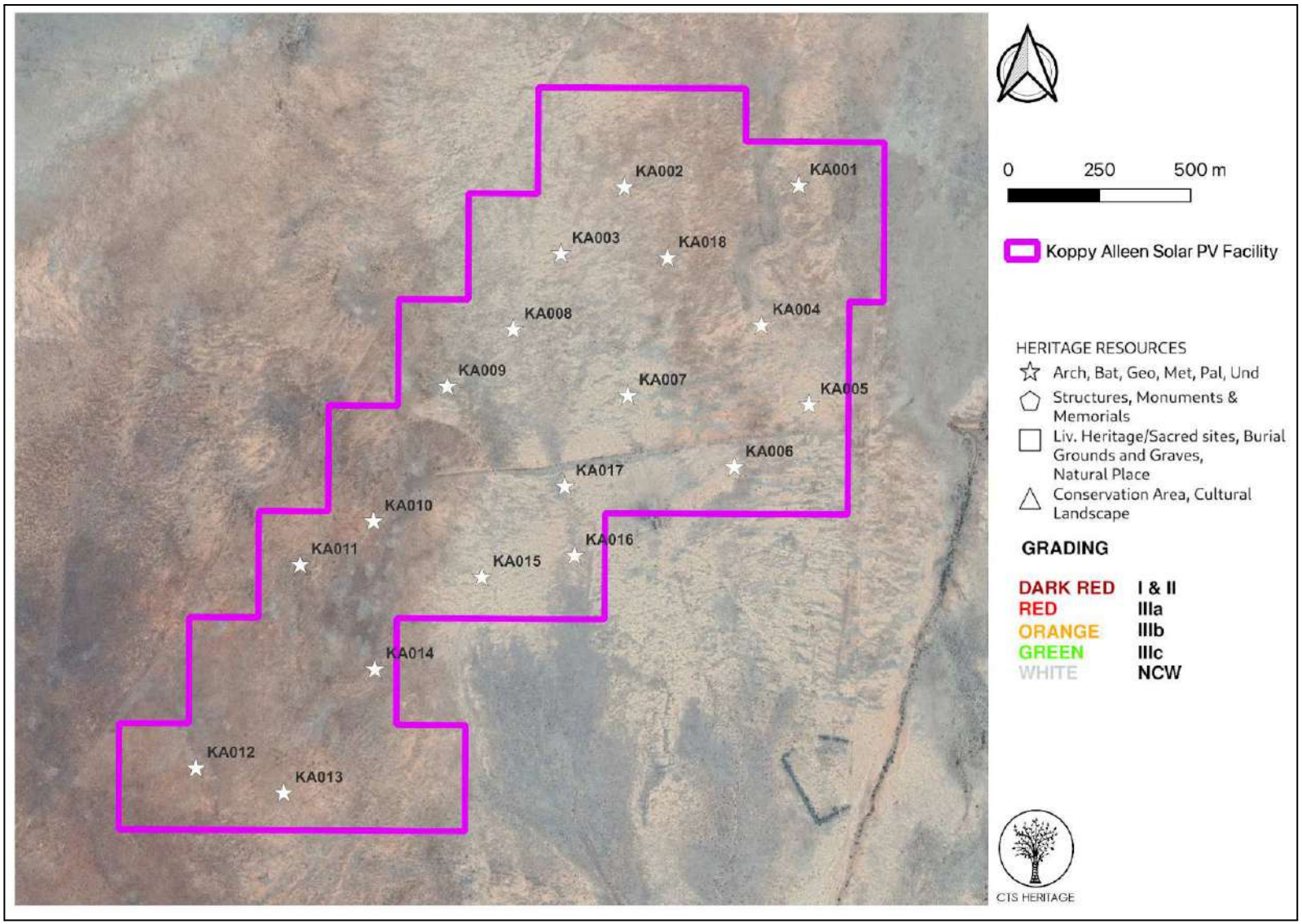

Figure 6.10: Map of field observations relative to the proposed development

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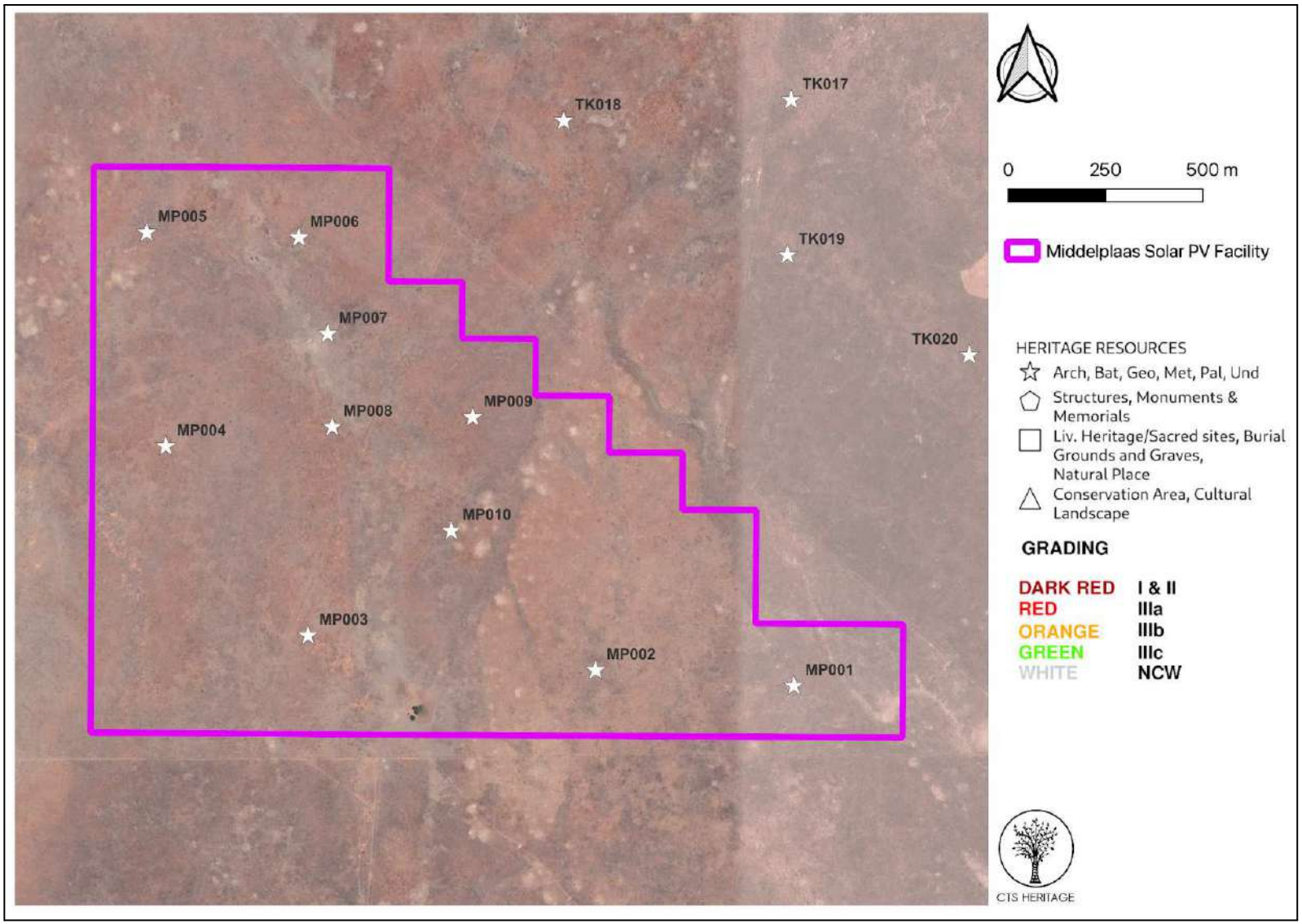

Figure 6.11: Map of field observations relative to the proposed development

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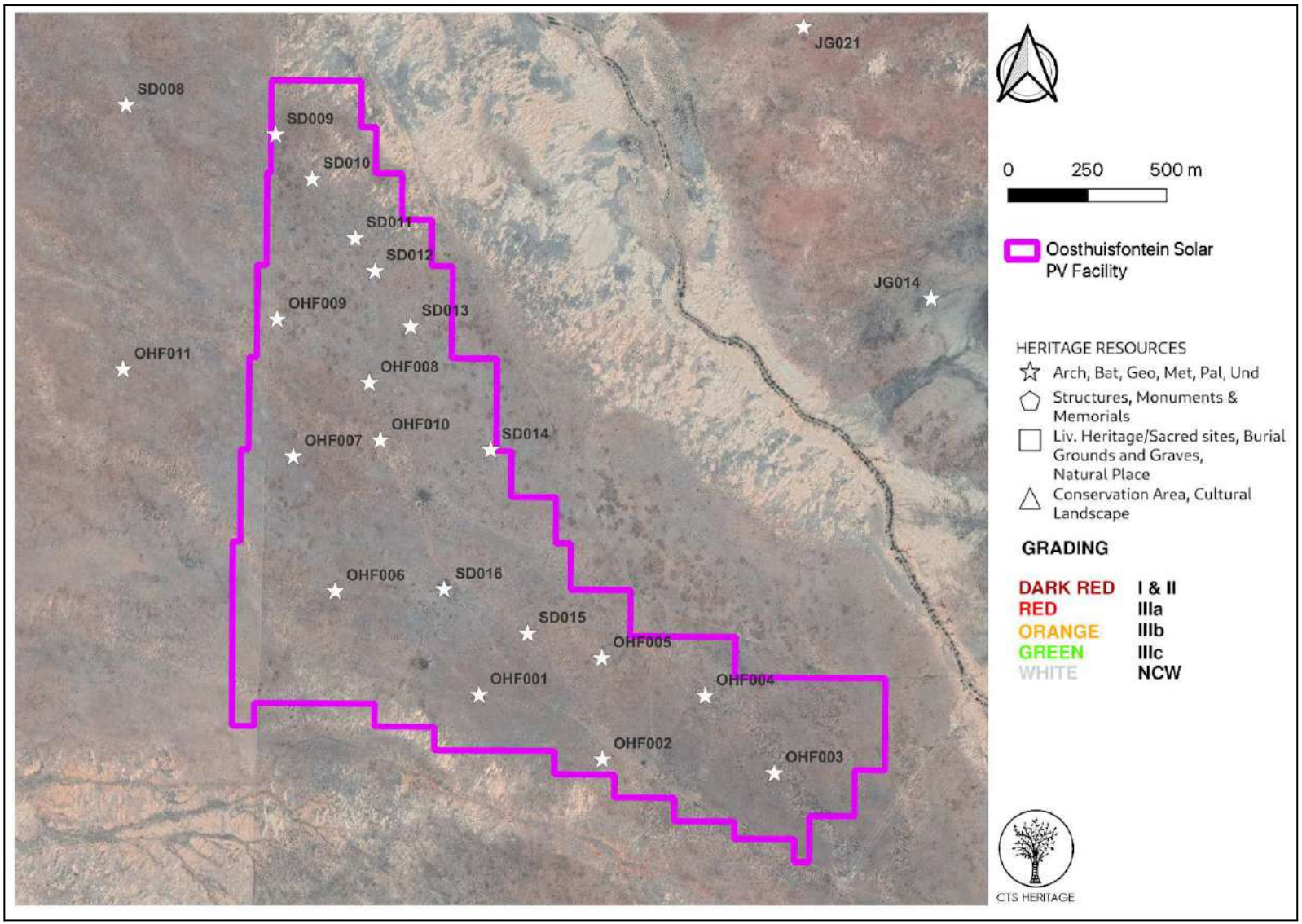

Figure 6.12: Map of field observations relative to the proposed development

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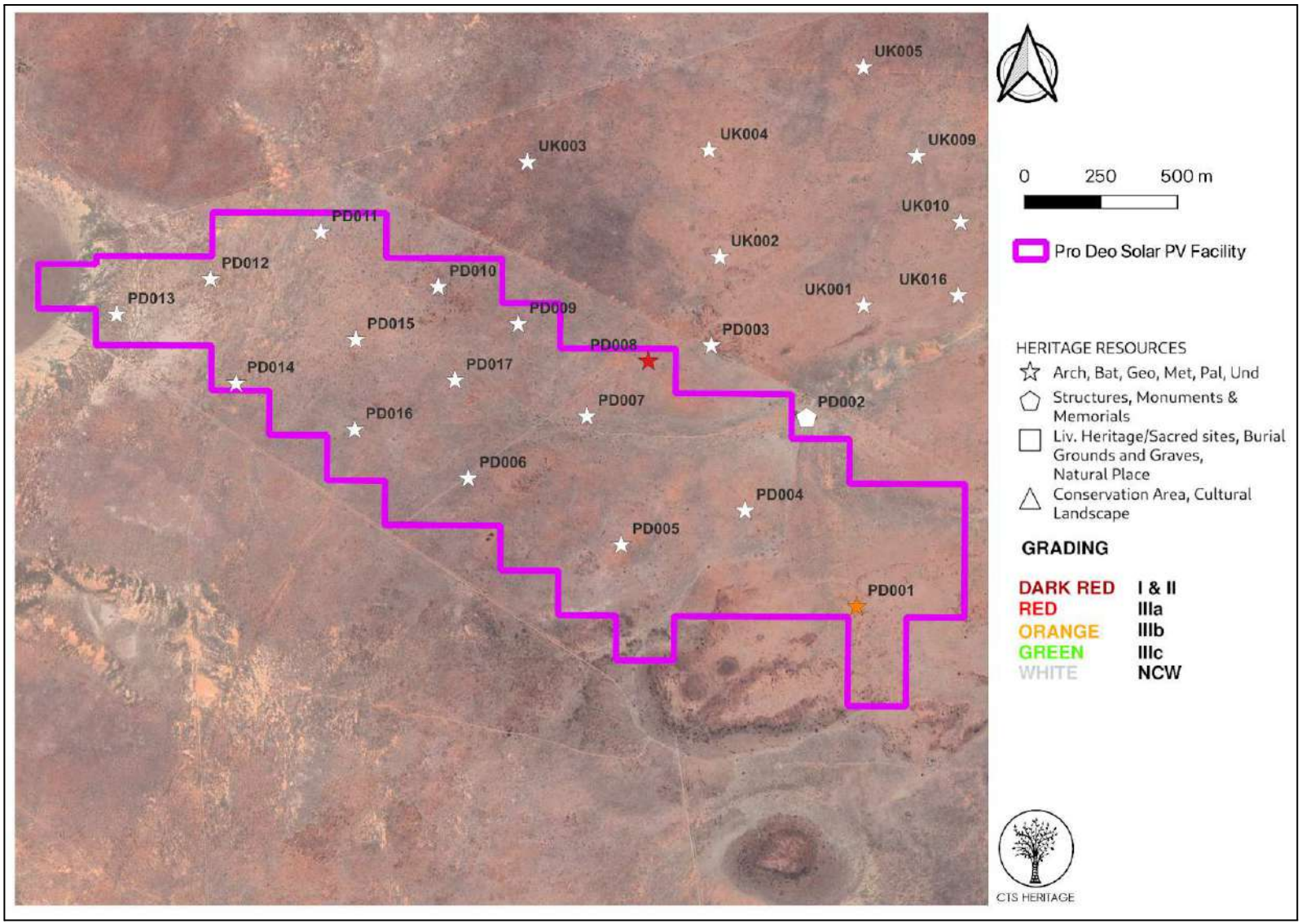

Figure 6.13: Map of field observations relative to the proposed development

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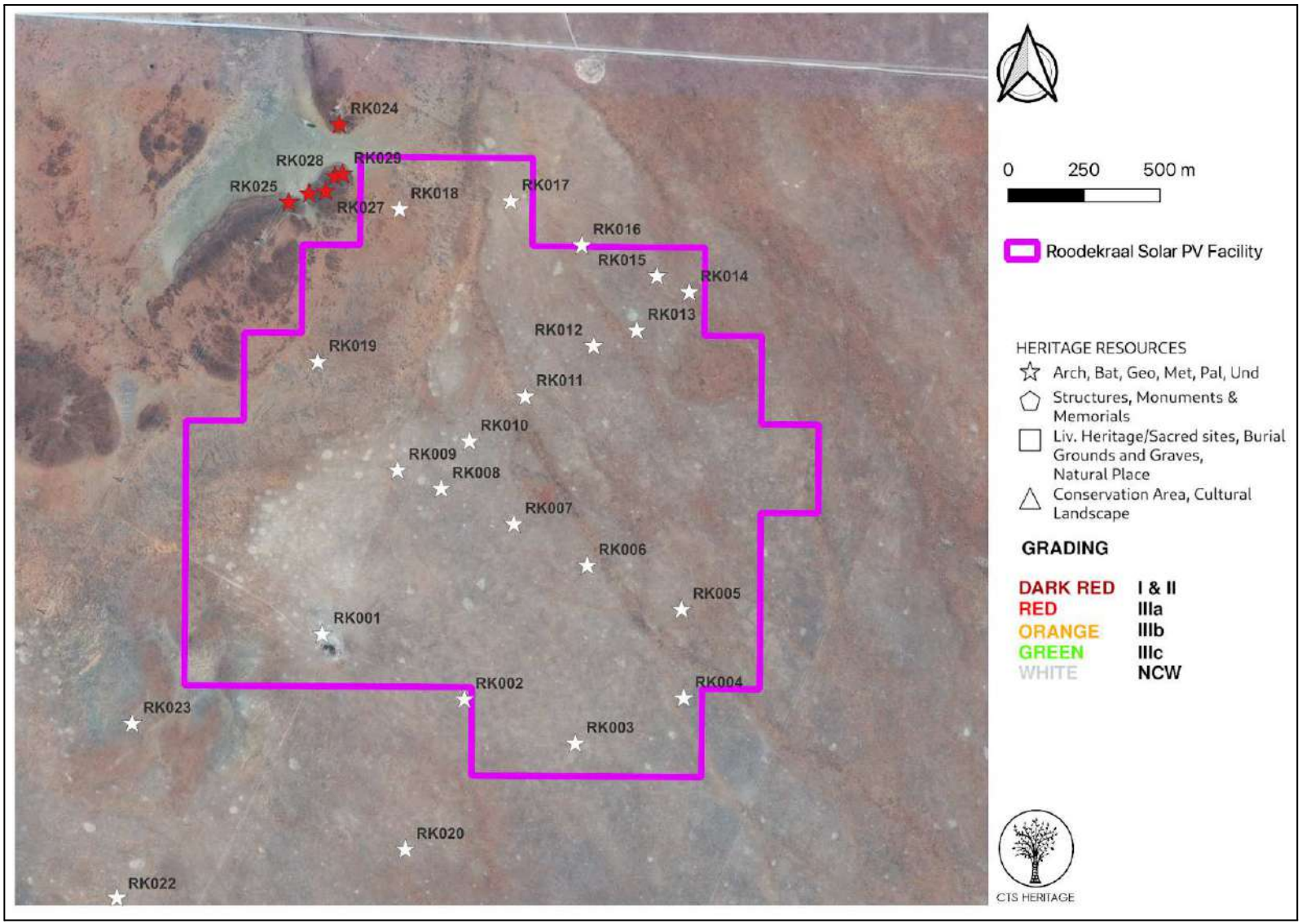

Figure 6.14: Map of field observations relative to the proposed development

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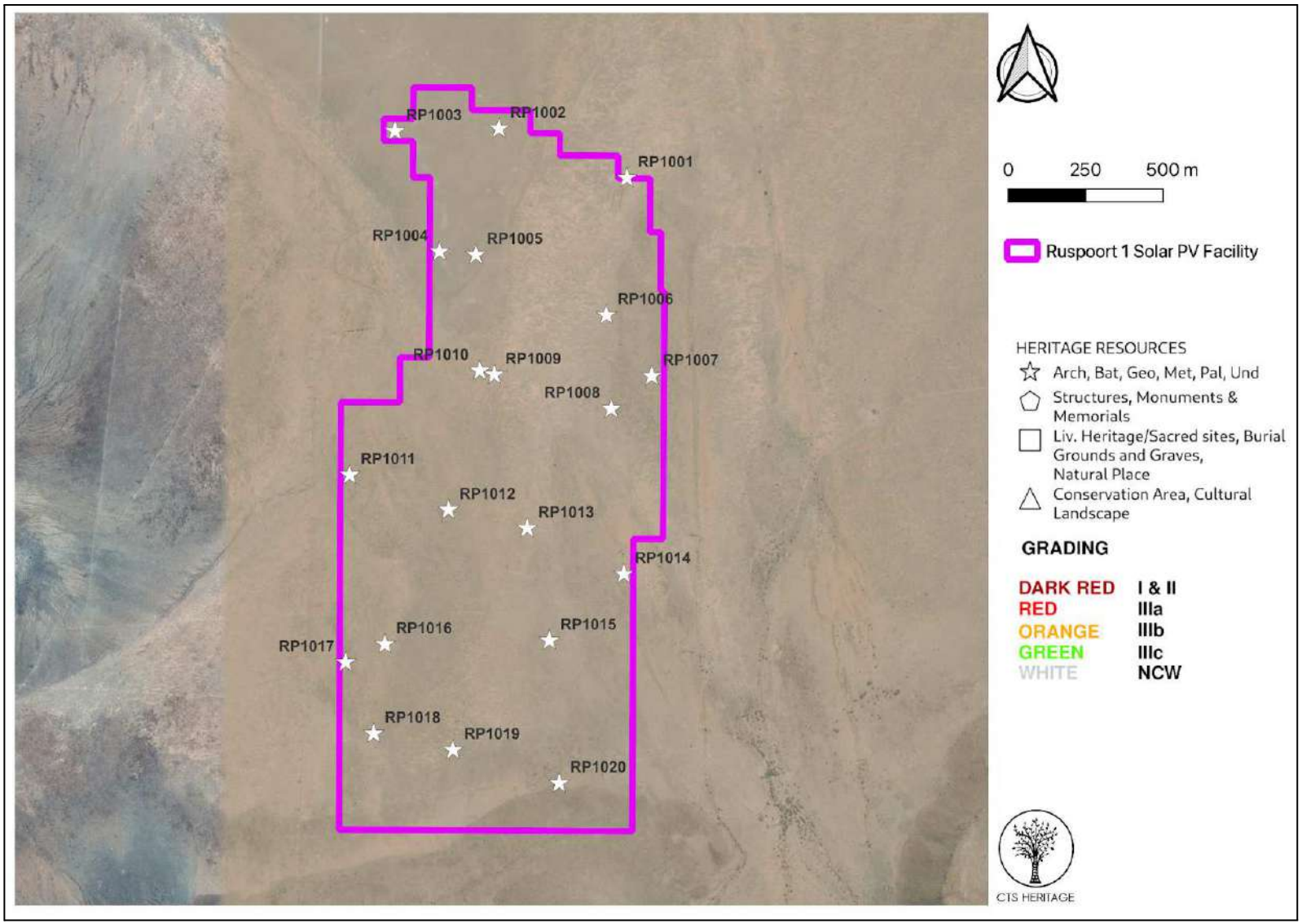

Figure 6.15: Map of field observations relative to the proposed development

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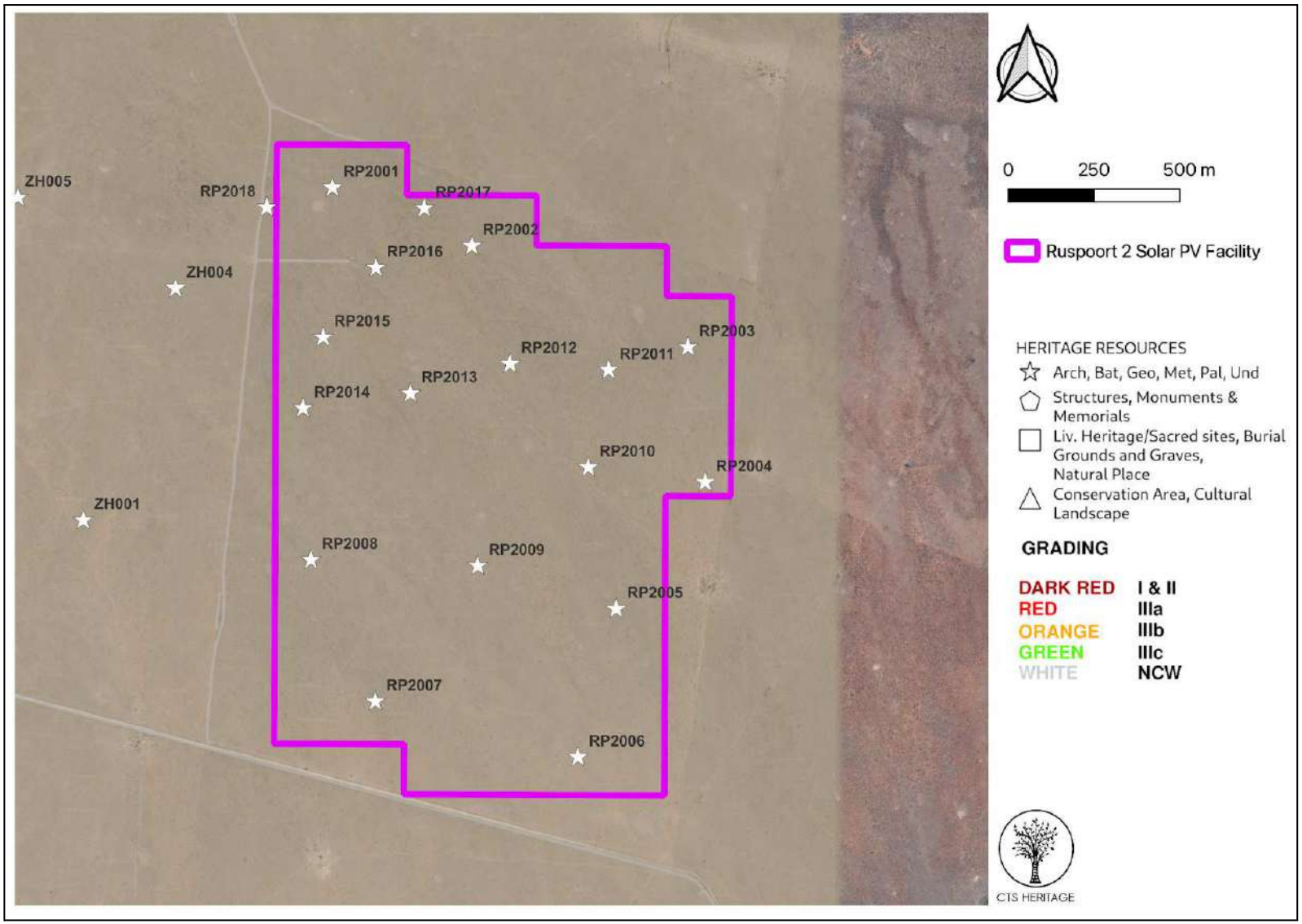

Figure 6.16: Map of field observations relative to the proposed development

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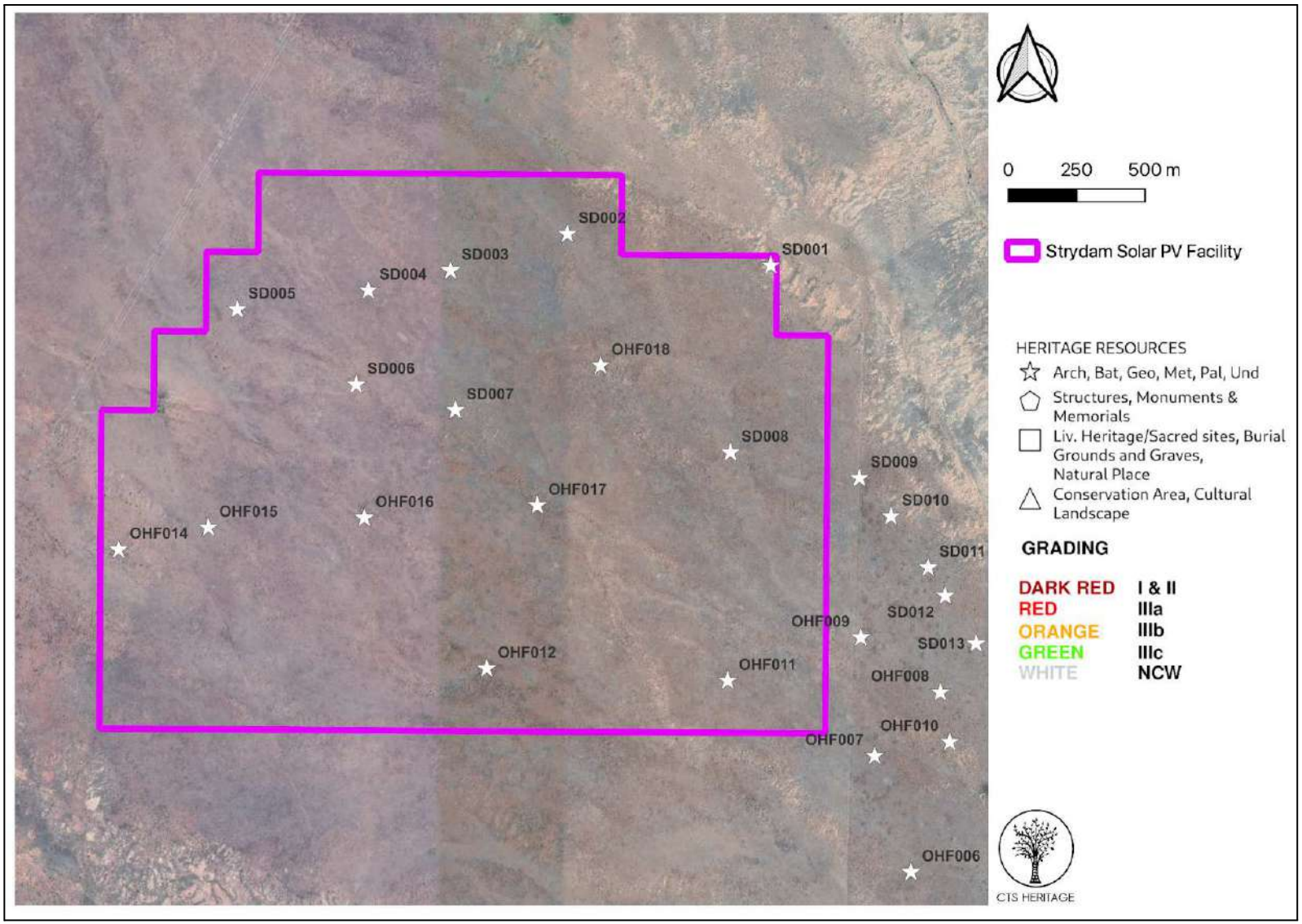

Figure 6.17: Map of field observations relative to the proposed development

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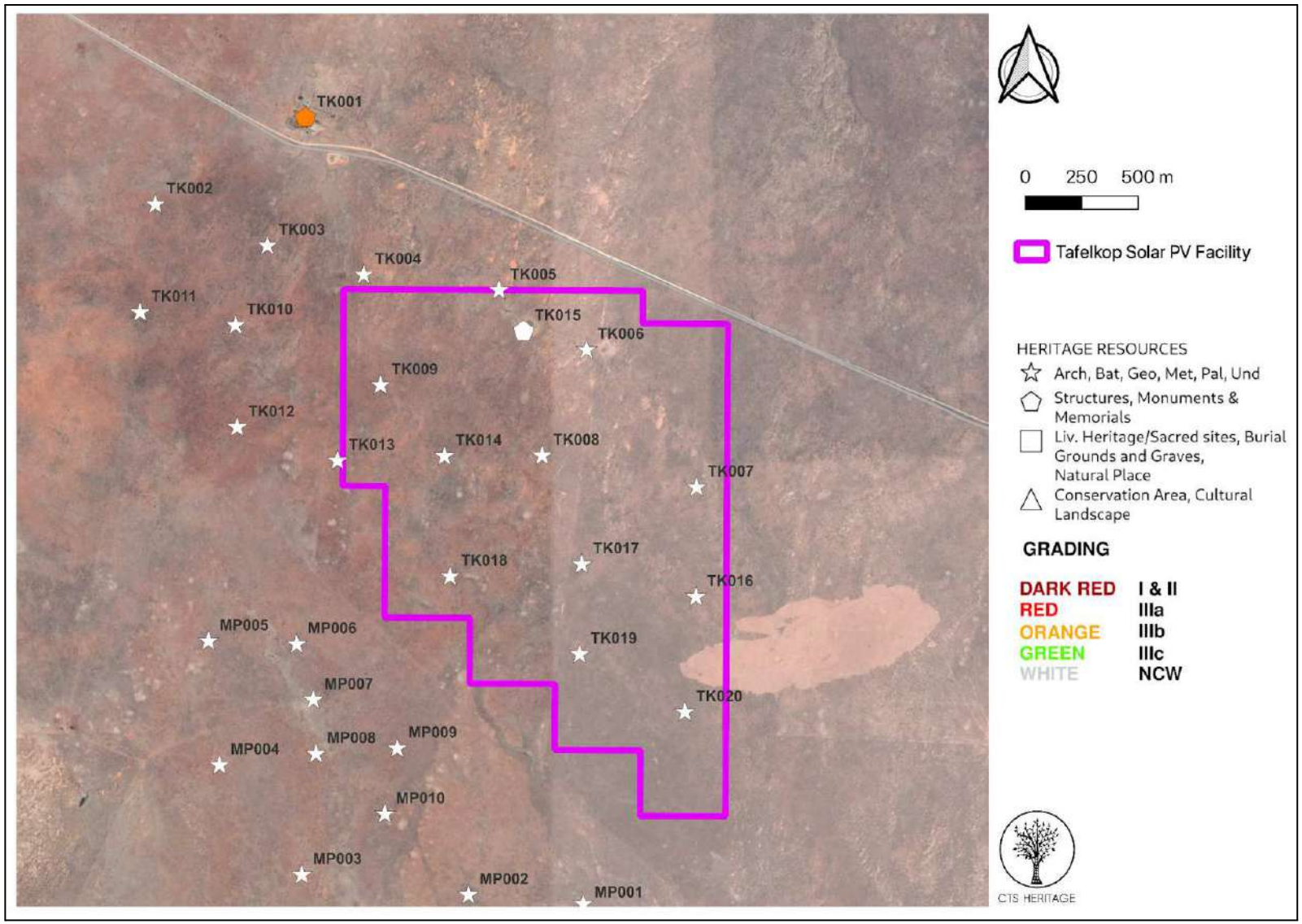

Figure 6.18: Map of field observations relative to the proposed development

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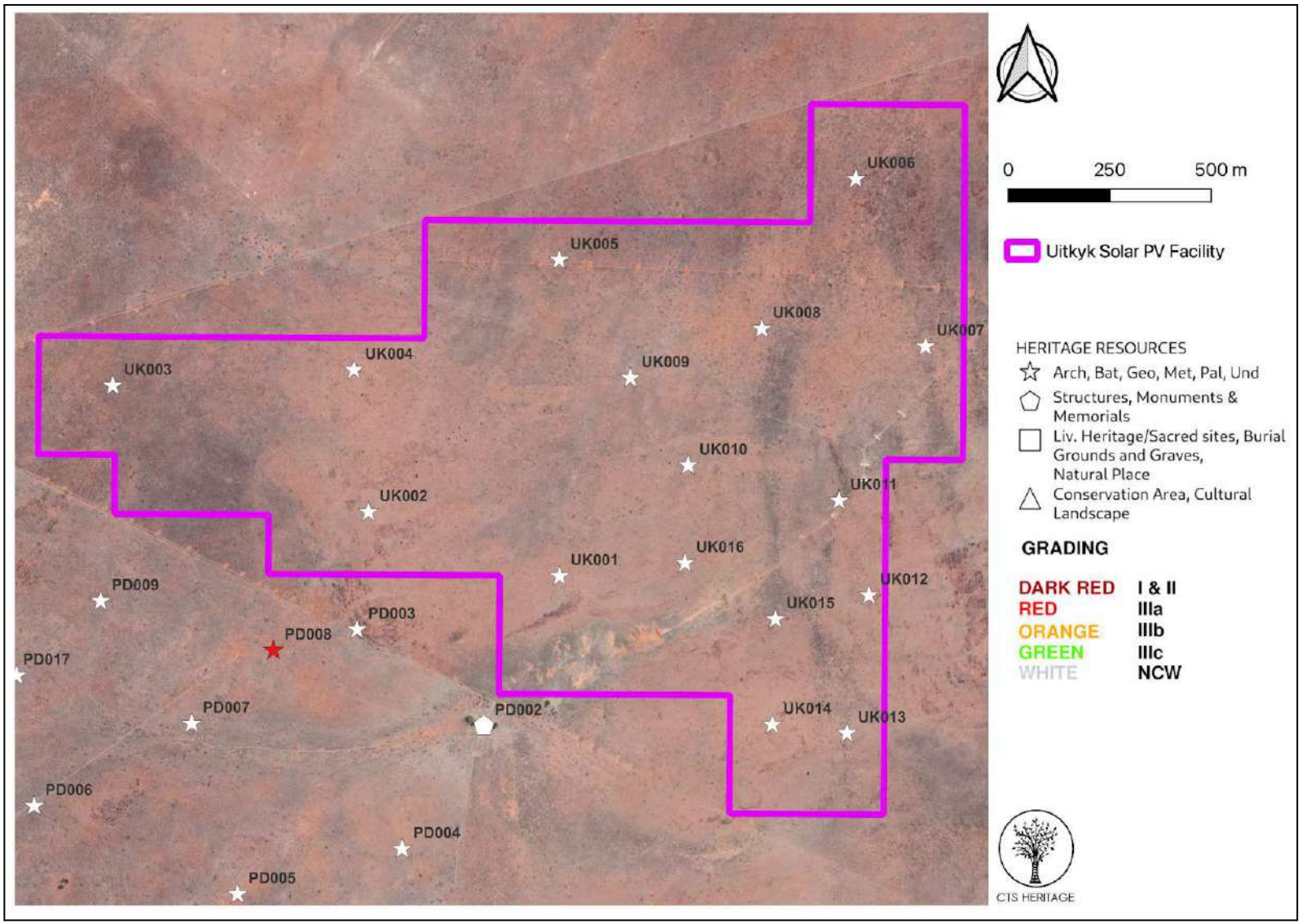

Figure 6.19: Map of field observations relative to the proposed development

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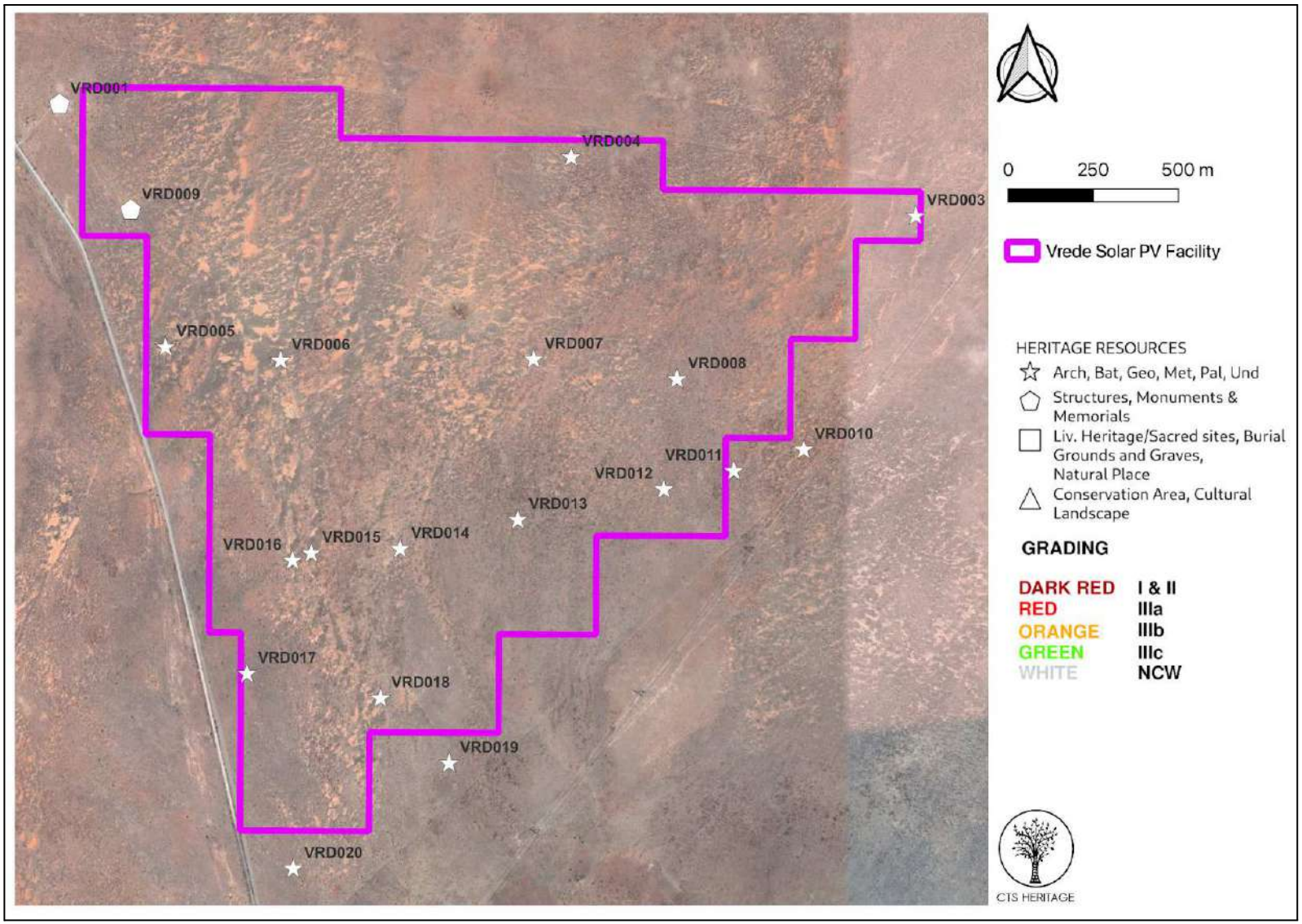

Figure 6.20: Map of field observations relative to the proposed development

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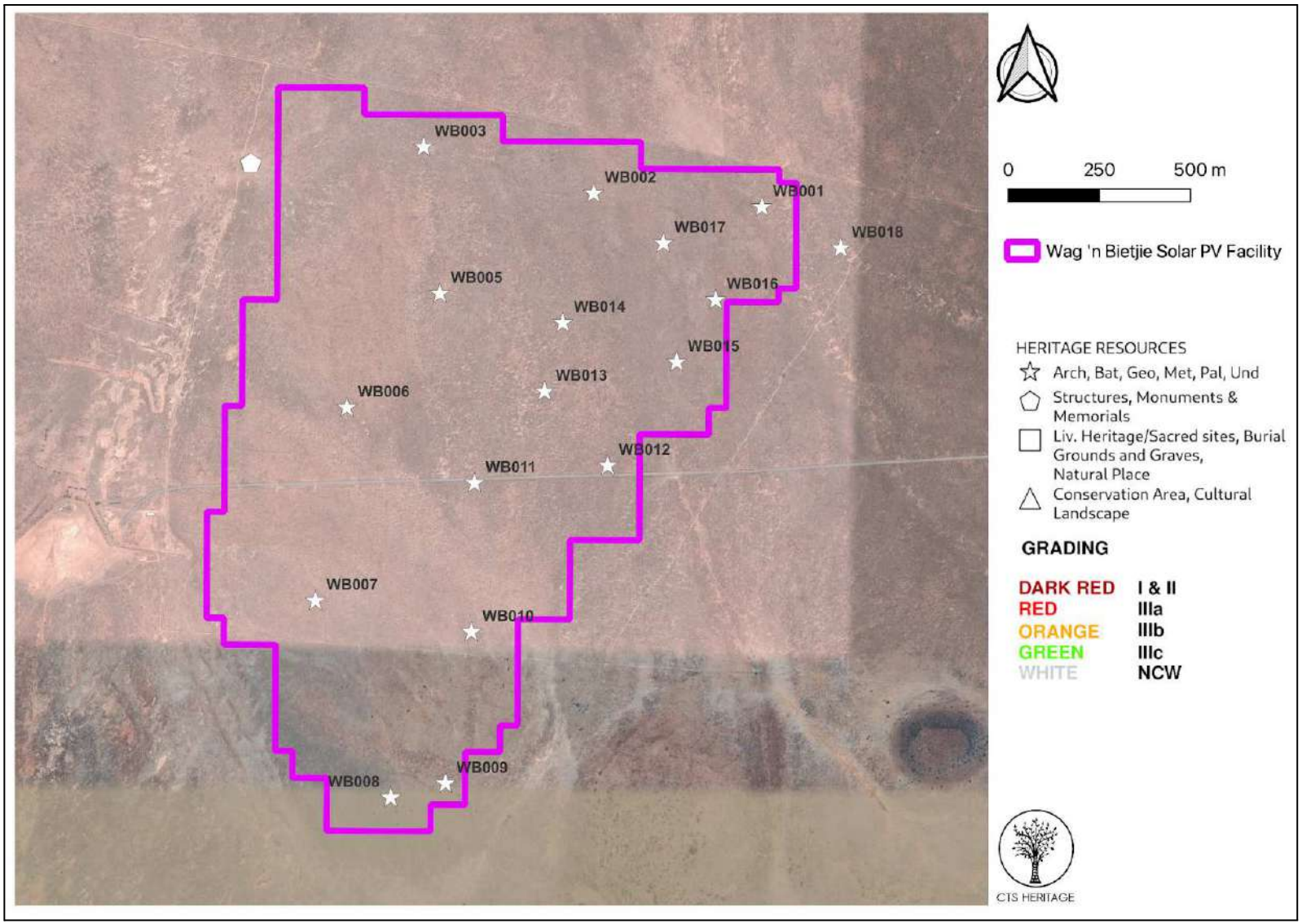

Figure 6.21: Map of field observations relative to the proposed development

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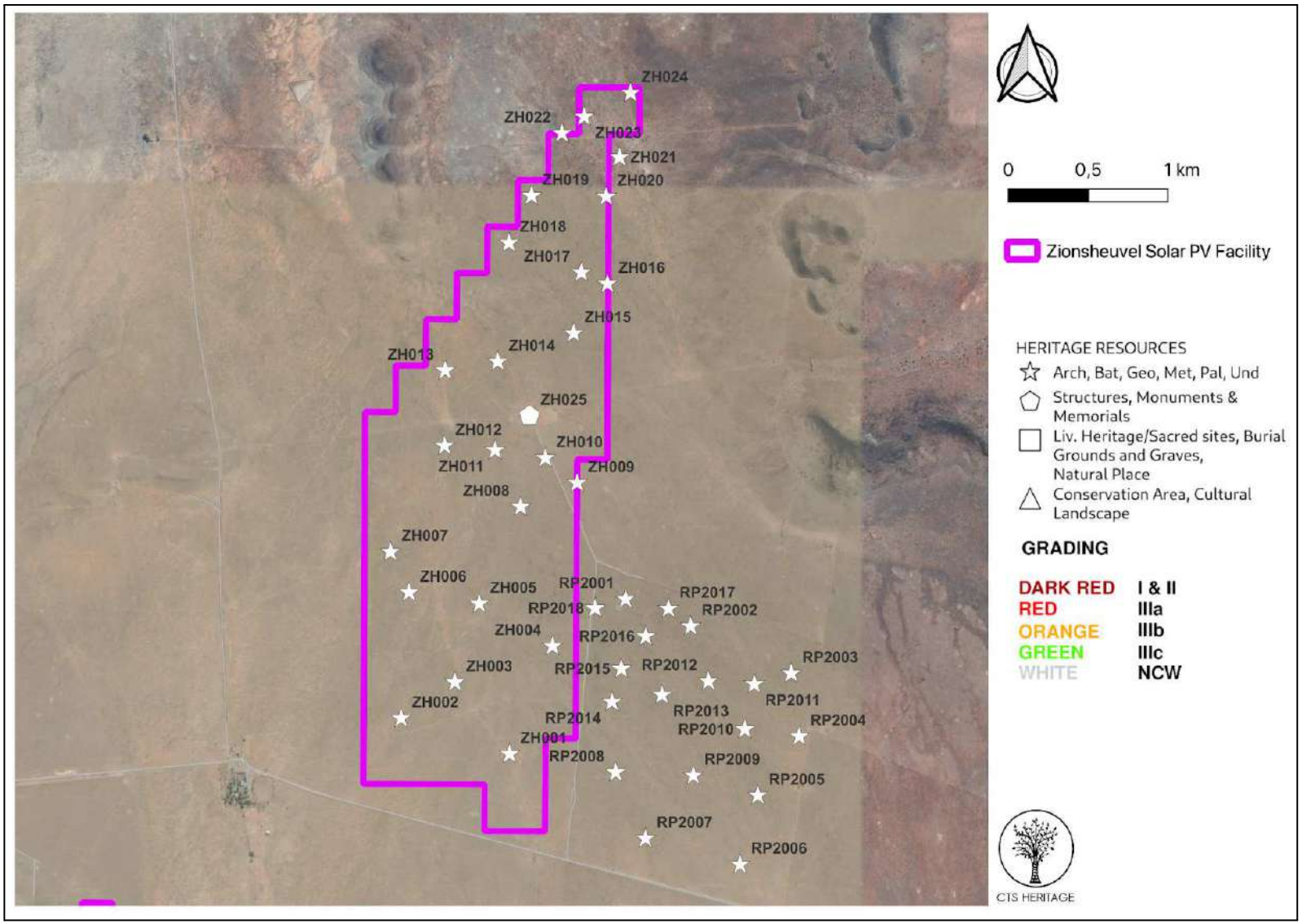

Figure 6.22: Map of field observations relative to the proposed development

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1: Observation DF032

Figure 7.2: Observation HCA002

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Figure 7.3: Observation HCA003

Figure 7.4: Observation KK007

Figure 7.5: Observation RK026

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Figure 7.6: Observation RK025

Figure 7.7: Observation RK027 (first image DSTretched)

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Figure 7.8: Observation RK028

Figure 7.9: Observation RK029

Figure 7.10: Observation PD001

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Figure 7.11: Observation PD008

Figure 7.12: Observation TK001

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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 (Kruger, 2012). The majority of the archaeological resources identified within the area proposed for the development in this field assessment have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from an archaeological perspective.

No archaeological resources of significance were identified within the areas proposed for the following PV Facilities:

- Amper Daar PV
- Bokkraal PV
- Driefontein PV 2
- Jagpoort PV
- JAN PV
- JW PV
- Koppy Alleen PV
- Middelplaas PV
- Oosthuisfontein PV
- Ruspoort PV 1
- Ruspoort PV 2
- Strydam PV
- Vrede PV
- Wag n Bietjie PV
- Zionsheuvel

Archaeological resources of significance were identified within, or in close proximity to, the areas proposed for the following PV Facilities:

Driefontein PV 1 (Figure 8.1)

- The site of De Wet's abandoned gear is located in close proximity to this development area (Site DF032). This site is graded IIIA for its high levels of local significance. This site is located well outside of the development area and so no direct impact is anticipated, however it is recommended that a no-development buffer area of 100m is implemented around this site.

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HCA PV (Figure 8.2)

- Two stone-walled kraals were located in close proximity to this development area (Sites HCA002 and 003). Additionally, scattered hornfels artefacts were located near one of these kraals (HCA003). Both sites have been graded IIIC for the contextual heritage value they have within this landscape. Although no direct impact is anticipated due to the location of these sites outside of the development area, a 50m no-development buffer is recommended to ensure their conservation.

Kareekloof PV (Figure 8.3)

- A historical midden site consisting of Historical refuse, porcelain, glass, metal items, likely from the late 19th C was located within the area proposed for this PV facility (KK007). This site has been graded IIIB for its moderate scientific value. It is located adjacent to a kraal or ruin evident from GoogleEarth imagery and is located within the development footprint.
- It is very likely, therefore, that this site will be directly impacted by the proposed development and as such, it is recommended that a no development buffer of 100m is implemented around this site to ensure its conservation. If this is not possible, then it is recommended that this site be subject to formal scientific excavation under a permit issued by SAHRA.

Pro Deo PV (Figure 8.4 and 8.7)

- Two sites of significance were identified within the area proposed for the Pro Deao PV Facility. PD001 is a moderately dense (10 to 30 artefacts /m2) cluster of Middle Stone Age hornfels blades and flakes located in and amongst a dolerite outcrop. This site has been graded IIIB for its potential scientific significance. It is unlikely that the proposed PV facility will impact on the dolerite outcrop, however it is recommended that the development is shifted away from this outcrop in order to avoid impact. PD008 is described as a rock engraving depicting an historical farm scene including stick figures and a kraal and animals. This rock art site has high levels of local value, and as such has been graded IIIA. It is recommended that a no development buffer of 100m is implemented around this site to ensure its conservation.
- Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present within the area proposed for the Pro Deo PV facility therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided. It is recommended that the high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.
- If it is not possible to avoid impact to sites PD001 and PD008, then it is recommended that these sites be subject to formal scientific excavation and mitigation under a permit issued by SAHRA.

Roodekraal PV (Figure 8.5)

- A cluster of historical rock art engravings was identified in the dolerite outcrop located just north of the area proposed for the Roodekraal PV facility. This cluster of engravings has high local levels of cultural value and as such, each site has been graded IIIA. Site RK024 represents an historical engraving of the text “J v.d. B. 1909 apr

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14". Site RK025 represents an historical engraving depicting a wagon and a field etched in lines. Site RK026 depicts an eland engraving which is very clear as well as possible humans and additional scratches on boulder next to this. Sites RK027 and 028 each depict scratches and grids marked onto dolerite boulders, and site RK029 depicts the letters M VV scratched onto a dolerite boulder.

- Although no direct impact is anticipated due to the location of these sites outside of the development area, a 100m no-development buffer is recommended to ensure their conservation.
- Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present adjacent to the area proposed for the Roodekraal PV facility therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided. It is also recommended that the entirety of this dolerite outcrop be considered as a no-go area for the proposed development.
- If it is not possible to avoid impact to this outcrop, then it is recommended that this outcrop be subject to formal scientific excavation and mitigation under a permit issued by SAHRA.

Tafelkop PV (Figure 8.6)

- The Tafelkop Farm Werf was identified as site TK001, and is located more than 500m from the boundaries of the proposed Tafelkop PV facility. This farmhouse complex was noted to include a Victorian double pitched roof and has been determined to have moderate local significance. As such, the site has been graded IIIB.
- Although no direct impact is anticipated due to the location of this complex outside of the development area, a 100m no-development buffer is recommended to ensure its conservation.

Uitkyk PV (Figure 8.7)

- Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. Indeed, significant archaeological resources have been identified within these outcrops within the adjacent Pro Deo PV Facility. The dolerite outcrops that are present within the area proposed for the Uitkyk PV facility therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided. It is recommended that the high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.
- If it is not possible to avoid impact to this outcrop, then it is recommended that this outcrop be subject to formal scientific excavation and mitigation under a permit issued by SAHRA.

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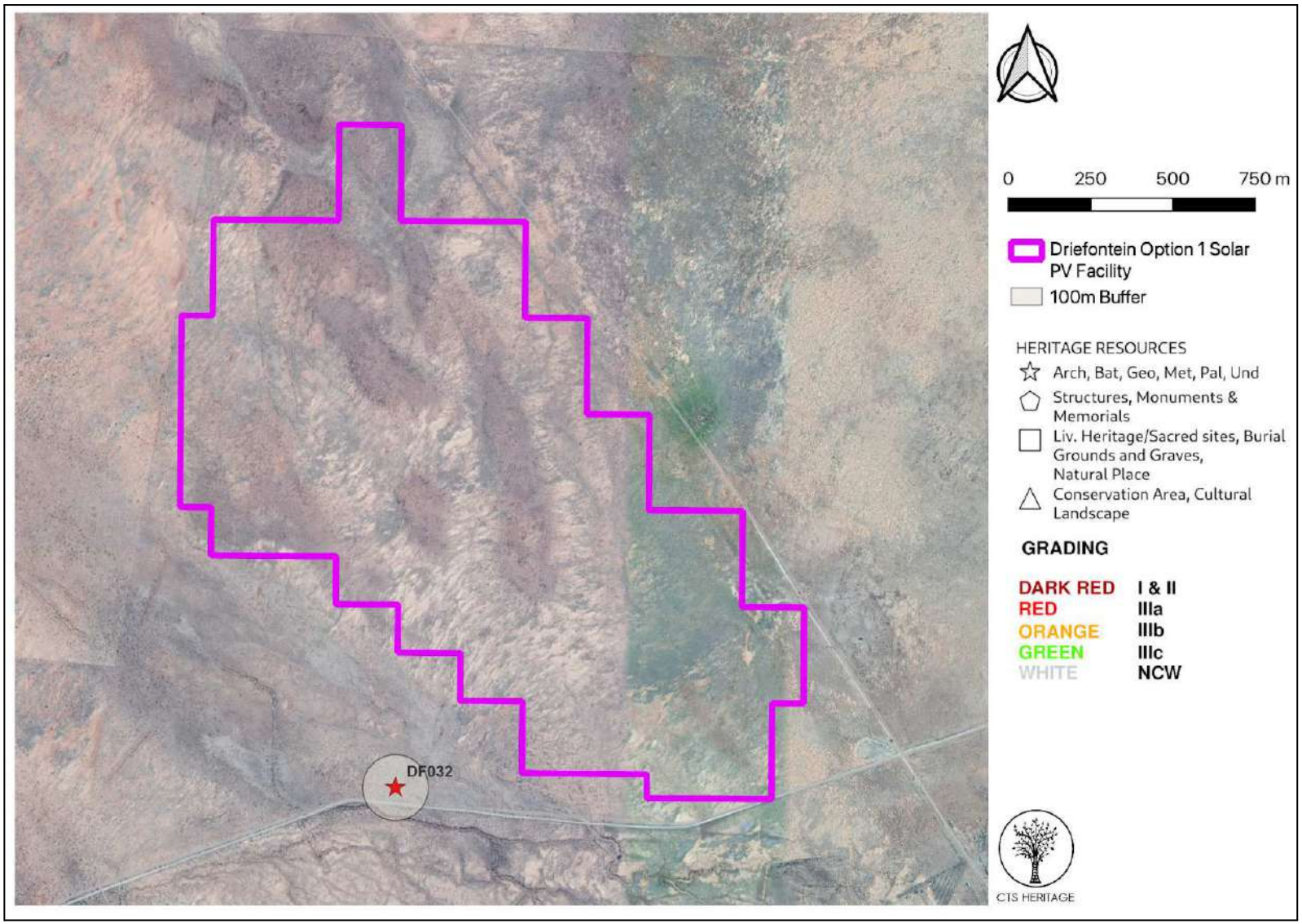

Figure 8.1: Recommended Buffers

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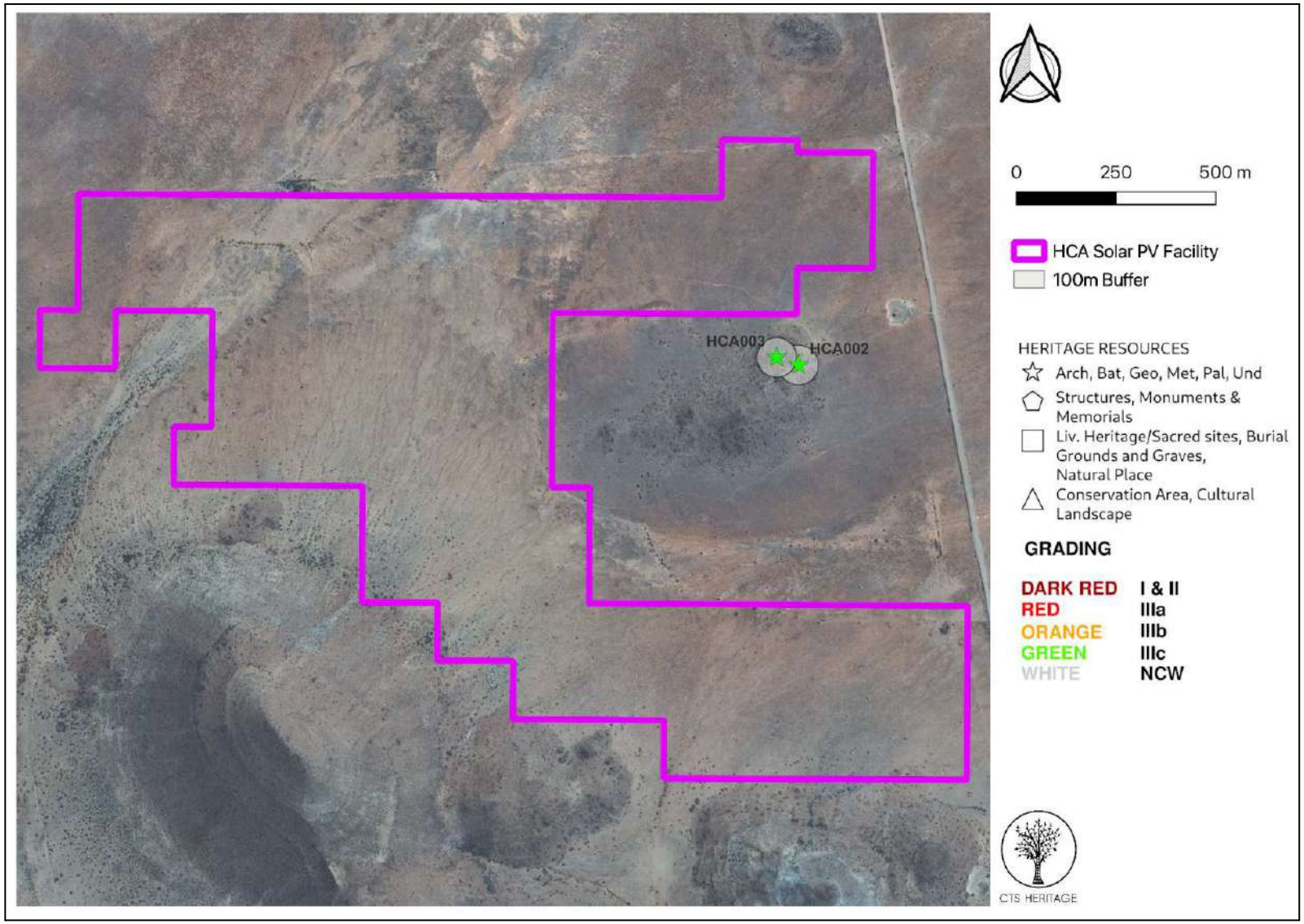

Figure 8.2: Recommended Buffers

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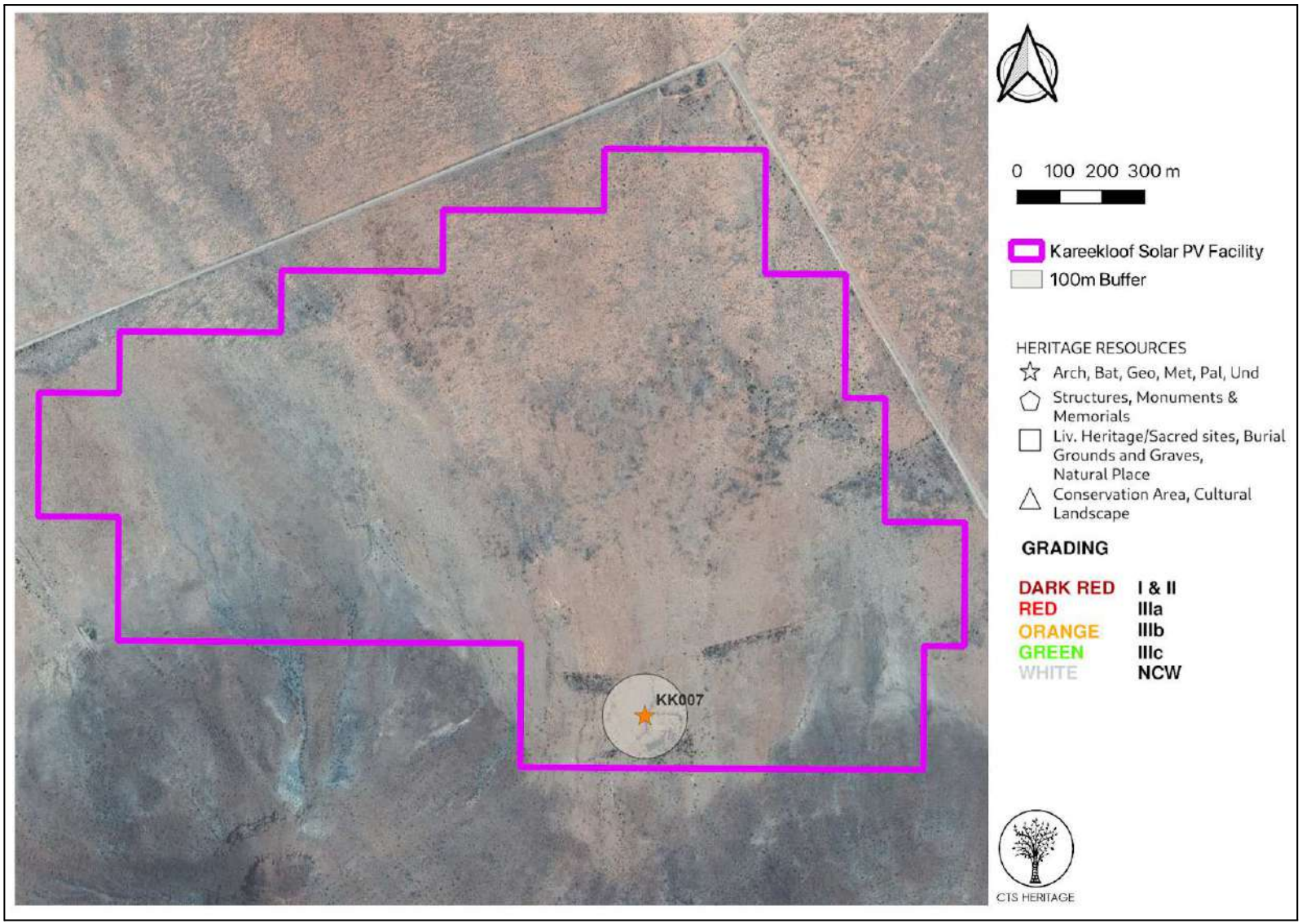

Figure 8.3: Recommended Buffers

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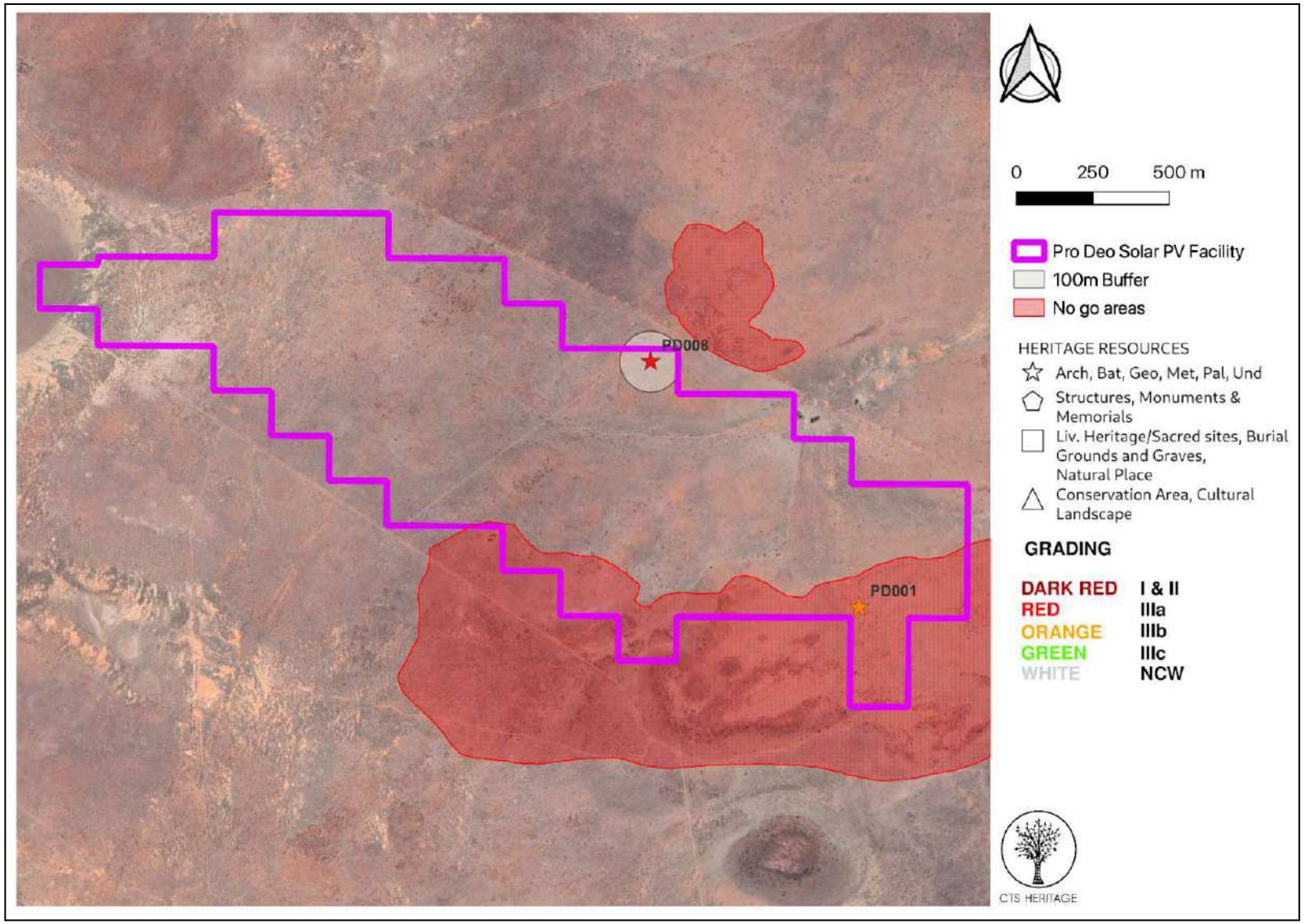

Figure 8.4: Recommended Buffers

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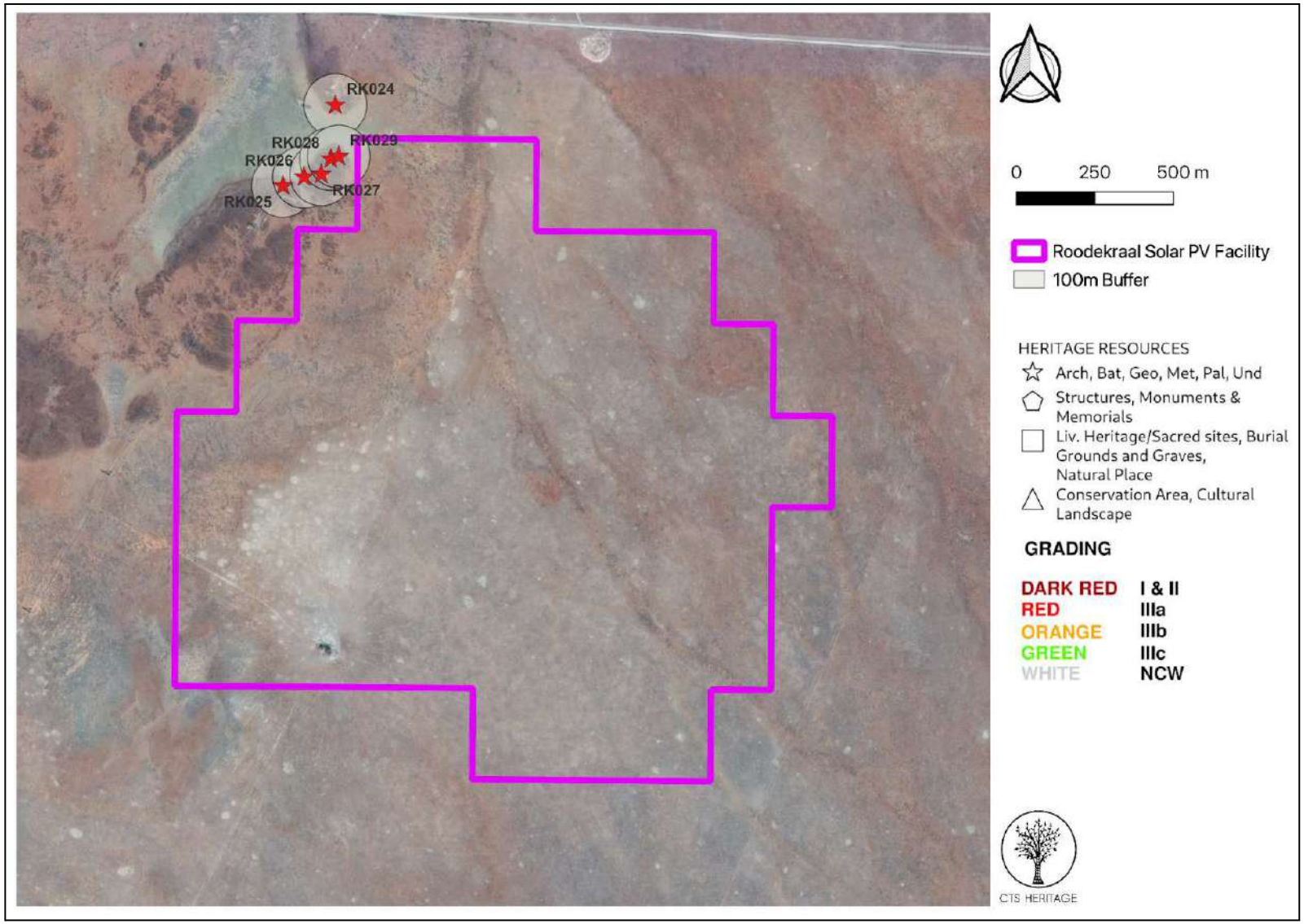

Figure 8.5: Recommended Buffers

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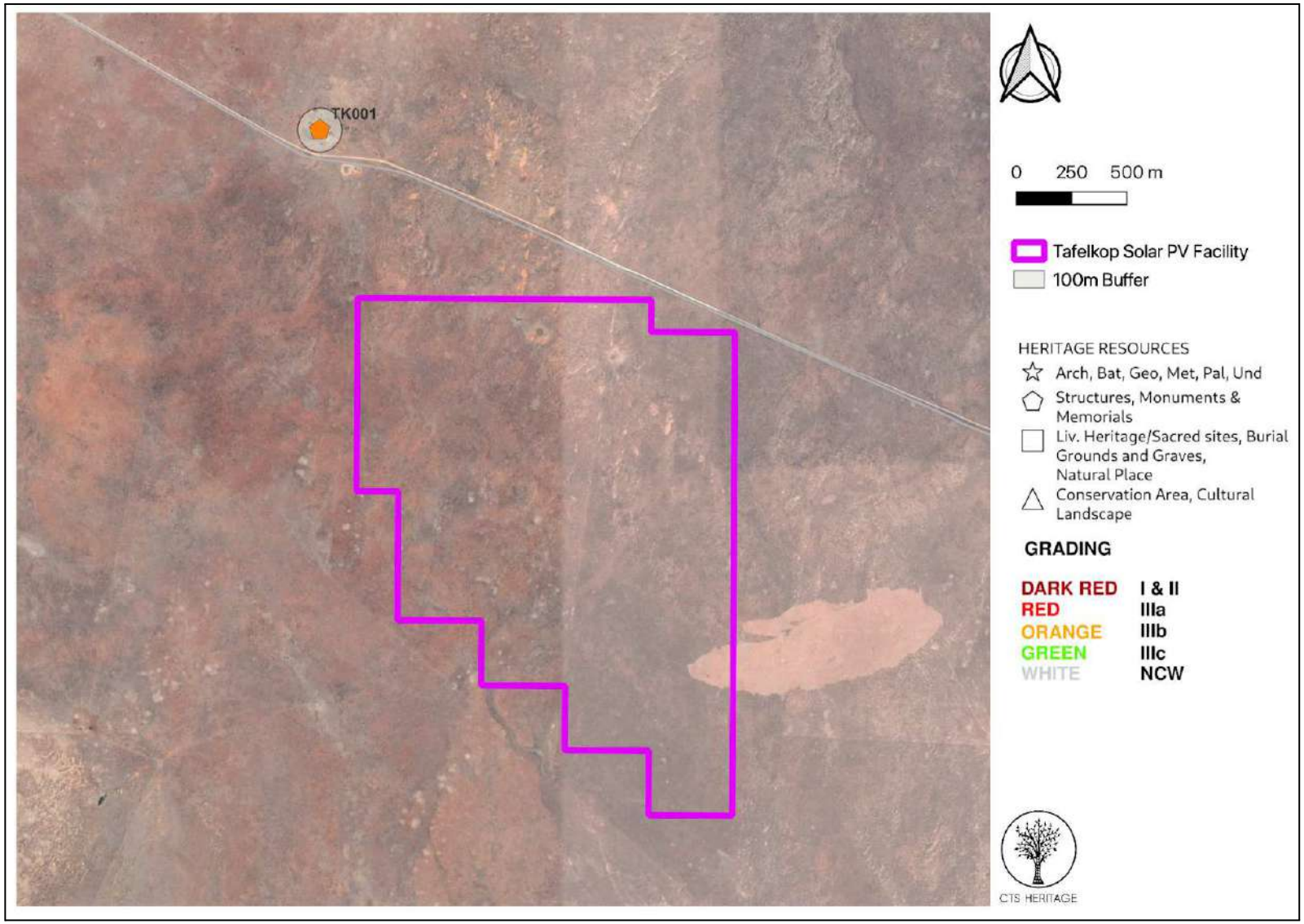

Figure 8.6: Recommended Buffers

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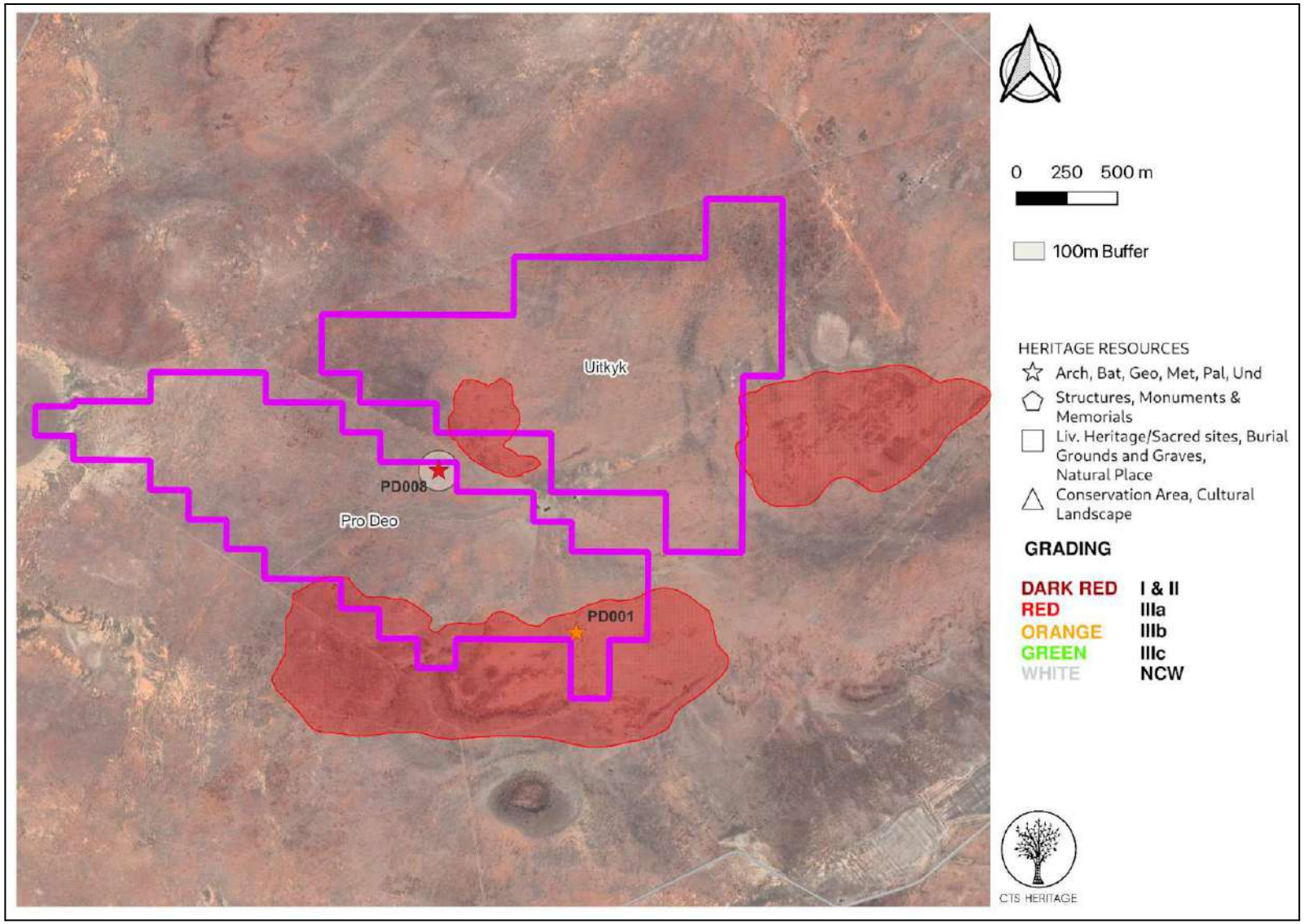

Figure 8.7: Recommended Buffers

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6. CONCLUSION AND RECOMMENDATIONS

The overall archaeological sensitivity of the development area 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 areas proposed for development have an overall low sensitivity for impacts to significant archaeological heritage.

As indicated above, the results of this assessment align with the findings of other specialists 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. Specific mitigation measures are proposed for the few sensitive sites identified. Often, rock engravings and some archaeological sites from this area are associated with dolerite outcrops as these outcrops provide the raw material resource for rock engravings. The dolerite outcrops that are present within the areas proposed for development therefore have high levels of archaeological sensitivity and impacts to these outcrops must be avoided. It is recommended that the high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.

Recommendations

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

- The high sensitivity areas marked in Figure 8.7 are considered as no-go areas for the development.
- The mitigation measures outlined in Table 2 above are implemented. These sites and their respective buffers should be indicated on site development maps during the construction phase of the project. Furthermore, during the operational phase of the projects, relevant staff of the facility should be made aware of these sites and proper training provided regarding appropriate behaviour at archaeological sites.
- 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	**Report Type**	**Author/s**	**Date**	**Title**
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
133138	HIA Phase 1	Jayson Orton, Lita Webley	09/07/2013	HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
163982	Palaeontological Specialist Reports		31/08/2013	Palaeontological specialist assessment: combined desktop and field study: Proposed development PV Solar Facility near De Aar, Northern CApe Province
163994	HIA	Wouter Fourie	03/08/2013	Proposed PV Facility: Heritage Impact Report
177599	AIA Phase 1	Jonathan Kaplan	01/04/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
177600	Site Inspection Report	Will Archer, Jonathan Kaplan	01/05/2012	Reconnaissance and plan for further mitigation: sites impacted on by proposed photovoltaic power generation facility in De Aar Northern Cape
256408	Palaeontological Specialist Reports	John E Almond	16/07/2013	Palaeontological Specialist Study: Combined Desktop and Field-based Assessments - Proposed Photovoltaic (Solar) Energy Facilities on Badenhorst Dam Farm near De Aar, Northern Cape
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	Impact Assessment Specialist Reports	Webley, Jayson Orton		Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources
49745	AIA Phase 1	Neels Kruger	01/03/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE OF THE FARM VETLAAGTE 4, DE AAR, NORTHERN CAPE PROVINCE
49843	PIA Phase 1	John E Almond	01/05/2012	PALAEONTOLOGICAL SPECIALIST STUDY: COMBINED DESKTOP AND FIELD-BASED ASSESSMENTS Proposed solar power generation facilities on the remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province
50006	HIA Phase 1	Jayson Orton	20/02/2012	HERITAGE IMPACT ASSESSMENT FOR THREE SOLAR ENERGY FACILITIES AT DE AAR, WESTERN CAPE
53198	HIA Phase 1	Elize Becker	20/04/2012	Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project Heritage Impact Assessment Phase 2
53200	Heritage Scoping	Elize Becker	18/01/2012	HERITAGE IMPACT ASSESSMENT SCOPING REPORT Prepared for De Aar Solar One Photovoltaic Power Plant, Nothern Cape
58989	PIA Desktop	James Brink	10/08/2012	A Palaeontological Desktop Study of the Area to be Affected by the Proposed Photovoltaic Power Project on Portion 3 of Farm Hartebeestplaats 135
8378	HIA Phase 1	Jayson Orton	29/02/2012	HIA for three solar energy facilties at the De Aar, Northern Cape (Paarde Valley, Badenhorst Dam Farm and Annex Du Plessis Dam Farm)
89361	HIA Phase 1	Neels Kruger	01/03/2012	ENNEX DEVELOPMENTS: PROPOSED ESTABLISHMENT OF A SOLAR ENERGY FACILITY NEAR DE AAR, NORTHERN CAPE PROVINCE Phase 1 Archaeological Impact Assessment Report

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APPENDIX 2: Palaeontological Assessment (2022)

PALAEONTOLOGICAL SPECIALIST STUDY

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

Proposed Development of the Hydra B Solar PV Facilities near De Aar in the Northern Cape

Prepared by

CTS HERITAGE

And Dr Kimberley Chapelle

In Association with

Savannah

October 2022

EXECUTIVE SUMMARY

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Hydra B Solar Energy Cluster located on various farms in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Cluster entails the development of up to nineteen (19) solar energy facilities.

Based on previous surveys in the area, the land use (for grazing by sheep), the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (probably Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE.** However, any excavations > 1.5m could disrupt Ecca and Beaufort Group sediments which are highly fossiliferous and would increase the impact of the development to **MODERATE to HIGH**.

There are no objections on palaeontological heritage grounds, granted the excavations do not exceed 1.5m in depth. Any fossil finds, most likely in the superficial Quaternary sediments, are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).

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1. INTRODUCTION

1.1 Background Information on Project

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Hydra B Solar Energy Cluster located on various farms in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Cluster entails the development of up to nineteen (19) solar energy facilities.

A technically suitable project site of ~1020ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 100MW and will include the following infrastructure:

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system)
- Inverters and transformers
- Cabling between the project components
- Battery Energy Storage System (BESS)
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process)
- Site offices, Security office, operations and control, and maintenance and storage laydown areas
- Access roads, internal distribution roads

1.2 Description of Property and Affected Environment

The Hydra B solar PV facilities are spread out across an area roughly 30x30km northeast of De Aar in the Northern Cape. Houtkraal lies on the southwestern corner, Phillipstown on the southeastern corner, Petrusville on the northeastern corner and Potfontein on the northwestern corner. Each laydown area holds around 100-200MW of proposed solar PV capacity spread across 21 projects. The project facilities will be linked up via the proposed Hydra B MTS and onwards to the national grid. To the south around De Aar, a number of renewable energy projects, particularly solar PV farms, have been completed with several new projects proposed such as Wag ‘n Bietjie, De Aar Solar and Paarde Valley. A completed 144MW wind farm lies on the plateau south east of the development and can be seen from the study area. Existing 765kV powerlines run through the study area along the southwest - northeast trajectory. Most of the study area is covered in vlaktes covered in grassland in order to take advantage of level ground suitable for solar PV facilities. The Tierberg and Basberg koppies lie prominently in the middle of the study area in otherwise predominantly flat and level terrain. Outcrops of dolerite boulders were found at Pro Deo, Uitkyk and Roodekraal where the likelihood of rock engravings was thoroughly surveyed.

The farms are currently used for grazing by sheep. The grass stood high and densely covered many areas due to the recent heavy rainfall this year. The vegetation is typical of the Karoo and shrubs, succulents and grassland cover the study area.

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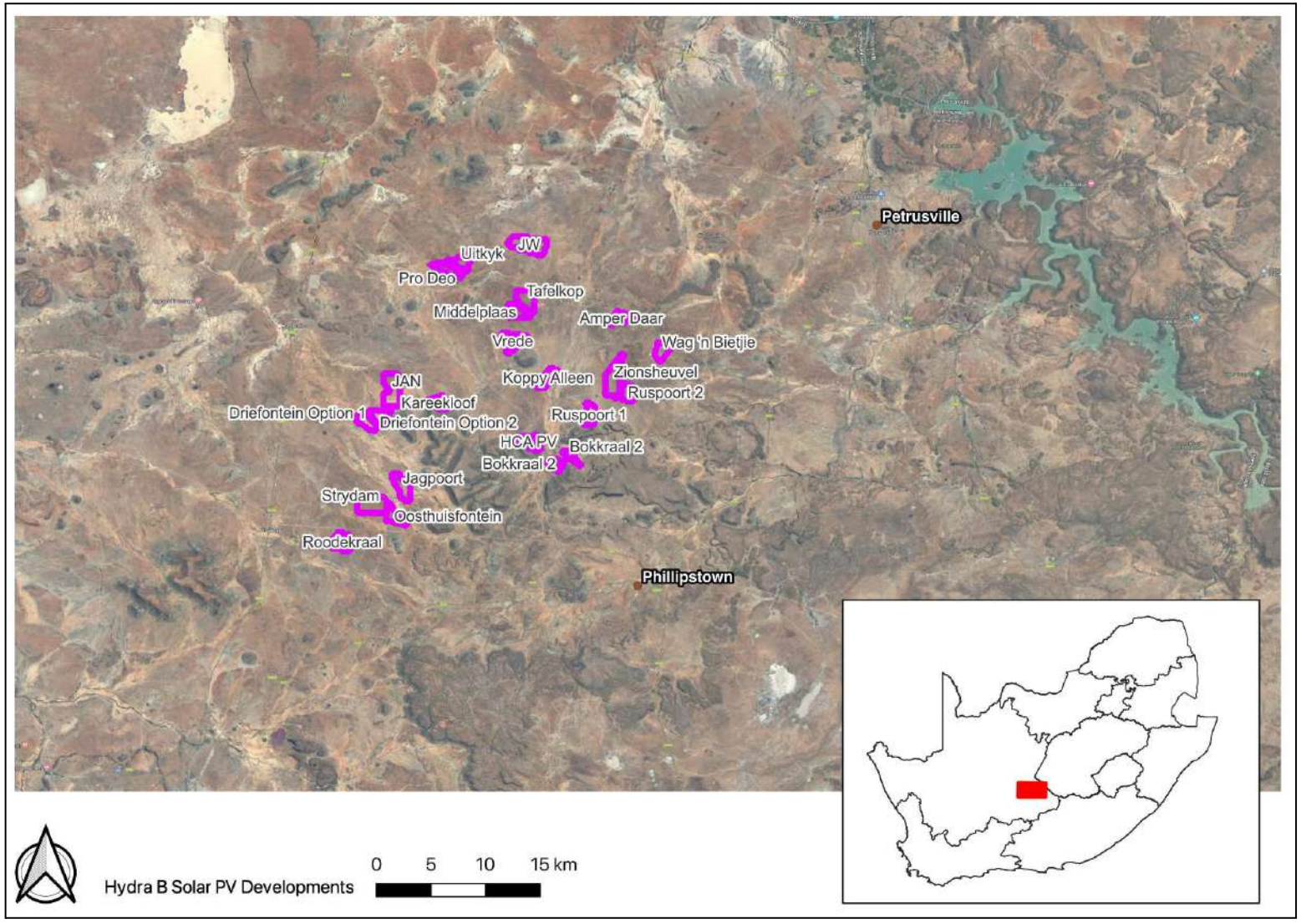

Figure 1.1: Close up satellite image indicating proposed location of study area

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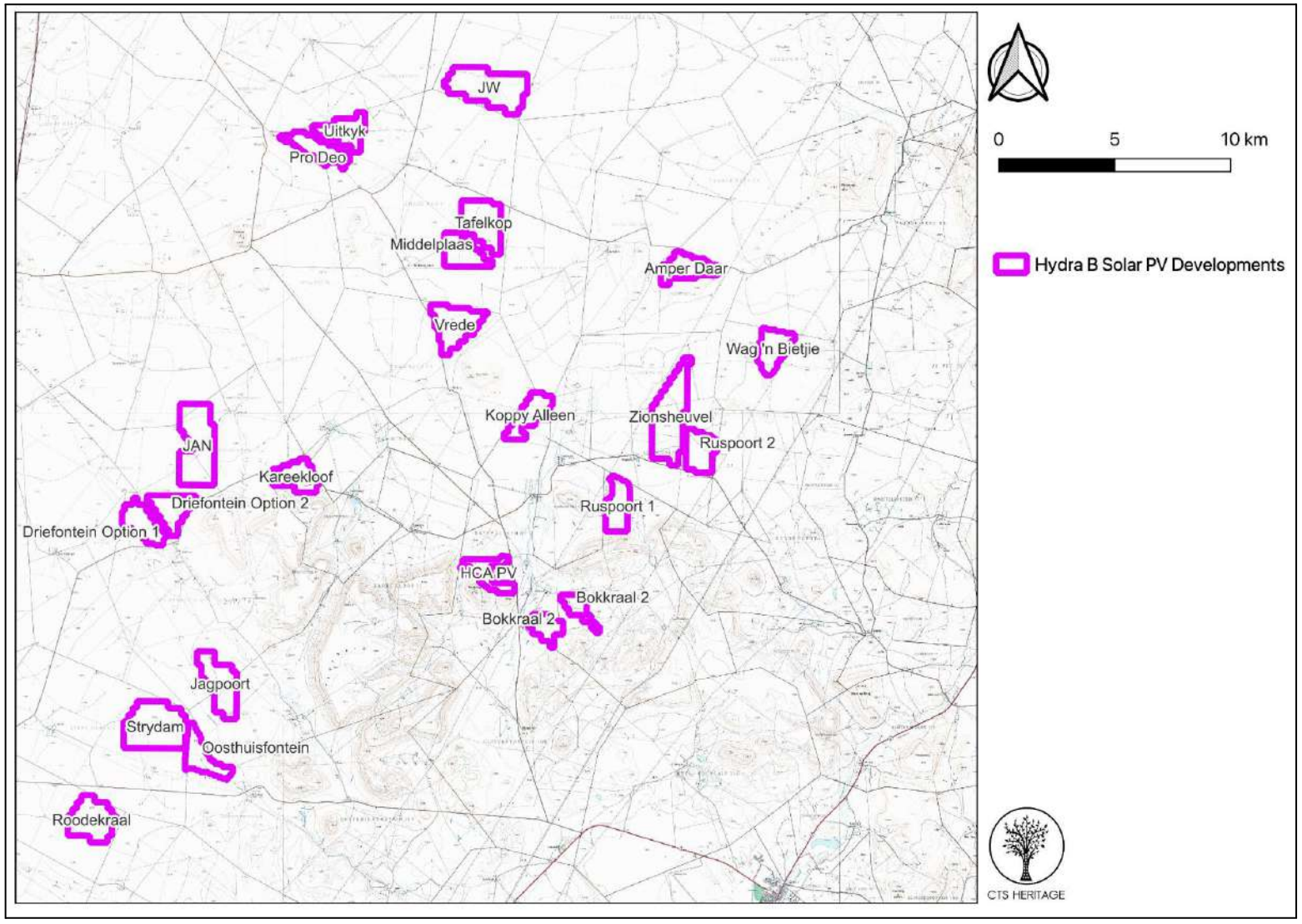

Figure 1.2: Study Area reflected on the 1:50 000 Topo Map

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2. METHODOLOGY

2.1 Purpose of Palaeontological Study

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of moderate and high paleontological sensitivity. The purpose of this desktop palaeontological 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

- Primary research literature was consulted for detailed accounts of the geology and palaeontological representation across the study area. References of these primary research articles are provided.
- Geological maps (provided at various scales by CTS heritage and the South African Council for Geosciences) were consulted to identify represented geological contexts within the study area.
- Where possible, other Palaeontological Impact Assessments were consulted to provide additional information on local geomorphological, geological and palaeontological contexts. These often provide valuable additional information to primary research publications and formal geological maps, which can lack resolution at a local scale and it is important that discussions regarding alternative stratigraphic attributions of exposed rocks are noted and considered.

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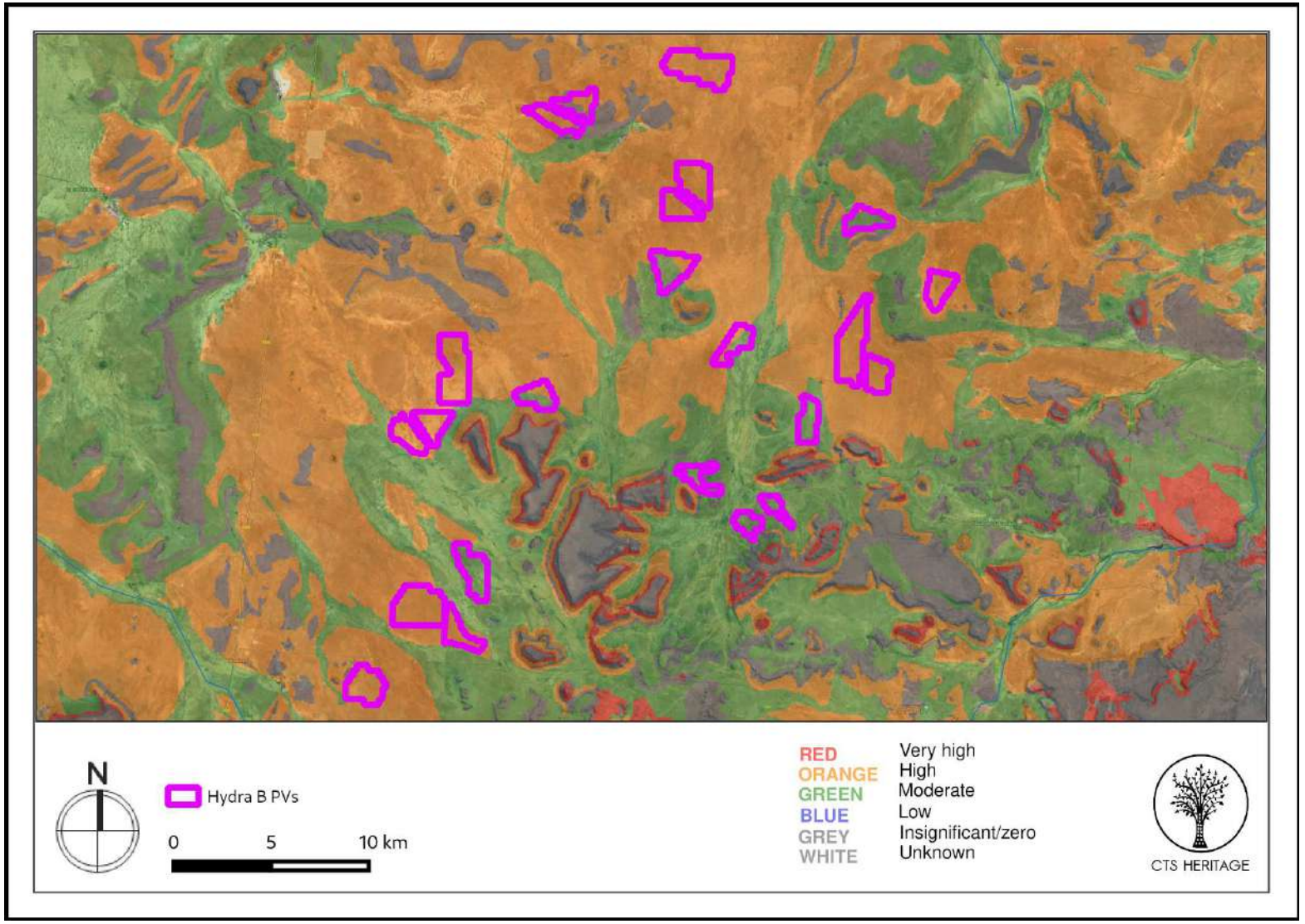

Figure 2: Palaeontological sensitivity of the development area from the SAHRIS PalaeoMap

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3. SITE SENSITIVITY

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of high and very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3024 for Colesburg, the development area is underlain by Jurassic Dolerite and superficial Quaternary deposits which may overlay the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group.

As part of the Vetlaagte project in 2012, Almond completed a field-based palaeontological assessment. Almond (2012) found that "The potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Ecca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Ecca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian *Glossopteris* Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area. Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age. The diverse superficial deposits within the three study areas (e.g. soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole. Abundant fragments of reworked fossil wood material of Ecca provenance occur widely within subsurface and surface gravels overlying the Ecca Group outcrop area."

In Bamford's assessment completed for the area in 2021, she notes that "Based on experience, other reports and the lack of any significant previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the Tierberg Formation or Adelaide Subgroup. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr."

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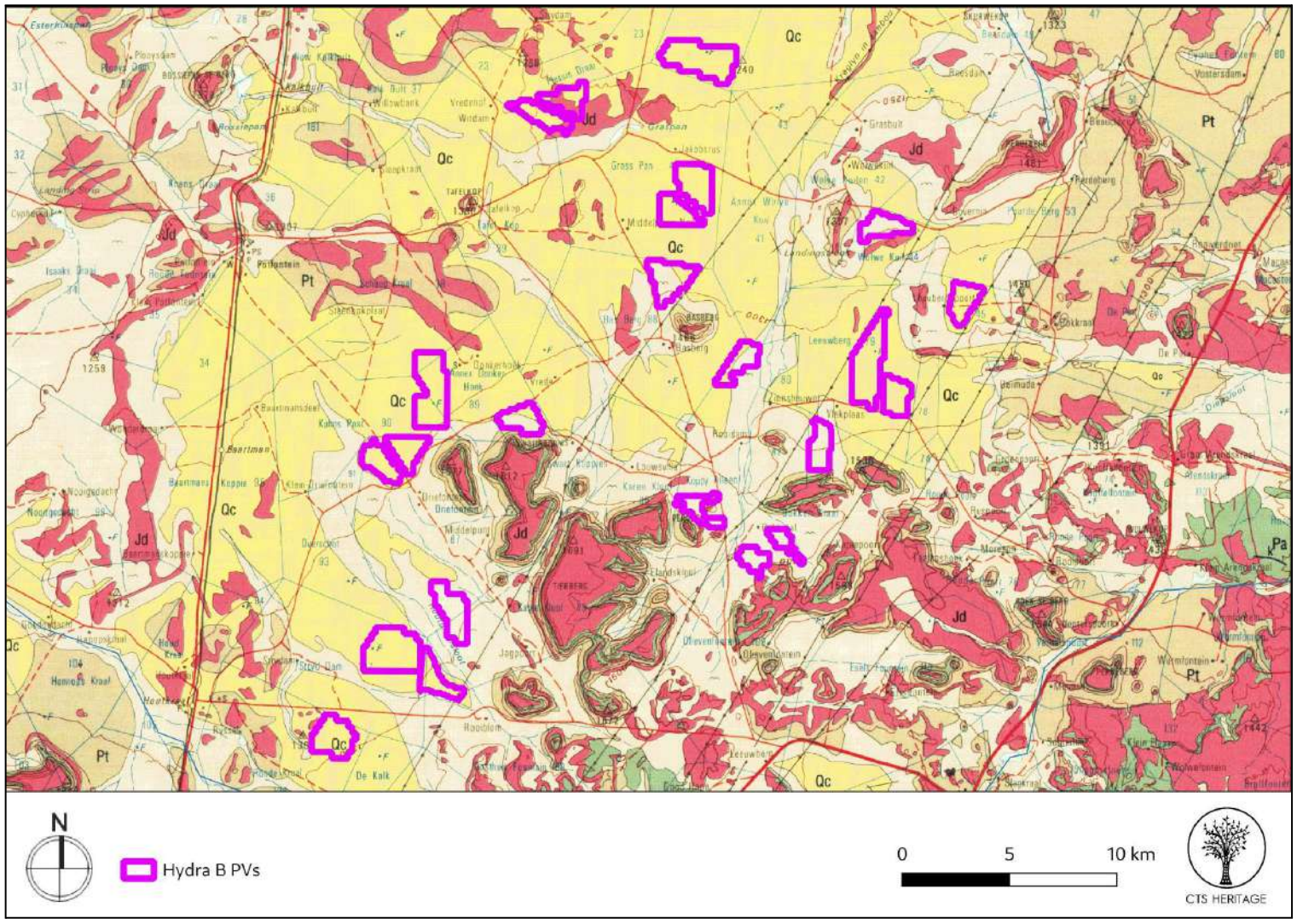

Figure 3. Geology Map. Extract from the Council of GeoScience Geology Map tile 3024 for Colesberg indicating that the area proposed for development is underlain by Quaternary Sands, Quaternary calcretes (Qc) and Jurassic dolerites (Jd).

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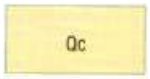
Table 1: Geological Summary Table

Geological unit	Age	Lithology	Symbol on figure 3	Fossil heritage	Palaeontological sensitivity	Recommended mitigation
Quaternary	Quaternary 2.58 mya to 0 mya	Alluvium and debris		Calcretised insect burrows (including termites) and root casts (rhizoliths), rare vertebrate remains (e.g. tortoise, mammal), ostrich eggshells (S*truthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *unio*) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils	Moderate	Any fossil finds to be reported by developer
Quaternary	Quaternary 2.58 mya to 0 mya	Calcrete		Calcretised insect burrows (including termites) and root casts (rhizoliths), rare vertebrate remains (e.g. tortoise, mammal), ostrich eggshells (S*truthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *unio*) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils	High	Any fossil finds to be reported by developer
Jurassic dolerite	Jurassic 183 mya	Intrusive dolerite, granophyric (); dyke ()		None	Insignificant	No action required

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Underlying geology of development area

The geological context of the proposed Hydra B development area is characterised by Quaternary sands, Quaternary Calcrete (Qc) and Jurassic Dolerite (Jd) (see table 1 for summary).

- The area surrounding the proposed project area is abundantly intruded by an extensive network of igneous **Jurassic Dolerite (183 mya)** sills and dykes (part of the Karoo Igneous Province of Southern Africa). These were formed through crustal doming and stretching during the break-up of Gondwana, (Johnson, Anhauesser & Thomas, 2006; Almond, 2013b).

- Superficial **Quaternary (<2.5 mya) to Recent calcrete and alluvial deposits** underly most of the Hydra B PVs development area. These may overlie Early to Mid-Permian (290-266 mya) sediments of the Tierberg Formation of the Ecca Group (Pt on map) or Late Permian to Early Triassic (266-250 mya) sediments Adelaide Subgroup of the Beaufort Group (Pa).

The superficial Quaternary deposits cover all gentle slopes of the Eastern Plateau Karoo escarpment. They have also been found to cover associated plains and dry river courses including the Brakrivier and Hondeblafrivier in the broader De Aar study region (Almond, 2012). These superficial deposits can include pedocretes (e.g. calcretes), colluvial slope deposits (dolerite, sandstone and hornfels scree etc), sandy, gravelly and bouldery river alluvium, as well as spring and pan sediments. These colluvial and alluvial deposits may be extensively calcretised (i.e. cemented with soil limestone), especially in the neighbourhood of dolerite intrusions which are extensive in the De Aar area (Almond, 2012; Almond, 2013a).

Previous field studies near De Aar have found that thin (usually < 1m) horizons of fine to coarse, angular gravels directly overlie the Palaeozoic and Mesozoic bedrocks over much of the De Aar area. Gravel clasts mostly consist of locally-derived Ecca or Beaufort Group mudrocks, hornfels, quartzite, ferruginous carbonate nodule fragments and silicified wood as well as weathered to fresh dolerite (Almond, 2012; Almond, 2013a). Calcretes seen in the De Aar study area are very variable in character and in many or most cases are probably composite horizons that have developed in several phases. Veins, networks and sheets of calcrete extend downwards from the main hardpan into the underlying superficial sediments or bedrock. Doleritic alluvium in streambeds may be heavily calcretised (Almond, 2012; Almond, 2013a). Locally, superficial soils, characterised by loose orange-brown and brown sediments, constitute part of the Quaternary sedimentary component and may have formed in the last 10,000 years (Almond, 2013). These contain a broad spectrum of clastic materials of wide derivation, the larger clasts of which have formed irregular deflation surfaces and pavements.

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4.2 Palaeontological Sensitivity of the Development Area

- The Palaeontological Sensitivity of the **Jurassic Dolerite** is classified as **Insignificant/Zero** by SAHRIS (figure 2). The igneous intrusive origin of the Jurassic dolerite dykes makes it unlikely that they contain fossils.
- The Palaeontological Sensitivity of the **Quaternary deposits** is classified as **Moderate to High** by SAHRIS (figure 2). Although present, the fossil record of the Quaternary Sands is sporadic and not very diverse. Aeolian dunes are not likely to preserve fossil material, however, calcretisation of burrows (including termites) and root casts (rhizoliths) can occur. Fossils that have been recorded include ostrich eggshells (*Struthio*), rare vertebrate remains (e.g. tortoise, mammal teeth and bones), shells of land snails (e.g. *Trigonephrus*), 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). The Mokolanen clacretes have also yielded calcretised burrows (including termites), root casts (rhizoliths) as well as mammalian ichnofossils (Malherbe, 1984; Almond & Pether, 2008).

  Previous surveys in the De Aar area have identified possible calcretized rhizoliths (solid plant root casts), hollow subhorizontal root moulds and / or invertebrate burrows exposed below the calcrete hardpan in a quarry near the N10 to the southeast of De Aar (Almond, 2012; Almond, 2013a). Reworked clasts of cherty fossil wood are locally common both in subsurface gravels as well as sheetwash gravels at the soil surface (Almond, 2012; Almond, 2013a)

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Palaeontological Resources

Based on previous surveys in the area, the land use (for grazing by sheep), the presence of superficial deposits (probable Pleistocene to Recent age) covering the fossiliferous sediments (probably Ecca and Beaufort Groups), as well as the extensive network of intrusive dolerite dykes and sills that bake (thermally metamorphose) adjacent mudrocks, it is anticipated that the impact of the development will mainly be **LOW to MODERATE.** However, any excavations > 1.5m could disrupt Ecca and Beaufort Group sediments which are highly fossiliferous and would increase the impact of the development to **MODERATE to HIGH**.

6. CONCLUSION AND RECOMMENDATIONS

There are no objections on palaeontological heritage grounds, granted the excavations do not exceed 1.5m in depth. Any fossil finds, most likely in the superficial Quaternary sediments, are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).

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Nid	**Report Type**	**Author/s**	**Date**	**Title**
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
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160512	Archaeological Monitoring	Lita Webley, Dave Halkett	17/03/2014	HERITAGE IMPACT ASSESSMENT: WALKDOWN OF FINAL LAYOUT OF THE LONGYUAN MULILO DE AAR 2 NORTH WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE
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384332	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofsig 3 Solar PV Energy Facility on the remainder of farm Kalkpoort 18, Resnosterberg Local Municipality near Petrusville, Northern Cape
384452	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Assessment Screening of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384456	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
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384554	Archaeological Specialist	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area,

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114929	HIA Phase 1	Elize Becker	25/02/2013	Transnet Capital Projects Ngqura 16 Mtpa Manganese Rail Phase 1 Heritage Impact Assessment Rail Kimberley to De Aar
115026	PIA Phase 1	John E Almond	01/02/2013	Proposed 16 Mtpa expansion of Transnet's existing manganese ore export railway line and associated infrastructure between Hotazel and the Port of Ngqura, Northern and Eastern Cape. Part 3: Kimberley to De Aar, Northern Cape
121518	HIA Phase 1	Elize Becker	28/01/2013	Phase 1 Heritage Impact Assessment - Borrow Pit areas between Kimberley to De Aar
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
151768	PIA Phase 1	John E Almond	01/11/2013	Palaeontological specialist assessment: combined desktop and field-based study: PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE.
163451	Archaeological Specialist Reports	Wouter Fourie	27/03/2014	Proposed construction of a 132kV transmission line from the Longyuan Mulilo De Aar 2 North Wind Energy Facility on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape
8086	AIA Phase 1	Johan Nel	14/11/2008	Final Report Heritage Resources Scoping Survey & Preliminary Assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape
92575	HIA Phase 1	Elize Becker	10/10/2012	Phase 1 Heritage Impact Assessment Kimberley to De Aar
93185	HIA Phase 1	Elize Becker	01/11/2012	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port Ngqura

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Additional Relevant Literature Cited:

- Almond J. 2012. Two wind energy facilities on the Eastern Plateau near De Aar, Northern Cape Province proposed by Mulilo Renewable Energy (Pty) Ltd. Palaeontological specialist study: combined desktop and field-based assessments, 55 pp. Natura Viva cc, Cape Town.
- Almond J. 2013a. Proposed photovoltaic (solar) energy facilities on Du Plessis dam farm near De Aar, Northern Cape. Palaeontological Specialist Study: Combined Desktop And Fieldbased Assessments.
- Almond J. 2013b. Proposed Photovoltaic (solar) energy facilities on du Plessis Dam Farm near De Aar: Palaeontological specialist study - combined desktop and field-based assessments. Unpublished report prepared for Mulilo Renewable Energy (Pty) Ltd. *Natura Viva*.
- Almond J, and Pether J. 2008. Palaeontological heritage of the Northern Cape. *Interim SAHRA*.
- Johnson M, Anhauesser C, and Thomas RJ. 2006. The Geology of South Africa. Geological Society of South Africa.
- Malherbe S. 1984. The geology of the Kalahari Gemsbok National Park. *Koedoe* 27:33-44.

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APPENDIX 3: Heritage Screening Assessment

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS21_146**
SAHRIS Ref	
Client:	**Savannah**
Date:	**May 2022**
Title:	**PROPOSED VREDE SOLAR PV FACILITY NEAR PETRUSVILLE, DE AAR & PHILLIPSTOWN IN THE NORTHERN CAPE**

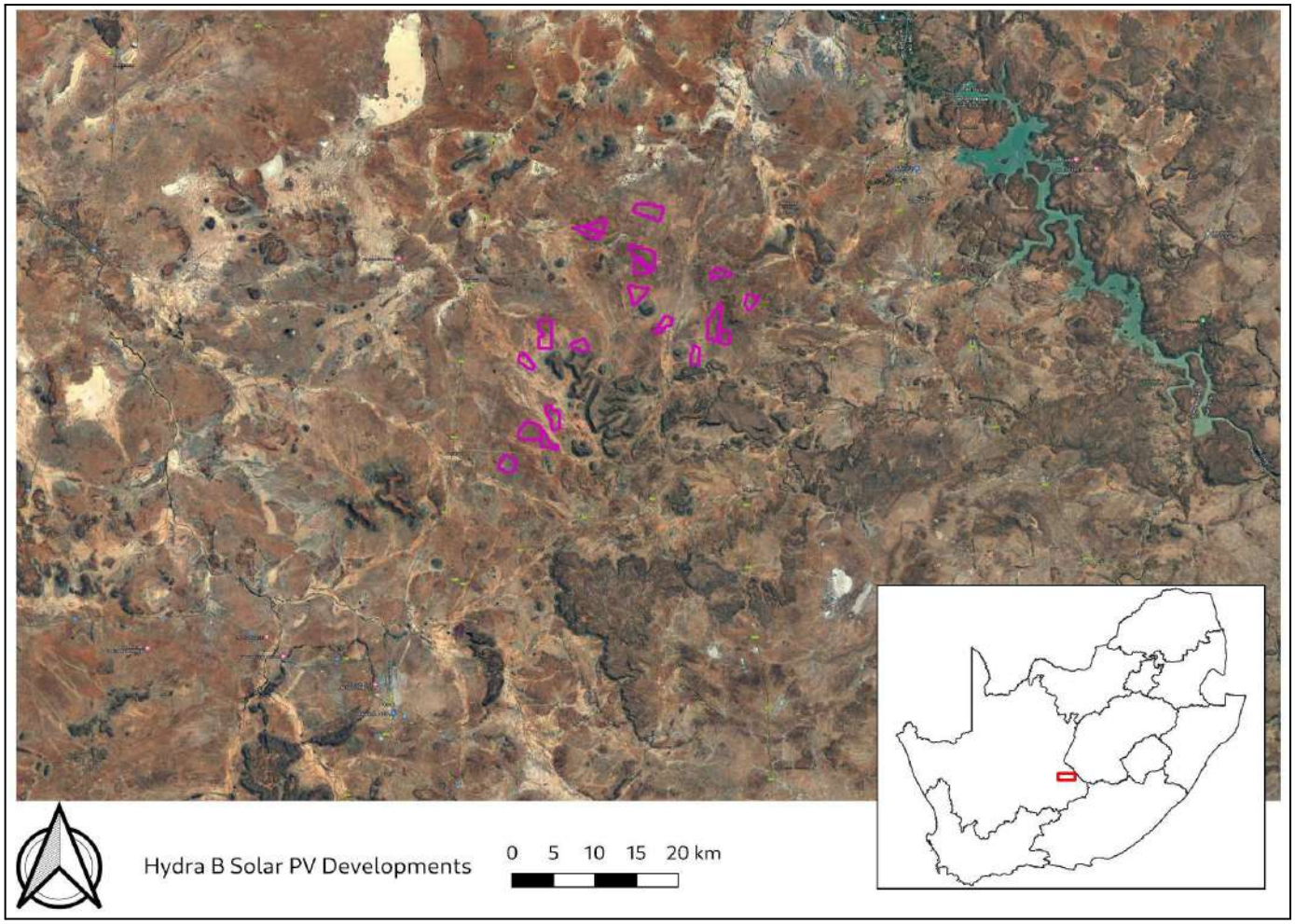

Figure 1a. Satellite map indicating the location of the proposed Hydra B PV development in the Northern Cape

Recommendation:	**RECOMMENDATION** **An HIA should be conducted consisting of a field-based archaeological impact assessment due to the likelihood of encountering engravings and possible graves or ruins. The area has very low palaeontological sensitivity as verified by the fieldwork carried out by Almond and Millstead. A desktop PIA should therefore be carried out as part of the HIA.**

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CTS HERITAGE

1. Proposed Development Summary

Vrede Solar PV Facility, Northern Cape Province application by Akuo Energy Afrique.
A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Vrede Solar PV Facility and its associated electrical infrastructure on Portion 5 of the Farm Bas Berg 88 in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Project (Vrede Solar PV Facility) is part of a cluster known as the Hydra B Renewable Energy Cluster. The Cluster entails the development of up to Twenty-one (21) solar energy facilities.
A technically suitable project site of ~1102ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 150MW.

2. Application References

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

3. Property Information

Latitude / Longitude	-30.21675863, 24.32685768
Erf number / Farm number	Portion 5 of the Farm Bas Berg 88
Local Municipality	Renosterberg
District Municipality	Pixley ka Seme
Province	Northern Cape
Current Use	Agriculture (grazing)
Current Zoning	Agriculture

4. Nature of the Proposed Development

Total Surface Area	310ha
Depth of excavation (m)	~2m

Height of development (m)	<5m

5. Category of Development

x	**Triggers: Section 38(8) of the National Heritage Resources Act**
	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

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system)
- Inverters and transformers
- Cabling between the project components
- Battery Energy Storage System (BESS)
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process)
- Site offices, Security office, operations and control, and maintenance and storage laydown areas
- Access roads, internal distribution roads

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

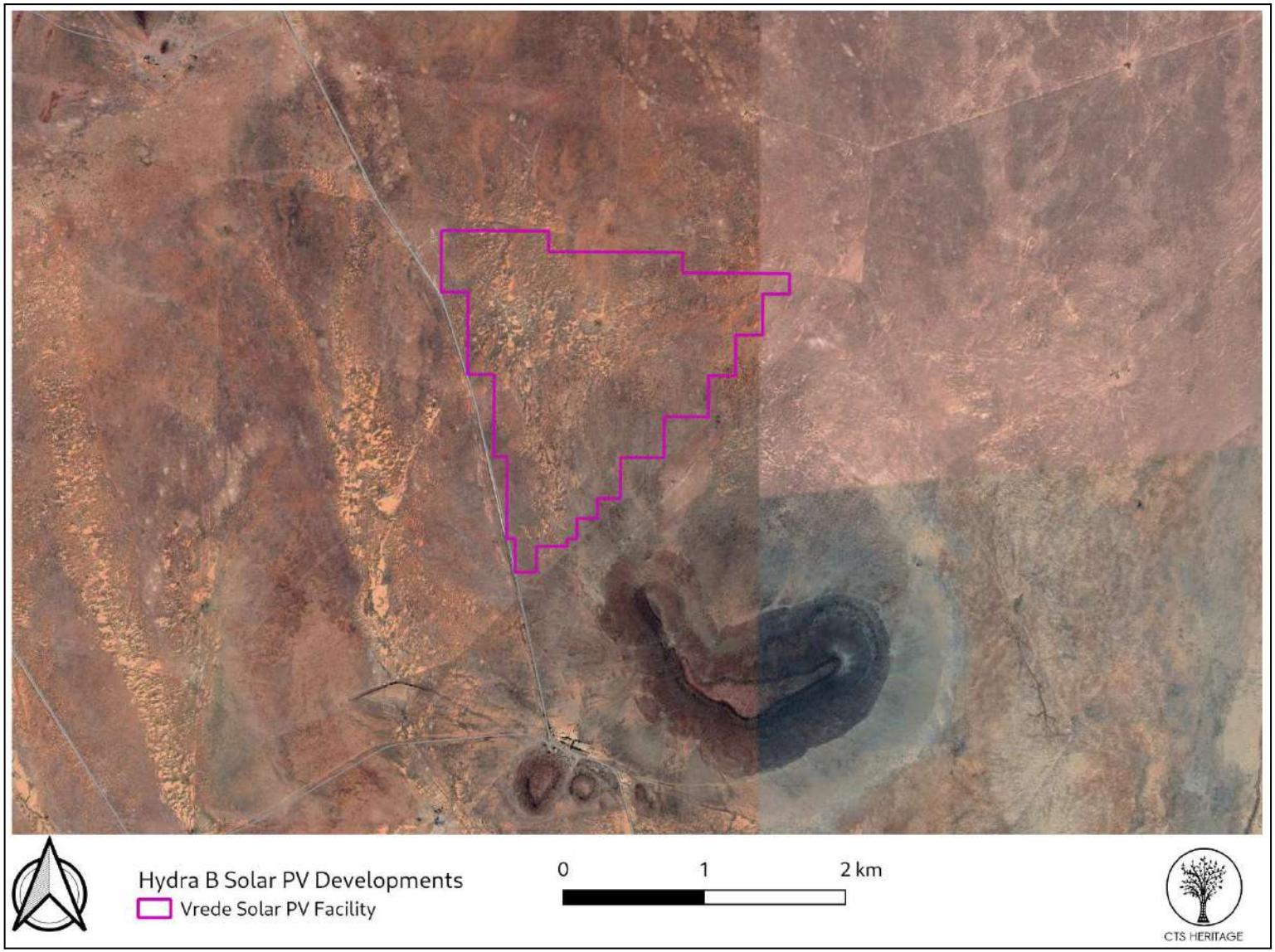

Figure 1b Overview Map. Satellite image (2019) indicating the proposed development area

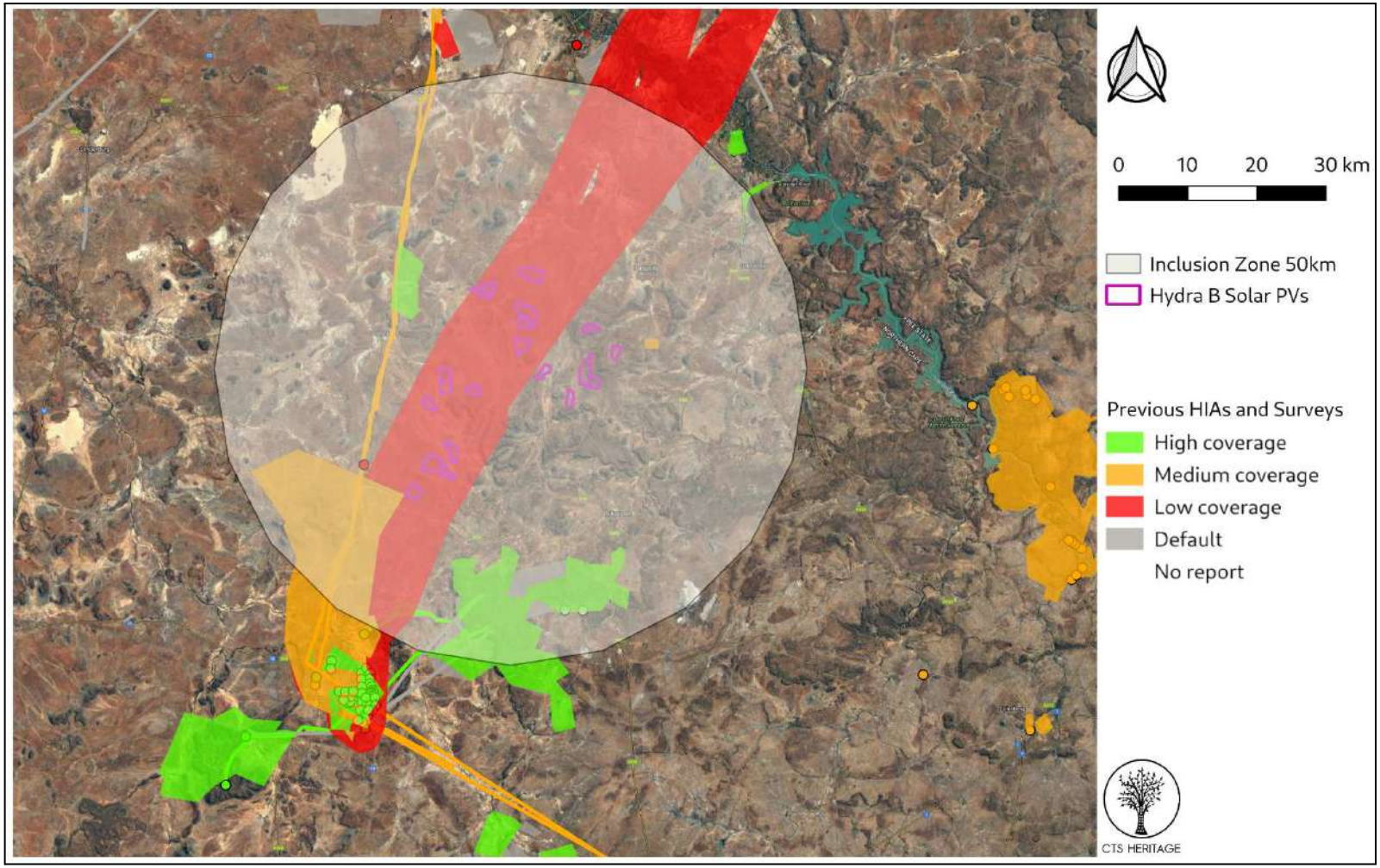

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area within 50km, with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

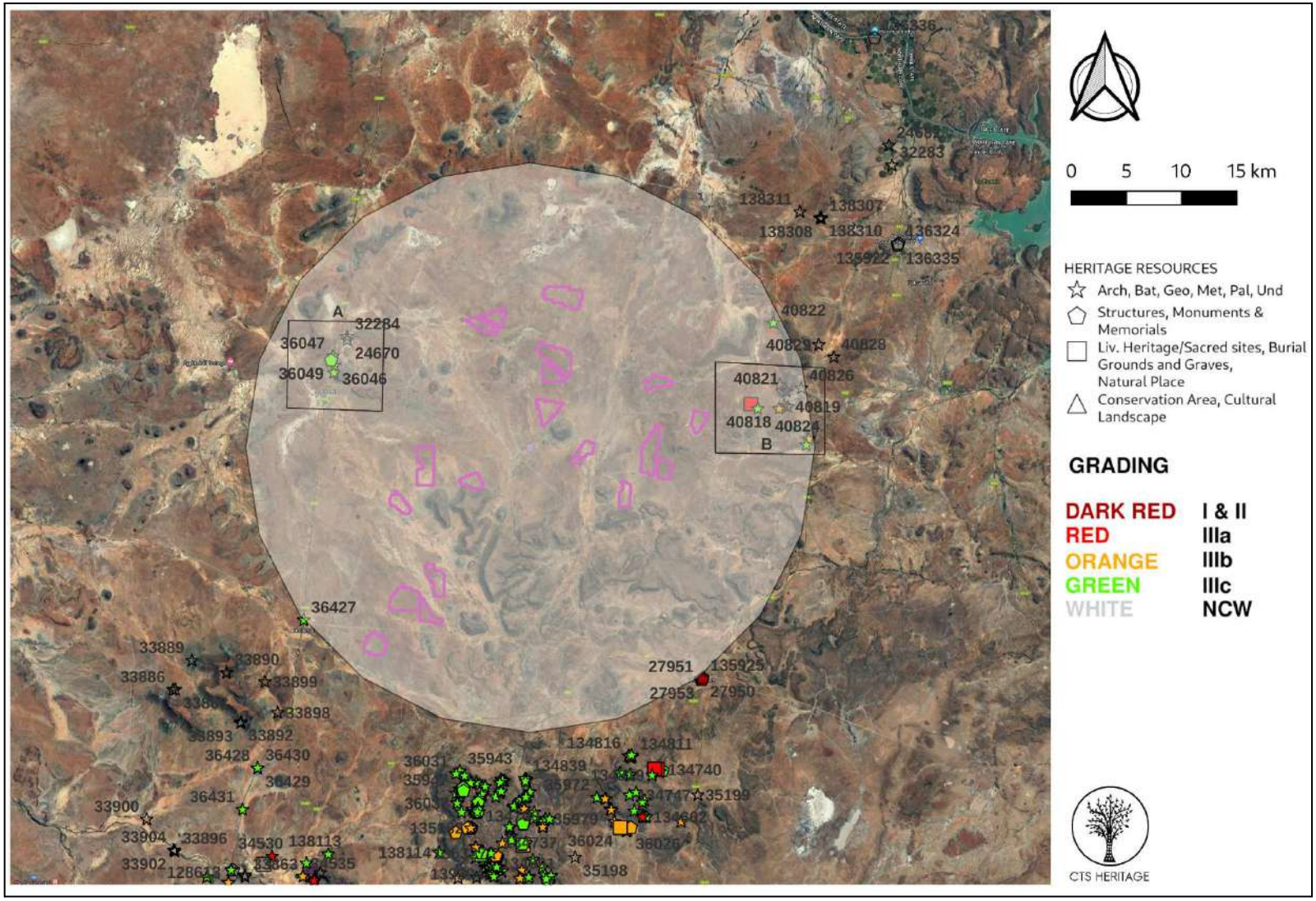

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated within 30km. Please See Appendix 4 for full description of heritage resource types.

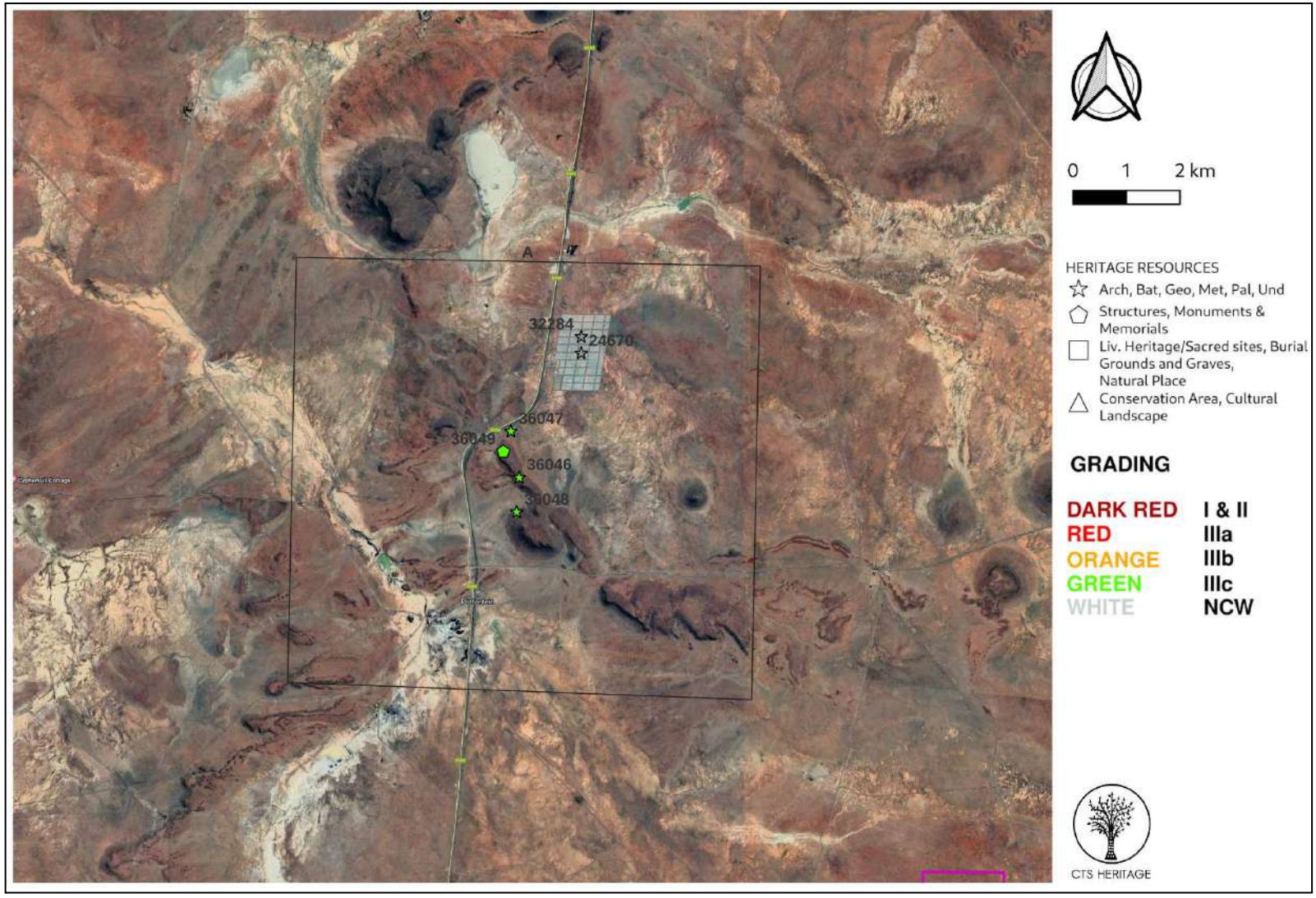

Figure 3a. Heritage Resources Map. Inset A.

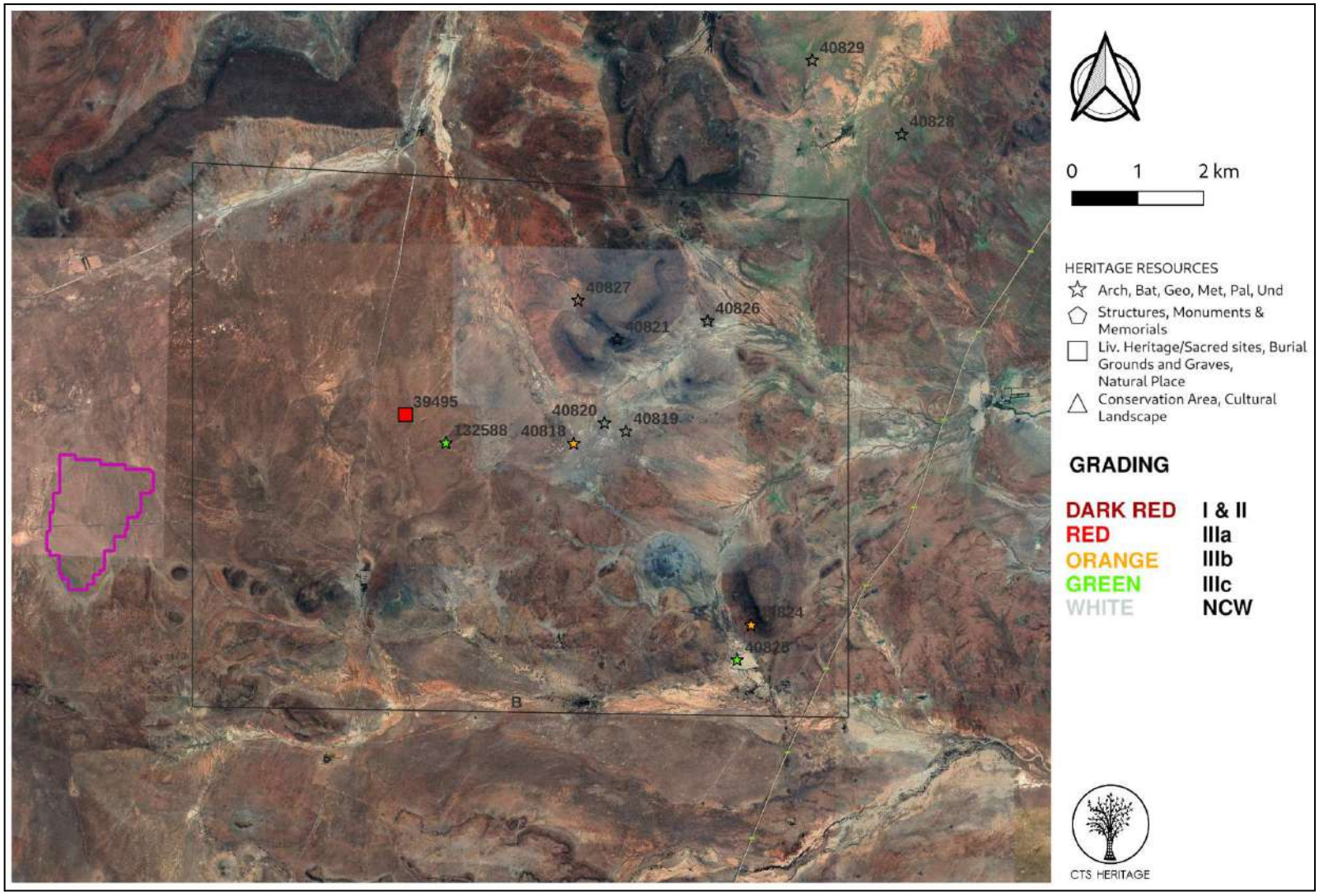

Figure 3b. Heritage Resources Map. Inset B.

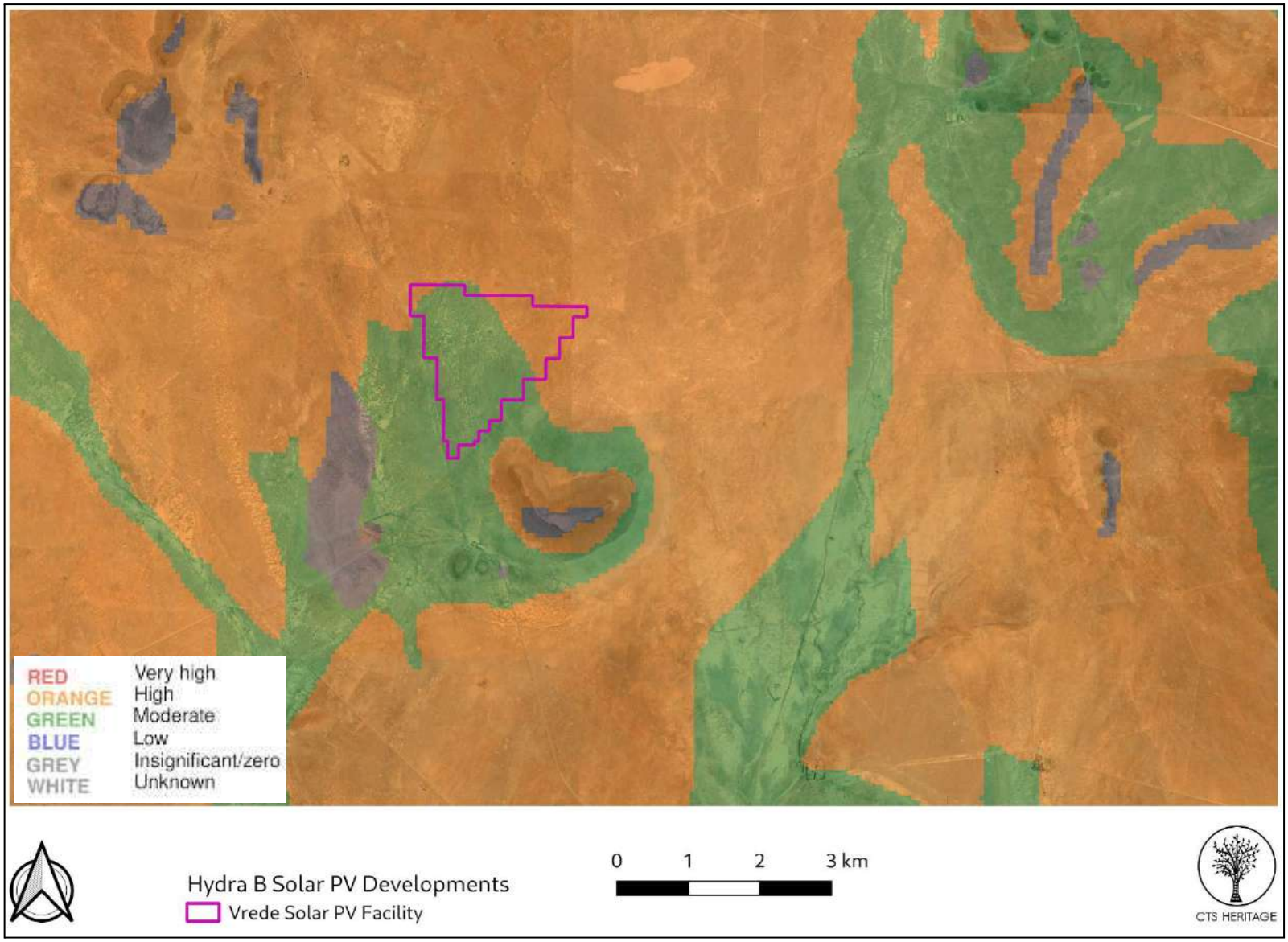

Figure 4a. Palaeosensitivity Map. Indicating varied fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

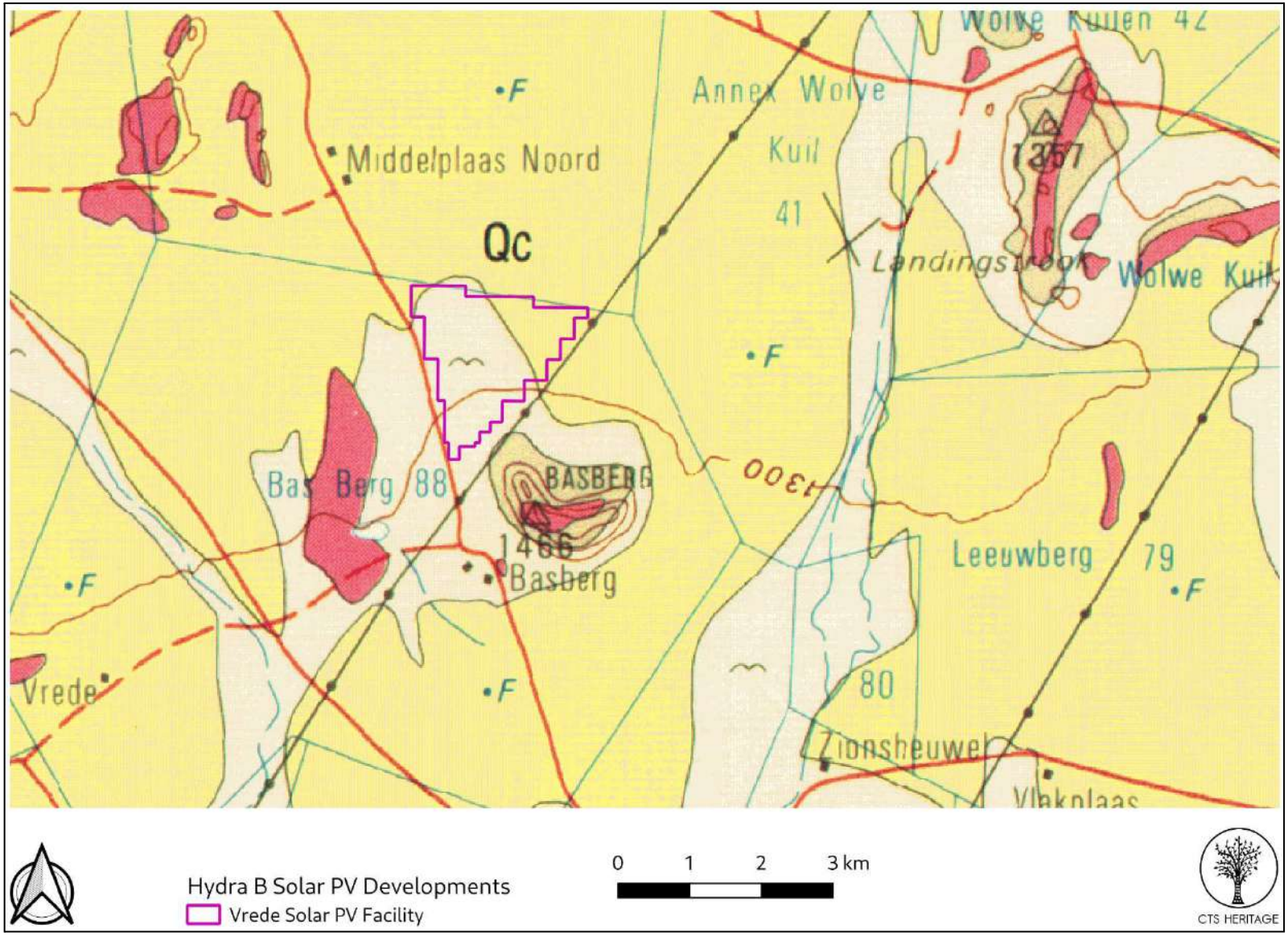

Figure 4b. Geology Map. Extract from the Council of GeoScience Geology Map tile 3024 for Colesberg indicating that the area proposed for development is underlain by Quaternary Sands.

8. Heritage Assessment

Vrede Solar PV Facility, Northern Cape Province application by Akuo Energy Afrique.

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Vrede Solar PV Facility and its associated electrical infrastructure on Portion 5 of the Farm Bas Berg 88 in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Project (Vrede Solar PV Facility) is part of a cluster known as the Hydra B Renewable Energy Cluster. The Cluster entails the development of up to Twenty-one (21) solar energy facilities.

A technically suitable project site of ~1102ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 150MW.

Built Environment and historical context

De Aar was originally established on the Farm "De Aar." The name means "the artery," a reference to its underground water supply. The Cape Government Railways were founded in 1872, and the route that the government chose for the line to connect the Kimberley diamond fields to Cape Town on the coast, ran directly through De Aar. Because of its central location, the government also selected the location for a junction between this first railway line, and the other Cape railway networks further east, in 1881. In 1899 two brothers who ran a trading store and hotel at the junction, Isaac and Wulf Friedlander, purchased the farm of De Aar. Following the Anglo Boer War, the Friedlander brothers surveyed the land for the establishment of a town. The municipality was created a year later in 1900. Phillipstown lies at the south eastern end of the Hydra B study area while Petrusville lies to the north east.

This area was also a contested space during the South African War (also known as the Second Boer War/Anglo-Boer War) where various sorties through the area were carried out by Generals De Wet and Smuts. The British erected a number of blockhouses protecting the railway lines that were essential in maintaining territorial control and the Hopetown - De Aar line runs along the western end of the Hydra B project area. This line was also actively used to transport military equipment during the Border War (1966-1990) fought between South Africa and independence movements in Angola, Namibia, Botswana, Zambia, Zimbabwe and Mozambique.

Kruger (2012) documented historical period buildings dating to the 1930s and associated farm graveyards at Vetlaagte - a number of farm homestead complexes dot the area covered by the Hydra B project but all are situated sufficiently far away (at least 1km) from these homesteads that no heritage impacts are anticipated on these resources.

Archaeology

A number of impact assessments related to renewable energy (wind and solar) have been carried out in the De Aar area over the last 15 years. A cluster of solar energy projects surround the Hydra substation 10km south of De Aar. As part of the 2012 process for approval of the Vetlaagte Solar Energy Facility, Kruger conducted a detailed Heritage Impact Assessment of the area proposed for development. According to Kruger (2012), “During the survey, widespread Middle Stone Age (MSA) material, including characteristic formal MSA stone tools such as points, blades and scrapers were documented in the survey area along a north-south oriented drainage on the eastern periphery of the property. The lithic remains occur in three large scatters and, almost without exception, in low lying areas along non-perennial drainage lines and wetland areas where precipitation and groundwater have exposed the stone tools, originally deposited on a decomposed calcrete rock layer approximately 30cm sub surface. Preliminary examinations of some of the lithics indicated that a number of flakes displayed facetted platforms, characteristic of the MSA.”

The approved Castle Wind Energy Facility lies on the hills just to the south east of the Hydra B project area. The development area has been subject to a previous heritage impact assessment process (Van der Walt, 2014, SAHRIS ID 183142) and a palaeontology assessment (Milsteed, 2014, SAHRIS ID 183143). A number of San engravings can be found on the dolerite boulders spread throughout the area and a more recent historical set of engravings has been made since the establishment of diamond mining at Kimberley and the spread of stock farming in the area.

Palaeontology
According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of high and very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3024 for Colesburg, the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group.

As part of the Vetlaagte project in 2012, Almond completed a field-based palaeontological assessment. Almond (2012) found that "The potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Ecca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Ecca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian Glossopteris Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area. Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age. The diverse superficial deposits within the three study areas (e.g. soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole. Abundant fragments of reworked fossil wood material of Ecca provenance occur widely within subsurface and surface gravels overlying the Ecca Group outcrop area."

In Bamford's assessment completed for the area in 2021, she notes that "Based on experience, other reports and the lack of any significant previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the Tierberg Formation or Adelaide Subgroup. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr."

RECOMMENDATION
An HIA should be conducted consisting of a field-based archaeological impact assessment due to the likelihood of encountering engravings and possible graves or ruins. The area has very low palaeontological sensitivity as verified by the fieldwork carried out by Almond and Millstead. A desktop PIA should therefore be carried out as part of the HIA.

9. Scoping Assessment Impact Table

Impact

- Impact to archaeological and built environment resources
- Impact to palaeontological resources
- Impact to Cultural Landscape
- Cumulative Impact

Desktop Sensitivity Analysis of the Site

- Impact to significant archaeological resources such as Stone Age artefact scatters, remnants of Iron Age settlements, burial grounds and graves, historical artefacts, historical structures and rock art engravings through destruction during the development phase and disturbance during the operational phase is possible.
- Impacts to palaeontological resources are unlikely.
- There is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from rural and mining to semi-industrial, however, due to the density of mining activities in the area, the impact on the experience of the cultural landscape is not foreseen to be significant.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Impact to significant heritage resources through destruction during the development phase and disturbance during the operational phase.	Destruction of significant heritage resources	Local scale with broader impacts to scientific knowledge	None known at present

Gaps in knowledge & recommendations for further study

The heritage resources in the area proposed for development are not yet sufficiently recorded

Based on the available information, including the scale and nature of the proposed development, it is likely that significant heritage resources will be impacted by the proposed development and as such it is recommended that further heritage studies are required in terms of section 38 of the NHRA with specific focus on impacts to archaeological heritage.

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APPENDIX 1: List of heritage resources in proximity to the development area

Site ID	Site no	Full Site Name	Site Type	Grading
27950	9/2/071/0005	Magistrate's Court, Market Street, Philipstown	Building	Grade IIIb
27951	9/2/071/0007	Teich house complex, Sofia Street, Philipstown	Building	Grade IIIb
27953	9/2/071/0004	Reformed Church, Philipstown	Building	Grade II
40819	DeP 02	De Put 02	Palaeontological	Grade IIIb
40820	DeP 03	De Put 03	Palaeontological	Grade IIIb
40818	DeP 01	De Put 01	Palaeontological	Grade IIIb
40825	DeP 06	De Put 06	Palaeontological	Grade IIIc
39495	SWT 01	Swartwater 01	Burial Grounds & Graves	Grade IIIa
134665	DWEF005	De Aar WEF	Rock Art	Grade IIIa
134740	DWEF026	De Aar WEF	Building	Grade IIIb
134742	DWEF028	De Aar WEF	Artefacts	Grade IIIc
134744	DWEF029	De Aar WEF	Artefacts	Grade IIIb
134745	DWEF030	De Aar WEF	Artefacts	Grade IIIc
135925	DC7/NAMM/0016	Voortrekker Memorial, Market Square, Philipstown	Monuments & Memorials	
134799	DWEF042	De Aar WEF	Structures	Grade IIIc

134801	DWEF043	De Aar WEF	Palaeontological	Grade IIIc
134805	DWEF044	De Aar WEF	Artefacts	Grade IIIc
134807	DWEF045	De Aar WEF	Burial Grounds & Graves	Grade IIIa
134809	DWEF046	De Aar WEF	Burial Grounds & Graves	Grade IIIa
134810	DWEF047	De Aar WEF	Burial Grounds & Graves	Grade IIIa
134811	DWEF048	De Aar WEF	Artefacts	Grade IIIc
134813	DWEF049	De Aar WEF	Artefacts	Grade IIIc
134816	DWEF050	De Aar WEF	Artefacts	Grade IIIb
134817	DWEF051	De Aar WEF	Artefacts	Grade IIIb
134818	DWEF052	De Aar WEF	Artefacts	Grade IIIc
134819	DWEF053	De Aar WEF	Artefacts	Grade IIIc
132588	SWT 02	Swartwater 02	Artefacts	Grade IIIc

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APPENDIX 2: Reference List

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
109347	AIA Phase 1	David Morris	01/12/2012	ARCHAEOLOGY SPECIALIST INPUT ON THE PROPOSED ACCESS ROAD FOR THE VANDERLINDESKRAAL PHOTOVOLTAIC SITE SITUATED NEAR HANOVER, NORTHERN CAPE
109627	PIA Phase 1	Gideon Groenewald	24/01/2013	PALAEONTOLOGICAL FIELD INVESTIGATION PHASE 1 REPORT FOR THE PROPOSED ACCESS ROAD ON THE REMAINDER OF THE FARM VAN DER LINDES KRAAL NO. 79, HANOVER, NORTHERN CAPE
126242	HIA Phase 1	Anton van Vollenhoven	30/07/2013	A REPORT ON A CULTURAL HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED SWARTWATER SOLAR PV POWER FACILITY, CLOSE TO PETRUSVILLE, NORTHERN CAPE PROVINCE
127514	Palaeontological Specialist Reports	Robert Gess	13/08/2013	Palaeontological Impact Assessment for Proposed establishment of the Swartwater Solar energy Facility, Eastern Cape
151280	Archaeological Specialist Reports	Jaco van der Walt	26/08/2013	Archeological Scoping Report for the Proposed Castle WEF near De Aar, Northern Cape Province
151284	PIA Desktop	John E Almond	31/08/2013	Palaeontological Heritage Assessment: Desktop Study
160512	Archaeological Monitoring	Lita Webley, Dave Halkett	17/03/2014	HERITAGE IMPACT ASSESSMENT: WALKDOWN OF FINAL LAYOUT OF THE LONGYUAN MULILO DE AAR 2 NORTH WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE

163994		Wouter Fourie	03/08/2013	Proposed PV Facility: Heritage Impact Report
183142	Archaeological Specialist Reports	Jaco van der Walt	30/10/2014	Archaeological Impact Assessment Report for the Proposed Castle Wind Energy Facility, De Aar, Northern Cape
183143	Heritage Impact Assessment Specialist Reports	Barry Millsteed	24/11/2014	Full Palaeontological Heritage Impact Assessment Report on a Portion of a Proposed Wind Energy Generation Facility (The Castle Project); This Being on the Eastern Extent of the Farm Knapdaar 8 near De Aar, Northern Cape Province
339820	Heritage Impact Assessment Specialist Reports	Lita Webley, Jayson Orton	01/12/2011	Proposed De Aar Wind Energy Facility on the North and South Plateau, Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
384330	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofsig 1 Solar PV Energy Facility on the remainder of Farm Kalkpoort 18, Renosterberg Local Municipality near Petrusville, Northern Cape
384331	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofisg 2 Solar PV Energy Facility on the remainder of Farm Kalkpoort 18, Renosterberg Local Municipality near Petrusville, Northern Cape
384332	HIA Letter of Exemption	John Almond	01/10/2016	Proposed Kloofsig 3 Solar PV Energy Facility on the remainder of farm Kalkpoort 18, Resnosterberg Local Municipality near Petrusville, Northern Cape
384452	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Assessment Screening of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384456	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384469	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Screening Assessment - Proposed Kloofsig Solar Pv Facility On The Remainder Of Farm Kalk Poort 18, Renosterberg Local Municipality Near Colesberg, Northern Cape

384497	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 2 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
384552	Palaeontological Specialist Reports	John E Almond	01/06/2015	Palaeontological Impact Assessment: Basic Assessment Study & Proposed Exemption From Further Specialist Palaeontological Studies Proposed Kloofsig Solar PV Facility On The Remainder Of Farm Kalk Poort 18, Renosterberg Local Municipality Near Colesberg, Northern Cape
384554	Archaeological Specialist Reports	Madelon Tusenius	24/10/2016	Archaeological Impact Assessment of the proposed Kloofsig 1 Solar PV Energy Facility on the remainder of the Farm Kalkpoort 18, Petrusville area, REsnosterberg Local Municipality, Northern Cape.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources
4555	AIA Phase 1	Cobus Dreyer	10/06/2005	Archaeological and Historical Investigation of the Proposed Pipeline Installation at Philipstown, Northern Cape
4556	AIA Phase 1	Cobus Dreyer	29/05/2006	Archaeological and Cultural Heritage Investigation of the Proposed Eskom Hydra-Perseus & Beta-Perseus Transmission Line at the Farm Jackalskuil 21, Petrusville, Northern Cape
4558	AIA Phase 1	Cobus Dreyer	27/02/2008	First Phase Archaeological and Cultural Heritage Investigation of the Vanderkloof Dam - Petrusville Main Water Supply Scheme, Northern Cape
6970	AIA Phase 1	David Morris	02/09/2011	Paarde Valley. Ilanga Lethemba PV Solar Energy Facility. Specailist input for the environmental impact asssessment phase and environmental management programme for the proposed Ilanga Lethemba Solar Energy Facility, near De Aar, Northern Cape province
6971	AIA Desktop	Johnny Van Schalkwyk	30/04/2011	Heritage Impact Scoping report for the proposed establishment of the Ilanga Lethemba PV Solar Energy Facility, near De Aar, Northern Cape Province.
7020	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Kalkbult Photovoltaic construction site north of De Aar, Northern Cape
8023	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Taaiboschfontein Photovoltaic construction site

				between De Aar and Hanover, Northern Cape
8167	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Vanderlindeskraal Photovoltaic construction site near Hanover, Northern Cape
8992	PIA Phase 1	John E Almond	29/01/2012	Palaeontological Specialist Study: Combined Desktop and Field -based Assessments. Two wind energy facilities on the Eastern Plateau near De Aar, Northern Cape Province proposed by Mulilo Renewable Eneergy (Pty) Ltd
116245	AIA Phase 1	David Morris	08/01/2013	ARCHAEOLOGY SPECIALIST INPUT ON THE SITE OF THE PROPOSED POTFONTEIN PHOTOVOLTAIC CONSTRUCTION SITE NORTH OF DE AAR, NORTHERN CAPE
118851	PIA Desktop	Gideon Groenewald	29/04/2013	PALAEONTOLOGICAL DESKTOP REPORT PROPOSED POTFONTEIN PHOTOVOLTAIC FACILITY Potfontein Photovoltaic Facility, Farm: Koens Draai 36, Emthanjeni Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province of South Africa
356810	HIA Phase 1	Lita Webley	15/02/2016	Desktop Heritage Impact Assessment: Proposed mining of two borrow pits on the remainder of farm Enkeldebult 150, south of Phillipstown, Northern Cape
108972	PIA Desktop	Gideon Groenewald	18/12/2012	Palaeontological Desktop Assessment - Proposed construction of two 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape
108995	HIA Phase 1	Wouter Fourie	10/01/2013	HIA - 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2)
108996	HIA Phase 1	Wouter Fourie	10/01/2013	HIA - Addendum - 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2)
114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel to Kimberley, Northern Cape
114929	HIA Phase 1	Elize Becker	25/02/2013	Transnet Capital Projects Ngqura 16 Mtpa Manganese Rail Phase 1 Heritage Impact Assessment Rail

				Kimberley to De Aar
115026	PIA Phase 1	John E Almond	01/02/2013	Proposed 16 Mtpa expansion of Transnet's existing manganese ore export railway line and associated infrastructure between Hotazel and the Port of Ngqura, Northern and Eastern Cape. Part 3: Kimberley to De Aar, Northern Cape
121518	HIA Phase 1	Elize Becker	28/01/2013	Phase 1 Heritage Impact Assessment - Borrow Pit areas between Kimberley to De Aar
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
151768	PIA Phase 1	John E Almond	01/11/2013	Palaeontological specialist assessment: combined desktop and field-based study: PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE.
163451	Archaeological Specialist Reports	Wouter Fourie	27/03/2014	Proposed construction of a 132kV transmission line from the Longyuan Mulilo De Aar 2 North Wind Energy Facility on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape
8086	AIA Phase 1	Johan Nel	14/11/2008	Final Report Heritage Resources Scoping Survey & Preliminary Assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape
92575	HIA Phase 1	Elize Becker	10/10/2012	Phase 1 Heritage Impact Assessment Kimberley to De Aar
93185	HIA Phase 1	Elize Becker	01/11/2012	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port Ngqura

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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)
DEFF	Department of Environment, Forest and Fisheries (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.

CTS HERITAGE

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.

Note:
The responsibility for generating a response detailing the requirements for the development lies with the heritage authority. However, since the methodology utilised for the compilation of the Heritage Screeners is thorough and consistent, contradictory outcomes to the recommendations made by CTS should rarely occur. Should a discrepancy arise, CTS will immediately take up the matter with the heritage authority to clarify the dispute.

APPENDIX 5 -Summary of Specialist Expertise

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 a member 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 70 Heritage Impact Assessments throughout South Africa.