

HERITAGE IMPACT ASSESSMENT

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

Proposed development of the Grid Connections for the Rondawel Solar Energy Facility near Kroonstad, Free State Province

SAHRIS Ref:

Prepared by CTS Heritage



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For

Savannah Environmental (Pty) Ltd

December 2020

Updated April 2021

Updated July 2021



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EXECUTIVE SUMMARY

1. Site Name:

Rondavel SEF Grid connection

2. Location:

Farm Rondavel No. 627 (Remaining Extent, Portion 1 and Portion 0);

Farm Boschplaat No. 330 (Remaining Extent);

Farm Salie No. 1837 (Remaining Extent);

Farm Rondavel-Noord No. 1475 (Remaining Extent);

Farm Naseby Thorns No. 288 (Portion 1);

Farm Leeuwkrantz No. 1384 (Portion 0);

Farm Dorp Gronden Van Kroonstadt No. 460 (Remaining Extent, Portion 225 and Portion 226); and

Farm farm Waterloo No. 1383 (Remaining Extent).

3. Locality Plan:

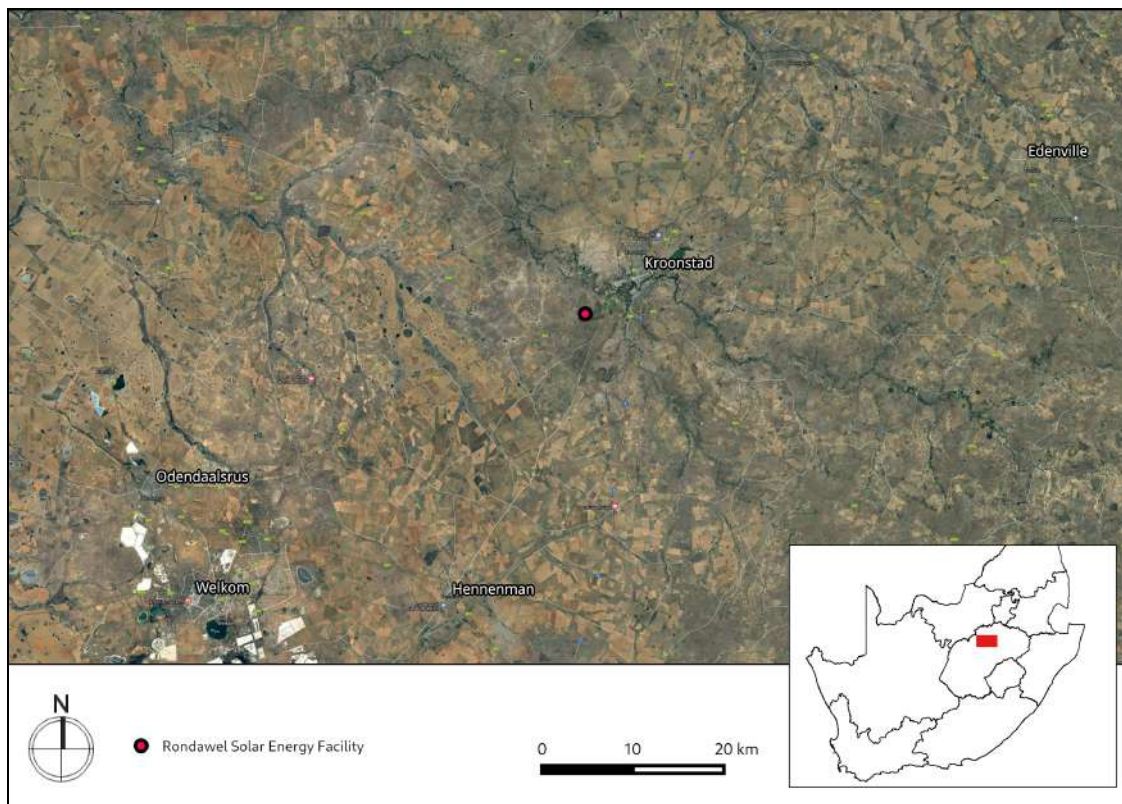


Figure 1: Location of the proposed development area

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4. Description of Proposed Development:

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the grid connection infrastructure for the proposed 100 MWac Rondawel Solar Energy Facility (SEF), Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa.

5. Heritage Resources Identified:

No significant heritage resources were identified within any of the proposed grid connection alignment options during the field survey for both archaeology and palaeontology. Four heritage resources were identified within the area proposed for Rondawel SEF located adjacent to the proposed grid connection corridors. RDW001 and RDW004 (both LSA Scatters) are located near to two of the corridors, however even these are located more than 50m away and will not be impacted by the development.

6. Anticipated Impacts on Heritage Resources:

The area proposed for the development of the Rondawel Solar Energy facility grid connection was assessed in the field assessment described in this report. It was noted that the area proposed for development is somewhat overgrown which limited archaeological visibility. However, the generally shallow nature of the soils and heavy disturbance of the landscape for previous use (in dam and road construction) limit the potential for long, *in situ* sequences of archaeological significance. Four observations of varied cultural significance were recorded, two of which are located in close proximity to the proposed grid connection corridors. Based on the outcomes of this assessment, it is not anticipated that the proposed development of the SEF at Rondawel will negatively impact on any archaeological heritage resources on condition that the recommendations articulated below are implemented.

The overall palaeontological sensitivity of the areas proposed for the Rondavel SEF is HIGH to VERY HIGH. The field survey identified a number of areas of possibly fossiliferous outcrops of the underlying bedrock. In addition, examples of fossilised wood were identified associated with Outcrop 2 located within the area proposed for the Rondavel SEF. Although *ex situ*, these findings corroborate the high palaeontological sensitivity of the area.

In general, it is preferred that excavations take place into fossiliferous bedrock rather than avoiding impact as this allows palaeontologists access to otherwise inaccessible palaeontological resources. The negative impacts of such excavations to palaeontological resources are managed through careful monitoring of excavations into



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bedrock by a suitably qualified palaeontologist. It is therefore preferable that excavations do indeed take place on condition that these excavations are properly monitored.

7. Recommendations:

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

- There is no preferred alternative in terms of impacts to heritage resources
- A no-development buffer zone of 50m is implemented around RDW001 and RDW004
- All excavations into bedrock are monitored by a suitably qualified palaeontologist and a report on the outcomes of the monitoring activities must be submitted to SAHRA on completion of the development of the facility.
- All other excavation activities are subject to the Palaeontological Chance Finds Procedure.
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

8. Author/s and Date:

Jenna Lavin

July 2020

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Details of Specialist who prepared the HIA

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

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

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.



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1. INTRODUCTION

1.1 Background Information on Project

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of grid connection infrastructure for the proposed 100MWac Rondavel Solar Energy Facility (SEF), Battery Energy Storage System (BESS) and associated infrastructure. These projects are located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The solar PV facility will be connected to the grid via a dedicated grid connection solution, to be known as the Rondavel Grid Connection.

The proposed grid solution comprises the following:

- On-site substation (located within the respective Solar PV Facility), consisting of:
 - 33/132 kV Eskom substation;
 - Associated equipment, infrastructure and buildings;
 - Access and maintenance roads; and
 - Temporary and permanent laydown areas.
- Distribution Lines:
 - 132kV distribution line from the onsite 33/132 kV Eskom substation via a loop in loop out into the Eskom 132 kV Kroonstad Munic- Theseus 1 Switching Station (S/Stn) powerline, or direct connection with the destination Eskom substation (Kroonstad Municipality 132/66kV substation).

It is the Developer's intention to bid each solar PV facility under the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The power generated from each solar PV facility will be sold to Eskom and fed into the national electricity grid through the proposed grid connection solutions. The development of the facilities and grid connection infrastructure will also assist with achieving the energy mix as set out in the Integrated Resources Plan (IRP).

The Rondavel Grid Connection will loop into either the Kroonstad Munic - Kroonstad SW STN 1 132kV power line, or connect directly with the Kroonstad Municipality 132/66kV substation, depending on which alternative is constructed. The assessment of the grid connection infrastructure will consider a corridor with a width of up to 260m.



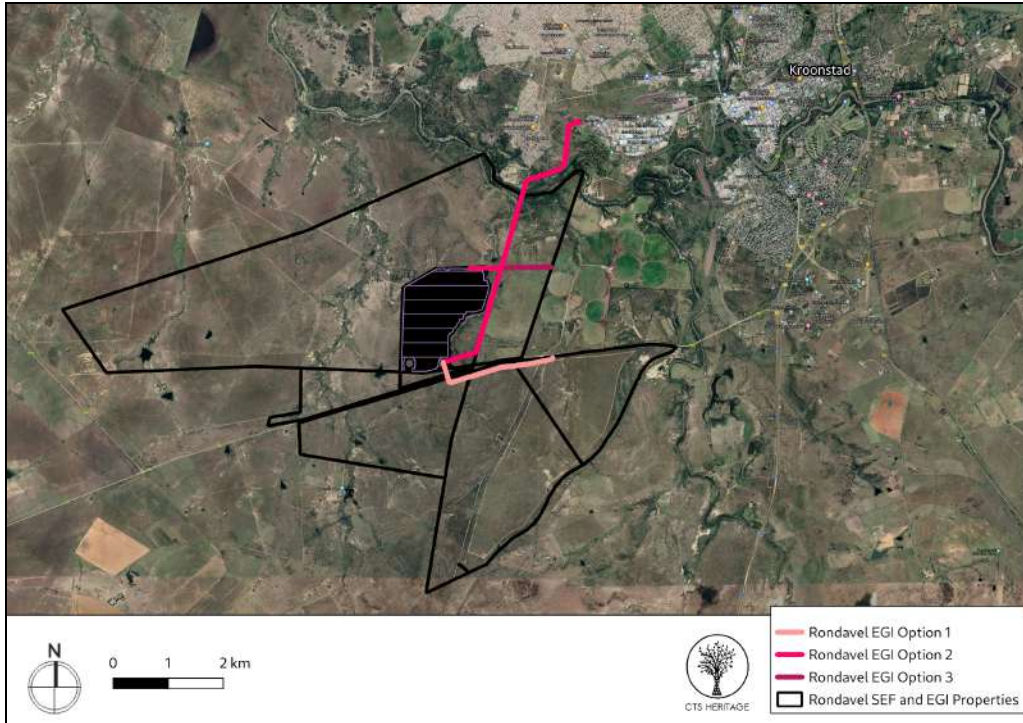
The proposed infrastructure will be appropriately placed within the respective power line corridors and switching station study area through consideration and avoidance of environmental sensitivities and other energy infrastructure on the affected properties. The pylon structures of the power lines will be up to 32m high and the power line will be developed within the servitude of up to 40m wide.

1.2 Description of Property and Affected Environment

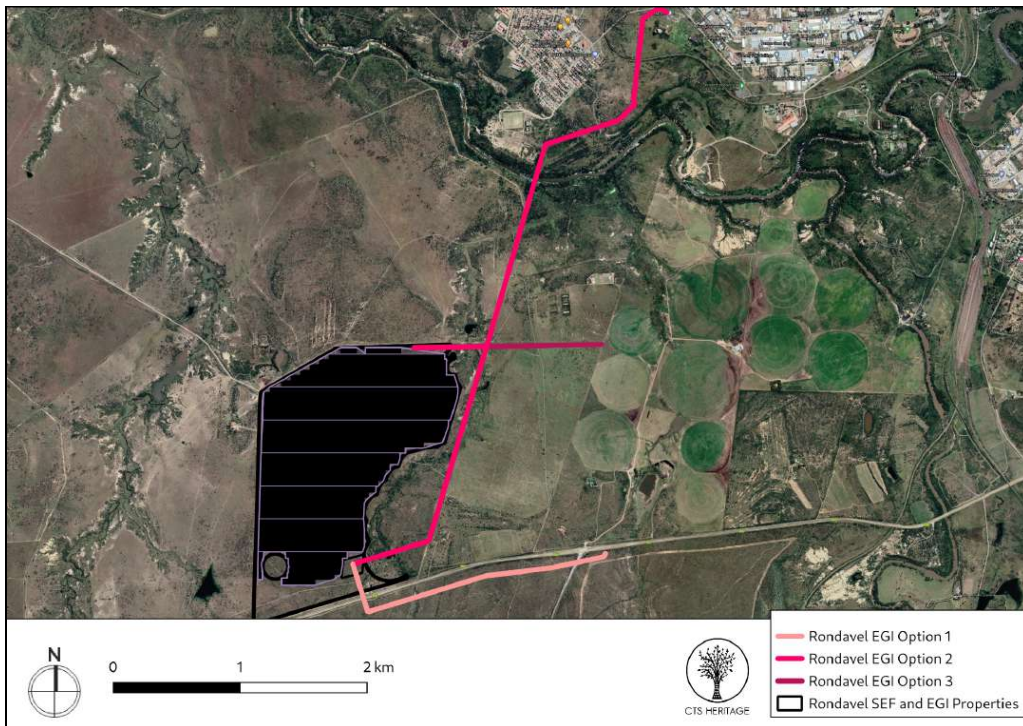
The proposed North-East power line extended along the eastern boundary of the Rondavel property to the river. The river has eroded several deep (over 10m) channels into quaternary sand deposits in this location. This area is currently heavily used by foot traffic and local cattle. Several pre-existing power lines cross the river at this location. Immediately on the other side of the river is an industrial and informal residential area that spreads down to the river. Local landowners advised us to avoid accessing this land due to safety issues. The proposed Mid-East line extends east to west from the midline of the Rondavel property across a neighbour's farm and follows a field boundary gravel road. Overgrazing on this property has exposed soils and rock outcrop, resulting in good visibility but high levels of soil disturbance. The proposed south power line route extends along the southern border of the R34 main tar road. On both sides of the R34, extensive and significant construction processes have disturbed and displaced soils reducing the preservation or integrity of any cultural remains.



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Map 1a: The proposed development area including all proposed Solar Energy Facilities



Map 1b: The proposed development area including all proposed Solar Energy Facilities

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2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologists conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 18 to 19 October 2020.
- A palaeontologist conducted an assessment of palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted her site visit from 18 to 19 October 2020.
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

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

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

2.4 Constraints & Limitations

Dense vegetation covered the majority of the landscape and seriously hindered systematic and comprehensive coverage of the ground. In this case, google earth was used to identify specific geomorphic features commonly



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associated with cultural remains (rivers and high ground). These areas and more open grassland were then targeted through field walking to build a representative perspective on the presence, distribution and abundance of any cultural remains. However, the dense vegetation in the interior of the property may have obscured small cultural features and isolated artefacts. The specialist is confident that this approach sampled adequately the variety of landscapes on this property and that the report presented is representative of the majority of preserved cultural remains.

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

2.5 Savannah Impact Assessment Methodology

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

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

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improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

- The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
- The status, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

The area proposed for development is located approximately 7km southwest of the historic core of Kroonstad. Kroonstad was established as a town in 1855. During the Second Boer War, from 13 March to 11 May 1900, the city became the capital of the Orange Free State, and subsequently the site of a British concentration camp to contain Boer women and children. Kroonstad still boasts much of the inherent rugged beauty which led the Voortrekkers to establish the town where they did and it is situated in an area characterised by open spaces and an abundant

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variety of vegetation that makes it particularly beautiful. According to Van Schalkwyk (2013), “Most farmsteads were burned down during the Anglo-Boer War, with the result that very little of the built environment dates to the 19th century.” According to Matenga (2019), the Black and Coloured townships are significant as landscapes of segregation occupying the north-western fringe of the CBD, while the exclusive white suburbs were located northeast of the town and south of the Valsch River.

According to Van Schalkwyk (2013), “The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component. This was soon followed by the development of a number of urban centres or towns. Originally these mostly served the surrounding farming communities, but with the discovery of the Free State Gold Fields, they expanded rapidly in order to serve this industry as well.” The proposed Solar Energy Facilities and their associated grid connections are located some distance from the historic core of Kroonstad town. Furthermore, the areas proposed for development are located more than 5km away from the site of the Boer War concentration camps and associated burial grounds.

Archaeology

Prior to colonial settlement in 1855, the area proposed for development formed part of a landscape that was occupied by indigenous Khoe herders and San hunter-gatherers. These indigenous communities were displaced by Bantu-speaking people who began to occupy the area in the Iron Age. According to Van Schalkwyk (2013), “Sites dating to the Late Iron Age are known to occur in the region, especially... in the vicinity of the Sandrivier, whereas some are known to occur to the northwest of Ventersburg. These are typical stone walled sites that are linked with Sothospeakers and date to the period after 1600.” As such, it is possible that Early, Middle or Later Stone Age artefacts may be located within the proposed development footprint. Furthermore, it is possible that evidence of Iron Age settlement may also be located within the proposed development areas.

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figures 4a and 4b), the areas proposed for development are underlain by sediments of moderate to very high palaeontological sensitivity. According to the Council of GeoScience 2726 Kroonstad Map, the development area for the Rondawel SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volksrust Formation (Pvo) (Figure 5a) and the Vrede SEF and Grid Connections are underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs) (Figure 5b). The

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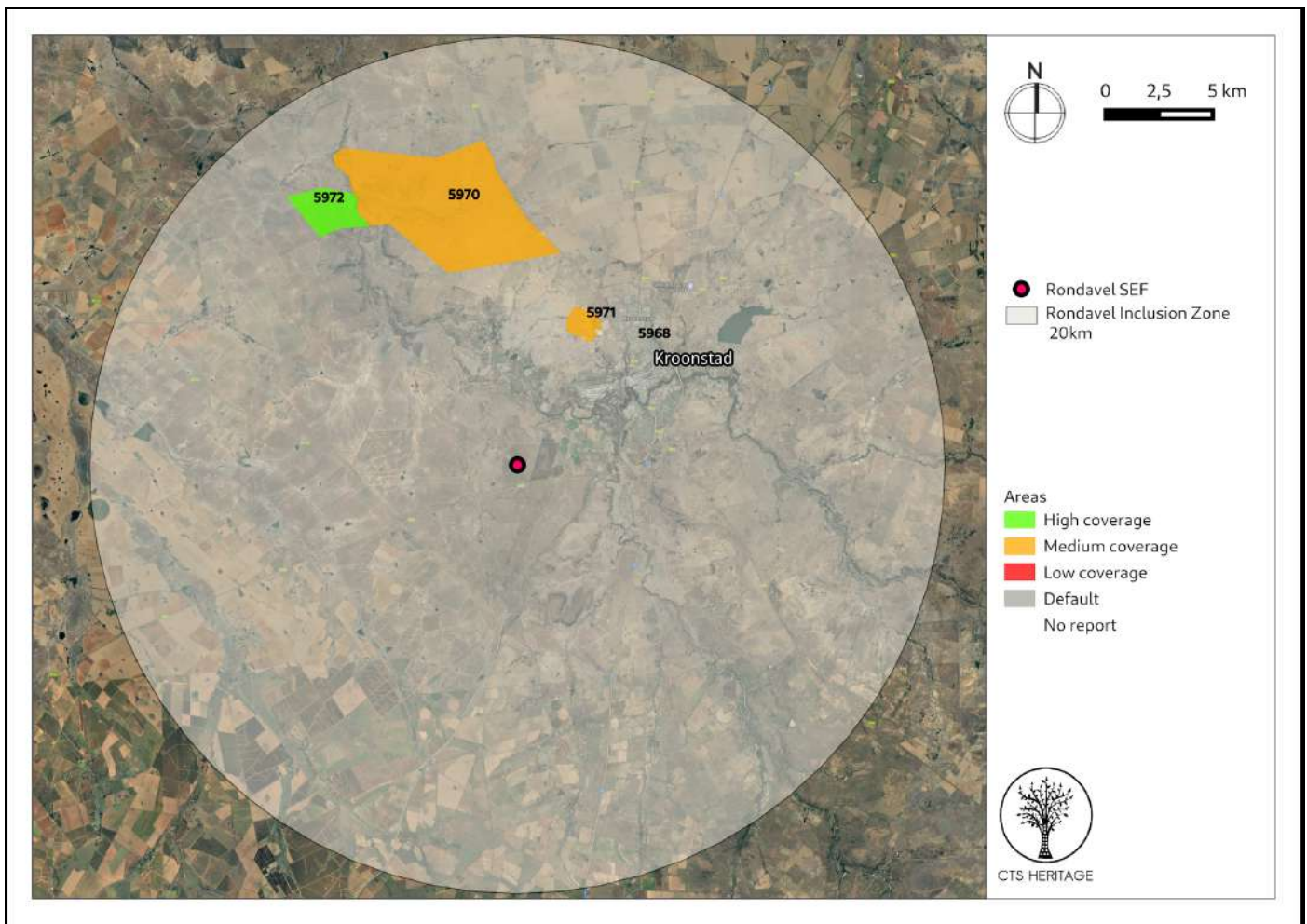
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most palaeontologically sensitive formation underlying the development areas is the Adelaide Subgroup of the Beaufort Group. This formation forms part of the Dicynodon and Lystrosaurus assemblage zones and is known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows. Diverse terrestrial and freshwater tetrapods of *Pristernognathus* to *Dicynodon* Assemblage Zones (amphibians, true reptiles, synapsids – especially therapsids) have been found in this formation, as well as, palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse to rich assemblages of vascular plants (*Glossopteris* Flora, including spectacular petrified logs) and insects.



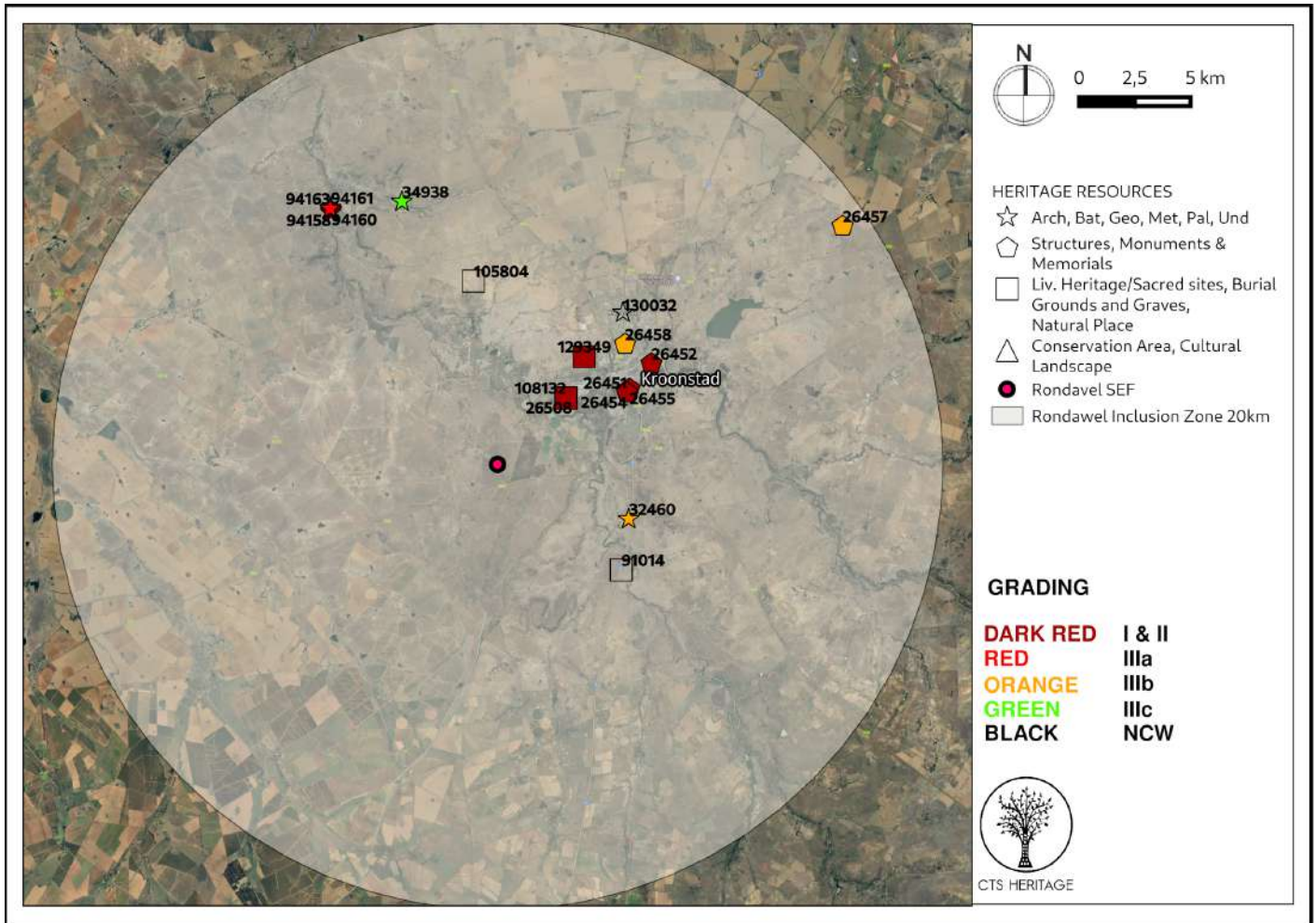
Map 2.2: Spatialisation of heritage assessments conducted in proximity to the proposed development

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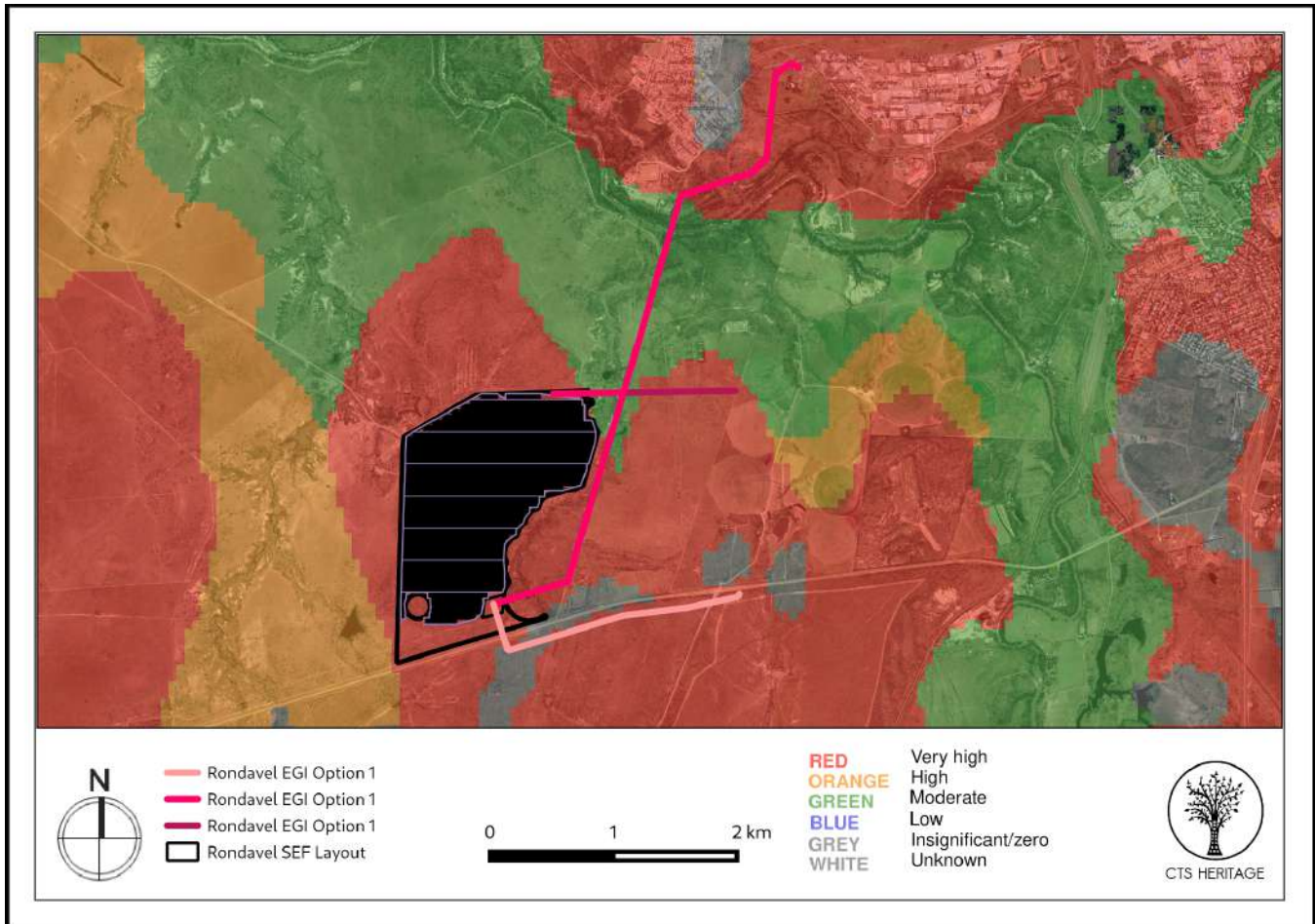


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Map 3.1: Palaeontological sensitivity of the proposed development area

3.2 Geology

According to the Council of GeoScience 2726 Kroonstad Map, the development area for the Rondavel SEF grid connection is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volksrust Formation (Pvo) (Figure 4a). The most palaeontologically sensitive formation underlying the development area is the Adelaide Subgroup of the Beaufort Group. This formation forms part of the Dicynodon and Lystrosaurus assemblage zones and is known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows. Diverse terrestrial and freshwater tetrapods of *Pristerognathus* to *Dicynodon* Assemblage Zones (amphibians, true reptiles, synapsids – especially therapsids) have been found in this formation, as well as, palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse to rich assemblages of vascular plants (*Glossopteris* Flora, including spectacular petrified logs) and insects.

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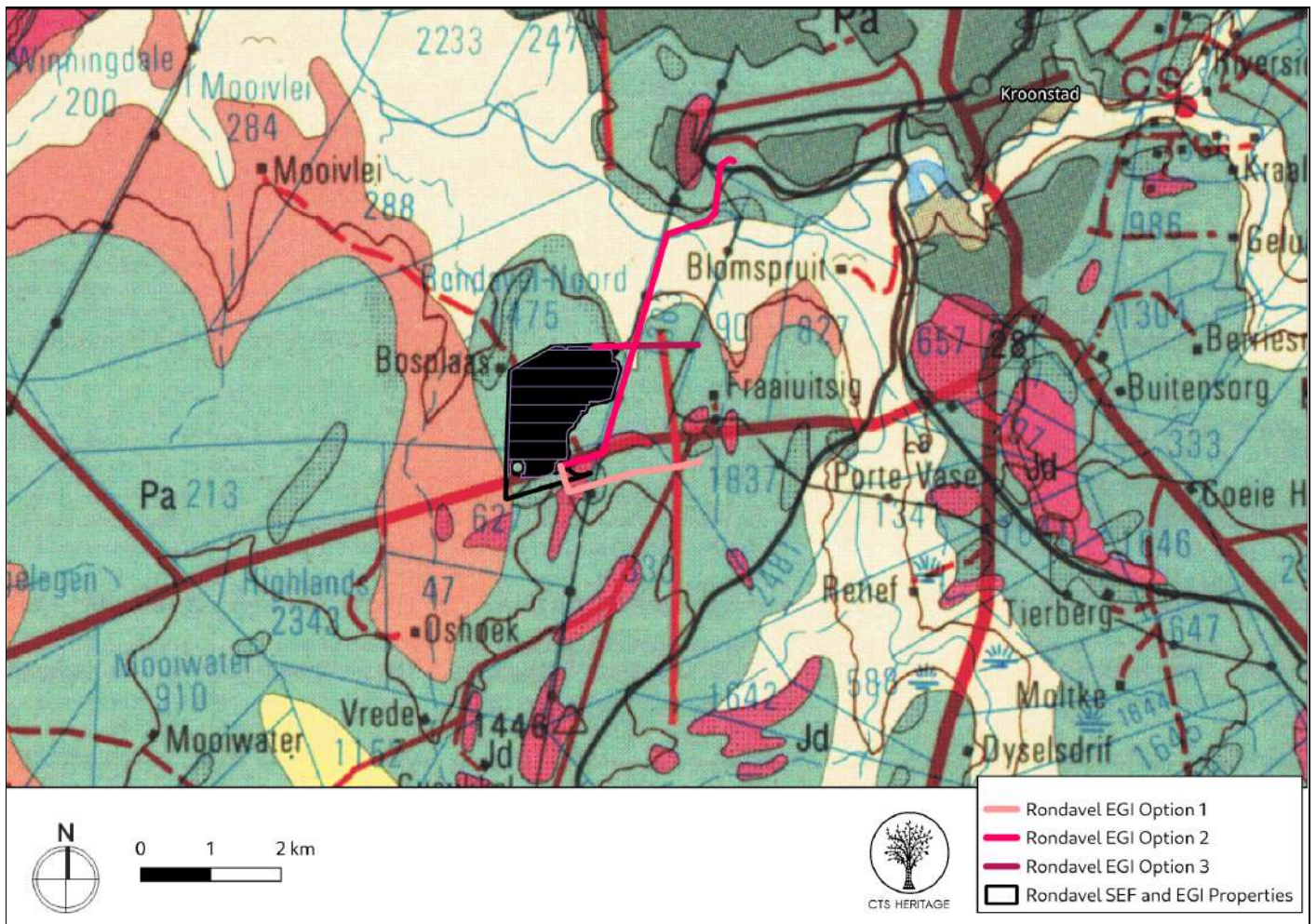
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The geology of the study area on the Rondawel property can be seen on the 1: 250 000 geology sheet 2726 Kroonstad (Schutte 1993) (Figure 3.2). These properties are situated in the northern edge of the Main Karoo Basin of South Africa and are underlain by Late Permian shallow marine / lacustrine to continental sediments of the Karoo Supergroup (Johnson et al. 2006). According to the 1: 250 000 geological maps, the Rondawel SEF and EGI area mainly comprises Karoo sediments belonging to the predominantly fluvial Lower Beaufort Group (Adelaide Subgroup; Pa) that is of latest Permian age with some Middle to Late Permian lacustrine to deltaic sediments of the Ecca Group beneath the Lower Beaufort continental rocks in the very South-West corner (basinal mudrocks of the Volksrust Formation; Pvo) and intrusive Jurassic dolerite dykes (Jd) in the very South-East corner (Figure 3.2).



Map 3.2: Geology Map. Extract from the CGS 2726 Kroonstad Map indicating that the development area for the Vrede SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs)

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

Symbol	Group/Formation	Notes
Qs	Kalahari Group, wind-blown sand (Gordonia Formation)	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (<i>Struthio</i>), shells of land snails (e.g. <i>Trigonephrus</i>), bivalves and gastropods (e.g. <i>Corbula unio</i>) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils
Jd	Jurassic dolerite	No palaeontological sensitivity
Pa	Karoo Supergroup, Beaufort Group, Adelaide Subgroup	<i>Daptocephalus</i> , <i>Dicynodon</i> and <i>Lystrosaurus</i> Assemblage zones. Fossil of fish, amphibians, reptiles and burrows
PVo	Karoo Supergroup, Ecca Group, Volksrust Formation	Trace fossils, bivalves, temnospondyl amphibians, vertebrate microfossils (including fish teeth, spines, scales etc), insect remains, petrified wood

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

The proposed northeast power line extends along the eastern boundary of the Rondavel property to the river. The river has eroded several deep (over 10m) channels into quaternary sand deposits in this location. This area is currently heavily used by foot traffic and local cattle. Several pre-existing power lines do cross the river at this location. Immediately on the other side of the river is an industrial and informal residential area that spreads down to the river. Local landowners advised us on not accessing this land due to safety issues. The proposed Mid-East line extends east to west from the midline of the Rondavel property across a neighbour's farm and follows a field boundary gravel road. Overgrazing on this property has exposed soils and sandstone rock outcrop, resulting in good visibility but high levels of soil disturbance. The proposed south power line route extends along the southern border of the R34 main tar road. On both sides of the R34, extensive and significant construction processes have disturbed and displaced soils reducing the possibility for fossil preservation.

4.2 Heritage Resources identified

No significant heritage resources were identified within any of the proposed grid connection alignment options during the field survey for both archaeology and palaeontology. Four heritage resources were identified within the area proposed for Rondawel SEF located adjacent to the proposed grid connection corridors. RDW001 and RDW004 (both LSA Scatters) are located near to two of the corridors, however even these are located more than 50m away and will not be impacted by the development.

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Table 2: Observations from the field assessments for the Rondavel SEF

POINT ID	Site Name	Description	Co-ordinates		Grading	Mitigation
RDW001	Rondavel 001	LSA Scatter	S 27.69110	E 027.18327°	IIIC	None Required
RDW002	Rondavel 002	Series of possible graves demarcated by piles of stones	S 27.70531°	E 027.16925°	IIIA	A no-go buffer of 100m must be implemented around the identified stone piles
RDW003	Rondavel 003	Single isolated flake, <i>ex situ</i>	S 27.70413°	E 027.17879°	NCW	None Required
RDW004	Rondavel 004	LSA Scatter	S 27.70099°	E 027.17900°	IIIC	None Required
RDW_P07	Rondavel Palaeo 7	Petrified Wood <i>Same location as RDW001</i>	S 27.69110	E 027.18327°	NCW	None Required
RDW_P15	Rondavel Palaeo 15	Petrified Wood <i>Same location as RDW004</i>	S 27.70099°	E 027.17900°	NCW	None Required

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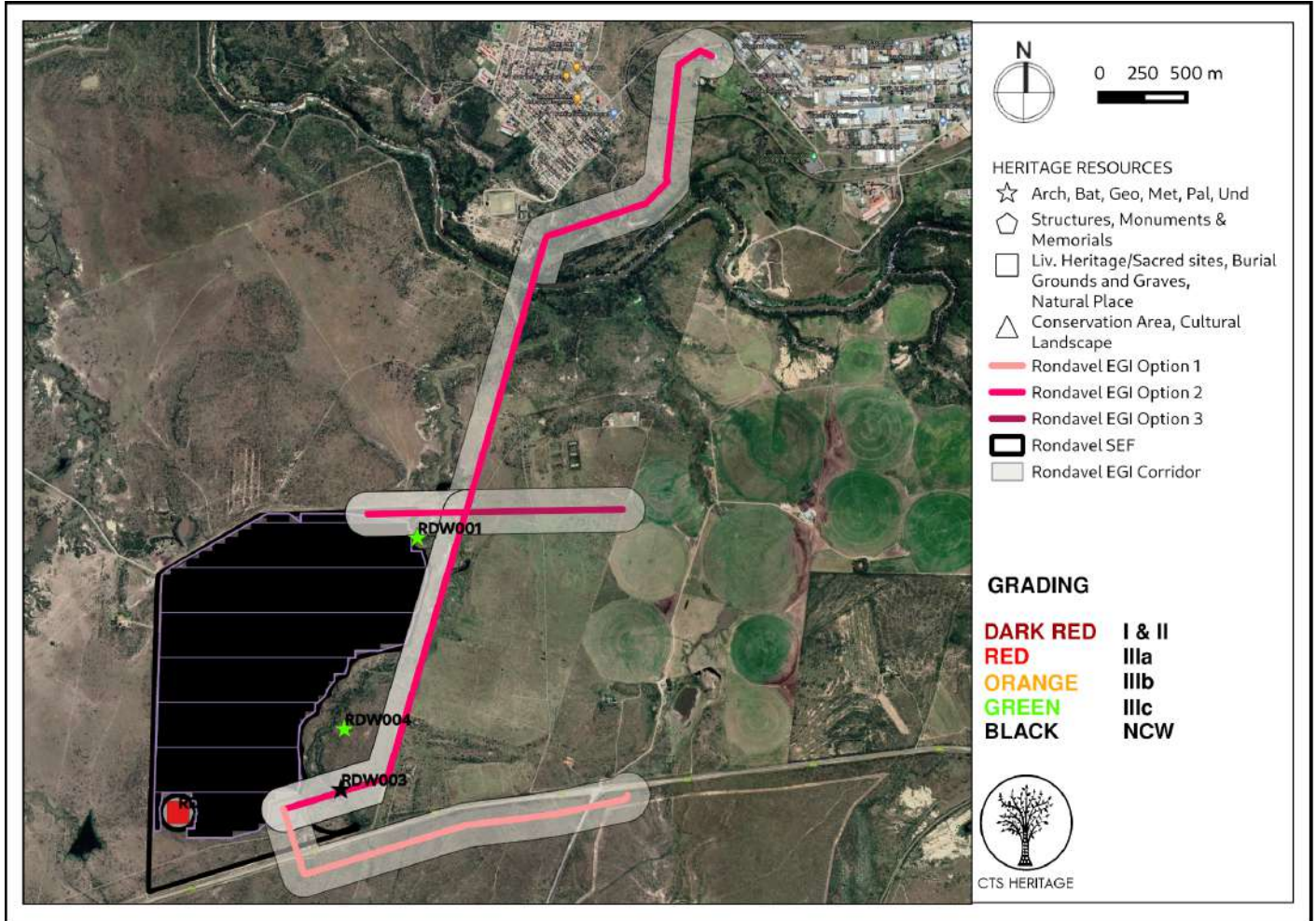
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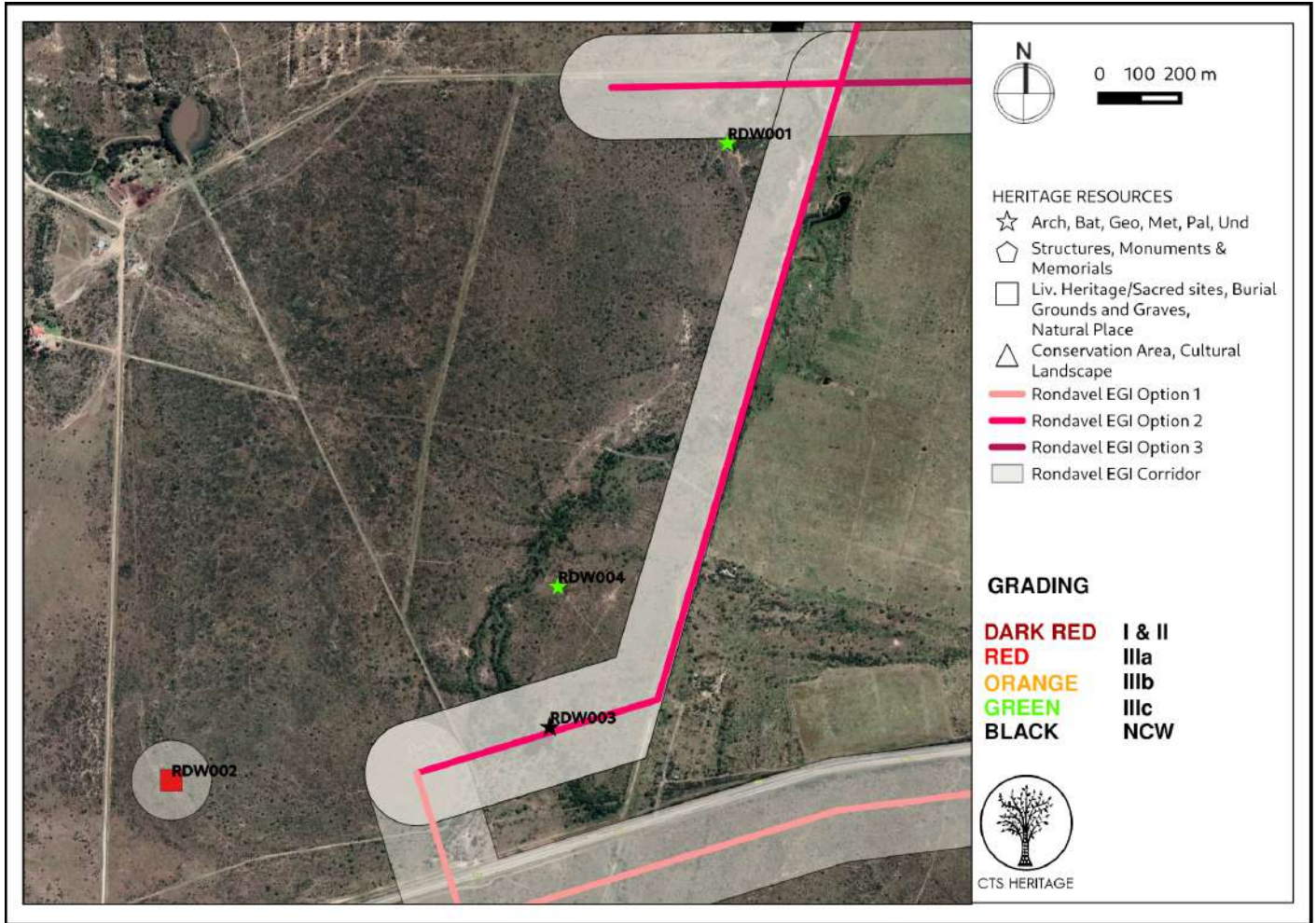
4.3 Mapping and spatialisation of heritage resources



Map 4.1: Observations made during the field assessments conducted for the Rondavel SEF grid connection



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Map 4.2: Observations made during the field assessments conducted for the Rondavel SEF grid connection

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

In summary, the area proposed for the development of the Rondavel SEF grid connection and adjacent properties has yielded some cultural remains but with varied value and preservation. The isolated and scattered lithic artefacts (RDW001, RDW003 and RDW004) are typical of a deflated landscape and have very limited cultural value given that they have been accumulated and modified by various natural processes to their current *ex situ* state. RDW001 and RDW004 are located near to two of the proposed grid connection options. However, as these are located more than 50m away from the grid connection corridors, negative impact is unlikely.

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will be HIGH to VERY HIGH due to the likely presence of highly fossiliferous Adelaide Subgroup and Volksrust Formation mudstones and shales underlying almost the entirety of both properties, underneath the reworked soil layers.

There is very little probability that fossils will be present in the Jurassic dolerites. However, the majority of both the Rondavel and Vrede properties are underlain by highly fossiliferous sediments (the Adelaide Subgroup and Volksrust Formation) of high palaeontological sensitivity. The land, having been reworked extensively (such as visible plough lines on the Vrede property), is covered by a thick layer of soil, making the underlying bedrock and geology difficult to identify. However, the presence of fresh outcropping Adelaide mudstones on the Rondavel property and this layer being exposed at the bottom of a porcupine den, indicates the high likelihood of these highly fossiliferous layers being disturbed with construction requiring excavation exceeding 1m in depth. It is therefore recommended that palaeontological monitoring of excavations takes place during the construction phase of the proposed development of the Rondavel SEF grid connection.



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Table 3: Impacts of the Rondawel Solar PV facility and associated infrastructure to heritage resources

NATURE: It is possible that buried archaeological and palaeontological resources may be impacted by the proposed development				
		Archaeology		Palaeontology
MAGNITUDE	M (6)	RDW001 and RDW004 are located approximately 50m or more from the proposed grid connection corridors.	H (8)	Although no palaeontological resources were identified within the development area, the palaeontological sensitivity of the study area is rated as very high.
DURATION	H (5)	Where manifest, the impact will be permanent.	H (5)	Where manifest, the impact will be permanent.
EXTENT	L (1)	Localised within the site boundary	L (1)	Limited to the development footprint
PROBABILITY	M (3)	It is possible that significant archaeological resources will be impacted	H (5)	It is likely that significant fossils will be impacted by excavations that are greater than 1m deep
SIGNIFICANCE	M	$(6+5+1) \times 3 = 36$	H	$(8+5+1) \times 5 = 70$
STATUS		Negative		Negative
REVERSIBILITY	L	Any impacts to heritage resources that do occur are irreversible	L	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	L	Unlikely	H	Likely
CAN IMPACTS BE MITIGATED		Yes - with mitigation, Significance is reduced to $(6+5+1) \times 1 = 11$ (Low)		Yes - with mitigation, Significance is reduced to $(8+5+1) \times 1 = 14$ (Low)
MITIGATION: A no-go buffer of 50m is implemented around RDW001 and RDW004 All excavations into bedrock are monitored by a suitably qualified palaeontologist and a report on the outcomes of the monitoring activities must be submitted to SAHRA on completion of the development of the facility.				
RESIDUAL RISK: All other excavation activities are subject to the Palaeontological Chance Finds Procedure. Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.				

5.2 Sustainable Social and Economic Benefit

According to the Social Impact Assessment conducted for this project as part of the Scoping Phase, construction of the project is likely to result in the creation of a number of direct and indirect employment opportunities, which will assist in addressing unemployment levels within the area and aid in skills development of communities in the area.

As the proposed development is for the construction of a grid connection to connect a proposed PV facility to the National grid, this project falls under the Renewable Energy Independent Power Producer (REIPP) Programme for renewable energy projects. Such projects are required to contribute to local economic development in the area. Awarded projects are required to spend a certain amount of their generated revenue (as defined in the

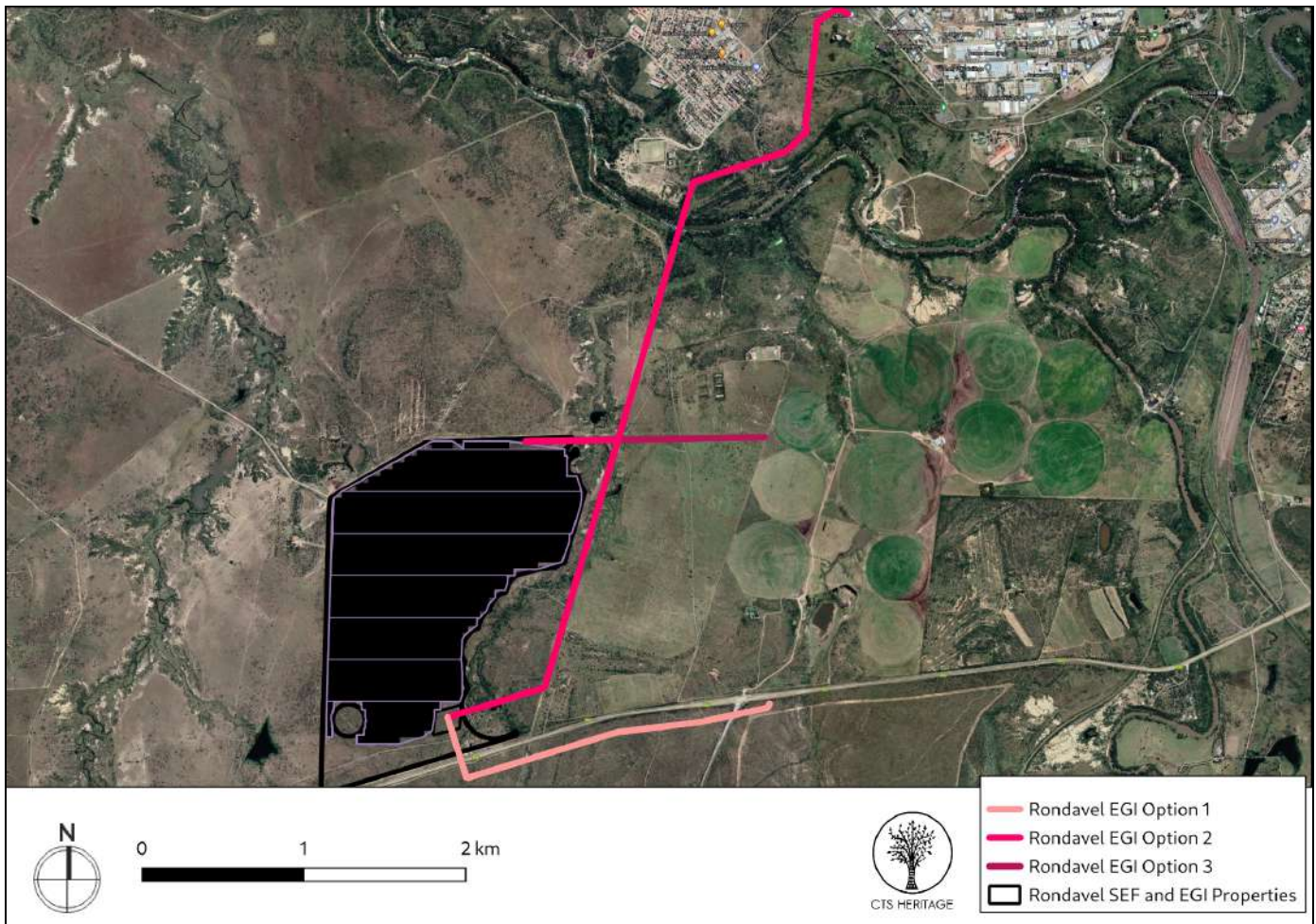


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agreement with the Department of Energy) on Socio-Economic Development (SED) and Enterprise Development (ED) and share ownership. in the project company with local communities. The impact is likely to be positive, local to national in extent, long-term, and of high significance. Based on the information available, the anticipated socio-economic benefits of the proposed development outweigh the anticipated impacts to heritage resources.

5.3 Proposed development alternatives

Three Alternative routes are proposed for the Rondavel OHL grid connection. Based on the assessments completed, there is no preferred alternative in terms of impacts to heritage resources. All three proposed options are likely to have similar impacts to heritage resources on condition that the recommendations included below are adhered to.



Map 6: Proposed OHL Alternatives

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5.4 Cumulative Impacts

Cumulative impact in terms of heritage was assessed by reviewing the renewable energy facilities and other development infrastructure that are proposed or developed within 20km of the development area. Three renewable Energy Facilities are proposed within 50km of this proposed development area. This includes the Vrede SEF proposed to be located approximately 5km from the Rondawel SEF as well as the approved Steynsrus PV Facilities located approximately 50km from the proposed Rondawel SEF. In addition, impacts to heritage result from all kinds of development and as such, this assessment of cumulative impacts to heritage was not limited to impact from renewable energy facilities. Of the six (6) Heritage Assessments conducted within 20km of the proposed development area, four are for residential township developments. One is for a road upgrade and one is for a filling station. At this stage, there is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from rural agriculture to semi-industrial, however, due to the limited nature of the development the impact on the experience of the cultural landscape is not foreseen to be significant.

Table 4: Cumulative Impact Table

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



6. RESULTS OF PUBLIC CONSULTATION

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

7. CONCLUSION

The area proposed for the development of the Rondawel Solar Energy facility grid connection was assessed in the field assessment described in this report. It was noted that the area proposed for development is somewhat overgrown which limited archaeological visibility. However, the generally shallow nature of the soils and heavy disturbance of the landscape for previous use (in dam and road construction) limit the potential for long, *in situ* sequences of archaeological significance. Four observations of varied cultural significance were recorded, two of which are located in close proximity to the proposed grid connection corridors. Based on the outcomes of this assessment, it is not anticipated that the proposed development of the SEF at Rondawel will negatively impact on any archaeological heritage resources on condition that the recommendations articulated below are implemented.

The overall palaeontological sensitivity of the areas proposed for the Rondavel SEF is HIGH to VERY HIGH. The field survey identified a number of areas of possibly fossiliferous outcrops of the underlying bedrock. In addition, examples of fossilised wood were identified associated with Outcrop 2 located within the area proposed for the Rondavel SEF. Although *ex situ*, these findings corroborate the high palaeontological sensitivity of the area.

In general, it is preferred that excavations take place into fossiliferous bedrock rather than avoiding impact as this allows palaeontologists access to otherwise inaccessible palaeontological resources. The negative impacts of such excavations to palaeontological resources are managed through careful monitoring of excavations into bedrock by a suitably qualified palaeontologist. It is therefore preferable that excavations do indeed take place on condition that these excavations are properly monitored.

8. RECOMMENDATIONS

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

- There is no preferred alternative in terms of impacts to heritage resources
- A no-development buffer zone of 50m is implemented around RDW001 and RDW004



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- All excavations into bedrock are monitored by a suitably qualified palaeontologist and a report on the outcomes of the monitoring activities must be submitted to SAHRA on completion of the development of the facility.
- All other excavation activities are subject to the Palaeontological Chance Finds Procedure.
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

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9. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
5968	AIA Phase 1	Cobus Dreyer	20/06/2005	Archaeological and Historical Investigation of the Proposed New Filling Station at Kroonstad, Free State
5969	AIA Phase 1	Cobus Dreyer	25/08/2005	Historical Investigation of the Existing Outbuildings at the Farm Smaldeel 202, Kroonstad, Free State
5970	AIA Phase 1	Cobus Dreyer	29/05/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Middenspruit 151, Kroonstad, Free State
5971	AIA Phase 1	Cobus Dreyer	12/07/2006	Archaeological and Historical Investigation of the Proposed Township Developments at Maokeng, Kroonstad, Free State
5972	AIA Phase 1	Cobus Dreyer	26/10/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Boschpunt 2218 Kroonstad, Free State
129819	AIA Phase 1	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment Report for the Proposed Steynsrus (19.5MW) Photovoltaic Plant, Free State Province
533640	HIA Phase 1	Edward Matenga	25/11/2019	PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEOLOGICAL DESKTOP ASSESSMENT) IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR THE PROPOSED PHASE II MAOKENG HOUSING DEVELOPMENT(5390 ERVEN MOAKENG) (KROONSTAD), FREE STATE PROVINCE
165622	HIA Phase 1	Johnny van Schalkwyk	04/06/2014	Cultural heritage impact assessment for the UPGRADE OF A SECTION OF NATIONAL ROUTE 1, BETWEEN KROONSTAD AND VENTERSBURG, FREE STATE PROVINCE

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APPENDICES

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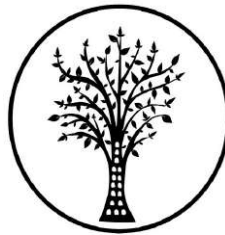
APPENDIX 1: Archaeological Assessment

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Vrede and Rondavel Solar Energy
Facilities near Kroonstad, Free State Province

Prepared by



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And Dr Dominic Stratford

In Association with

Savannah Environmental

November 2020



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

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

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not; and
- are aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Jenna Lavin

Signature of the specialist

CTS Heritage

Name of company

September 2020

Date



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EXECUTIVE SUMMARY

Two new Solar Energy Facilities - Vrede and Rondavel - and their associated grid connection infrastructure are proposed for development just outside of Kroonstad in the Free State. The areas proposed for the development of the Vrede and Rondavel Solar Energy facilities and their associated grid infrastructure were thoroughly assessed in the field assessment described in this report. It was noted that both areas proposed for development have been thoroughly previously disturbed through agricultural activities and neither property can be considered a pristine landscape.

Two Later Stone Age scatters (RDW001 and RDW004) and one isolated flake (RDW003) were identified within the area proposed for the Rondavel SEF. Neither LSA scatter, nor the single flake, have much scientific significance and as such, no further mitigation measures are proposed for these resources. Also within the area proposed for the Rondavel SEF, a series of four stone piles were identified (RDW002), and additional examples may have been obscured by the vegetation. These stone piles may mark human burials and as such, are graded as having high local significance (Grade IIIA). It is recommended that a no-go area of 100m is implemented around site RDW002 so that these possible burials remain undisturbed. Furthermore, it is recommended that vegetation-clearing activities taking place in proximity to RDW002 be monitored by a professional archaeologist to ensure that no un-anticipated impact takes place.

Based on the outcomes of this assessment, it is not anticipated that the proposed development of the SEF at Vrede will negatively impact on any archaeological heritage resources. However, due to the nature of archaeological resources, it is possible that significant archaeological heritage may exist below the ground surface and as such, mitigation measures are recommended in this regard below.

Recommendations

There is no objection to the proposed development of either the proposed Vrede or Rondavel SEFs and their associated infrastructure on condition that:

- A 100m no development buffer is implemented around Site RDW002 as per Figure 7.2
- Monitoring of vegetation-clearing activities located in proximity to RDW002 by a professional archaeologist takes place. A monitoring report describing the outcome of the monitoring activities must be submitted to SAHRA.
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.



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1. INTRODUCTION

1.1 Background Information on Project

Two new Solar Energy Facilities - Vrede and Rondavel - and their associated grid connection infrastructure are proposed for development just outside of Kroonstad in the Free State. These are described in detail below:

Rondavel Solar Energy Facility

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the 75 MWac Rondavel Photovoltaic (PV) Solar Energy Facility (SEF) and Battery Energy Storage System (BESS), near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses two (2) farm parcels namely:

- Remaining Extent of the farm Rondavel Noord No. 1475 (main site); and
- Remaining Extent of the farm Rondavel No. 627 (main and grid site).

Rondavel SEF Grid connection

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the grid connection infrastructure for the proposed 75 MWac Rondavel Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses three (3) farm parcels namely:

- Remaining Extent of the farm Rondavel No. 627 (main and grid site);
- Remaining Extent of the farm Boschplaat No. 330 (grid site); and
- Remaining Extent of the farm Salie No. 1837 (grid site).

Vrede Solar Energy Facility

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the 75 MWac Vrede Photovoltaic (PV) Solar Energy Facility (SEF) and Battery Energy Storage System (BESS), near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses two (2) farm parcels namely:

- Farm Vrede, No. 1152, Remaining Extent;
- Farm Uitval, No 1104, portion 1;

Vrede SEF Grid connection

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the grid connection infrastructure for the proposed 75 MWac Vrede Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses three (3) farm parcels namely:

- Farm Vrede, No. 1152, Remaining Extent;
- Farm Gesukkel, No. 1153, Remaining Extent;
- Farm Geduld No. 1156, Remaining Extent.



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1.2 Description of Property and Affected Environment

Rondavel

The proposed North-East power line extended along the eastern boundary of the Rondavel property to the river. The river has eroded several deep (over 10m) channels into quaternary sand deposits in this location. This area is currently heavily used by foot traffic and local cattle. Several pre-existing power lines cross the river at this location. Immediately on the other side of the river is an industrial and informal residential area that spreads down to the river. Local landowners advised us to avoid accessing this land due to safety issues. The proposed Mid-East line extends east to west from the midline of the Rondavel property across a neighbour's farm and follows a field boundary gravel road. Overgrazing on this property has exposed soils and rock outcrop, resulting in good visibility but high levels of soil disturbance. The proposed south power line route extends along the southern border of the R34 main tar road. On both sides of the R34, extensive and significant construction processes have disturbed and displaced soils reducing the preservation or integrity of any cultural remains.

Vrede

Heavy grazing of cattle and small-scale ploughing of fields has impacted the whole property and in particular the northern and western areas, aiding in quick identification of surficial cultural features (stone walling, etc.) and soils. In the west of the property, four large square fields previously ploughed have been left fallow. The southernmost of these fields has been used for grazing and soil exposure was good, aiding the survey. Tall and dense grasses have grown in the northernmost fields, seriously limited soil exposure and hindering survey coverage. However, based on visible plough and irrigation lines from satellite imagery, it is clear that this section of the development area has been previously extensively disturbed through agricultural activities. In the eastern areas, dense pockets of acacia trees hindered access, but limited ground cover allowed clear assessment of potential surficial features that are often associated with localised tree growth. The multi-generation agricultural use of this property limits the potential preservation of culturally significant features.



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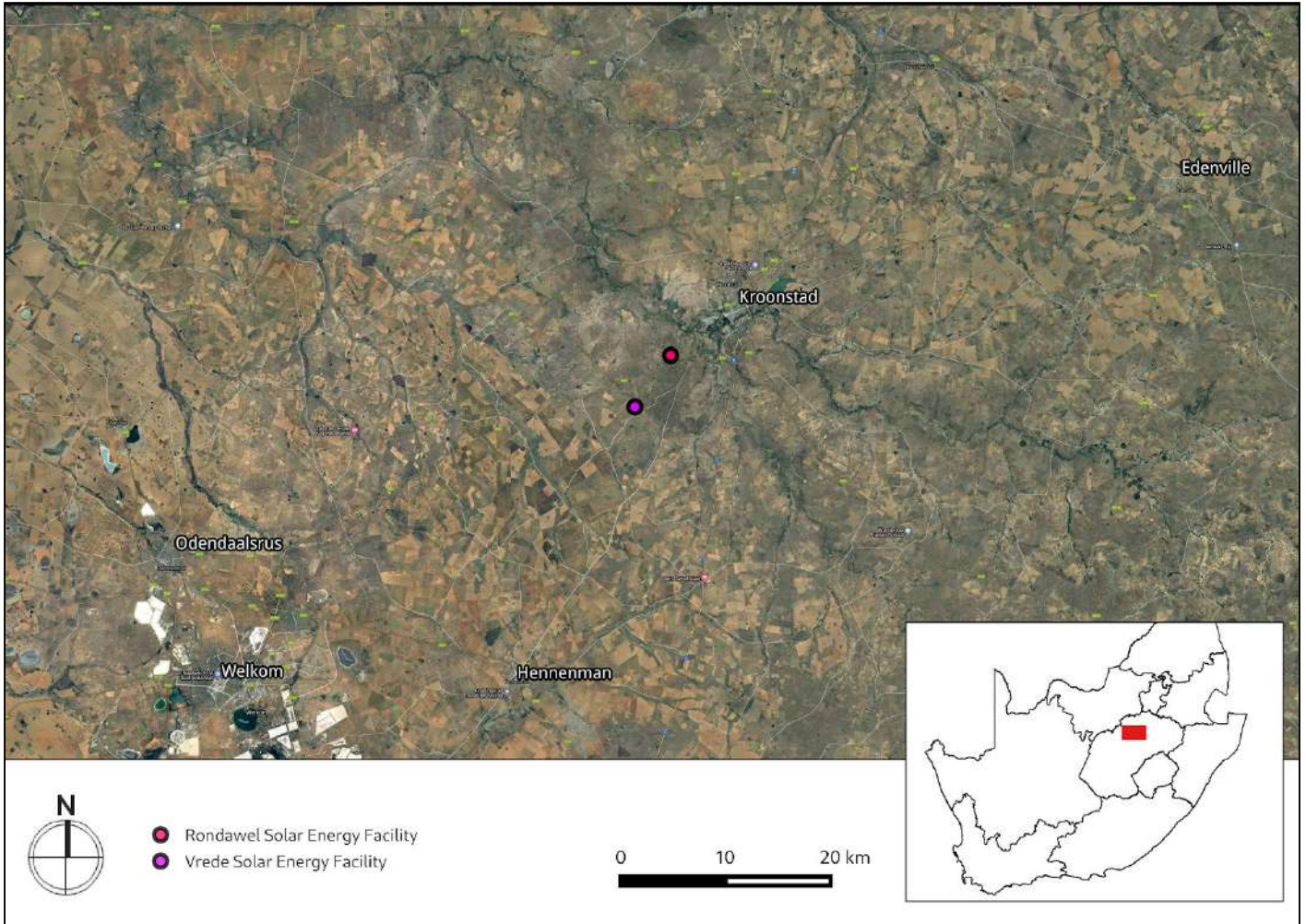


Figure 1.1: Close up satellite image indicating proposed location of development

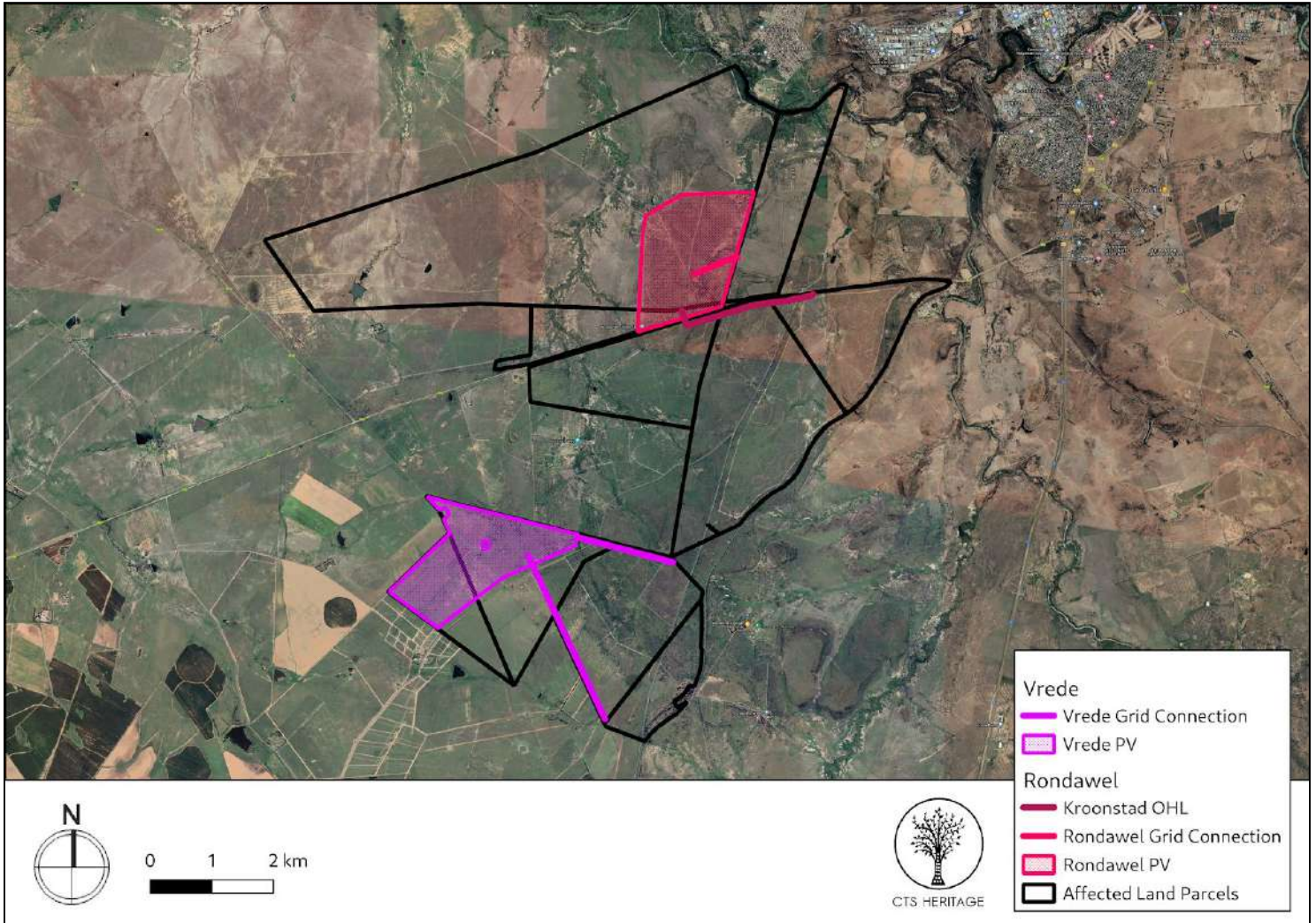


Figure 1.2: Area proposed for development including the proposed layout

2. METHODOLOGY

2.1 Purpose of Archaeological Study

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

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 18 and 19 October 2020 to determine what archaeological resources are likely to be impacted by the proposed development.
- The area proposed for development 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.



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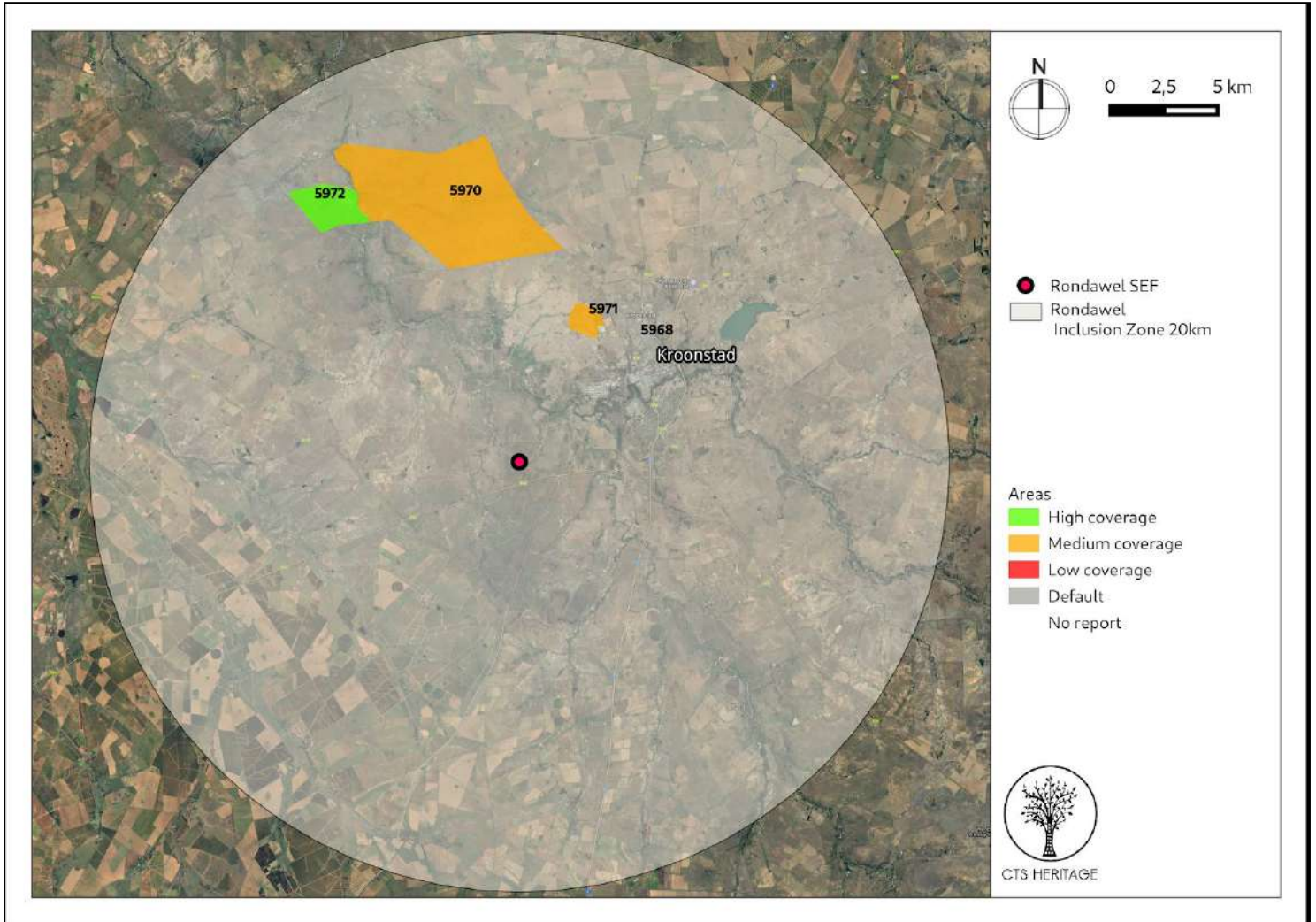


Figure 2a: Close up satellite image indicating proposed location of the Rondavel SEF in relation to heritage studies previously conducted



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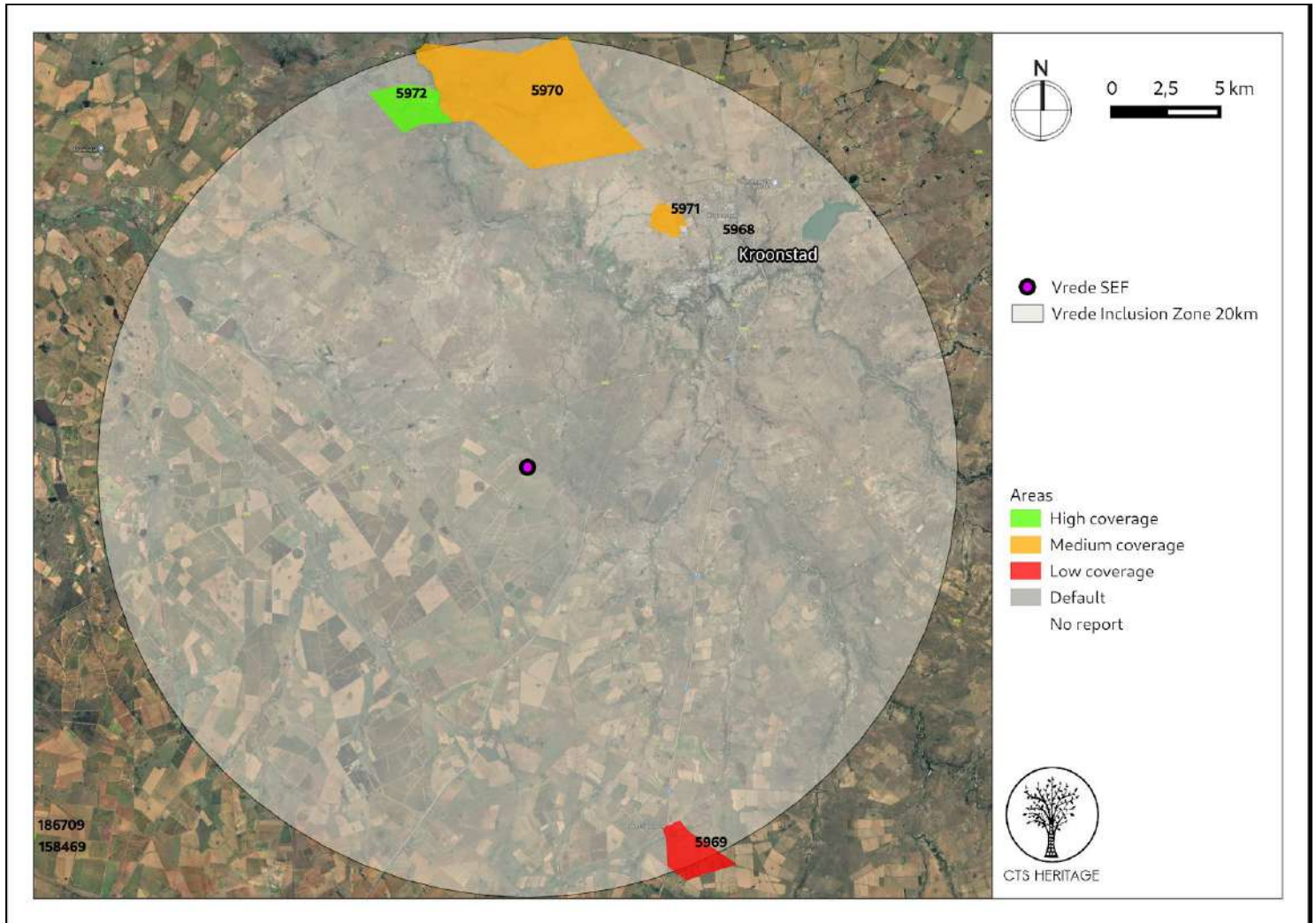


Figure 2b: Close up satellite image indicating proposed location of the Vrede SEF in relation to heritage studies previously conducted

2.3 Constraints & Limitations

Rondavel

Dense vegetation covered the majority of the landscape and seriously hindered systematic and comprehensive coverage of the ground. In this case, google earth was used to identify specific geomorphic features commonly associated with cultural remains (rivers and high ground). These areas and more open grassland were then targeted through field walking to build a representative perspective on the presence, distribution and abundance of any cultural remains. However, the dense vegetation in the interior of the property may have obscured small cultural features and isolated artefacts. Additional areas to survey were provided by CTS at short notice and were incorporated into the field walking. Local landowners advised us to avoid accessing various portions of the proposed powerline due to safety issues. The specialist is confident that this approach sampled adequately the variety of landscapes on this property and that the report presented is representative of the majority of preserved cultural remains.

Vrede

No constraints or limitations were experienced in the assessment of the Vrede site.



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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Kroonstad was established as a town in 1855. During the Second Boer War, from 13 March to 11 May 1900, the city became the capital of the Orange Free State, and subsequently the site of a British concentration camp to contain Boer women and children. Kroonstad still boasts much of the inherent rugged beauty which led the Voortrekkers to establish the town where they did and it is situated in an area characterised by open spaces and an abundant variety of vegetation that makes it particularly beautiful. According to Van Schalkwyk (2013), “Most farmsteads were burned down during the Anglo-Boer War, with the result that very little of the built environment dates to the 19th century.” According to Matenga (2019), the Black and Coloured townships are significant as landscapes of segregation occupying the north-western fringe of the CBD, while the exclusive white suburbs were located northeast of the town and south of the Valsch River.

According to Van Schalkwyk (2013), “The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component. This was soon followed by the development of a number of urban centres or towns. Originally these mostly served the surrounding farming communities, but with the discovery of the Free State Gold Fields, they expanded rapidly in order to serve this industry as well.” The proposed Solar Energy Facilities and their associated grid connections are located some distance from the historic core of Kroonstad town. Furthermore, the areas proposed for development are located more than 5km away from the site of the Boer War concentration camps and associated burial grounds.

Prior to colonial settlement in 1855, the area proposed for development formed part of a landscape that was occupied by indigenous Khoe herders and San hunter-gatherers. These indigenous communities were displaced by Bantu-speaking people who began to occupy the area in the Iron Age. According to Van Schalkwyk (2013), “Sites dating to the Late Iron Age are known to occur in the region, especially... in the vicinity of the Sandrivier, whereas some are known to occur to the northwest of Ventersburg, These are typical stone walled sites that are linked with Sothospeakers and date to the period after 1600.” As such, it is possible that Early, Middle or Later Stone Age artefacts may be located within the proposed development footprint. Furthermore, it is possible that evidence of Iron Age settlement may also be located within the proposed development areas.



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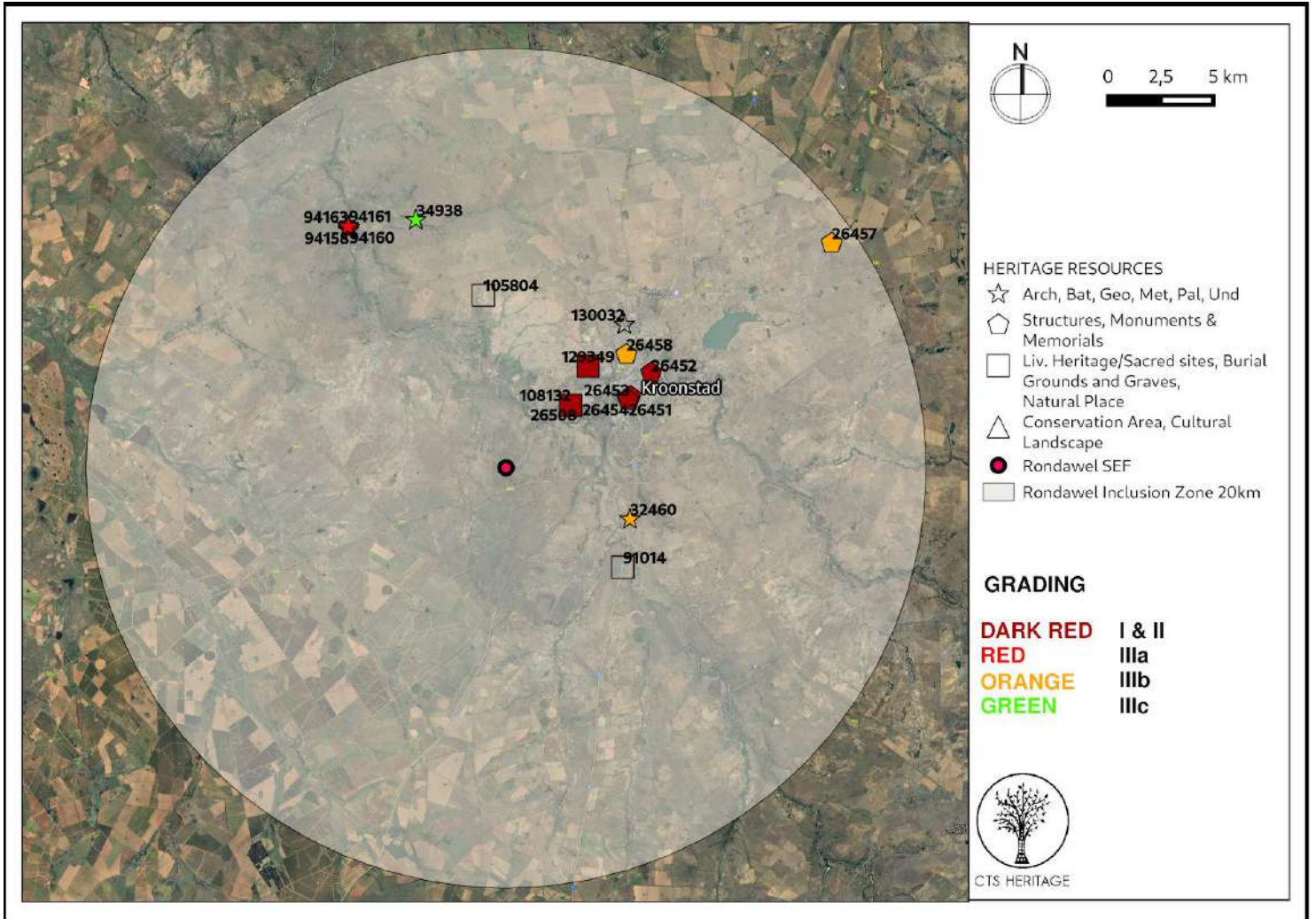


Figure 3a. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated (see Heritage Screening Assessment for insets)



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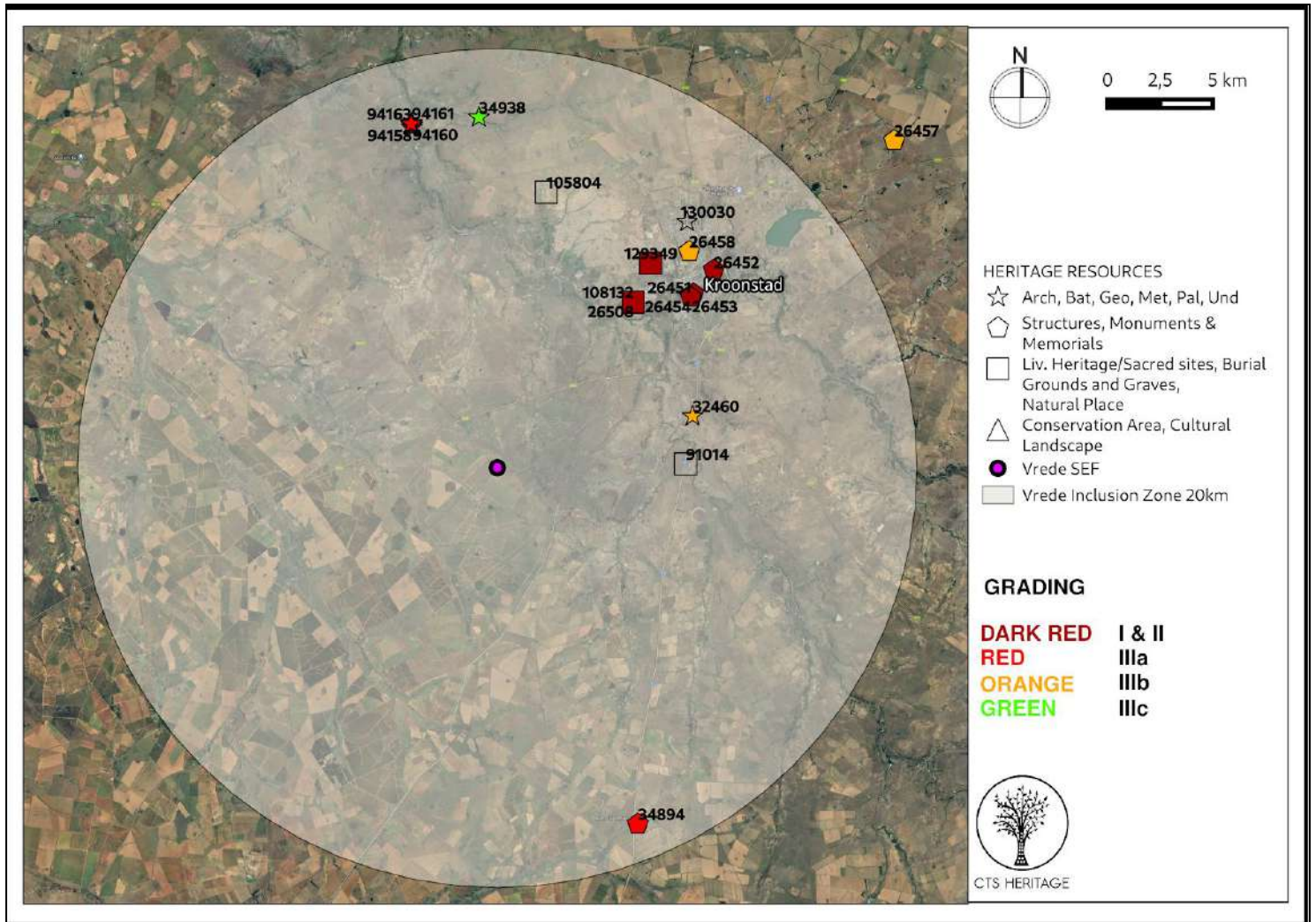


Figure 3b. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated (see Heritage Screening Assessment for insets)



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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

Rondavel

Due to dense vegetation present within this development area, the field assessment focussed on investigating outcrops visible on GoogleEarth Satellite imagery.

- Outcrop 2

Outcrop 2 was considered important because of its relatively open surfaces and exposed regolith and soil, which are often useful deflation areas that can accumulate cultural remains. The survey extended the length of the outcrop both above and below the primary exposures of sandstones. Below the outcrop, cattle have trampled large areas, but have also exposed soils. Here, on a deflated compact surface, a small accumulation of Later Stone Age informal artefacts was found comprising quartz flakes and small chert cores (RDW001). These isolated artefacts are no longer in situ and have been extensively disturbed through water, animals and plant growth. However, they do suggest that similar, isolated and *ex situ* scatters of artefacts may exist elsewhere on the property. As such, the recommended grading for this scatter is Grade IIIC. The outcrop also serves as a demonstration of the relatively shallow nature of the soils here, and therefore limited opportunity for major cultural sequences to remain buried on the property.

- Outcrop 3

The soils above Outcrop 3 were thicker than the soils seen in the northern areas of the property as demonstrated by several large porcupine dens that had dug up to one meter deep. Large animal dens often provide a good opportunity to find buried cultural remains in the animal spoil heaps and so each large den and its excavated sediments was inspected for artefacts. None were identified. On the northwestern edge of Outcrop 3, a series of discrete but deliberately constructed stone piles were found against the outcropping sandstone (RDW002). These stone piles varied in size, but not shape, being elongated and in most cases measuring approximately 2m long by 1m wide and up to 30cm high. The piles occurred in a series of features laid next to each other with another two more isolated piles located a few meters to the east. It is possible that more were present but were obscured by tall grass. In all cases, grass has grown over the piles, obscuring them slightly. The piles are slightly degraded, but are reminiscent of Iron Age graves. They could also be piles created from field-clearing agricultural activities however these features should be treated with great sensitivity. Due to the chance that these features may mark graves, these features are graded IIIA.

- Dam Outcrop

A large, now empty, dam is located in the southeastern corner of the property. Recent cuttings exposed various deposits. At the base of once such cutting, a single lithic flake was found (RDW003). This artefact is not technologically diagnostic or identifiable to a major industry and was not *in situ*, being located close to rubble accumulated through the dam-building process. This artefact is considered to be not conservation-worthy (NCW).

- Later Stone Age Observation

Immediately adjacent to a small ephemeral stream lined by dense vegetation, in a cattle-trampled exposure of soil, several small informal Later Stone Age lithic artefacts were identified scattered on the surface (RDW004).



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The artefact scatter comprises quartz and chert flakes, and small cores that have been brought together in a small depression through surface run-off. These artefacts are not in situ and have limited scientific value. As such, this observation is graded as Grade III C.

Vrede

The Vrede property has been utilised for numerous farming activities over several generations and so the landscape has been heavily modified by this activity. A combination of ploughing and heavy grazing has important detrimental implications on the preservation of in situ surficial cultural features such as stone walling, stone tools, shallow graves and associated cultural remains. It is important to note that despite an extensive foot survey, no cultural heritage remains were identified on the property. However, there remains the possibility that cultural material may be present beneath the ground surface.



Figure 4.1: Thick bush along North West to South East diagonal track at Rondavel



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Figure 4.2: Thick bush along North West to South East diagonal track at Rondavel.



Figure 4.3: Looking East from the end of the proposed Mid-East power line. Note the overgrazing-exposed soils in the foreground and irrigated agricultural land in the background.



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Figure 4.4: Looking North from the middle of the proposed Mid-East power line. Note the grazed open grassland and compacted soils by cattle along the fence track



Figure 4.5: Along the Mid-East power line. Note the overgrazing on the farm track verge and grazed open grass in the field on the left. Also note the major power lines extending along the track.



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Figure 4.6: Looking South from the middle of the proposed Mid-East power line.



Figure 4.7: Looking West from the middle of the proposed Mid-East power line. Note the overgrazed field to the left and multiple farm and cattle tracks. Also note the heavily trampled and disturbed context of the road. The Rondavel property can be seen in the background.



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Figure 4.8 Looking East from the middle of the proposed Mid-East power line. Note the overgrazed field on the left.



Figure 4.9 Looking North from the middle of the proposed Mid-East power line.



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Figure 4.10 Looking North from the northern boundary of the Rondavel property at the point where the proposed power line would cross the river.



Figure 4.11 Looking East from the northern boundary of the Rondavel property at the point where the proposed power line would cross the river. Note the heavily compacted grass of the wide Rondavel farm fence-line track in the foreground and the major power line on the neighbouring farm to the east.



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Figure 4.12 Looking South from the northern boundary of the Rondavel property at the point where the proposed power line would cross the river. Note the heavily compacted grass and exposed soils of the wide Rondavel farm fence-line track extending south.



Figure 4.10 Looking West from the northern boundary of the Rondavel property at the point where the proposed power line would cross the river. Note the heavily compacted grass and exposed soils of the wide Rondavel farm fence-line track



Figure 4.13 Outcrop 2 with scalebar = 10cm



Figure 4.14 Overview of the landscape at Vrede from the main gate (1/3rd along South East border) looking South West. Note the heavy grazing and trampling by cattle and rutting from farming vehicles extending over a wide area near the fence on the left and under the power lines. Also note the short grass cover extending to the right across the field providing good visibility of features on the landscape



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Figure 4.15 Overview of the landscape from the Vrede main gate looking North West. Note the heavy grazing and trampling by cattle and rutting from farming vehicles extending over a wide area near the fence on the right. Also note the short grass cover extending to the left across the field providing good visibility of features on the landscape.



Figure 4.16 Overview of the landscape from main gate at Vrede looking North East. Note the heavy grazing and trampling by cattle and rutting from farming vehicles extending over a wide area neat the fence on the right.



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Figure 4.17 From the main gate, looking South West along the road running along the South East border of the Vrede property.



Figure 4.18 From the South corner of the property, looking South West into neighbouring property.



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Figure 4.19 From the South corner of the property, looking North West along western border of the Vrede property. Note the wide fence track.



Figure 4.20 From the middle of southern portion of the Vrede property, looking South West. Note the short, grazed grass and good feature visibility.



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Figure 4.21 From the middle of northern portion of the Vrede property, looking South West. Note the short, grazed grass and good feature visibility.



Figure 4.22 From the middle of northern portion of the Vrede property, looking North West. Note the short, overgrazed grass and good feature visibility.



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Figure 4.23 From the middle of northern portion of the Vrede property, looking NE. Here, note the small cattle watering station and heavily trampled, exposed soils.



Figure 4.24 From the western corner of the Vrede property, looking South East. Note on the left, the tall, dense grasses that hindered survey (also see methods section for description of this area).



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Figure 4.24 From the western corner of the Vrede property, looking East towards middle of property. Note the tall, dense grasses that hindered survey (also see methods section for description of this area).



Figure 4.25 From the middle of western boundary of the Vrede property, looking South West. Note the tall, dense grasses that hindered survey (also see methods section for description of this area)



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Figure 4.26 From the South East corner of the Vrede property, looking North. Note the denser but still open acacia-bearing grassland with good ground visibility.



Figure 4.27 From South East corner of the Vrede property, looking South. Note the denser acacia-bearing grassland with more limited ground visibility.



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Figure 4.28 From South East corner of the Vrede property, looking East. Note the denser acacia-bearing grassland with more limited ground visibility. Also note the power line cables.



Figure 4.29 From the North corner of the Vrede property, looking South East. Note the grazed and cleared fence tracks and the short, grazed grass.



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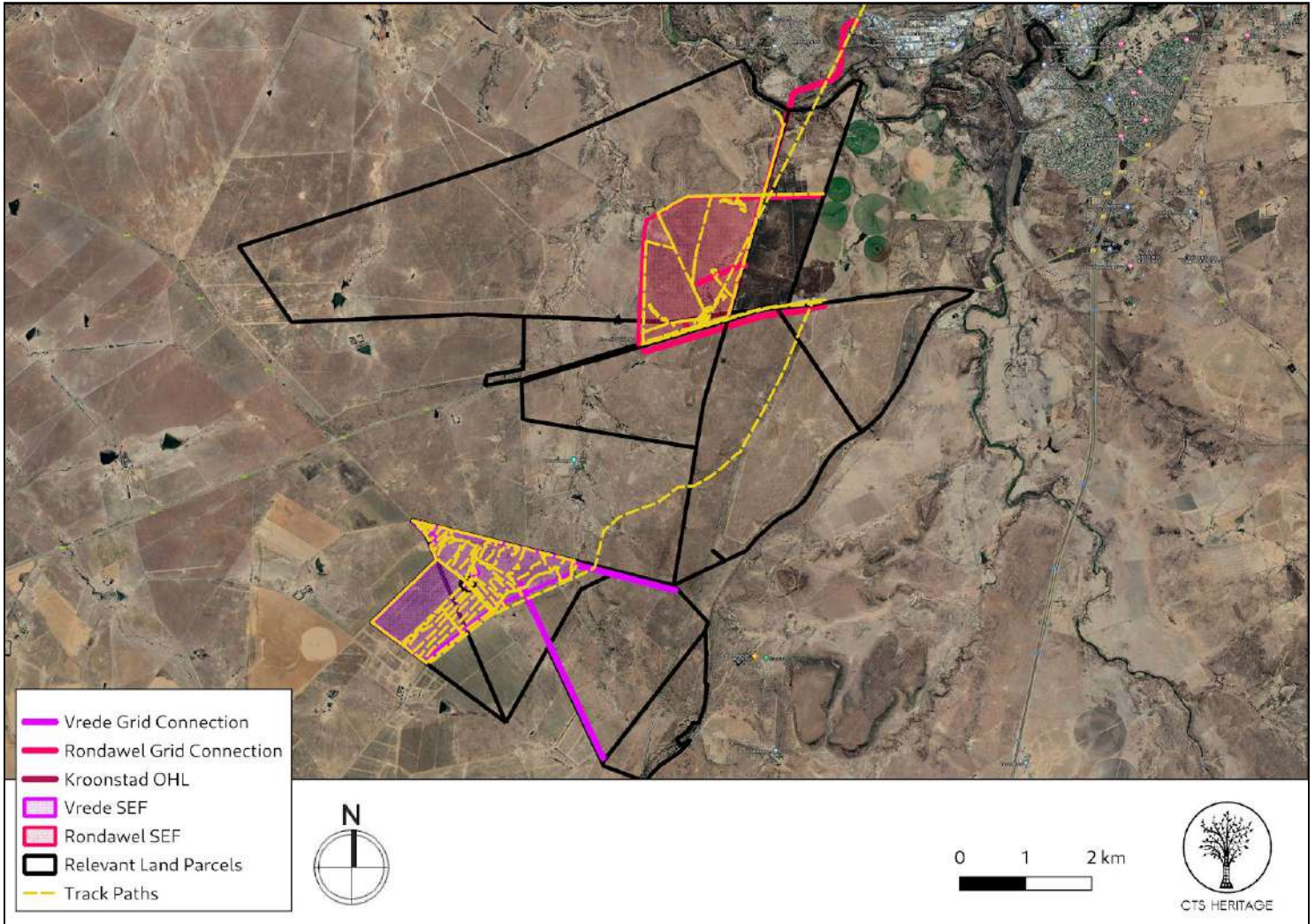


Figure 5: Overall track paths of foot survey

4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

Site No.	Site Name	Description	Co-ordinates		Grading	Mitigation
RDW001	Rondavel 001	LSA Scatter	S 27.69110	E 027.18327°	IIIC	None Required
RDW002	Rondavel 002	Series of possible graves demarcated by piles of stones	S 27.70531°	E 027.16925°	IIIA	A no-go buffer of 100m must be implemented around the identified stone piles
RDW003	Rondavel 003	Single isolated flake, <i>ex situ</i>	S 27.70413°	E 027.17879°	NCW	None Required
RDW004	Rondavel 004	LSA Scatter	S 27.70099°	E 027.17900°	IIIC	None Required



4.3 Selected photographic record

(a full photographic record is available upon request)



Figure 6.1: Outcrop 2 and RDW001 LSA Scatter (Grade IIIC)



Figure 6.2: Outcrop 3 and porcupine den indicating soil depth



Figure 6.3: Stone piles 1 and 2 at RDW002



Figure 6.4: Stone piles 3 and 4 at RDW002



Figure 6.5 Dam outcrop and flake RDW003



Figure 6.6 LSA Scatter (RDW004) and its context



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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

Rondavel

In summary, the area proposed for the development of the Rondavel SEF and associated infrastructure has yielded some cultural remains but with varied value and preservation. The isolated and scattered lithic artefacts (RDW001, RDW003 and RDW004) are typical of a deflated landscape and have very limited cultural value given that they have been accumulated and modified by various natural processes to their current *ex situ* state. The stone piles found in the south west of the property (RDW002) are more noteworthy (Grade IIIA) and require sensitive treatment. The dense vegetation did limit comprehensive coverage of the landscape during the survey and so caution should be practiced when clearing the vegetation during construction. As such, it is recommended that a no development buffer of 100m is implemented around RDW002 in order to mitigate the risk of disturbing the possible human remains identified here.

However, the generally shallow nature of the soils and heavy disturbance of the landscape for previous use (in dam and road construction) limit the potential for long, *in situ* sequences of archaeological significance. No archaeological resources were identified in any of the proposed powerline routes associated with the Rondavel development. There is an existing access track along the route proposed for the Kroonstad OHL. The track and its verges are used as a major through-route for farms vehicles and cattle resulting in a heavily disturbed landscape surface along this route. A major power line extended north-south along the neighbouring farm's western fence.

Vrede

Based on the assessment completed, the area proposed for the Vrede SEF and associated infrastructure has low archaeological sensitivity. The majority of this property has been exploited by various farming practices over several generations that have fundamentally modified the landscape and removed or destroyed any previous archaeological remains. Having conducted a comprehensive survey of the property I am confident that there is a very limited potential for the preservation of in situ surficial cultural remains. There may be small and isolated lithic artefacts or ceramic fragments, but there is a low potential for these to be *in situ* and escaping the heavy grazing and trampling previously and currently occurring on the landscape. The previous ploughing of most of the western side of the property has essentially removed any archaeology on the surface or buried to a depth of 30 cm.

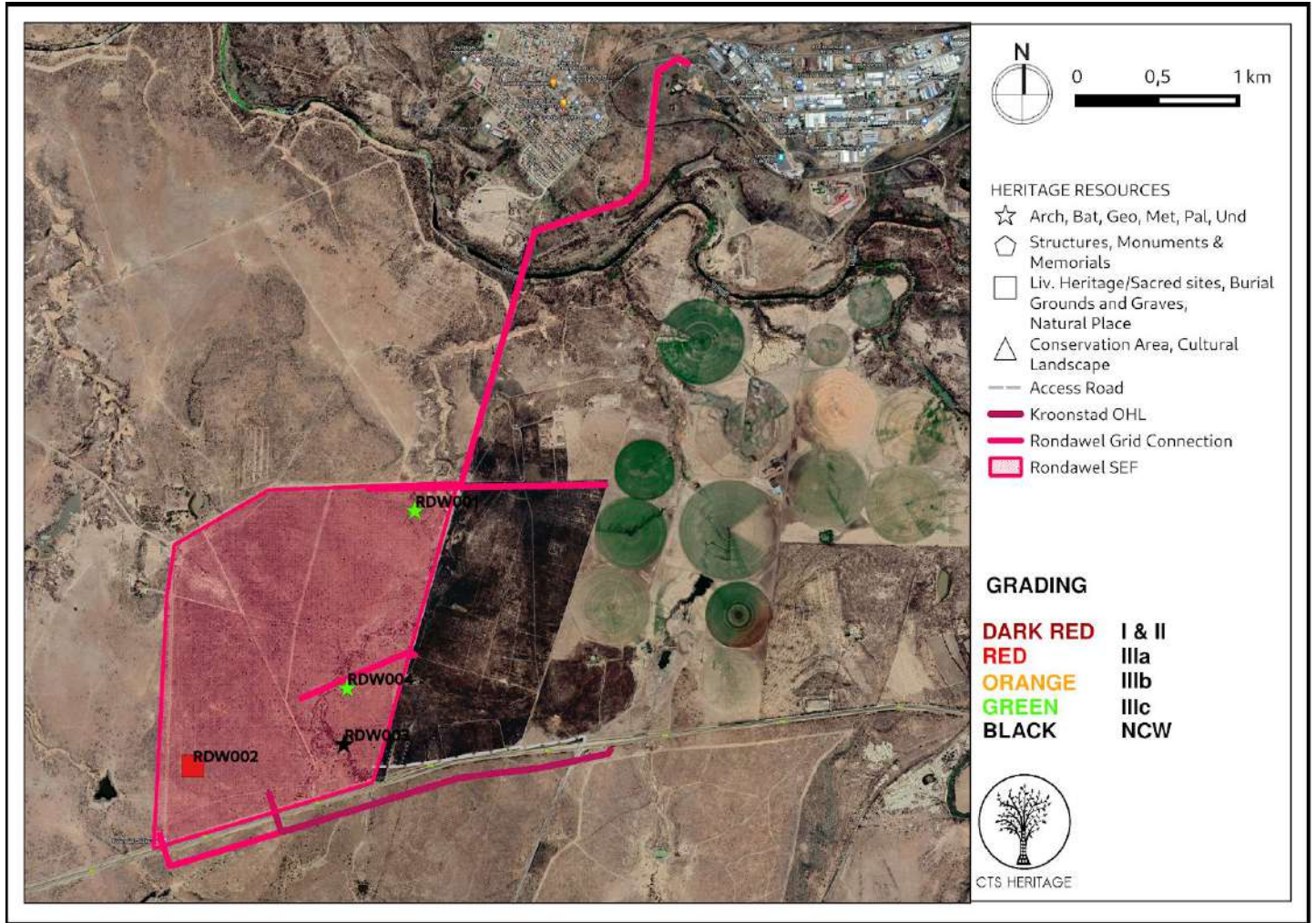


Figure 7.1: Map of heritage resources identified during the field assessment, relative to the proposed development footprint

6. CONCLUSION AND RECOMMENDATIONS

The areas proposed for the development of the Vrede and Rondavel Solar Energy facilities and their associated grid infrastructure were thoroughly assessed in the field assessment described in this report. It was noted that both areas proposed for development have been thoroughly (Vrede) and somewhat (Rondavel) previously disturbed through agricultural activities.

Two Later Stone Age scatters (RDW001 and RDW004) and one isolated flake (RDW003) were identified within the area proposed for the Rondavel SEF. Neither LSA scatter, nor the single flake, have much scientific significance and as such, no further mitigation measures are proposed for these resources. Also within the area proposed for the Rondavel SEF, a series of four stone piles were identified (RDW002), and additional examples may have been obscured by the vegetation. These stone piles may mark human burials and as such, are graded as having high local significance (Grade IIIA). It is recommended that a no-go area of 100m is implemented around site RDW002 so that these possible burials remain undisturbed. Furthermore, it is recommended that vegetation-clearing activities taking place in proximity to RDW002 be monitored by a professional archaeologist to ensure that no un-anticipated impact takes place.



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Based on the outcomes of this assessment, it is not anticipated that the proposed development of the SEF at Vrede will negatively impact on any archaeological heritage resources. However, due to the nature of archaeological resources, it is possible that significant archaeological heritage may exist below the ground surface and as such, mitigation measures are recommended in this regard below.

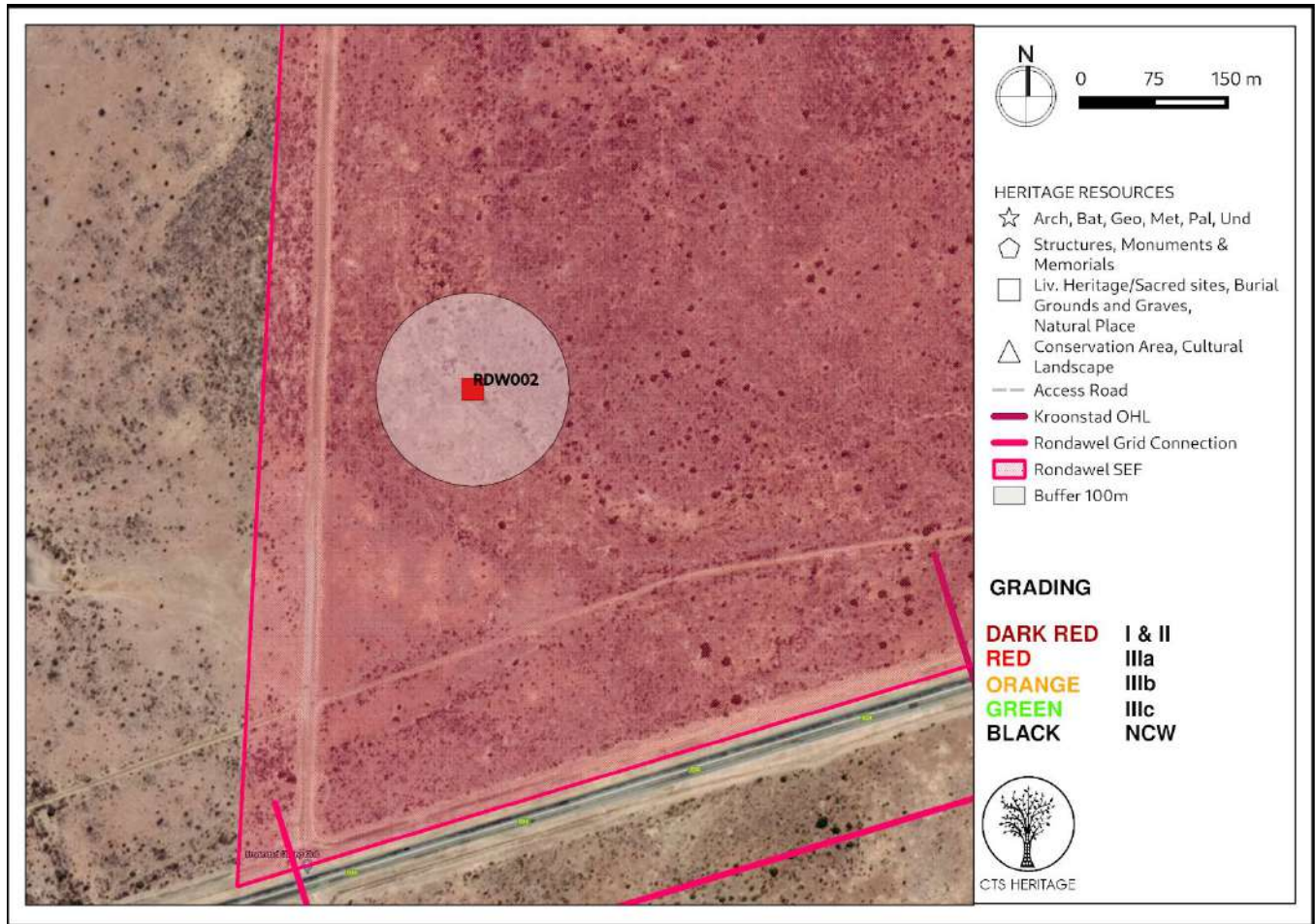


Figure 7.2: Map of heritage resources identified during the field assessment, relative to the proposed development footprint including the recommended 100m buffer around RDW002

Recommendations

There is no objection to the proposed development of either the proposed Vrede or Rondavel SEFs and their associated infrastructure on condition that:

- A 100m no development buffer is implemented around Site RDW002 as per Figure 7.2
- Monitoring of vegetation-clearing activities located in proximity to RDW002 by a professional archaeologist takes place. A monitoring report describing the outcome of the monitoring activities must be submitted to SAHRA.
- Should any previously unrecorded archaeological resources or possible burials be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.



7. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
5968	AIA Phase 1	Cobus Dreyer	20/06/2005	Archaeological and Historical Investigation of the Proposed New Filling Station at Kroonstad, Free State
5969	AIA Phase 1	Cobus Dreyer	25/08/2005	Historical Investigation of the Existing Outbuildings at the Farm Smaldeel 202, Kroonstad, Free State
5970	AIA Phase 1	Cobus Dreyer	29/05/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Middenspruit 151, Kroonstad, Free State
5971	AIA Phase 1	Cobus Dreyer	12/07/2006	Archaeological and Historical Investigation of the Proposed Township Developments at Maokeng, Kroonstad, Free State
5972	AIA Phase 1	Cobus Dreyer	26/10/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Boschpunt 2218 Kroonstad, Free State
129819	AIA Phase 1	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment Report for the Proposed Steynsrus (19.5MW) Photovoltaic Plant, Free State Province
533640	HIA Phase 1	Edward Matenga	25/11/2019	PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEOLOGICAL DESKTOP ASSESSMENT) IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR THE PROPOSED PHASE II MAOKENG HOUSING DEVELOPMENT(5390 ERVEN MOAKENG) (KROONSTAD), FREE STATE PROVINCE
165622	HIA Phase 1	Johnny van Schalkwyk	04/06/2014	Cultural heritage impact assessment for the UPGRADE OF A SECTION OF NATIONAL ROUTE 1, BETWEEN KROONSTAD AND VENTERSBURG, FREE STATE PROVINCE



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APPENDIX 2: Palaeontological Assessment

PALAEONTOLOGICAL SPECIALIST STUDY

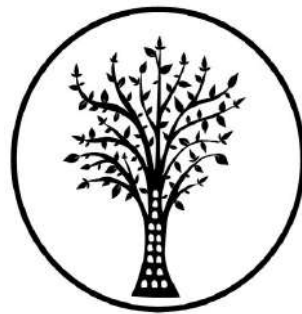
In terms of Section 38(8) of the NHRA

Proposed development of the Vrede and Rondavel Solar Energy Facilities near Kroonstad, Free State Province

Prepared by

Dr Kimberley Etienne Justin Chapelle

and



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In Association with

Savannah Environmental

November 2020



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

I, Kimberley E. J. Chapelle as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signed:

Name: Kimberley E. J. Chapelle

Date: 17 November 2020



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EXECUTIVE SUMMARY

Two new Solar Energy Facilities - Vrede and Rondavel - and their associated grid connection infrastructure are proposed for development just outside of Kroonstad in the Free State. The area proposed for development is underlain by geological sediments of high moderate palaeontological sensitivity (Figure 3a and b). Based on the very high palaeontological sensitivities indicated, it is recommended that a palaeontological field assessment of the areas proposed for development is completed and anticipated impacts to such resources assessed. The resulting Palaeontological Specialist Assessment will be integrated into the Heritage Impact Assessment completed for the proposed development and will be submitted to SAHRA for comment in terms of section 38(8) of the NHRA.

There is very little probability that fossils will be present in the Jurassic dolerites. However, the majority of both the Rondavel and Vrede properties are underlain by highly fossiliferous sediments (the Adelaide Subgroup and Volksrust Formation) of high palaeontological sensitivity. The land, having been reworked extensively (such as visible plough lines on the Vrede property), is covered by a thick layer of soil, making the underlying bedrock and geology difficult to identify. However, the presence of fresh outcropping Adelaide mudstones on the Rondavel property and this layer being exposed at the bottom of a porcupine den, indicates the high likelihood of these highly fossiliferous layers being disturbed with construction requiring excavation exceeding 1m in depth. It is therefore recommended that palaeontological monitoring of excavations takes place during the construction phase of the proposed development of both the Vrede and Rondavel SEFs and their associated infrastructure.

The overall palaeontological sensitivity of the areas proposed for the Vrede and Rondavel SEFs and their associated infrastructure is HIGH to VERY HIGH. The field survey identified a number of areas of possibly fossiliferous outcrops of the underlying bedrock. In addition, examples of fossilised wood were identified associated with Outcrop 2 located within the area proposed for the Rondavel SEF. Although *ex situ*, these findings corroborate the high palaeontological sensitivity of the area.

In general, it is preferred that excavations take place into fossiliferous bedrock rather than avoiding impact as this allows palaeontologists access to otherwise inaccessible palaeontological resources. The negative impacts of such excavations to palaeontological resources are managed through careful monitoring of excavations into bedrock by a suitably qualified palaeontologist. It is therefore preferable that excavations do indeed take place on condition that these excavations are properly monitored.

In summary, despite the VERY HIGH palaeontological sensitivity of the areas proposed for development, there is no objection to the proposed development of the Vrede and Rondavel SEFs and their associated infrastructure on condition that:

- All excavations into bedrock are monitored by a suitably qualified palaeontologist and a report on the outcomes of the monitoring activities must be submitted to SAHRA on completion of the development of the facility.



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- All other excavation activities are subject to the Palaeontological Chance Finds Procedure (Appendix 1 of this report).

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Appendix 1: Fossil Finds Procedure



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1. INTRODUCTION

1.1 Background Information on Project

Two new Solar Energy Facilities - Vrede and Rondavel - and their associated grid connection infrastructure are proposed for development just outside of Kroonstad in the Free State. These are described in detail below:

Rondavel Solar Energy Facility

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the 75 MWac Rondavel Photovoltaic (PV) Solar Energy Facility (SEF) and Battery Energy Storage System (BESS), near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses two (2) farm parcels namely:

- Remaining Extent of the farm Rondavel Noord No. 1475 (main site); and
- Remaining Extent of the farm Rondavel No. 627 (main and grid site).

Rondavel SEF Grid connection

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the grid connection infrastructure for the proposed 75 MWac Rondavel Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses three (3) farm parcels namely:

- Remaining Extent of the farm Rondavel No. 627 (main and grid site);
- Remaining Extent of the farm Boschplaat No. 330 (grid site); and
- Remaining Extent of the farm Salie No. 1837 (grid site).

Vrede Solar Energy Facility

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the 75 MWac Vrede Photovoltaic (PV) Solar Energy Facility (SEF) and Battery Energy Storage System (BESS), near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses two (2) farm parcels namely:

- Farm Vrede, No. 1152, Remaining Extent;
- Farm Uitval, No 1104, portion 1;

Vrede SEF Grid connection

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the grid connection infrastructure for the proposed 75 MWac Vrede Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The proposed development traverses three (3) farm parcels namely:

- Farm Vrede, No. 1152, Remaining Extent;
- Farm Gesukkel, No. 1153, Remaining Extent;
- Farm Geduld No. 1156, Remaining Extent.



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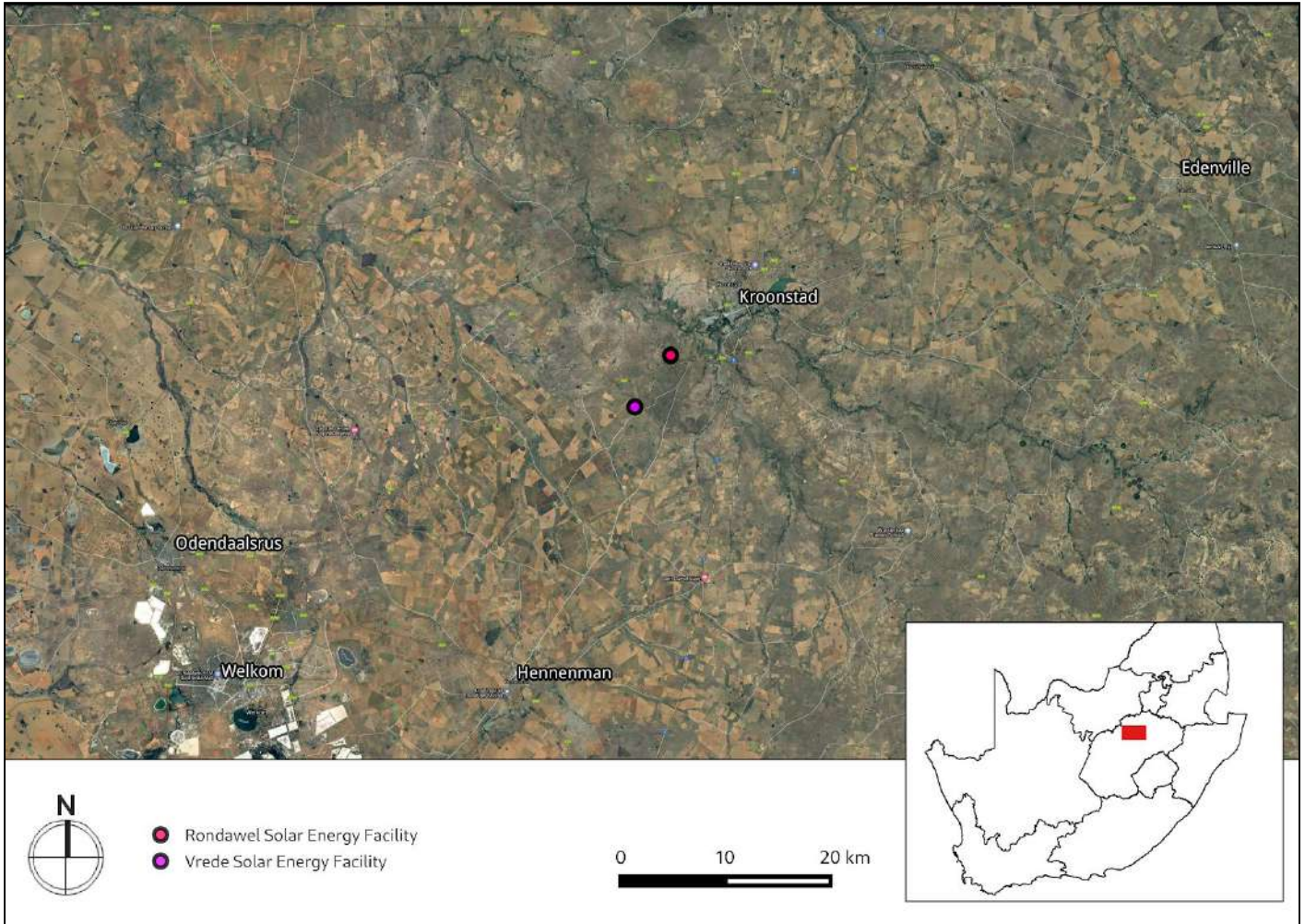


Figure 1: Google Earth© satellite image of the proposed development area



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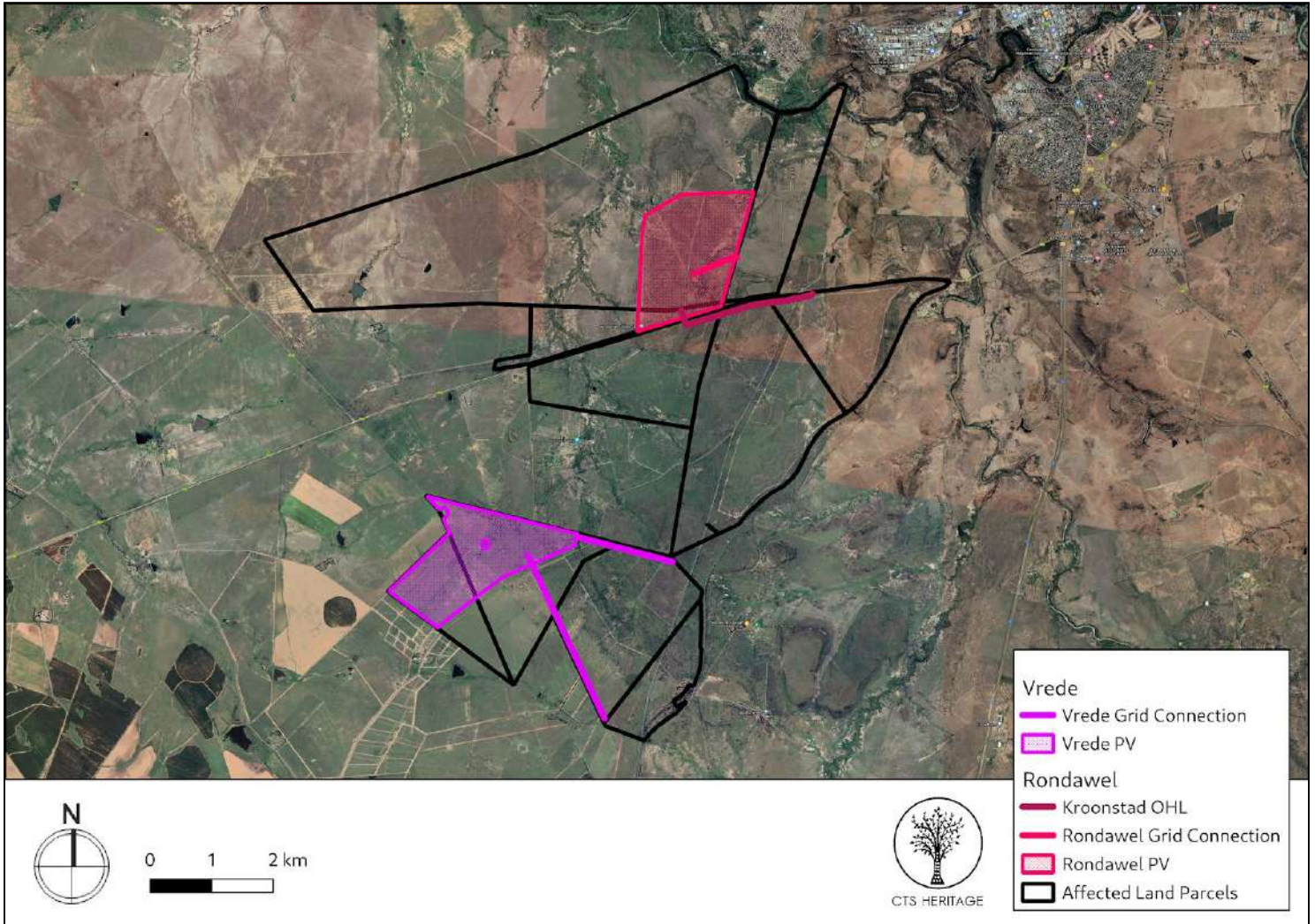


Figure 2: Google Earth© satellite image of the proposed dam expansion, vegetation clearing and pipeline zones

2. METHODOLOGY

2.1 Purpose of Palaeontological Study

The area proposed for development is underlain by geological sediments of high moderate palaeontological sensitivity (Figure 3a and b). Based on the very high palaeontological sensitivities indicated, it is recommended that a palaeontological field assessment of the areas proposed for development is completed and anticipated impacts to such resources assessed. The resulting Palaeontological Specialist Assessment will be integrated into the Heritage Impact Assessment completed for the proposed development and will be submitted to SAHRA for comment in terms of section 38(8) of the NHRA.



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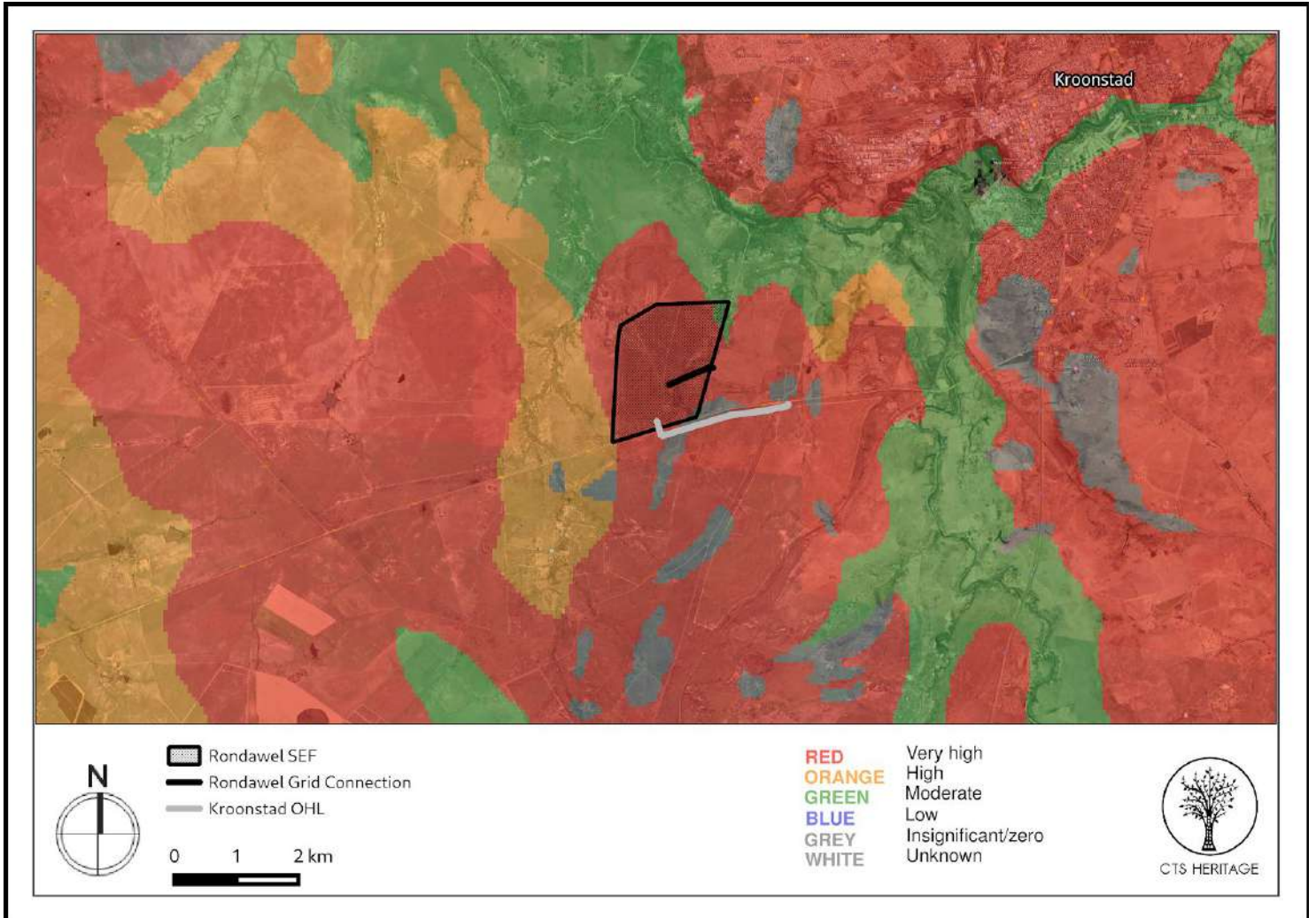


Figure 3a: Palaeosensitivity Map. Indicating Moderate to High fossil sensitivity underlying the study area for the Rondavel SEF and associated grid infrastructure



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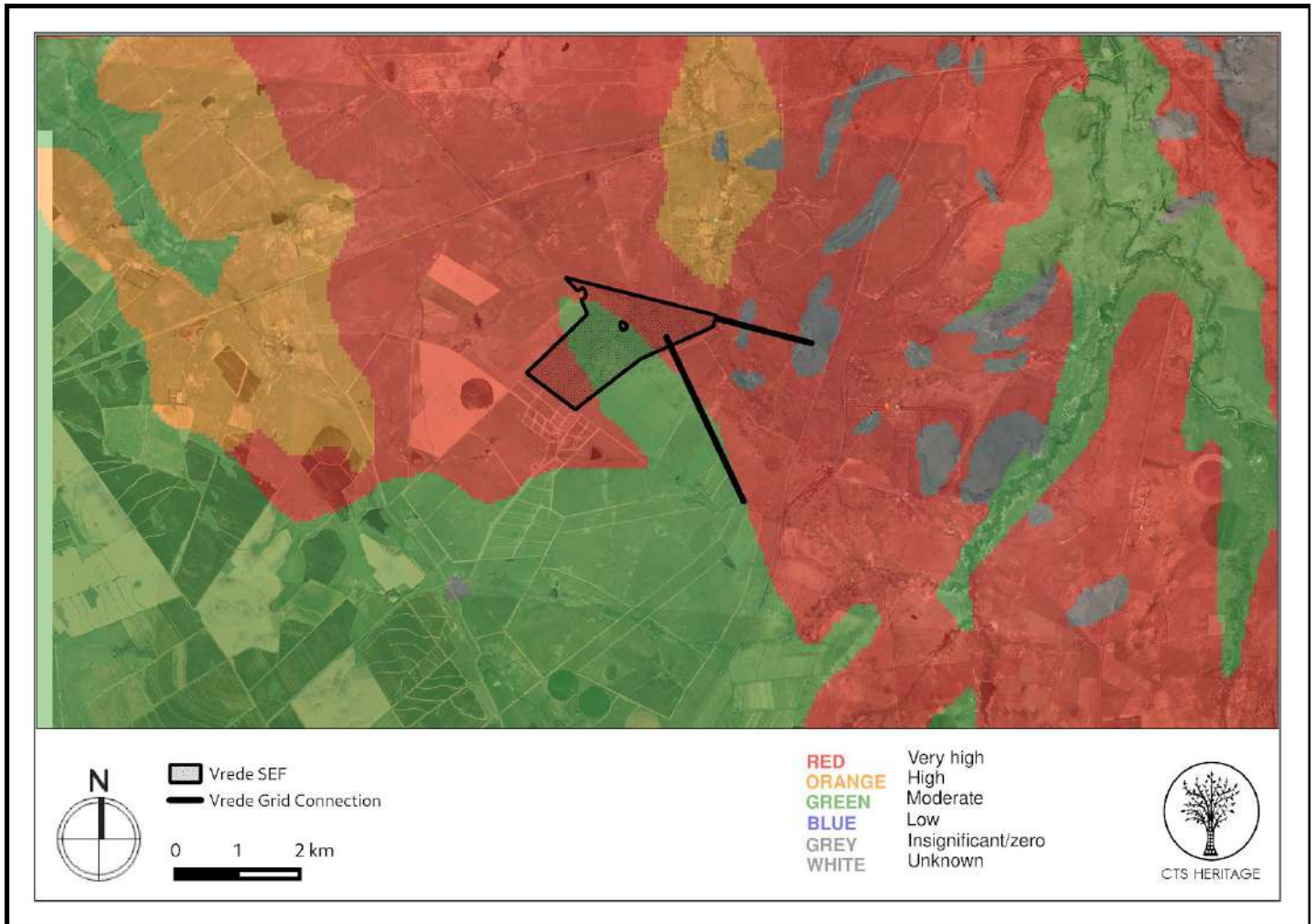


Figure 3b: Palaeosensitivity Map. Indicating Moderate to High fossil sensitivity underlying the study area for the Vrede SEF and associated grid infrastructure

2.2 Study approach

This PIA report provides a record of the observed or inferred palaeontological heritage resources within the broader project study area. The identified resources have been assessed to evaluate their heritage significance in terms of the grading system outlined in Section 3 of the NHRA (Act 25 of 1999). Recommendations for specialist palaeontological mitigation are made where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, including previous palaeontological impact assessments in the broader study region (e.g. Almond 2008; 2012) published geological maps, project data, Google Earth satellite imagery and accompanying sheet explanations.

The areas proposed for development were surveyed through a standard field walking method with constantly tracking GPS and camera. The walking tracks were uploaded, and individual points of interest were marked with GPS waypoints and photographed. Each area was inspected for possible fossil bearing rock outcrops and fossil remains.



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3. GEOLOGICAL CONTEXT OF THE STUDY AREA

According to the Council of GeoScience 2726 Kroonstad Map, the development area for the Rondavel SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volksrust Formation (Pvo) (Figure 4a) and the Vrede SEF and Grid Connections are underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs) (Figure 4b). The most palaeontologically sensitive formation underlying the development areas is the Adelaide Subgroup of the Beaufort Group. This formation forms part of the Dicynodon and Lystrosaurus assemblage zones and is known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows. Diverse terrestrial and freshwater tetrapods of *Pristerognathus* to *Dicynodon* Assemblage Zones (amphibians, true reptiles, synapsids – especially therapsids) have been found in this formation, as well as, palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse to rich assemblages of vascular plants (*Glossopteris* Flora, including spectacular petrified logs) and insects.

The geology of the study area on the Rondavel and Vrede properties can be seen on the 1: 250 000 geology sheet 2726 Kroonstad (Schutte 1993) (Figure 4a and 4b). These properties are situated in the northern edge of the Main Karoo Basin of South Africa and are underlain by Late Permian shallow marine / lacustrine to continental sediments of the Karoo Supergroup (Johnson et al. 2006). According to the 1: 250 000 geological maps, the Rondavel site mainly comprises Karoo sediments belonging to the predominantly fluvial Lower Beaufort Group (Adelaide Subgroup; Pa) that is of latest Permian age with some Middle to Late Permian lacustrine to deltaic sediments of the Ecca Group beneath the Lower Beaufort continental rocks in the very south-west corner (basinal mudrocks of the Volksrust Formation; Pvo) and intrusive Jurassic dolerite dykes (Jd) in the very south-east corner (Figure 4a). The Vrede site is underlain by Adelaide Subgroup sediments (Pa) in the eastern and western thirds, and Quaternary Sands in the middle third (Qs) (Figure 4b).

The Beaufort Group of the Karoo Supergroup consists of a lower Adelaide and upper Tarkastad Subgroup (SACS, 1980), the former being characterised by a lower sandstone-to-mudstone ratio. The Adelaide Subgroup can be subdivided into six formations which are latitude specific (i.e. Abrahamskraal and Teekloof formations west of 24°E; Abrahamskraal, Middleton and Balfour formations east of 24°E; and the Normandien and Emakwezini formations in the northern Free-State and Kwa-Zulu Natal provinces). The Vrede site, Rondavel site and proposed alternate lines extend from latitudes of E 027.12584° to the west (VRD_P05-“West Corner” point in table 2 and figure 6.2) and E 027.19557° to the east (RDW_P02-“Mid East Line End” point in table 2 and figure 6.1) making it likely that the formations of the Adelaide Subgroup present at the sites would consist of Abrahamskraal, Middleton and Balfour formations (from oldest to youngest respectively). The Adelaide Subgroup is dominated by greenish-grey to blueish-grey, gradually changing to greyish-red, reddish-brown or purple mudstones; alternating with grey, very fine to medium-grained, lithofeldspathic sandstone. The mudstones were deposited in an overbank or floodplain environment. The Adelaide Subgroup ranges from 100-200m thick in the north to 5000m thick in the southeastern part of the basin.

The Middle Permian Ecca Group of the Karoo Supergroup mainly overlies the Dwyka Group (except for some areas where it sits directly on older basement rocks) and underlies the Beaufort Group. The Ecca Group is Asselian to Roadian



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in age (298-268myo) and is associated with a marine depositional environment (ranging from deep pelagic, submarine fan to shallow marine deposits and beach deposits). The Ecca Group can be divided into 16 formations split into three geographical areas. In the Western/Northwestern part of the Group, these include the Prince Albert Formation, the Whitehill Formation, the Collingham Formation, the Tierberg Formation, the Skoorsteenberg Formation, the Kookfontein Formation, and the Waterford Formation. In the Southern part of the Group, these include the Prince Albert Formation, the Whitehill Formation, the Collingham Formation, the Vischkuil Formation, the Laingsbrug Formation, the Ripon Formation, the Fort Brown Formation and the Waterford Formation. The Northeastern part of the group includes the Pietermaritzberg Formation, the Vryheid Formation and the Volksrust Formation. The latter consists of silt-rich, grey to black shale with thin, bioturbated siltstone or sandstone lenses. The sediments are fine-grained indicating that the rock sediments were deposited in both lacustrine to lagoonal and shallow coastal settings. The Volksrust Formation varies in thickness from 150-250m (Tavener-Smith et al 1988).

The Quaternary red to flesh-coloured wind-blown sands ('Qs' on figure 4b) can broadly be correlated with the Gordonia formation of the Kalahari Group (Pether et al., 2018). The Kalahari Group represents the largest Cenozoic (66 mya to 0 mya) terrestrial sediment deposit in southern Africa. It extends uninterrupted from the Northern Cape to 2 degrees north of the equator, and possibly further south in the semi-arid Karoo. The Kalahari Group can reach up to 210m in thickness. The thickest part of the Kalahari overlies the Dwyka Group rocks that may have played a role in the deposition of Kalahari Group sediments (Johnson et al., 2006; Malherbe, 1984). The Gordonia Formation (informally Kalahari sand) is part of the upper Kalahari Group. The former can reach up to 30m in thickness and comprises red aeolian sands, usually deposited on an underlying calcrete surface but can rest directly on pre Kalahari deposits. The sands, composed of rounded quartz grains, owe their red colour to a thin coating of haematite around the grains. The presence of white sand in river bottoms and bottomland areas is due to the lack of haematite. Linear dunes (formed as early as the Late Pliocene or Early Pleistocene, 2.6 mya) make up a lot of the Gordonia Formation.

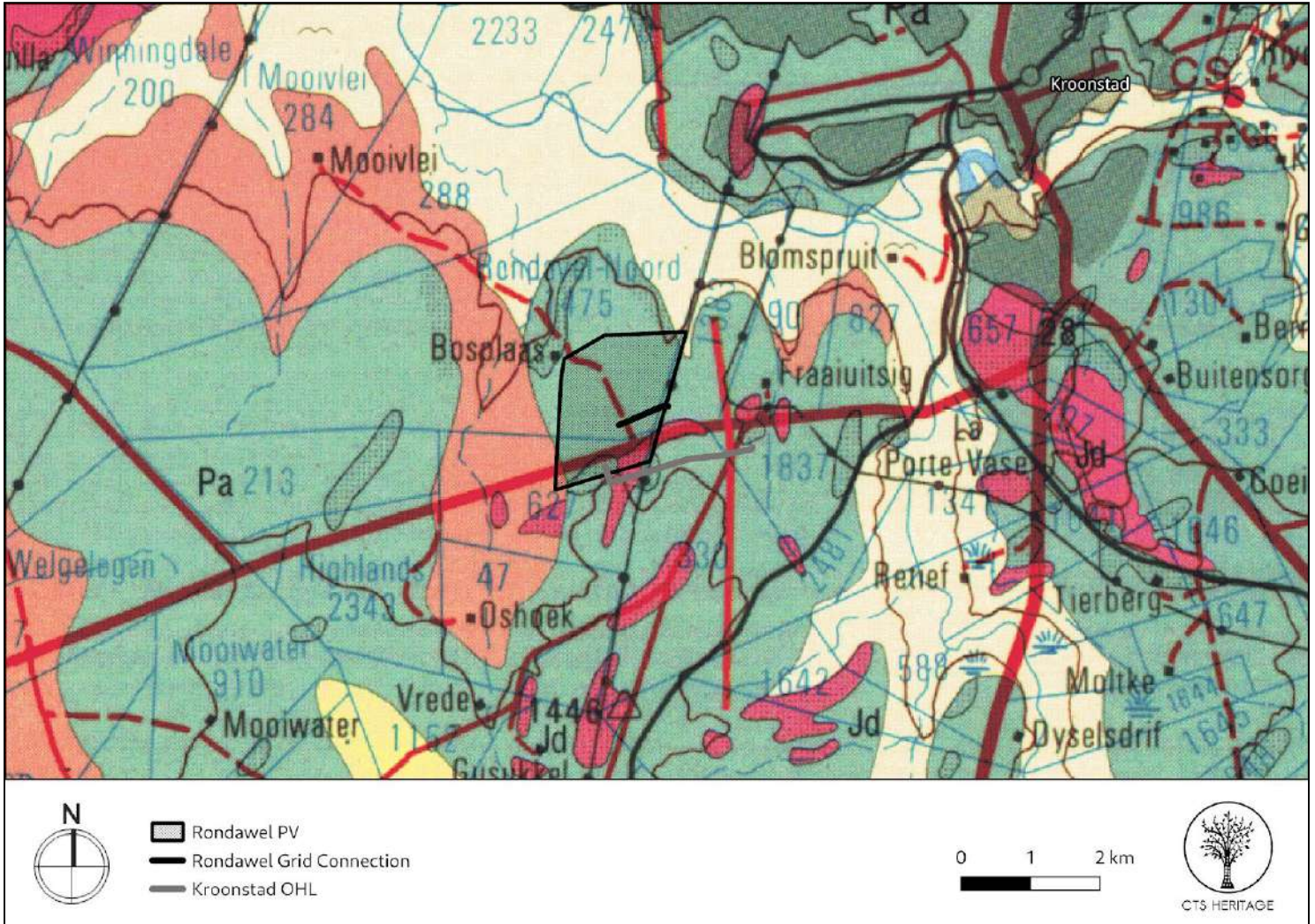


Figure 4a. Geology Map. Extract from the CGS 2726 Kroonstad Map indicating that the development area for the Rondavel SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volkstrust Formation (Pvo) and Jurassic Dolerite (Jd).



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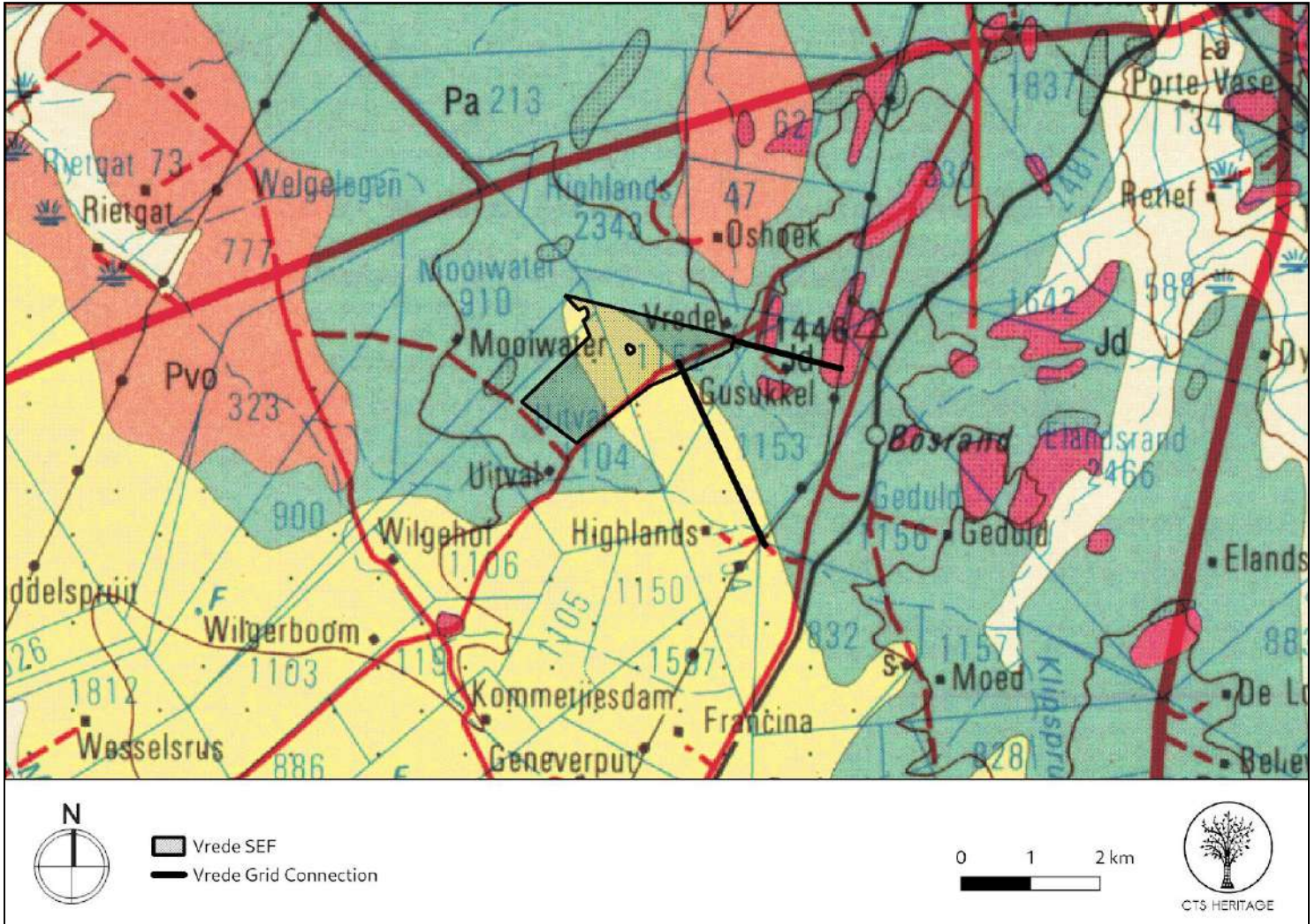


Figure 4b. Geology Map. Extract from the CGS 2726 Kroonstad Map indicating that the development area for the Vrede SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs)



Table 1: Explanation of Geology

Geological unit	Age	Lithology	Symbol on figure 4	Fossil heritage	Palaeo-sensitivity	Recommended mitigation
Kalahari Group, wind-blown sand (Gordonia Formation)	2.6 mya to 0 mya	Informally kalahari sand, red (haematite coated) and white (lacking haematite) aeolian sand, usually deposited on underlying calcrete surface but can rest directly on pre kalahari deposits. 30m thick	Qs	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (<i>Struthio</i>), shells of land snails (e.g. <i>Trigonephrus</i>), bivalves and gastropods (e.g. <i>Corbula, unio</i>) and ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, mammalian ichnofossils	Low	No action required (any fossil finds to be reported by developer)
Jurassic dolerite	200mya	Intrusive dolerite	Jd	None	Insignificant	No action
Karoo Supergroup, Beaufort Group, Adelaide Subgroup	265.8mya - 252.6mya	Deltaic and fluvial sequences of sandstone and green-grey mudstone	Pa	<i>Daptocephalus</i> , <i>Dicynodon</i> and <i>Lystrosaurus</i> Assemblage zones. Fossil of fish, amphibians, reptiles and burrows	Very High	Specialist present on site during initial excavation
Karoo Supergroup, Ecca Group, Volksrust Formation	270mya - 260mya	Lacustrine to deltaic sediments dark grey mudstone, siltstone, shale	PVo	Trace fossils, bivalves, temnospondyl amphibians, vertebrate microfossils (including fish teeth, spines, scales etc), insect remains, petrified wood	High	Specialist present on site during initial excavation



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4. PALAEOLOGICAL HERITAGE RESOURCES

4.1. Review of regional palaeontology

The Volksrust Formation has yielded both vertebrate and invertebrate fossils. Fossils include acritarchs (organic-walled microfossils), large *Megadesmus* bivalves, rare temnospondyl amphibian remains, vertebrate microfossils (e.g. fish teeth, spines, scales) within diagenetic nodules, wind-blown insect remains, petrified driftwoods (“*Dadoxylon*”) and low-diversity trace fossils assemblages (ichnogenera include *Siphonicnus Ecccaensis*, *Scolicia*, *Scoyenia*, *Skolithos*, *Planolites* and *Helminthopsis*) (Cairncross et al 2005, Almond 2014). The trace fossils are mainly horizontal (unbranched or bifurcating) feeding trails with some oriented obliquely into the sediment. The horizontal trace fossils were formed in low energy depositional environments and are more commonly found in the stratigraphically lower deltaic siltstones. The oblique/vertical trace fossils were formed in higher energy depositional environments and are more commonly found in the uppermost deltaic sandstones and siltstones (Cairncross et al 2005).

The rocks of the Adelaide Subgroup are highly fossiliferous and incorporate the entire *Daptocephalus* Assemblage Zone, the lowermost portion of the *Lystrosaurus* Assemblage Zone, and the uppermost rocks of the *Cistecephalus* Assemblage Zone (Viglietti et al 2017). This Subgroup has yielded fossils of fish, amphibians, reptiles and burrows.

The igneous intrusive origin of the Jurassic dolerite dykes makes it unlikely that they contain fossils.

Although present, the fossil record of the Kalahari Group is sporadic and not very diverse. These fossils are usually associated with ancient pans, lakes and rivers (Almond and Pether, 2008). Aeolian dunes are not likely to preserve fossil material, however, calcretisation in low relief areas may preserve burrows (including termites) and root casts (rhizoliths). Fossils that have been recorded include ostrich egg shells (*Struthio*), shells of land snails (e.g. *Trigonephrus*), bivalves and gastropods (e.g. *Corbula*, *Unio*), ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones).

4.2. Field assessment

In the case of the Rondavel property, dense vegetation covers most of the landscape and seriously hinders systematic and comprehensive coverage of the ground. In this case, Google Earth was used to identify possible exposed fossil bearing rock outcrop. These areas and more open grasslands were then targeted through field walking. This approach allowed for sampling of the variety of landscapes on this property. The majority of the property is covered in a thick layer of reworked soil. Fresh, possibly fossil bearing Adelaide mudstone outcrop was only visible in a couple of areas, including by the dam in the south-east corner of the property (RDW_P12-“Dam outcrop” in Table 2 and figure 6.1) and by the road in the south-east corner of the property (RDW_P16-“Outcrop 5” and RDW_P17-“Outcrop 6” in Table 2 and figure 6.1). These outcrops consist of greenish-grayish thin to medium grained mudstones. In both instances, the mudstone layer is overlaid by a medium to coarse grained yellowish sandstone. This sandstone is approximately 40cm thick at the “Dam Outcrop” and 1m thick at “Outcrop 5”.

“Outcrop 6” is exposed as a concave blowout extending over a surface of +/- 100m². A porcupine den (RDW_P10-“Porcupine Den Outcrop” in Table 2 and figure 6.1) shows a +/- 1m thick layer of soil underlain by fresher



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greyish mudstones. Thick medium to coarse grained yellowish sandstones are visible at several locations on the property (RDW_P03-“Outcrop 1” in Table 2 and figure 6.1; RDW_P05-“Outcrop 2” in Table 2 and figure 6.1). These greenish-grey mudstones and medium-coarse grained sandstones probably correspond to the alternating layers of the Adelaide Subgroup. Finally, Jurassic dolerites were recorded and exposed at three different areas on the property (RDW_P12-“Dam Outcrop” in Table 2 and figure 6.1; RDW_P13-“Dolerite” in Table 2 and figure 6.1; RDW_P14-“Outcrop 4” in Table 2 and figure 6.1). The dolerite weathers with an orange exterior and an interior that ranges from pinkish to dark grey.

The proposed northeast power line extends along the eastern boundary of the Rondavel property to the river. The river has eroded several deep (over 10m) channels into quaternary sand deposits in this location. This area is currently heavily used by foot traffic and local cattle. Several pre-existing power lines do cross the river at this location. Immediately on the other side of the river is an industrial and informal residential area that spreads down to the river. Local landowners advised us on not accessing this land due to safety issues. The proposed Mid-East line extends east to west from the midline of the Rondavel property across a neighbour's farm and follows a field boundary gravel road. Overgrazing on this property has exposed soils and sandstone rock outcrop, resulting in good visibility but high levels of soil disturbance. The proposed south power line route extends along the southern border of the R34 main tar road. On both sides of the R34, extensive and significant construction processes have disturbed and displaced soils reducing the possibility for fossil preservation.

At the Vrede property, heavy grazing of cattle and small-scale ploughing of fields has impacted the whole property and in particular the northern and western areas, aiding in quick identification of possible fossil bearing rock outcrops. Most areas were surveyed systematically and comprehensively in transects. The size of the property required survey transects to be conducted at 15-20 m intervals. In the west of the property, four large square fields previously ploughed have been left fallow. The southernmost of these fields has been used for grazing and soil exposure was good, aiding the survey. Tall and dense grasses have grown in the northernmost fields, seriously limited soil exposure and hindering survey coverage. In the eastern areas, dense pockets of acacia trees hindered access, but limited ground cover allowed clear assessment of potential surficial features that are often associated with localised tree growth.

The multi-generation agricultural use of this property limits the potential preservation of fossils. No fresh fossil bearing outcrop was identified on the property. Several large extant burrows show a soil layer of +/-1m thick with no evidence of non-eroded bedrock underneath it (VRD_P03-“Large burrow” in Table 2 and figure 6.2). A dolerite dyke was identified in the north-east corner of the property (VRD_P08-“East Corner” in Table 2 and figure 6.2) extending north for +/- 15m.

4.3. Palaeontological resources identified

No fossils were identified except for a couple of possible fragments of petrified wood on the Rondavel property (RDW_P07 in Table 2; RDW_P15 in Table 2). These were *ex situ* and their stratigraphic origin could not be determined.



Table 2: Palaeontological and Geological Observations

Site No.	Site Name	Description	Latitude	Longitude
RDW_P01	Rondavel Palaeo 1	Mid East Line End	S 27.68934°	E 027.19557°
RDW_P02	Rondavel Palaeo 2	Mid Mid East Line	S 27.68936°	E 027.19111°
RDW_P03	Rondavel Palaeo 3	Outcrop 1	S 27.68942°	E 027.18894°
RDW_P04	Rondavel Palaeo 4	NE Line End	S 27.67978°	E 027.18937°
RDW_P05	Rondavel Palaeo 5	Outcrop 2 start	S 27.69026°	E 027.18198°
RDW_P06	Rondavel Palaeo 6	Outcrop 2 E end	S 27.69177°	E 027.18320°
RDW_P07	Rondavel Palaeo 7	Petrified Wood	S 27.69110	E 027.18327°
RDW_P08	Rondavel Palaeo 8	Outcrop 2 W end	S 27.69046°	E 027.17946°
RDW_P09	Rondavel Palaeo 9	Outcrop 3 W end	S 27.70671°	E 027.17131°
RDW_P10	Rondavel Palaeo 10	Porcupine Den Outcrop	S 27.70632°	E 027.17105°
RDW_P11	Rondavel Palaeo 11	Outcrop 3 NW end	S 27.70437°	E 027.16869°
RDW_P12	Rondavel Palaeo 12	Dam outcrop	S 27.70430°	E 027.17887°
RDW_P13	Rondavel Palaeo 13	Dolerite	S 27.70413°	E 027.17879°
RDW_P14	Rondavel Palaeo 14	Outcrop 4	S 27.70316°	E 027.17966°
RDW_P15	Rondavel Palaeo 15	Petrified Wood	S 27.70099°	E 027.17900°
RDW_P16	Rondavel Palaeo 16	Outcrop 5	S 27.70705°	E 027.17666°
RDW_P17	Rondavel Palaeo 17	Outcrop 6	S 27.70651°	E 027.17670°
RDW_P18	Rondavel Palaeo 18	S Line Start	S 27.70981°	E 027.16750°
RDW_P19	Rondavel Palaeo 19	S Line End	S 27.70382°	E 027.19555°
VRD_P01	Vrede Palaeo 1	Vrede Main Gate	S 27.74659°	E 027.14448°
VRD_P02	Vrede Palaeo 2	Mid Field 1	S 27.74593°	E 027.13642°
VRD_P03	Vrede Palaeo 3	Large Burrow	S 27.74780°	E 027.13562°
VRD_P04	Vrede Palaeo 4	Mid Field 2	S 27.74261°	E 027.14059°
VRD_P05	Vrede Palaeo 5	West Corner	S 27.74778°	E 027.12584°
VRD_P06	Vrede Palaeo 6	Mid W Corner	S 27.73922°	E 027.13598°
VRD_P07	Vrede Palaeo 7	SE Corner	S 27.74177°	E 027.15629°
VRD_P08	Vrede Palaeo 8	East Corner	S 27.73931°	E 027.15666°
VRD_P09	Vrede Palaeo 9	North Corner	S 27.73394°	E 027.13210°



4.4. Photographic Record



Figure 5.1: Outcrop 1 (scale bar = 10cm) consisting of medium to coarse grained yellowish sandstone (probably of the Adelaide Subgroup)



Figure 5.2: Outcrop 2 (scale bar = 10cm) consisting of medium to coarse grained yellowish sandstone (probably of the Adelaide Subgroup)



Figure 5.3: Outcrop 2 (scale bar = 10cm) consisting of medium to coarse grained yellowish sandstone (probably of the Adelaide Subgroup)



Figure 5.4: Petrified wood (RDW_P07) from Outcrop 2 (scale bar = 10cm)



Figure 5.5: Porcupine Den Outcrop (scale bar = 10cm) with fresh greenish-greyish medium mudstones (probably of the Adelaide Subgroup) exposed at the bottom



Figure 5.6: Dam outcrop (scale bar = 10cm) showing reworked soil layer and dolerite sill



Figure 5.7: Dolerite exposure (scale bar = 10cm)



Figure 5.8: Outcrop 4 consisting of dolerite boulders (scale bar = 10cm)



Figure 5.9: Greyish medium grained mudstone under dam outcrop probably from the Adelaide Subgroup (scale bar = 10cm)



Figure 5.10: Petrified wood (scale bar = 10cm), RDW_P15



Figure 5.11: Outcrop 5 consisting of medium to coarse grained yellowish sandstone underlain by greyish to greenish medium grained mudstone (probably Adelaide Subgroup) (scale bar = 10cm)



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Figure 5.12: Outcrop 5 greyish to greenish medium grained mudstone (probably Adelaide Subgroup) (scale bar = 10cm)



Figure 5.13: Outcrop 6 showing blowout consisting of greyish to greenish medium grained mudstone (probably Adelaide Subgroup)



Figure 5.14: Outcrop 6 greyish to greenish medium grained mudstone (probably Adelaide Subgroup) (scale bar = 10cm)



Figure 5.15: Burrow from middle of Vrede property showing no fresh outcrop, only soil exposed



Figure 5.16: Burrow from middle of Vrede property showing no fresh outcrop, only soil exposed



Figure 5.17: Large burrow from Vrede showing no fresh outcrop, only soil exposed



Figure 5.18: Large burrow from Vrede showing no fresh outcrop, only soil exposed



Figure 5.19: North-East corner of Vrede, dolerite dyke extending North for 15m (scale bar = 10cm)



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Figure 5.20: North-East corner of Vrede, dolerite dyke extending North for 15m (scale bar = 10cm)

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will be HIGH to VERY HIGH due to the likely presence of highly fossiliferous Adelaide Subgroup and Volksrust Formation mudstones and shales underlying almost the entirety of both properties, underneath the reworked soil layers.

There is very little probability that fossils will be present in the Jurassic dolerites. However, the majority of both the Rondavel and Vrede properties are underlain by highly fossiliferous sediments (the Adelaide Subgroup and Volksrust Formation) of high palaeontological sensitivity. The land, having been reworked extensively (such as visible plough lines on the Vrede property), is covered by a thick layer of soil, making the underlying bedrock and geology difficult to identify. However, the presence of fresh outcropping Adelaide mudstones on the Rondavel property and this layer being exposed at the bottom of a porcupine den, indicates the high likelihood of these highly fossiliferous layers being disturbed with construction requiring excavation exceeding 1m in depth. It is therefore recommended that palaeontological monitoring of excavations takes place during the construction phase of the proposed development of both the Vrede and Rondavel SEFs and their associated infrastructure.



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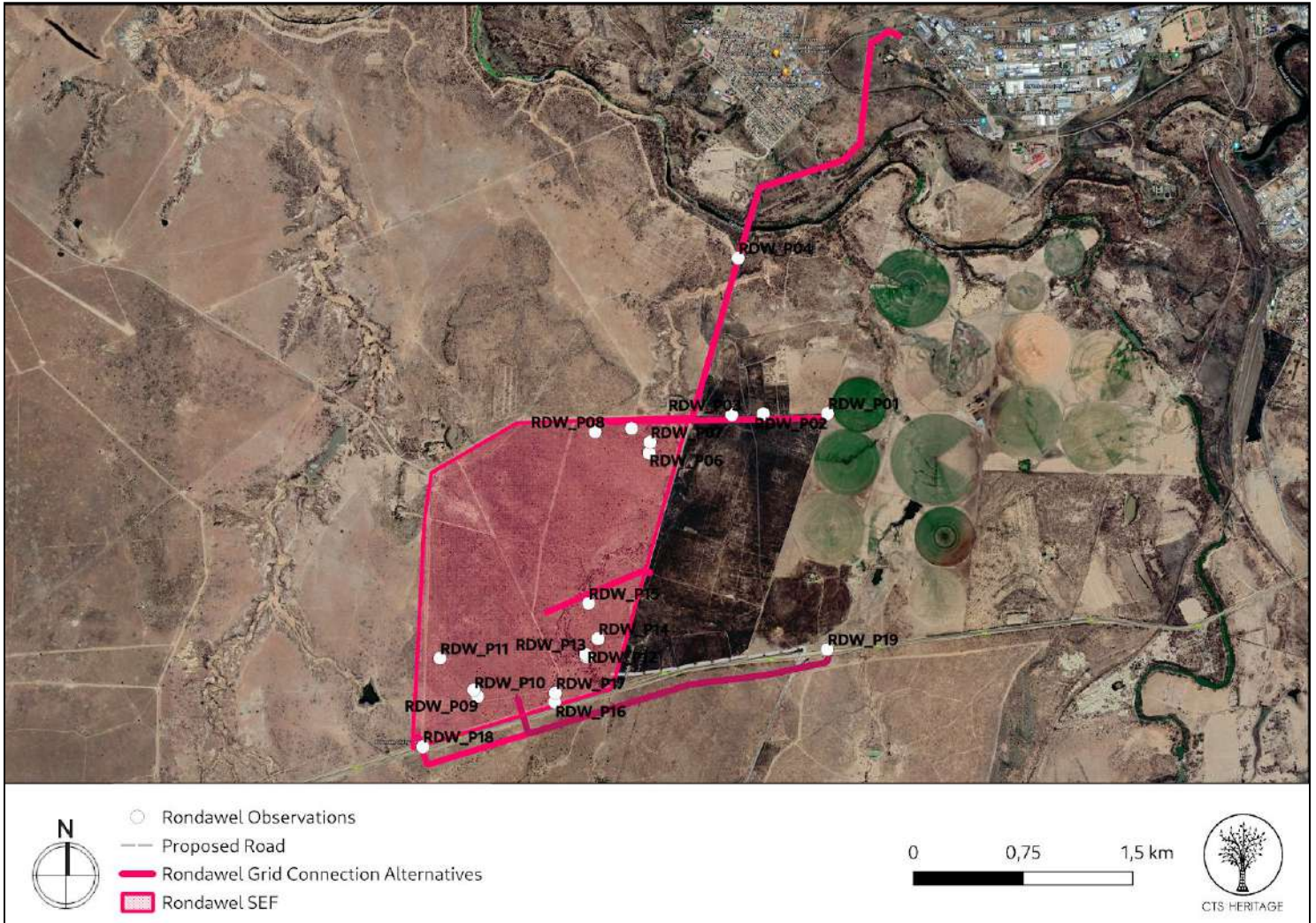


Figure 6.1: Map of Palaeontological Observations within the area proposed for the Rondavel SEF development and associated infrastructure



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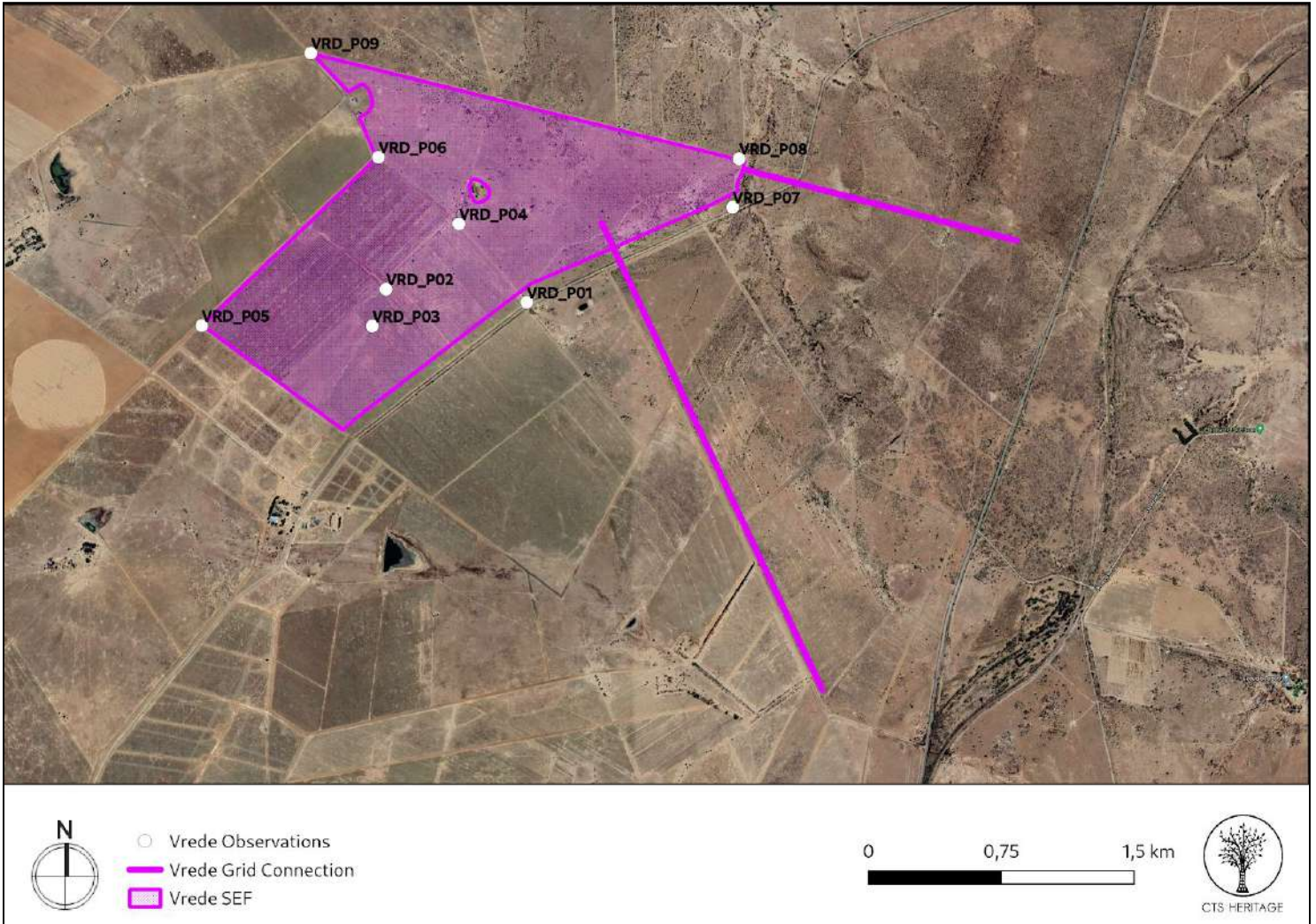


Figure 6.2: Map of Palaeontological Observations within the area proposed for the Vrede SEF development and associated infrastructure



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6. CONCLUSION AND RECOMMENDATIONS

The overall palaeontological sensitivity of the areas proposed for the Vrede and Rondavel SEFs and their associated infrastructure is HIGH to VERY HIGH. The field survey identified a number of areas of possibly fossiliferous outcrops of the underlying bedrock. In addition, examples of fossilised wood were identified associated with Outcrop 2 located within the area proposed for the Rondavel SEF. Although *ex situ*, these findings corroborate the high palaeontological sensitivity of the area.

In general, it is preferred that excavations take place into fossiliferous bedrock rather than avoiding impact as this allows palaeontologists access to otherwise inaccessible palaeontological resources. The negative impacts of such excavations to palaeontological resources are managed through careful monitoring of excavations into bedrock by a suitably qualified palaeontologist. It is therefore preferable that excavations do indeed take place on condition that these excavations are properly monitored.

In summary, despite the VERY HIGH palaeontological sensitivity of the areas proposed for development, there is no objection to the proposed development of the Vrede and Rondavel SEFs and their associated infrastructure on condition that:

- All excavations into bedrock are monitored by a suitably qualified palaeontologist and a report on the outcomes of the monitoring activities must be submitted to SAHRA on completion of the development of the facility.
- All other excavation activities are subject to the Palaeontological Chance Finds Procedure (Appendix 1 of this report).



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APPENDIX 1: Fossil Finds Procedure

CHANCE FINDS OF PALAEOLOGICAL MATERIAL

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

Introduction

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

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

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

Training

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

Actions to be taken

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

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



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

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

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

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



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



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APPENDIX 3: Heritage Screening Assessment



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HERITAGE SCREENER

CTS Reference Number:	CTS20_042_2	
SAHRIS Reference:		
Client:	Savannah Environmental (Pty) Ltd	
Date:	November 2020	
Title:	Proposed development of the Rondavel Solar Energy Facilities near Kroonstad, Free State Province	
CTS Heritage Recommendation	<p>RECOMMENDATION Based on the available information, it is likely that the proposed development will negatively impact on significant archaeological and palaeontological heritage resources. As such, it is recommended that an HIA is required that identifies these resources in the field, assesses these impacts and proposes mitigation measures.</p>	

Figure 1a. Satellite map indicating the location of the proposed development in the Free State



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1. Proposed Development Summary

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the 75 MWac Rondavel Photovoltaic (PV) Solar Energy Facility (SEF) and Battery Energy Storage System (BESS), near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa.

The proposed development traverses four (4) farm parcels namely:

- » Remaining Extent of the farm Rondavel Noord No. 1475 (main site); and
- » Remaining Extent of the farm Rondavel No. 627 (main and grid site).

2. Application References

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

3. Property Information

Latitude / Longitude	27.1752 E, -27.6985 S
Erf number / Farm number	» Remaining Extent of the farm Rondavel Noord No. 1475 (main site); and » Remaining Extent of the farm Rondavel No. 627 (main and grid site)
Local Municipality	Moqhaka Local Municipality
District Municipality	Fezile Dabi District
Previous Magisterial District	Kroonstad
Province	Free State
Current Zoning	Agriculture
Project Site	2027ha

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4. Nature of the Proposed Development

Total Development Area	195ha
Depth of excavation (m)	2 - 2.5m
Height of development (m)	2.5m for panels and 2.8m for inverters

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
	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

The following infrastructure will be developed:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Underground cabling between the project components.
- On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas and temporary man camp area.
- Access roads, internal distribution roads and fencing around the development area.

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- Telecommunication infrastructure;
- Stormwater channels; and water pipelines.

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

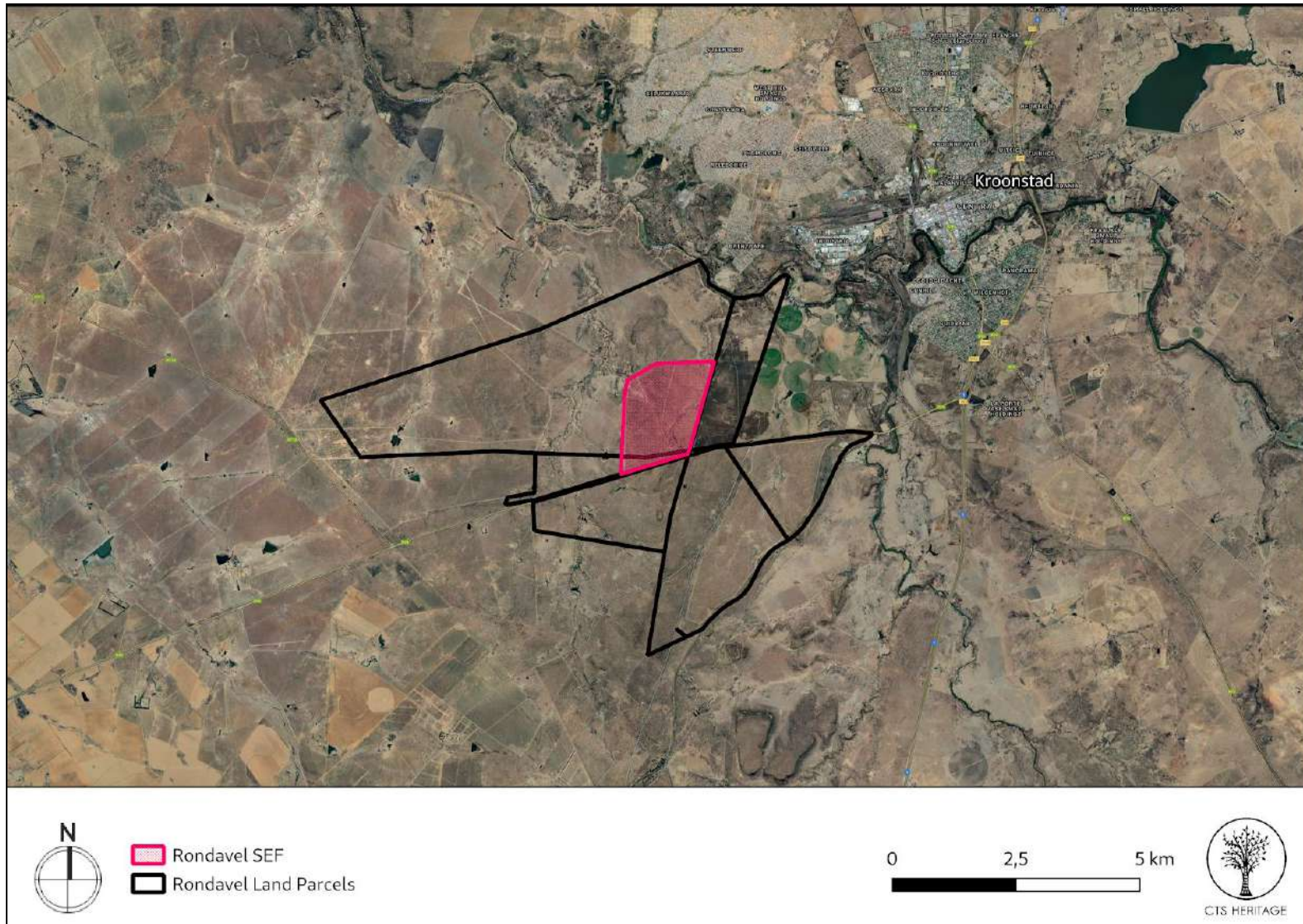


Figure 1b. Overview Map. Satellite image (2020) indicating the proposed development area for the Rondavel SEF

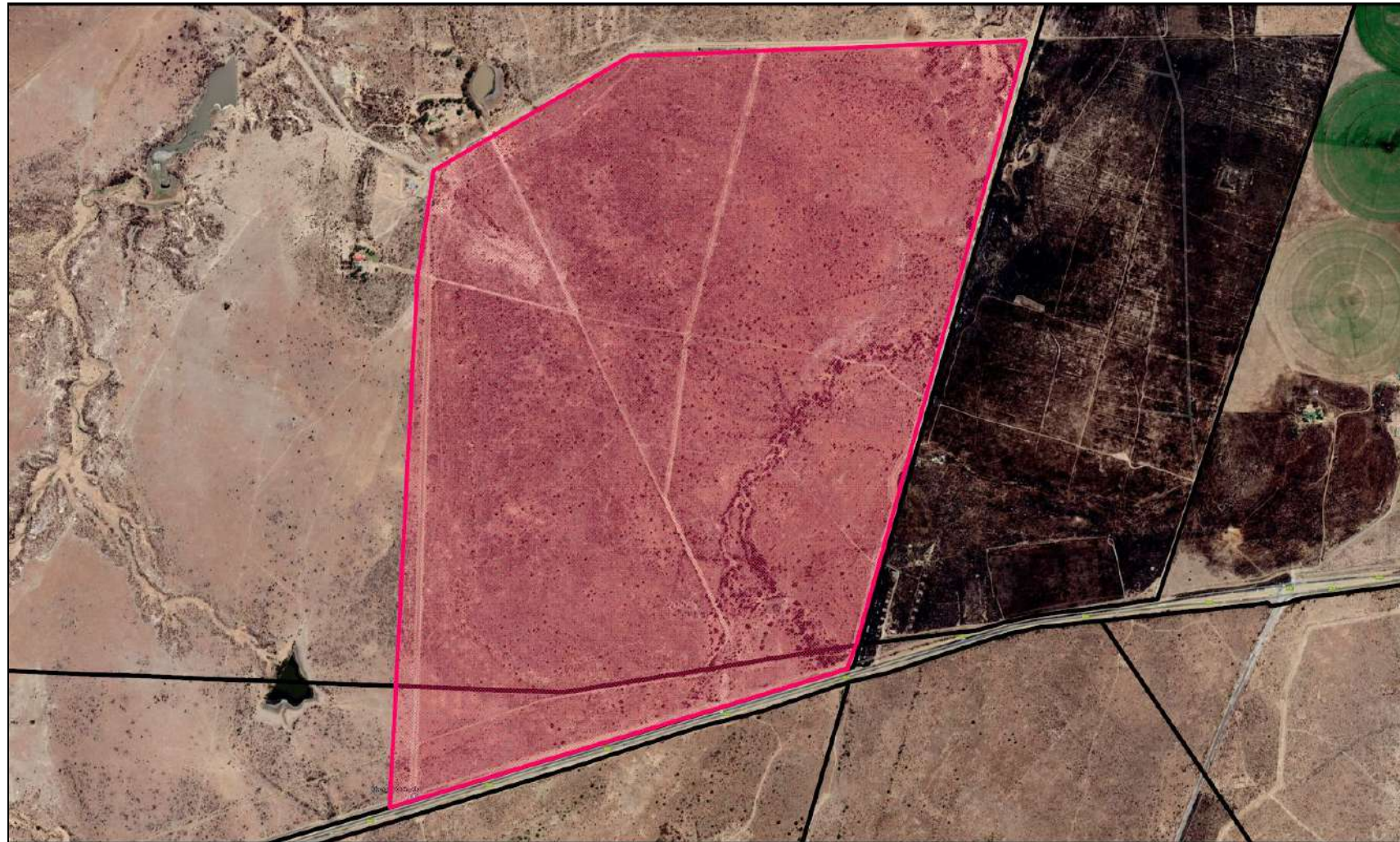
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 Rondavel SEF
 Rondavel Land Parcels

0 0,5 1 km



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Figure 1c. Overview Map. Satellite image (2020) indicating the proposed development area for the Rondavel SEF

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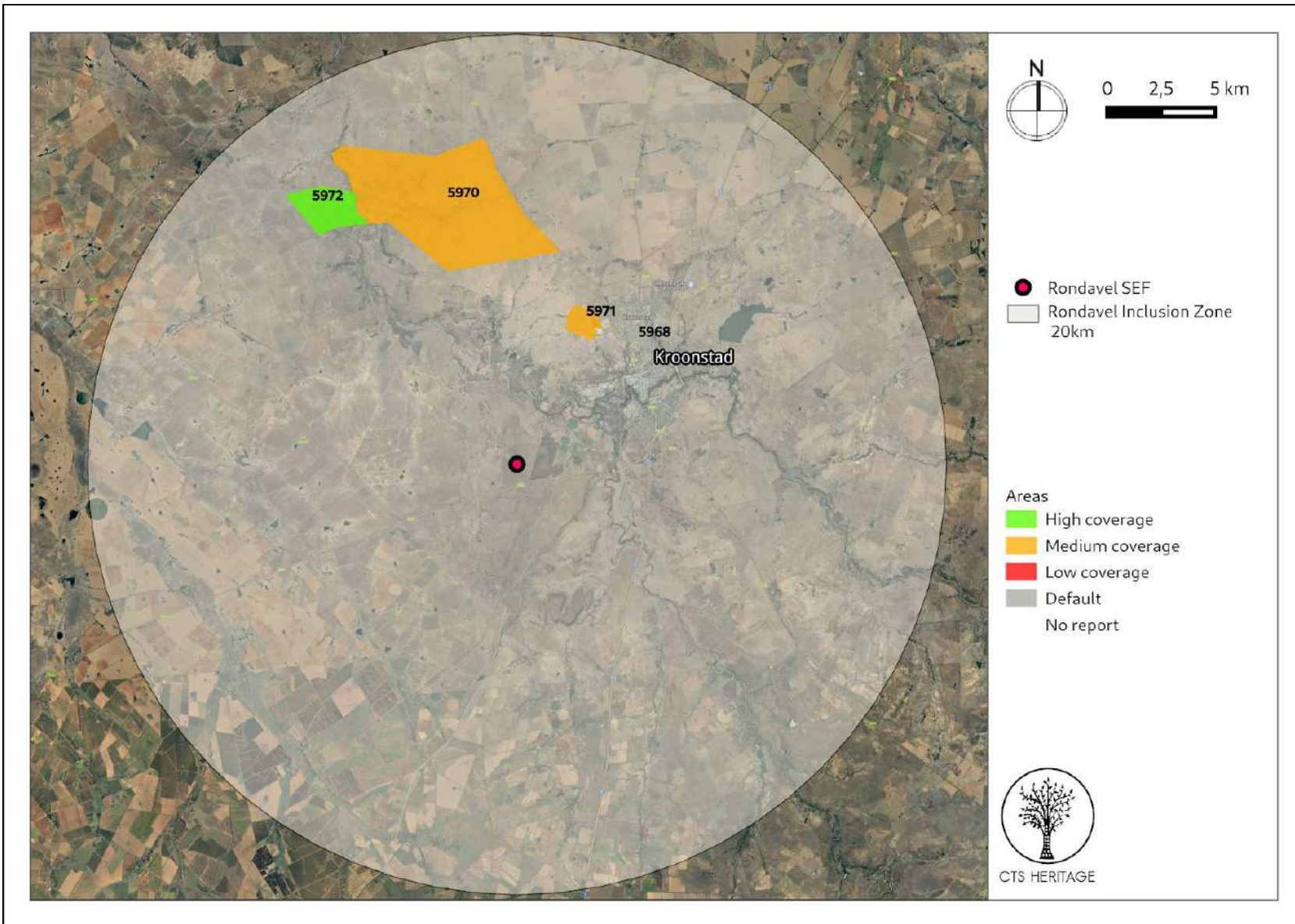


Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list

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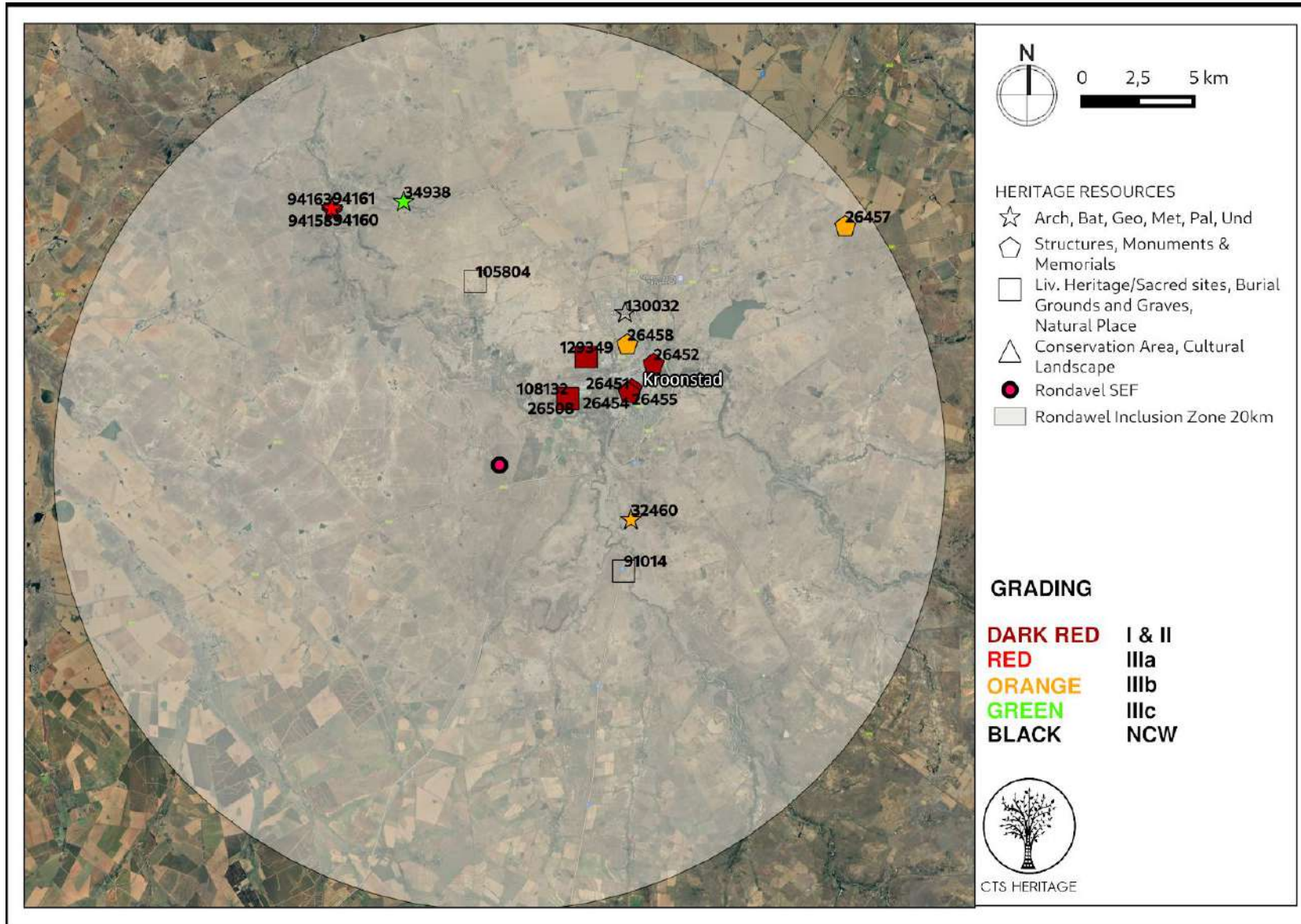


Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for full description of heritage resource types



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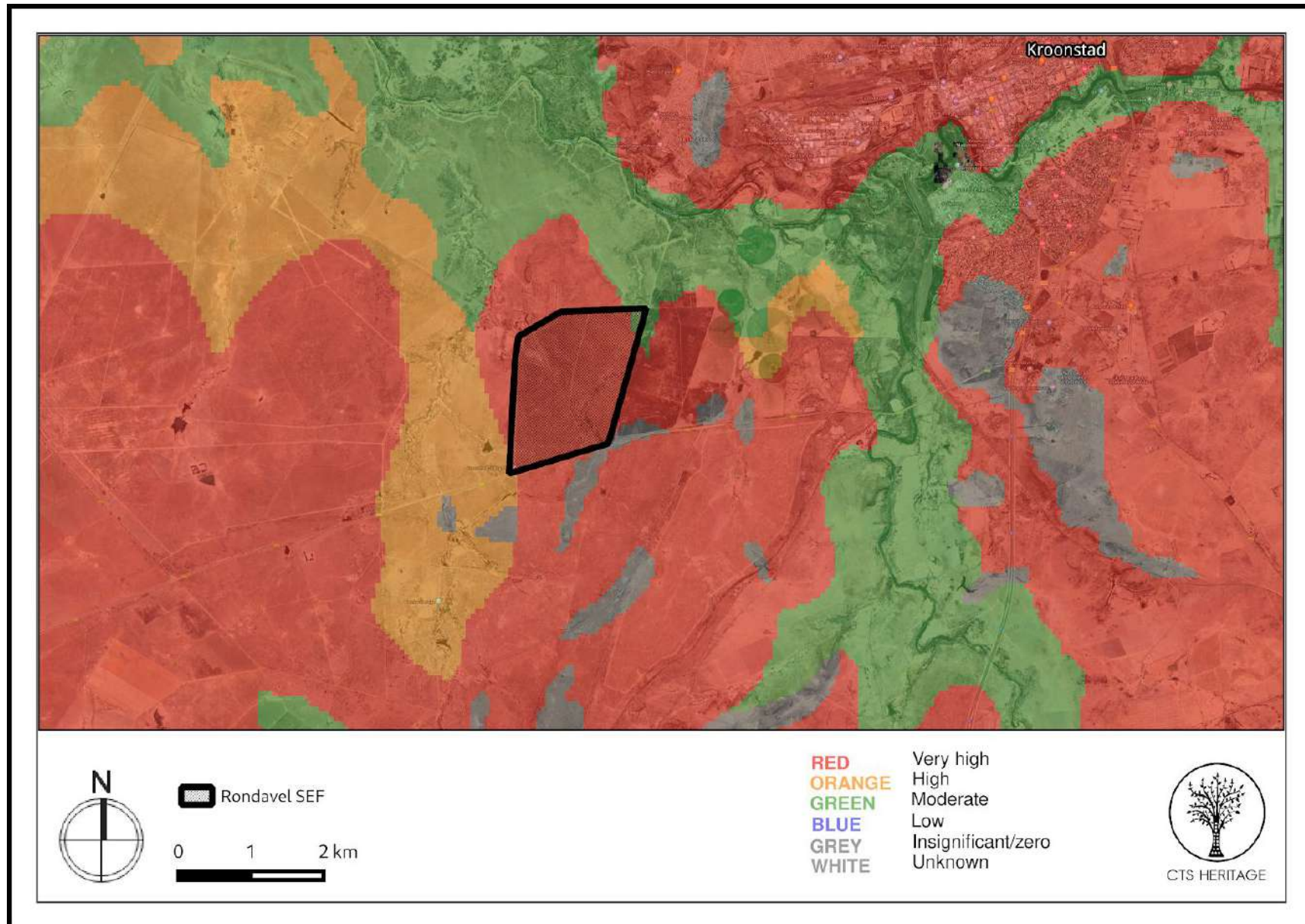


Figure 4. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend

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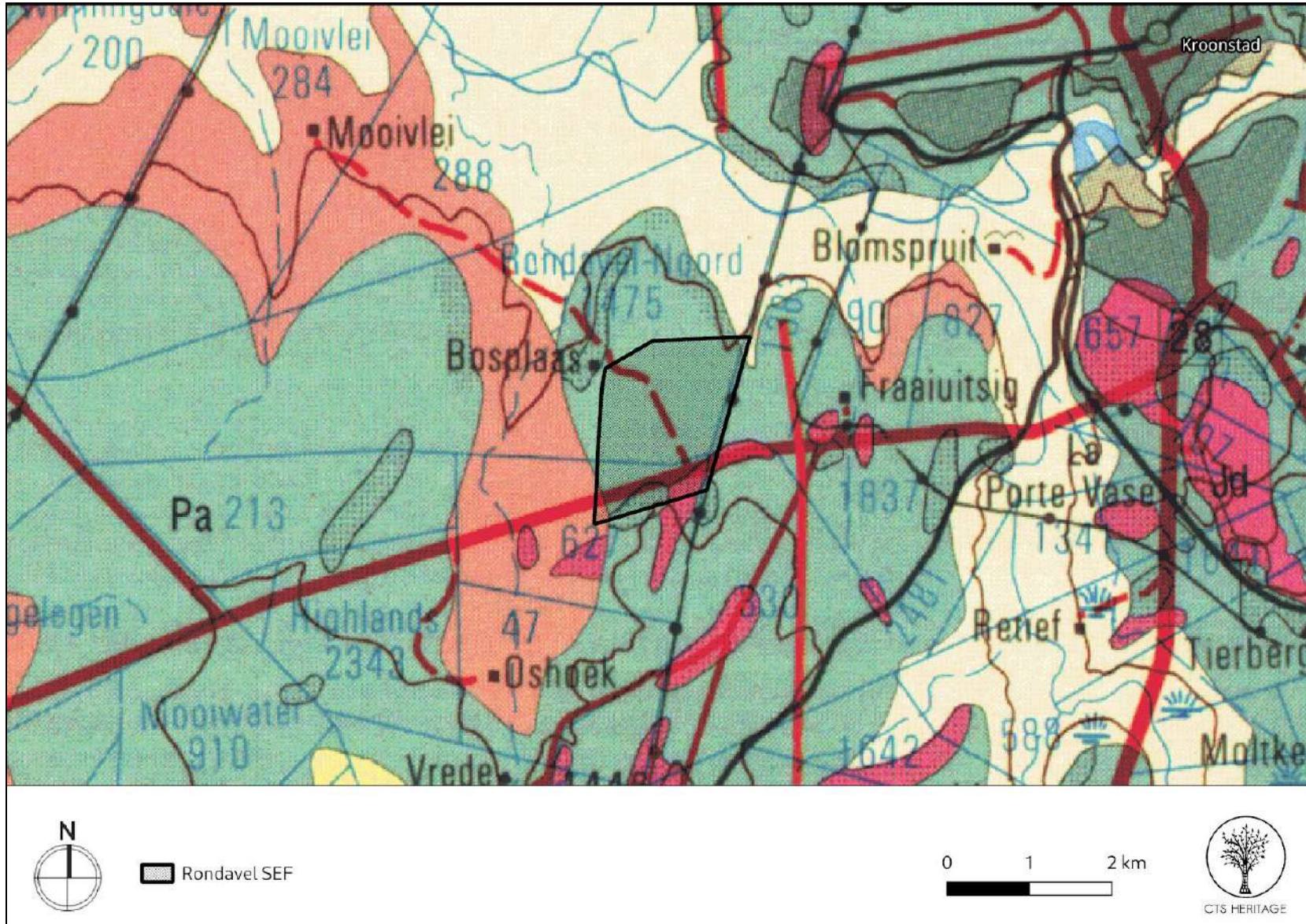


Figure 5a. Geology Map. Extract from the CGS 2726 Kroonstad Map indicating that the development area for the Rondavel SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volksrust Formation (Pvo) and Jurassic Dolerite (Jd).

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Figure 6. Google Street View image of Rondavel SEF area

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8. Heritage Assessment

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the construction and operation of the Rondavel Solar Energy Facilities and associated infrastructure near the town of Kroonstad in the Moqhaka Local Municipality. Kroonstad was established as a town in 1855. During the Second Boer War, from 13 March to 11 May 1900, the city became the capital of the Orange Free State, and subsequently the site of a British concentration camp to contain Boer women and children. Kroonstad still boasts much of the inherent rugged beauty which led the Voortrekkers to establish the town where they did and it is situated in an area characterised by open spaces and an abundant variety of vegetation that makes it particularly beautiful. According to Van Schalkwyk (2013), “Most farmsteads were burned down during the Anglo-Boer War, with the result that very little of the built environment dates to the 19th century.” According to Matenga (2019), the Black and Coloured townships are significant as landscapes of segregation occupying the north-western fringe of the CBD, while the exclusive white suburbs were located northeast of the town and south of the Valsch River.

According to Van Schalkwyk (2013), “The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component. This was soon followed by the development of a number of urban centres or towns. Originally these mostly served the surrounding farming communities, but with the discovery of the Free State Gold Fields, they expanded rapidly in order to serve this industry as well.” The proposed Solar Energy Facility and its associated grid connections are located some distance from the historic core of Kroonstad town. Furthermore, the areas proposed for development are located more than 5km away from the site of the Boer War concentration camps and associated burial grounds.

Prior to colonial settlement in 1855, the area proposed for development formed part of a landscape that was occupied by indigenous Khoe herders and San hunter-gatherers. These indigenous communities were displaced by Bantu-speaking people who began to occupy the area in the Iron Age. According to Van Schalkwyk (2013), “Sites dating to the Late Iron Age are known to occur in the region, especially... in the vicinity of the Sandrivier, whereas some are known to occur to the northwest of Ventersburg. These are typical stone walled sites that are linked with Sothospeakers and date to the period after 1600.” As such, it is possible that Early, Middle or Later Stone Age artefacts may be located within the proposed development footprint. Furthermore, it is possible that evidence of Iron Age settlement may also be located within the proposed development areas. As such, it is recommended that an archaeological assessment of the areas proposed for development is completed and anticipated impacts to such resources assessed.

According to the SAHRIS Palaeosensitivity Map (Figures 4a and 4b), the areas proposed for development are underlain by sediments of moderate to very high palaeontological sensitivity. According to the Council of GeoScience 2726 Kroonstad Map, the development area for the Rondavel SEF and Grid Connections is underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa), the Volksrust Formation (Pvo) (Figure 5a) and the Vrede SEF and Grid Connections are underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs) (Figure 5b). The most palaeontologically sensitive formation underlying the development areas is the Adelaide Subgroup of the Beaufort Group. This formation forms part of the Dicynodon and Lystrosaurus assemblage zones and is known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows. Diverse terrestrial and freshwater tetrapods of *Pristerognathus* to *Dicynodon* Assemblage Zones (amphibians, true reptiles, synapsids – especially therapsids) have been found in this formation, as well as, palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse to rich assemblages of vascular plants (*Glossopteris* Flora, including spectacular petrified logs) and insects. Based on the known palaeontological sensitivities of the Adelaide Subgroup, it is recommended that a palaeontological assessment of the areas proposed for development is completed and anticipated impacts to such resources assessed.

RECOMMENDATION

Based on the available information, it is likely that the proposed development will negatively impact on significant archaeological and palaeontological heritage resources. As such, it is recommended that an HIA is required that identifies these resources in the field, assesses these impacts and proposes mitigation measures.

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Impact Assessment Table

IMPACTS: Potential impacts to significant archaeological, palaeontological and cultural landscape heritage resources

DESKTOP SENSITIVITY ANALYSIS OF THE SITE: Overall, the Rondavel SEF sites have a HIGH sensitivity regarding impacts to heritage resources.

While no archaeological resources are known to exist within the development area, based on other heritage finds in the broader Kroonstad area, potential exists for archaeological resources within the development area. Any damage or loss of archaeological resources will be irreversible and permanent, representing a loss of evidence of past occupation of the landscape. Should an archaeological resource be damaged, the significance of the impact is therefore expected to be high.

In addition, a very high palaeontological sensitivity was determined for the development area. Any damage or loss of palaeontological heritage resources will be irreversible and permanent loss of scientific knowledge regarding the evolution of life. Should a palaeontological resource be damaged, the significance of the impact is therefore expected to be high.

ISSUE	NATURE OF IMPACT	EXTENT OF IMPACT	NO-GO AREAS
Cumulative impact to the Cultural Landscape	Erosion of the sense of place associated with a rural area characterised by open spaces and an abundant variety of vegetation	Local	None anticipated
Destruction of significant archaeological heritage resources	Permanent loss of evidence of past occupation of the landscape	Local	To be determined through the field assessment
Destruction of significant palaeontological heritage resources	Permanent loss of scientific knowledge regarding the evolution of life	Local	To be determined through the field assessment

GAPS IN KNOWLEDGE: The areas proposed for the development of the Rondavel SEF have not previously been surveyed for significant archaeological or palaeontological heritage resources based on the Desktop Information available. In addition, the Cultural Landscape of rural areas located on the outskirts of Kroonstad have not been assessed for their heritage significance.

In line with the National Heritage Resources Act (Act 25 of 1999) a Heritage Impact Assessment will be prepared considering existing survey reports submitted to SAHRA which will assess likely impacts to archaeological and palaeontological heritage resources through the completion of additional specialist studies. A full survey to identify archaeological and palaeontological resources must be undertaken to support this Impact Assessment report. This assessment should:

- Comply with specific requirements and guidelines of SAHRA and NHRA.
- Include the identification and mapping of all heritage resources in the area affected, as defined in Section 2 of NHRA.
- Include an assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- Include an assessment of the impact of development on such heritage resources.
- Identify heritage resources to be monitored.
- Suggest suitable mitigation measures to address the identified impacts.
- Provide recommendations regarding the alternatives provided from a heritage perspective.
- Provide a description of the heritage sensitivity of the development based on the finding of the study.



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The subsurface archaeological and palaeontological record can never be fully understood without excavation, and the EIA Phase report will make recommendations on how to proceed should fossils or heritage finds be discovered during construction activities.

RECOMMENDATIONS FOR FURTHER ASSESSMENT: Based on the available information, it is likely that the proposed development will negatively impact on significant archaeological and palaeontological heritage resources. As such, it is recommended that an HIA is required that identifies these resources in the field, assesses these impacts and proposes mitigation measures.

Plan of Study:

Sensitivity Analysis and EIA assessment

SAHRA requires that an assessment be provided for the Rondavel Solar PV Facility. The report will comply with the requirements of the National Heritage Resources Act section 38(3) and will consider Heritage and Palaeontological Impacts, based on a field assessment of palaeontological, heritage and cultural resources within the development footprint.

The following HIA specific tasks must be undertaken:

- Undertake a Phase 1 HIA in accordance with the National Heritage Resources Act (Act 25 of 1999) (NHRA).
- Comply with specific requirements and guidelines of SAHRA and NHRA.
- The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of NHRA.
- An assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- An assessment of the impact of development on such heritage resources.
- Identify heritage resources to be monitored.
- Suggest suitable mitigation measures to address the identified impacts.
- Provide recommendations regarding the alternatives provided from a heritage perspective.
- Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with Appendix 6 of GN No. R982 (2017).
- Provide a description of the heritage sensitivity of the development based on the finding of the study.

Assessment of Impacts for the EIA

The methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

The nature of the impact will be defined and described. It will refer to the causes of the impact, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.

Environmental Management Programme

For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMP, as well as a Chance Fossil Finds Procedure.

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APPENDIX 1

List of heritage resources within 20km of the development area

Site ID	Site no	Full Site Name	Site Type	Grading
26508	9/2/306/0003	Concentration Camp Cemetery, Louvain, Brandfort District	Burial Grounds & Graves	Grade II
26453	9/2/324/0005	Old Market Square Post Office and prison-cells, 66 Murray Street, Kroonstad	Building	Grade II
26454	9/2/324/0006	Old market building, Market and Murray Streets, Kroonstad	Building	Grade II
26455	9/2/324/0008	Town Hall, Church Street, Kroonstad	Building	Grade II
26452	9/2/324/0016	Nederduitse Gereformeerde Mother Church, Church Square, Kroonstad	Building	Grade II
26451	9/2/324/0014	Old Magistrate's Office, Murray Street, Kroonstad	Building	Grade II
26458	9/2/324/0003	Kroonstad North Nederduitse Gereformeerde Church, Reitz, Symond and Malherbe Streets, Kroonstad	Building	Grade IIIb
26457	9/2/324/0001	Farmhouse, Congleton, Kroonstad District	Building	Grade IIIb
32460	Kroonstad Quarry	Kroonstad Quarry Q42.5	Palaeontological	Grade IIIb
34938	MID001	Middenspruit 001	Stone walling, Artefacts	Grade IIIc
94157	BOSCH 2218 / 01	Boschpunt 2218 / 01	Stone walling	Grade IIIa
94158	BOSCH 2218 / 02	Boschpunt 2218 / 02	Stone walling	Grade IIIa
94159	BOSCH 2218 / 03	Boschpunt 2218 / 03	Stone walling	Grade IIIa
94160	BOSCH 2218 / 04	Boschpunt 2218 / 04	Stone walling	Grade IIIa

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94161	BOSCH 2218 / 05	Boschpunt 2218 / 05	Stone walling	Grade IIIa
94162	BOSCH 2218 / 06	Boschpunt 2218 / 06	Stone walling	Grade IIIa
94163	BOSCH 2218 / 07	Boschpunt 2218 / 07	Stone walling	Grade IIIa
34894	SMA001	Smaaldeel 001	Building	Grade IIIa
105804	Motale Family Graves	Motale Family Graves	Burial Grounds & Graves	Grade IIIa
108132	Kroonstaad Concentration Camp Cemetery	Kroonstaad Concentration Camp Cemetery	Burial Grounds & Graves	Grade IIIa
91014	Kroonstad N1	Kroonstad National Road 1 Widening	Burial Grounds & Graves	Grade IIIa
129349	Grave of Rev. Zaccheus Richard Mahabane	Grave of Rev. Zaccheus Richard Mahabane, Seeisoville Cemetery, Maokeng, Kroonstad	Burial Grounds & Graves	Grade I
130030	2727AC/Environmental Rehabilitation/Farm Morgenster 772/Site 2	Archaeological site	Archaeological	Grade IV
130032	2727AC/Environmental Rehabilitation/Farm Morgenster 772/Site 3	Historical village	Settlement	Ungraded

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APPENDIX 2

Reference List with relevant AIAs and PIAs

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
5968	AIA Phase 1	Cobus Dreyer	20/06/2005	Archaeological and Historical Investigation of the Proposed New Filling Station at Kroonstad, Free State
5969	AIA Phase 1	Cobus Dreyer	25/08/2005	Historical Investigation of the Existing Outbuildings at the Farm Smaldeel 202, Kroonstad, Free State
5970	AIA Phase 1	Cobus Dreyer	29/05/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Middenspruit 151, Kroonstad, Free State
5971	AIA Phase 1	Cobus Dreyer	12/07/2006	Archaeological and Historical Investigation of the Proposed Township Developments at Maokeng, Kroonstad, Free State
5972	AIA Phase 1	Cobus Dreyer	26/10/2006	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Boschpunt 2218 Kroonstad, Free State
129819	AIA Phase 1	Jaco van der Walt	30/08/2013	Archaeological Impact Assessment Report for the Proposed Steynsrus (19.5MW) Photovoltaic Plant, Free State Province
533640	HIA Phase 1	Edward Matenga	25/11/2019	PHASE I HERITAGE IMPACT ASSESSMENT (INCLUDING PALAEOANTHROPOLOGICAL DESKTOP ASSESSMENT) IN TERMS OF SECTION 38 OF THE NATIONAL HERITAGE RESOURCES ACT NO 25/1999 FOR THE PROPOSED PHASE II MAOKENG HOUSING DEVELOPMENT(5390 ERVEN MOAKENG) (KROONSTAD), FREE STATE PROVINCE
165622	HIA Phase 1	Johnny van Schalkwyk	04/06/2014	Cultural heritage impact assessment for the UPGRADE OF A SECTION OF NATIONAL ROUTE 1, BETWEEN KROONSTAD AND VENTERSBURG, FREE STATE PROVINCE

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

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

Full guide to Palaeosensitivity Map legend

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

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APPENDIX 4 - Methodology

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

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

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

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

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

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

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

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

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

DETERMINATION OF THE PALAEOLOGICAL 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.

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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

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

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.

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