

# HERITAGE IMPACT ASSESSMENT

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

## **Proposed Development of the Vetlaagte infrastructure associated with the authorised PV Facilities near De Aar including:**

1. Switching station and 132kV power line with a 300m corridor on PV2
2. Switching station and 132kV power line with a 300m corridor on PV4
3. Switching station and 132kV power line with a 300m corridor on PV7
4. 400kV MTS with LILO lines connecting to existing 400kV lines

SAHRIS Ref:

**Prepared by CTS Heritage**

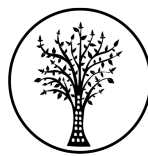


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**For**

**Landscape Dynamics Environmental Consultants**

**December 2021**



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## EXECUTIVE SUMMARY

1. Site Name:

Vetlaagte MTS

2. Location:

Remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province

3. Locality Plan:

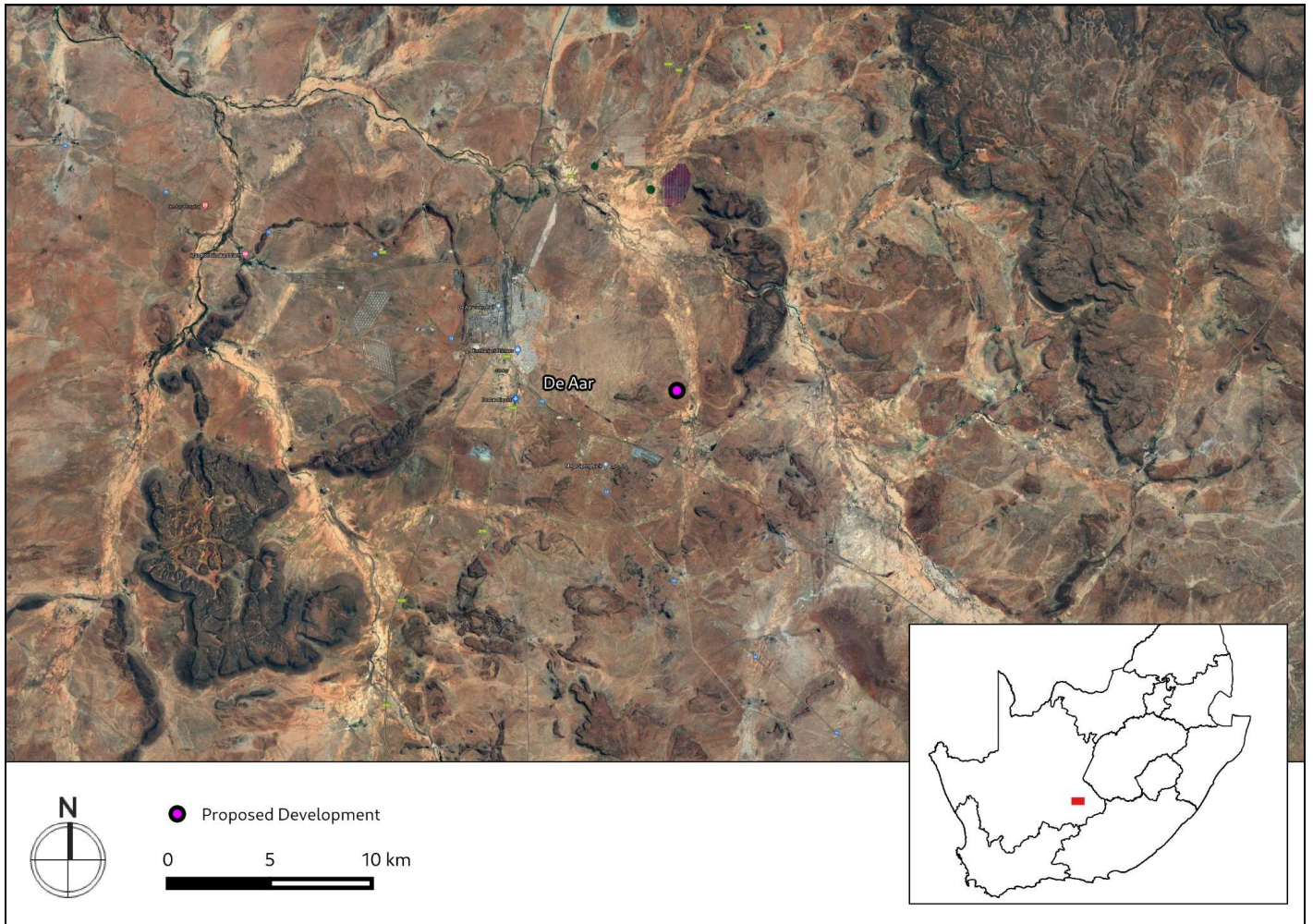


Figure 1: Location of the proposed study area

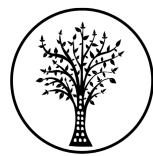
4. Description of Proposed Development:

- Vetlaagte Farm consists of 7x PV farms of which Environmental Authorisation was obtained in 2012/14
- It is proposed that 3 of these PV farms will each have a Switching Station as well as a grid connection connecting the PV farm to the new MTS
- The new MTS will connect via Loop In Loop Out (LILO) power lines to an existing 400kV power line

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The four projects assessed in this HIA are:

**Project 1:** Switching station and 132kV power line with a 300m corridor on PV2

**Project 2:** Switching station and 132kV power line with a 300m corridor on PV4

**Project 3:** Switching station and 132kV power line with a 300m corridor on PV7

**Project 4:** 400kV MTS with LILO lines connecting to existing 400kV lines

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

No new heritage resources of significance were identified within any of the proposed development areas.

6. Anticipated Impacts on Heritage Resources:

#### *Archaeology*

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

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

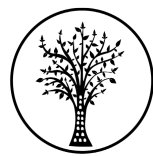
#### *Palaeontology*

Based on experience, other reports and the lack of any significant previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the Tierberg Formation or Adelaide Subgroup. Nonetheless, a Fossil Chance Find Protocol should be added to the EMP.

7. Recommendations:

There is no objection to the proposed development of Projects 1, 2, 3 or 4 as described above in terms of impacts to heritage resources on condition that:

- There is no preferred alternative from a heritage perspective
- Site Vetlaagte 03 (SAHRIS ID 34471) be properly recorded prior to construction.
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.



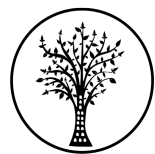
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### **Details of Specialist who prepared the HIA**

**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.

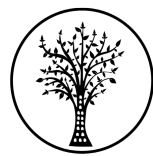
Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has 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 80 Heritage Impact Assessments throughout South Africa.



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## 1. INTRODUCTION

### 1.1 Background Information on Project

#### *Background*

- Vetlaagte Farm consists of 7x PV farms of which Environmental Authorisation was obtained in 2012/14
- It is proposed that 3 of these PV farms will each have a Switching Station as well as a grid connection connecting the PV farm to the new MTS
- The new MTS will connect via Loop In Loop Out (LILO) power lines to an existing 400kV power line

#### *Project components and areas for assessment*

- 3x grid connections WITH A 300M CORRIDOR
- 3x switching stations (note that the Switching Stations fall within the 300m corridor)
- Main Transmission Substation – note that there are two site alternatives within the assessment area. These alternative sites need to be assessed and other sites recommended should these sites not be suitable.
- LILO lines to connect the MTS to the existing 400kV lines
- The entire assessment area (as per info provided for quoting purposes) needs to be investigated and no go areas demarcated.

#### *General*

- The grid connections connecting PV2 and PV4 are running adjacent to each other and to the direct east of an existing 132kV line (the existing line is in red in the map below)
- The PV7 grid connection and switching station are situated within the assessment area.

The four projects assessed in this HIA are:

**Project 1:** Switching station and 132kV power line with a 300m corridor on PV2

**Project 2:** Switching station and 132kV power line with a 300m corridor on PV4

**Project 3:** Switching station and 132kV power line with a 300m corridor on PV7

**Project 4:** 400kV MTS with LILO lines connecting to existing 400kV lines

### 1.2 Description of Property and Affected Environment

The farm, Vetlaagte 4, lies 5.5 km east of the town of De Aar and about 2km north of the large Hydra substation. A number of renewable energy projects, particularly solar PV farms, have been proposed immediately surrounding this development and three completed solar farms lie north and northwest of Vetlaagte 4 such as De Aar Solar and Paarde Valley. A completed 144MW wind farm lies on the plateau north east of the development and can be seen from parts of Vetlaagte. The Vetlaagte project has a roughly 4km long stretch of proposed

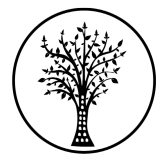




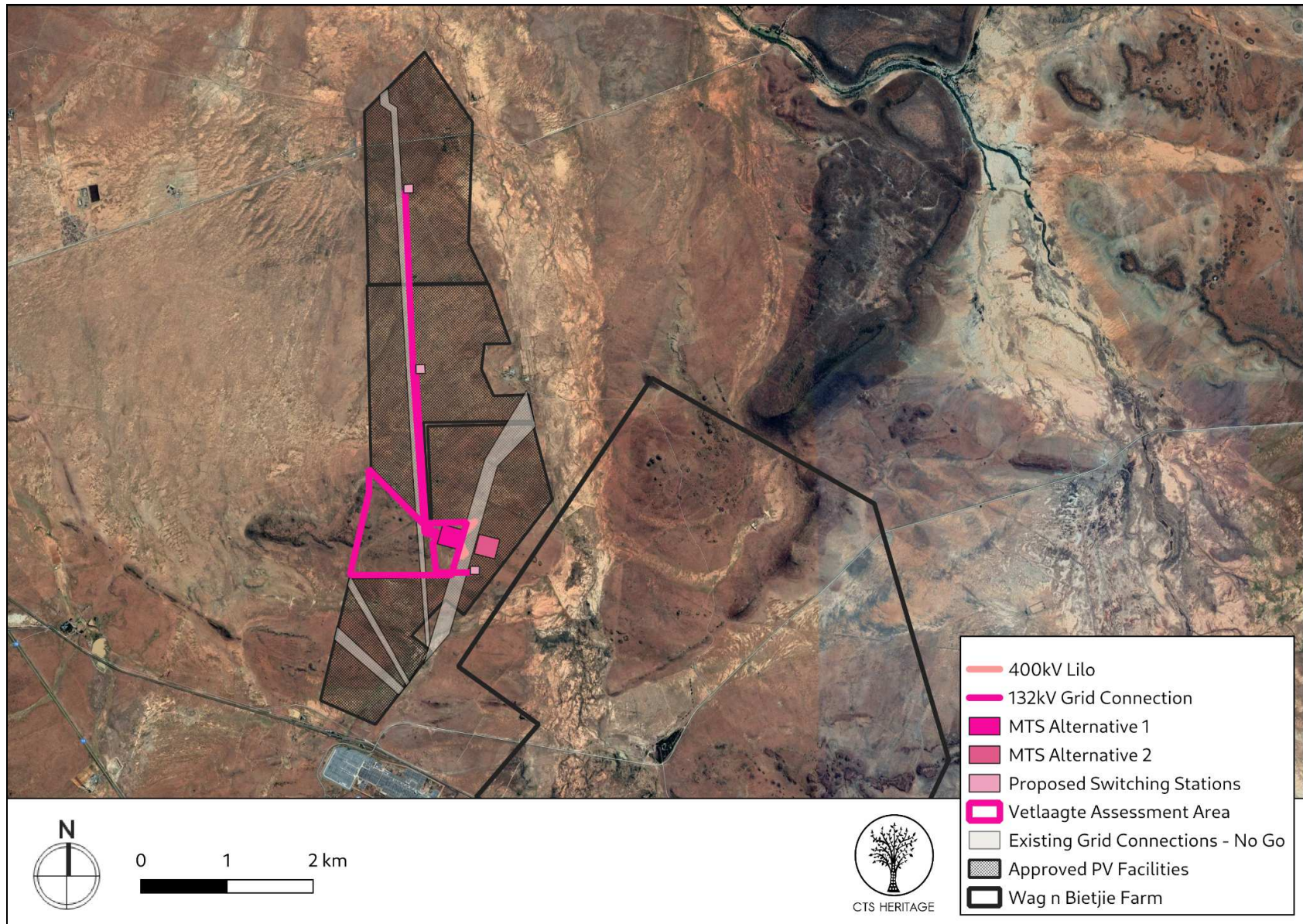
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powerlines running right next to an existing powerline as well as the various solar PV panels and infrastructure clustered on the southern end of the development area. The powerline route runs along flat grassland and much of the eastern half of Vetlaagte is similarly flat with only a few very small dolerite outcrops. The western half of Vetlaagte is rockier and hilly with two clusters of dolerite outcrops split either side of a jeep track.

The farms are currently used for grazing by sheep and a few farm windmills were observed. The vegetation is typical of the Karoo and the grassland was dense enough over much of the site to hamper visibility of archaeological material lying on the surface. Some small scale crop agricultural production is placed at the Vetlaagte farmhouse complex which lies on the banks of a floodplain running north - south past the eastern end of the study area. A few (currently dry) farm dams were evident that appear to be in a state of disuse within the floodplain.



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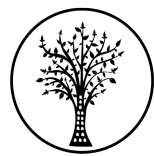
Map 1a: The proposed development area

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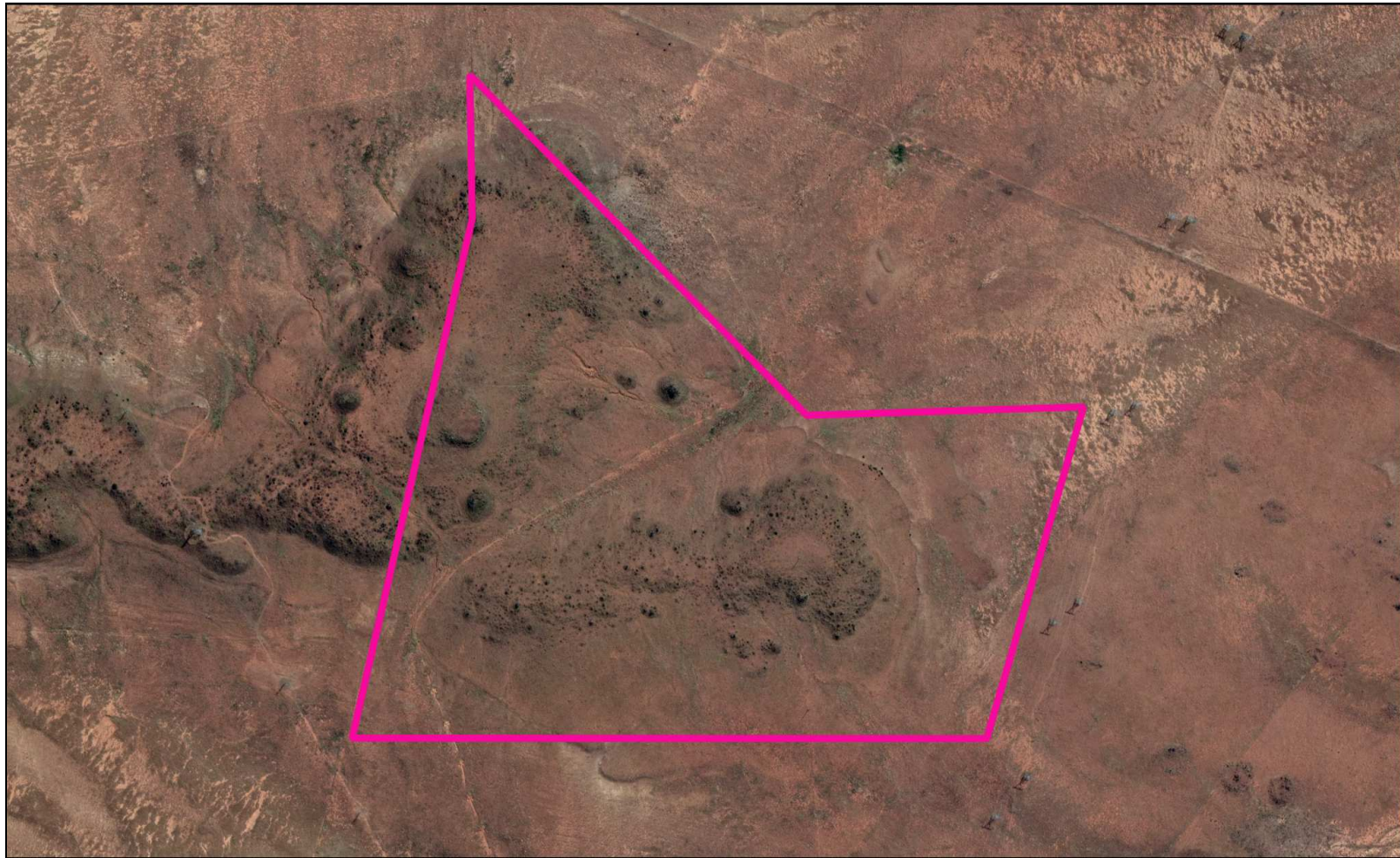
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 Vetlaagte Assessment Area

0 250 500 m



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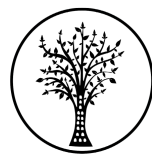
Map 1b: The proposed development area

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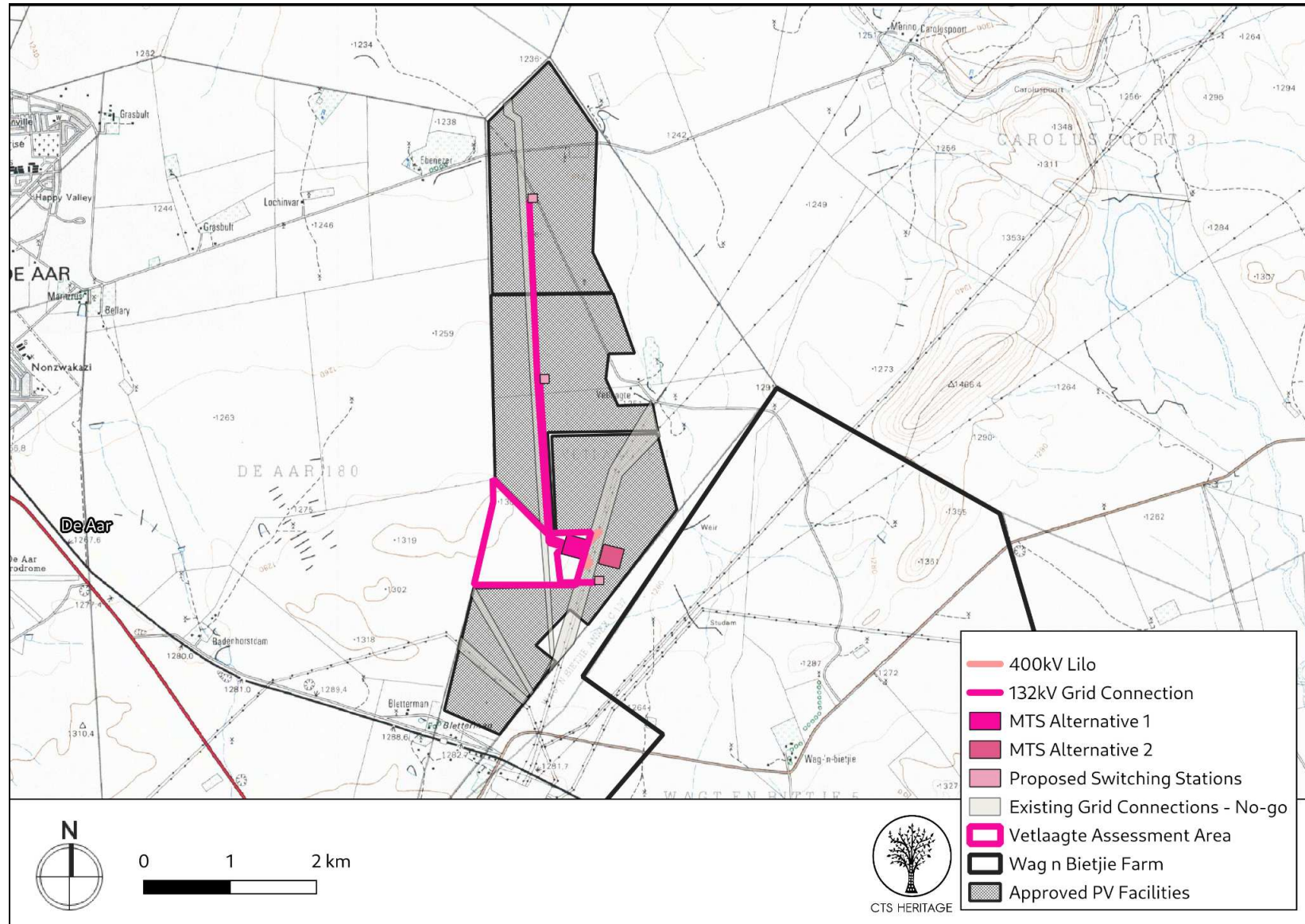
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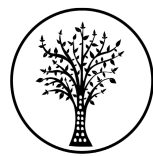


Map 1c: Study Area reflected on the 1:50 000 Topo Map

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## 2. METHODOLOGY

### 2.1 Purpose of HIA

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

### 2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used) (Appendix 1)
- An archaeologist conducted an assessment of the broader study area in order to determine the archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit on 9 November 2021 (Appendix 2)
- A Desktop Palaeontology Assessment was completed (December 2021)
- The identified resources were assessed to evaluate their heritage significance and potential impacts to these resources were interrogated
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

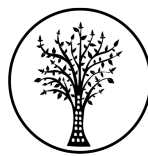
### 2.3 Assumptions and uncertainties

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

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

### 2.4 Constraints & Limitations

The grassland areas could be quite densely covered in places spread throughout the site which certainly contributed to obscuring the archaeological material on the surface. However, enough patches of exposed and open ground were encountered throughout the study area and scatters of artefacts were easily recorded in these spots along with Stone Age material associated with occupation areas nearer to the dolerite outcrops. There were



therefore no major limitations or constraints to the survey carried out and we are confident that the assessment provided an accurate report on the archaeological sensitivity of the area.

## 2.5 Impact Assessment Methodology

Impacts are evaluated and assessed in terms of the following criteria:

Extent of impact	Explanation of extent
Site	Impacts limited to construction site and direct surrounding area
Local	Impacts affecting environmental elements within the local area / district
Regional	Impacts affecting environmental elements within the province
National	Impacts affecting environmental elements on a national level

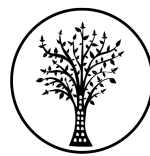
Duration of impact	Explanation of duration
Short term	0 - 5 years. The impact is reversible in less than 5 years.
Medium term	5 - 15 years. The impact is reversible in less than 15 years.
Long term	>15 years, but where the impacts will cease if the project is decommissioned
Permanent	The impact will continue indefinitely and is irreversible.

Probability of impact	Explanation of Probability
Unlikely	The chance of the impact occurring is extremely low
Possible	The impact may occur
Probable	The impact will very likely occur
Definite	Impact will certainly occur

Reversibility of impact	Explanation of Reversibility Ratings
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environment will be able to recover from the impact

Significance of impact	Explanation of Significance
None	There is no impact at all
Low	Impact is negligible or is of a low order and is likely to have little real effect
Moderate	Impact is real but not substantial
High	Impact is substantial
Very high	Impact is very high and can therefore influence the viability of the project





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### **3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT**

#### **3.1 Desktop Assessment**

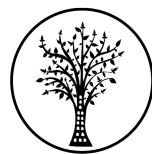
This application is for the proposed development of supplementary infrastructure associated with the Vetlaagte Solar Energy Facility located West of De Aar in the Northern cape. De Aar was originally established on the Farm "De Aar." The name means "the artery," a reference to its underground water supply.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

The area proposed for development has been previously approved for the establishment of the Vetlaagte Solar Energy Facility in 2012 (SAHRIS Case ID 192). As such, the development area has been subject to a previous heritage impact assessment process (Kruger, 2012 SAHRIS ID 49745) and a palaeontology assessment (Almond, 2012 SAHRIS ID 49843). Both of these reports are referred to extensively below.

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

#### **Archaeology**

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

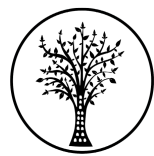


Kruger (2012) also documented historical period remains, “specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden and labourers quarters, as well as a dilapidated dam wall constructed in the drainage line east of the farmstead are present on the property. The date of construction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

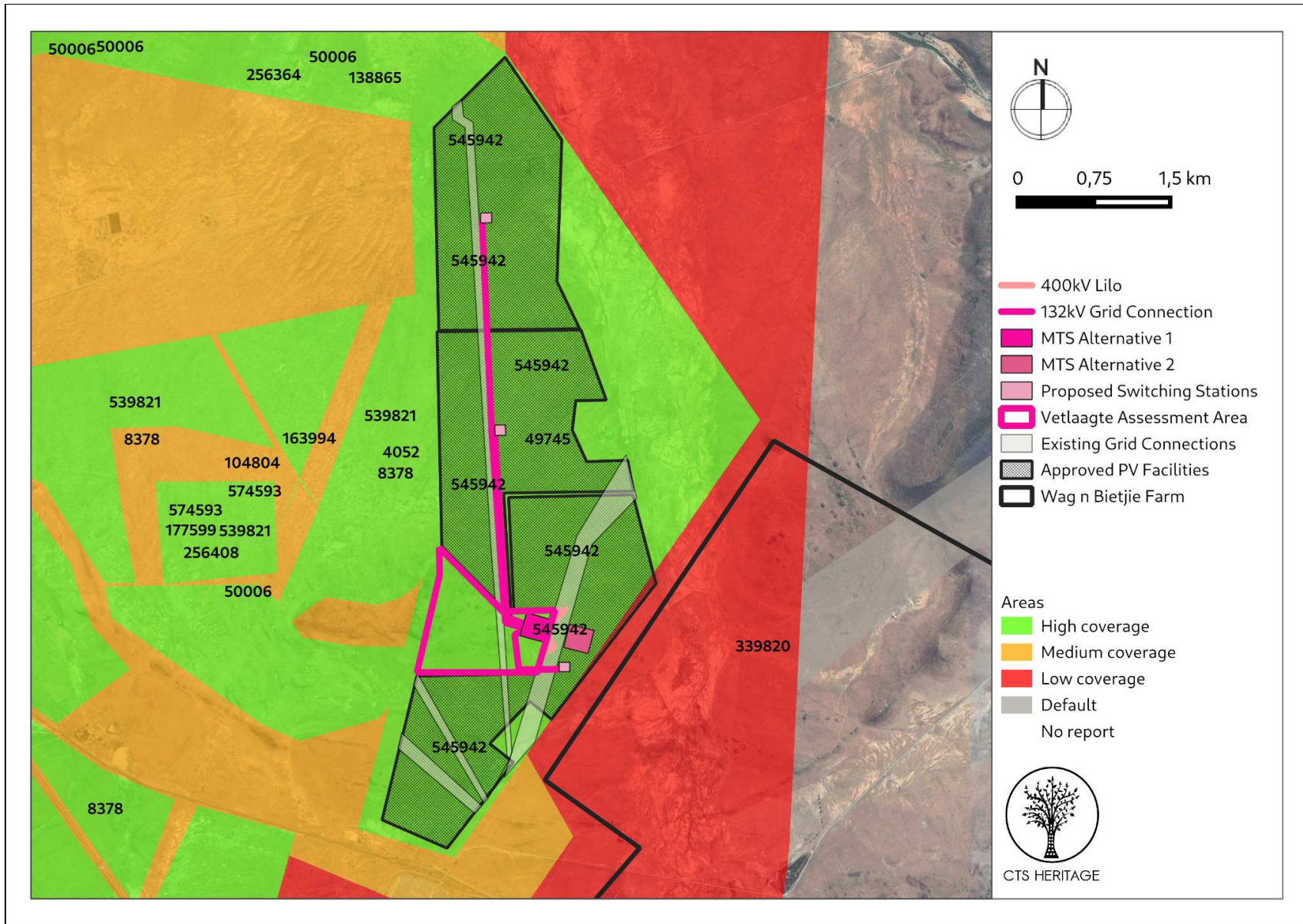
All of the heritage resources identified by Kruger (2012) have been mapped relative to the proposed development in Figure 3. No impact to any known heritage resources are anticipated. None of the infrastructure proposed as part of this development application are located near the archaeologically sensitive drainage located along the eastern periphery of the property. The sites listed in the table below are located within the development footprint however direct impact is only anticipated to Site Vetlaagte 03 (SAHRIS ID 34471) as it is located within the proposed 132kV alignment. As per Kruger (2012), it is recommended that the site be properly recorded prior to construction.

**Table 1: Heritage resources identified through previous assessments**

NID	Site No.	Site Name	Description	Grading	Latitude	Longitude	Mitigation
34479	VLG007	VETLAAGTE 7	Burial Grounds & Graves - A small family graveyard, associated with the farmstead at Vetlaagte. It contains a single grave of a former farm owner who passed away in 1933.	Grade IIIa	-30,669722	24,103228	No impact anticipated
34470	VLG002	Vetlaagte 2	Artefacts - High density MSA artefact and debris scatters in drainage line at Vetlaagte.	Grade IIIb	-30,65015	24,100117	No impact anticipated
34471	VLG003	VETLAAGTE 3	Artefacts - MSA, single blades and scrapers occur along with flakes and debris. The site integrity has been compromised by the mixing of artefacts caused by riverbank erosion	Grade IIIc	-30,677206	24,090869	Located within the proposed 132kV grid connection. Documentation of sites.
34474	VLG004	VETLAAGTE 4	Artefacts - High density MSA Lithics exposed as a result of calcrete erosion.	Grade IIIb	-30,699747	24,091936	No impact anticipated
34475	VLG005	VETLAAGTE 5	Building - Historical period remains, specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden and labourers quarters. The date of construction of the farm house is denoted by a year count (“1930”) on the front gable of the structure.	Grade IIIb	-30,671839	24,102522	No impact anticipated



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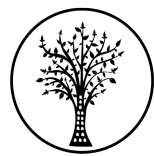
Map 2a: Spatialisation of heritage assessments conducted in proximity to the broader study area

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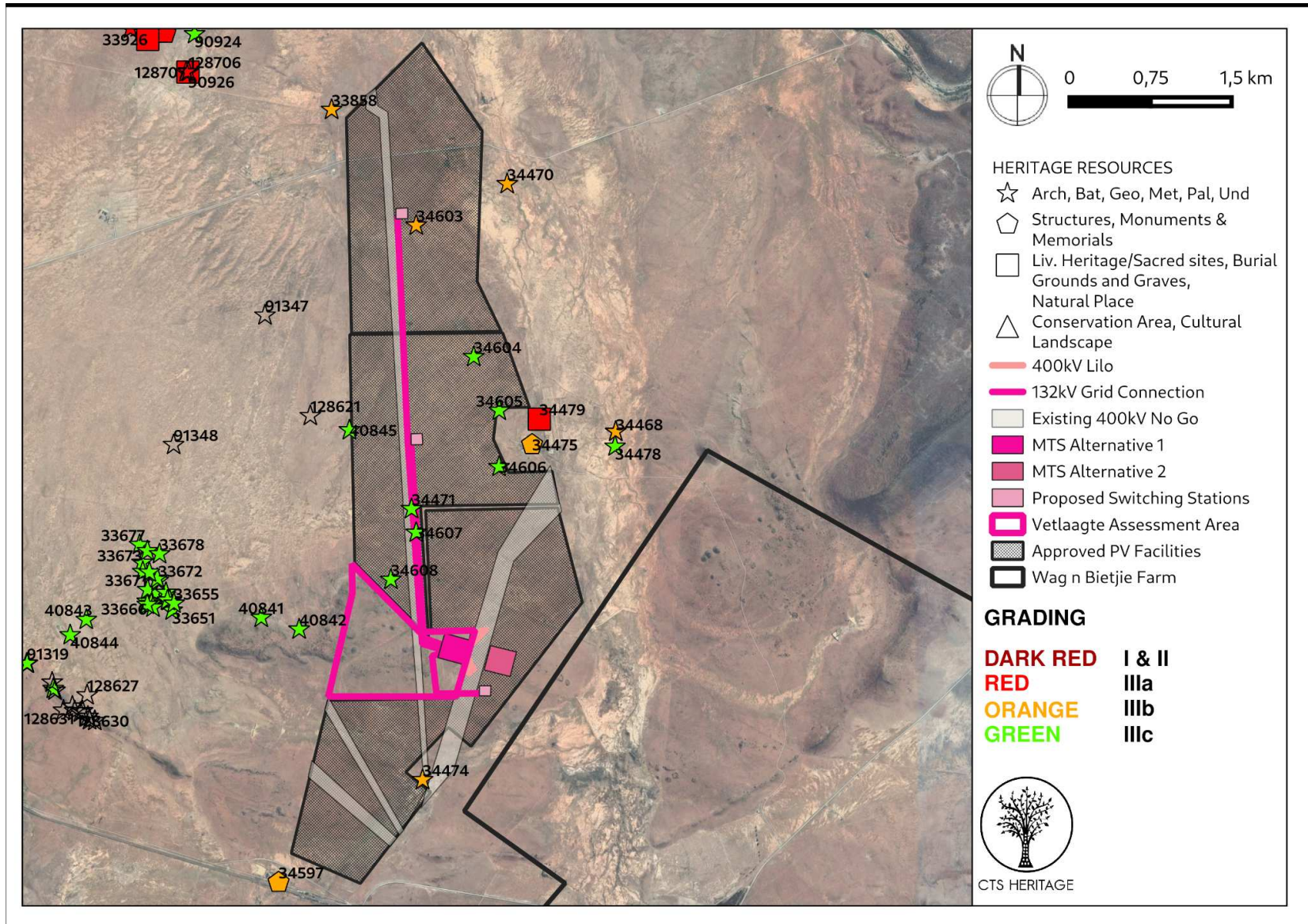
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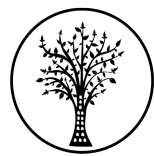
Map 2b: Spatialisation of heritage resources known in proximity to the broader study area

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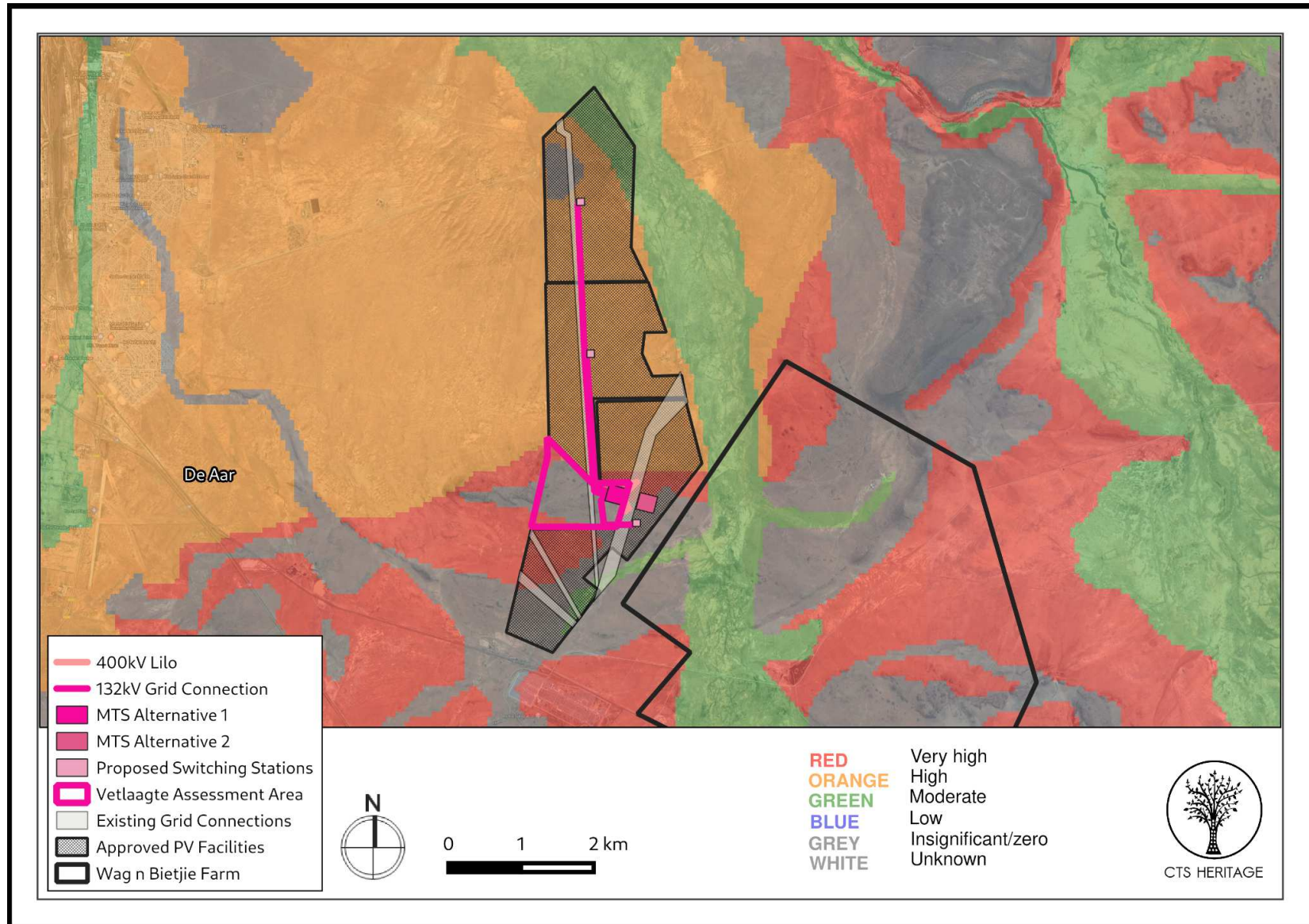
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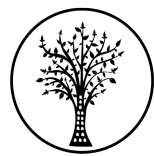
Map 3a: Palaeontological sensitivity of the area surrounding the broader study area

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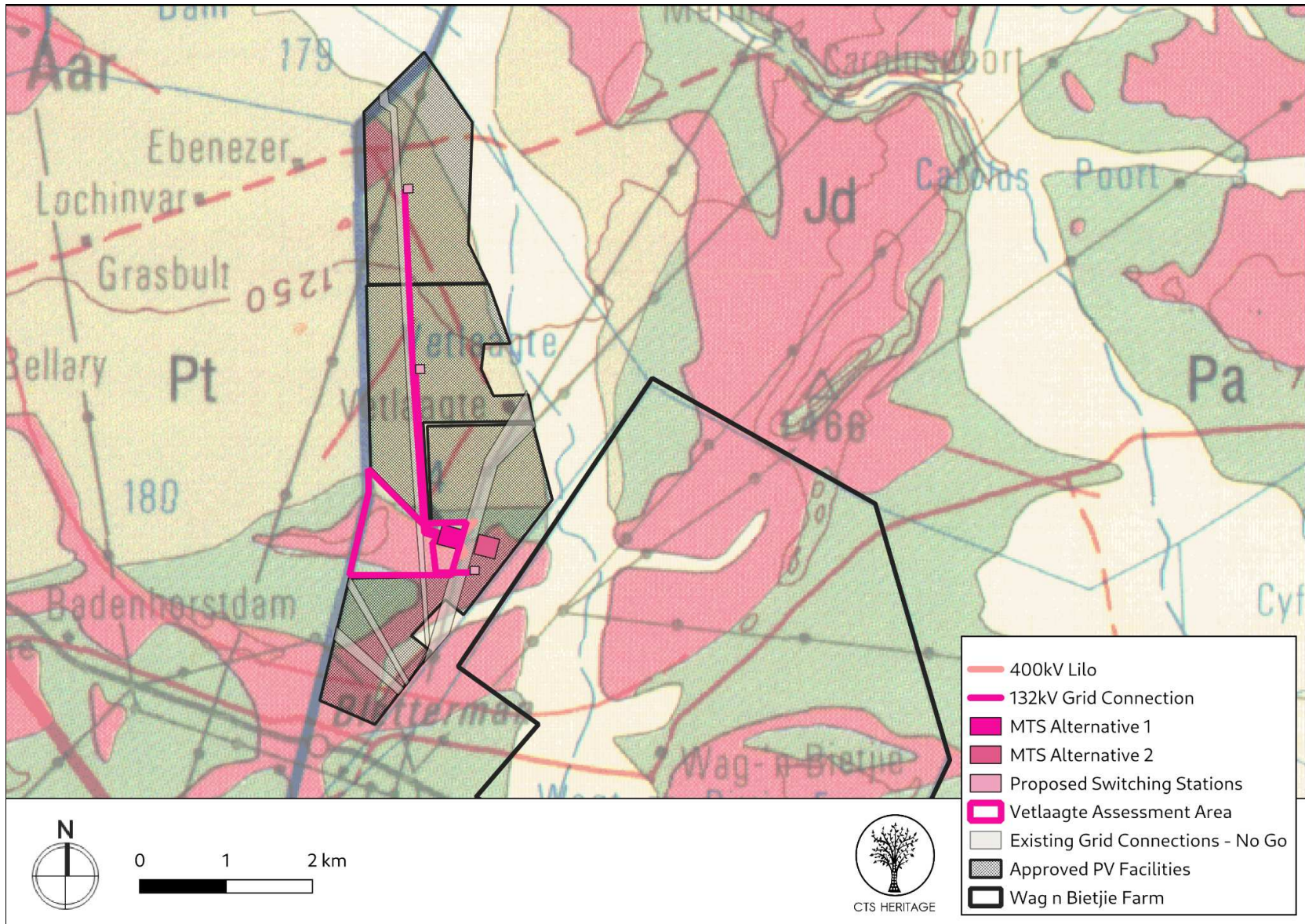
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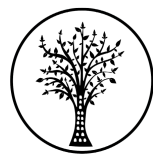


**Map 3b: Geology Map.** Extracted from the Council for GeoSciences Map 3024 for Colesburg indicating that the development area is underlain by Jd: Jurassic Dolerite, Pt (lighter green): Tierberg Formation of the Ecca Group and Pa (darker green): Adelaide Subgroup of the Beaufort Group

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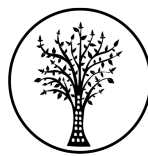
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### 3.2 Palaeontology

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

As part of the process completed in 2012, Almond completed a field-based palaeontological assessment of the area proposed for development in this application. Almond (2012) found that “The potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Eccca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Eccca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian Glossopteris Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area. Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age. The diverse superficial deposits within the three study areas (e.g. soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole . Abundant fragments of reworked fossil wood material of Eccca provenance occur widely within subsurface and surface gravels overlying the Eccca Group outcrop area.” The observations made by Almond (2012) are mapped relative to the proposed development in Figure 3. These observations and other known palaeontological resources located within the area proposed for development are recorded in the table below.

Almond (2012) concludes that “The construction of new access roads and transmission lines in this region are likewise considered to be of low significance as far as fossil heritage is concerned... In view of the overall low significance of the proposed development on palaeontological heritage resources, it is concluded that no further palaeontological heritage studies or specialist mitigation are required for these small PV projects, pending the exposure of any substantial fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood) during the construction phase.”

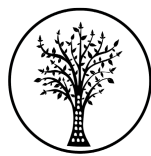


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**Table 2: Palaeontology resources identified through previous assessments**

SAHRIS NID	Site No.	Site Name	Description	Grading	Latitude	Longitude	Mitigation
33858	DPLE8	DU PLESSIS 8	Palaeontological - Larger fragments of silicified wood in surface gravels, bioturbated Ecca sediments, ferruginous concretions.	Grade IIIb	-30,643972	24,083139	None required
34603	VLG008	Vetlaagte 008	Palaeontological - Small fragments of petrified wood in surface gravels	Grade IIIb	-30,6536	24,091317	None required
34604	VLG009	Vetlaagte 009	Palaeontological - Small fragments of petrified wood in surface gravels	Grade IIIc	-30,66455	24,096883	None required
34605	VLG010	Vetlaagte 010	Palaeontological - Small fragments of petrified wood in surface gravels. Calcrete hard pan beneath surface soils.	Grade IIIc	-30,669017	24,09935	None required
34606	VLG011	Vetlaagte 011	Palaeontological - Large ferruginous carbonate nodules within Ecca sandstones, plus fossil wood fragments	Grade IIIc	-30,6737	24,099333	None required
34607	VLG012	Vetlaagte 012	Palaeontological - Thin tempestite sandstones of Waterford Formation with moderately diverse trace fossil assemblages	Grade IIIc	-30,679167	24,091317	None required
34608	VLG013	Vetlaagte 013	Palaeontological - Baked Beaufort Group mudrocks with transported fossil plant remains	Grade IIIc	-30,683083	24,088867	None required
40845	DAR2011 /034	BADENHORS T DAM FARM 2011/034	Palaeontological - Surface gravels, including fragmentary ferruginous carbonate concretions	Grade IIIc	-30,670639	24,084861	None required





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## **4. IDENTIFICATION OF HERITAGE RESOURCES**

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

#### *Archaeology*

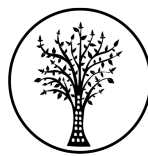
Over 20 archaeological observations were made on Vetlaagte. Hornfels dominated the assemblages with smaller components of CCS and siltstones. While the vast majority of the scatters were made during the Middle Stone Age, there was also a relatively clear Later Stone Age presence in the study area. Many examples of blade forms were found which is typical of the Still Bay period (>70 000 years BP) and the neighbouring Wag 'n Bietjie farm was also surveyed whilst conducting an HIA for a similar solar PV facility there. Relatively dense Later Stone Age sites were found on the far eastern end of Wag 'n Bietjie and these date within the last 2000 years due to the presence of pottery in these sites. The areas around the dolerite outcrops on Vetlaagte were not nearly as densely occupied and this is probably due to the distance from the Brakrivier which runs around Caroluspoort (4km northeast of Wag 'n Bietjie).

None of the sites found at Vetlaagte warranted further study as they are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. Kruger's previous survey on ground overlapping with this study area found similar material but we feel the gradings attributed to these (IIC) are better downgraded to NCW now that we have greater coverage contextualising these finds and that they are widespread. Much of the archaeological material will be well conserved within a series of areas that can't be developed for the solar PV arrays while the flat, grassy vlaktes that are ideal for the solar PV are also the areas with the lowest archaeological sensitivity.

#### *Palaeontology*

According to the SAHRIS Palaeosensitivity Maps (Figures 4, 5), the area proposed for development is underlain by sediments of moderate, high and very high paleontological sensitivity. According to the Desktop PIA completed by Bamford (2021), "Moderately sensitive sediments are the Quaternary sands, high sensitivity sediments are the Tierberg Formation shales and the very highly sensitive rocks are the Adelaide Subgroup mudstones and sandstones. The dolerite has no fossils. The formations will be considered chronologically from oldest to youngest.

The Tierberg Formation does not have a significant vertebrate fauna but may preserve fossil leaves of the *Glossopteris* flora and fragments of silicified wood (Plumstead, 1969; Johnson et al., 2006). According to the site visit reported by Almond (2012) for the Tierberg Formation on Farm Vetlaagte, there were some fragments of plant fossils and wood that he considered of minimal importance and the PV facility was approved by SAHRA. Therefore, the same can be said for the proposed 132 kV grid connection on Vetlaagte that runs N-S through the approved PV area.



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The Adelaide Subgroup is very highly sensitive as it has a variety of vertebrate fossils in some areas. According to the recent Biostratigraphy for South Africa (Smith et al., 2020), De Aar is in the Eodicynodon and the Tapinocephalus Assemblage Zones, i.e. in the lower part of the Adelaide Subgroup, of the Abrahamskraal Formation. Index fossils would have to be found to support this.

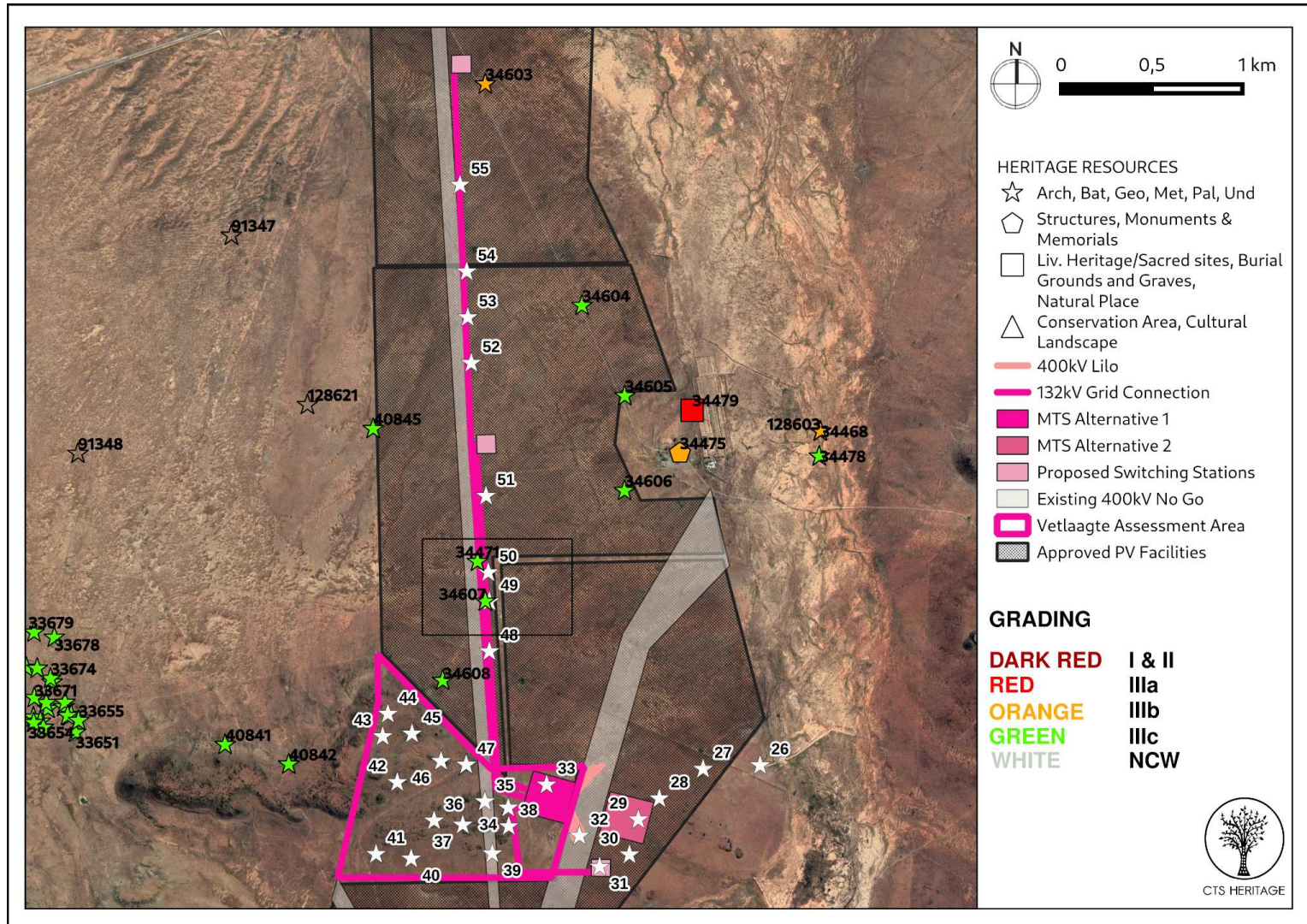
Jurassic dolerite does not preserve fossils so the new assessment area for Vetlaagte that lies on dolerite does not need any palaeontological impact assessment. Quaternary alluvium, especially when associated with valleys and river or stream channels, would only have transported robust and fragmentary fossils. These are of minimal palaeontological significance as they are out of primary context, and the fragments are difficult to identify.

Almond (2012) did not consider the impact on fossils by the proposed developments to be high, and the literature does not contradict him. In addition, fossils are more easily seen where there is rocky outcrop and not on flat land. Nonetheless, a Fossil Chance find Protocol should be followed (Appendix 4).

#### **4.2 Heritage Resources identified**

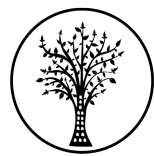
*No new heritage resources of significance were identified within any of the proposed development areas.*

### 4.3 Mapping and spatialisation of heritage resources

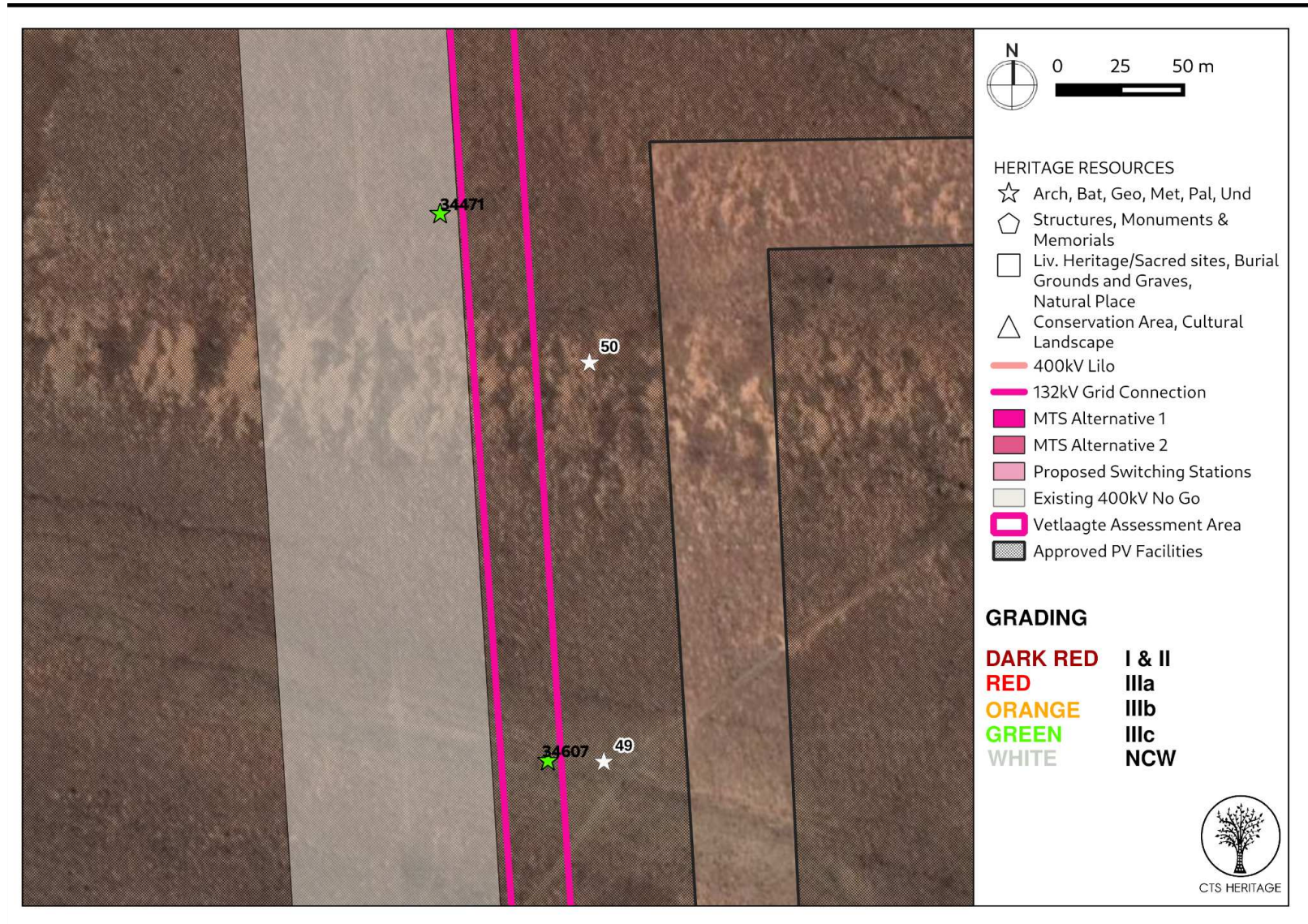


Map 4: Map of heritage resources identified during the field assessment, relative to the proposed development (see Table 1 and 2). The sites marked as WHITE are not considered to be conservation-worthy





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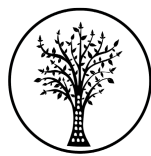
Map 4a: Map of heritage resources identified during the field assessment, relative to the proposed development (see Table 1 and 2). The sites marked as WHITE are not considered to be conservation-worthy. Site Vetlaagte 003 (SAHRIS Site 34471) is located in close proximity to the proposed 132kV alignment anticipated for Project 1.

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## **5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT**

### **5.1 Assessment of impact to Heritage Resources**

No impacts to heritage resources are anticipated for the Design and Pre-Construction Phase, and the Post-Construction and Operational Phase. The only anticipated impacts are likely during the construction phase.

#### ***Archaeology***

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Kruger, 2012). All of the archaeological resources identified within the areas proposed for the development in this field assessment have been determined to be not conservation-worthy. As such, these resources have been sufficiently recorded and there is no objection to the proposed development in these locations from an archaeological perspective.

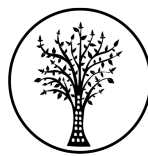
None of the infrastructure proposed as part of this development application are located near the archaeologically sensitive drainage located along the eastern periphery of the property. The sites listed in table 1 above are located within the development footprint however direct impact is only anticipated to Site Vetlaagte 03 (SAHRIS ID 34471) as it is located within the proposed 400kV alignment for Project 1 (PV2). As per Kruger (2012), it is recommended that the site be properly recorded prior to construction.

Other than LSA and MSA artefacts that have been determined to be not conservation-worthy, the archaeological field assessment completed in November 2021 identified no structures or other kinds of heritage resources located within the areas proposed for development.

#### ***Palaeontology***

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and some do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils. Almond (2010) found no fossils of significance during his site visit to Vetlaagte, and the Wag 'n Bietjie farm has the same lithology. It is unknown what lies below the surface.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct type and age to contain fossils. A Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is low.



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**Table 3: Heritage resources identified in the study area**

Structure and location	Palaeosensitivity	Action required
Vetlaagte Assessment area – all	Jurassic dolerite No sensitivity	No action
Vetlaagte 132 kV grid connection	Tierberg Fm High	Chance Fossil Finds Procedure – plants and wood
Vetlaagte LILO, MTS Alt 1	Adelaide sG Very high	Chance Fossil Finds Procedure – bones
Vetlaagte MTS Alt 2 (east)	Jurassic dolerite	No action

**Project 1: Grid connection and Switching Station – PV2**

***Portion B of the Remaining extent of the farm Vetlaagte No. 4***

No impacts to heritage resources anticipated on condition that the Chance Fossil Finds Procedure is implemented. This proposed alignment lies closest to Site Vetlaagte 003 (SAHRIS ID 34471) which, as per the recommendations of Kruger (2012) must be properly recorded prior to construction.

**Project 2: Grid connection and Switching Station – PV4**

***Portion D of the Remaining extent of the farm Vetlaagte No. 4***

No impacts to heritage resources anticipated on condition that the Chance Fossil Finds Procedure is implemented

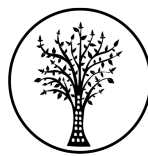
**Project 3: Grid connection and Switching Station – PV7**

***Portion G of the Remaining extent of the farm Vetlaagte No. 4***

No impacts to heritage resources anticipated on condition that the Chance Fossil Finds Procedure is implemented

**Project 4: 400kV MTS and LILO lines**

No impacts to heritage resources anticipated on condition that the Chance Fossil Finds Procedure is implemented



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**Table 4.1: Impacts of the proposed development to archaeological resources for Project 1**

Impact Description: It is possible that significant archaeological resources may be impacted by the proposed development

Cumulative Impact Description: Destruction or negative impact to significant archaeological heritage

Mitigation:

- Site Vetlaagte 003 (SAHRIS ID 34471), as per the recommendations of Kruger (2012), must be properly recorded prior to construction.
- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
1 archaeological site (Vetlaagte 003) of low scientific significance was identified within the area proposed for development and may be impacted	Limited to the development footprint	Where manifest, the impact will be permanent	It is possible that significant archaeological resources will be impacted	Any impacts to heritage resources that do occur are irreversible	Moderate	Low

Impact on Irreplaceable Resources (after mitigation) - No

Cumulative impact rating (after mitigation) - Low

**Table 4.2: Impacts of the proposed development to archaeological resources for Projects 2, 3 and 4**

Impact Description: It is possible that significant archaeological resources may be impacted by the proposed development

Cumulative Impact Description: Destruction or negative impact to significant archaeological heritage

Mitigation:

- Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
32 archaeological sites of low scientific significance were identified within the areas proposed for development	Limited to the development footprint	Where manifest, the impact will be permanent	It is possible that significant archaeological resources will be impacted	Any impacts to heritage resources that do occur are irreversible	Moderate	Low

Impact on Irreplaceable Resources (after mitigation) - No

Cumulative impact rating (after mitigation) - Low





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**Table 4.3: Impacts of the proposed development to palaeontological resources for Projects 1, 2, 3 and 4**

Impact Description: It is possible that significant palaeontological resources may be impacted by the proposed development

Cumulative Impact Description: Destruction or negative impact to significant palaeontological heritage

Mitigation:

- The attached Chance Fossil Finds procedure must be implemented during the course of construction activities

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have high and very high palaeontological sensitivity.	Limited to the development footprint	Where manifest, the impact will be permanent	It is possible that significant fossil resources will be impacted	Any impacts to heritage resources that do occur are irreversible	Moderate	Low

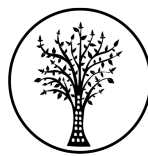
Impact on Irreplaceable Resources (after mitigation) - No

Cumulative impact rating (after mitigation) - Low

## 5.2 Sustainable Social and Economic Benefit

This proposed development is intended to support the approved Vetlaagte PV Facilities and as such, the findings of the SIA conducted for the Pv Facilities in 2012 is relevant here. The SIA (2012) indicates that the development of the proposed Vetlaagte PVSEF will create employment and business opportunities for locals during both the construction and operational phase of the project. Due the relatively large size of the project (480MW) the benefits during both the construction and operational phase are rated as high positive. The enhancement measures listed in the report should be implemented in order to enhance these benefits. In addition, the proposed establishment of a number of other solar energy facilities near De Aar will create significant socio-economic opportunities for the town, which, in turn, will result in a positive social benefit. These benefits will assist to offset the negative impacts on the town of De Aar associated with the decline in rail traffic in South Africa over the last 10-15 years and the town's role as a major rail hub.

The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. Given the size of the proposed facility (480MW) this will represent a significant social benefit for an area where there are limited opportunities. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Vetlaagte PVSEF is therefore supported by the findings of the SIA.



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As such, the identified socio-economic benefits to be derived from this project outweigh the anticipated negative impacts to heritage resources identified in this report.

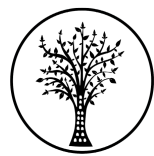
### **5.3 Proposed development alternatives**

According to the developer, Alternative 2 is not the preferred alternative. The space available for PV modules is already constrained to approximately 75 MW without the MTS located in the alternative position. Limiting the available space even more will make this project less competitive. Also, the alternative is on the “wrong side” of the existing lines, making it more technically complicated for the majority of the lines for the Ennex PV projects to “cross over” and connect. There are no alternative power line route corridors except that the final position of the MTS will determine the final section of each route.

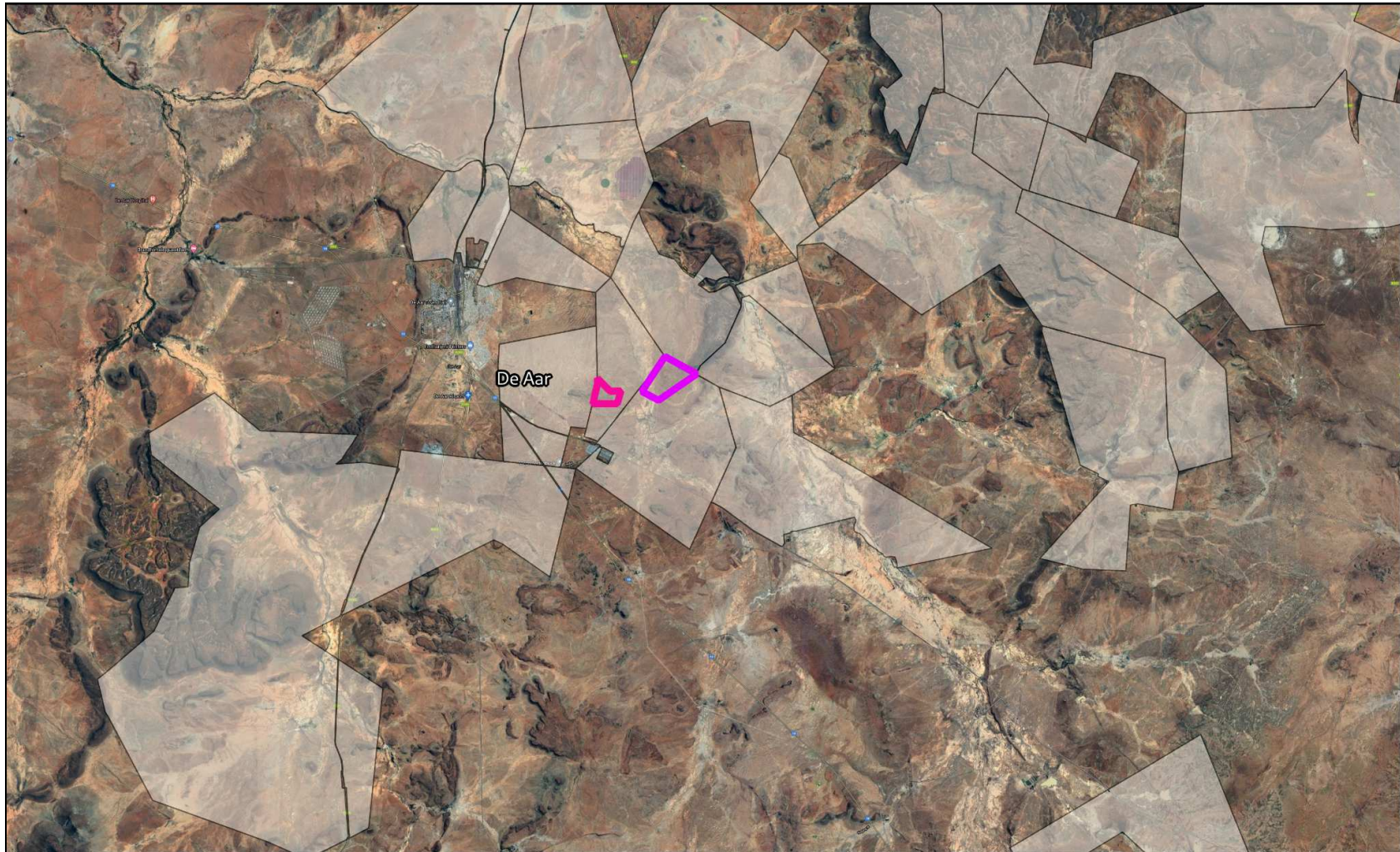
### **5.4 Cumulative Impacts**



The proposed renewable energy facilities are located within a belt of approved renewable energy facilities (Map 5) located outside of De Aar. Furthermore, there are already 7 approved PV facilities for which this proposed development is made in support of.

In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact due to its location as one of many renewable energy facilities in this area.



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-  WagnBietjie Assessment Area
-  Vetlaagte Assessment Area
-  Renewable Energy EA



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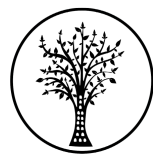
Map 5: Map indicating the location of authorised renewable energy facilities in proximity to the proposed development

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

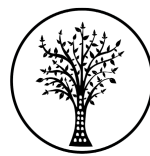
As indicated above, the results of this assessment align with the findings of other specialists such as Morris (2011) who notes that ephemeral MSA and LSA scatters are the dominant archaeological signature of the area and are therefore not archaeologically significant.

Based on experience, other reports and the lack of any significant previously recorded fossils from the area, it is unlikely that any fossils would be preserved in the Tierberg Formation or Adelaide Subgroup. Nonetheless, a Fossil Chance Find Protocol should be added to the EMP.

## 8. RECOMMENDATIONS

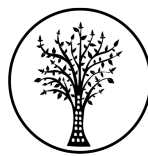
There is no objection to the proposed development of Projects 1, 2, 3 or 4 as described above in terms of impacts to heritage resources on condition that:

- There is no preferred alternative from a heritage perspective
- Site Vetlaagte 03 (SAHRIS ID 34471) be properly recorded prior to construction.
- The attached Chance Fossil Finds Procedure is implemented for the duration of construction activities
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.



**9. REFERENCES**

Heritage Impact Assessments				
NID	Author(s)	Date	Type	Title
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
133138	HIA Phase 1	Jayson Orton, Lita Webley	09/07/2013	HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
163982	Palaeontological Specialist Reports		31/08/2013	Palaeontological specialist assessment: combined desktop and field study: Proposed development PV Solar Facility near De Aar, Northern Cape Province
163994		Wouter Fourie	03/08/2013	Proposed PV Facility: Heritage Impact Report
177599	AIA Phase 1	Jonathan Kaplan	01/04/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
177600	Site Inspection Report	Will Archer, Jonathan Kaplan	01/05/2012	Reconnaissance and plan for further mitigation: sites impacted on by proposed photovoltaic power generation facility in De Aar Northern Cape
256408	Palaeontological Specialist Reports	John E Almond	16/07/2013	Palaeontological Specialist Study: Combined Desktop and Field-based Assessments - Proposed Photovoltaic (Solar) Energy Facilities on Badenhorst Dam Farm near De Aar, Northern Cape
256413	Heritage	Jayson Orton	09/07/2013	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities



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	Impact Assessment Specialist Reports			on De Aar 180/1 (Badenhorst Dam Farm), De Aar, Northern Cape
339820	Heritage Impact Assessment Specialist Reports	Lita Webley, Jayson Orton	01/12/2011	Proposed De Aar Wind Energy Facility on the North and South Plateau, Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources
49745	AIA Phase 1	Neels Kruger	01/03/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE OF THE FARM VETLAAGTE 4, DE AAR, NORTHERN CAPE PROVINCE
49843	PIA Phase 1	John E Almond	01/05/2012	PALAEONTOLOGICAL SPECIALIST STUDY: COMBINED DESKTOP AND FIELD-BASED ASSESSMENTS Proposed solar power generation facilities on the remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province
50006	HIA Phase 1	Jayson Orton	20/02/2012	HERITAGE IMPACT ASSESSMENT FOR THREE SOLAR ENERGY FACILITIES AT DE AAR, WESTERN CAPE
53198	HIA Phase 1	Elize Becker	20/04/2012	Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project Heritage Impact Assessment Phase 2
53200	Heritage Scoping	Elize Becker	18/01/2012	HERITAGE IMPACT ASSESSMENT SCOPING REPORT Prepared for De Aar Solar One Photovoltaic Power Plant, Northern Cape
58989	PIA Desktop	James Brink	10/08/2012	A Palaeontological Desktop Study of the Area to be Affected by the Proposed Photovoltaic Power Project on Portion 3 of Farm Hartebeestplaats 135
8378	HIA Phase 1	Jayson Orton	29/02/2012	HIA for three solar energy facilities at the De Aar, Northern Cape (Paarde Valley, Badenhorst Dam Farm and Annex Du Plessis Dam Farm)
89361	HIA Phase 1	Neels Kruger	01/03/2012	ENNEX DEVELOPMENTS: PROPOSED ESTABLISHMENT OF A SOLAR ENERGY FACILITY NEAR DE AAR, NORTHERN CAPE PROVINCE Phase 1 Archaeological Impact Assessment Report





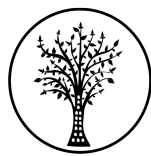
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## APPENDICES

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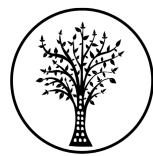
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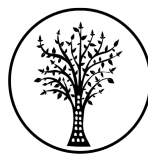
## APPENDIX 1: Heritage Screening Assessment (2021)



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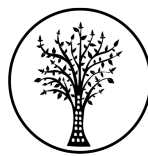
## APPENDIX 2: Archaeological Assessment (2021)





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### APPENDIX 3: Palaeontological Assessment (2016)



CTS HERITAGE

## APPENDIX 4: Chance Fossil Finds Procedure