HERITAGE IMPACT ASSESSMENT

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

Limestone PV1 Solar Energy Facility, Northern Cape Province

Prepared by CTS Heritage

CTS HERITAGE

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For

Savannah Environmental

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EXECUTIVE SUMMARY

1. Site Name:

Limestone PV1 Solar Energy Facility

2. Location:

Portion 4 of the Farm Engeland 300

3. Locality Plan:

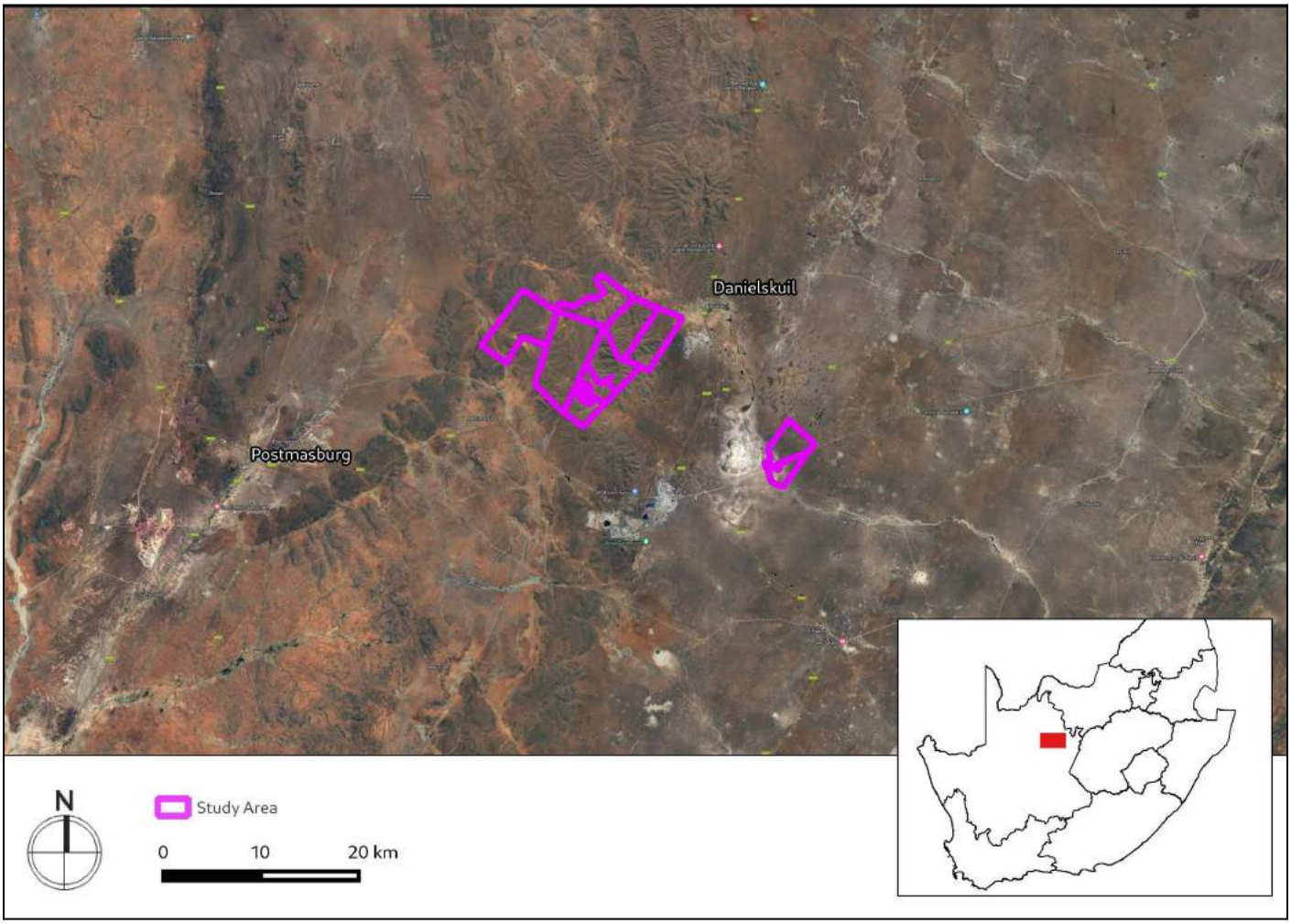

Figure 1: Location of the proposed development area

4. Description of Proposed Development:

AGV Projects (Pty) Ltd is proposing the development of a commercial Photovoltaic(PV) Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site comprises the following farm portion:

- Portion 4 of the Farm Engeland 300

The Limestone PV1 will have a contracted capacity of between up to 150MW Maximum Export Capacity. A broader study area (Project Site) of ~1842 ha and a preferred project site with an extent of up to 250ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the Limestone PV1 facility.

5. Anticipated Impacts on Heritage Resources:

As noted by the VIA completed for this project, ""The greater landscape of the study area is characterised by wide-open spaces and very limited development. It should however be noted that there are a few authorised (and current)/proposed renewable energy applications within the study area and the greater region, that may change the landscape to some degree in the future."

As was anticipated, the archaeological field assessment revealed a great many heritage resources evident within the development area. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. No further mitigation for impacts to these heritage observations is recommended. A number of heritage resources of significance were identified in the broader area. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and asbestos mining infrastructure. The relationship between the mining infrastructure, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area. It is important that the spatial relationship of these resources is not disrupted by the proposed development.

Due to the weathered and relatively scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

6. Recommendations:

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that:

- The recommendations of the VIA must be implemented
- A 300m no development buffer for PV infrastructure must be implemented around Site 117. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site Office infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

Details of Specialist who prepared the HIA

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

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

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

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CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

AGV Projects (Pty) Ltd is proposing the development of a commercial Photovoltaic(PV) Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site comprises the following farm portion:

- Portion 4 of the Farm Engeland 300

The Limestone PV1 will have a contracted capacity of up to 150MW Maximum Export Capacity. A broader study area (Project Site) of ~1842ha and a preferred project site with an extent of up to 250ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the Limestone PV1 facility. Environmental Site Establishment processes were undertaken before the initiation of the EIA. The aim of the Environmental Site Establishment processes was to determine the suitability from an environmental and social perspective and identify areas that should be avoided in development planning. The project is planned as part of a larger cluster of renewable energy projects, which includes another up to 150MW PV Solar Energy Facility (Limestone PV2) located on the same project site as Limestone PV1 and 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil. The Limestone PV1 project site is proposed to accommodate the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area with security and access control
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors for the duration of the Operational Phase of the development. The operations site office and maintenance area will be constructed behind the existing farmhouse, adjacent to the existing store and will include a workshop area, parking, and storage. This area will be screened using vegetation. The building will be designed and built to the same aesthetic as the current buildings not to detract from the sense of place.

- Laydown/staging area on site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 5m wide).
- Temporary concrete batching facility
- Stormwater management infrastructure as required

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 1.

Table 1: Details or dimensions of typical infrastructure required for the Limestone PV1 Solar Energy Facility

Infrastructure	Footprint and dimensions
Panel Height	+/- 2.2m
Technology	Use of fixed-tilt and single-axis tracking.
Contracted Capacity	Up to 150MW Maximum Export Capacity
Area occupied by the solar array	To be determined in the EIA phase
Area occupied by the on-site facility substation	Up to 0.75ha
Capacity of on-site facility substation	33kV/132kV
Cabling between the PV array and the onsite substation	The cabling will be in underground trenches, and operate at a voltage of up to 33kV.
Extent of areas required for laydown of materials, equipment etc.	Less than 2ha
Access and internal roads	Existing roads will be used as far as possible. There are existing gravel roads that can be utilized for site access (width of up to 6m). Upgrading of existing roads or new roads will be required. New internal access roads required (Up to 5m), same for construction and operation. Internal access roads will be gravel/hard surfaced.
Temporary infrastructure	Temporary store area close to site entrance (Less than 2ha).

As noted above, site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors will be developed for use for the duration of the Operational Phase of the development. The operations site office and maintenance area will be constructed behind the existing farmhouse, adjacent to the existing store and will include a workshop area, parking, and storage. This area will be screened using vegetation. The building will be designed and built to the same aesthetic as the current buildings not to detract from the sense of place.

The Limestone PV1 facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP) with the Limestone PV1 Facility set to inject up to 150MW Maximum Export Capacity into the national grid.

From a regional perspective, the area within the Northern Cape identified for the project is considered favourable for the development of a commercial PV facility due to the low environmental sensitivity of the identified site, excellent solar resource, and availability of land on which the development can take place. There is also potential for evacuating the power to the national grid via a direct grid connection at the Olien MTS (Main Transmission Substation) which is adjacent to the proposed site.

1.2 Description of Property and Affected Environment

The solar PV areas lie on flat, level ground, 10km east of Lime Acres around the Olien substation. The area is well known for its intensive mining industries for over 100 years related to iron ore, asbestos, diamonds and lime, amongst others. Historic asbestos mines dot the hills of the Asbestos range and larger, mechanised mines near Owendale are now inactive too given the negative health risks associated with prolonged exposure to asbestos dust. The solar PV facility lies on the England Farm east of Lime Acres. More recently, solar farms have been built in the area and the completed Jasper Solar farm lies to the south of the R385 which connects Danielskuil and Lime Acres to Postmasburg further west. A massive tower for the Redcap Concentrated Solar Plant (CSP) was being completed at the time of the survey which will be surrounded by a battery of mirrors adjacent to the Jasper Solar farm. A large number of high voltage overhead powerlines span the area due to the large number of mines in the area and the proximity of this grid infrastructure has been chosen carefully in the design of the renewable facilities to take advantage of the wind and solar conditions present on site. Besides the OHLs, there are also a number of relatively good highways and railways crisscrossing the study area and connecting the mines to the various depots.

Most of the buildings recorded at the various werfs were built in the 20th century and do not contain very old original fabric but older stone walling and graves are present at the England farm. The vegetation ranges from the Ghaap Plateau Vaalbosveld in the solar PV area on nearly flat calcareous ground to the Olifantshoek Plains Thornveld and Kuruman Mountain Bushveld which dominate the majority of the WEF study area with rocky, bushy vegetation and thorn trees on the ridges and grassland and low shrubbery vegetation found on the plains.

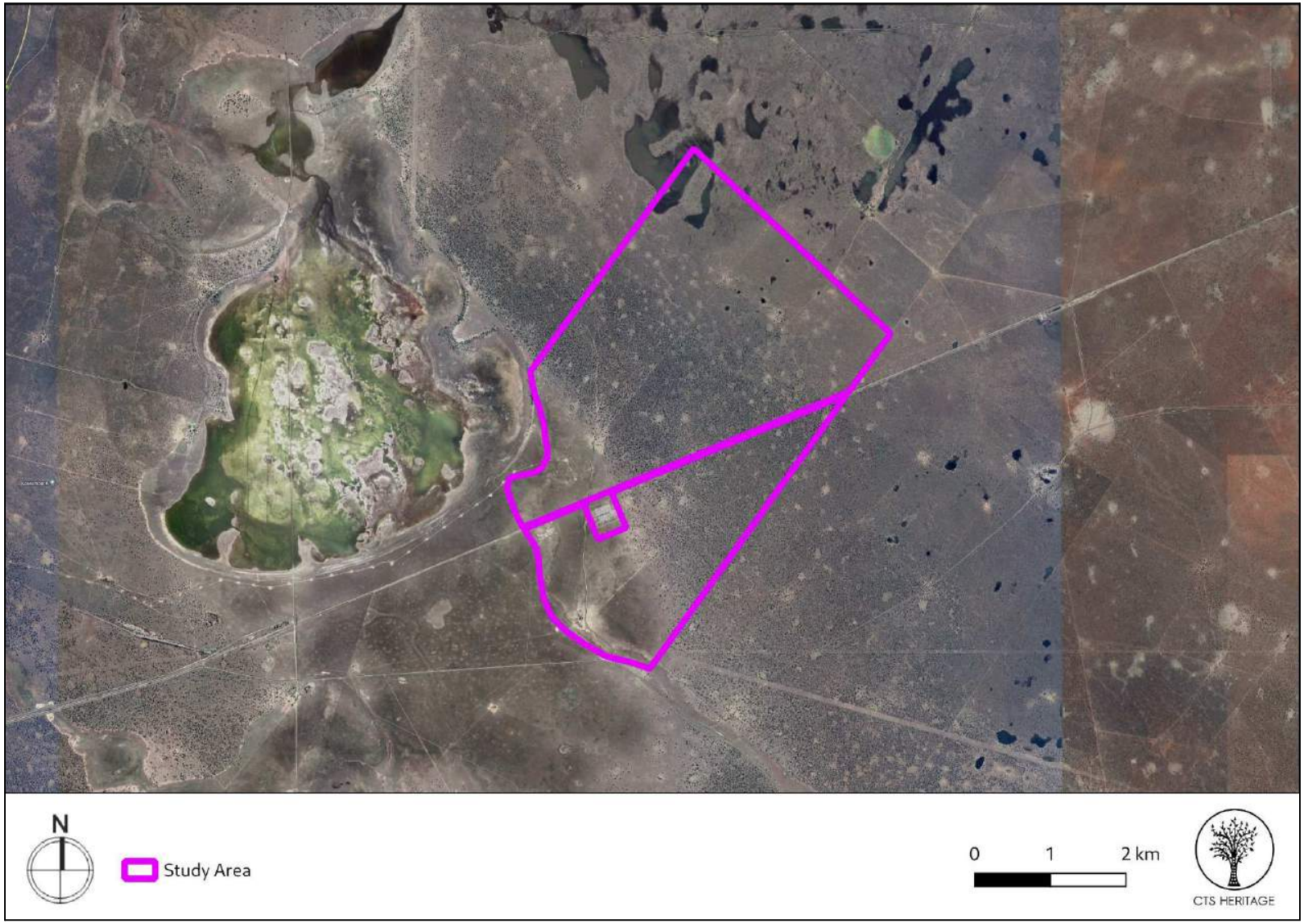

Figure 1.1: The proposed Project Site of the Limestone PV Facility

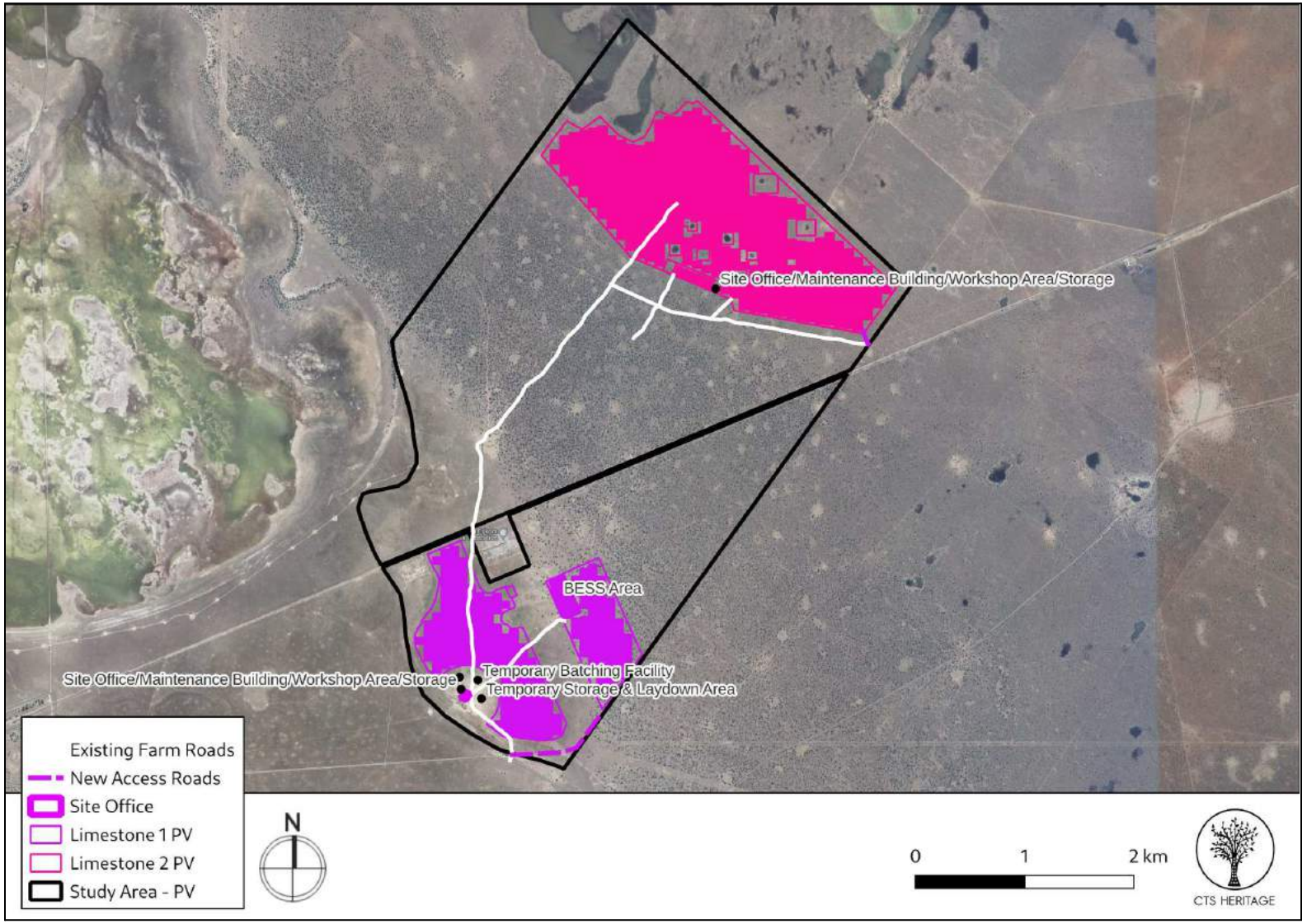

Figure 1.2: The proposed development layout of the Limestone PV Facilities

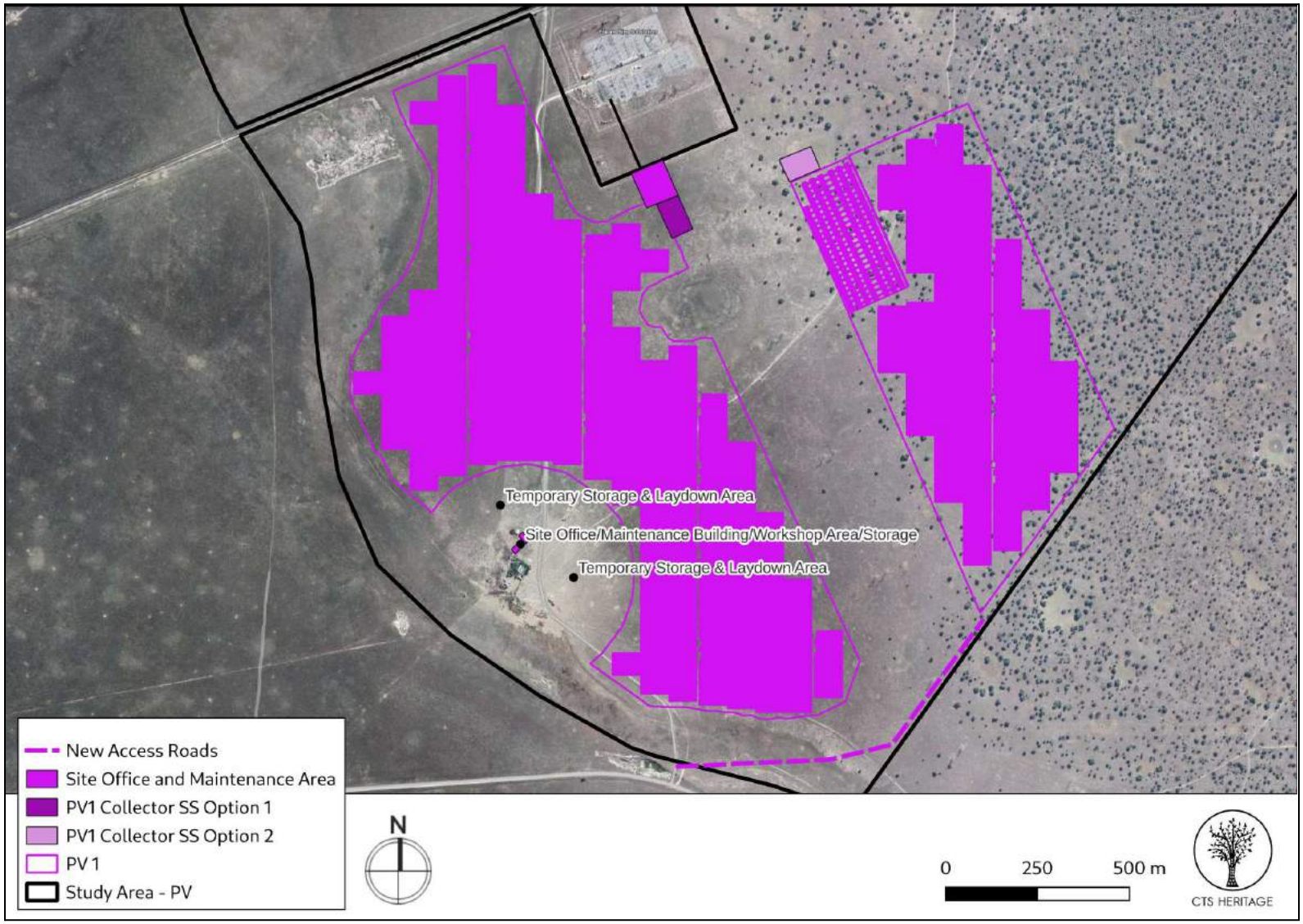

Figure 1.3: The proposed development layout of the Limestone PV1 Facility

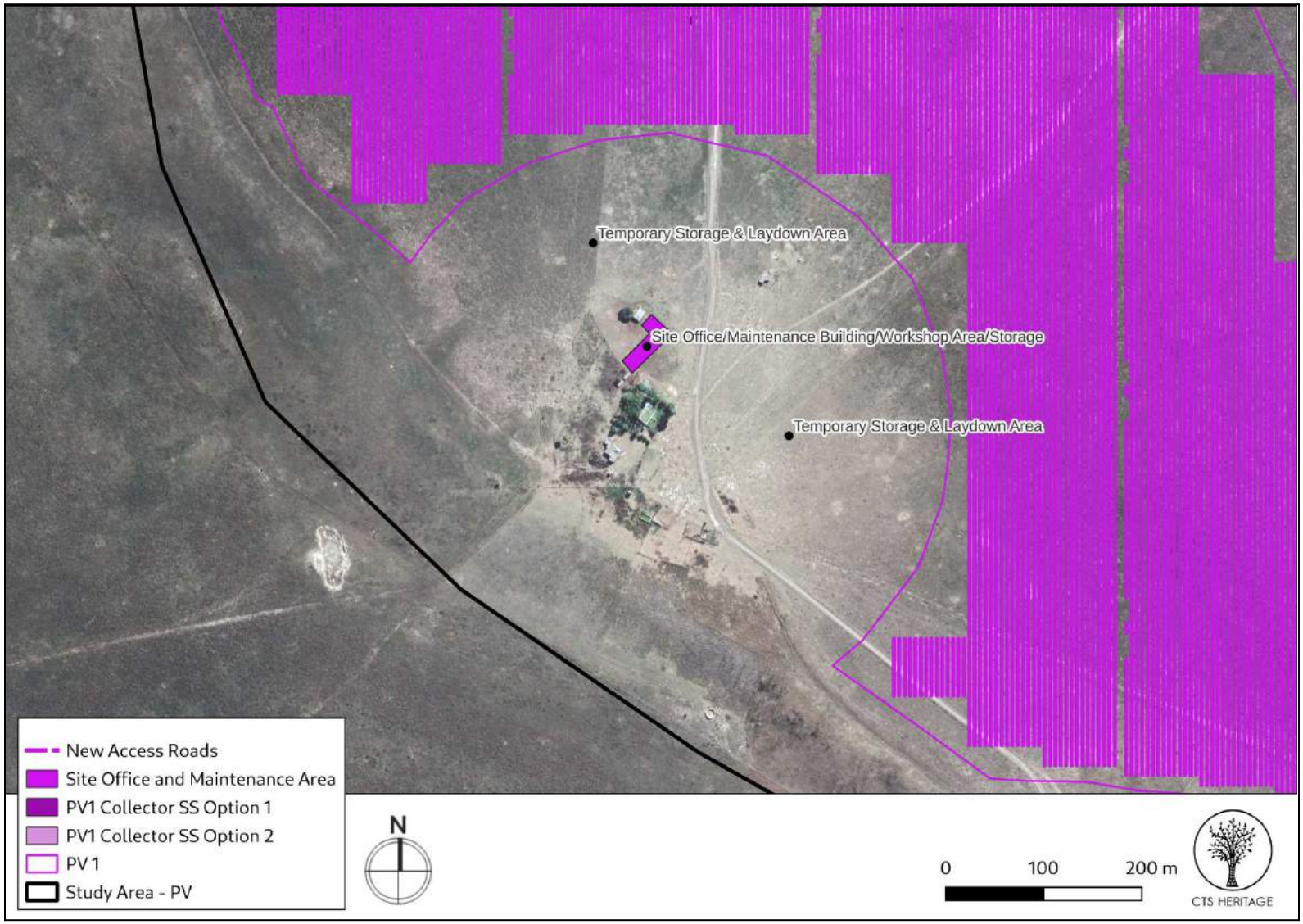

Figure 1.4: The proposed development layout of the Limestone PV1 Facility

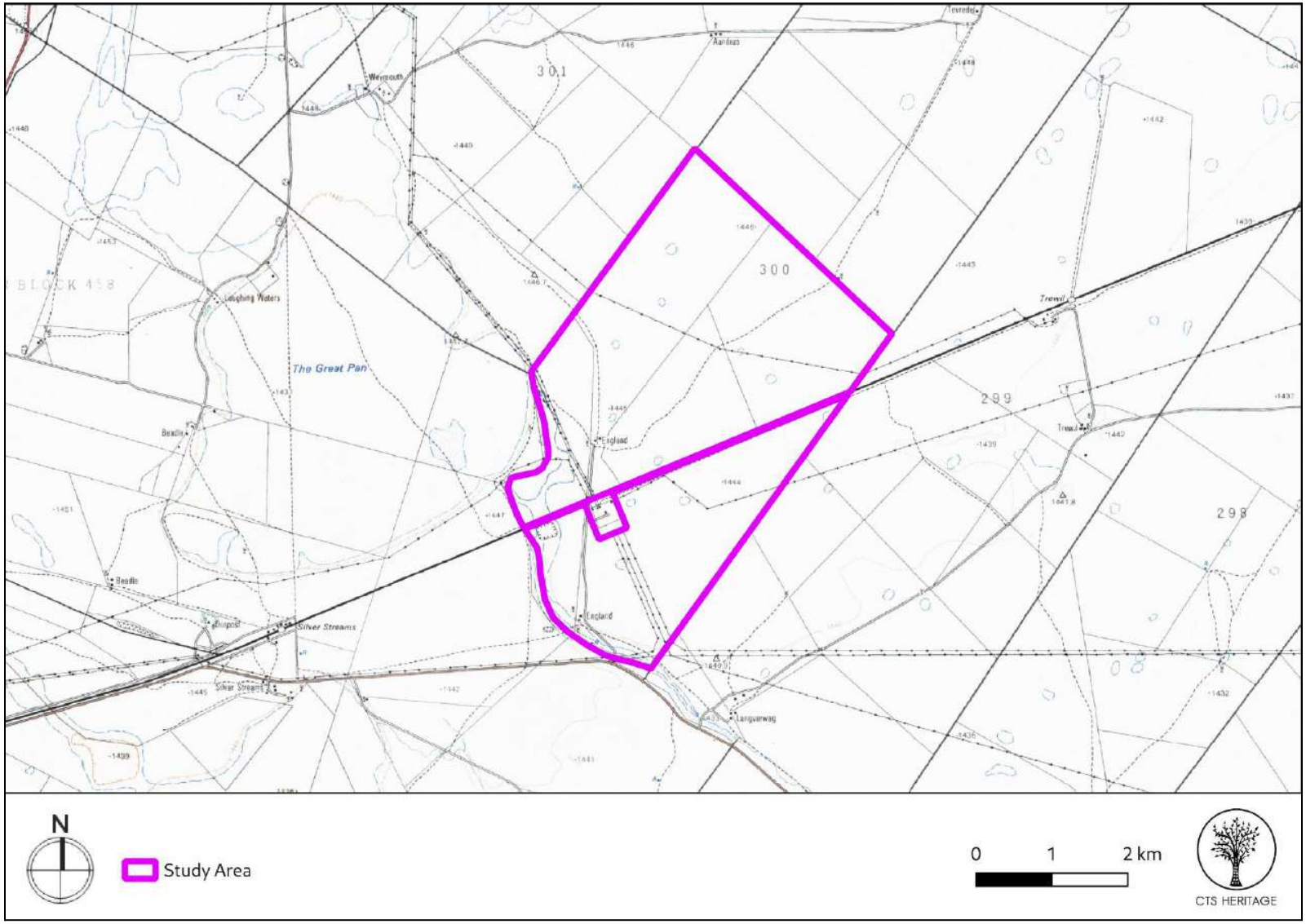

Figure 1.5. Overview Map. Extract from the 1:50 000 Topo Map indicating the proposed development area for the PV

2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from **21 - 26 September 2022**
- A palaeontologist conducted an assessment of palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted her site visit on **15 October 2022**
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

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

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

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

2.4 Constraints & Limitations

Grassland and shrubbery covered much of the study area at the time of the survey and recent good rains meant the vegetation was quite dense in places. However, small patches of exposed ground were regularly encountered

and this meant that the observation of visible archaeological material was not significantly impeded overall. The ground was much rockier on the ridges but despite this archaeological material was still identified without too much trouble in these areas. The survey therefore obtained a good account of the archaeological sensitivity of the area.

The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the heritage sensitivity of the receiving environment.

2.5 Savannah Impact Assessment Methodology

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

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

- The status, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

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

S = (E + D + M) x P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background:

Originally a station of the London Missionary Society called Sibiling, Postmasburg became a Griqua village with the name Blinkklip and was then proclaimed a town on 6 June 1892. Postmasburg achieved municipal status in 1936. Postmasburg had its own diamond rush. The first diamond was discovered in 1918 and as a result an open cast mine grew. The mine was permanently flooded in 1935 and as a result, just like Kimberley, Postmasburg could also boast its very own “Big Hole”. This hole is over 45 m deep and filled with fish. Postmasburg also boasts spectacular architecture and many historical sites. An old blue dolomite stone Reformed Church was built in 1908. There is also a rather impressive gun known as “Howitzer Gun” which stands at the civic centre. It honours the men of Postmasburg who died during World War II. The proposed development is also located in close proximity Lime Acres, home to the employees of the Finsch Diamond Mine located nearby.

Cultural Landscape

In 1801, the London Missionary Society also established a station among the Griqua at *Leeuwenkuil*. The site proved too arid for cultivation and in about 1805 they moved the station to another spring further up the valley and called it *Klaarwater*. Their second choice was little better than their first, and for many years a lack of water prevented any further development. The name of the settlement was changed later to Griquatown or *Griekwastad* in Afrikaans. They lived among a mixed nomadic community of the Chaguriqua tribe and "bastaards" (people of mixed origin) from Piketberg. Their two leaders were Andries Waterboer and Adam Kok II. From 1813 to 17 July 1871, the town and its surrounding area functioned as Andries *Waterboer's Land*. *Griekwastad* was later the capital of British Colony Griqualand West from 1873 to 1880, with its own flag and currency, before it was annexed into the Cape Colony. The proposed development is located on one of the main routes between Griekwastad and Kuruman and as such, evidence of this heritage may be impacted by the proposed development.

Danielskuil derives its name from a cone-shaped depression deep in the dolomitic limestone; with a domed covering, reminiscent of the biblical ‘Daniel in the lions' den’. The Griqua leader Adam Kok is said to have used this depression as a prison, and to also have kept snakes in it. The area was famous because of the Griqua Chief who ruled there by the name of Barend Barends. Barend Barends was the son of a “half-Hottentot Dutchman” and one of the most important leaders along the turbulent northern frontier of the Cape Colony from 1790 to 1834. He was one of the first chiefs of the Griqua tribe, an indigenous Khoi group. A book, Barend Barends - Die Vergete Kaptein van Danielskuil**,** has been recently published about his story. During the Anglo Boer war (1899-1902) the British

army built and used a blockhouse fort, which overlooks the town from the north.

Archaeology

An archaeological assessment of the Finsch Mine was completed by Henderson in 2005 (SAHRIS ID 6780). Henderson drafted a brief history of the Finsch Mine and this is not repeated here. Suffice to note that "Recent human activity at the Finsch Mine, which would have left traces of mining and structures, therefore only dates back to 1959 on Brits. It would appear that there may be an earlier date for farming activities on Bonza". Elements of the cultural landscape that may be impacted by the proposed development include the sense of place of the historic core of Postmasburg as well as the mining and farming heritage of the area.

Due to mining activities in the area, a number of heritage impact assessments have been completed in close proximity to the development area and these are relevant here (Figure 2 and Appendix 2). The well known Taung site that preserved early hominid remains is located only some 50 kilometres to the west of the site under investigation. Wonderwerk cave near Kuruman also retain evidence of early peoples in its 6 meter midden deposit, especially in the rear portions of the cave. Towards the front rock-art from later Stone Age peoples are also preserved. Furthermore the engraving sites Wildebeestkuil, Driekopseiland and Nooitgedacht near Kimberly confirm a continued presence of Later Stone Age peoples in the general region. It is very likely that significant archaeological heritage may be impacted by the proposed development.

A recent HIA completed by CTS Heritage located south of this proposed development area (CTS 2022) revealed a great many heritage resources evident within the broader context. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. A number of heritage resources of significance were, however, also identified. These resources range from significant archaeological sites and scatters, to burial grounds and graves as well as historic farm werfs and infrastructure such as the irrigation furrows ascribed to the work of the London Missionary Society and the local Griekwa population. The relationship between the furrows, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area and its Griekwa inhabitants. It is likely that similar heritage resources are located within this development footprint.

A number of known heritage resources that have been identified through other Heritage Impact Assessment processes are located within the assessment area. It is recommended here that the mitigation measures previously proposed for these resources are adopted for this project. This information is detailed below:

Table 1: Observations noted during past field assessments

Site ID	Site Name	Description	Grading	Recommended Mitigation
45547	PLCP1/Groenwater 453-04	Site PLCP1 comprises of a Colonial Period farmstead, situated on the property Plaas 455, including the main residence and 2 outbuildings. Later period structures, including a 2nd residence and garage are built on the property, but not impacting directly on any of the Colonial Period structures. All structures, both old and new are still in use. The Steenkamp family acquired the land about 12 years ago and not much is known about the old structures, aside from the fact that the main residence and 1 outbuilding is constructed of a sand-rich baked brick and have been plastered in order to ascertain maintenance thereof. The 2nd outbuilding is stone built. Based on architectural style of the main residence a date easily preceding 60 years is ascribed; structures may well date to the late 1800's / early 1900's	IIIA	Outside of development area
85442	HR06: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 004	An informal cemetery with 5 graves was identified at this location. The graves were placed in a single line next to each other and were orientated from west to east. The graves have informal mounds of soil and packed rocks as dressings. The graves are situated approximately 120m to the west of the farmstead. The graves are most probably associated with farm labourers who were previously working on the farm England. There was nobody on the farm to question about these graves. Site size: Approximately 5m x 15m.	IIIA	Adjust the development layout and demarcate site with at least a 10 metre buffer.
85448	HR04: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 010	The remains of a circular stone walled kraal were identified at this location. The walls of the kraal measured only approximately 0.2m high and most probably served as the foundations of a structure which was used to keep livestock such as sheep or goats. Thorny branches were most probably used to keep wild animals outside and the stock inside. The structure measures approximately 5m in diameter and is situated approximately 25m south of an existing power line.	IIIC	Outside of development area
85449	HR05: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 011	The remains of an old mine shaft or exploration pit were identified at this location (Figure 30). The mine shaft or pit was identified on one of the northern slopes of the Rooiberge. The mine shaft or pit measures approximately 3m wide and approximately 12m long. The shaft is presently approximately 3m deep, but collapsed side walls partially refilled the shaft or pit.	IIIB	Adjust the development layout and demarcate site with at least a 50 metre buffer.
91007	Olien SEF002	Later Stone Age flakes on chert from a dispersed scatter in the northern part of the area	IIIC	None
91008	Olien SEF003	Remains of kraals made from calcrete cobbles.	IIIC	None
91009	Olien SEF004	A row of unmarked graves was documented	IIIA	The graves should be fenced and development must be restricted to no closer than 100 m.

Asbestos Mining in the Northern Cape

The area around Danielskuil has long been a centre of the asbestos mining industry in South Africa. The below summary of the history of asbestos mining in this area is largely extracted from Van Zyl (2017):

“Asbestos was mined in South Africa for more than a century, starting in approximately 1891 and ending in 2001. Asbestos is 'a highly heat-resistant fibrous silicate mineral that can be woven into fabrics, and is used in brake linings and in re-resistant and insulating materials.' The earliest reference to the occurrence of asbestos in South Africa can be found in the reports of Lichtenstein in 1805 and Burchell in 1812, following their expeditions into the interior. Both these observations were made in the Prieska/Koegas/Griquatown areas of the Northern Cape. This part of the country was incorporated into the Cape Colony in 1879 and is now known as Griqualand West.

During 1884 the land north of the Orange River up to the Molopo River became a Crown Colony. By then it had already been established that blue asbestos occurred over a distance of some 200 miles (approximately 300 kilometres) from south of Prieska to north of Kuruman, in what is generally referred to as the Asbestos Mountains in the south and the Kuruman Hills in the north.

In the early 18th century local inhabitants from the areas near Prieska were well aware of the existence of asbestos rock formations in their neighbourhood, and there is speculation that they may have used it on a limited scale as a building material or in pottery. They referred to it as doeksteen, meaning cloth rock. However, there was no commercial demand for it and therefore no need to exploit it.

When diamonds were discovered near Kimberley in the 1860s, work seekers flocked in from the surrounding areas. Those from Prieska brought with them rock samples containing blue asbestos, in an effort to evoke commercial interest. Large deposits of chrysotile asbestos were discovered in Canada around 1870, and the commercial use of this material was well established long before the first blue asbestos was mined. However factories using a specific fibre type successfully were loath to switch to unknown and untested types.

Early operations in the blue asbestos fields were rather primitive, with ore being extracted manually and thereafter cleaned on surface by chiselling off the attaching host rock with hammers to produce a clean ‘cob’ of bre. Cobs were bagged and sent to factories in England and Europe where the fibre was spun into fire-resistant and insulating cloth and yarn, which is still used for packing pumps and bearings, and in sealing caulk.

Virtually no infrastructure existed in these areas. The highest priority was to secure water at or near any site. Those properties on or near the Orange River, like Koegas and Westerberg, had an advantage over properties

further away where water was extremely scarce. Many wells dug on farms in this semi-desert region turned out dry. All transport was animal drawn over dirt tracks, and the only communication with the outside world was the post cart service from Kimberley to Prieska, from where the transport wagons took the mail to Koegas. On occasion there was a break in communications when the Koegas mailbag from Kimberley fell off the cart before reaching Prieska! Final product had to be carted by wagon to De Aar, the nearest railway station some 250 kilometres away. From here it was railed to Port Elizabeth and shipped by steamer to Europe.

Asbestos mining in the Danielskuil area

By 1903, the Cape was offered farms near Danielskuil, including Warrendale, where a few tons of fibre had been recovered earlier. Water supply was however insufficient and the deposit considered too small to be of interest. A farm belonging to Mr van Staden was offered through Mr Bates, a promoter of Cape Town, but this was not followed through.

During 1907 Olds was instructed by the Kimberley office to proceed to properties in the north which were on offer to Cape. He set off on the 180 mile journey in a Cape cart, on the way calling in at Griquatown for normal business and then on to Postmasburg, where Mr Theo Scribante provided him with a guide. The first site visited was Billinghurst, about 50k's north of Danielskuil, where some fibre was opened up. Although Olds was satisfied with the quality, he did not think the deposit was large enough to be of interest to Cape.

Next stop was at Khosis (Ga-Tlhose) where the reef could not be located. The storekeeper was however requested to send samples and, provided quality and prices are acceptable, he could act as agent for Cape. On the return journey he called in at Farm 104 of Mr De Lange. According to Olds this was the best reef seen on the trip. Olds did not think any of these prospects could be worked by Cape, but crude might be bought from tributors provided prices and quality were acceptable.

Olds returned via Griquatown and called in at Kranskloof, a Gefco farm some 12 miles south-east of Griquatown, next to Elandsfontein. This property was worked by Christie & Carroll at the time. They claimed to have a contract with the Admiralty at prices far in excess of those being obtained by Cape. Although they did not want to disclose any details to Olds, he did memorise the bag markings. It is not known whether this information was of any value at a later stage but not long afterwards this operation floundered. Olds covered some 500 miles in 3 weeks visiting the various sites.

During 1908 Cape's Kimberley office drew the London office's attention to the fact that Reuters cabled Cape's

financial results of the previous year, released at the annual general meeting, to various countries, including South Africa. This led to a scramble by all and sundry for asbestos rights in the Northern Cape. It was feared by the local office that, should some successful new operators enter the market, prices may be forced down, to the detriment of Cape. London was urgently requested to ensure that such information remains confidential in future. Locally Cape started looking at other farms in the Prieska neighbourhood like Pypwater and Naauwgekneld. Olds was also instructed to establish who was opening up Glen Allen mine. By 1909 Cape realised that they were fast losing their monopoly in the blue asbestos business as new operators entered the fray and Cape found it impossible to buy up all the production. Cape reported that shopkeepers, schoolmasters (an obvious reference to Mr Cunningham of the Kuruman Public School) and ex-policemen were all digging!

Cape was also offered other opportunities in the minerals field. During 1908 copper samples were delivered to Olds at Koegas. Oats followed up on the prospects which were apparently towards Upington. Olds also received some samples of saltpetre in 1905 which were evaluated by the DeBeers Explosives Works at Somerset West and found to be of good quality. After despatching a consignment of 800lbs to them, he was advised to discontinue all efforts towards this business as railage costs to the factory rendered it totally uneconomical. This was also the time when large deposits of chrysotile asbestos were discovered in Rhodesia and Old's brother was sent to the Hartley area to report on these for Cape. All in all, by 1910 some 40 farms were already known to either have substantial reserves of blue bre on it or had the potential to be turned into small payable operations. These stretched from south-east of Prieska to well north of Danielskuil.

By 1981 it was clear that the blue market was under severe pressure and that survival depended on drastic actions. During 1985 the Atmospheric Pollution act of 1965, originally applicable to gold mines, was made applicable to asbestos mining as well. The Heuningvlei site, having already been closed, was the first to be rehabilitated, with a closure certificate issued end 1985. No prescribed standards were as yet in place and the 'best practice' method was applied. In accordance with the then applicable legislation regarding the rehabilitation of defunct asbestos mines, Gefco entered into negotiations with the Department of Minerals and Energy to determine Gefco's liabilities. In the end the State accepted responsibility for the rehabilitation of certain mines, whilst Gefco attended to the mines considered its own responsibility.

Stripping of the mines commenced and rehabilitation actions continued through to 2006, when closure certificates were obtained for all the Gefco blue asbestos mines in the North West and Northern Cape provinces. So ended the exploitation of blue asbestos in South Africa, after more than 100 years."

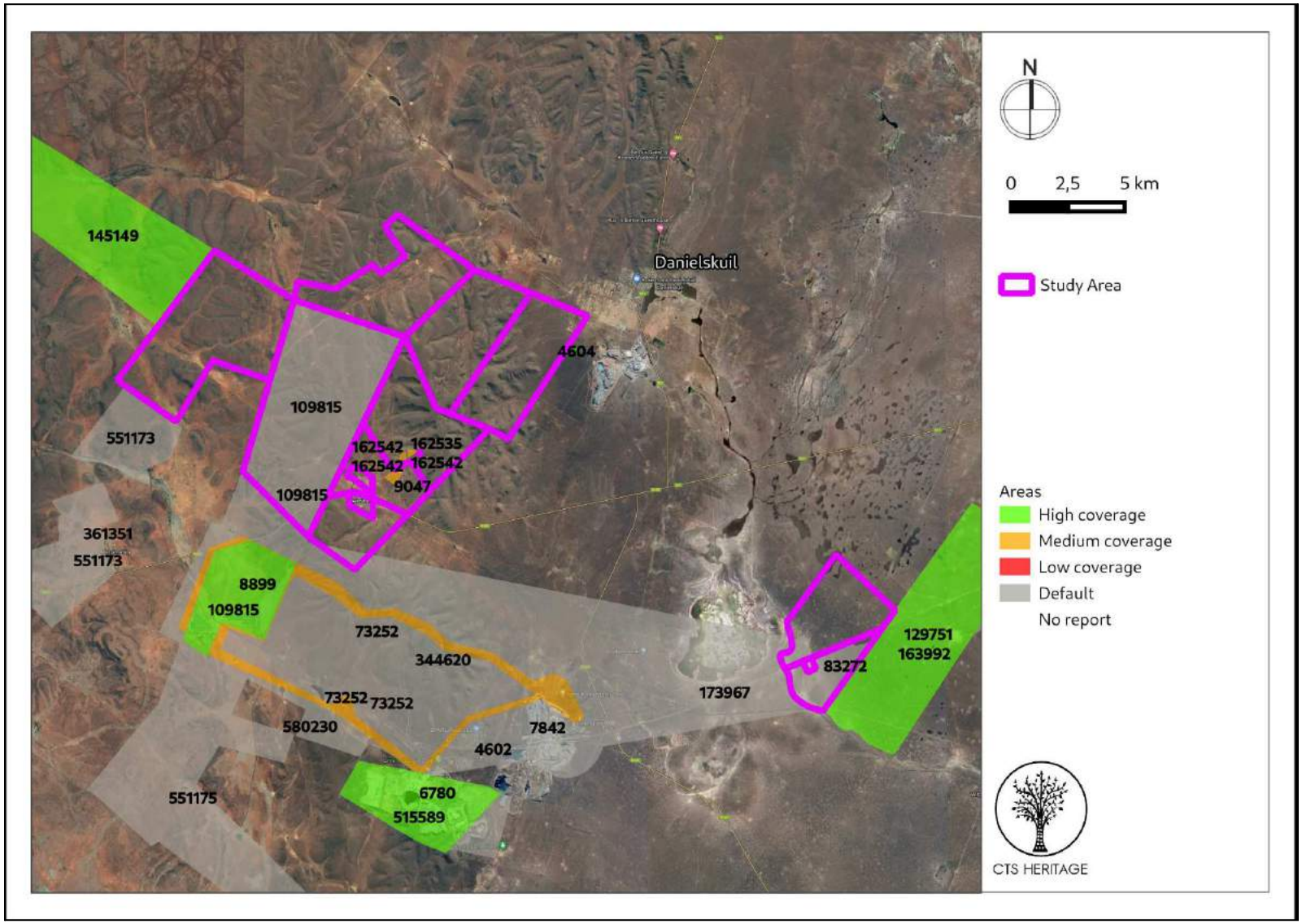

Figure 2.1: Spatialisation of heritage assessments conducted in proximity to the proposed development

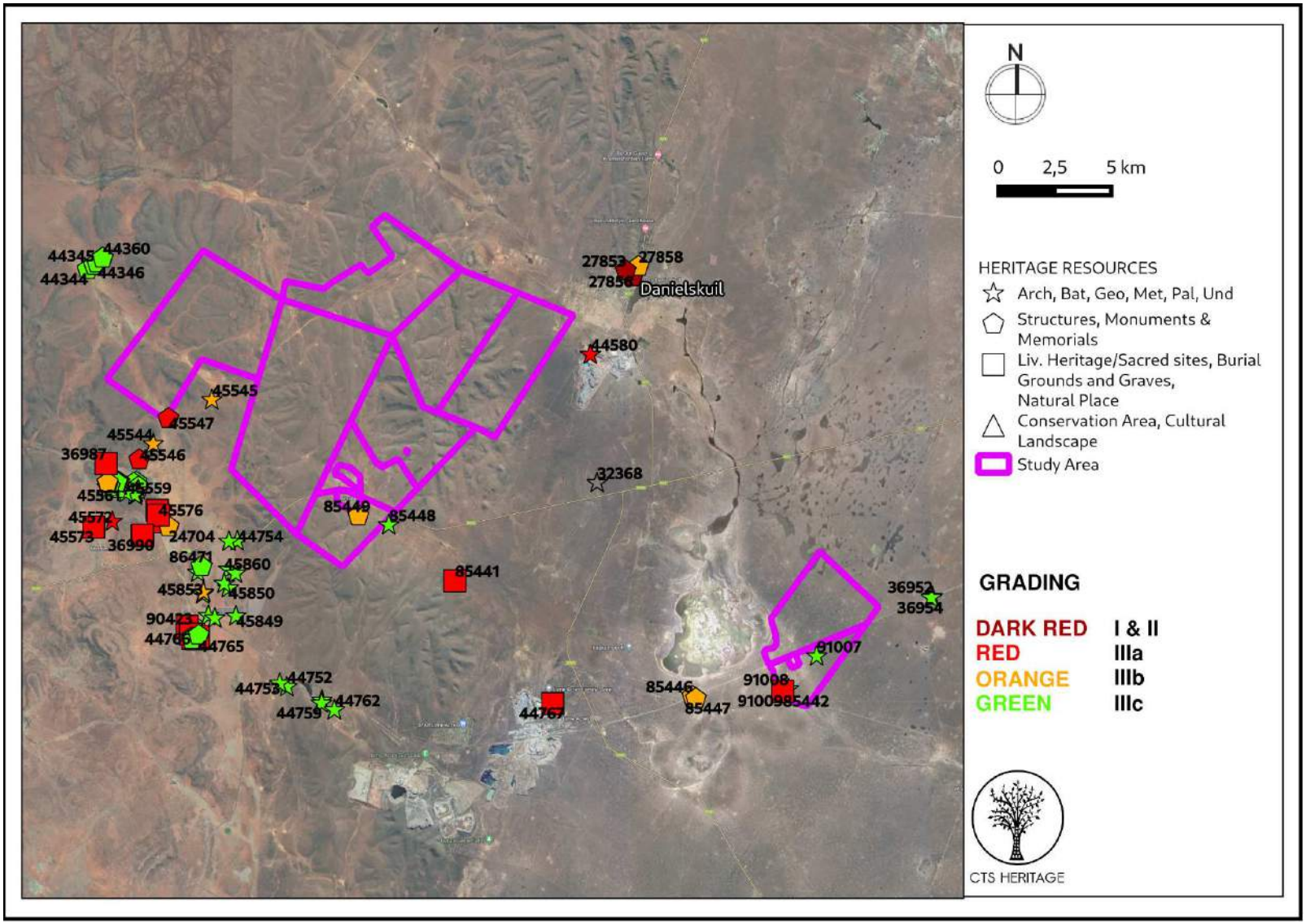

Figure 2.2. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for full description of heritage resource types.

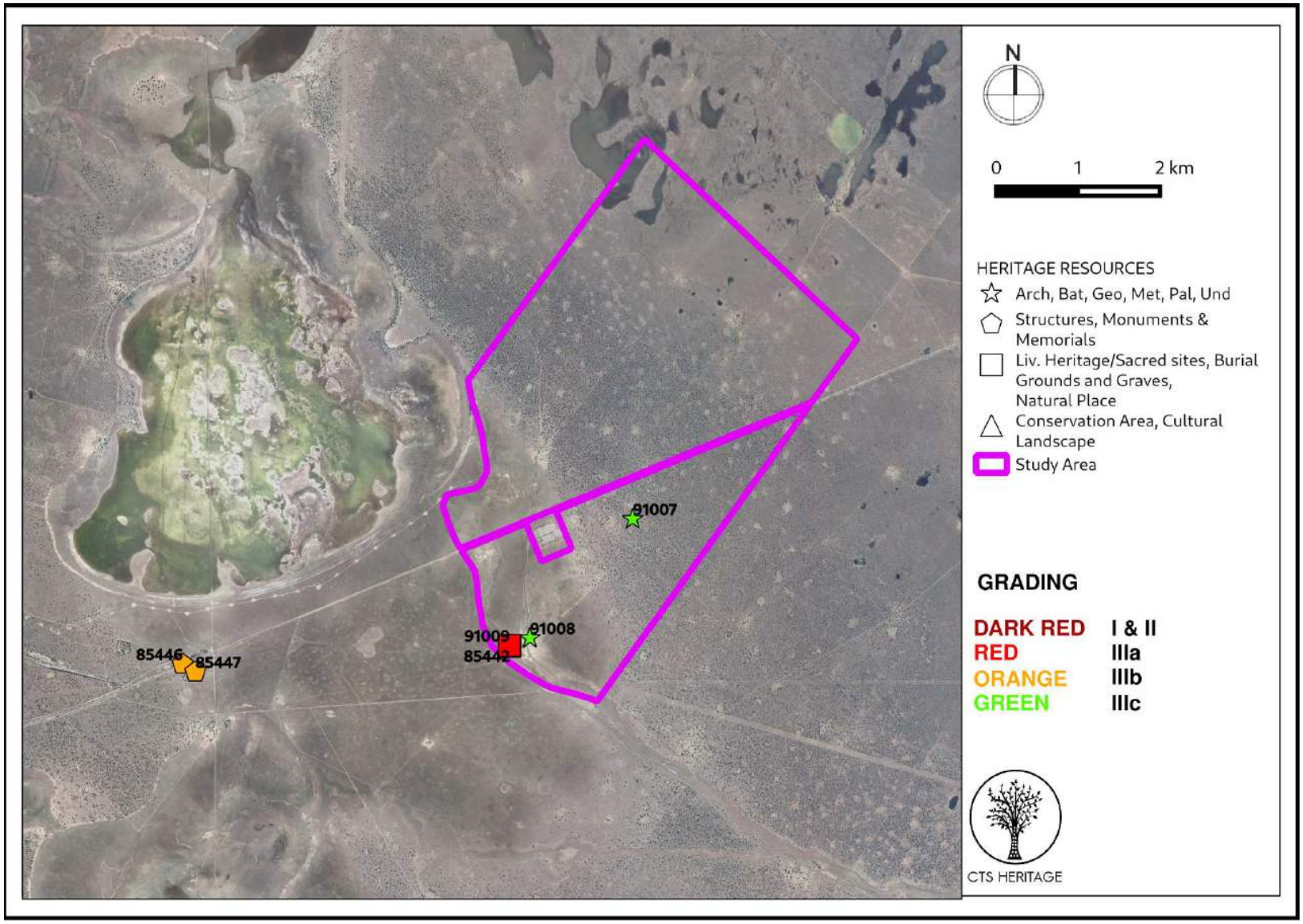

Figure 2.3. Heritage Resources Map for the proposed Limestone PV Facilities

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is predominantly underlain by sediments of moderate, very high and high palaeontological sensitivity (Figure 3.1). According to the Extract from the CGS 2822 Postmasburg Map, the development area is underlain by sediments of the Ongeluk Formation, Danielskuil Member and Kuruman Member of the Asbesberge Formation, the Lime Acres Member of the Ghaap Plateau as well as Surface Limestone Quaternary Sands.

In an assessment completed for a proposed powerline that traverses the same geological formations, Almond (2015, SAHRIS ID 344620) concluded that "On the basis of both desktop analysis and fieldwork within the broader power line study area (Almond 2013a, 2014) the palaeontological sensitivity of all power line corridors under consideration is assessed as low. This also applies to the area to the north of Lime Acres where stromatolites occur within the underlying bedrock but are rarely well-exposed at surface and are therefore unlikely to be significantly impacted by the proposed transmission lines. The Makganyene Formation outcrop area in the north-western corner of the Remainder of the Farm Nr 469, close to the R385 tar road, is of considerable scientific interest as an accessible part of the limited rock record for an Early Proterozoic (c. 2.3 billion years-old) "snowball earth" glacial event, when ice sheets may have covered much of the planet. However, fossil stromatolites do not occur within the succession here and significant palaeontological impacts are therefore not anticipated. Potential impacts on local palaeontological heritage are assessed for all power line corridor options as being of low negative significance." It is likely that similar palaeontological sensitivities exist for the proposed development area and as such, it is recommended that potential impacts to palaeontological heritage are assessed.

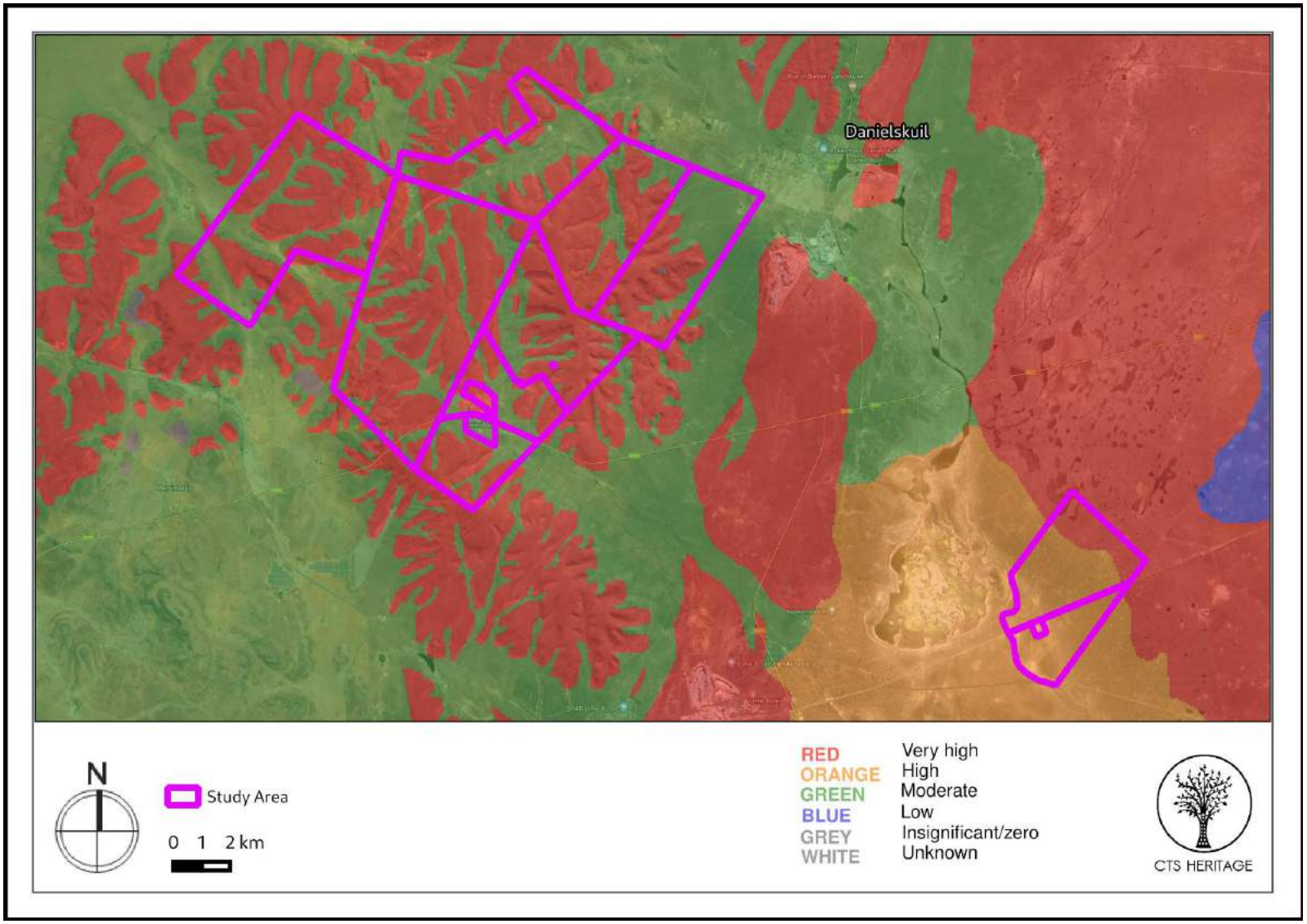

Figure 3.1: Palaeontological sensitivity of the proposed development area

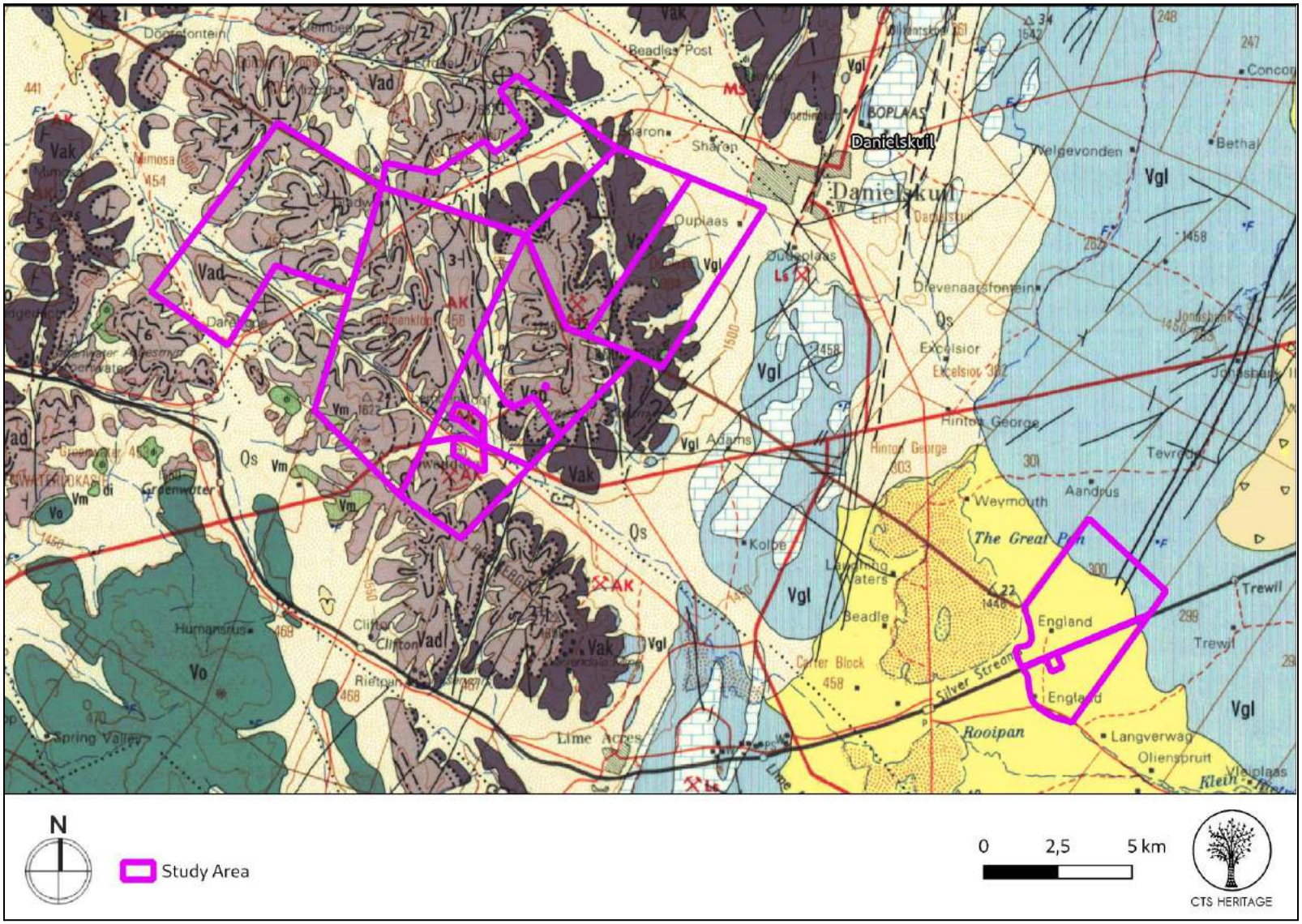

Figure 3.2: Geology Map. Extract from the CGS 2822 Postmasburg Map indicating that the development area is underlain by sediments of the Vo: Ongeluk Formation, Vad: Danielskuil Member and Vak: Kuruman Member of the Asbesberge Formation, Vgl: Lime Acres Member of the Ghaap Plateau, Ql: Surface Limestone and Qs: Quaternary Sands

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

Most of these observations were made of open air stone tool scatters dating to the Middle Stone Age using the abundant and locally available sources of hornfels stone. There was a strong early MSA component distributed throughout the area and weathering and deposition conditions are favourable in many areas of the study site to view these artefacts on the surface. Larger numbers of LSA scatters were also found, particularly on the level ground surrounding the wetlands near the pans for the PV area.

Certain features and resources at the England farm, previously recorded, are worthy of conservation such as the farm graves and the stone walling in the farm complex.

Besides the Stone Age and historical built environment heritage resources, we also recorded a number of historic mining features related to the early asbestos mining exploration in the area in the late 19th century. These open shaft mining pits are still left in relatively good condition given their age and nature of excavation by hand. These mining resources are located well away from the proposed PV facility.

Palaeontology (Appendix 2)

A few weathered stromatolite outcrops were identified in the development footprint. Due to the weathered and relatively scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, just east of the development, well-preserved stromatolite outcrops in the Lime Acers Member (Altermann & Wotherspoon 1995) were identified, while Almond (2015) found well-preserved stromatolites south of the R385, north of Lime Acres. These well-preserved outcrops are located just south-west of the present study area. The possibility of well-preserved stromatolite finds is thus possible.

4.2 Heritage Resources identified

In terms of the heritage resources identified in the archaeological field assessment, see Table 3 below. These are mapped relative to the development layout in Figure 4.2 and 4.3

Table 3: Artefacts identified during the field assessment development area

Obs #	Description	Period	Density	Co-Ordinates		Grading	Mitigation
117	Engeland werf previously recorded – has a graveyard and some stone walling. Very little of the original farmhouse remains	Historic	n/a	-28.34482392	23.62044046	IIIC	500m buffer around farm werf recommended for PVs and 1km for WEF Should Site 117 form part of the operational infrastructure for the PV facility, a buffer area of 300m is appropriate.
118	Hornfels, light brown point	LSA	0 to 5	-28.3476714	23.62871671	NCW	NA
119	Hornfels core	LSA	0 to 5	-28.34032175	23.62568338	NCW	NA
120	Triangular hornfels point	LSA	0 to 5	-28.33811774	23.61713056	NCW	NA
121	Hornfels core	LSA	0 to 5	-28.33601169	23.61672469	NCW	NA
122	Hornfels core	LSA	0 to 5	-28.33228878	23.61325423	NCW	NA
123	Microlithic hornfels cores	LSA	5 to 10	-28.32862326	23.61450186	NCW	NA
124	Hornfels flake	MSA	0 to 5	-28.32068108	23.616031	NCW	NA
125	Hornfels and quartz cores	LSA	0 to 5	-28.32453639	23.61966221	NCW	NA
126	Hornfels flake and core	LSA+MSA	0 to 5	-28.32177087	23.62966221	NCW	NA
127	Hornfels flakes, cores	LSA	5 to 10	-28.32219973	23.63372804	NCW	NA
128	Hornfels flake	MSA	0 to 5	-28.31408405	23.63734689	NCW	NA
129	Hornfels chunk and flake	LSA	0 to 5	-28.31062548	23.64697911	NCW	NA
130	Hornfels cores	LSA	0 to 5	-28.30413762	23.6484543	NCW	NA
131	Hornfels flakes and cores	LSA+MSA	5 to 10	-28.30594456	23.63847527	NCW	NA
132	Hornfels flakes and cores	MSA	0 to 5	-28.30751682	23.63686039	NCW	NA
133	Hornfels cores, flakes	MSA	0 to 5	-28.30859047	23.62876345	NCW	NA
134	Hornfels cores and flakes	LSA	5 to 10	-28.31026811	23.62106086	NCW	NA
135	Quartzite and hornfels flakes	MSA	0 to 5	-28.32003806	23.62563547	NCW	NA
136	Hornfels core and microlith	LSA	0 to 5	-28.31460317	23.63053368	NCW	NA
137	Hornfels flake with dorsal scarring and core	MSA	0 to 5	-28.31425913	23.64811811	NCW	NA
138	Hornfels flake, retouched with core/flake also retouched	LSA	0 to 5	-28.31552457	23.65641372	NCW	NA
139	Various hornfels flakes and flake	LSA+MSA	10 to 30	-28.32589811	23.63578356	NCW	NA

	blanks						
140	Hornfels microlith and flake with faceted platform	LSA+MSA	0 to 5	-28.32629467	23.6416097	NCW	NA
141	Hornfels microlithic point and core	LSA	0 to 5	-28.32711453	23.64703783	NCW	NA
142	Hornfels flakes	LSA	0 to 5	-28.32840577	23.64539104	NCW	NA
143	Hornfels flakes and cores	MSA	5 to 10	-28.33113692	23.64117013	NCW	NA
144	Hornfels and chert core	LSA	0 to 5	-28.33199198	23.64086582	NCW	NA
145	Hornfels cores and yellow/banded point	LSA	5 to 10	-28.33605976	23.63759364	NCW	NA
146	Various hornfels cores	MSA	0 to 5	-28.33792954	23.63551518	NCW	NA
147	Hornfels and chert microlithic points	LSA	5 to 10	-28.33988384	23.63428335	NCW	NA
148	Hornfels flakes	MSA	0 to 5	-28.34342959	23.63232105	NCW	NA
149	Hornfels core and microlith	LSA	0 to 5	-28.34590743	23.63098588	NCW	NA
150	Quartzite core, radial	MSA	0 to 5	-28.33855427	23.62835894	NCW	NA
151	Hornfels cores	LSA	0 to 5	-28.33622498	23.63078773	NCW	NA
152	Hornfels and quartzite flakes and cores	LSA	5 to 10	-28.33578747	23.63106553	NCW	NA
153	Hornfels and quartz cores, flakes	LSA	10 to 30	-28.33255786	23.63241771	NCW	NA
154	Large fine grained/ccs or hornfels MSA flake	MSA	0 to 5	-28.32984852	23.63274905	NCW	NA
155	Hornfels flakes and cores	LSA	0 to 5	-28.32794624	23.63342213	NCW	NA
156	Hornfels flakes and cores	LSA+MSA	5 to 10	-28.32654688	23.63392239	NCW	NA
157	Hornfels and quartzite microliths and cores	LSA	5 to 10	-28.32624047	23.63517424	NCW	NA

The palaeontological assessment noted that the proposed PV development is located on a flat topography. No fossils were found in the solar PV site.

4.3 Mapping and spatialisation of heritage resources

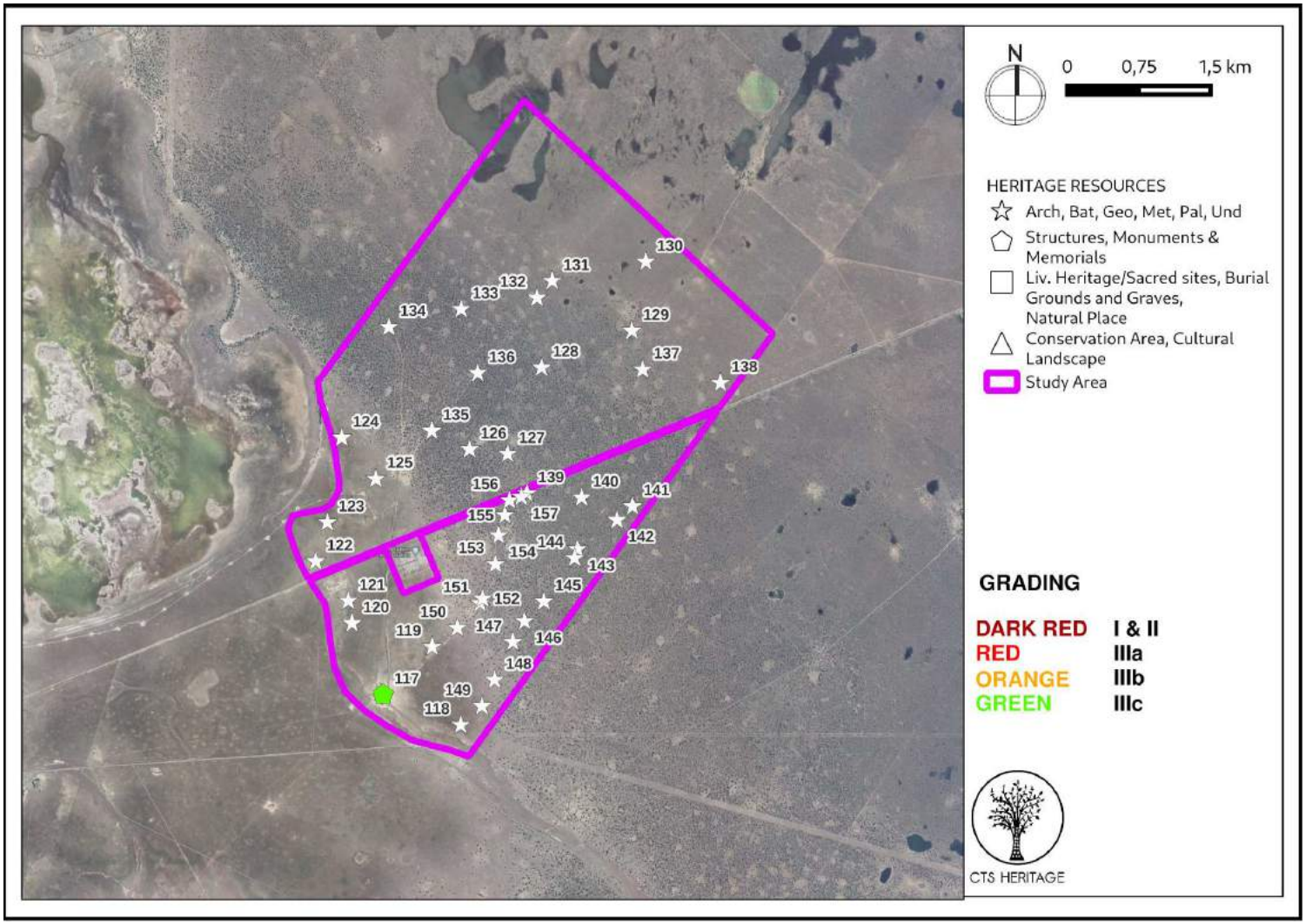

Figure 4.1: Map of archaeological heritage resources within the proposed project site

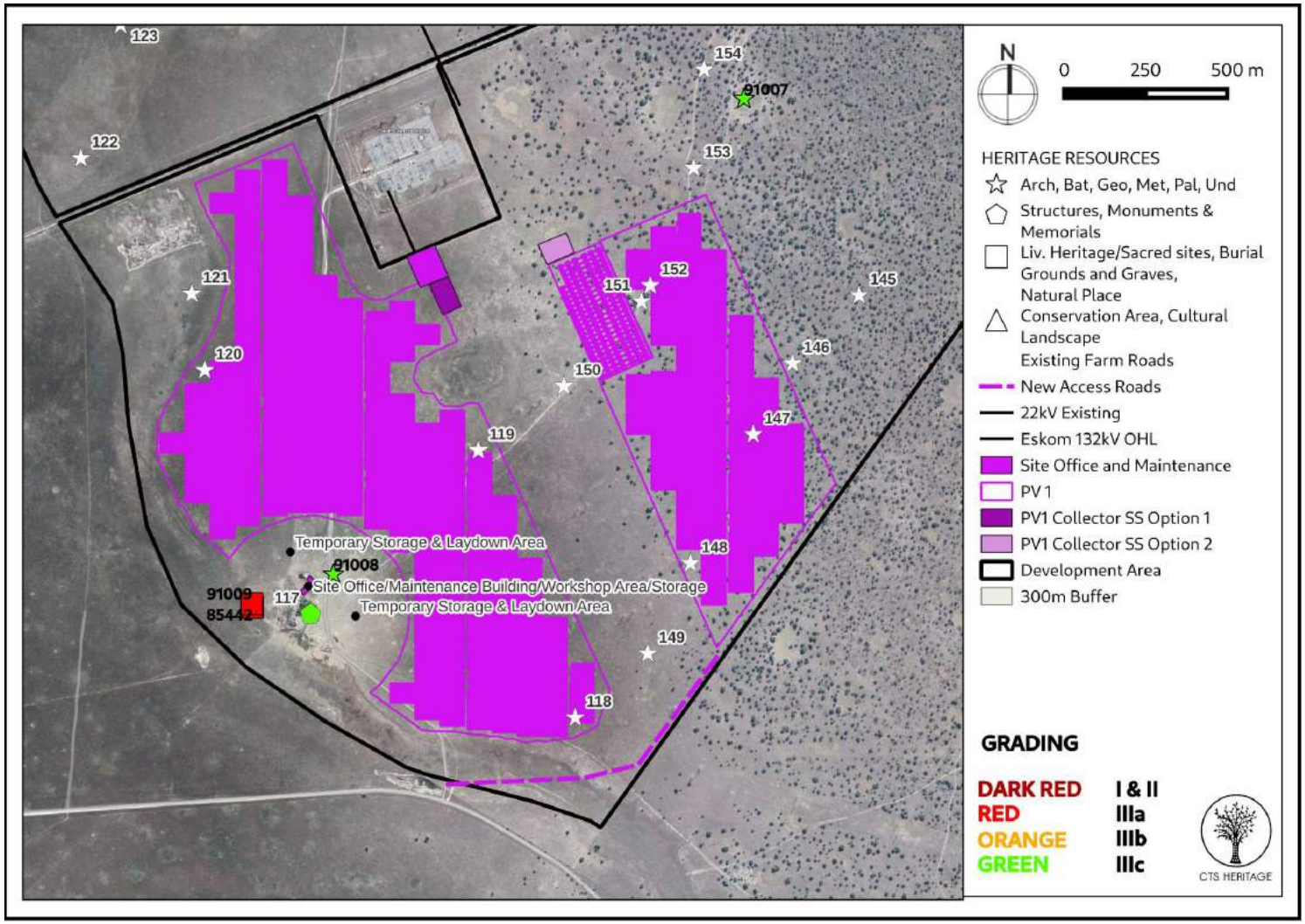

Figure 4.2: Map of all sites and observations noted within the development area for Limestone PV1 Area

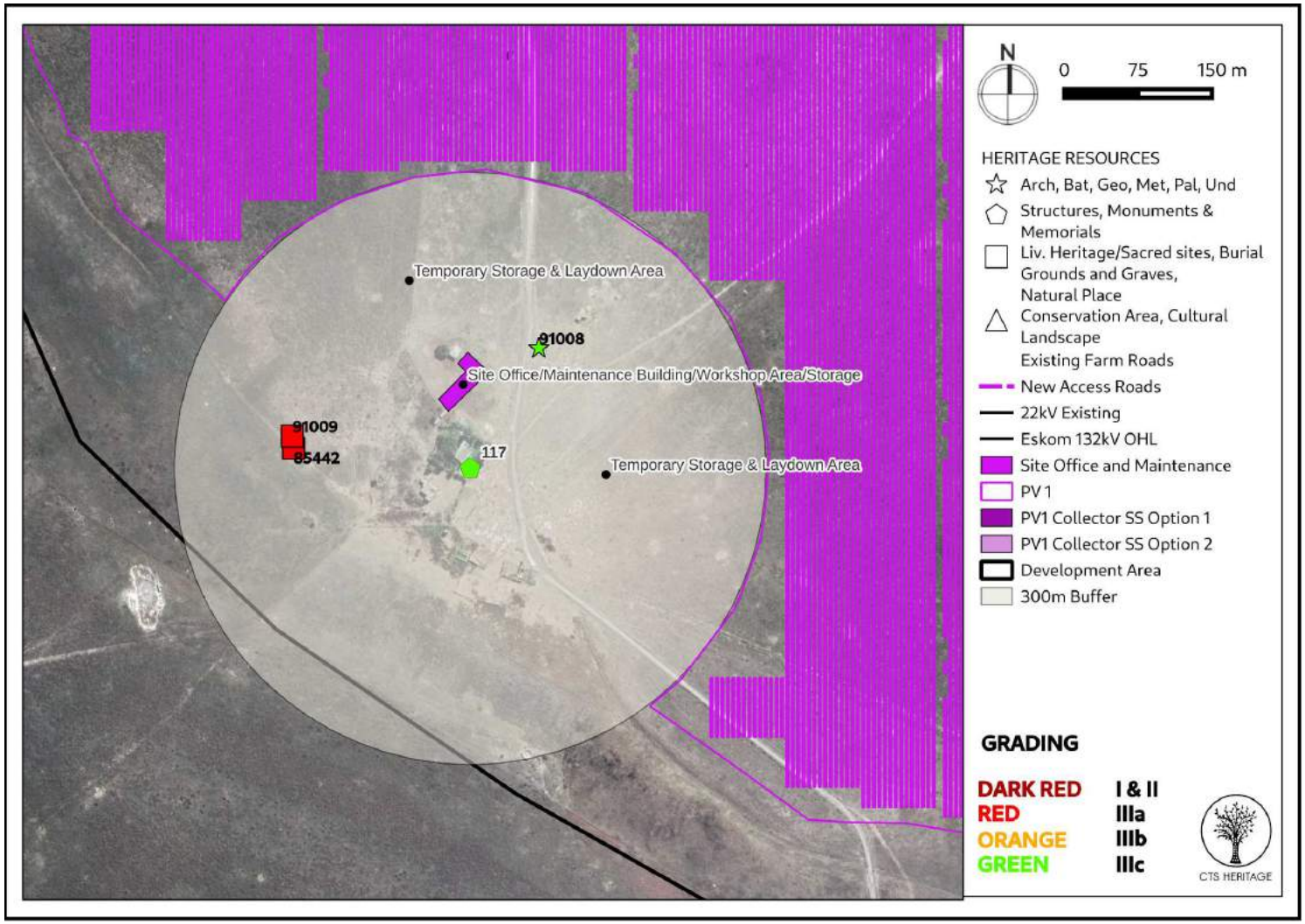

Figure 4.3: Map of all sites and observations noted within the development area for Limestone PV1 Area including proposed site plans

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape and Visual Impacts

According to the VIA completed for this project, "The greater landscape of the study area is characterised by wide-open spaces and very limited development. It should however be noted that there are a few of authorised (and current)/proposed renewable energy applications within the study area and the greater region, that may change the landscape to some degree in the future. There are no formally protected or conservation areas within the study area. There are no tourist routes or protected areas found within the study area."

The VIA goes on to note that "Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), play a significant role. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character, however there are numerous existing powerlines and substations in close proximity to the proposed site which results in the visual quality of the region being moderate. The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6km radius of the development and within the greater region) is expected to be of moderate significance."

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

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

The layouts provided comply with the above general principles.

A number of heritage resources of significance were identified in the broader area. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and asbestos mining infrastructure. The relationship between the mining infrastructure, the farm werfs

and the burials form a unique and layered cultural landscape that speaks to the unique past of this area. It is important that the spatial relationship of these resources is not disrupted by the proposed development. As such, a 300m buffer around the farm werf is recommended for site 117 for PV-related infrastructure. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site Office infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.

As noted above, site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors will be developed for use for the duration of the Operational Phase of the development. The operations site office and maintenance area will be constructed behind the existing farmhouse (Site 117), adjacent to the existing store and will include a workshop area, parking, and storage. This area will be screened using vegetation. The building will be designed and built to the same aesthetic as the current buildings not to detract from the sense of place.

Table 5: Impact table for Cultural Landscape Heritage Resources impacted by the Solar Energy Facility

NATURE: The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**M (5)**	While the cultural value of the development area is moderate, the location of the proposed PV facility means that impact to the cultural landscape is likely to result from the proposed development.	**M (5)**	While the cultural value of the development area is moderate, the location of the proposed turbines means that impact to the cultural landscape is likely to result from the proposed development.
DURATION	**H (4)**	Where manifest, the impact will be long term - for the duration of the PV lifetime	**H (4)**	Where manifest, the impact will be long term - for the duration of the PV lifetime
EXTENT	**H (5)**	Regional	**H (5)**	Regional
PROBABILITY	**H (5)**	It is extremely likely that a significant cultural landscape resources will be impacted	**L (1)**	It is unlikely that any significant cultural landscape resources will be impacted
SIGNIFICANCE	**H**	(5+4+5)x5=70	**L**	(5+4+5)x1=14
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are reversible once the SEF infrastructure is removed	**L**	Any impacts to heritage resources that do occur are reversible once the SEF infrastructure is removed
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site Office infrastructure and Site 117 and the burial ground at SAHRIS				

Sites 91009 and 85442 is implemented.
RESIDUAL RISK: NA

5.1.2 Archaeology

As was anticipated, the archaeological field assessment revealed a great many heritage resources evident within the development area. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. No further mitigation for impacts to these heritage observations is recommended.

Table 6: Impact table for Archaeological Heritage Resources impacted by the Solar Energy Facility

NATURE: The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development				
		Before Mitigation		**After Mitigation**
MAGNITUDE	**H (7)**	Some significant archaeological resources were identified within the development area	**H (7)**	Some significant archaeological resources were identified within the development area
DURATION	**H (5)**	Where manifest, the impact will be permanent	**H (5)**	Where manifest, the impact will be permanent
EXTENT	**L (1)**	Localised within the site boundary	**L (1)**	Localised within the site boundary
PROBABILITY	**H (4)**	It is possible that any significant archaeological resources will be impacted	**L (1)**	It is extremely unlikely that any significant archaeological resources will be impacted
SIGNIFICANCE	**M**	(7+5+1)x4=52	**L**	(7+5+1)x1=13
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: - Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				
RESIDUAL RISK: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources				

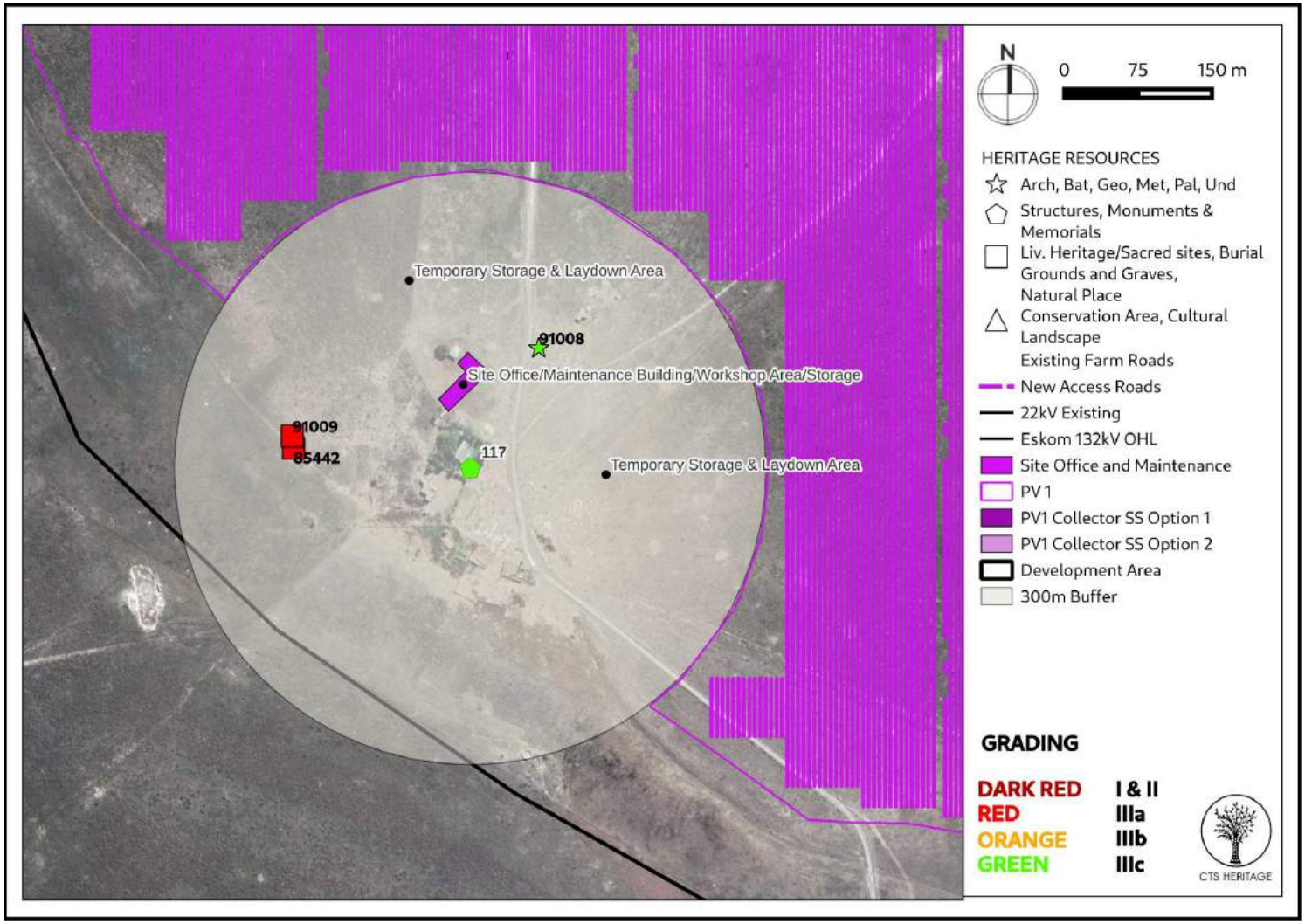

Figure 5.1: Map of heritage resources identified during the field assessment relative to the proposed development footprint with recommended mitigation measures

5.1.3 Palaeontology

The proposed solar PV development (in the south) is mostly underlain by surface limestone while the Lime Acres Member (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation) crops out in the north-eastern portion of the development. The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the Quaternary surface limestones are High and that of the Lime Acres member, Daniëlskuil and Kuruman Members are Very High (Almond and Pether, 2009; Almond *et al.*, 2013). Due to the weathered and relatively scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. However, just east of the development, well-preserved stromatolite outcrops in the Lime Acres Member (Altermann & Wotherspoon 1995) were identified, while Almond (2015) found well-preserved stromatolites south of the R385, north of Lime Acres. These well-preserved outcrops are located just south-west of the present study area. The possibility of well-preserved stromatolite finds is thus possible.

Table 7: Impact table for Palaeontological Heritage Resources impacted by the Solar Energy Facility

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (1)**	According to the SAHRIS Palaeosensitivity Map (Figure 3.1), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.	**L (1)**	According to the SAHRIS Palaeosensitivity Map (Figure 3.1), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Limited to the development footprint	**L (1)**	Limited to the development footprint
PROBABILITY	**L (1)**	It is unlikely that significant fossils will be impacted	**L (1)**	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	**L**	(1+5+1)x1=7	**L**	(1+5+1)x1=7
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	**L**	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: • The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities • Should any previously unrecorded palaeontological resources 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.				
RESIDUAL RISK: None				

5.2 Sustainable Social and Economic Benefit

According to information provided by the client, positive anticipated benefits include:

- Creation of local employment and business opportunities, skill development and training
- The development of infrastructure for the generation of renewable energy

The Limestone PV1 Solar Energy Facility has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. Limestone PV1 Solar Energy Facility also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment. Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. . Renewable energy will help offset the country's overall carbon emissions from the energy generation sector."

As such, on condition that the recommendations indicated in Section 7 and 8 are implemented, the anticipated socio-economic benefits of the proposed development outweigh the likely impacts to heritage resources.

5.3 Proposed development alternatives

For the purposes of heritage impact assessment, the location and layout alternatives that were considered are detailed below. Other alternatives considered include activity alternatives and technology alternatives however these alternatives will have negligible impact to heritage resources and as such, are not considered further.

Location Alternatives

"The development site identified for the Limestone PV1 Solar Energy Facility is located ~16km south-east of the town of Danielskuil. The placement of a solar PV facility is dependent on several factors including land suitability,

climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project. AGV Projects (Pty) Ltd considers the preferred development area placed within the study area as being highly favourable and suitable for the establishment of a solar PV facility."

Design and Layout Alternatives

"The overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, social and environmental impacts. The findings of the specialist scoping assessments will assist the developer in selecting the optimum position for the PV arrays and associated infrastructures including, but not limited to, access roads, and laydown areas.

An overall environmental scoping sensitivity map has been compiled in order to illustrate the sensitive environmental features located within the project site identified at this stage in the process which needs to be considered and, in some instances completely avoided by the development footprint. Once more detailed information is available from an environmental and planning perspective for the broader site following detailed specialist studies, a detailed micro-siting exercise will be undertaken to effectively 'design' the solar facility layout within the project site, which will be known as the development footprint. Through the process of determining constraining factors and environmentally sensitive areas, the layout of the PV facility footprint and infrastructure will be planned and adjusted if necessary to ensure the avoidance of no-go areas and mitigation of sensitive environmental features. A detailed facility layout has been developed and made available for assessment and ground-truthing by the independent specialists in the EIA phase. Where further conflicts are predicted, a mitigation strategy was developed to meet the objectives of the mitigation hierarchy (avoid, minimise, mitigate)."

The Do-Nothing Alternative

"The 'do-nothing' alternative is the option of not constructing and operating the Limestone PV1 Solar Energy Facility. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a Solar Energy Facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. This alternative was assessed within the EIA Phase of the process."

The proposed location and layout assessed in this report are appropriate from a heritage perspective on condition that the recommendations outlined below are implemented.

5.4 Cumulative Impacts

According to the VIA completed for the project, the proposed project will result in loss of rural landscape. The cumulative visual impact of the proposed Limestone PV Facilities and the other authorised renewable energy projects will primarily occur on the plains. The anticipated cumulative visual impact is expected to be of high significance. At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. Although this project falls outside of a REDZ area, it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

To address concerns about the cumulative impact of RE facilities within the greater region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The placement of RE facilities must take cognisance of the very high visual impact on a relatively intact and representative cultural landscape, and the extremely limited ability to visually screen this infrastructural development.

Table 8: Cumulative Impact Table

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

Figure 6: Cumulative Impact Map. Indicating other Renewable Energy Facilities that have been granted Environmental Authorisation (EA). The EA that overlaps this development area has lapsed.

5.5 Site Verification

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

- The cultural value of the pristine Karoo Landscape is very high (Very High)
- Some significant archaeological resources were identified within the development area (High)
- No highly significant palaeontological resources were identified within the development area, however the geology underlying the development area is very sensitive for impacts to significant fossils (Very High)

As per the findings of this assessment, and its supporting documentation, the outcome of the sensitivity verification confirms the results of the DFFE Screening Tool for both Palaeontology and for Archaeology and Cultural Heritage. This evidence is provided in the body of this report and in the appendices (Appendix 1 and 2).

6. RESULTS OF PUBLIC CONSULTATION

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

7. CONCLUSION

As noted by the VIA completed for this project, ““The greater landscape of the study area is characterised by wide-open spaces and very limited development. It should however be noted that there are a few authorised (and current)/proposed renewable energy applications within the study area and the greater region, that may change the landscape to some degree in the future.”

As was anticipated, the archaeological field assessment revealed a great many heritage resources evident within the development area. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. No further mitigation for impacts to these heritage observations is recommended. A number of heritage resources of significance were identified in the broader area. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and asbestos mining infrastructure. The relationship between the mining infrastructure, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the

unique past of this area. It is important that the spatial relationship of these resources is not disrupted by the proposed development.

Due to the weathered and relatively scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

8. RECOMMENDATIONS

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that:

- The recommendations of the VIA must be implemented
- A 300m no development buffer for PV infrastructure must be implemented around Site 117. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site Office infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
157393	Heritage Statement	Shahzaade e Karodia Khan, Johan Nel	01/02/2014	HERITAGE STATEMENT FOR THE BASIC ASSESSMENT UNDERTAKEN FOR A POWERLINE UPGRADE, SYFERFONTEIN MINE, SECUNDA, MPUMALANGA PROVINCE
358403	HIA Phase 1	Anton van Vollenhove n	10/08/2015	A report on a Cultural Heritage Impact Assessment for the Development of a De-stoning Plan at the New Denmark Colliery, close to Standerton, Mpumalanga Province
5014	AIA Phase 1	Julius CC Pistorius	01/06/2007	A Phase 1 Heritage Impact Assessment Study for the Proposed New 88 kV Power Line Running from the Majuba Power Station near Amersfoort to the Camden Power Station near Ermelo in the Mpumalanga Province
5059	AIA Phase 1	Johnny Van Schalkwyk	01/05/2003	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline Bethal and Highveld Ridge
5700	AIA Phase 1	Johnny Van Schalkwyk	01/10/2002	A Survey of Cultural Resources for the Proposed New Tutuka-Alpha Standerton Power Transmission Line, Standerton District
7920	AIA Phase 1	Johnny Van Schalkwyk	01/02/2004	Heritage Impact Assessment for the Planned Sivukile Extension 4 Township Lekwa Municipality

APPENDICES

APPENDIX 1: Archaeological Assessment (2022)

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Danielskuil PV and WEF, Northern Cape

Prepared by

CTS HERITAGE

In Association with

Savannah

November 2022

EXECUTIVE SUMMARY

AGV Projects (Pty) Ltd is proposing the development of two commercial Solar Energy Facilities and a Wind Energy Facility located on a site located south-east of the town of Danielskuil in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality.

As was anticipated, the archaeological field assessment revealed a great many heritage resources evident within the development area. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. No further mitigation for impacts to these heritage observations is recommended.

A number of heritage resources of significance were, however, identified. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and asbestos mining infrastructure. The relationship between the mining infrastructure, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area. It is important that the spatial relationship of these resources is not disrupted by the proposed development. Various mitigation measures are proposed in Table 2 above and in the below recommendations in order to mitigate these impacts.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that the following mitigation measures are implemented:

1. A 100m no development buffer must be implemented around sites 19, 28, 19, 51 and 85449
2. A 300m no development buffer must be implemented around site 78
3. A 500m no development buffer for PV infrastructure and a 1km no development buffer for WEF infrastructure must be implemented around Site 117. Should Site 117 form part of the operational infrastructure for the PV facility, a buffer area of 300m is appropriate.
4. The identified sensitive no-go areas indicated in Figures 8.3 (for sites 74, 75 and 76) and 8.4 (for site 90) must be adhered to for all and any proposed infrastructure including PV panels, turbines, grid connection infrastructure and roads
5. A conservation management plan must be drafted for the ongoing management and conservation of the rock art and its associated archaeology identified at Site 90
6. Should any human remains, burials or burial grounds be uncovered during construction activities, work must cease in the vicinity of the find and the SAHRA Burial Grounds and Graves Unit must be contacted regarding a way forward.
7. Should any archaeological resources be uncovered during construction activities, work must cease in the vicinity of the find and the SAHRA Archaeology, Palaeontology and Meteorites Unit must be contacted regarding a way forward.

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CONTENTS

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1. INTRODUCTION

1.1 Background Information on Project

AGV Projects (Pty) Ltd is proposing the development of two commercial Solar Energy Facilities and a Wind Energy Facility. The Solar Energy Facility will be located on a site located ~16km south-east of the town of Danielskuil in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site comprises the following farm portion:

- Portion 4 of the Farm Engeland 300

The Limestone PV facilities will each have a contracted capacity of up to 75-100MWp. A broader study area of 1842 ha and a preferred project site with an extent of 200-300ha has been identified by AGV Projects (Pty) Ltd as a technically suitable area for each development of the Limestone PV facilities. Each Limestone PV project site is proposed to accommodate the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area with security and access control
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation
- Battery Energy Storage System (BESS) with a footprint of 3-5ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 1ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 4m wide).
- Temporary concrete batching facility
- Stormwater management infrastructure as required

The Wind Energy Facility will be located on a site located ~10km west of the town of Danielskuil in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and Tsantsabane Local Municipality in the ZF Mgcawu District Municipality. The project site comprises the following farm portions:

- Portion 3 of Farm Ouplaas 304
- Portion 2 of Farm Ouplaas 304
- Portion 4 of Plaas 457
- Portion 5 of Plaas 457
- Portion 2 of Plaas 457
- Remaining Portion of Plaas 457

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- Portion 2 of Farm Doornvlei 305
- Portion 0 of Farm Lemoenkloof 456
- Portion 2 of Farm Lemoenkloof 456
- Remaining Portion of Plaas 455

The Oryx Wind Energy Farm will have a contracted capacity of up to 360MW and is proposed to accommodate the following infrastructure:

- Up to 60 wind turbines with a maximum hub height between 100-140m and rotor diameter between 130-180m.
- Concrete turbine foundations to support the turbines
- 33kV cabling to connect the wind turbines to the onsite substations, to be laid underground and overhead where applicable
- Inverters and transformers
- Temporary laydown areas for, setup assembly and storage.
- Temporary concrete batching plant
- Construction compounds
- Up to 2x 33kV/132kV onsite substations each having a footprint of 0.5-0.6ha
- Cabling from onsite substations to collector substation
- Electrical and auxiliary equipment to support the function of the substation, including substation yard, control buildings, fences etc. Camera surveillance
- Internet connection
- Battery Energy Storage System (BESS).
- Laydown and crane hardstand areas

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1.2 Description of Property and Affected Environment

Two areas have been selected for the renewable energy facilities for the Danielskuil project. The solar PV areas lie on flat, level ground, 10km east of Lime Acres around the Olien substation. The wind energy facilities are on the ridges and hills of the Asbestos Hills west of Danielskuil and north of the small mining town of Owendale. The area is well known for its intensive mining industries for over 100 years related to iron ore, asbestos, diamonds and lime, amongst others. Historic asbestos mines dot the hills of the Asbestos range and larger, mechanised mines near Owendale are now inactive too given the negative health risks associated with prolonged exposure to asbestos dust.

The solar PV facility lies on the Engeland Farm east of Lime Acres and the Ouplaas and Lemoenkloof farms in the WEF area have since been subdivided into smaller portions with cattle farming being the main farming activity. Wild game farming of various antelope is taking place on parts of Lemoenkloof and we also saw sheep on some farms. More recently, solar farms have been built in the area and the completed Jasper Solar farm lies to the south of the R385 which connects Danielskuil and Lime Acres to Postmasburg further west. A massive tower for the Redcap Concentrated Solar Plant (CSP) was being completed at the time of the survey which will be surrounded by a battery of mirrors adjacent to the Jasper Solar farm. A large number of high voltage overhead powerlines span the area due to the large number of mines in the area and the proximity of this grid infrastructure has been chosen carefully in the design of the renewable facilities to take advantage of the wind and solar conditions present on site. Besides the OHLs, there are also a number of relatively good highways and railways crisscrossing the study area and connecting the mines to the various depots.

Most of the buildings recorded at the various werfs were built in the 20th century and do not contain very old original fabric but older stone walling and graves are present at the England farm. The vegetation ranges from the Ghaap Plateau Vaalbosveld in the solar PV area on nearly flat calcareous ground to the Olifantshoek Plains Thornveld and Kuruman Mountain Bushveld which dominate the majority of the WEF study area with rocky, bushy vegetation and thorn trees on the ridges and grassland and low shrubbery vegetation found on the plains.

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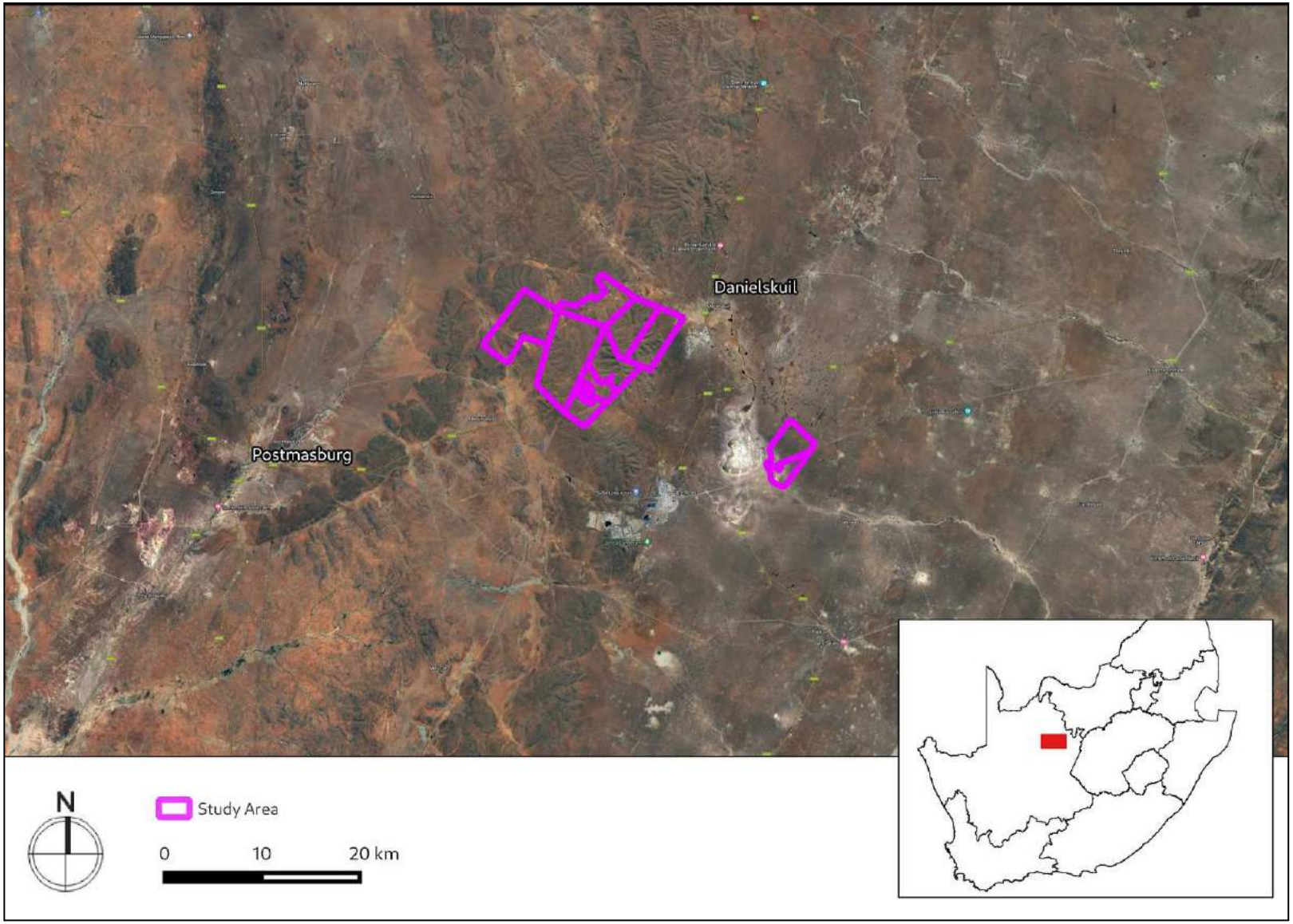

Figure 1.1: Close up satellite image indicating proposed location of development

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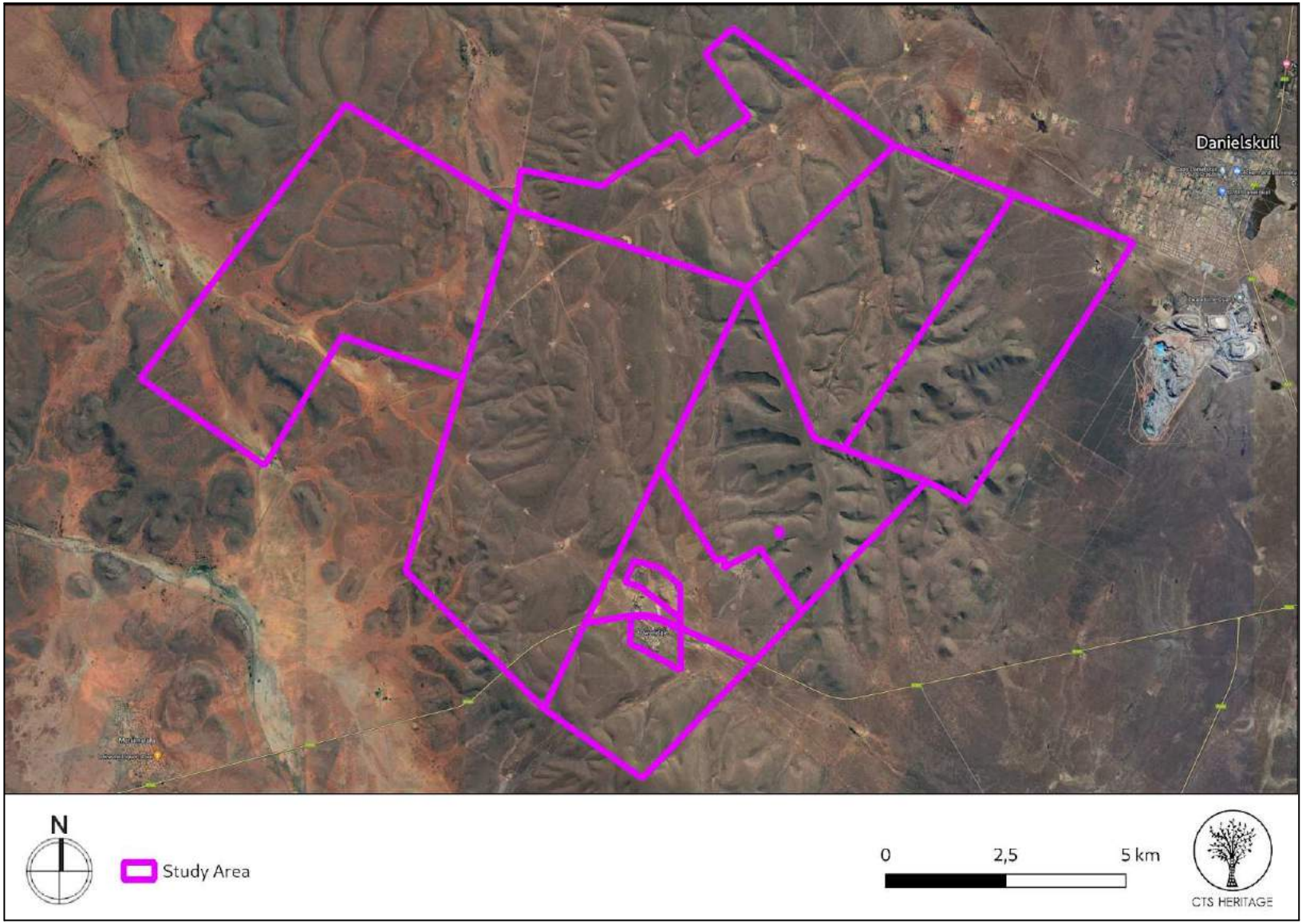

Figure 1.2: Area proposed for development including the proposed WEF development area

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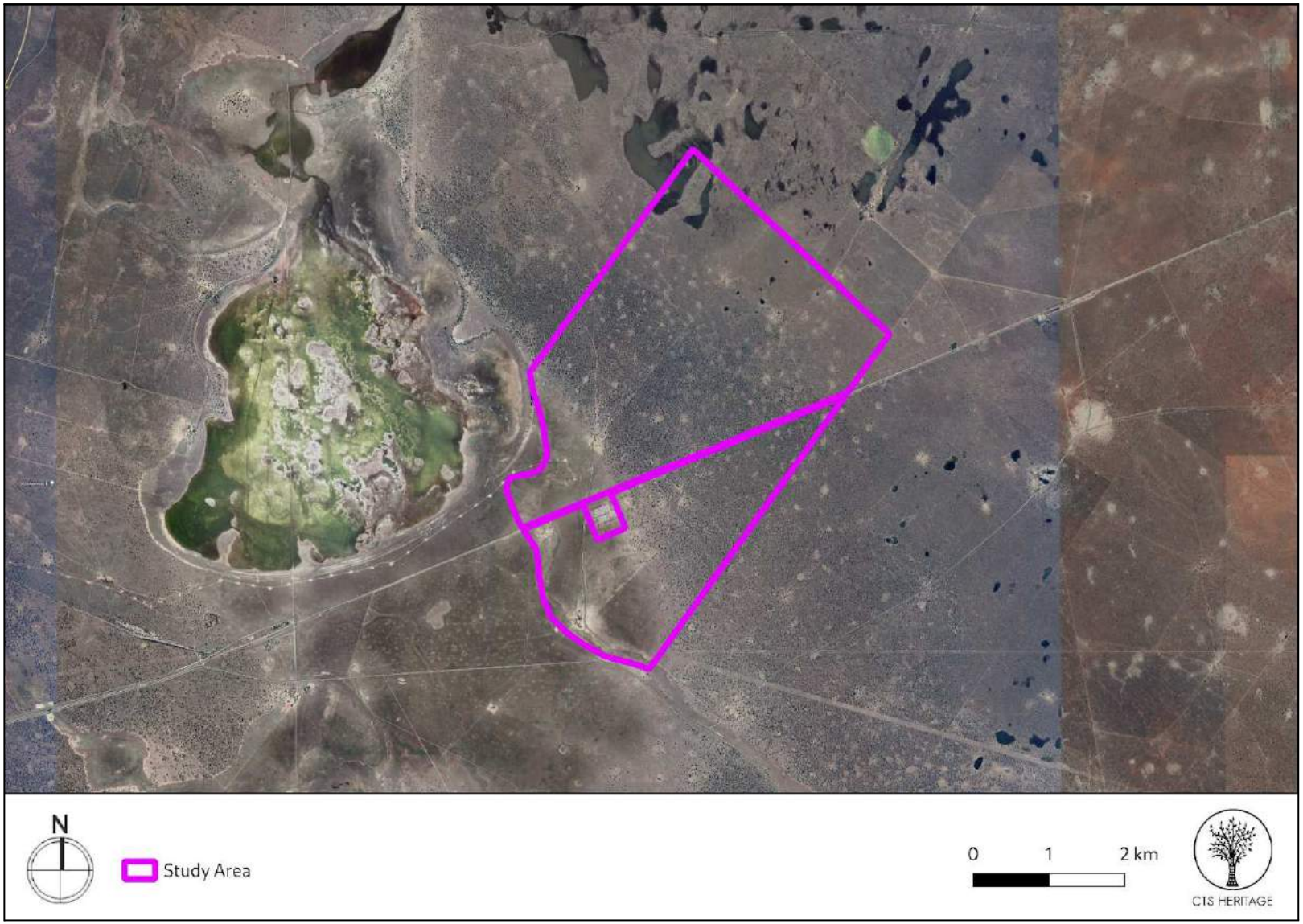

Figure 1.3: Area proposed for development including the proposed PV development area

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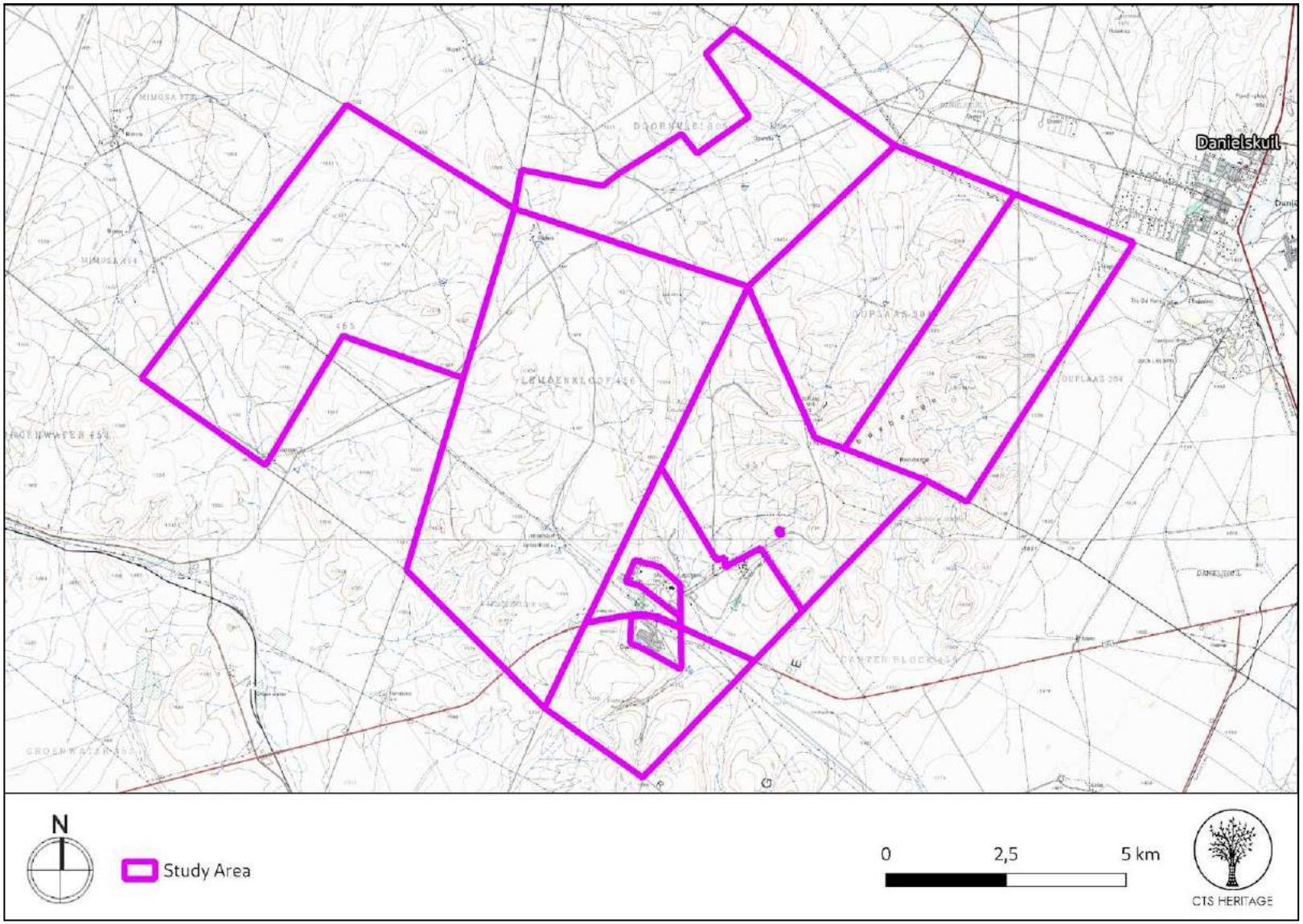

Figure 1.3: Area proposed for development including the proposed WEF development area

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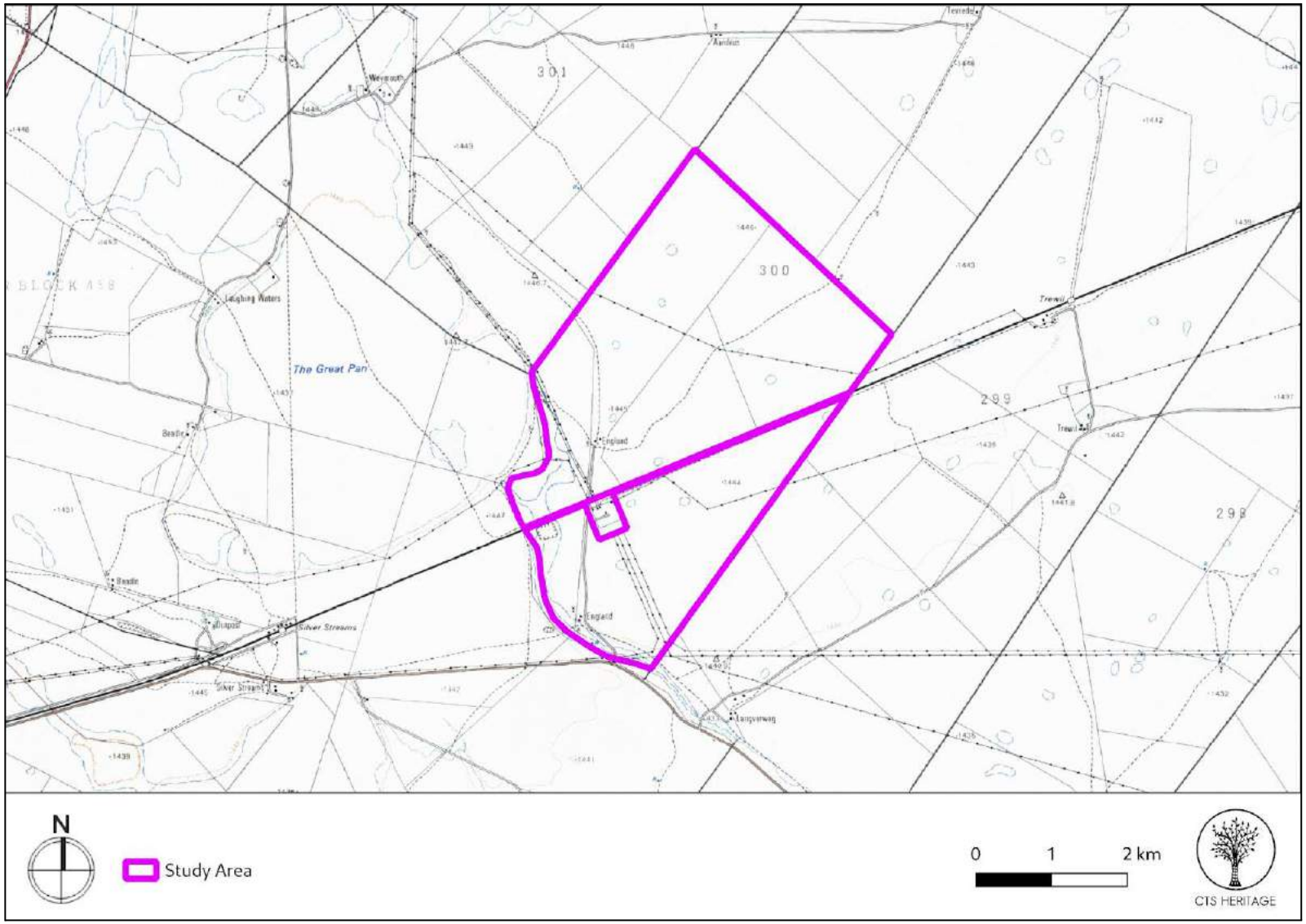

Figure 1.3: Area proposed for development including the proposed PV development area

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2. METHODOLOGY

2.1 Purpose of Archaeological Study

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

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs from **21 - 26 September 2022** to determine what archaeological resources are likely to be impacted by the proposed development.
- The area proposed for development was assessed on foot, mountain bike and 4x4 vehicle, photographs of the context and finds were taken, and tracks were recorded (at 100m intervals) using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

2.3 Constraints & Limitations

Grassland and shrubbery covered much of the study area at the time of the survey and recent good rains meant the vegetation was quite dense in places. However, small patches of exposed ground were regularly encountered and this meant that the observation of visible archaeological material was not significantly impeded overall. The ground was much rockier on the ridges but despite this archaeological material was still identified without too much trouble in these areas. The survey therefore obtained a good account of the archaeological sensitivity of the area.

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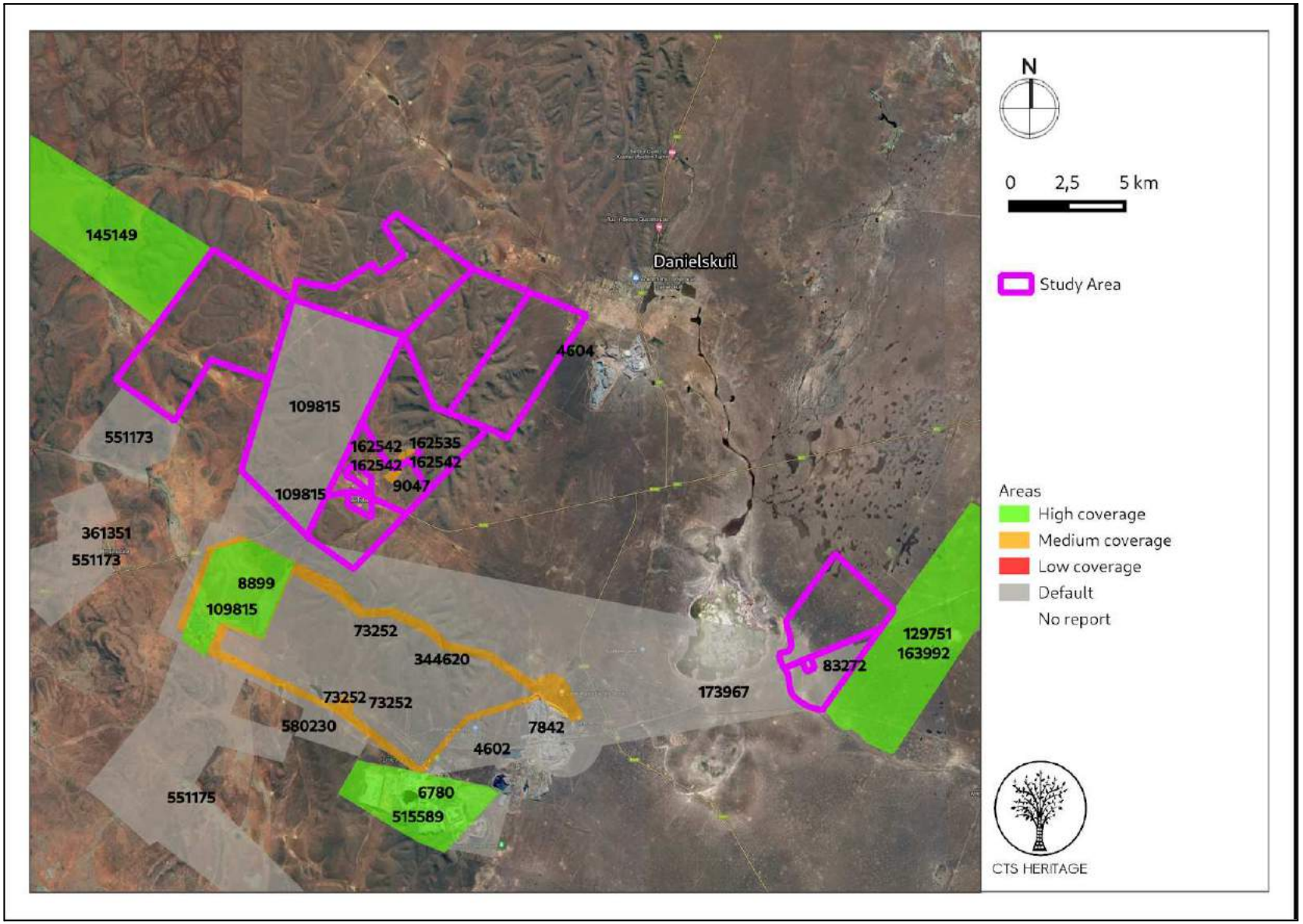

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

This application is for the proposed development of a Wind and Solar Energy Facility located between Danielskuil and Postamsburg in the Northern Cape. Originally a station of the London Missionary Society called Sibiling, Postmasburg became a Griqua village with the name Blinkklip and was then proclaimed a town on 6 June 1892. Postmasburg achieved municipal status in 1936. Postmasburg had its own diamond rush. The first diamond was discovered in 1918 and as a result an open cast mine grew. The mine was permanently flooded in 1935 and as a result, just like Kimberley, Postmasburg could also boast its very own “Big Hole”. This hole is over 45 m deep and filled with fish. Postmasburg also boasts spectacular architecture and many historical sites. An old blue dolomite stone Reformed Church was built in 1908. There is also a rather impressive gun known as “Howitzer Gun” which stands at the civic centre. It honours the men of Postmasburg who died during World War II. The proposed development is also located in close proximity Lime Acres, home to the employees of the Finsch Diamond Mine located nearby.

Cultural Landscape

In 1801, the London Missionary Society also established a station among the Griqua at *Leeuwenkuil*. The site proved too arid for cultivation and in about 1805 they moved the station to another spring further up the valley and called it *Klaarwater*. Their second choice was little better than their first, and for many years a lack of water prevented any further development. The name of the settlement was changed later to Griquatown or *Griekwastad* in Afrikaans. They lived among a mixed nomadic community of the Chaguriqua tribe and "bastaards" (people of mixed origin) from Piketberg. Their two leaders were Andries Waterboer and Adam Kok II. From 1813 to 17 July 1871, the town and its surrounding area functioned as Andries *Waterboer's Land*. *Griekwastad* was later the capital of British Colony Griqualand West from 1873 to 1880, with its own flag and currency, before it was annexed into the Cape Colony. The proposed development is located on one of the main routes between Griekwastad and Kuruman and as such, evidence of this heritage may be impacted by the proposed development.

Danielskuil derives its name from a cone-shaped depression deep in the dolomitic limestone; with a domed covering, reminiscent of the biblical ‘Daniel in the lions' den’. The Griqua leader Adam Kok is said to have used this depression as a prison, and to also have kept snakes in it. The area was famous because of the Griqua Chief who ruled there by the name of Barend Barends. Barend Barends was the son of a “half-Hottentot Dutchman” and one of the most important leaders along the turbulent northern frontier of the Cape Colony from 1790 to 1834. He was one of the first chiefs of the Griqua tribe, an indigenous Khoi group. A book, Barend Barends - Die Vergete Kaptein van Danielskuil**,** has been recently published about his story. During the Anglo Boer war (1899-1902) the British army built and used a blockhouse fort, which overlooks the town from the north.

Archaeology

An archaeological assessment of the Finsch Mine was completed by Henderson in 2005 (SAHRIS ID 6780). Henderson drafted a brief history of the Finsch Mine and this is not repeated here. Suffice to note that “Recent human activity at the Finsch Mine, which would have left traces of mining and structures, therefore only dates back to 1959 on Brits. It would appear that there may be an earlier date for farming activities on Bonza”. Elements of the cultural landscape that may be impacted by the proposed development include the sense of place of the historic core of Postmasburg as

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well as the mining and farming heritage of the area.

Due to mining activities in the area, a number of heritage impact assessments have been completed in close proximity to the development area and these are relevant here (Figure 2 and Appendix 2). The well known Taung site that preserved early hominid remains is located only some 50 kilometres to the west of the site under investigation. Wonderwerk cave near Kuruman also retain evidence of early peoples in its 6 meter midden deposit, especially in the rear portions of the cave. Towards the front rock-art from later Stone Age peoples are also preserved. Furthermore the engraving sites Wildebeestkuil, Driekopseiland and Nooitgedacht near Kimberly confirm a continued presence of Later Stone Age peoples in the general region. It is very likely that significant archaeological heritage may be impacted by the proposed development.

A recent HIA completed by CTS Heritage located south of this proposed development area (CTS 2022) revealed a great many heritage resources evident within the broader context. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. A number of heritage resources of significance were, however, also identified. These resources range from significant archaeological sites and scatters, to burial grounds and graves as well as historic farm werfs and infrastructure such as the irrigation furrows ascribed to the work of the London Missionary Society and the local Griekwa population. The relationship between the furrows, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area and its Griekwa inhabitants. It is likely that similar heritage resources are located within this development footprint.

A number of known heritage resources that have been identified through other Heritage Impact Assessment processes are located within the assessment area. It is recommended here that the mitigation measures previously proposed for these resources are adopted for this project. This information is detailed below:

Table 1: Observations noted during past field assessments

Site ID	Site Name	Description	Grading	Recommended Mitigation
45547	PLCP1/Groenwater 453-04	Site PLCP1 comprises of a Colonial Period farmstead, situated on the property Plaas 455, including the main residence and 2 outbuildings. Later period structures, including a 2nd residence and garage are built on the property, but not impacting directly on any of the Colonial Period structures. All structures, both old and new are still in use. The Steenkamp family acquired the land about 12 years ago and not much is known about the old structures, aside from the fact that the main residence and 1 outbuilding is constructed of a sand-rich baked brick and have been plastered in order to ascertain maintenance thereof. The 2nd outbuilding is stone built. Based on architectural style of the main residence a date easily preceding 60 years is ascribed; structures may well date to the late 1800's / early 1900's	IIIA	Outside of development area
85442	HR06: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 004	An informal cemetery with 5 graves was identified at this location. The graves were placed in a single line next to each other and were orientated from west to east. The graves have informal mounds of soil and packed rocks as dressings. The graves are situated approximately 120m to the west of the farmstead. The graves are most probably associated with farm labourers who were previously working on the farm England. There was nobody on the farm to question about these graves. Site size: Approximately 5m x 15m.	IIIA	Adjust the development layout and demarcate site with at least a 10 metre buffer.

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85448	HR04: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 010	The remains of a circular stone walled kraal were identified at this location. The walls of the kraal measured only approximately 0.2m high and most probably served as the foundations of a structure which was used to keep livestock such as sheep or goats. Thorny branches were most probably used to keep wild animals outside and the stock inside. The structure measures approximately 5m in diameter and is situated approximately 25m south of an existing power line.	IIIC	Outside of development area
85449	HR05: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 011	The remains of an old mine shaft or exploration pit were identified at this location (Figure 30). The mine shaft or pit was identified on one of the northern slopes of the Rooiberge. The mine shaft or pit measures approximately 3m wide and approximately 12m long. The shaft is presently approximately 3m deep, but collapsed side walls partially refilled the shaft or pit.	IIIB	Adjust the development layout and demarcate site with at least a 50 metre buffer.
91007	Olien SEF002	Later Stone Age flakes on chert from a dispersed scatter in the northern part of the area	IIIC	None
91008	Olien SEF003	Remains of kraals made from calcrete cobbles.	IIIC	None
91009	Olien SEF004	A row of unmarked graves was documented	IIIA	The graves should be fenced and development must be restricted to no closer than 100 m.

Asbestos Mining in the Northern Cape

The area around Danielskuil has long been a centre of the asbestos mining industry in South Africa. The below summary of the history of asbestos mining in this area is largely extracted from Van Zyl (2017):

“Asbestos was mined in South Africa for more than a century, starting in approximately 1891 and ending in 2001. Asbestos is 'a highly heat-resistant fibrous silicate mineral that can be woven into fabrics, and is used in brake linings and in re-resistant and insulating materials.' The earliest reference to the occurrence of asbestos in South Africa can be found in the reports of Lichtenstein in 1805 and Burchell in 1812, following their expeditions into the interior. Both these observations were made in the Prieska/Koegas/Griquatown areas of the Northern Cape. This part of the country was incorporated into the Cape Colony in 1879 and is now known as Griqualand West.

During 1884 the land north of the Orange River up to the Molopo River became a Crown Colony. By then it had already been established that blue asbestos occurred over a distance of some 200 miles (approximately 300 kilometres) from south of Prieska to north of Kuruman, in what is generally referred to as the Asbestos Mountains in the south and the Kuruman Hills in the north.

In the early 18th century local inhabitants from the areas near Prieska were well aware of the existence of brous rock formations in their neighbourhood, and there is speculation that they may have used it on a limited scale as a building material or in pottery. They referred to it as doeksteen, meaning cloth rock. However, there was no commercial demand for it and therefore no need to exploit it.

When diamonds were discovered near Kimberley in the 1860s, work seekers flocked in from the surrounding areas.

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Those from Prieska brought with them rock samples containing blue asbestos, in an effort to evoke commercial interest. Large deposits of chrysotile asbestos were discovered in Canada around 1870, and the commercial use of this material was well established long before the first blue asbestos was mined. However factories using a specific fibre type successfully were loath to switch to unknown and untested types.

Early operations in the blue asbestos elds were rather primitive, with ore being extracted manually and thereafter cleaned on surface by chiselling off the attaching host rock with hammers to produce a clean 'cob' of bre. Cobs were bagged and sent to factories in England and Europe where the fibre was spun into fire-resistant and insulating cloth and yarn, which is still used for packing pumps and bearings, and in sealing caulk.

Virtually no infrastructure existed in these areas. The highest priority was to secure water at or near any site. Those properties on or near the Orange River, like Koegas and Westerberg, had an advantage over properties further away where water was extremely scarce. Many wells dug on farms in this semi-desert region turned out dry. All transport was animal drawn over dirt tracks, and the only communication with the outside world was the post cart service from Kimberley to Prieska, from where the transport wagons took the mail to Koegas. On occasion there was a break in communications when the Koegas mailbag from Kimberley fell off the cart before reaching Prieska! Final product had to be carted by wagon to De Aar, the nearest railway station some 250 kilometres away. From here it was railed to Port Elizabeth and shipped by steamer to Europe.

Asbestos mining in the Danielskuil area

By 1903 Cape was offered farms near Danielskuil, including Warrendale, where a few tons of bre had been recovered earlier. Water supply was however insufficient and the deposit considered too small to be of interest. A farm belonging to Mr van Staden was offered through Mr Bates, a promoter of Cape Town, but this was not followed through.

During 1907 Olds was instructed by the Kimberley office to proceed to properties in the north which were on offer to Cape. He set off on the 180 mile journey in a Cape cart, on the way calling in at Griquatown for normal business and then on to Postmasburg, where Mr Theo Scribante provided him with a guide. The first site visited was Billinghurst, about 50k's north of Danielskuil, where some fibre was opened up. Although Olds was satisfied with the quality, he did not think the deposit was large enough to be of interest to Cape.

Next stop was at Khosis (Ga-Tlhose) where the reef could not be located. The storekeeper was however requested to send samples and, provided quality and prices are acceptable, he could act as agent for Cape. On the return journey he called in at Farm 104 of Mr De Lange. According to Olds this was the best reef seen on the trip. Olds did not think any of these prospects could be worked by Cape, but crude might be bought from tributors provided prices and quality were acceptable.

Olds returned via Griquatown and called in at Kranskloof, a Gefco farm some 12 miles south-east of Griquatown, next to Elandsfontein. This property was worked by Christie & Carroll at the time. They claimed to have a contract with the Admiralty at prices far in excess of those being obtained by Cape. Although they did not want to disclose any details to Olds, he did memorise the bag markings. It is not known whether this information was of any value at a later stage but

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not long afterwards this operation floundered. Olds covered some 500 miles in 3 weeks visiting the various sites.

During 1908 Cape's Kimberley office drew the London office's attention to the fact that Reuters cabled Cape's financial results of the previous year, released at the annual general meeting, to various countries, including South Africa. This led to a scramble by all and sundry for asbestos rights in the Northern Cape. It was feared by the local office that, should some successful new operators enter the market, prices may be forced down, to the detriment of Cape. London was urgently requested to ensure that such information remains confidential in future. Locally Cape started looking at other farms in the Prieska neighbourhood like Pypwater and Naauwgekneld. Olds was also instructed to establish who was opening up Glen Allen mine. By 1909 Cape realised that they were fast losing their monopoly in the blue asbestos business as new operators entered the fray and Cape found it impossible to buy up all the production. Cape reported that shopkeepers, schoolmasters (an obvious reference to Mr Cunningham of the Kuruman Public School) and ex-policemen were all digging!

Cape was also offered other opportunities in the minerals eld. During 1908 copper samples were delivered to Olds at Koegas. Oats followed up on the prospects which were apparently towards Upington. Olds also received some samples of saltpetre in 1905 which were evaluated by the DeBeers Explosives Works at Somerset West and found to be of good quality. After despatching a consignment of 800lbs to them, he was advised to discontinue all efforts towards this business as railage costs to the factory rendered it totally uneconomical. This was also the time when large deposits of chrysotile asbestos were discovered in Rhodesia and Old's brother was sent to the Hartley area to report on these for Cape. All in all, by 1910 some 40 farms were already known to either have substantial reserves of blue bre on it or had the potential to be turned into small payable operations. These stretched from south-east of Prieska to well north of Danielskuil.

By 1981 it was clear that the blue market was under severe pressure and that survival depended on drastic actions. During 1985 the Atmospheric Pollution act of 1965, originally applicable to gold mines, was made applicable to asbestos mining as well. The Heuningvlei site, having already been closed, was the first to be rehabilitated, with a closure certificate issued end 1985. No prescribed standards were as yet in place and the 'best practice' method was applied. In accordance with the then applicable legislation regarding the rehabilitation of defunct asbestos mines, Gefco entered into negotiations with the Department of Minerals and Energy to determine Gefco's liabilities. In the end the State accepted responsibility for the rehabilitation of certain mines, whilst Gefco attended to the mines considered its own responsibility.

Stripping of the mines commenced and rehabilitation actions continued through to 2006, when closure certificates were obtained for all the Gefco blue asbestos mines in the North West and Northern Cape provinces. So ended the exploitation of blue asbestos in South Africa, after more than 100 years."

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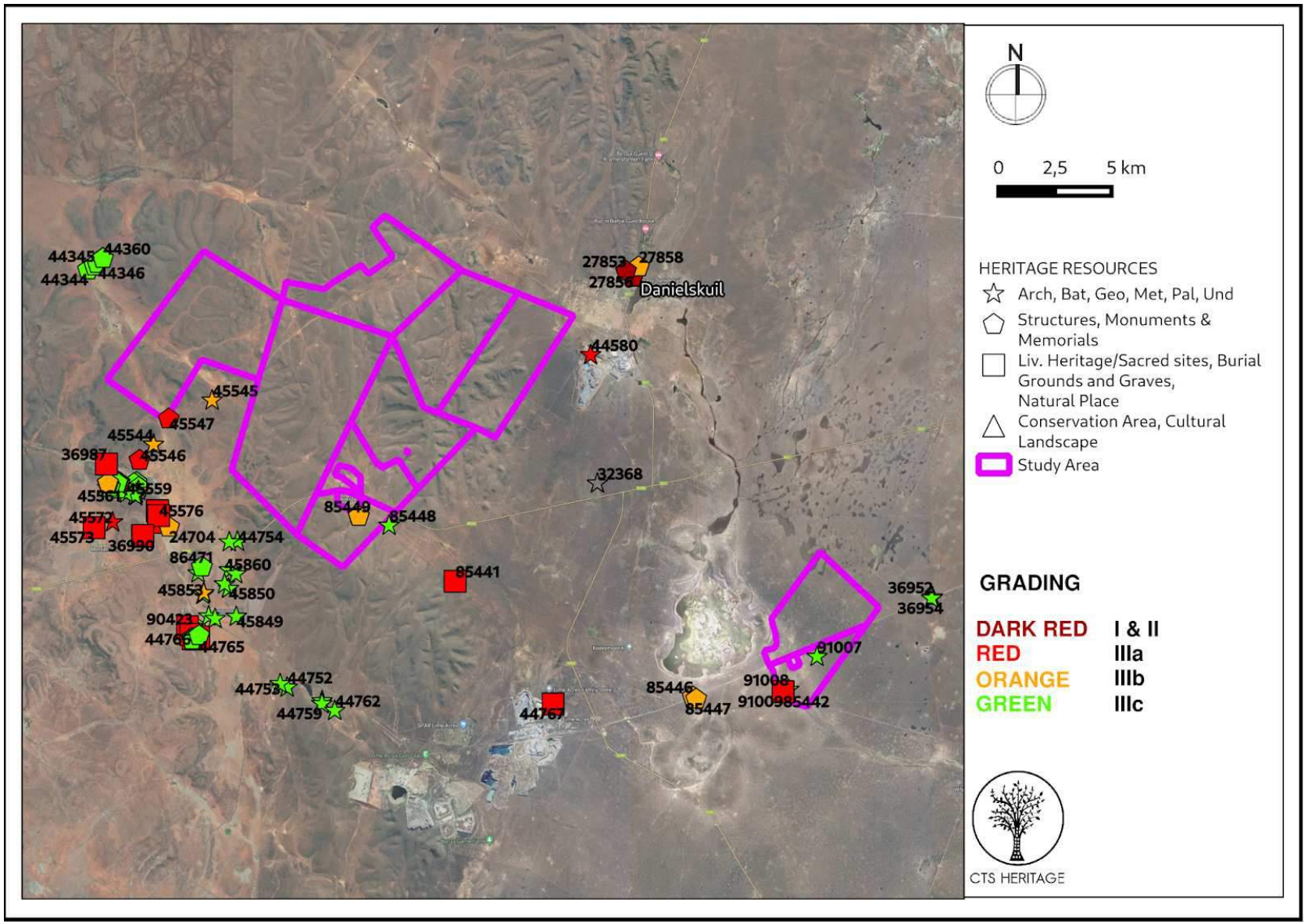

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated (see Heritage Screening Assessment for insets)

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

Given the very large area assessed, particularly for the WEF west of Danielskuil, a large number of observations were made totalling nearly 160 in all. Most of these observations were made of open air stone tool scatters dating to the Middle Stone Age using the abundant and locally available sources of hornfels stone. There was a strong early MSA component distributed throughout the area and weathering and deposition conditions are favourable in many areas of the study site to view these artefacts on the surface. Larger numbers of LSA scatters were also found, particularly on the level ground surrounding the wetlands near the pans for the PV area.

More significant sites worthy of conservation and avoidance in the design of the final layouts included a small geometric and historical rock engraving site at Darehope farm (part of Lemoenkloof) as well as a site with rock paintings consisting of vertical daubs in a small kloof east of the Owendale asbestos mine. This site was associated with a large number of LSA stone tools on the talus slope and impacts on this site can easily be avoided. Certain features and resources at the Engeland farm, previously recorded, are worthy of conservation such as the farm graves and the stone walling in the farm complex.

Besides the Stone Age and historical built environment heritage resources, we also recorded a number of historic mining features related to the early asbestos mining exploration in the area in the late 19th century. These open shaft mining pits are still left in relatively good condition given their age and nature of excavation by hand. Most of the pits can also be avoided from impact in the planning of access roads and OHL or underground power lines connecting the wind turbine positions once they are proposed. Given the recent disaster of the collapsed slimes dam at Jagersfontein mine in the Free State, the viability of industrial mining tourism, conservation and management of archaeological mines should be debated and investigated by SAHRA at a national level in bringing the various stakeholders and the mining industry together towards a clear vision and direction for managing these resources.

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Figure 4.1: Contextual Image from the western side of the WEF area near Darehope farm.

Figure 4.2: Contextual Image from the western side of the WEF area near Darehope farm.

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Figure 4.3: Contextual Image from the western side of the WEF area near Darehope farm.

Figure 4.4: Contextual Image of the low hills and ridges in the WEF area.

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Figure 4.5: Contextual Image of the low hills and ridges in the WEF area.

Figure 4.6: Contextual Image of the low hills, grassland and ridges in the WEF area.

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Figure 4.8: Contextual Image of typical kraal in the WEF area.

Figure 4.9: Looking east along one of the access roads straddling the WEF area.

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Figure 4.10: Contextual Image of the extensive OHL infrastructure.

Figure 4.11: Contextual Image of the low hills and ridges in the WEF area from the southern end of Lemoenkloof.

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Figure 4.12: Looking out from a small ridge onto the valleys inbetween the hills in the WEF area.

Figure 4.13: Small stock post on top of ridges at Lemoenkloof.

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Figure 4.14: Overlooking the circle irrigation areas adjacent to the closed Owendale Asbestos mine from the farm werf.

Figure 4.15: Contextual Images of Development Area indicating electrical infrastructure

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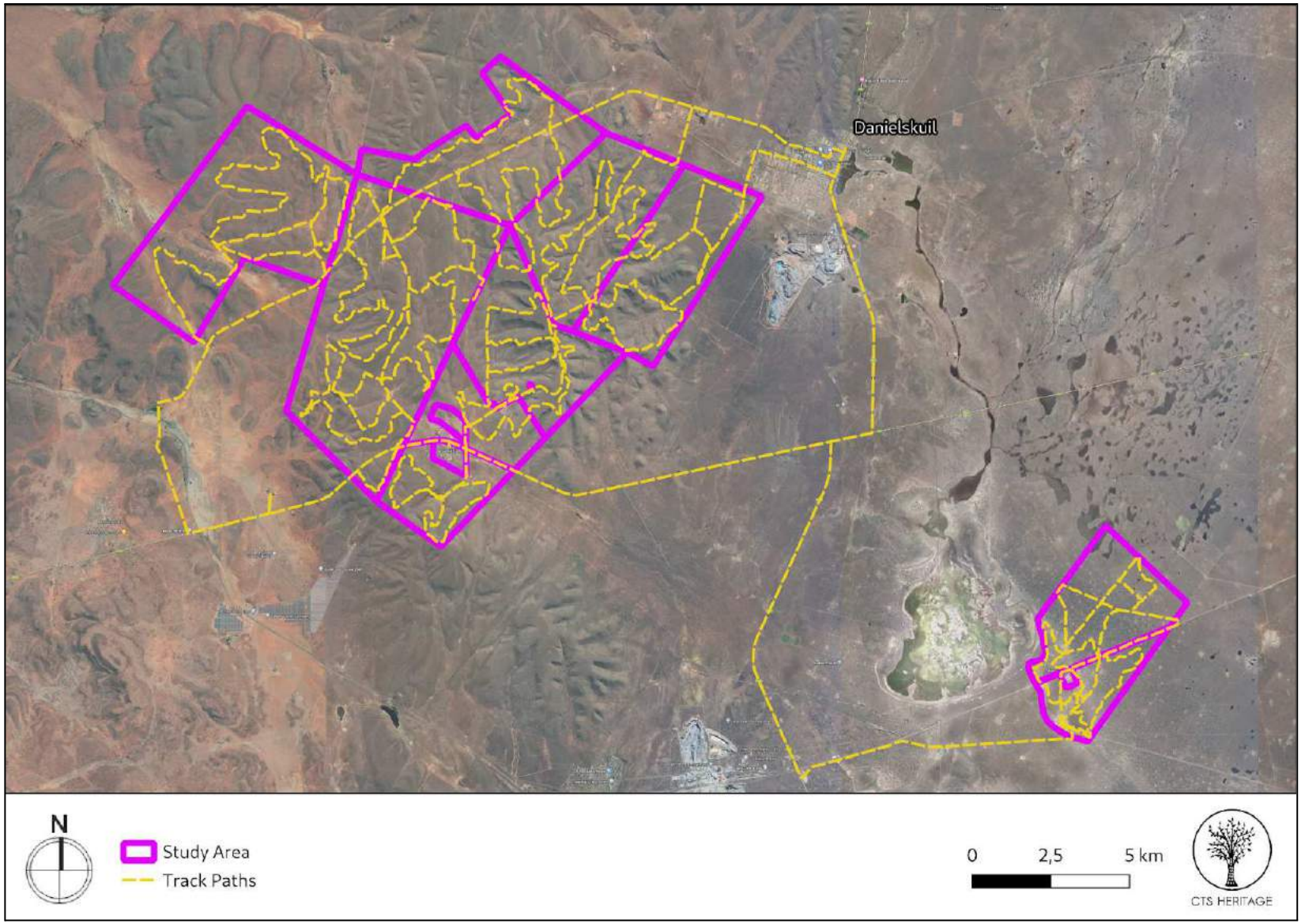

Figure 5.1: Overall track paths of foot survey

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4.2 Archaeological Resources identified

Table 2: Observations noted during the field assessment

Obs #	Description	Period	Density	Co-Ordinates		Grading	Mitigation
001	Hornfels core and prepared flake with scarring	MSA	0 to 5	-28.2253645	23.33340963	NCW	NA
002	Thin reddish hornfles point	LSA	0 to 5	-28.21159135	23.33156536	NCW	NA
003	Hornfels cores and trapezoid flakes	MSA	5 to 10	-28.21629522	23.34075362	NCW	NA
004	Yellow hornfels point and retouched flake	MSA	0 to 5	-28.21809838	23.35054079	NCW	NA
005	Long triangular retouched hornfels flake	MSA	0 to 5	-28.20516423	23.34596779	NCW	NA
006	Series of hornfels flakes, one with edge retouch around nearly the whole edge	MSA	5 to 10	-28.20327552	23.34754264	NCW	NA
007	Hornfels core and long blade flake	MSA	0 to 5	-28.20004721	23.35594895	NCW	NA
008	Hornfels points	MSA	0 to 5	-28.19664031	23.36798615	NCW	NA
009	Hornfels point and flake core	MSA	0 to 5	-28.19259721	23.35277819	NCW	NA
010	Yellow hornfels cores and flake blanks	MSA	5 to 10	-28.18705523	23.36196034	NCW	NA
011	Hornfels core	MSA	0 to 5	-28.18114162	23.37258732	NCW	NA
012	Early MSA hornfels prepared flake and cores	MSA	5 to 10	-28.19034443	23.37857045	NCW	NA
013	Patinated hornfels points and flakes	MSA	0 to 5	-28.1902381	23.38793087	NCW	NA
014	Hornfels points, patinated and core	MSA	0 to 5	-28.19852549	23.38791296	NCW	NA
015	Hornfels points	LSA	0 to 5	-28.2043247	23.38572331	NCW	NA
016	Patinated hornfels core	MSA	0 to 5	-28.21206992	23.35639555	NCW	NA
017	Retouched hornfels flakes and points	LSA+MSA	10 to 30	-28.21142268	23.36590499	NCW	NA
018	Hornfels radial core	MSA	0 to 5	-28.20737544	23.35448577	NCW	NA
019	Engravings on varnished base rock on hill terrace. Mainly geometric, poorly preserved, circles and scratch lines, possible claw print, 'sun' and block designs	Historic	n/a	-28.20780416	23.38075033	IIIB	100m no development buffer
020	Gladwin werf; mostly 1960s buildings	Modern	n/a	-28.1929642	23.39616766	NCW	NA
021	Hornfels core	MSA	0 to 5	-28.20126212	23.39048215	NCW	NA
022	Hornfels flakes – early MSA	MSA	0 to 5	-28.21120943	23.40109483	NCW	NA
023	Banded ironstone/hornfels core	MSA	0 to 5	-28.22190632	23.41108395	NCW	NA
024	Hornfels cores, flakes and blade forms	MSA	10 to 30	-28.21507144	23.42425268	NCW	NA
025	Hornfels core and flake	MSA	0 to 5	-28.21744652	23.43159562	NCW	NA
026	Hornfels core and yellow hornfels flakes	MSA	5 to 10	-28.20731395	23.42570603	NCW	NA
027	Yellow hornfels core	MSA	0 to 5	-28.2010571	23.41132083	NCW	NA
028	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.19793623	23.4212529	IIIB	100m no development buffer
029	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.20572458	23.42334521	IIIB	100m no development buffer

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030	Hornfels points	LSA	0 to 5	-28.21122849	23.39122888	NCW	NA
031	Hornfels adze and points	LSA	5 to 10	-28.21873433	23.39504301	NCW	NA
032	Hornfels flakes and points	MSA	0 to 5	-28.22275087	23.38744685	NCW	NA
033	Hornfels blade form	MSA	0 to 5	-28.2306012	23.38779775	NCW	NA
034	Hornfels core and siltstone flake	MSA	0 to 5	-28.22693979	23.4022723	NCW	NA
035	Patinated hornfels flakes	MSA	5 to 10	-28.23475914	23.39630368	NCW	NA
036	Hornfels core and retouched flake	MSA	0 to 5	-28.24127025	23.39372011	NCW	NA
037	Large hornfels flake blank and core	MSA	0 to 5	-28.22891319	23.40699346	NCW	NA
038	Hornfels flake blanks	MSA	0 to 5	-28.24911996	23.39347685	NCW	NA
039	Large hornfels blade	MSA	0 to 5	-28.24228738	23.38296348	NCW	NA
040	Hornfels cores and flakes	MSA	0 to 5	-28.25137969	23.37758052	NCW	NA
041	Reddish hornfels and dark hornfels flakes with edge retouch	MSA	5 to 10	-28.25475697	23.38309364	NCW	NA
042	Pointed hornfels flake, quite large with lateral retouch	MSA	0 to 5	-28.26226341	23.38477359	NCW	NA
043	Hornfels points and blade forms	MSA	5 to 10	-28.26509281	23.39274303	NCW	NA
044	Hornfels blade flake and radial core	MSA	0 to 5	-28.26178081	23.40360473	NCW	NA
045	Hornfels core and debitage	MSA	0 to 5	-28.24490019	23.40467709	NCW	NA
046	Reddish hornfels flake	MSA	0 to 5	-28.24220188	23.40999041	NCW	NA
047	Hornfels cores	MSA	0 to 5	-28.2495237	23.41532367	NCW	NA
048	Hornfels points and flakes, edge retouch	MSA	0 to 5	-28.24077684	23.41511466	NCW	NA
049	Hornfels flakes, retouch present on many flakes	MSA	5 to 10	-28.23581201	23.42101832	NCW	NA
050	Hornfels flakes with dorsal spine	MSA	0 to 5	-28.22819087	23.42379381	NCW	NA
051	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.22460973	23.4251647	IIIB	100m no development buffer
052	Hornfels flakes on darkened hornfels	MSA	0 to 5	-28.27030085	23.40372233	NCW	NA
053	Hornfels core and blade	MSA	0 to 5	-28.2750876	23.40134765	NCW	NA
054	Hornfels flakes, patinated	MSA	0 to 5	-28.27855689	23.39775702	NCW	NA
055	Hornfels core and flakes	MSA	10 to 30	-28.27493849	23.39399023	NCW	NA
056	Hornfels core and flake	MSA	0 to 5	-28.19349093	23.40337685	NCW	NA
057	Hornfels blade core and flake	MSA	0 to 5	-28.18609656	23.40852276	NCW	NA
058	Long patinated hornfels blade flake	MSA	0 to 5	-28.18401154	23.41800967	NCW	NA
059	Hornfels flakes	MSA	0 to 5	-28.18043947	23.42415581	NCW	NA
060	Hornfels core	LSA	0 to 5	-28.17529622	23.43793154	NCW	NA
061	Hornfels flakes and blade forms	MSA	5 to 10	-28.16675014	23.44537522	NCW	NA
062	Hornfels flakes, prom. b. of percussion, core	MSA	0 to 5	-28.18345157	23.45886127	NCW	NA
063	Hornfels cores and blade forms	MSA	0 to 5	-28.19485757	23.45759226	NCW	NA
064	Hornfels core flake, secondary scarring	MSA	0 to 5	-28.20260245	23.45231653	NCW	NA
065	Hornfels points	LSA	0 to 5	-28.18702782	23.44556352	NCW	NA
066	Early MSA hornfels flakes	MSA	0 to 5	-28.19455265	23.44109334	NCW	NA
067	Hornfels flake	MSA	0 to 5	-28.20688029	23.44805764	NCW	NA
068	Hornfels bladeforms	MSA	5 to 10	-28.21540308	23.44418737	NCW	NA
069	Patinated hornfels flakes	MSA	0 to 5	-28.21044034	23.43793018	NCW	NA
070	Hornfels flake with retouch	MSA	0 to 5	-28.19559693	23.43334175	NCW	NA

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071	Danielskuil Asbestos Mine, established early 20th century. Mined until 1990s. The older mining digs have more value in the pattern of mining history than this mine itself	Modern	0 to 5	-28.26086692	23.42421016	NCW	NA
072	Owendale mining town, early 20th century through to present. Buildings mostly prefabricated/ bulk construction for the mining compound. Has social significance in its place in the history of asbestos mining	Modern	0 to 5	-28.26702	23.42145788	IIIC	No direct impact anticipated however association with asbestos mining should be retained
073	Stone clad ruin with cinder blocks visible inside ruined walls. Probably 1930s or more recent construction	Modern	0 to 5	-28.26539212	23.42544193	NCW	NA
074	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.21881237	23.49105783	IIIB	No go area identified
075	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.22348756	23.48807124	IIIB	No go area identified
076	Old asbestos mine, part of the original mining exploration in the area	Historic	n/a	-28.22161722	23.48497266	IIIB	No go area identified
077	Old kraal with metal sheets, metal fence poles and trough on top of ridge	Historic	n/a	-28.22085165	23.48015861	NCW	NA
078	Ouplaas mine on top of ridge near communications towers	Modern	n/a	-28.2275902	23.45619894	IIIC	300m no development buffer
079	Ruined stock farming buildings	Historic	n/a	-28.25445389	23.43572115	NCW	NA
080	Yellow hornfels core	MSA	0 to 5	-28.26088374	23.43848199	NCW	NA
081	Laminated hornfels cores and flakes edge retouched	MSA	5 to 10	-28.26005809	23.44637578	NCW	NA
082	Banded hornfels flake and core	MSA	0 to 5	-28.25428668	23.45495447	NCW	NA
083	Hornfels cores, flakes	LSA+MSA	0 to 5	-28.24634671	23.4601051	NCW	NA
084	Hornfels blade flake and larger flake	MSA	0 to 5	-28.23897422	23.46261601	NCW	NA
085	Quartzite core, hornfels core and flakes	LSA	0 to 5	-28.23263189	23.45719656	NCW	NA
086	Hornfels blade flake and hafted flake	MSA	5 to 10	-28.22447109	23.44880932	NCW	NA
087	Hornfels core and flakes	LSA	0 to 5	-28.22705113	23.43887765	NCW	NA
088	Hornfels prom. b.o.percussion, quartz flakes	LSA+MSA	5 to 10	-28.23593929	23.43463182	NCW	NA
089	Hornfels flakes and core	MSA	0 to 5	-28.24938657	23.43459305	NCW	NA
090	Rock art site in slight shelter formed in the kloof. All vertical daubs, quite faded on a reddish laminar surface not suitable for painting. Over 200 daubs present with a fair number of LSA artefacts on talus	LSA	30+	-28.25082838	23.44869411	IIIA	No go area identified

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091	Patinated hornfels flakes	MSA	0 to 5	-28.24860361	23.4439005	NCW	NA
092	Hornfels point and flake blank	MSA	0 to 5	-28.24378978	23.44766178	NCW	NA
093	Retouched hornfels flake and core	MSA	5 to 10	-28.23609196	23.44972185	NCW	NA
094	Large hornfels flake/core with smaller yellower flake retouched	MSA	0 to 5	-28.28228793	23.40454642	NCW	NA
095	Hornfels prepared cores	MSA	0 to 5	-28.27396167	23.41453272	NCW	NA
096	Hornfels blade forms	MSA	5 to 10	-28.285847	23.41453215	NCW	NA
097	Hornfels blade, flakes	MSA	0 to 5	-28.28282266	23.42876074	NCW	NA
098	Reddish hornfels flakes, faceted platforms	MSA	0 to 5	-28.20933254	23.50886149	NCW	NA
099	Hornfels core and flake	MSA	0 to 5	-28.21244864	23.48899836	NCW	NA
100	Edge retouched hornfels flake	MSA	0 to 5	-28.23120001	23.49698706	NCW	NA
101	Hornfels flakes and cores, large bulb of percussion, retouch present on most pieces	MSA	5 to 10	-28.23856721	23.48568735	NCW	NA
102	Hornfels core and flake blank with large b.o.p.	MSA	0 to 5	-28.23191307	23.47396988	NCW	NA
103	Hornfels core with edge worked	MSA	0 to 5	-28.22492553	23.46834322	NCW	NA
104	Hornfels, radial core and flake	MSA	0 to 5	-28.21210992	23.48009896	NCW	NA
105	Yellow hornfels cores and flakes	MSA	5 to 10	-28.20665967	23.48161362	NCW	NA
106	Weathered hornfels cores and flakes	MSA	0 to 5	-28.19476956	23.48506084	NCW	NA
107	Hornfels core, triangular retouched flake quite large	MSA	0 to 5	-28.1973353	23.47402096	NCW	NA
108	Very patinated hornfels flakes	MSA	0 to 5	-28.18789352	23.47517315	NCW	NA
109	Hornfels core	LSA	0 to 5	-28.20062692	23.46882478	NCW	NA
110	Hornfels flakes with prominent dorsal spines	MSA	5 to 10	-28.20622729	23.46000609	NCW	NA
111	Hornfels cores and flakes	MSA	0 to 5	-28.2100271	23.45760789	NCW	NA
112	Large triangular hornfels core/flake with lateral retouch	MSA	0 to 5	-28.21427302	23.45464007	NCW	NA
113	Reddish hornfels and yellow cores	MSA	0 to 5	-28.21668783	23.45490143	NCW	NA
114	Early MSA hornfels retouched flake	MSA	0 to 5	-28.22187076	23.45352933	NCW	NA
115	Patinated hornfels flake blanks	MSA	0 to 5	-28.22856761	23.45538864	NCW	NA
116	Hornfels flakes and cores, large bulb of percussion, retouch present on most pieces	MSA	5 to 10	-28.2283021	23.46069865	NCW	NA
117	Engeland werf previously recorded – has a graveyard and some stone walling. Very little of the original farmhouse remains	Historic	n/a	-28.34482392	23.62044046	IIIC	500m buffer around farm werf recommended for PVs and 1km for WEF Should Site 117 form part of the operational infrastructure for the PV facility, a buffer area of 300m is appropriate.
118	Hornfels, light brown point	LSA	0 to 5	-28.3476714	23.62871671	NCW	NA
119	Hornfels core	LSA	0 to 5	-28.34032175	23.62568338	NCW	NA
120	Triangular hornfels point	LSA	0 to 5	-28.33811774	23.61713056	NCW	NA
121	Hornfels core	LSA	0 to 5	-28.33601169	23.61672469	NCW	NA
122	Hornfels core	LSA	0 to 5	-28.33228878	23.61325423	NCW	NA
123	Microlithic hornfels cores	LSA	5 to 10	-28.32862326	23.61450186	NCW	NA
124	Hornfels flake	MSA	0 to 5	-28.32068108	23.616031	NCW	NA

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125	Hornfels and quartz cores	LSA	0 to 5	-28.32453639	23.61966221	NCW	NA
126	Hornfels flake and core	LSA+MSA	0 to 5	-28.32177087	23.62966221	NCW	NA
127	Hornfels flakes, cores	LSA	5 to 10	-28.32219973	23.63372804	NCW	NA
128	Hornfels flake	MSA	0 to 5	-28.31408405	23.63734689	NCW	NA
129	Hornfels chunk and flake	LSA	0 to 5	-28.31062548	23.64697911	NCW	NA
130	Hornfels cores	LSA	0 to 5	-28.30413762	23.6484543	NCW	NA
131	Hornfels flakes and cores	LSA+MSA	5 to 10	-28.30594456	23.63847527	NCW	NA
132	Hornfels flakes and cores	MSA	0 to 5	-28.30751682	23.63686039	NCW	NA
133	Hornfels cores, flakes	MSA	0 to 5	-28.30859047	23.62876345	NCW	NA
134	Hornfels cores and flakes	LSA	5 to 10	-28.31026811	23.62106086	NCW	NA
135	Quartzite and hornfels flakes	MSA	0 to 5	-28.32003806	23.62563547	NCW	NA
136	Hornfels core and microlith	LSA	0 to 5	-28.31460317	23.63053368	NCW	NA
137	Hornfels flake with dorsal scarring and core	MSA	0 to 5	-28.31425913	23.64811811	NCW	NA
138	Hornfels flake, retouched with core/flake also retouched	LSA	0 to 5	-28.31552457	23.65641372	NCW	NA
139	Various hornfels flakes and flake blanks	LSA+MSA	10 to 30	-28.32589811	23.63578356	NCW	NA
140	Hornfels microlith and flake with faceted platform	LSA+MSA	0 to 5	-28.32629467	23.6416097	NCW	NA
141	Hornfels microlithic point and core	LSA	0 to 5	-28.32711453	23.64703783	NCW	NA
142	Hornfels flakes	LSA	0 to 5	-28.32840577	23.64539104	NCW	NA
143	Hornfels flakes and cores	MSA	5 to 10	-28.33113692	23.64117013	NCW	NA
144	Hornfels and chert core	LSA	0 to 5	-28.33199198	23.64086582	NCW	NA
145	Hornfels cores and yellow/banded point	LSA	5 to 10	-28.33605976	23.63759364	NCW	NA
146	Various hornfels cores	MSA	0 to 5	-28.33792954	23.63551518	NCW	NA
147	Hornfels and chert microlithic points	LSA	5 to 10	-28.33988384	23.63428335	NCW	NA
148	Hornfels flakes	MSA	0 to 5	-28.34342959	23.63232105	NCW	NA
149	Hornfels core and microlith	LSA	0 to 5	-28.34590743	23.63098588	NCW	NA
150	Quartzite core, radial	MSA	0 to 5	-28.33855427	23.62835894	NCW	NA
151	Hornfels cores	LSA	0 to 5	-28.33622498	23.63078773	NCW	NA
152	Hornfels and quartzite flakes and cores	LSA	5 to 10	-28.33578747	23.63106553	NCW	NA
153	Hornfels and quartz cores, flakes	LSA	10 to 30	-28.33255786	23.63241771	NCW	NA
154	Large fine grained/ccs or hornfels MSA flake	MSA	0 to 5	-28.32984852	23.63274905	NCW	NA
155	Hornfels flakes and cores	LSA	0 to 5	-28.32794624	23.63342213	NCW	NA
156	Hornfels flakes and cores	LSA+MSA	5 to 10	-28.32654688	23.63392239	NCW	NA
157	Hornfels and quartzite microliths and cores	LSA	5 to 10	-28.32624047	23.63517424	NCW	NA

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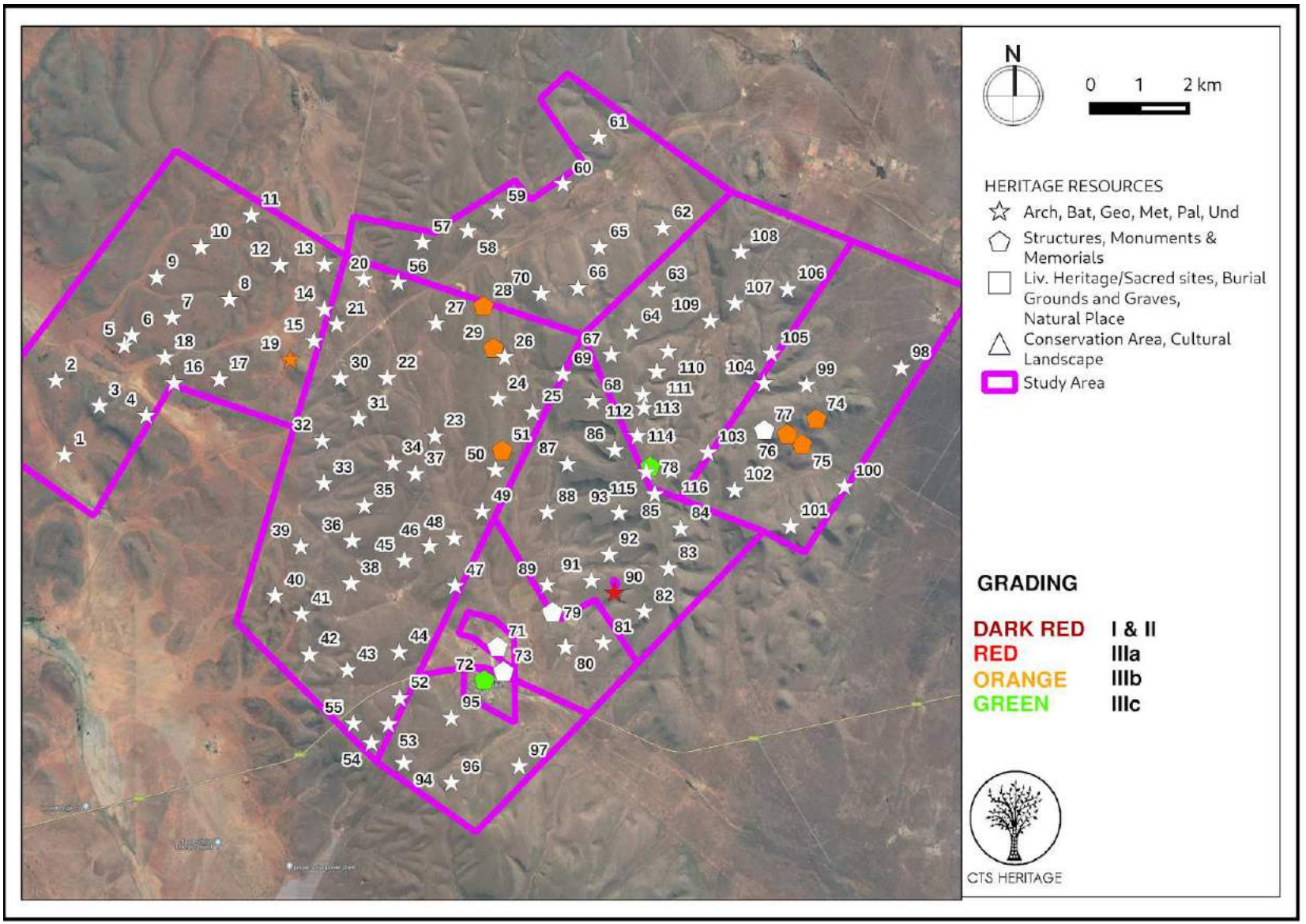

Figure 6.1: Map of heritage resources identified during the field assessment, relative to the proposed development footprint

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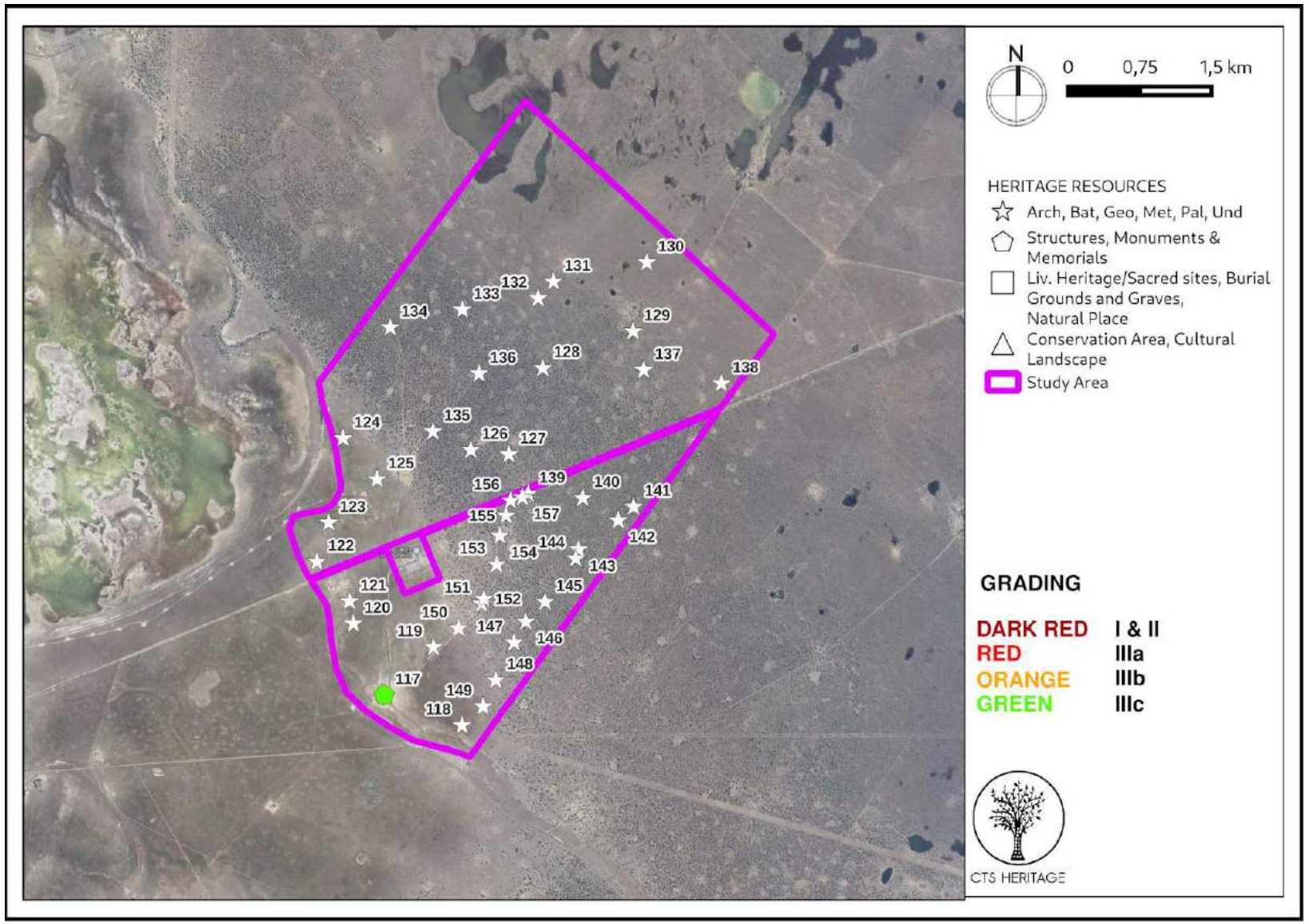

Figure 6.2: Map of heritage resources identified during the field assessment, relative to the proposed development footprint

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4.3 Selected photographic record

(a full photographic record is available upon request)

Figure 7.1: Site No. 003

Figure 7.2: Site No. 012

Figure 7.3: Site No. 019

Figure 7.4: Site No. 028

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Figure 7.5: Site No. 029

Figure 7.6: Site No. 042

Figure 7.7: Site No. 051

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Figure 7.8 Site No. 063

Figure 7.9 Site No. 072

Figure 7.10 Site No. 075

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Figure 7.11 Site No. 076

Figure 7.12 Site No. 078

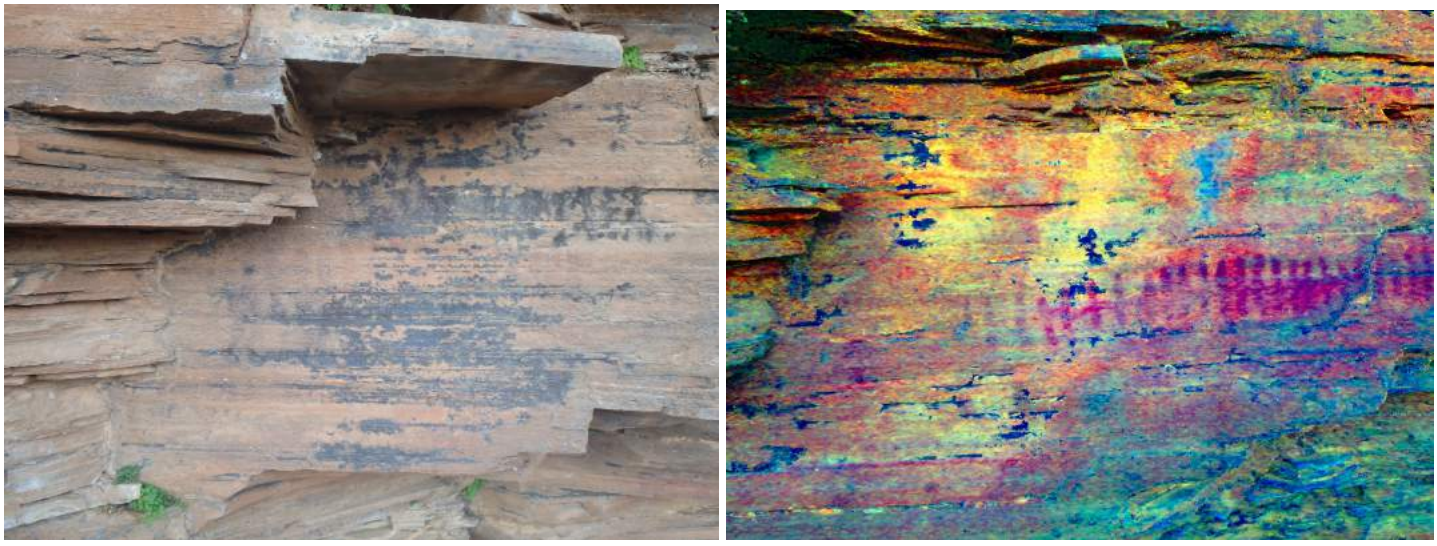

Figure 7.13 Site No. 090

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Figure 7.14: Site No. 101

Figure 7.15 Site No. 114

Figure 7.16 Site No. 117

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Figure 7.17 Site No. 130

Figure 7.18 Site No. 139

Figure 7.19 Site No. 146

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Figure 7.20 Site No. 154

Figure 7.21 Site No. 157

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

The heritage field assessment identified a number of heritage resources located within the areas proposed for development. The majority of these heritage resources were determined to be not conservation-worthy and as such, no further mitigation for impacts to these heritage observations is recommended.

A number of heritage resources of significance were, however, identified. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and infrastructure associated with the asbestos mining heritage of the area. The relationship between the mine infrastructure, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area and its past inhabitants and uses. It is important that the spatial relationship of these resources is not disrupted by the proposed development.

In order to ensure that no negative impact to significant heritage resources results from the proposed development, a number of recommended buffer areas and no-go areas have been identified. These mitigation measures are detailed in Table 2 above and have been mapped in Figures 8.1 to 8.5 below.

In order to retain the cultural value associated with the history of asbestos mining in the area, it is recommended that a 100m no-development buffer is implemented around sites 28, 29, 51 and 85449. Additionally, it is recommended that the sensitive no development area mapped around sites 74, 75 and 76 is implemented. It is further recommended that a 300m no development buffer is implemented around site 78. These recommendations will allow breathing space around these sites associated with the asbestos mining history of the area and will allow for the proposed REF to form a cultural layer in addition to rather than overriding the existing infrastructure.

Sites 19 and 90 both reflect rock art sites. Site 19 is graded IIIB and reflects a rock engraving. A 100m no development buffer is recommended around this site. Site 90 is of high local significance and is graded IIIA as it includes both rock art and associated Later Stone Age archaeological deposit. This site is located within a kloof located south of an access road. A no development area has been mapped over this kloof and south of the existing road in order to ensure the conservation of this rock art site and its context.

Sites 117 (structure, graded IIIC), 85442 (likely the same as 91009, informal burial graded IIIA) and 91008 (historic kraal, graded IIIC) are all heritage resources associated with the Engeland historic farm werf. Part of the significance of this historic werf lies in its context and as such, it is recommended that a buffer of 500m is implemented around the farm werf for PV infrastructure. This recommended buffer is increased to 1km for WEF infrastructure due to its increased scale. Should Site 117 form part of the operational infrastructure for the PV facility, such as a site office or similar, a buffer area of 300m is appropriate.

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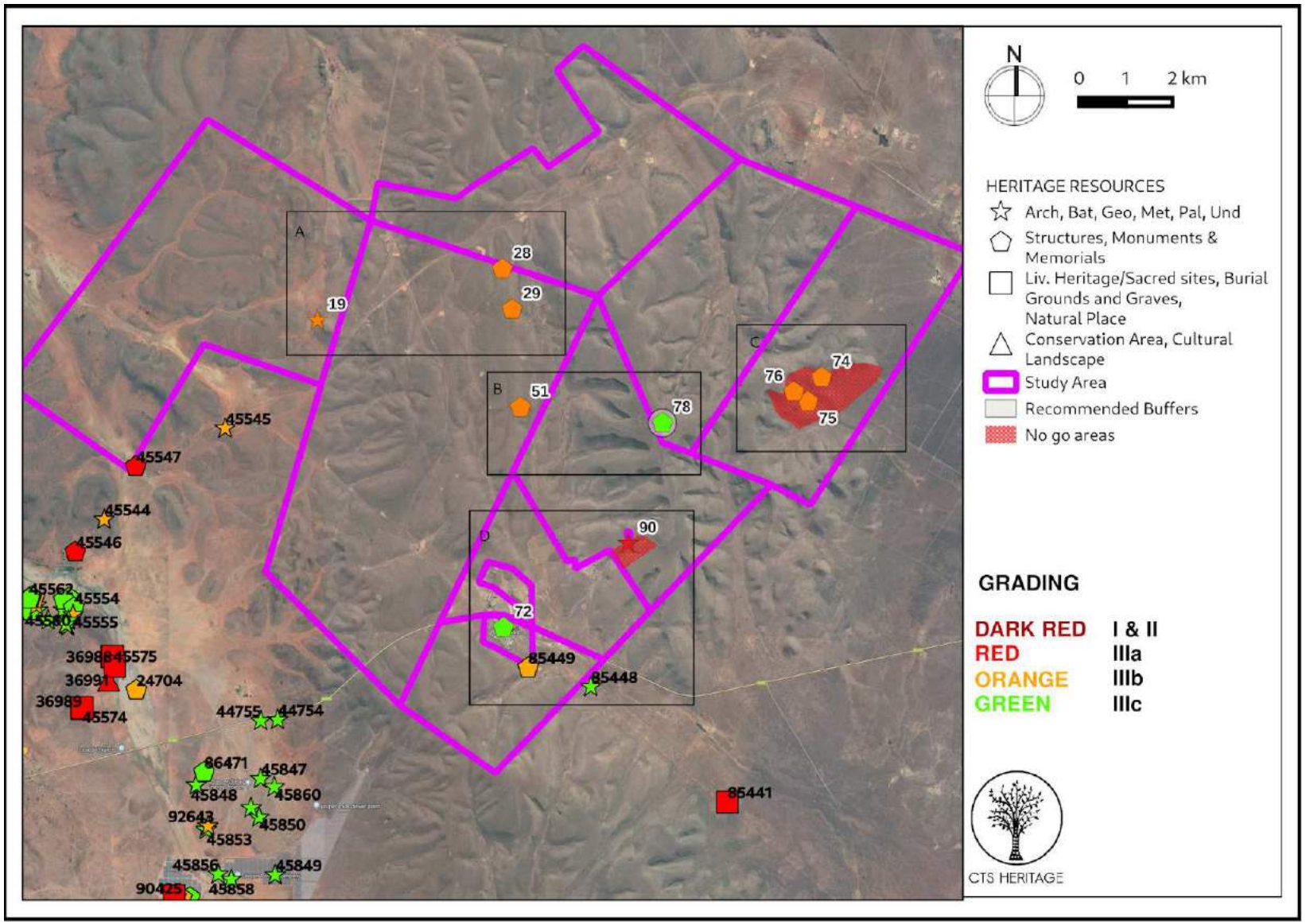

Figure 8: Map of significant heritage resources identified during the field assessment, and known sites, relative to the proposed development footprint with recommended mitigation measures

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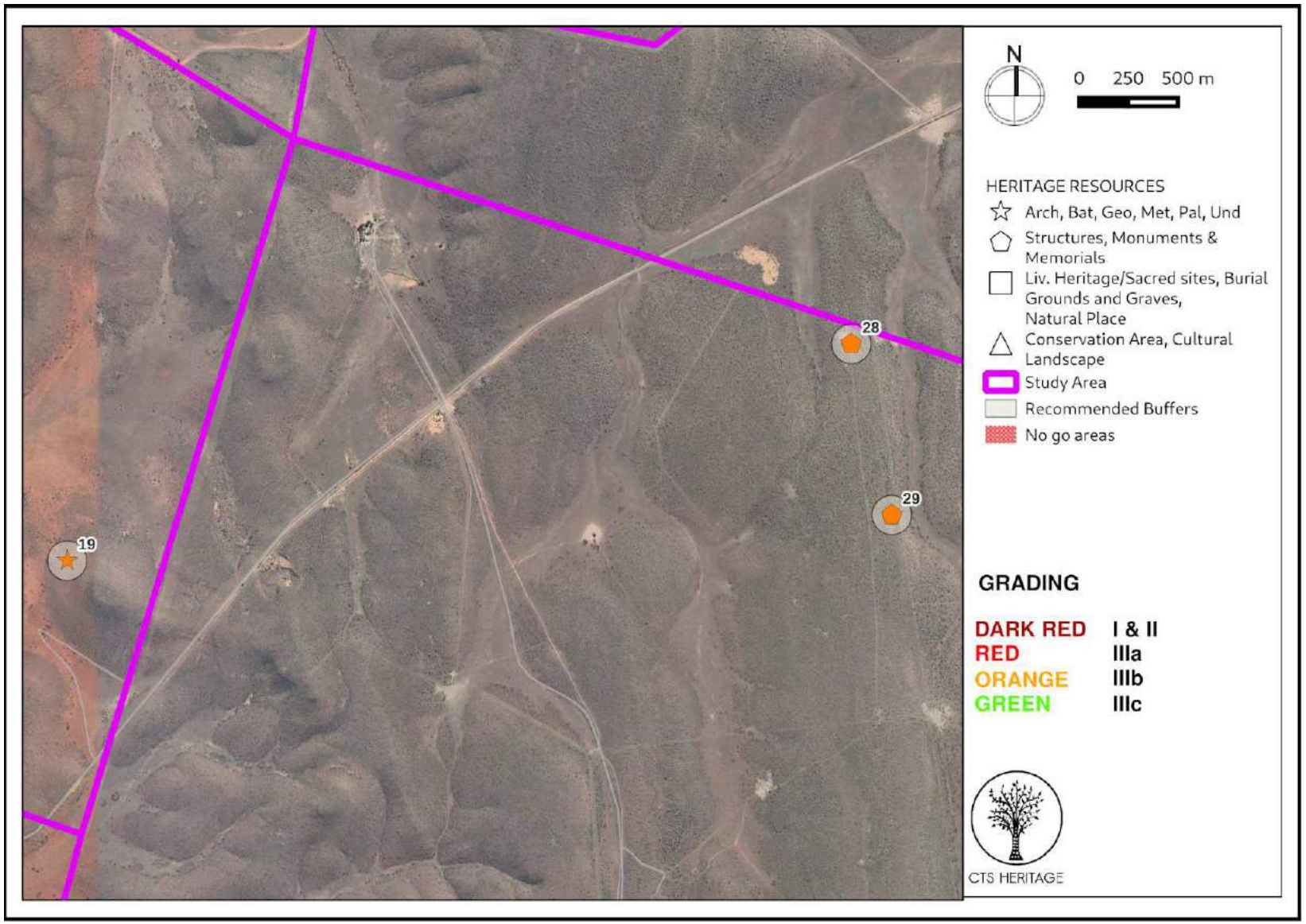

Figure 8.1: Inset A

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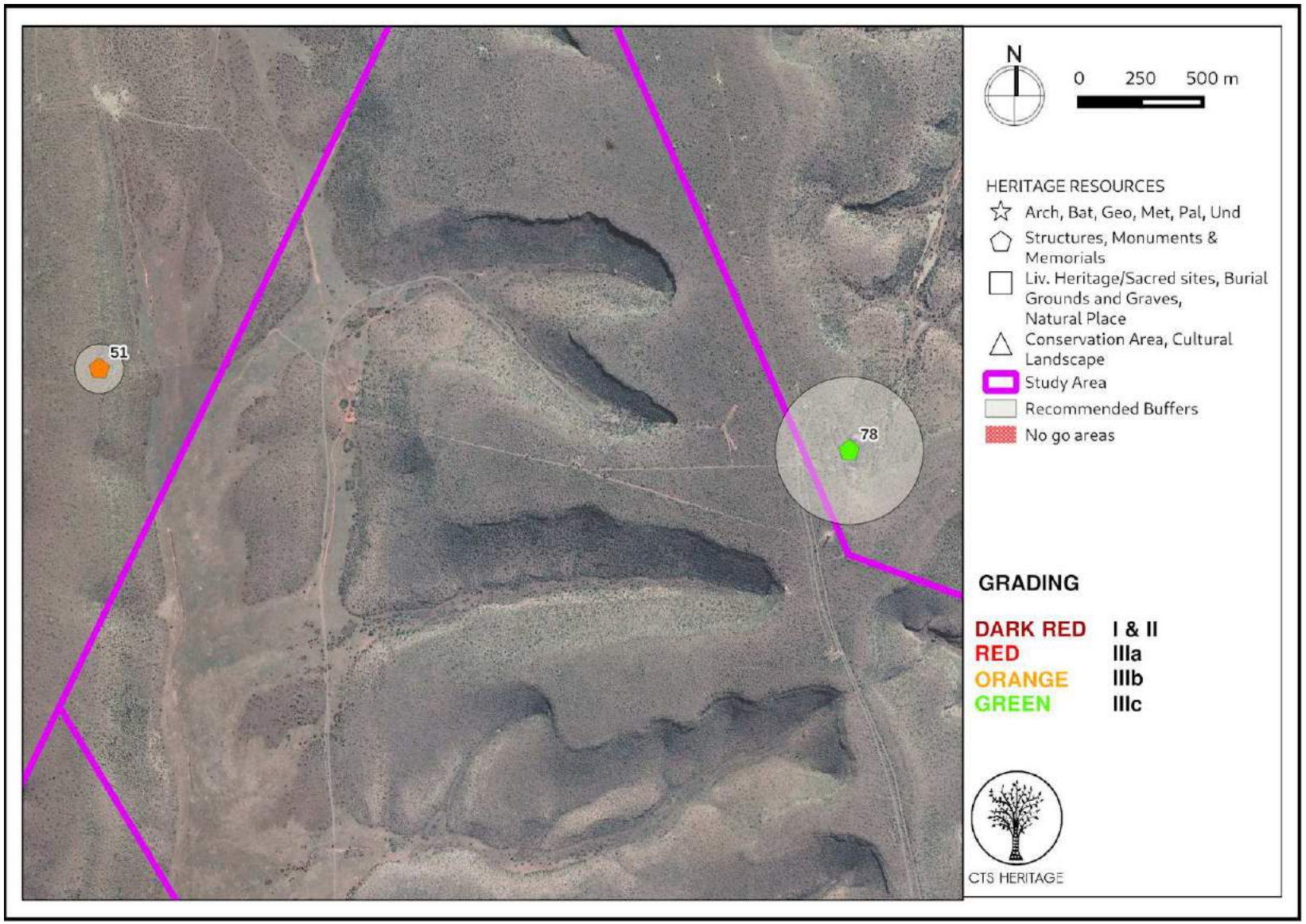

Figure 8.2: Inset B

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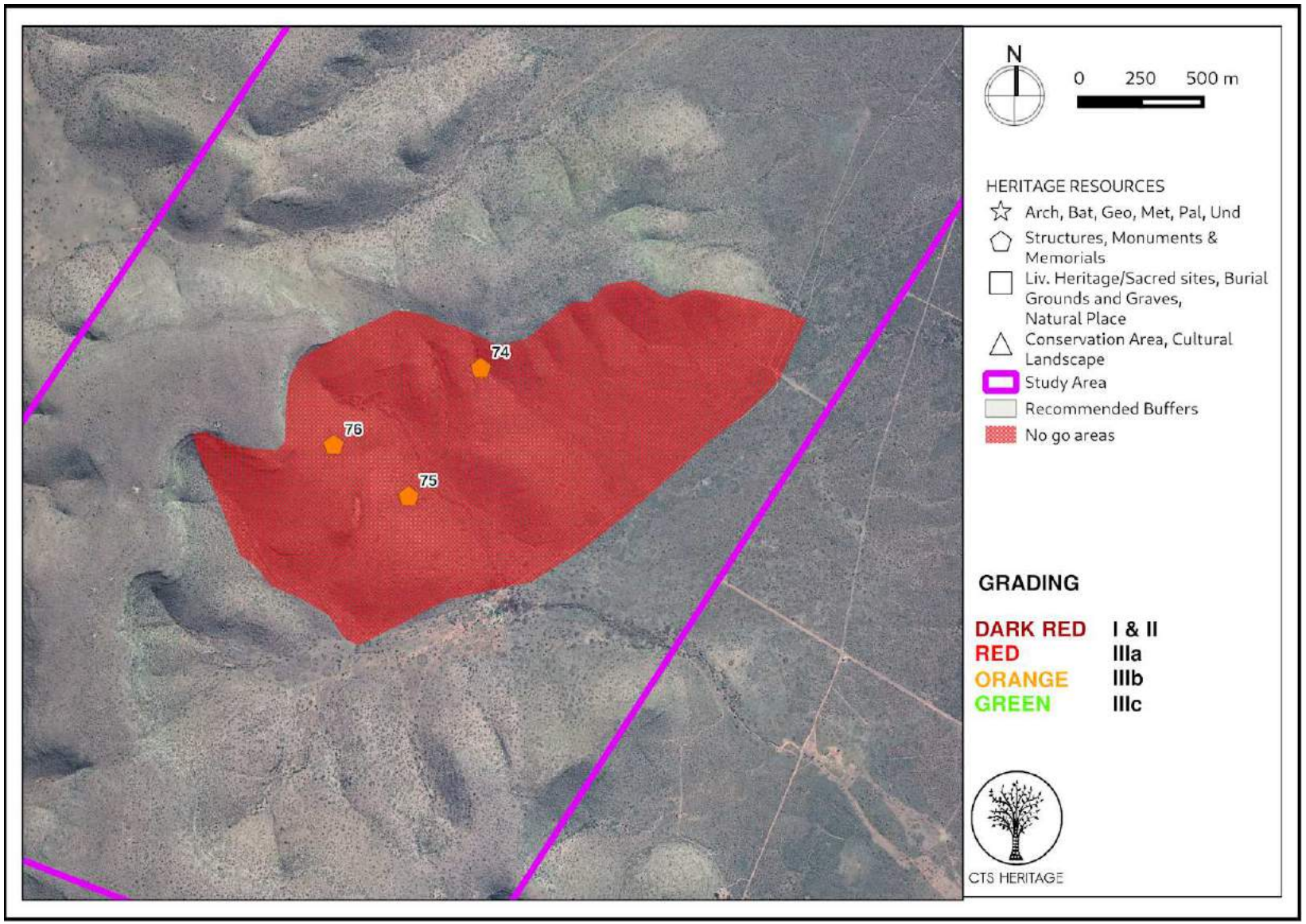

Figure 8.3: Inset C

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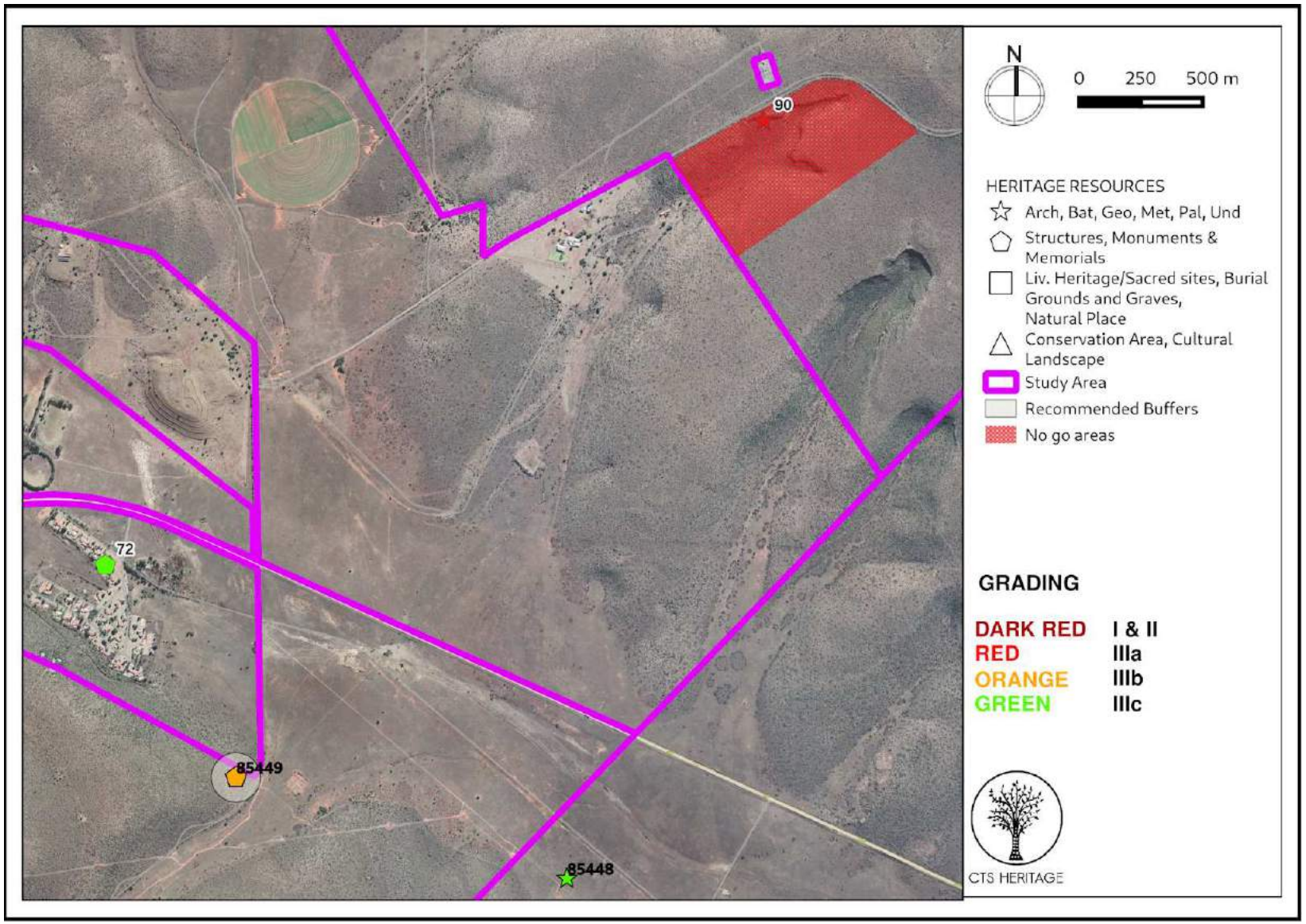

Figure 8.4: Inset D

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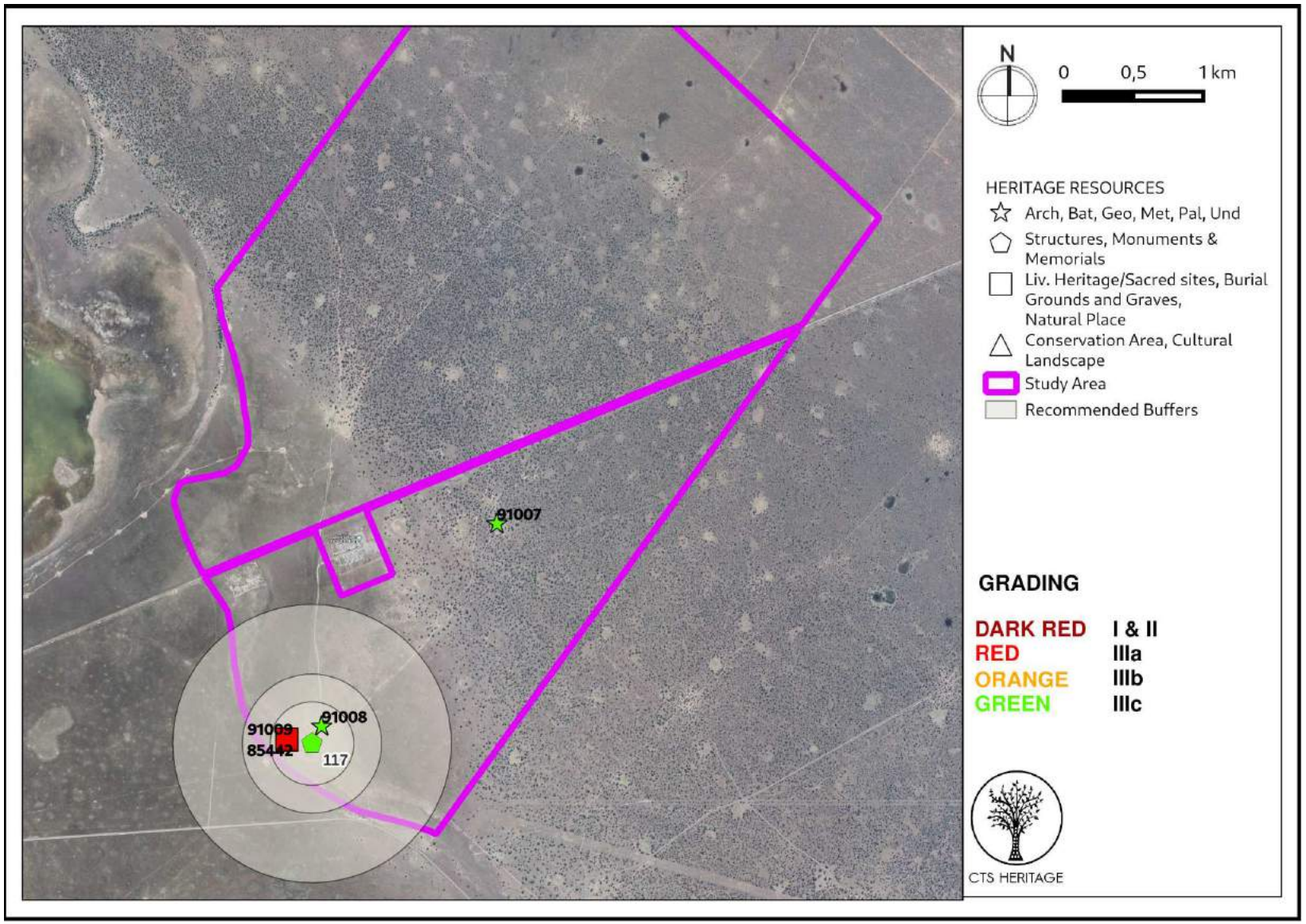

Figure 8.5: Map of significant heritage resources identified during the field assessment, and known sites, relative to the proposed development footprint with recommended mitigation measures

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6. CONCLUSION AND RECOMMENDATIONS

As was anticipated, the archaeological field assessment revealed a great many heritage resources evident within the development area. The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. No further mitigation for impacts to these heritage observations is recommended.

A number of heritage resources of significance were, however, identified. These resources range from significant archaeological sites including rock art and scatters, to burial grounds and graves as well as historic farm werfs and asbestos mining infrastructure. The relationship between the mining infrastructure, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area. It is important that the spatial relationship of these resources is not disrupted by the proposed development. Various mitigation measures are proposed in Table 2 above and in the below recommendations in order to mitigate these impacts.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that the following mitigation measures are implemented:

1. A 100m no development buffer must be implemented around sites 19, 28, 19, 51 and 85449
2. A 300m no development buffer must be implemented around site 78
3. A 500m no development buffer for PV infrastructure and a 1km no development buffer for WEF infrastructure must be implemented around Site 117. Should Site 117 form part of the operational infrastructure for the PV facility, a buffer area of 300m is appropriate.
4. The identified sensitive no-go areas indicated in Figures 8.3 (for sites 74, 75 and 76) and 8.4 (for site 90) must be adhered to for all and any proposed infrastructure including PV panels, turbines, grid connection infrastructure and roads
5. A conservation management plan must be drafted for the ongoing management and conservation of the rock art and its associated archaeology identified at Site 90
6. Should any human remains, burials or burial grounds be uncovered during construction activities, work must cease in the vicinity of the find and the SAHRA Burial Grounds and Graves Unit must be contacted regarding a way forward.
7. Should any archaeological resources be uncovered during construction activities, work must cease in the vicinity of the find and the SAHRA Archaeology, Palaeontology and Meteorites Unit must be contacted regarding a way forward.

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7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
6780	AIA Phase 1	Zoe Henderson	01/09/2005	Cultural Heritage Assessment for Finsch Mine
7842	AIA Phase 1	Cobus Dreyer	19/11/2007	Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape
4602	AIA Phase 1	David Morris	01/07/2008	Archaeological and Heritage Impact Assessment on Remainder of Carter Block 458, near Limeacres, Northern Cape
163992		Wouter Fourie	03/12/2013	Proposed Construction of the Limestone 1 - 132kV Power Line and the associated Switchyards on Portion 0 (remaining extent) of the Farm 267, Northern Cape Province
164009	Heritage Impact Assessment Specialist Reports	Wouter Fourie	03/12/2013	Proposed Decommissioning and Construction of the Limestone 2 - 132kV Power Line and the associated Switchyards on Portion 0 (remaining extent) of the Plaas 267 Arriesfontein, Northern Cape Province
6218	AIA Phase 1	Wouter Fourie	27/03/2012	Heritage Impact Assessment: The proposed 10mw Photovoltaic (PV) Power Plant on the Farm Arriesfontein (Farm 267) near Danielskuil, Northern Cape Province
6958	AIA Phase 1	Wouter Fourie	10/06/2011	Humansrus Solar Thermal Energy Power Plant, Postmasburg
8240	AIA Phase 1	David Morris	11/06/2010	Proposed development of PV Power Station at Welcome Wood, near Owendale, Northern Cape
8368	AIA Phase 1	Karen Van Ryneveld	29/06/2005	Cultural Heritage Site Inspection Report for the Purpose of a Prospecting Right EMP - (Portion of) Skeyfontein 536, Postmasburg District, Northern Cape, South Africa
8899	PIA Phase 1	John E Almond	04/05/2011	Recommended exemption from further palaeontological studies: Proposed Humansrus Solar Thermal Energy Power Plant development on Farm 469, near Postmasburg, Northern Cape Province
9047	PIA Phase 1	John E Almond	11/06/2010	Proposed photovoltaic power station adjacent to Welcome Wood Substation, Owendale near Postmasburg, Northern Cape Province
73252	HIA Phase 1	Wouter Fourie	13/09/2012	Heritage Impact Assessment - Proposed Construction of 132kv Power Line and Switchyard Associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province
83272	HIA Phase 1	David Morris	01/08/2012	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape
83273	PIA Desktop	Jennifer Botha-Brink	26/06/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED OLIEN SOLAR PROJECT ON FARM 300, BARKLY WEST, NORTHERN CAPE PROVINCE
109815	HIA Phase 1	Wouter Fourie	22/03/2012	132 kV Power line connection to the Humasrus Solar Thermal Energy Power plant, postmasburg.
114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE.

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				Part 1: Hotazel to Kimberley, Northern Cape
122772	HIA Phase 1	Wouter Fourie	01/09/2011	Heritage Impact Assessment for the Humansrus Solar Thermal Energy Power Plant, Postmasburg
123342	HIA Phase 1	Marko Hutten	01/04/2013	Renewable Energy Generation project on the farm Grootvlei 296, Kgatelopele Local Municipality, Siyanda District Municipality, Northern Cape Province
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
155262	PIA Desktop	John E Almond	22/12/2013	Palaeontological Heritage Basic Assessment: Desktop Study - Proposed construction of a 132 kV power line and switchyard associated with the Redstone Solar Thermal Energy Plant near Postmasburg, Northern Cape Province
156348	Archaeological Monitoring	Lloyd Rossouw	08/01/2014	Updated report on the Cultural Heritage Impact Assessment for Petra Diamonds Finsch Mine
162535	AIA Phase 1	David Morris	02/03/2012	Archaeological Impact Assessment Phase 1: Proposed development of a PV Power Station at Welcome Wood (extended area), near Owendale, Northern Cape
162542	PIA Desktop	John E Almond	01/02/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY Proposed PV power stations Welcome Wood II and III adjacent to Welcome Wood Substation, near DaniÃ«lskuil, Northern Cape Province
173943	Heritage Impact Assessment Specialist Reports	Marko Hutten, John Almond	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the ACWA Power SolarReserve Redstone Solar Thermal Power Plant with the Olien Substation â€“ Option 1: ACWA Power SolarReserve Redstone Solar Thermal Power Plant to Olien Substation, in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment
173967	Heritage Impact Assessment Specialist Reports	Marko Hutten	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the Redstone Solar Thermal Energy Plant with the Olien Substation in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment Option 2: Silverstreams substation to Olien Substations
344620	PIA Phase 1	John E Almond	09/11/2015	Palaeontological Heritage Report for the proposed 132 kV power lines between the ACWA Power SolarReserve Redstone Solar Thermal Energy Plant Site and Olien Main Transmission Substation near Lime Acres, Northern Cape Province
361351	AIA Phase 1	Karen Van Ryneveld	20/03/2016	Archaeological Impact Assessment Report
361357	PIA Phase 1	Lloyd Rossouw	03/05/2016	Palaeontological Impact Assessment

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APPENDIX 2: Palaeontological Assessment (2022)

PALAEONTOLOGICAL IMPACT ASSESSMENT

PROPOSED DEVELOPMENT OF THE DANIËLSKUIL WEF AND PV, NORTHERN CAPE PROVINCE

2022

COMPILED FOR: CTS Heritage

BANZAI ENVIRONMENTAL (PTY) LTD.
Reg No. 2015/332235/07 |

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application.
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct.
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and

- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: info@banzai-group.com

SIGNATURE: 

The heritage impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to **Appendix A**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Objective
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1 and 11
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7 Approach and Methodology
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	Section 1 and 11
(g) An identification of any areas to be avoided, including buffers	No buffers or areas of sensitivity identified Section 5
(h) A map superimposing the activity including the associated structures and infrastructure on the	Section 5 – Geological and Palaeontological history

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
environmental sensitivities of the site including areas to be avoided, including buffers;	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1 – Assumptions and Limitation
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 11
(k) Any mitigation measures for inclusion in the EMPr	Section 12
(l) Any conditions for inclusion in the environmental authorisation	Section 12
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 12
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 11
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 11
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process will be conducted as part of the EIA and EMPr process. N/A
(p) A summary and copies if any comments that were received during any consultation process	N/A
(q) Any other information requested by the competent authority.	N/A
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be	Section 3 compliance with SAHRA guidelines

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
applied to a specialist report, the requirements as indicated in such notice will apply.	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by CTS Heritage to conduct the Palaeontological Impact Assessment (PIA) to assess the Daniëlskuil WEF and PV in the Northern Cape Province. To comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to verify if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The Wind Energy Facility is underlain by small areas of low lying Quaternary sands while a small portion in the centre is underlain by the Kuruman Formation and a larger portion in the south and east is underlain by the Daniëlskuil Formation of the Asbestos Hills Subgroup (Griquatown Group, Transvaal Supergroup).The proposed solar PV development (in the south) is mostly underlain by surface limestone while the Lime Acres Member (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation) crops out in the north-eastern portion of the development. The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the Quaternary sands are Moderate, while that of the Quaternary surface limestones are High and that of the Lime Acres Member, Daniëlskuil and Kuruman Members are Very High (Almond and Pether, 2009; Almond *et al*., 2013).

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 15 October 2022. A few weathered stromatolite outcrops were identified in the development footprint. Due to the weathered and relative scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, just east of the development, well-preserved stromatolite outcrops in the Lime Acers Member (Altermann & Wotherspoon 1995) were identified, while Almond (2015) found well-preserved stromatolites south of the R385, north of Lime Acres. These well-preserved outcrops are located just south-west of the present study area. The possibility of well-preserved stromatolite finds is thus possible.

It is thus **recommended that:**

- The Environmental Control Officer (ECO), responsible for the development, should be aware of the possibility of finding fossils in the development area. All excavations deeper than one meter should be monitored by the ECO, on an ongoing basis during the construction of the Energy Facilities.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the **Chance find Protocol** attached should be implemented immediately. These discoveries ought to be protected (if possible, *in situ*) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation (recording and collection) can be carry out by a paleontologist.

Before any fossil material can be collected from the development site, the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012). It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Appendix 1: Curriculum Vitae

Appendix 2: Assessment methodology and Impact Assessment Format Table

1 INTRODUCTION

The Daniëlskuil Wind Energy and Solar Energy Facility between Daniëlskuil and Postmasburg in the Northern Cape is proposed.

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This present study has been conducted by Mrs Elize Butler. She has conducted approximately 300 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa, and has been working in Palaeontology for more than twenty-nine years. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

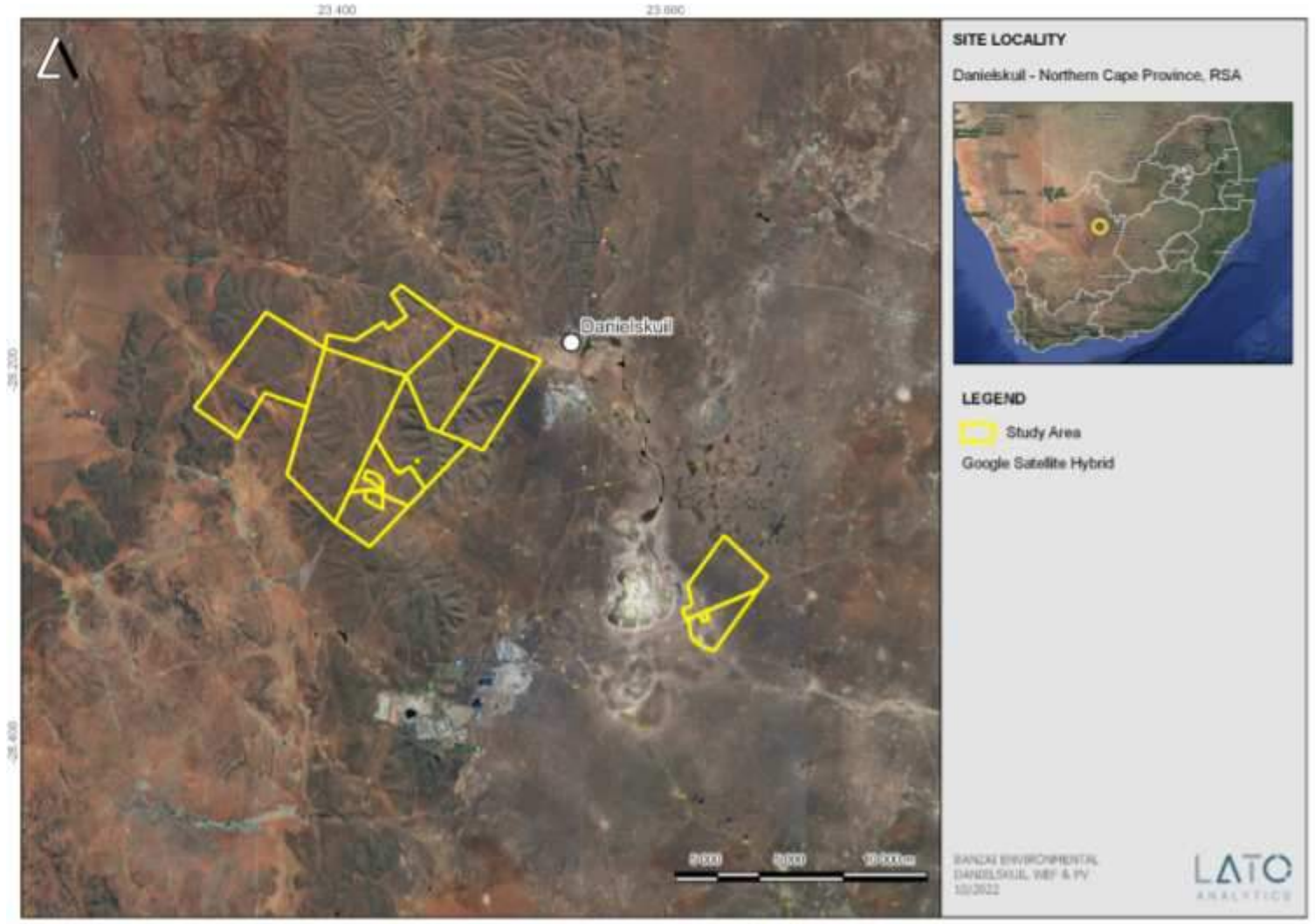

***Figure SEQ Figure * ARABIC 1**: Google Earth Image (2022) of the location of the proposed Daniëlskuil Wind Energy Facility (northern cluster) and the Solar Energy Facility (southern cluster) in the Northern Cape Province.*

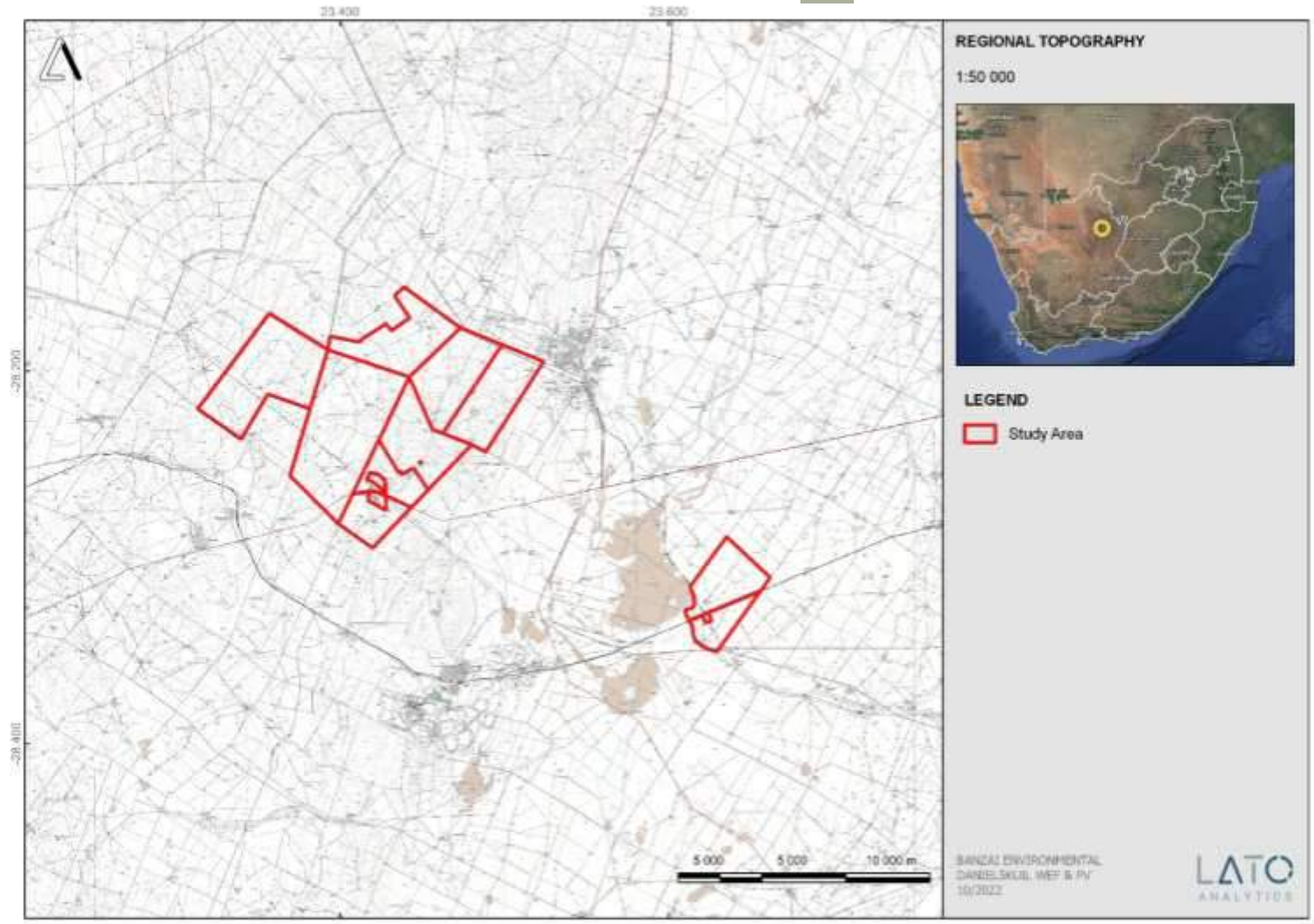

Figure SEQ Figure * ARABIC 2: *Topography of the proposed Daniëlskuil Energy Facilities in the Northern Cape Province.*

3 LEGISLATION

3.1 National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, and is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The following section in each Act are directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50

- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "*…identify, predict, and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies, the following comprehensive and legally compatible PIA report has been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adheres to the conditions of the Act. According to Section 38 (1), an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length.
- the construction of a bridge or similar structure exceeding 50 m in length.
- any development or other activity which will change the character of a site—
- Exceeding 5 000 m^2 in extent; or
- involving three or more existing erven or subdivisions thereof; or
- involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m^2 in extent.
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4 OBJECTIVE

The aim of a Palaeontological Impact Assessment (PIA) is to minimise the effect of the development on potential fossils at the development site and to determine the potential impact on palaeontological resources.

According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the

formations; 3) to clarify the impact on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

When the development footprint has a moderate to high palaeontological sensitivity a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact significance of the planned development and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible because our knowledge of local palaeontological heritage may be increased.

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.
- Adherence to all applicable best practice recommendations, appropriate legislation, and authority requirements.
- Submit a comprehensive overview of all appropriate legislation, guidelines.
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study.
- Description and location of the proposed development and provide geological and topographical maps.
- Provide Palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kml's) in the proposed development.
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect, and cumulative:

a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
c. **Cumulative impacts** result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.

- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

5 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The geology of the proposed Daniëlskuil Wind Energy Facility (WEF) and Solar Energy Clyster (PV) is depicted on the 1:250 000 Postmasburg 2822 (1977) Geological Map (Council of Geoscience) (**Figure 3, Table 2**). According to this map, the proposed solar PV development (in the south) is mostly underlain by surface limestone (Ql) while the Lime Acres Member (Vgl, light blue) (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation) crops out in the north-eastern portion of the development. The Wind Energy Facility (located north) is underlain by small areas of low lying Quaternary sands (Qs; pale yellow) while a small portion is underlain by the Kuruman Formation and a larger portion in the south and east is underlain by the Daniëlskuil Formation (Vak; dark brown) of the Asbestos Hills Subgroup (Griquatown Group, Transvaal Supergroup).

The geology has recently been updated (Council of Geosciences, Pretoria) and these maps (**Figure 4**) indicate that the southern PV facility is underlain by the Kalahari Group, and the Klippan and Kogelbeen (Campbell Rand Subgroup, Transvaal Supergroup). The northern WEF is underlain by the Kalahari Group, Kogelbeen Formation as well as the Daniëlskuil and Kuruman Formations (**Figure 4**). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the Quaternary Sands are Moderate, while that of the Quaternary surface limestones are High and that of the Lime Acres Member, Daniëlskuil and Kuruman Members are Very High (Almond and Pether, 2009; Almond *et al*., 2013) (**Figure 5**).

The proposed development is largely underlain by Precambrian (Early Proterozoic) sediments of the Transvaal Supergroup of the Griqualand West Basin. In Griqualand West the Ghaap Group is subdivided in the oldest Schmidtsdrif, middle Campbell Rand and youngest Asbestos Hills and Koegas Subgroups (**Figure 5**). The Ghaap Group in the development is represented by the Campbell Rand and Asbestos Hills Subgroups. The proposed development is located on the western border of the Kaapvaal Craton (McCarthy & Rubidge 2005, Eriksson et al. 2006).

Three successive Banded Iron Formations (BIF) is present in the Asbestos Hills Subgroup of the Griqualand West Basin namely the Daniëlskuil, Kuruman and Kliphuis Formations. Two of these formations are present in

the proposed development namely the Daniëlskuil and Kuruman Formations.The 200m thick Daniëlskuil Formation overlies the Kuruman Formation. This formation is a current or wave reworked Kuruman-type BIF (Banded Iron Formation). The texture of this Formation is granular (in contrast with the finely laminated underlying Kuruman BIF), displaying rich sedimentary structures and is abundant in BIF interclasts. Beukes & Klein (1992) and Horstman & Hälbich (1995) found that the chemistry of the two formations is similar. The Kuruman Formation displays full BIF macrocycles (Beukes, 1980) and varies in thickness from one meter to several tens of meters.

The Campbell Rand Subgroup (**Figure 6**) consists of a thick (1,6 to 2,5 km) carbonate platform succession of cherts with minor tuffs and siliciclastic rocks as well as dolomitic limestones and dolostones. These sediments were deposited about 2,6 to 2,5 Ga (billion years ago) on the shallow submerged shelf of the Kaapvaal Craton Young (1932); Beukes (1980, 1983); Eriksson & Truswell (1974); Eriksson & Altermann (1998); Eriksson et al. (2006); Altermann and Herbig (1991); Altermann and Wotherspoon (1995). Frequent changes in sea level were caused by changing depositional cycles in shallow water facies. Stromatolitic limestones and dolostones, oolites, laminated calcilutites, cherts, with subordinate siliclastics (shales, siltstones) and minor tuffs (Beukes 1980, Beukes 1986, Sumner 2002, Eriksson *et al.* 2006, Sumner & Beukes 2006) are present in the Campbell Rand Subgroup. Schopf (2006) reviewed the older Archaean stromatolite occurrences from the Ghaap Group. Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. Originally, they were formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era. Several authors have described the spectacular stromatolites of the Ghaap Group in the Northern Cape Province [Almond & Pether (2008); Boetsap locality figured by McCarthy & Rubidge (2005); Eriksson et al. (2006)

The Kogelbeen Formation is mined by the Idwala limestone mine about 2 km east of the proposed WEF. The late Archaean Kogelbeen Formation is about 450m thick and comprise of limestone and chert with stromatolites and microbial horizons as well as dolomite. Within the stromatolitic horizons secondary chert replacement occurs. Columnar and domal stromatolites as well as microbial laminites and oolitic facies are also found in this Formation. Altermann & Wotherspoon (1995) found that the Lime Acres Member is present at the top of the Kogelbeen Formation. The Lime Acres Member is extensively mined in this region. Lime Acres situated about 11 km south of the proposed WEF are known for its significant fossil stromatolite site (Altermann & Wotherspoon 1995).

Almond (2017) noted that PIAs have generally not been submitted in the majority of development proposals in the Daniëlskuil area. Most of these developments were for mine prospecting but also include solar, powerline and railway developments. However, a few Impact Assessments in the region have been submitted to SAHRA (see references). He noted that the general significance of the impact on fossil heritage in the Daniëlskuil area

varied from low to very low. But, Almond (2015) found well-preserved stromatolites south of the R385 north of Lime Acres. This site is located just south-west of the present study area.

The Precambrian bedrocks are mantled by superficial deposits comprising of alluvial and colluvial gravels, cherty surface rubble as well as sediments of the Kalahari Group. Along river valley floors gravelly to sandy sediments is often calcretised. In some areas of Kuruman highly-resistant, blocky-weathering siliceous breccia mantles caps the carbonate bedrocks. These silcrete-like breccia consists of angular clasts of laminated silicified carbonate and chert but no banded iron formations (BIF). This indicates that it was formed during a major explosive episode during the deposition of the Asbestos Hills deep marine succession. The upper surface of low-lying carbonate bedrocks has been karstified during the Caenozoic with common steep-sided solution hallows (sometimes infilled with ferruginised surface gravels and BIF forming underground drainage networks like the Eye of Kuruman as well as cave systems).

The fossil assemblages of the Kalahari (**Figure 7**) are represented by terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods, and trace fossils. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter. Fossils are mostly associated with ancient lakes, pans, and river systems.

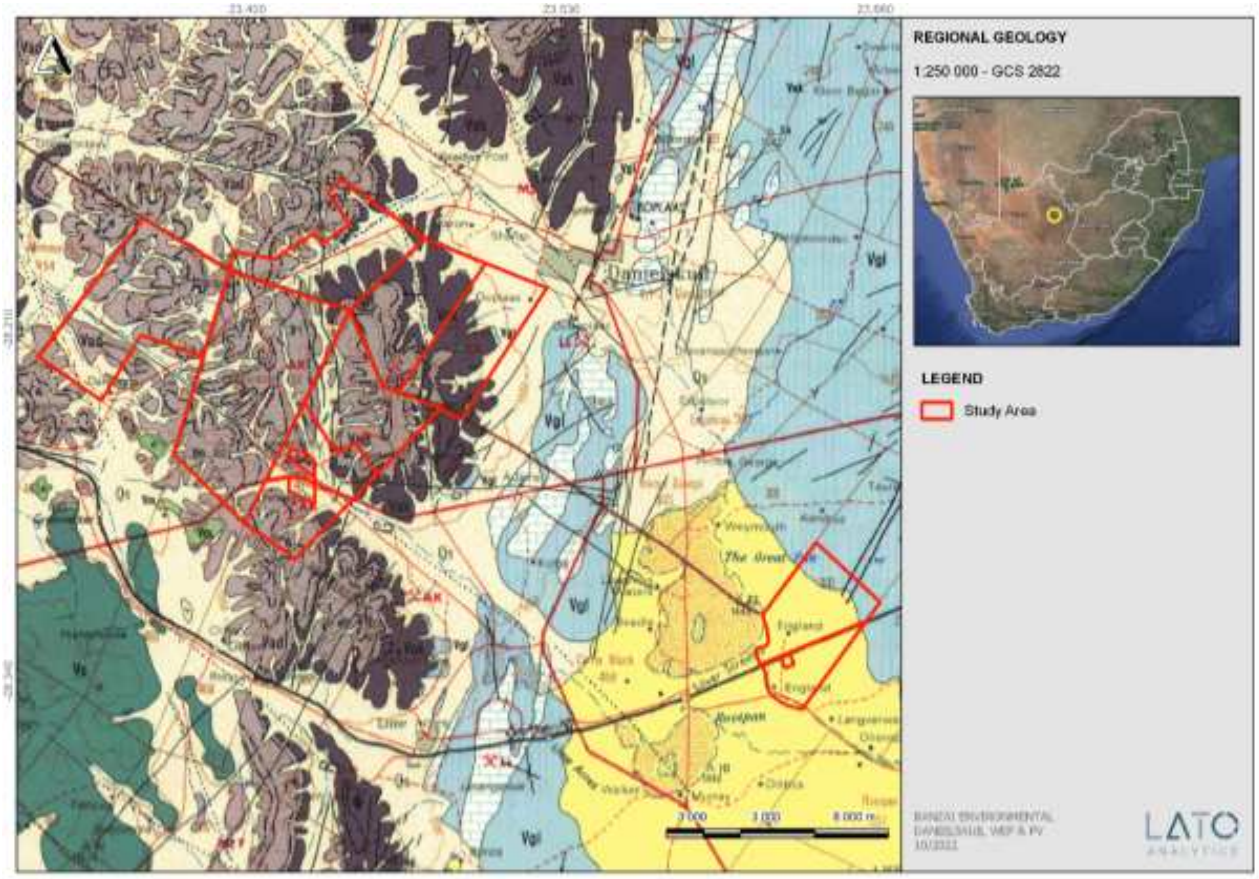

***Figure SEQ Figure * ARABIC 3**: The extract of the 1:250 000 Postmasburg 2822 (1977) Geological map (Council of Geoscience, Pretoria) indicates that the proposed PV development (south) is underlain by Quaternary surface limestone (Ql yellow) and the Lime Acres Member (Vgl, light blue) (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation). The Wind Energy Facility (north) is underlain by Quaternary sands (Qs; pale yellow), Kuruman Formation and Daniëlskuil Formation (Vak; dark brown) of the Asbestos Hills Subgroup (Griquatown Group, Transvaal Supergroup).*

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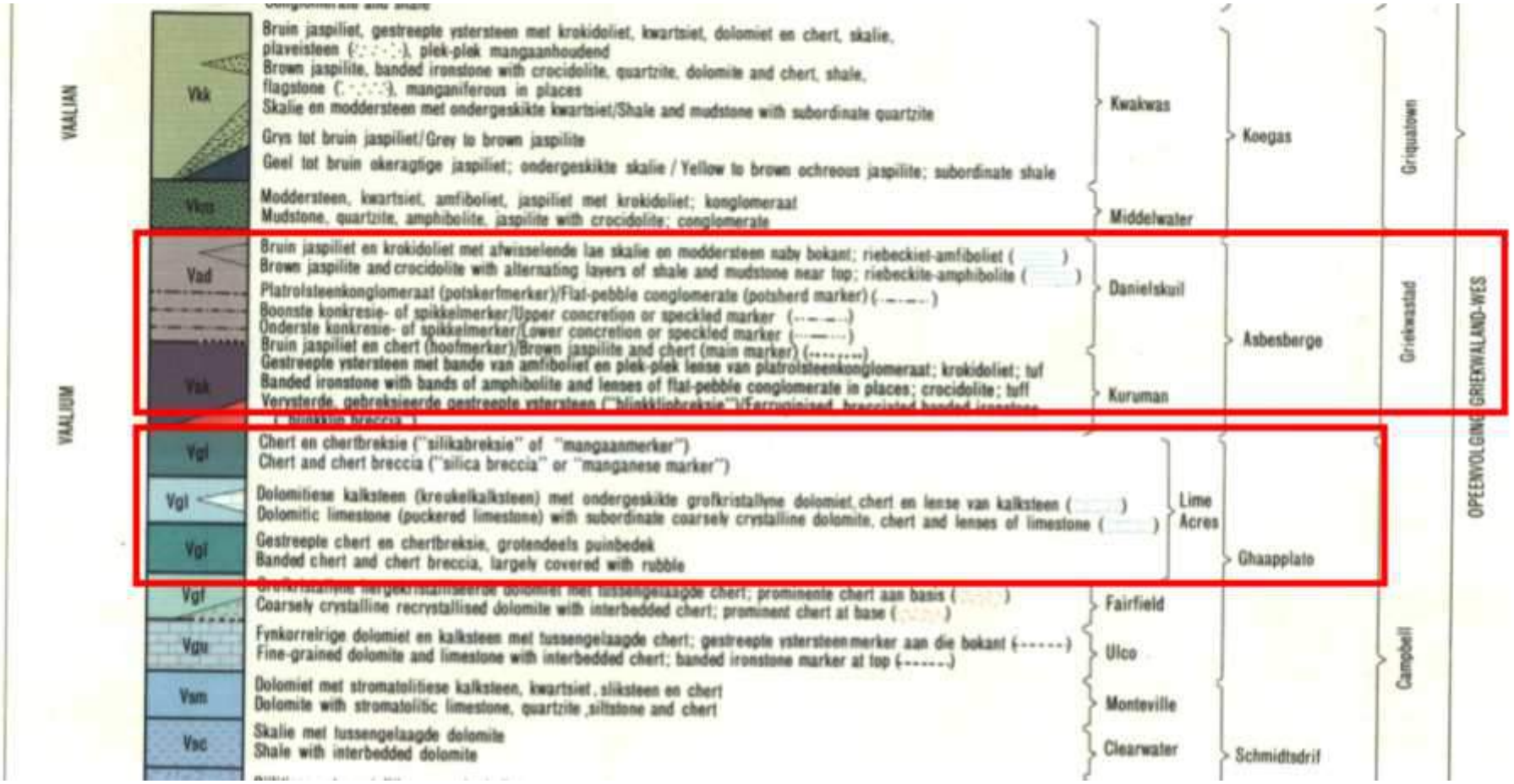
VAALIAN
VAALIUM
Vkk
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Vgl
Vgl
Vgf
Vgu
Vsm
Vsc
Bruin jaspiliet, gestreepte ystersteen met krokidoliet, kwartsiet, dolomiet en chert, skalie, plaveisteen (. . . .), plek-plek mangaanhoudend
Brown jaspilite, banded ironstone with crocidolite, quartzite, dolomite and chert, shale, flagstone (. . . .), manganiferous in places
Skalie en moddersteen met ondergeskikte kwartsiet/Shale and mudstone with subordinate quartzite
Grys tot bruin jaspiliet/Grey to brown jaspilite
Geel tot bruin okeragtige jaspiliet; ondergeskikte skalie / Yellow to brown ochreous jaspilite; subordinate shale
Moddersteen, kwartsiet, amfiboliet, jaspiliet met krokidoliet; konglomeraat
Mudstone, quartzite, amphibolite, jaspilite with crocidolite; conglomerate
Bruin jaspiliet en krokidoliet met afwisselende lae skalie en moddersteen naby bokant; riebeckiet-amfiboliet ( )
Brown jaspilite and crocidolite with alternating layers of shale and mudstone near top; riebeckite-amphibolite ( )
Platrolsteenkonglomeraat (potskerfmerker)/Flat-pebble conglomerate (potsherd marker) ( )
Boonste konkresie- of spikkelmerker/Upper concretion or speckled marker ( )
Onderste konkresie- of spikkelmerker/Lower concretion or speckled marker ( )
Bruin jaspiliet en chert (hoofmerker)/Brown jaspilite and chert (main marker) ( )
Gestreepte ystersteen met bande van amfiboliet en plek-plek lense van platrolsteenkonglomeraat; krokidoliet; tuf
Banded ironstone with bands of amphibolite and lenses of flat-pebble conglomerate in places; crocidolite; tuff
Chert en chertbreksie ("silikabreksie" of "mangaanmerker")
Chert and chert breccia ("silica breccia" or "manganese marker")
Dolomitiese kalksteen (kreukelkalksteen) met ondergeskikte grofkristallyne dolomiet, chert en lense van kalksteen ( )
Dolomitic limestone (puckered limestone) with subordinate coarsely crystalline dolomite, chert and lenses of limestone ( )
Gestreepte chert en chertbreksie, grotendeels puinbedek
Banded chert and chert breccia, largely covered with rubble
Coarsely crystalline recrystallised dolomite with interbedded chert; prominent chert at base ( )
Fynkorrelrige dolomiet en kalksteen met tussengelaagde chert; gestreepte ystersteenmerker aan die bokant (------)
Fine-grained dolomite and limestone with interbedded chert; banded ironstone marker at top (------)
Dolomiet met stromatolitiese kalksteen, kwartsiet, sliksteen en chert
Dolomite with stromatolitic limestone, quartzite, siltstone and chert
Skalie met tussengelaagde dolomite
Shale with interbedded dolomite
Kwakwas
Middelwater
Danielskuil
Kuruman
Lime Acres
Fairfield
Ulco
Monteville
Clearwater
Koegas
Asbesberge
Ghaapplato
Schmidtsdrif
Griquatown
Griekwastad
Campbell
OPEENVOLGING GRIEKWALAND-WES

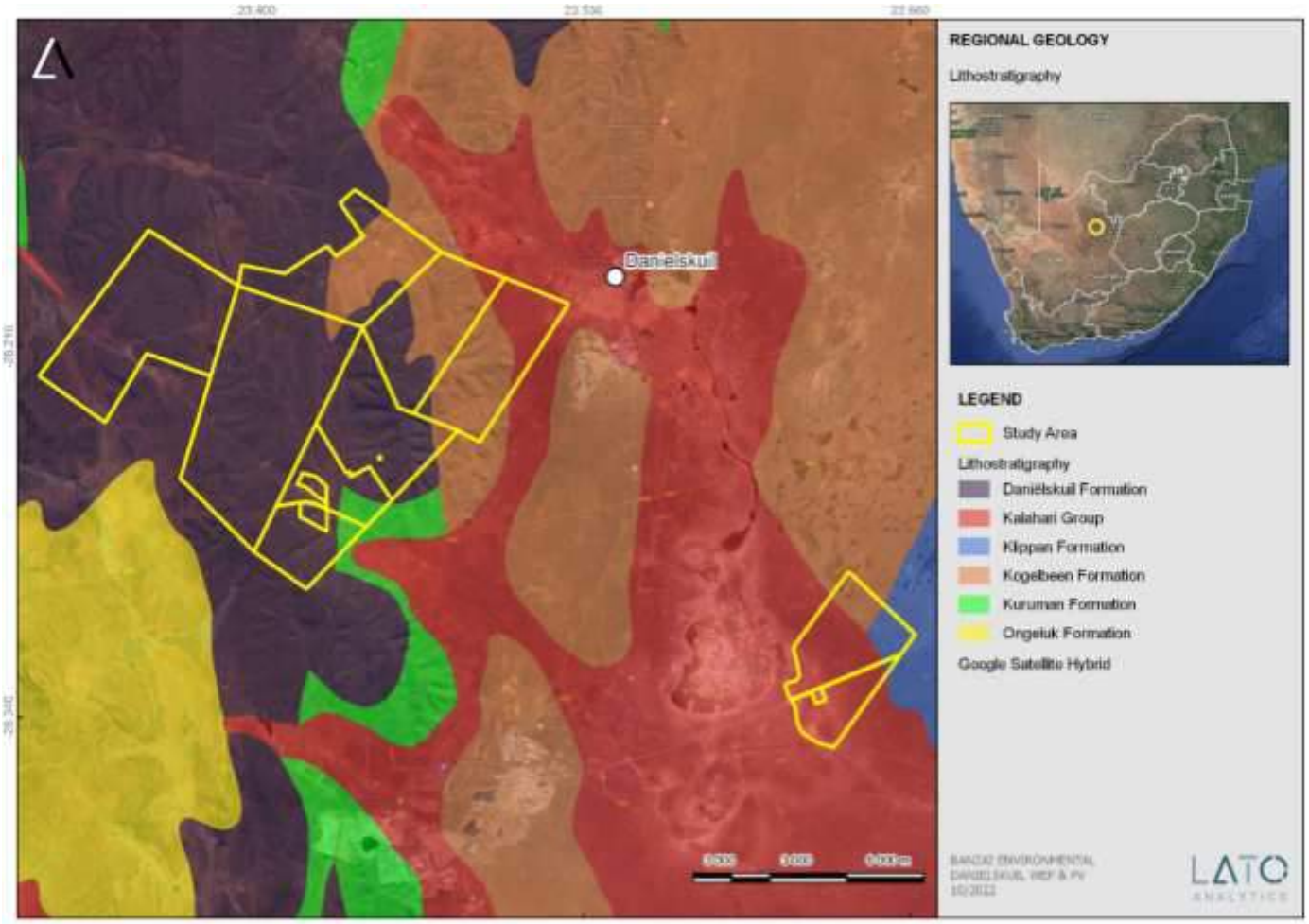

***Figure SEQ Figure * ARABIC 4**: Updated Geology (Council of Geosciences, Pretoria) of the proposed Daniëlskuil WEF and PV in the Northern Cape indicates that the proposed development is underlain by the Kalahari Group, the Kuruman and Daniëlskuil Formation Supergroup). Quaternary surface limestone*

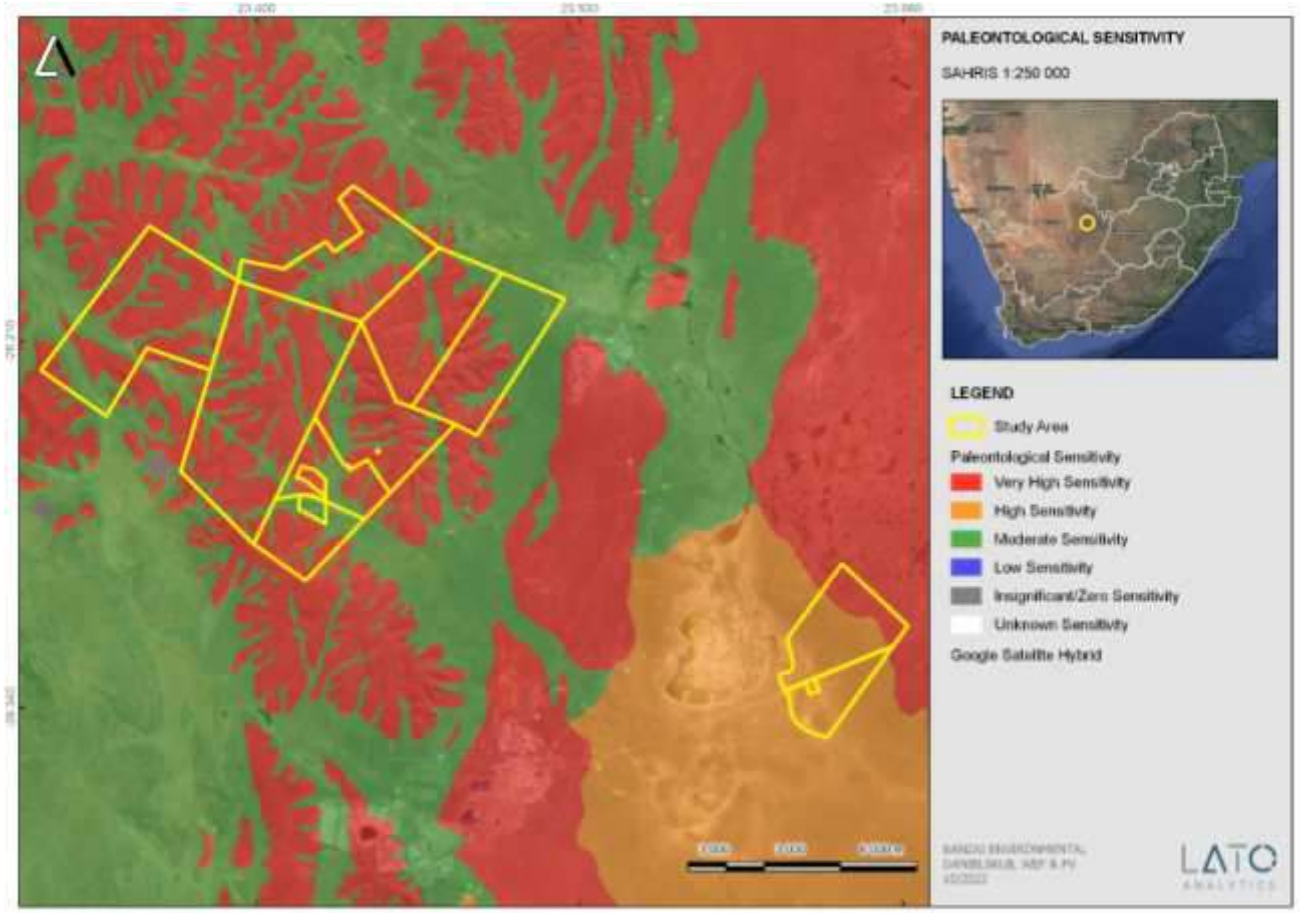

Figure SEQ Figure * ARABIC 5: *Extract of the 1:250 000 SAHRIS PalaeoMap map (Council of Geosciences, Pretoria) indicating the Palaeontological Sensitivity of the proposed Pixley Park REF near De Aar in the Northern Cape.*

According to the SAHRIS Palaeosensitivity map (**Figure 5)** the proposed development is underlain by sediments of Very High (red), and Moderate (green) Palaeontological Sensitivity.

Table 3:Palaeontological Significance

Colour	Sensitivity	Required Action
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	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Top of Form

The colours on the PalaeoMap indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero

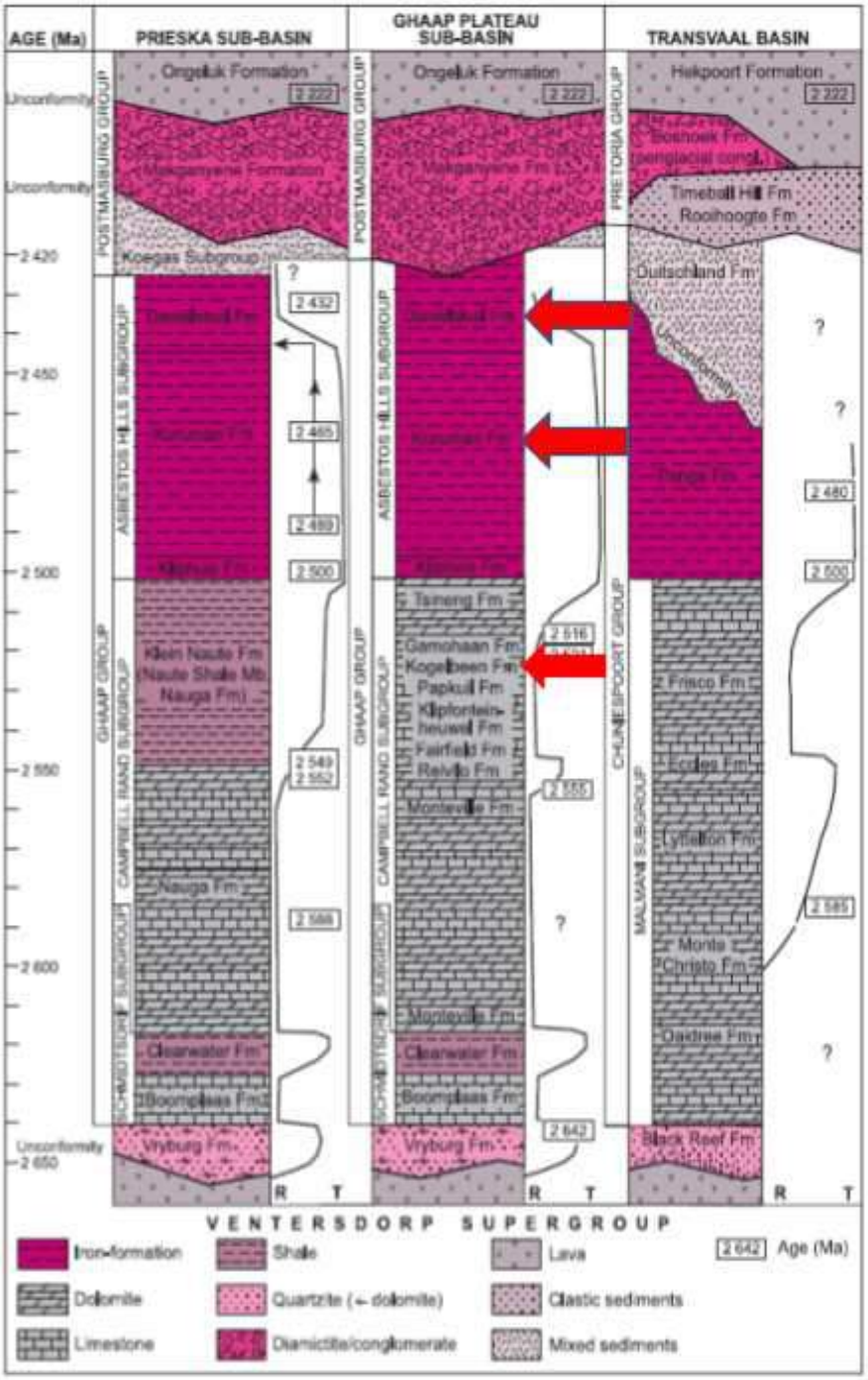

Figure SEQ Figure * ARABIC 6: Stratigraphy of the Transvaal Supergroup (Ghaap Plateau Sub-basin, middle column). Precambrian bedrock units represented in the study area is indicated by the red arrow (Modified from Eriksson et al. 2006).

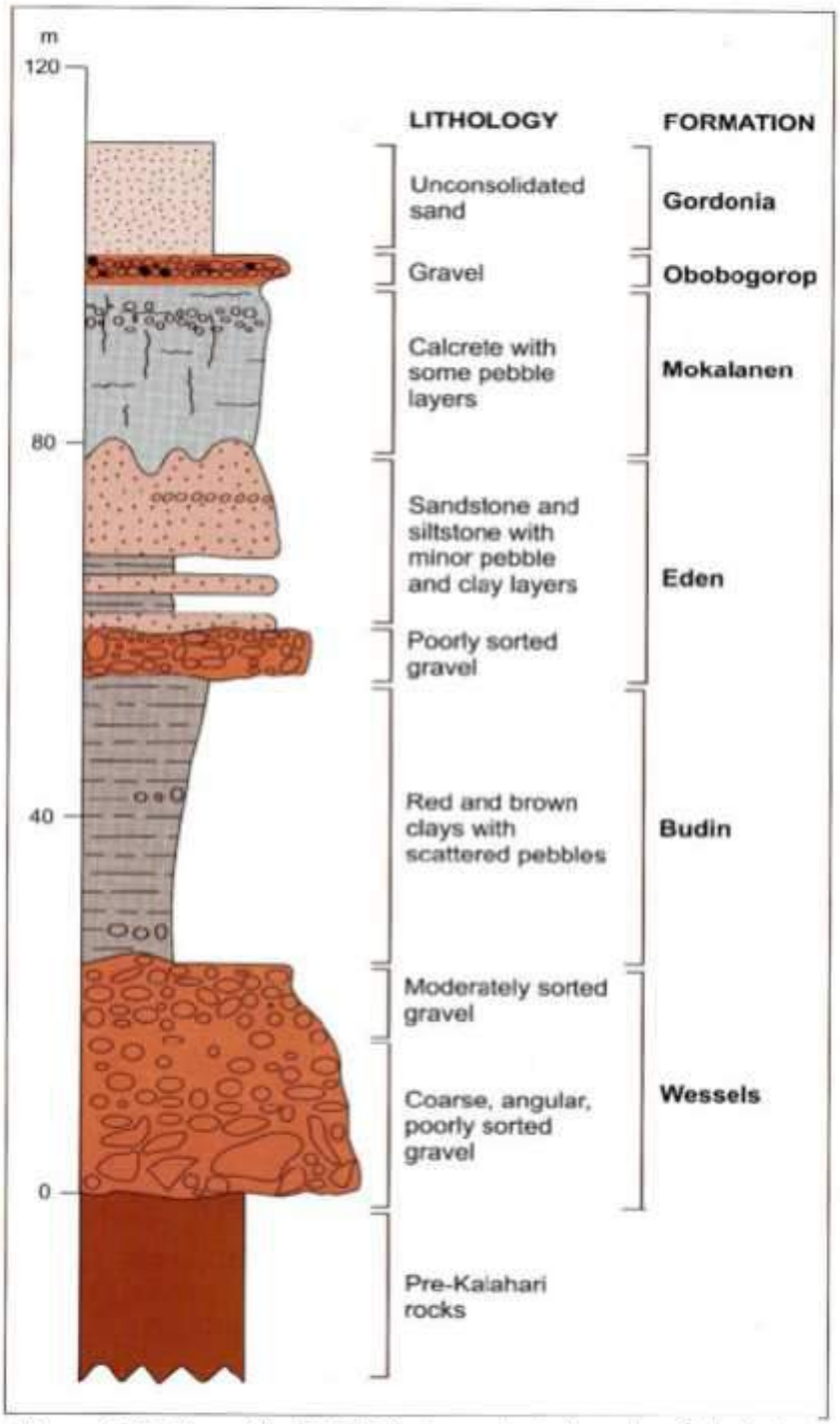

Figure SEQ Figure * ARABIC 7: General stratigraphy of the Late Cretaceous to Recent Kalahari Group (Taken from Partridge et al. 2006).

6 GEOGRAPHICAL LOCATION OF THE SITE

The proposed Danielskuil WEF and Solar plant is located north of Danielskuil in the Northern Cape.

*Table SEQ Table * ARABIC 4:Coordinates of the site*

	Latitude	Longitude
PV site		
Northern Border	-28.289252°	23.635669°
Western Border	-28.334302°	23.612513°
Southern Border	-28.350284°	23.628906°
Eastern Border	-28.311156°	23.662117°
WEF site		
Northern Border	-28.155746°	23.438024°
Western Border	-28.219414°	23.314132°
Southern Border	-28.295143°	23.420006°
Eastern Border	-28.196625°	23.524117°

7 METHODS

The aim of a desktop study is to evaluate the risk to palaeontological heritage in the proposed development. This includes all trace fossils and fossils. All available information is consulted to compile a desktop study and includes Palaeontological impact assessment reports in the same area, aerial photos, and Google Earth images, topographical as well as geological maps.

7.1 Assumptions and Limitations

When conducting a PIA several factors can affect the accuracy of the assessment. The focal point of geological maps is the geology of the area, and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have not been reviewed by palaeontologists and data is generally based on aerial photographs. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented. Comparable Assemblage Zones in other areas is used to provide information on the existence of fossils in an area which was not yet been documented. When similar Assemblage Zones and geological formations for Desktop studies is used it is generally assumed that exposed fossil heritage is present within the footprint.

8 Additional Information Consulted

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984).
- A Google Earth map with polygons of the proposed development was obtained CTS Heritage
- 1:250 000 Postmasburg 2822 (1977) Geological map (Council of Geoscience, Pretoria).
- Shape files produced by the Council of Geosciences (Pretoria).
- Various other PIAs has been conducted in the area (see references).

9 SITE VISIT

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 15 October 2022. The proposed PV development is located on a flat topography, while the WEF study area is located on hills. A few weathered stromatolites were identified in the eastern portion of the proposed WEF study area, while no fossils were found in the solar PV site.

***Figure SEQ Figure * ARABIC 8**: Surface outcrops are mantled by lush vegetation on the WEF study area.*

Figure SEQ Figure * ARABIC 9: Weathered stromatolite

GPS coordinate 28.182652, 23.537695

***Figure SEQ Figure * ARABIC 10**: Flat topography of the Solar PV, an abundancy of calcrete and electrical infrastructure prominent*

10 ASSESSMENT METHOLOGY AND IMPACT ASSESSMENT FORMAT

10.1 IMPACT ASSESSMENT TABLES:

Table 5: Impact Assessment

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**H (4)**	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.	**L (2)**	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Limited to the development footprint	**L (1)**	Limited to the development footprint
PROBABILITY	**L (4)**	It is that significant fossils will be impacted	**L (2)**	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	**L**	(1+5+4) x4=40	**L**	(1+5+2) x2=16
STATUS		Negative		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Likely	**L**	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: • The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities • Should any previously unrecorded palaeontological resources 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.				
RESIDUAL RISK: None				

11 FINDINGS AND RECOMMENDATIONS

The Wind Energy Facility is underlain by small areas of low lying Quaternary sands while a small portion in the centre is underlain by the Kuruman Formation and a larger portion in the south and east is underlain by the Daniëlskuil Formation of the Asbestos Hills Subgroup (Griquatown Group, Transvaal Supergroup).The proposed solar PV development (in the south) is mostly underlain by surface limestone while the Lime Acres Member (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation) crops out in the north-eastern portion of the development. The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the Quaternary sands are Moderate, while that of the Quaternary surface limestones are High and that of the Lime Acres Member, Daniëlskuil and Kuruman Members are Very High (Almond and Pether, 2009; Almond *et al*., 2013).

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 15 October 2022. A few weathered stromatolite outcrops were identified in the development footprint. Due to the weathered and relative scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, just east of the development, well-preserved stromatolite outcrops in the Lime Acers Member (Altermann & Wotherspoon 1995) were identified, while Almond (2015) found well-preserved stromatolites south of the R385, north of Lime Acres. These well-preserved outcrops are located just south-west of the present study area. The possibility of well-preserved stromatolite finds is thus possible.

It is thus **recommended that:**

- The Environmental Control Officer (ECO), responsible for the development, should be aware of the possibility of finding fossils in the development area. All excavations deeper than one meter should be monitored by the ECO, on an ongoing basis during the construction of the Energy Facilities.
- If Palaeontological Heritage is uncovered during surface clearing and excavations the **Chance find Protocol** attached should be implemented immediately. These discoveries ought to be protected (if possible, *in situ*) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation (recording and collection) can be carry out by a paleontologist.

Before any fossil material can be collected from the development site, the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012). It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

12 CHANCE FINDS PROTOCOL

The following procedure will only need to be followed if fossils are uncovered during excavation.

12.1 Background

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past millions of years ago. Fossils are extremely rare and irreplaceable. By studying

fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on the construction site. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the Chance Find Protocol as not to compromise the conservation of fossil material.

12.2 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and is the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

12.3 Chance Find Protocol

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.

- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

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APPENDIX 1: -

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	29 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B.Sc (Hons) Zoology, 1991
	University of the Orange Free State
	Management Course, 1991
	University of the Orange Free State
	M.Sc. Zoology (*Cum laude*), 2009
	University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part-time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part-time laboratory assistant	Department of Virology
	University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant	National Museum, Bloemfontein
and Collection Manager	1998–currently

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ANNEXURE 2: Assessment Methodology and Impact Assessment Format Table

Direct, indirect and cumulative impacts of the impacts identified above will be assessed according to the following standard methodology:

- 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 very short duration (0 - 1 years) – assigned a score of 1;
    - The lifetime of the impact will be of 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; or
    - Permanent – assigned a score of 5.
- The **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 result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease) and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1 - 5 where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but of 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 syntheses of the characteristics described above and can be assessed as low, medium or high; and
- The **status**, which is described as positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The degree to which the impact can be mitigated.

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

S = (E + D + M) x P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

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

NATURE: It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location				
		Without Mitigation		**With Mitigation**
MAGNITUDE	**L (1)**	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.	**L (1)**	According to the SAHRIS Palaeosensitivity Map (Figure 4), the area proposed for development of the PV facilities is underlain by sediments that have very high palaeontological sensitivity.
DURATION	**H (5)**	Where manifest, the impact will be permanent.	**H (5)**	Where manifest, the impact will be permanent.
EXTENT	**L (1)**	Limited to the development footprint	**L (1)**	Limited to the development footprint
PROBABILITY	**L (1)**	It is unlikely that significant fossils will be impacted	**L (1)**	It is unlikely that significant fossils will be impacted
SIGNIFICANCE	**L**	(1+5+1)x1=7	**L**	(1+5+1)x1=7
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	**L**	Not Likely
CAN IMPACTS BE MITIGATED		Yes		
MITIGATION: • The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities • Should any previously unrecorded palaeontological resources 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.				
RESIDUAL RISK: None				

APPENDIX 3: Chance Fossil Finds Procedure

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CHANCE FINDS OF PALAEONTOLOGICAL MATERIAL

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

Introduction

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

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

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

Training

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

Actions to be taken

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

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

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

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

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

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

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

CTS Heritage
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APPENDIX 4: Heritage Screening Assessment

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HERITAGE SCREENER

CTS Reference Number:	**CTS21_227**
SAHRIS Reference:	
Client:	**Savannah**
Date:	**November 2022**
Title:	**Limestone PV 1 Solar Energy Facility, Northern Cape Province**

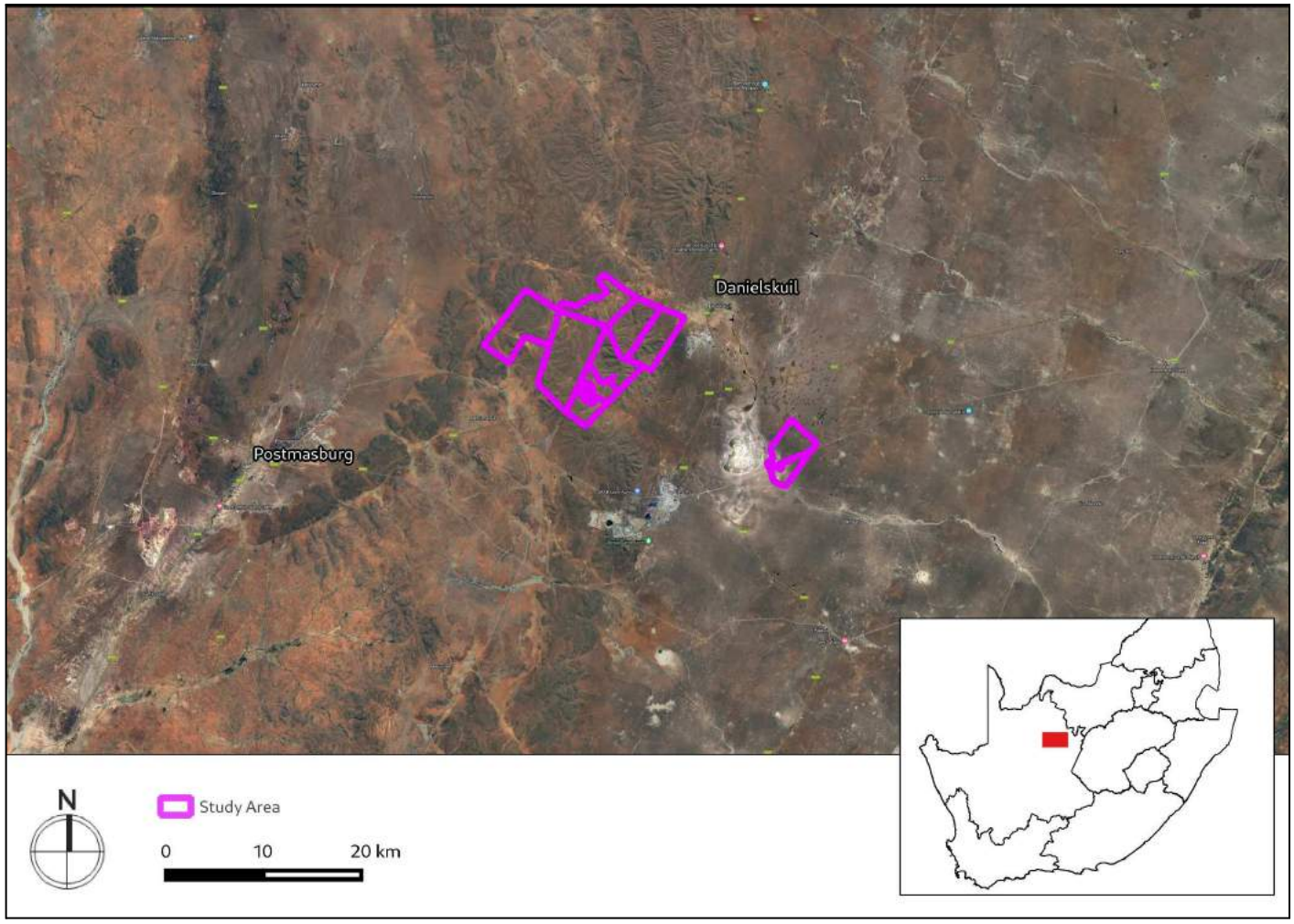

Figure 1a. Satellite map indicating the location of the proposed development in the Northern Cape

CTS Heritage Recommendation	**RECOMMENDATION** **Based on the available information, it is likely that the proposed development will negatively impact on significant archaeological, palaeontological and cultural landscape heritage resources. As such, it is recommended that an HIA is required that assesses these impacts and proposes mitigation measures.**

CTS Heritage
Bon Esperance, 238 Queens Road, Simons Town
Email: info@ctsheritage.com **Web:** www.ctsheritage.com

1. Proposed Development Summary

AGV Projects (Pty) Ltd is proposing the development of a commercial Photovoltaic(PV) Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site comprises the following farm portion:

- Portion 4 of the Farm Engeland 300

The Limestone PV 1 will have a contracted capacity of between 75MWp to 100MWp. A broader study area of 1842 ha and a preferred project site with an extent of 200-300ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the Limestone PV 1 facility. Environmental Site Establishment processes were undertaken before the initiation of the EIA. The aim of the Environmental Site Establishment processes was to determine the suitability from an environmental and social perspective and identify areas that should be avoided in development planning. The project is planned as part of a larger cluster of renewable energy projects, which includes another 75-100MWp PV Solar Energy Facility (Limestone PV 2) located adjacent to Limestone PV 1 and 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil. The Limestone PV 1 project site is proposed to accommodate the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area with security and access control
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation
- Battery Energy Storage System (BESS) with a footprint of 3-5ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 1ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 4m wide).
- Temporary concrete batching facility
- Stormwater management infrastructure as required

Table 1: Details or dimensions of typical infrastructure required for the 75-100MWp Limestone PV 1 Solar Energy Facility

Infrastructure	Footprint and dimensions
Number of Panels	To be determined
Panel Height	+/- 2.2m
Technology	Use of fixed-tilt and single-axis tracking.

Contracted Capacity	Between 75MWp and 100MWp
Area occupied by the solar array	To be determined in the EIA phase
Area occupied by the on-site facility substation	0.5 – 0.75ha
Capacity of on-site facility substation	33kV/132kV
Cabling between the PV array and the onsite substation	The cabling will be in underground trenches, and operate at a voltage of up to 33kV.
Extent of areas required for laydown of materials, equipment etc.	Less than 2ha
Access and internal roads	Existing roads will be used as far as possible. There are existing gravel roads that can be utilised for site access (width of up to 6m). Upgrading of existing roads or new roads will be required. New internal access roads required (+/-4m), same for construction and operation. Internal access roads will be gravel/hard surfaced.
Grid connection	132kV overhead lines with 31m corridors for overhead lines. Project site adjacent existing MTS (Olien MTS) but exact grid connection details will be determined later.
Temporary infrastructure	Temporary store area close to site entrance (Less than 1ha).

The Limestone PV 1 facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) with the aim of evacuating the generated power into the national grid or obtaining a commercial PPA (Power Purchase Agreement). This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP) with the Limestone PV 1 Facility set to inject up to 75MW (peak AC power) into the national grid.

From a regional perspective, the area within the Northern Cape identified for the project is considered favourable for the development of a commercial PV facility due to the low environmental sensitivity of the identified site, excellent solar resource, and availability of land on which the development can take place. There is also potential for evacuating the power to the national grid via a direct grid connection at the Olien MTS (Main Transmission Substation) which is adjacent to the proposed site. The site is also in proximity to large electricity users which opens opportunities for commercial PPAs (Behind the metre connection Or Wheeling to a 3rd party off-taker).

CTS HERITAGE

2. Application References

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

3. Property Information

Latitude / Longitude	28°13'29.56"S 23°25'10.83"E
Erf number / Farm number	PV: Portion 4 of the Farm Engeland 300
Local Municipality	Tsantsabane
District Municipality	ZF Mgcawu
Province	Northern Cape
Current Zoning	Agriculture

4. Nature of the Proposed Development

Project Area	TBA
Depth of excavation (m)	TBA
Height of development (m)	TBA

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

TBA

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

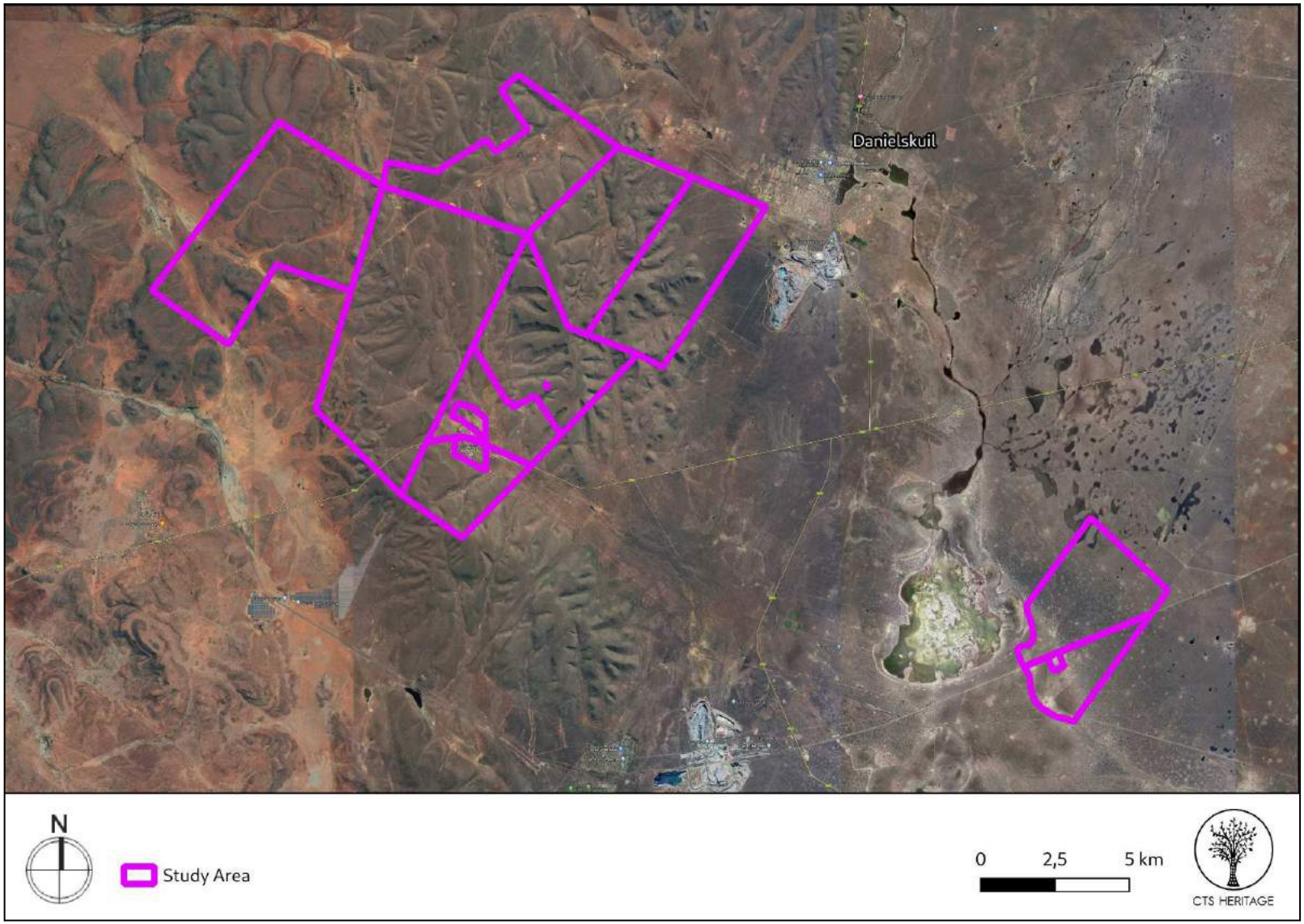

Figure 1b. Overview Map. Satellite image (2022) indicating the proposed development area for the WEF and 2x PV Facilities

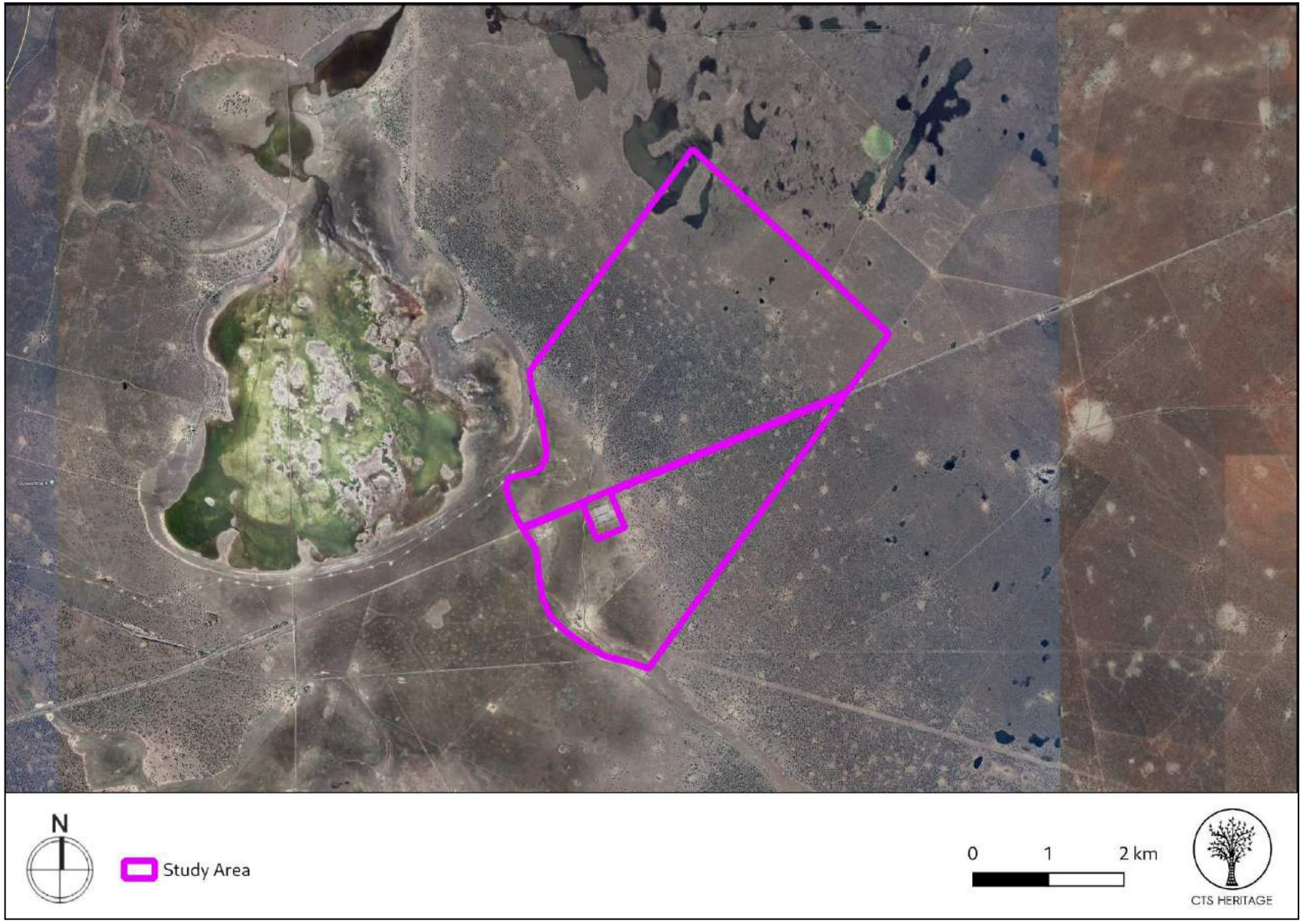

Figure 1c. Overview Map. Satellite image (2020) indicating the proposed development area for the PV

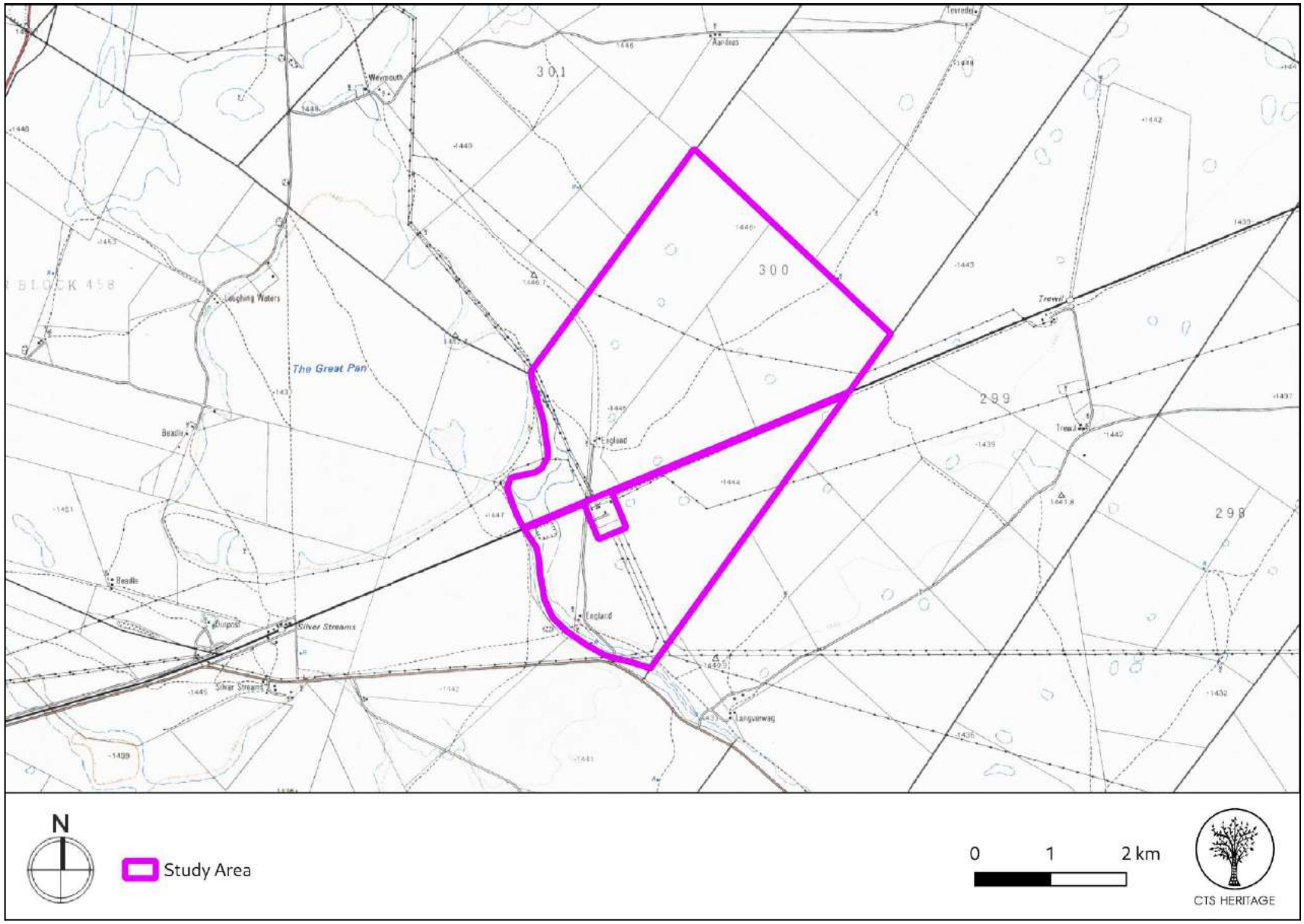

Figure 1d. Overview Map. Extract from the 1:50 000 Topo Map indicating the proposed development area for the PV

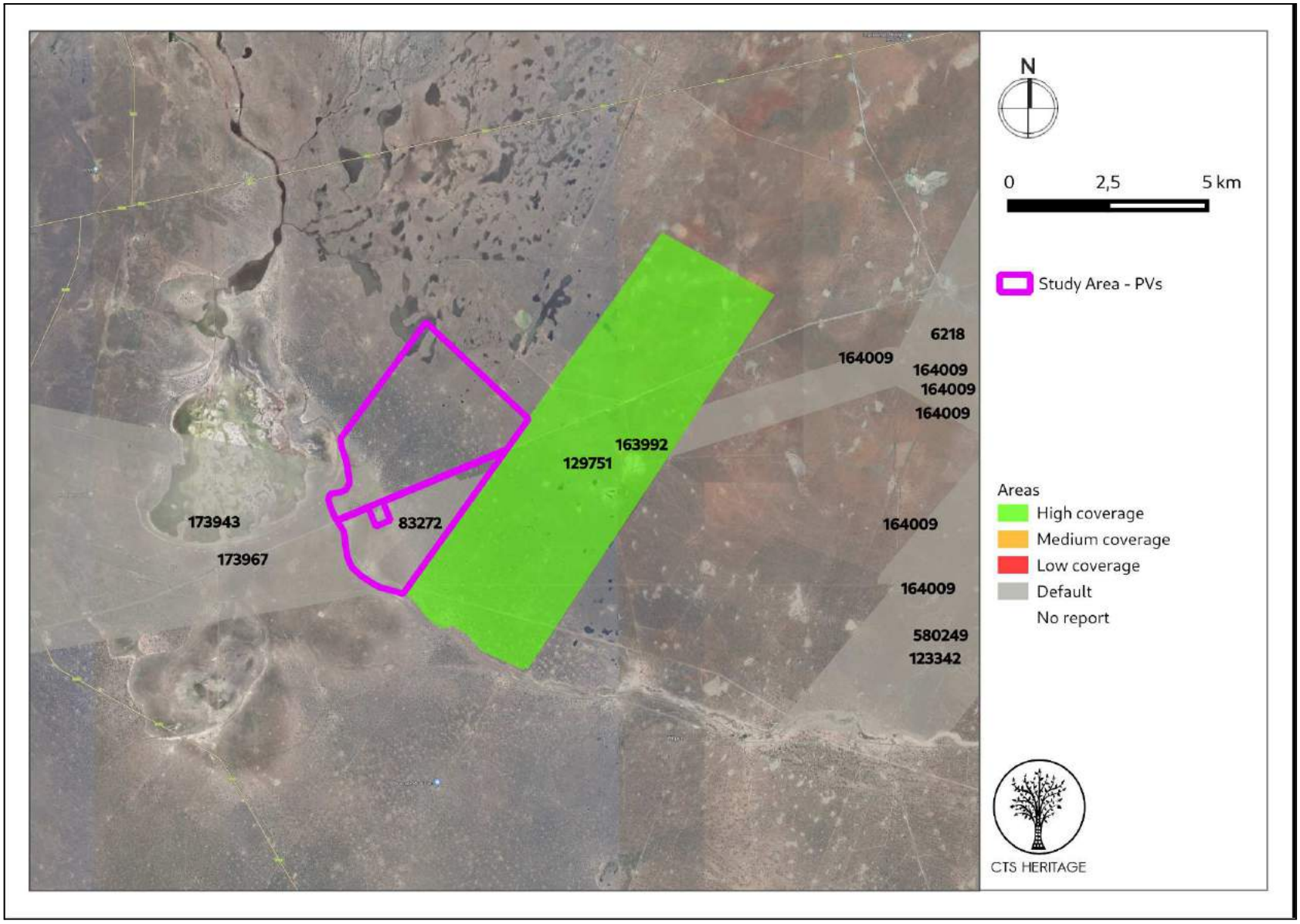

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

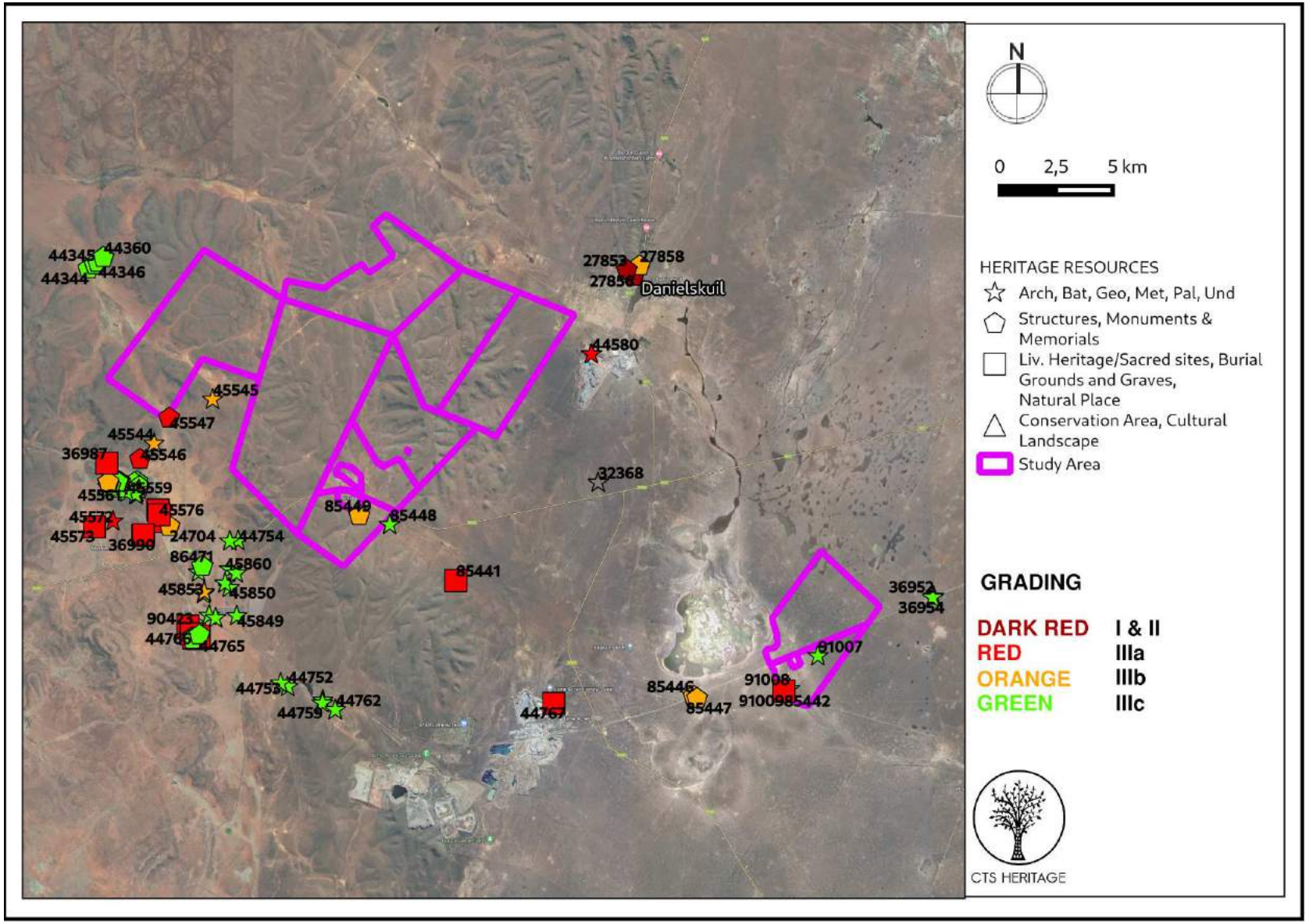

Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for full description of heritage resource types.

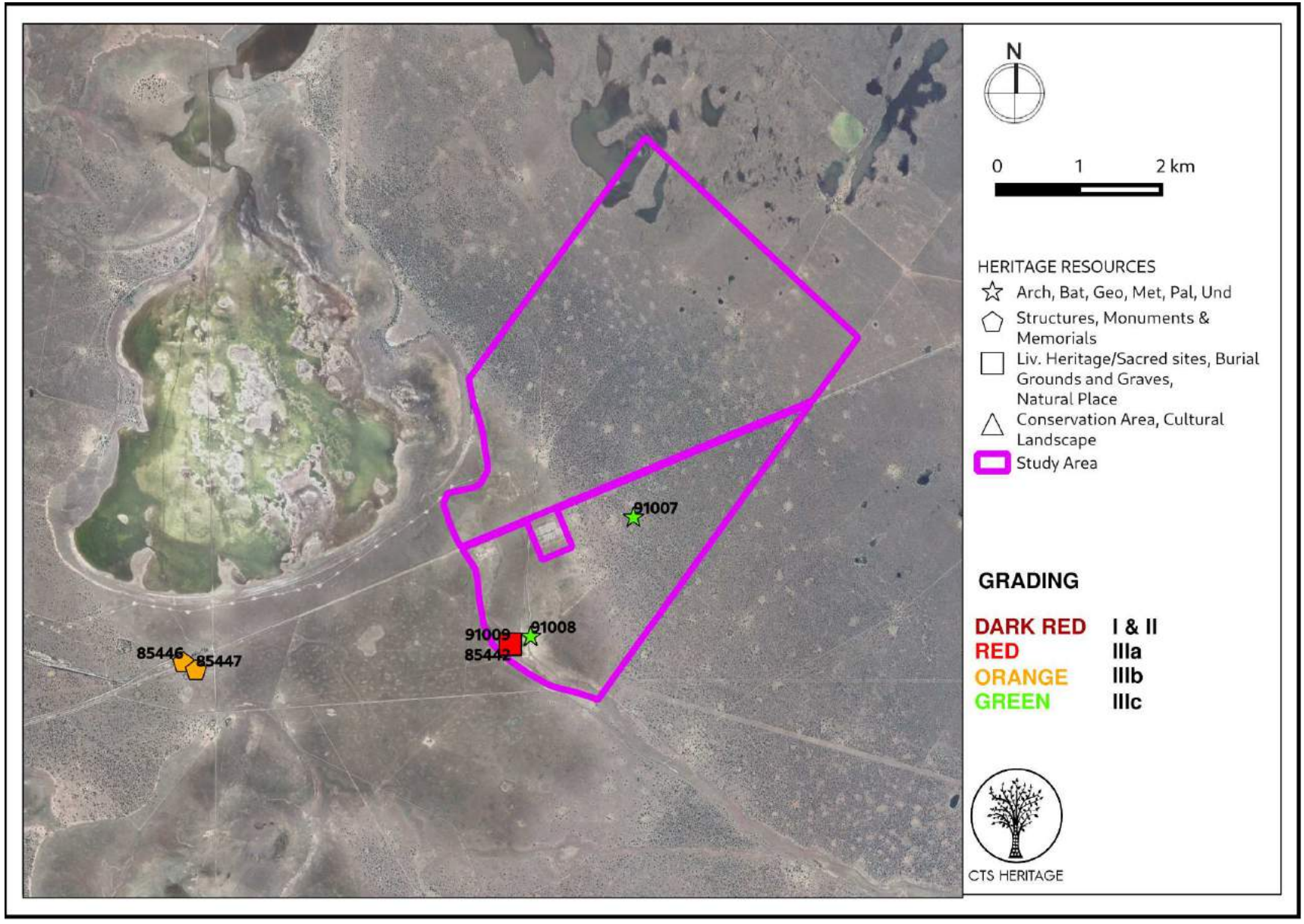

Figure 3a. Heritage Resources Map Inset A focussing on the PV facility

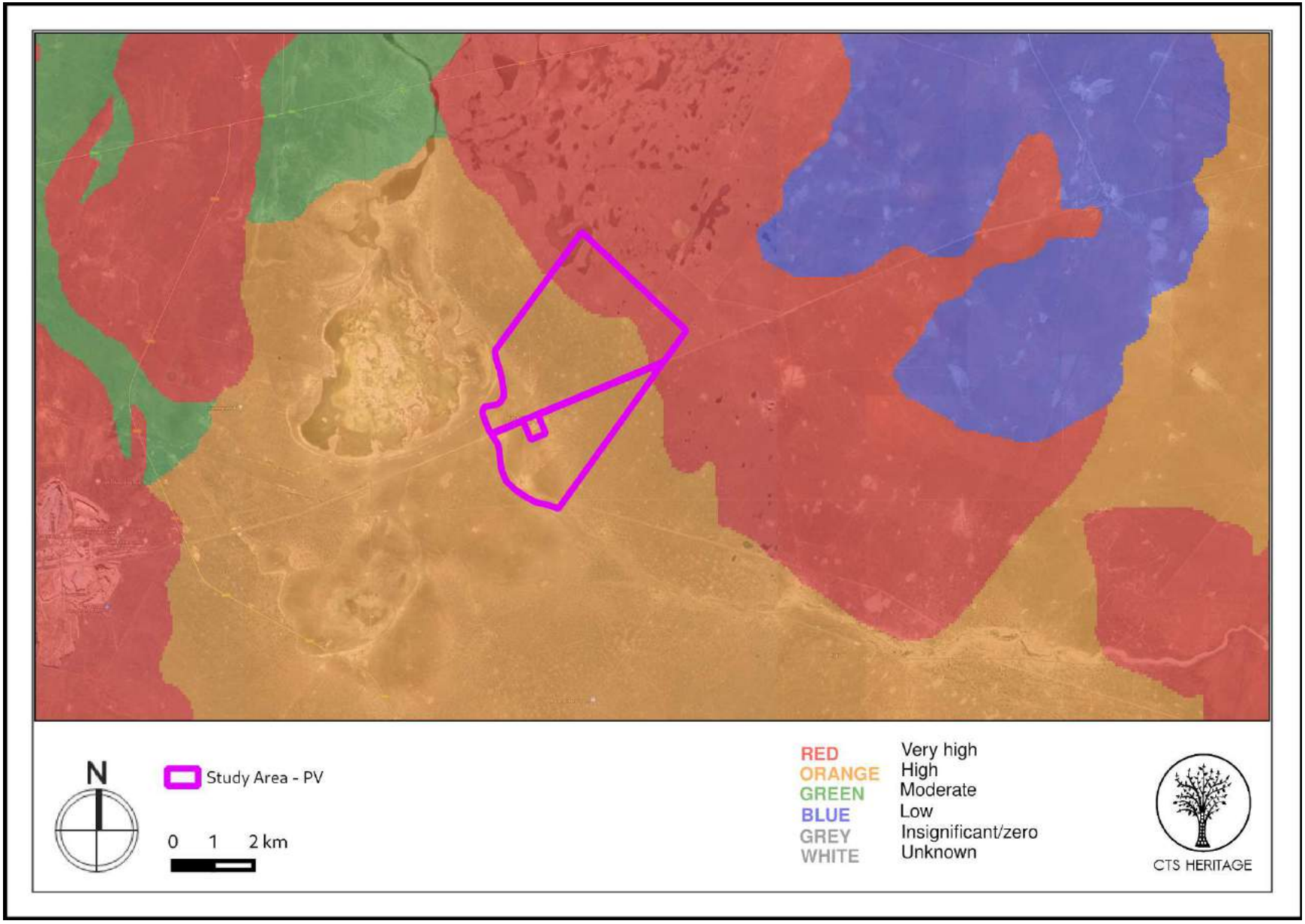

Figure 4a. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

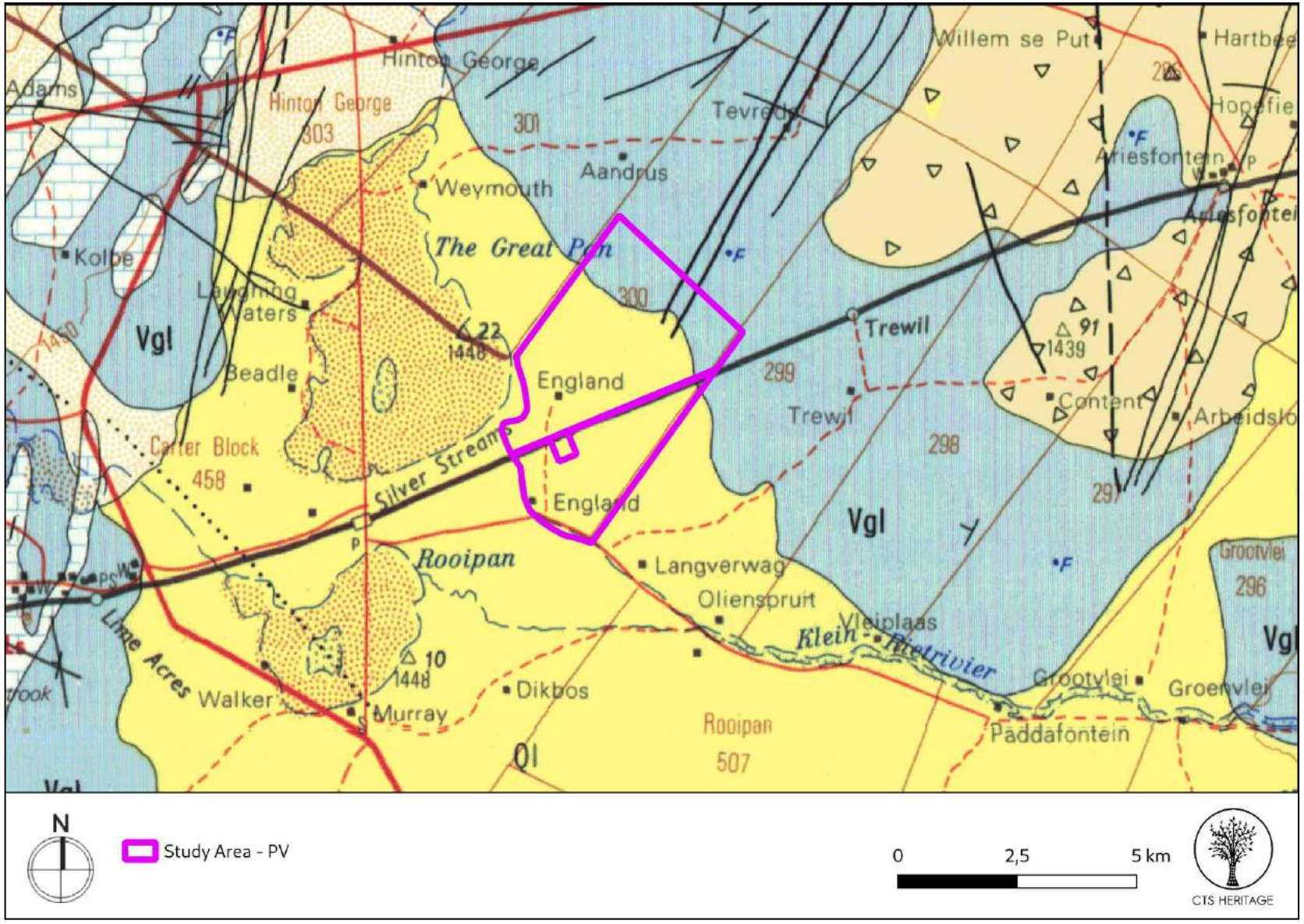

Figure 4b. Geology Map. Extract from the CGS 2822 Postmasburg Map indicating that the development area is underlain by sediments of the Vo: Ongeluk Formation, Vad: Danielskuil Member and Vak: Kuruman Member of the Asbesberge Formation, **Vgl: Lime Acres Member** of the Ghaap Plateau, **Ql: Surface Limestone** and Qs: Quaternary Sands

Figure 5. Cumulative Impact Map. Indicating other Renewable Energy Facilities that have been granted Environmental Authorisation (EA). The EA that overlaps this development area has lapsed.

8. Heritage Assessment

Background

This application is for the proposed development of the Limestone PV 1 facility that forms part of the Danielskuil Renewable Energy Facility projects consisting of a Wind and 2x Solar Energy Facilities located between Danielskuil and Postmasburg in the Northern Cape. Originally a station of the London Missionary Society called Sibling, Postmasburg became a Griqua village with the name Blinkklip and was then proclaimed a town on 6 June 1892. Postmasburg achieved municipal status in 1936. Postmasburg had its own diamond rush. The first diamond was discovered in 1918 and as a result an open cast mine grew. The mine was permanently flooded in 1935 and as a result, just like Kimberley, Postmasburg could also boast its very own “Big Hole”. This hole is over 45 m deep and filled with fish. Postmasburg also boasts spectacular architecture and many historical sites. An old blue dolomite stone Reformed Church was built in 1908. There is also a rather impressive gun known as “Howitzer Gun” which stands at the civic centre. It honours the men of Postmasburg who died during World War II. The proposed development is also located in close proximity Lime Acres, home to the employees of the Finsch Diamond Mine located nearby.

Cultural Landscape

In 1801, the London Missionary Society also established a station among the Griqua at *Leeuwenkuil*. The site proved too arid for cultivation and in about 1805 they moved the station to another spring further up the valley and called it *Klaarwater*. Their second choice was little better than their first, and for many years a lack of water prevented any further development. The name of the settlement was changed later to Griquatown or *Griekwastad* in Afrikaans. They lived among a mixed nomadic community of the Chaguriqua tribe and "bastaards" (people of mixed origin) from Piketberg. Their two leaders were Andries Waterboer and Adam Kok II. From 1813 to 17 July 1871, the town and its surrounding area functioned as Andries *Waterboer's Land*. *Griekwastad* was later the capital of British Colony Griqualand West from 1873 to 1880, with its own flag and currency, before it was annexed into the Cape Colony. The proposed development is located on one of the main routes between Griekwastad and Kuruman and as such, evidence of this heritage may be impacted by the proposed development.

Danielskuil derives its name from a cone-shaped depression deep in the dolomitic limestone; with a domed covering, reminiscent of the biblical ‘Daniel in the lions' den’. The Griqua leader Adam Kok is said to have used this depression as a prison, and to also have kept snakes in it. The area was famous because of the Griqua Chief who ruled there by the name of Barend Barends. Barend Barends was the son of a “half-Hottentot Dutchman” and one of the most important leaders along the turbulent northern frontier of the Cape Colony from 1790 to 1834. He was one of the first chiefs of the Griqua tribe, an indigenous Khoi group. A book, Barend Barends - Die Vergete Kaptein van Danielskuil**,** has been recently published about his story. During the Anglo Boer war (1899-1902) the British army built and used a blockhouse fort, which overlooks the town from the north.

Archaeology

An archaeological assessment of the Finsch Mine was completed by Henderson in 2005 (SAHRIS ID 6780). Henderson drafted a brief history of the Finsch Mine and this is not repeated here. Suffice to note that “Recent human activity at the Finsch Mine, which would have left traces of mining and structures, therefore only dates back to 1959 on Brits. It would appear that there may be an earlier date for farming activities on Bonza”. Elements of the cultural landscape that may be impacted by the proposed development include the sense of place of the historic core of Postmasburg as well as the mining and farming heritage of the area.

Due to mining activities in the area, a number of heritage impact assessments have been completed in close proximity to the development area and these are relevant here (Figure 2 and Appendix 2). The well known Taung site that preserved early hominid remains is located only some 50 kilometres to the west of the site under investigation. Wonderwerk cave near Kuruman also retains evidence of early peoples in its 6 metre midden deposit, especially in the rear portions of the cave. Towards the front rock-art from later Stone Age peoples are also preserved. Furthermore the engraving sites Wildebeestkuil, Driekopseiland and Nooitgedacht near Kimberly confirm a continued presence of Later Stone Age peoples in the general region. It is very likely that significant archaeological heritage may be impacted by the proposed development.

A recent HIA completed by CTS Heritage located south of this proposed development area (CTS 2022) revealed a great many heritage resources evident within the broader context.

The vast majority of these resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. A number of heritage resources of significance were, however, also identified. These resources range from significant archaeological sites and scatters, to burial grounds and graves as well as historic farm werfs and infrastructure such as the irrigation furrows ascribed to the work of the London Missionary Society and the local Griekwa population. The relationship between the furrows, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area and its Griekwa inhabitants. It is likely that similar heritage resources are located within this development footprint.

A number of known heritage resources that have been identified through other Heritage Impact Assessment processes are located within the assessment area. It is recommended here that the mitigation measures previously proposed for these resources are adopted for this project. This information is detailed below:

Site ID	Site Name	Description	Grading	Recommended Mitigation	Report
85442	HR06: Redstone Solar Thermal Power Project to Olien MTS Heritage Report 004	An informal cemetery with 5 graves was identified at this location. The graves were placed in a single line next to each other and were orientated from west to east. The graves have informal mounds of soil and packed rocks as dressings. The graves are situated approximately 120m to the west of the farmstead. The graves are most probably associated with farm labourers who were previously working on the farm Engeland. There was nobody on the farm to question about these graves. Site size: Approximately 5m x 15m.	IIIA	Adjust the development layout and demarcate site with at least a 10 metre buffer.	ACWA Power SolarReserve Redstone Solar Thermal Power Plant to Olien Substation, in the ZF Ngcawu District Municipality – Heritage Impact Assessment. *PGS Heritage* (2014)
91007	Olien SEF002	Later Stone Age flakes on chert from a dispersed scatter in the northern part of the area	IIIC	None	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape. *Morris* (2012)
91008	Olien SEF003	Remains of kraals made from calcrete cobbles.	IIIC	None	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape. *Morris* (2012)
91009	Olien SEF004	A row of unmarked graves was documented	IIIA	The graves should be fenced and development must be restricted to no closer than 100 m.	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape. *Morris* (2012)

Palaeontology
According to the SAHRIS Palaeosensitivity Map, the area proposed for development is predominantly underlain by sediments of very high and high palaeontological sensitivity (Figure 4a). According to the Extract from the CGS 2822 Postmasburg Map, the development area is underlain by sediments of the Ongeluk Formation, Danielskuil Member and Kuruman Member of the Asbesberge Formation, the Lime Acres Member of the Ghaap Plateau as well as Surface Limestone Quaternary Sands.

In an assessment completed for a proposed powerline that traverses the same geological formations, Almond (2015, SAHRIS ID 344620) concluded that "On the basis of both desktop analysis and fieldwork within the broader power line study area (Almond 2013a, 2014) the palaeontological sensitivity of all power line corridors under consideration is assessed as low. This also applies to the area to the north of Lime Acres where stromatolites occur within the underlying bedrock but are rarely well-exposed at surface and are therefore unlikely to be significantly impacted by the proposed transmission lines. The Makganyene Formation outcrop area in the north-western corner of the Remainder of the Farm Nr 469, close to the R385 tar road, is of considerable scientific interest as an accessible part of the limited rock record for an Early Proterozoic (c. 2.3 billion years-old) "snowball earth" glacial event, when ice sheets may have covered much of the planet. However, fossil stromatolites do not occur within the succession here and significant palaeontological impacts are therefore not anticipated. Potential impacts on local palaeontological heritage are assessed for all power line corridor options as being of low negative significance." It is likely that similar palaeontological sensitivities exist for the proposed development area and as such, it is recommended that potential impacts to palaeontological heritage are assessed.

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

9. Scoping Assessment Impact Table

Impact

- Impact to archaeological resources
- Impact to palaeontological resources
- Impact to Cultural Landscape
- Cumulative Impact

Desktop Sensitivity Analysis of the Site

- Impact to significant archaeological resources such as Stone Age artefact scatters, burial grounds and graves, historical artefacts, historical structures and rock art engravings through destruction during the development phase is likely.
- Impacts to palaeontological resources are likely.
- Due to the nature of the development and its context, cumulative impact and negative impact to the cultural landscape is possible

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

Gaps in knowledge & recommendations for further study

- It is likely that the proposed development will impact significant cultural landscape, archaeological and palaeontological heritage and as such, it is recommended that a heritage impact assessment be completed that assesses these impacts as per section 38(3) of the NHRA.

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APPENDIX 1

List of heritage resources within close proximity to the development area

Site ID	Site no	Full Site Name	Site Type	Grading
27858	9/2/074/0007	Old Police Station complex, Rhodes Street, Danielskuil	Building	Grade IIIb
86471	GROE001	Groenwater 001	Structures	Grade IIIc
27856	9/2/074/0005	First and Second Dutch Reformed Churches, Danielskuil	Building	Grade II
27853	9/2/074/0009	Anglo-Boer War Blockhouse, Danielskuil	Building	Grade II
95513	PGS06	PGS06 - Humansrus, Daniëlskuil	Deposit	
45544	GRNWTR01	Groenwater 453-01	Artefacts	Grade IIIb
45545	GRNWTR02	Groenwater 453-02	Artefacts	Grade IIIb
45546	GRNWTR03	Groenwater 453-03	Structures	Grade IIIa
45547	**GRNWTR04**	**Groenwater 453-04**	**Building**	**Grade IIIa**
45548	GRNWTR05	Groenwater 453-05	Artefacts	Grade IIIc
45549	GRNWTR06	Groenwater 453-06	Artefacts	Grade IIIc
45550	GRNWTR07	Groenwater 453-07	Artefacts	Grade IIIc
45551	GRNWTR08	Groenwater 453-08	Artefacts	Grade IIIb
45552	GRNWTR09	Groenwater 453-09	Structures	Grade IIIc
45553	GRNWTR10	Groenwater 453-10	Structures	Grade IIIc
45554	GRNWTR11	Groenwater 453-11	Structures	Grade IIIc
45555	GRNWTR12	Groenwater 453-12	Stone walling	Grade IIIb

45556	GRNWTR13	Groenwater 453-13	Stone walling	Grade IIIc
45557	GRNWTR14	Groenwater 453-14	Stone walling	Grade IIIb
45558	GRNWTR15	Groenwater 453-15	Stone walling	Grade IIIc
45559	GRNWTR16	Groenwater 453-16	Archaeological	Grade IIIc
45560	GRNWTR17	Groenwater 453-17	Structures	Grade IIIc
45561	GRNWTR18	Groenwater 453-18	Stone walling	Grade IIIb
45562	GRNWTR19	Groenwater 453-19	Structures	Grade IIIb
45563	GRNWTR20	Groenwater 453-20	Structures	Grade IIIb
45564	GRNWTR21	Groenwater 453-21	Structures	Grade IIIc
45565	GRNWTR22	Groenwater 453-22	Structures	Grade IIIc
45566	GRNWTR23	Groenwater 453-23	Structures	Grade IIIc
45567	GRNWTR24	Groenwater 453-24	Structures	Grade IIIc
45568	GRNWTR25	Groenwater 453-25	Structures	Grade IIIb
45569	GRNWTR26	Groenwater 453-26	Structures	Grade IIIb
45571	GRNWTR27	Groenwater 453-27	Burial Grounds & Graves	Grade IIIa
45572	GRNWTR28	Groenwater 453-28	Archaeological	Grade IIIa
45573	GRNWTR29	Groenwater 453-29	Burial Grounds & Graves	Grade IIIa
45574	GRNWTR30	Groenwater 453-30	Burial Grounds & Graves	Grade IIIa
45575	GRNWTR31	Groenwater 453-31	Burial Grounds & Graves	Grade IIIa
45576	GRNWTR32	Groenwater 453-32	Burial Grounds & Graves	Grade IIIa

36990	HOT029	Hotazel 029	Burial Grounds & Graves, Stone walling	Grade IIIa
32368	GMB-001	Gloria Mine Bridge	Archaeological	
36991	HOT030	Hotazel 030	Cultural Landscape	Grade IIIa
24704	Ngqura Manganese Railway	Groenwater crossing station	Building	Grade IIIb
45847	HUMA001	Humansrus 001	Artefacts	Grade IIIc
45848	HUMA002	Humansrus 002	Artefacts	Grade IIIc
45849	HUMA003	Humansrus 003	Artefacts	Grade IIIc
45850	HUMA004	Humansrus 004	Artefacts	Grade IIIc
45852	HUMA005	Humansrus 005	Artefacts	Grade IIIc
45853	HUMA006	Humansrus 006	Artefacts	Grade IIIc
45856	HUMA008	Humansrus 008	Artefacts	Grade IIIc
45858	HUMA009	Humansrus 009	Artefacts	Grade IIIc
45860	HUMA010	Humansrus 010	Artefacts	Grade IIIc
85440	RSTP002	Redstone Solar Thermal Power Project to Olien MTS Heritage Report 002	Burial Grounds & Graves	Grade IIIa
85441	RSTP003	Redstone Solar Thermal Power Project to Olien MTS Heritage Report 003	Burial Grounds & Graves	Grade IIIa
85442	**RSTP004**	**Redstone Solar Thermal Power Project to Olien MTS Heritage Report 004**	**Burial Grounds & Graves**	**Grade IIIa**
85443	RSTP005	Redstone Solar Thermal Power Project to Olien MTS Heritage Report	Building	Grade IIIb

		005		
85445	RSTP007	Redstone Solar Thermal Power Project to Olien MTS Heritage Report 007	Structures	Grade IIIc
85446	RSTP008	Redstone Solar Thermal Power Project to Olien MTS Heritage Report 008	Transport infrastructure	Grade IIIb
85447	RSTP009	Redstone Solar Thermal Power Project to Olien MTS Heritage Report 009	Building	Grade IIIb
85448	**RSTP010**	**Redstone Solar Thermal Power Project to Olien MTS Heritage Report 010**	**Stone walling**	**Grade IIIc**
85449	**RSTP011**	**Redstone Solar Thermal Power Project to Olien MTS Heritage Report 011**	**Structures**	**Grade IIIb**
44751	HUM01	Humansrus 01	Artefacts	Grade IIIc
44752	HUM02	Humansrus 02	Artefacts	Grade IIIc
44753	HUM03	Humansrus 03	Artefacts	Grade IIIc
44580	OUPLAAS01	Ouplaas Engravings 01	Rock Art	Grade IIIa
44754	HUM04	Humansrus 04	Artefacts	Grade IIIc
44755	HUM05	Humansrus 05	Artefacts	Grade IIIc
44759	HUM06	Humansrus 06	Artefacts	Grade IIIc
44761	HUM07	Humansrus 07	Artefacts	Grade IIIc
44762	HUM08	Humansrus 08	Artefacts	Grade IIIc
44763	HUM09	Humansrus 09	Burial Grounds & Graves	Grade IIIa
44764	HUM10	Humansrus 10	Burial Grounds & Graves	Grade IIIa

44765	HUM11	Humansrus 11	Burial Grounds & Graves	Grade IIIa
44766	HUM12	Humansrus 12	Burial Grounds & Graves	Grade IIIa
44767	HUM13	Humansrus 13	Burial Grounds & Graves	Grade IIIa
44769	HUM15	Humansrus 15	Structures	Grade IIIc
44344	PL438/488-15	Plaas 438/488 - 15	Structures	Grade IIIc
44345	PL438/488-16	Plaas 438/488 - 16	Structures	Grade IIIc
44346	PL438/488-17	Plaas 438/488 - 17	Structures	Grade IIIc
44770	HUM16	Humansrus 16	Structures	Grade IIIc
44771	HUM17	Humansrus 17	Structures	Grade IIIc
44359	PL438/488-22	Plaas 438/488 - 22	Building	Grade IIIc
44360	PL438/488-23	Plaas 438/488 - 23	Building	Grade IIIc
36952	HOT010	Hotazel 010	Palaeontological	Grade IIIc
36954	HOT011	Hotazel 011	Palaeontological	Grade IIIc
36989	HOT028	Hotazel 028	Burial Grounds & Graves	Grade IIIa
36987	HOT026	Hotazel 026	Burial Grounds & Graves	Grade IIIa
36988	HOT027	Hotazel 027	Burial Grounds & Graves	Grade IIIa
92643	HUMA016	Humansrus 016	Artefacts	Grade IIIb
92644	HUMA017	Humansrus 017	Burial Grounds & Graves	Grade IIIa
92645	HUMA018	Humansrus 018	Burial Grounds & Graves	Grade IIIa
92646	HUMA019	Humansrus 019	Burial Grounds & Graves	Grade IIIa

92647	HUMA020	Humansrus 020	Structures	Grade IIIc
92648	HUMA021	Humansrus 021	Burial Grounds & Graves	Grade IIIa
92649	HUMA022	Humansrus 022	Structures	Grade IIIc
92650	HUMA023	Humansrus 023	Structures	Grade IIIc
90422	HUMA011	Humansrus 011	Structures	Grade IIIc
90423	HUMA012	Humansrus 012	Structures	Grade IIIb
90424	HUMA013	Humansrus 013	Structures	Grade IIIc
90425	HUMA014	Humansrus 014	Structures	Grade IIIb
90426	HUMA015	Humansrus 015	Archaeological	Grade IIIc
91007	**OLI002**	**Olien SEF002**	**Artefacts**	**Grade IIIc**
91008	**OLI003**	**Olien SEF003**	**Stone walling**	**Grade IIIc**
91009	**OLI004**	**Olien SEF004**	**Burial Grounds & Graves**	**Grade IIIa**

CTS HERITAGE

APPENDIX 2

Reference List with relevant AIAs and PIAs

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
109815	HIA Phase 1	Wouter Fourie	22/03/2012	132 kV Power line connection to the Humasrus Solar Thermal Energy Power plant, postmasburg.
114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel to Kimberley, Northern Cape
122772	HIA Phase 1	Wouter Fourie	01/09/2011	Heritage Impact Assessment for the Humansrus Solar Thermal Energy Power Plant, Postmasburg
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
145149	HIA Phase 1	Louisa Hutten	01/11/2013	HERITAGE IMPACT ASSESSMENT REPORT FOR THE FARMS PLAAS 438 PORTION 1 & PLAAS 588 RE
155262	PIA Desktop	John E Almond	22/12/2013	Palaeontological Heritage Basic Assessment: Desktop Study - Proposed construction of a 132 kV power line and switchyard associated with the Redstone Solar Thermal Energy Plant near Postmasburg, Northern Cape Province
162535	AIA Phase 1	David Morris	02/03/2012	Archaeological Impact Assessment Phase 1: Proposed development of a PV Power Station at Welcome Wood (extended area), near Owendale, Northern Cape
162542	PIA Desktop	John E Almond	01/02/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY Proposed PV power stations Welcome Wood II and III adjacent to Welcome Wood Substation, near DaniÃ«lskuil, Northern Cape Province
163992		Wouter Fourie	03/12/2013	Proposed Construction of the Limestone 1 - 132kV Power Line and the associated Switchyards on Portion 0 (remaining extent) of the Farm 267, Northern Cape Province
173943	Heritage Impact	Marko Hutten,	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the ACWA Power SolarReserve

	Assessment Specialist Reports	John Almond		Redstone Solar Thermal Power Plant with the Olien Substation â€“ Option 1: ACWA Power SolarReserve Redstone Solar Thermal Power Plant to Olien Substation, in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment
173967	Heritage Impact Assessment Specialist Reports	Marko Hutten	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the Redstone Solar Thermal Energy Plant with the Olien Substation in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment Option 2: Silverstreams substation to Olien Substations
344620	PIA Phase 1	John E Almond	09/11/2015	Palaeontological Heritage Report for the proposed 132 kV power lines between the ACWA Power SolarReserve Redstone Solar Thermal Energy Plant Site and Olien Main Transmission Substation near Lime Acres, Northern Cape Province
361351	AIA Phase 1	Karen Van Ryneveld	20/03/2016	Archaeological Impact Assessment Report
361357	PIA Phase 1	Lloyd Rossouw	03/05/2016	Palaeontological Impact Assessment
4604	AIA Phase 1	David Morris, Peter Beaumont	01/10/1994	Ouplaas 2 Rock Engravings, Danielskuil
6958	AIA Phase 1	Wouter Fourie	10/06/2011	Humansrus Solar Thermal Energy Power Plant, Postmasburg
73252	HIA Phase 1	Wouter Fourie	13/09/2012	Heritage Impact Assessment - Proposed Construction of 132kv Power Line and Switchyard Associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province
7842	AIA Phase 1	Cobus Dreyer	19/11/2007	Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape
8240	AIA Phase 1	David Morris	11/06/2010	Proposed development of PV Power Station at Welcome Wood, near Owendale, Northern Cape
83272	HIA Phase 1	David Morris	01/08/2012	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape
83273	PIA Desktop	Jennifer Botha-Brink	26/06/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED OLIEN SOLAR PROJECT ON FARM 300, BARKLY WEST, NORTHERN CAPE PROVINCE

8899	PIA Phase 1	John E Almond	04/05/2011	Recommended exemption from further palaeontological studies: Proposed Humansrus Solar Thermal Energy Power Plant development on Farm 469, near Postmasburg, Northern Cape Province
9047	PIA Phase 1	John E Almond	11/06/2010	Proposed photovoltaic power station adjacent to Welcome Wood Substation, Owendale near Postmasburg, Northern Cape 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.

CTS HERITAGE

APPENDIX 4 - Methodology

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

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

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

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

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

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

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

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

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

DETERMINATION OF THE PALAEONTOLOGICAL SENSITIVITY

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

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

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

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

Low coverage will be used for:

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

Medium coverage will be used for

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

High coverage will be used for

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

RECOMMENDATION GUIDE

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

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

This recommendation is made when:

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

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

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

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

- undertaking mitigation measures requested in previous assessments/records of decision.

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

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

APPENDIX 5 -Summary of Specialist Expertise

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

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

Since 2016, Jenna has drafted over 100 Heritage Impact Assessments throughout South Africa.