HERITAGE IMPACT ASSESSMENT

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

Proposed development of the Sendawo BESS and OHL near Vryburg in the North West Province

Prepared by CTS Heritage

CTS HERITAGE

For

WSP

April 2023

CTS HERITAGE

EXECUTIVE SUMMARY

1. Site Name:

Sendawo OHL and BESS

2. Location:

Portion 1 of the Farm Edinburgh No 735

3. Locality Plan:

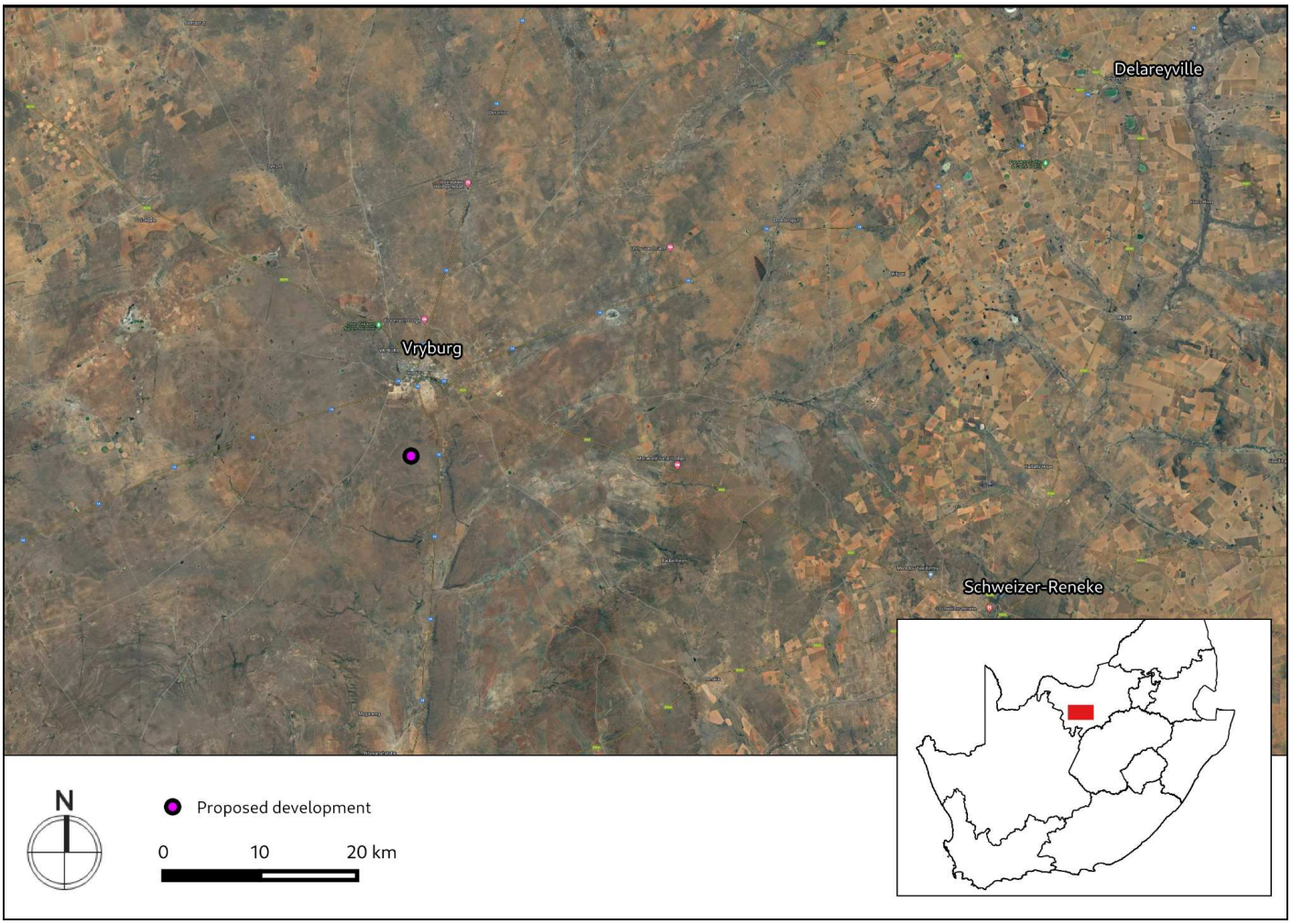


Figure A: Location of the proposed development area

4. Description of Proposed Development:

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of

the of Vryburg in the North West Province. The project entails the construction and operation of the Sendawo 132kV overhead powerline and associated up to 153mW Battery Energy Storage System and substation, that will connect to the operational ESKOM Mookodi Substation

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

5. Anticipated Impacts on Heritage Resources:

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. The majority heritage resources identified relate to the historic farm occupation of this area and are considered to be Not Conservation-Worthy. Previous assessments in this area have identified some significant archaeological heritage resources that are located within the proposed grid alignments. Recommendations in this regard are made below.

Although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

There is no objection to the proposed development of Sendawo BESS and grid connection on heritage grounds and no monitoring protocols are recommended. There are no disadvantages or advantages associated with the proposed amendment from a heritage perspective on condition that the mitigation measures included in the Table above are implemented. It should be noted that, although there were no other archaeological or heritage resources identified during the survey conducted for the already approved solar facility; some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward. The following findings have been made:

- No significant archaeological resources were identified in the project area identified for the development of the BESS.
- Archaeological resources of significance are known from the grid corridors. These significant resources must be avoided as per the recommendations below

- No graves or burial grounds were identified in the project area identified for the development of the BESS. However, graves are subterranean in nature and might not have been identified during the initial site visit and survey.
- There are no preferred alternatives for the BESS location from a heritage perspective
- Alternative 1 is preferred for the grid connection from an archaeological perspective due to the possible impacts archaeological heritage
- Based on the known palaeontological sensitivity of the area, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites will be impacted by the development. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

6. Recommendations:

There is no objection to the proposed development from an archaeological perspective on condition that:

- A no development buffer of 50m is implemented around sites 45521 and 45529 and the area identified as archaeologically sensitive in Figure 7 above is excluded from the development layout
- Based on the known palaeontological sensitivity of the area, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites will be impacted by the development. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Details of Specialist who prepared the HIA

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

Jenna is 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.

CTS HERITAGE

CONTENTS

APPENDICES

1. INTRODUCTION

1.1 Background Information on Project

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The project entails the construction and operation of the Sendawo 132kV overhead powerline and associated up to 153mW Battery Energy Storage System and substation, that will connect to the operational ESKOM Mookodi Substation

The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of liquid cooled Lithium-ion batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

A typical up to 153 MW/612MWh BESS system comprises a number of DC Battery Enclosures at a capacity of 2.81 MW. The proposed system has a 4 hour discharge time, with a usable energy of 0.7 MW, hence for a 153 MW/612MWh BESS system, approximately 215 battery enclosures are required.

Each Converter Station comprises of 2 converters (~4200 kW,~1500VDC, - 690Vac) feeding into a single MV transformer (690V/(22kV-33kV)), with the dimensions of each converter measuring 3.0 x 2.0 x 2.2m. A single converter is fed from approximately 7 Battery Enclosures.

The BESS is supplied by a number of outdoor auxiliary transformers ((22kV-33kV)/(220-380V)) to provide auxiliary power to the plant. The MV transformers feed the HV substation which steps the voltage from 22kV to 66kV through one or more HV transformers, in the HV substation connecting to the Eskom grid. The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of Liquid cooled Lithium-ion batteries or Vanadium Redox Flow Batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

The onsite HV substation will be constructed with a maximum footprint of approximately 56 800 m^2 and encloses the 22kV/66kV HV power transformer. A lightning mast with a maximum height of 24m, tower sections, earthing switches, circuit breakers, surge arrestors, busbars and other miscellaneous substation equipment, including a substation building containing MV switchgear, control and protection equipment will also form part of the onsite substation.

The proposed OHPL is a 132 kV single or double steel structure with a kingbird conductor. The powerline will be supported by powerline towers which may be steel lattice (518 H and 518 C) or monopole structures, both options will have a maximum height of 28 m.

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

1.2 Description of Property and Affected Environment

The area proposed for development is dominated by Ghaap Plateau Vaalbosveld. The area is densely vegetated with various grass, plant, shrubs and tree species. *Some of the species observed appear to belong to Acacia, Olea europaea, and Boscia, among* others.

The study area consists of a gently undulating landscape and rocky outcrops are found throughout the site. The geology of the area consists of surface limestone of Tertiary to recent age, as well as dolomite and chert of the Campbell Group.

Several water sources can be found near the northernmost corridor. Dirt roads and farmlands bound the site (Edinburgh 735) to the north, south, east and west. The N18 is situated east of the corridor and substation (Waterloo 730 and Rosendal 673). Animal grazing and small animal burrows (several of which are found around BESS 2, and along the corridors), have disturbed certain areas due to overgrazing and watering holes. Human-made holes and a landfill dumping site are situated near the substation. Several wire-fenced livestock kraals are located throughout the area.

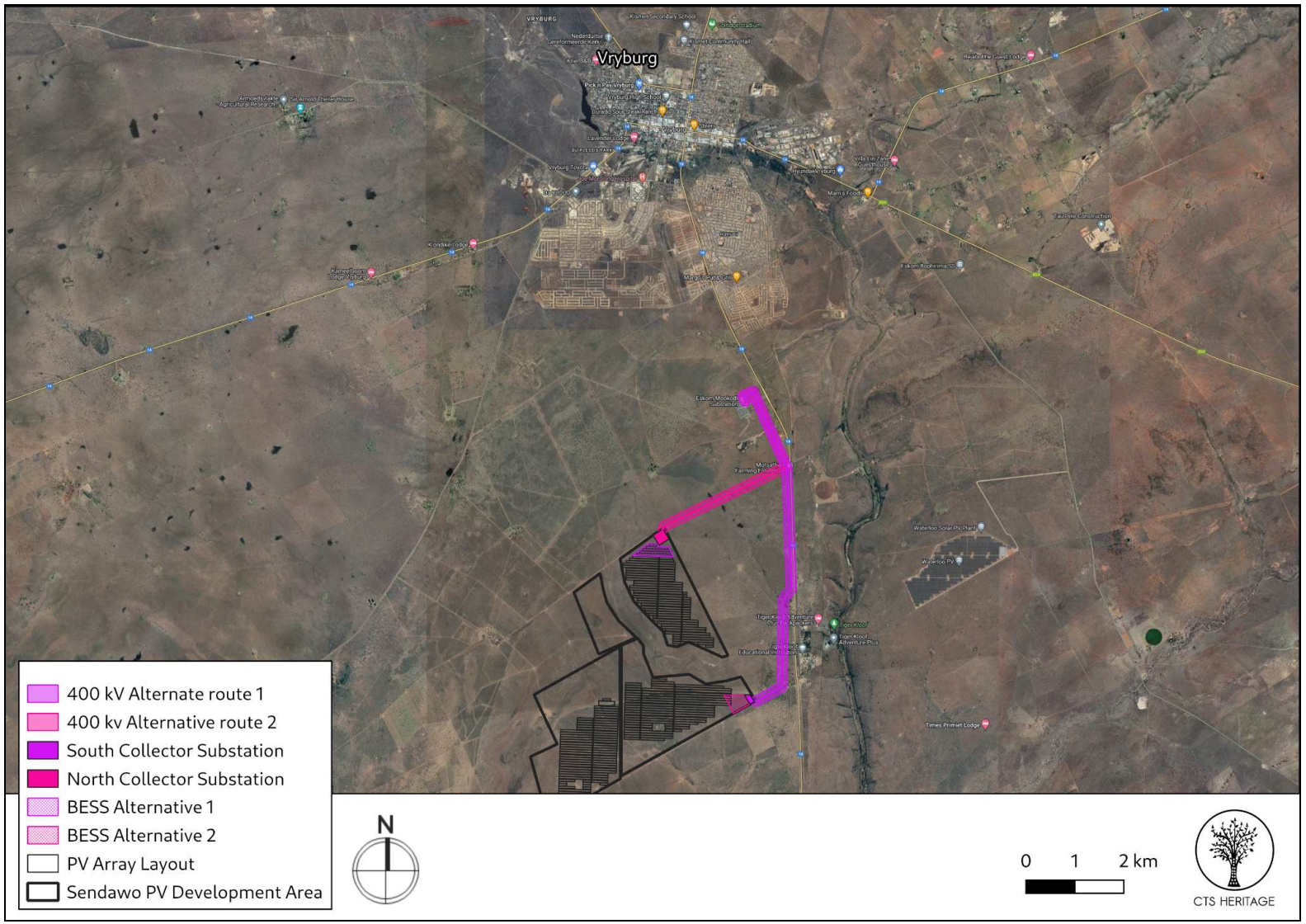


Figure 1.2: Proposed project boundary

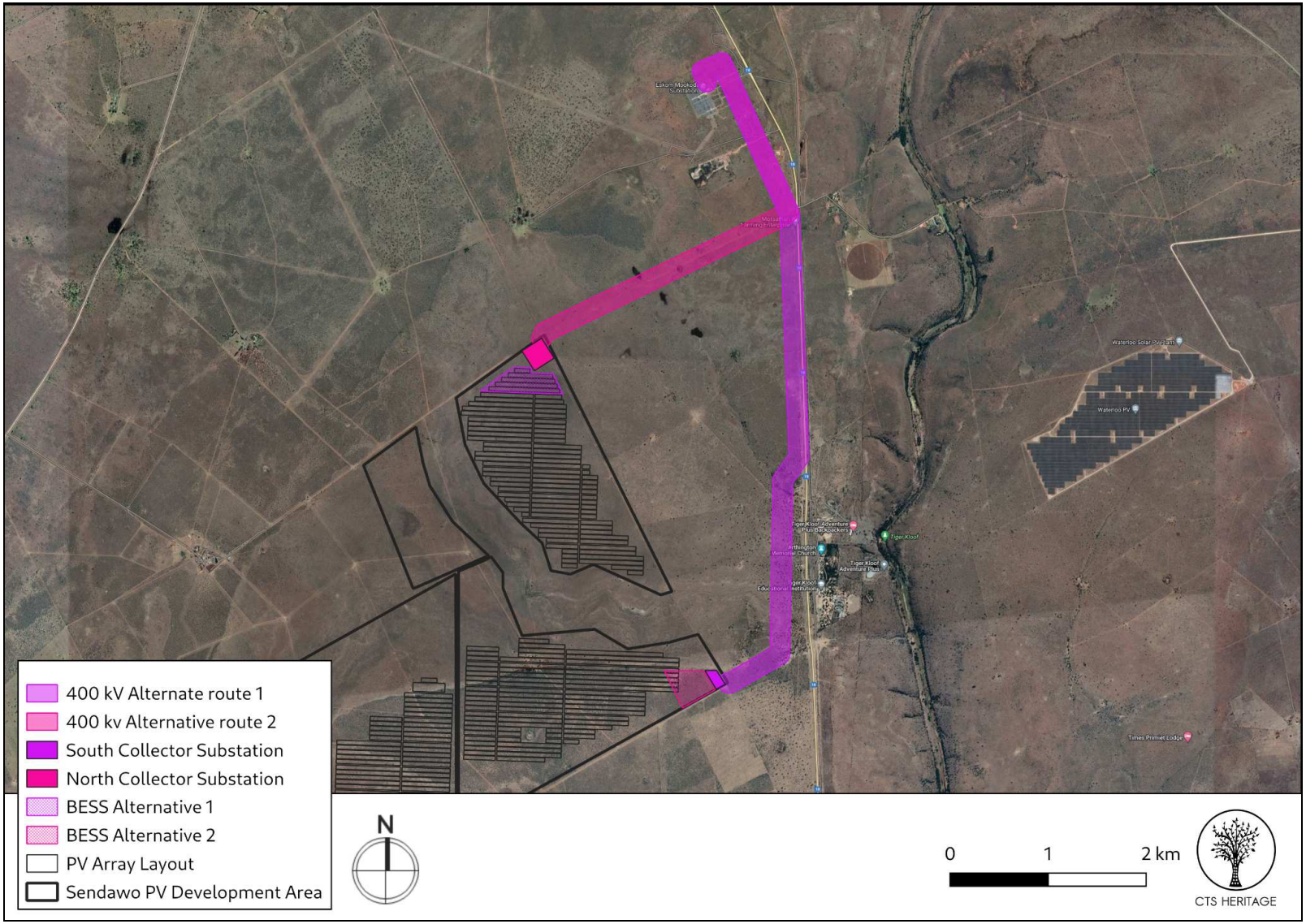


Figure 1.3: Proposed project boundary

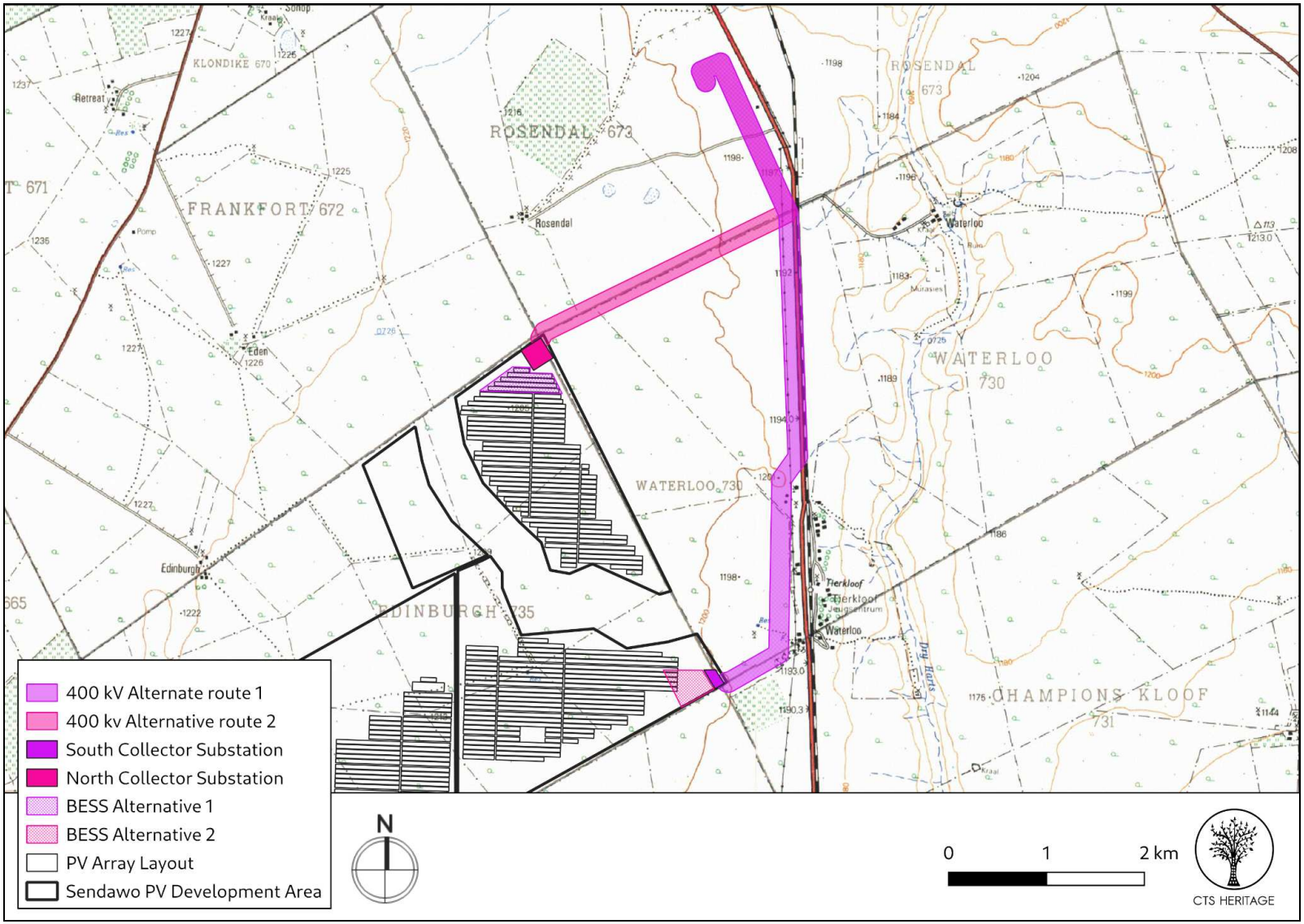


Figure 1.4: Proposed project boundary indicated on the 1:50 000 Topo Map

2. METHODOLOGY

2.1 Purpose of HIA

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

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- An archaeologist conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologists conducted their site visit from 23 to 24 March 2023
- A palaeontologist conducted a desktop assessment of palaeontological resources likely to be disturbed by the proposed development
- The identified resources were assessed to evaluate their heritage significance and impacts to these resources were assessed.
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

2.3 Assumptions and uncertainties

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

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

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

2.4 Constraints & Limitations

The entire area was surveyed as best as possible and as the vegetation and environment allowed. The site is densely vegetated in certain areas and impedes perfect transects. Fenced animal kraals further restricted direct access, and certain areas had to be reached through gates that were situated far away from the corridors. Where possible, fences were climbed, but it was not a possibility throughout.

On the afternoon of the 23rd a heavy thunderstorm occurred, forcing us to leave the site early. The following day (24th of March) the surface was consistently wet, as it rained (softly and hard) throughout the day.

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

2.5 WSP Impact Assessment Methodology

Assessments of Impacts and Mitigation

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria presented in Table 1 below.

Impact Mitigation

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

Table 2: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of	Immediate:	Short term:	Medium term:	Long term:	Permanent:

permanence of the impact on the environmental receptor	On impact	0-5 years	5-15 years	Project life	Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria:	S=(E+D+R+M)xP Significance=(Extent+Duration+Reversibility+Magnitude) x Probability				

IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

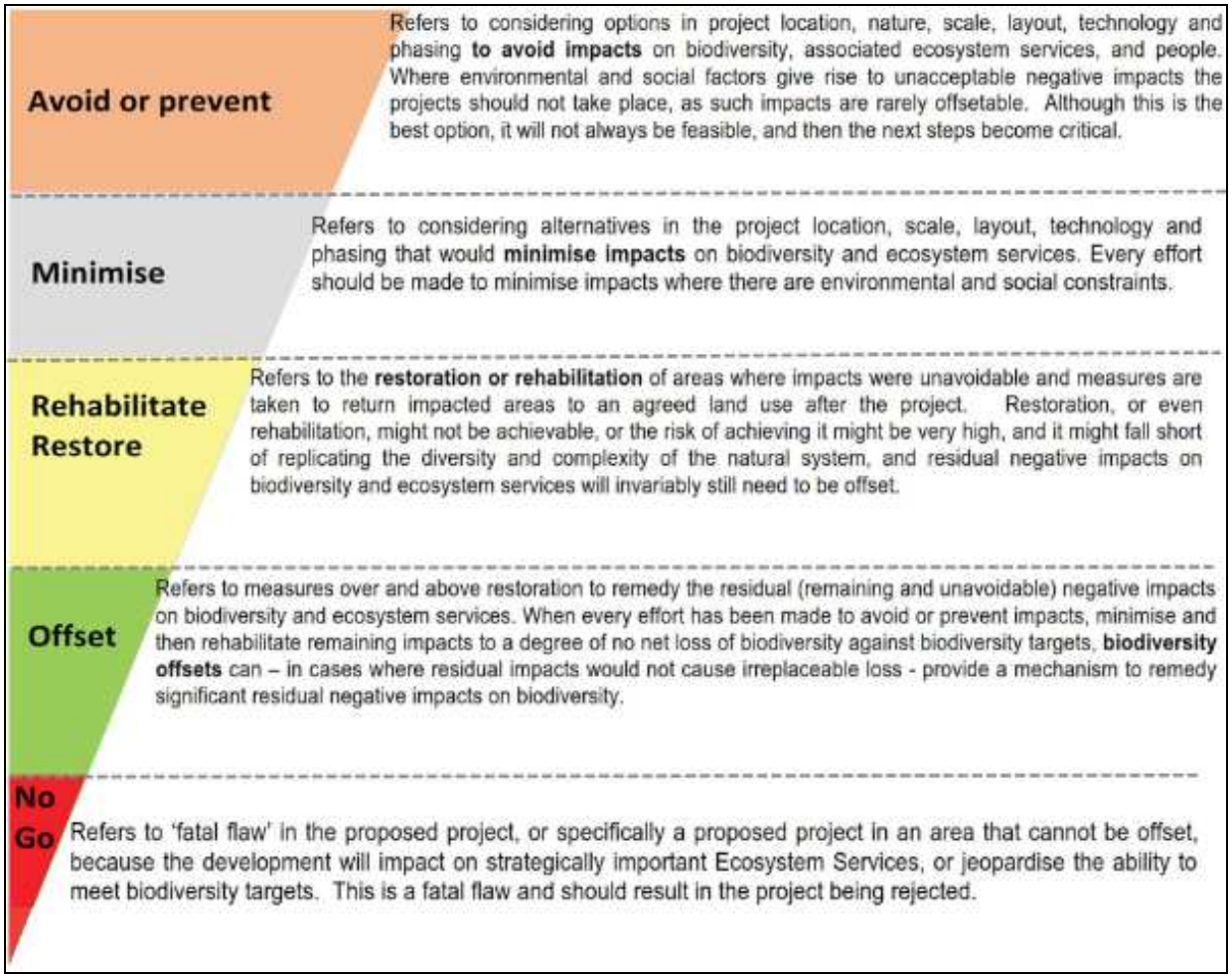


Figure 2: Mitigation Sequence Hierarchy

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Desktop Assessment

Background

This report is drafted for the proposed construction and operation of a Battery Energy Storage (BESS) and a grid connection for the authorised Sendawo Solar Energy Facility. The BESS which will have an extent of no more than 5ha will be developed within the authorised development footprint of the Sendawo PV facility. Two options are proposed for the area proposed for the BESS development, both are located within the area previously assessed for the Sendawo PV facility. This area was thoroughly assessed for impacts to heritage resources in the Heritage Impact Assessment conducted by Fourie (2016, SAHRIS NID 9721). The HIA by Fourie (2016) and an HIA completed by Van Schalkwyk (2018) for an adjacent property is referred to below.

Archaeology and Built Environment Heritage

Vryburg town was established in 1882 as the capital town of the independent Boer Republic of Stellaland. During its short history, the small state became a focal point for conflict between the British Empire and the South African Republic, the two major players vying for control of the territory. After a series of claims and annexations, British fears of Boer expansionism led to its demise and, among other factors, set the stage for the Second Boer War. Before the proclamation of the republic, the area was under the control of competing Korana and Tswana groups, while the United Kingdom laid claim to it as a part of the emerging protectorate of British Bechuanaland. Two of the indigenous groups were under the leadership of chiefs Mankoroane and Montšioa, whom the British regarded as "friendly," and two others under the leadership of chiefs Moshette (a Motswana) and Massouw (a Korana). When a feud erupted between Mankoroane and another chief, each side resorted to recruiting volunteers, promising them land in return for their assistance. After a settlement was negotiated with mediation from the Transvaal Republic, large portions of Mankoroane's land were given to Boer mercenaries who had fought on his adversary's side, and the new inhabitants decided to declare independence and establish the Republic of Stellaland. During the Second Boer War, a concentration camp was established at Vryburg, however this concentration camp is located north of Vryburg town and is therefore located sufficiently far from the area proposed for development that no impact is anticipated.

According to van Schalkwyk et al (2018, SAHRIS NID 510838) "Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over." Van Schalkwyk (2018, SAHRIS NID 510838) notes that Later Stone Age artefacts and rock art are also known from the area. Iron Age people started to settle in the area in the 1500s. According to Van Schalkwyk

(2018, SAHRIS NID 510838), “By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province.” including the proposed development area. “The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959).”

Despite the overall archaeological sensitivity of the broader landscape, the archaeological survey conducted by Fourie (2016) identified limited heritage resources of value within the areas proposed for the BESS facilities. Fourie (2016) notes that “The find spots in the larger study area varied from Later Stone Age (LSA) scatters consisting of flakes, chips and some cores manufactured from fine-grained quartzite, chalcedony, and cryptocrystalline (ccs) material; Middle Stones Age (MSA) lithics consisting of cores, chips and flakes with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Earlier Stone Age (ESA) lithics found at some of these finds spots consisted of a hand axe, cleavers and large flakes. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. No heritage resources related to archaeology or the more recent history was identified in the footprint area of Solar 3” (The proposed BESS locations are within Sendawo Solar Area 3).

The field assessment for the Sendawo Grid connection assessed a corridor that includes the alternatives considered in this report. Two archaeological sites of significance were identified by Fourie (2016) in his assessment. These sites, as well as others that occur within the grid corridor are detailed in the table below:

Table 1: Sites previously identified within the development area

Site ID	Site Name	Corridor	Description	Grade	Mitigation
45521	WATER05	Alt 2	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of high concentration 22-m² of MSA and LSA tools from CCS	IIIA	Buffer of 50m recommended - See Figure 5

			and Quartzite.		
45529	WATER09	Alt 1	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of Artefact count 13-m². LSA dominates with some MSA. Raw material on CCS and quartzite.	IIIA	Buffer of 50m recommended - See Figure 5
32418	Exhumation of graves at Eskom Mookodi Substation1	Alt 2 (although likely to have been mapped incorrectly)	Permit granted in 2014 to remove the graves at this site to a new location: PGS Heritage was appointed by Eskom Holdings SOC Limited, to effect the relocation of 6 graves located within the Eskom Mookodi substation area. The graves are located next to the substation High Voltage yard and have been fenced off. The graves need to be relocated as the expansion of the substation necessitates their relocation after alternatives for their preservation that were investigated were not viable. Based on this description, this site is likely the same as Sites 46713, 130097 and 130952 but mapped incorrectly	IIIA	NA
138456	SDNP004	Alt 2	Shallow sandy soils on shale and quartzites with minor dolomite. No heritage significance	NCW	NA
131106	SDG001	Alt 2	Low density scatter of MSA lithics over an area of approximately 50 m2. The site is characterised by a large pebble concentration within a dry pan. Same location as Site 130787 Low density scatter of MSA lithics over an area of approximately 50 m2. The site is characterised by a large pebble concentration within a dry pan. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was kept in mind with the development of the mitigation	IIIC	Implement walk down of final alignment on power line alignment

			recommendations.		
131107	SDG002	Alt 2	Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. Same location as Site 130788: Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was kept in mind with the development of the mitigation recommendations.	IIIC	Implement walk down of final alignment on power line alignment
130952	VBS003	Both	Originally some graves occurred in this area. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities. Same location as Site 46713 and 130097	IIIA	All cemeteries should have a buffer of at least 20 metres from the outermost graves. Fortunately, many cemeteries are fenced off, which can then be used as a buffer. Likely already exhumed

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for the BESS development is underlain by sediments of high palaeontological sensitivity (Figure 4a). According to the extract from the CGS 2724 Christiana Ma, the development area for the Sendawo PV Facility as well as the development area for the BESS is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc) (Figure 4b). The palaeontological impacts associated with the development of the Sendawo solar facilities was assessed by Groenewald (2016). According to Groenewald (2016), the area proposed for the BESS development is underlain by Stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group (Kameeldorns, Rietgat and Bothaville Formations) as well as the lower part of the Transvaal Supergroup (Ghaap

Group, Vryburg Formation & Schmidtsdrift Subgroup, including the Boomplaas Formation). In the Vryburg area and further south towards Taung these include some of the oldest (> 2.5 billion years) and best-preserved stromatolites (fossil microbial mounds) known from this period; Stromatolites are recorded from the dolomite layers. Highly fossiliferous Caenozoic cave breccias are also known to occur within the dolomite layers, but are not mapped individually. These fossiliferous deposits often contain more recent mammal and hominid fossils, e.g. in the Cradle of Humankind.

In his palaeontological assessment, Groenewald (2016) notes that "A small part of the study area is characterised by the presence of significant Stromatolites and that stromatolites are present in almost all the dolomite boulders on site. Some areas have possible remains of cave breccia but no in situ outcrops were recorded." The significant palaeontological observations noted by Groenewald (2016) are all located towards the south of the Sendawo PV 3 area and are located well away from the proposed BESS locations. As such, although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

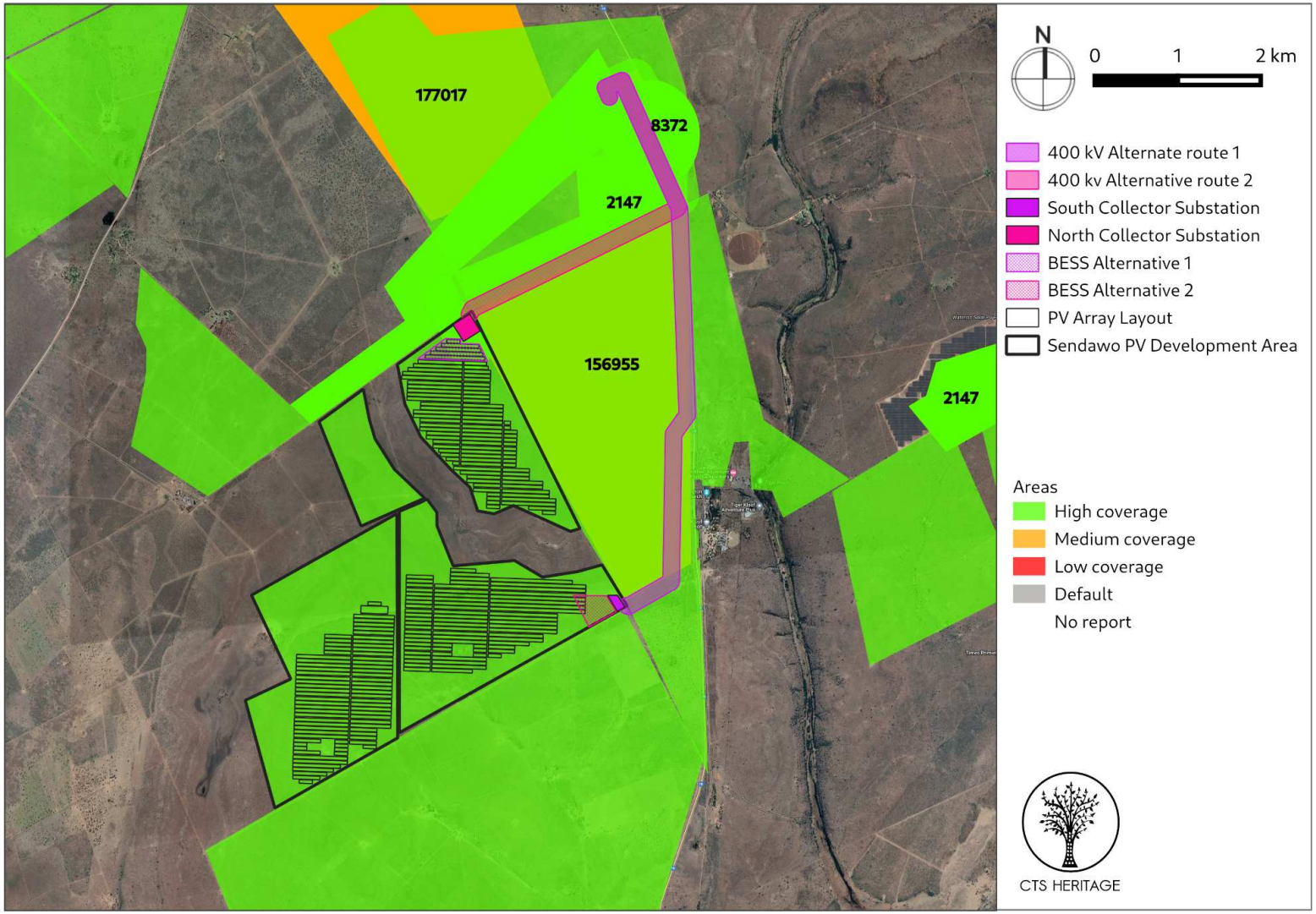


Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development

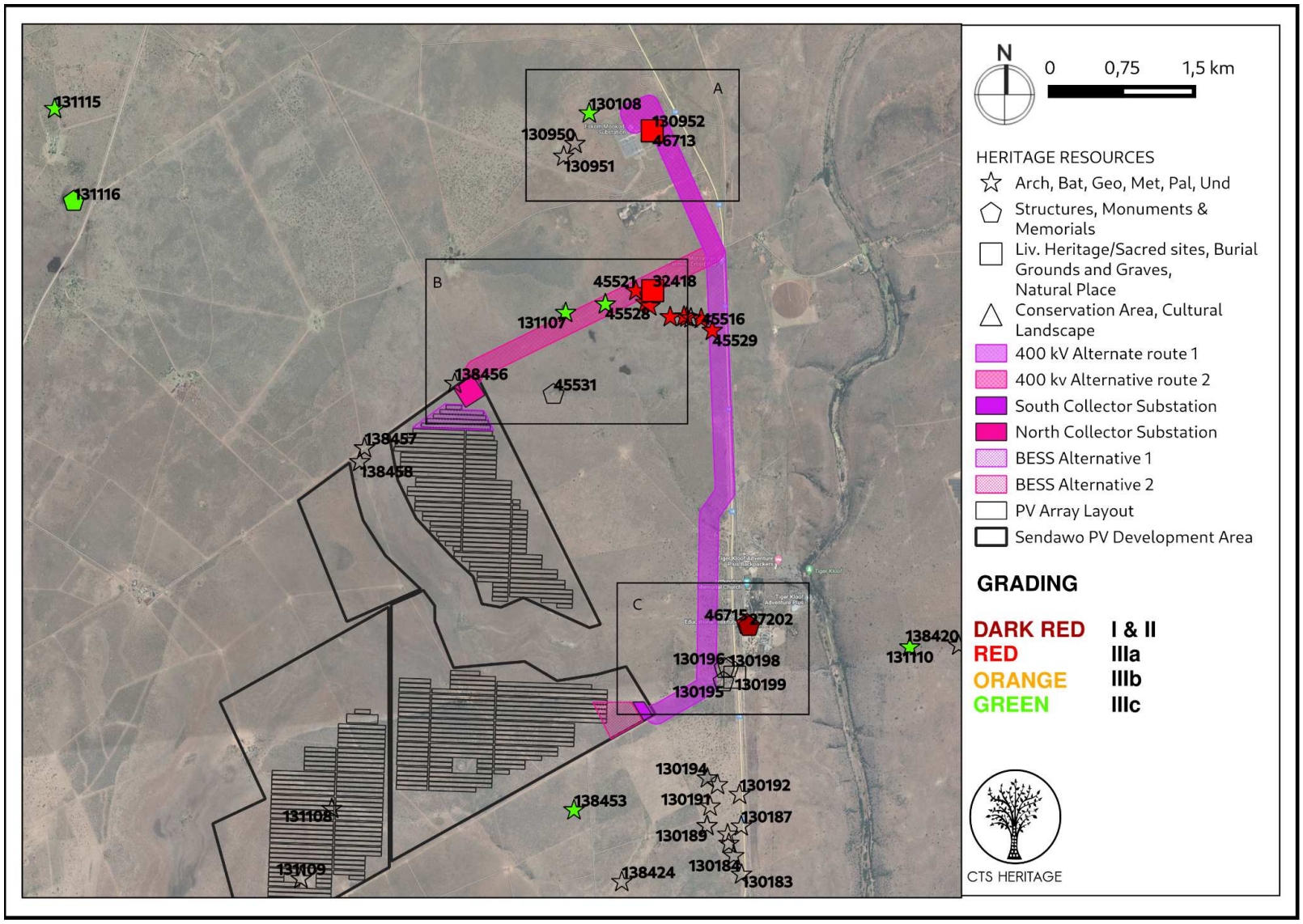


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

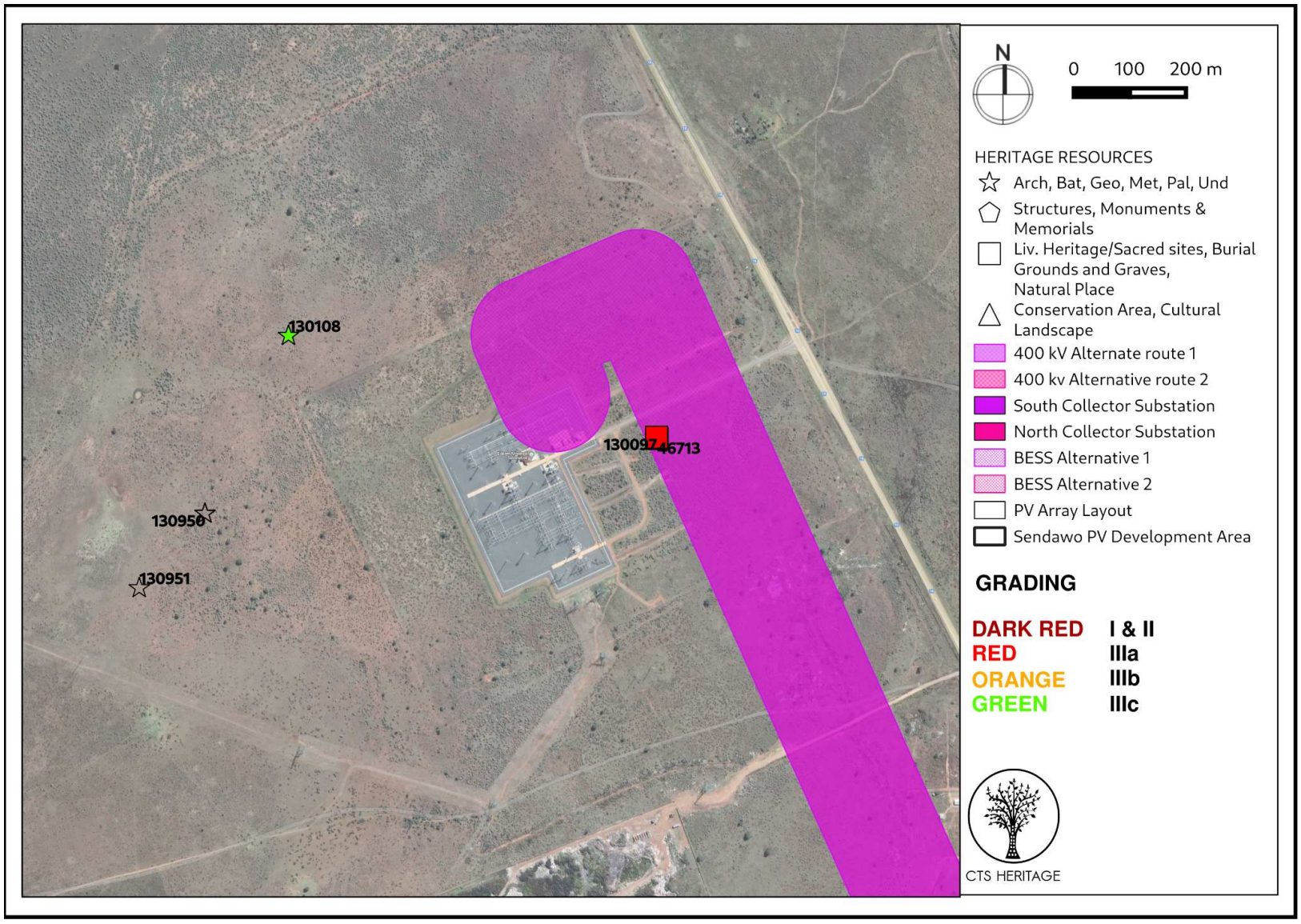


Figure 3.1. Heritage Resources Map. Heritage Resources inset A

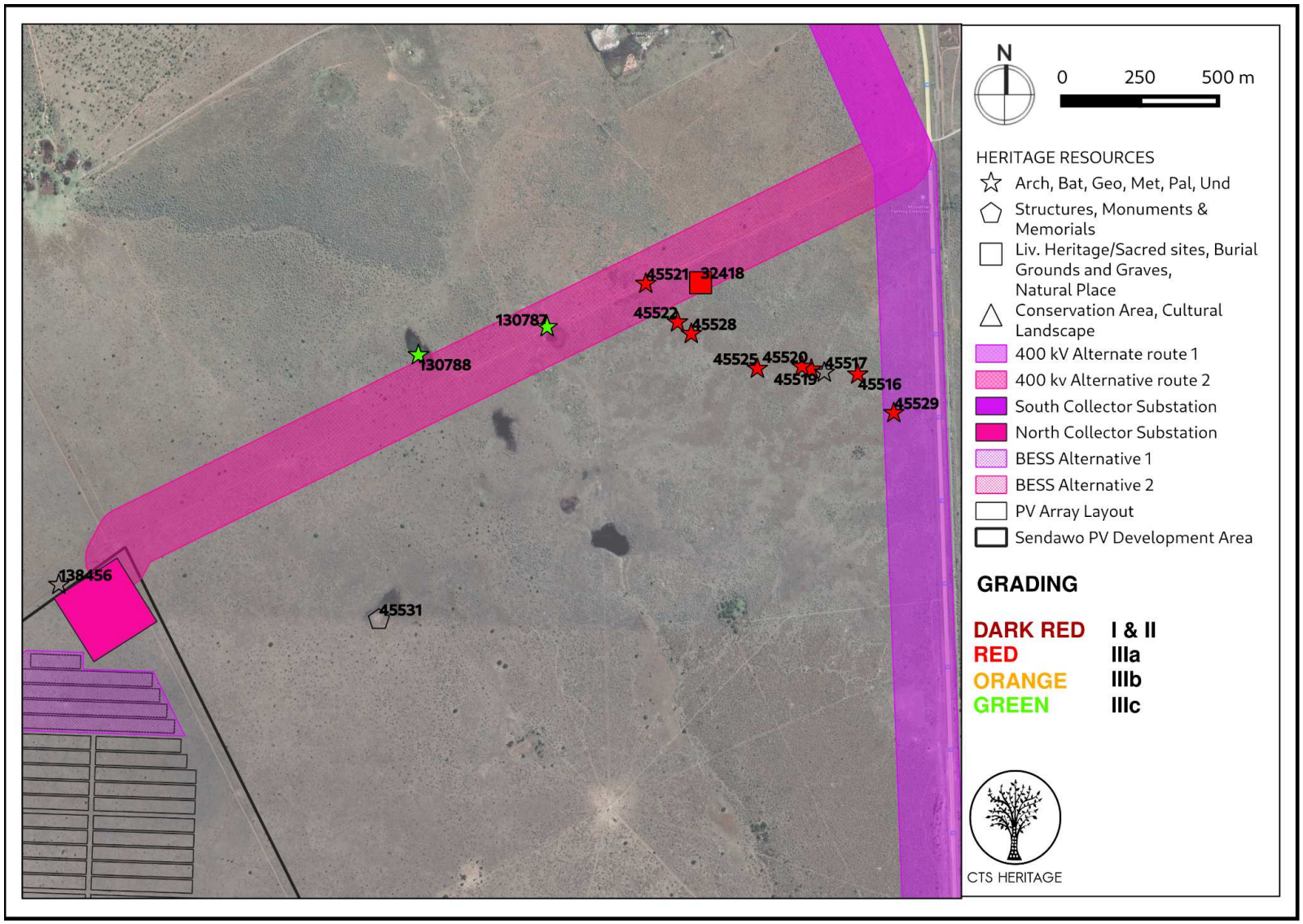


Figure 3.2. Heritage Resources Map. Heritage Resource inset B

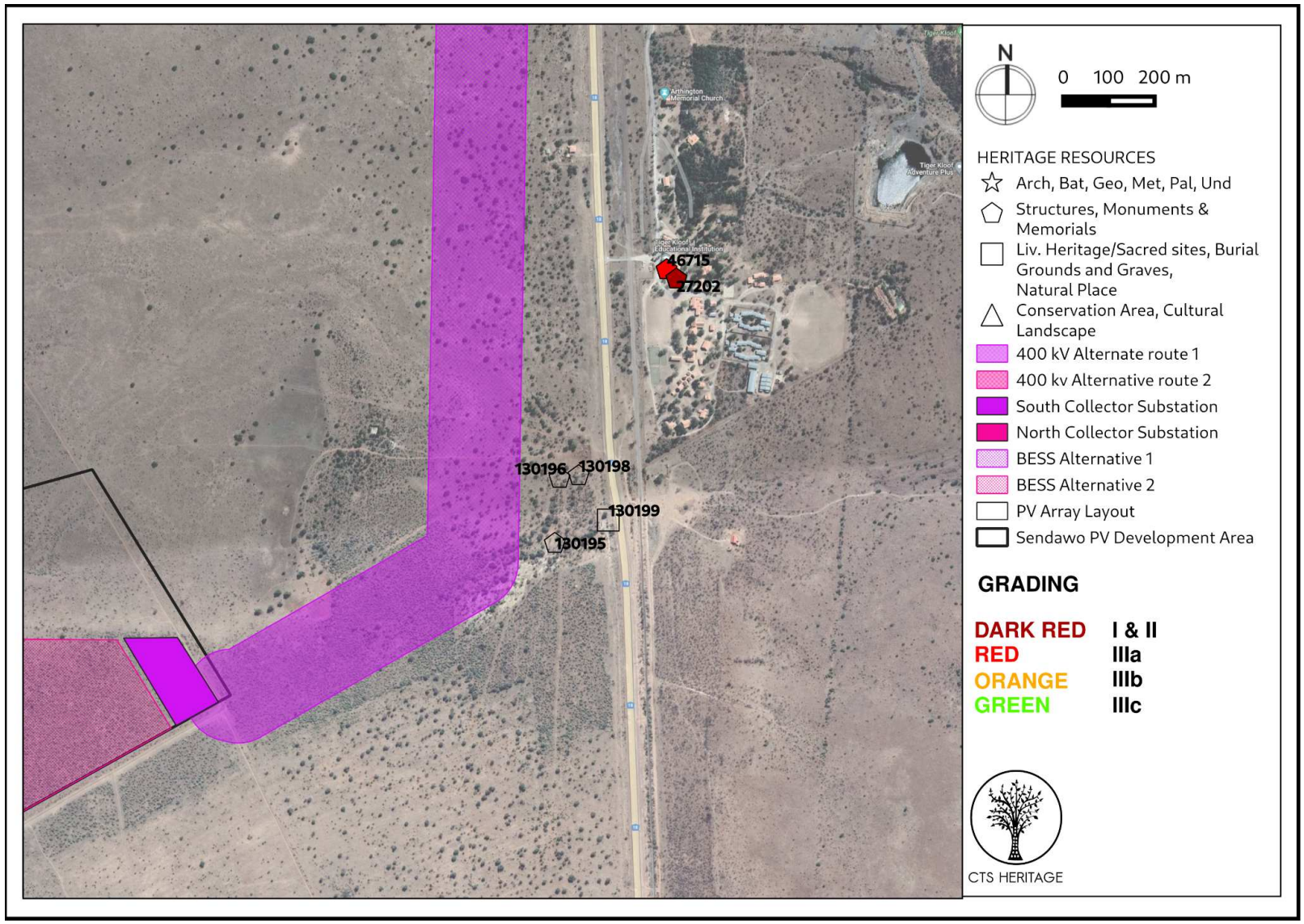


Figure 3.3. Heritage Resources Map. Heritage Resource inset C

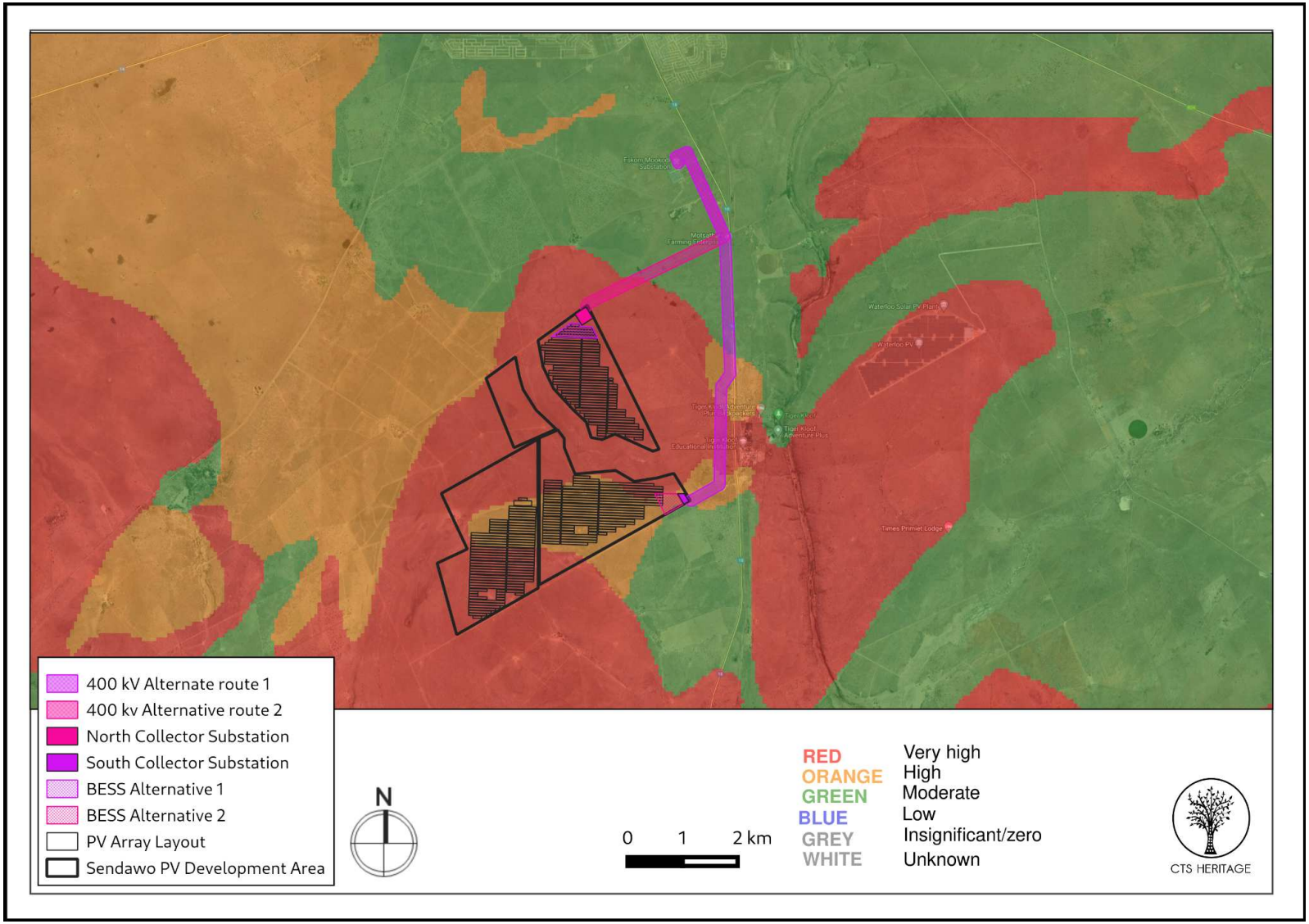


Figure 3.1: Palaeontological sensitivity of the proposed development area

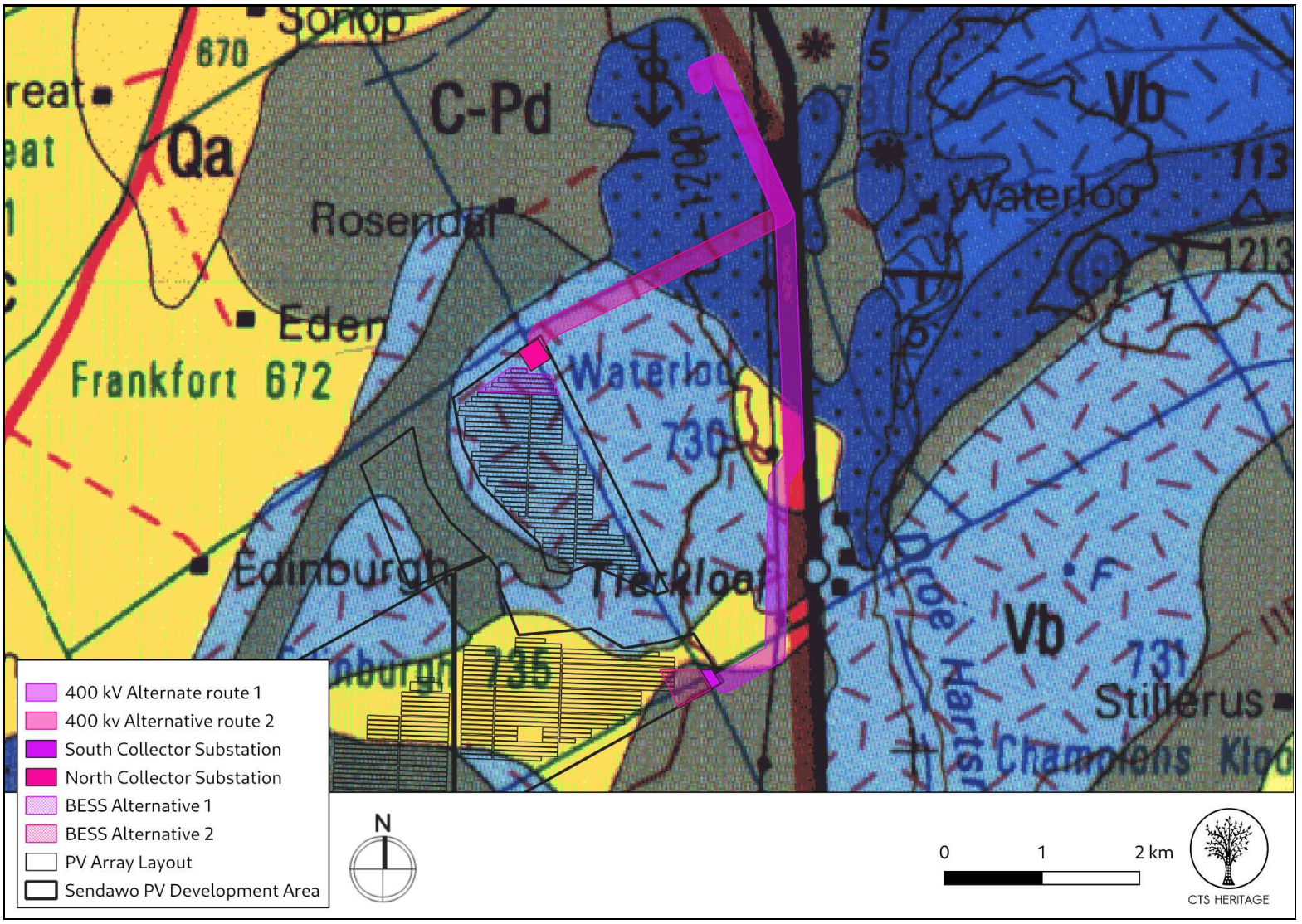


Figure 3.2: **Extract from the CGS 2724 Christiana Map indicating that the development area for the BESS and OHL alternatives is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc), Clearwater Formation (Vc), Boomplaas Formation (Vb) and Vryburg Formation (Vv) of the Ghaap Group**

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology (Appendix 1)

The three lithic occurrences were isolated finds without context and are considered to be of low significance. They are thus Non-Conservation Worthy.

No historical period resources were identified at BESS 1 and 2 or at the alternative areas. Several structural features were noted throughout the survey of the corridors. Some of these features (005-007) are all situated directly within the development footprint of the proposed corridors. Additionally, structural features (002, 003, 009 and 010) were identified just outside of the proposed corridor area.

Resources related to farming activities and farming machines (008) were noted. One of the cement resources had a date as well as a name inscribed on it. These resources (007, 008, 009 and 010) are all likely less than 60 years of age and are therefore considered Non-Conservation Worthy.

The original stonework at resources at 003, 005, and 006 likely date to the early 20th century, however, have been continuously modified (possibly till the 1960s), these are thus considered to be Non-Conservation Worthy. The large midden (002) has 20th-century cultural material. Unfortunately, a Phase 1 will not be able to determine whether there is sub-surface material dating to the early 20th-century.

These historic resources do not appear to have any archaeological or cultural significance; additionally, most of them are likely to be younger than 60 years of age. The structural features that have older stonework (early 20th century) have been modified and are therefore considered to have low cultural or archaeological significance and/or have been disturbed by farming activities.

Palaeontology (Appendix 2)

According to the PIA completed for this project;

- Large areas of the proposed development of the Sendawo PV and PV Array Layout overlie geology of significant palaeontological sensitivity. In particular, areas planned that overlie the Late Archaean Boomplaas dolomites and Clearwater Formation are sensitive for two reasons: (1) stromatolite forms are well preserved and poorly described in the academic literature but of significant importance for understanding Archaean palaeoenvironments; and (2) the occurrence of dolomites in both formations may be associated with the formation of karst caves, which in the stratigraphically correlated Oaktree Formation of the Malmani Dolomites in the Transvaal Basin host Plio-Pleistocene hominin- and stone tool-bearing breccias.
- A central area of the proposed development also overlies Kalahari Group pedogenic carbonates (calcretised sediments) that are considered highly sensitive due to their capacity to preserve not only pedogenic trace fossils but also archaeological material.
- The proposed locations for the BESS stations lie on either Boomplaas dolomite or Clearwater Formation rocks, which are considered highly sensitive.
- Proposed routes for the 400kV powerlines overlie both Boomplaas dolomites and andesitic lavas of the Vryburg Group. Lavas of the Vryburg group are low in sensitivity.
- However, it must be noted that the geological maps provided are generally of low resolution and several of the geological units documents comprise mixed lithologies of differing sensitivity making generalisations about sensitivity in particular areas challenging. It is recommended that field assessment is performed to clarify the exact nature of the geology in the proposed development areas.

4.2 Heritage Resources identified

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

Table 2: Artefacts identified during the field assessment development area

POINT ID	Description	Type	Co-ordinates		Grading	Mitigation
001	Dolerite flake located within the BESS2 footprint	MSA/LSA	27° 3'48.43"S	24°44'42.26"E	NCW	NA
002	A prominent midden feature with 20th-century glass on the surface. Situated near the kraal (003)	Historic Midden	27° 2'43.25"S	24°45'14.80"E	NCW	NA
003	A large kraal, possibly used for smaller livestock such as sheep/goats. Several additional structural features around the kraal and midden include water troughs. It appears to be unused. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Historic Kraal	27° 2'43.77"S	24°45'14.67"E	NCW	NA
004	Dolerite flake located within near to a rocky outcrop	MSA/LSA	27° 1'32.95"S	24°44'28.69"E	NCW	NA
005	Two structural ruins situated near a modern chicken and goat livestock kraal. They appear to be used as a dumping/storing area. Modern motor vehicle items can be found here, such as a door and several tires. The area is relatively disturbed by current livestock agricultural activities, and no above-ground cultural material was identified. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Ruins	27° 2'47.28"S	24°45'10.51"E	NCW	NA
006	Stone and cement feature Situated near a modern chicken and goat livestock kraal. The area is relatively disturbed by current livestock agricultural activities, and no above-ground cultural material was identified. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Structure	27° 2'48.58"S	24°45'10.61"	NCW	NA
007	Stone and cement foundation likely associated with the other nearby structures. No above-ground cultural material was identified. The structure was likely broken-down or bulldozed – the area is also disturbed.	Structure	27° 2'44.13"S	24°45'11.58"E	NCW	NA
008	Machinery and water pump hole(?). Two of the cement blocks associated with farming machinery have been marked. Handprints	Structure	27° 3'33.11"S	24°45'9.64"E	NCW	NA

	marked one with a horseshoe between them, the other was marked with writing. The inscription says: W. du P.23/3/68. The inscription provides us with a relative date, which indicates that it is less than 60 years of age.					
009	Structural feature Located near a modern livestock kraal and dirt road. Appears to be a water reservoir along with the foundation of a broken-down structural feature.	Structure	27° 3'32.98"S	24°45'15.20"E	NCW	NA
010	One room structure Located near a modern livestock kraal and dirt road. No additional above-ground cultural material was identified.	Structure	27° 3'33.48"S	24°45'14.08"E	NCW	NA
011	Dolerite flake located within near to a rocky outcrop	MSA/LSA	27° 2'9.23"S	24°45'13.94"E	NCW	NA

4.3 Mapping and spatialisation of heritage resources

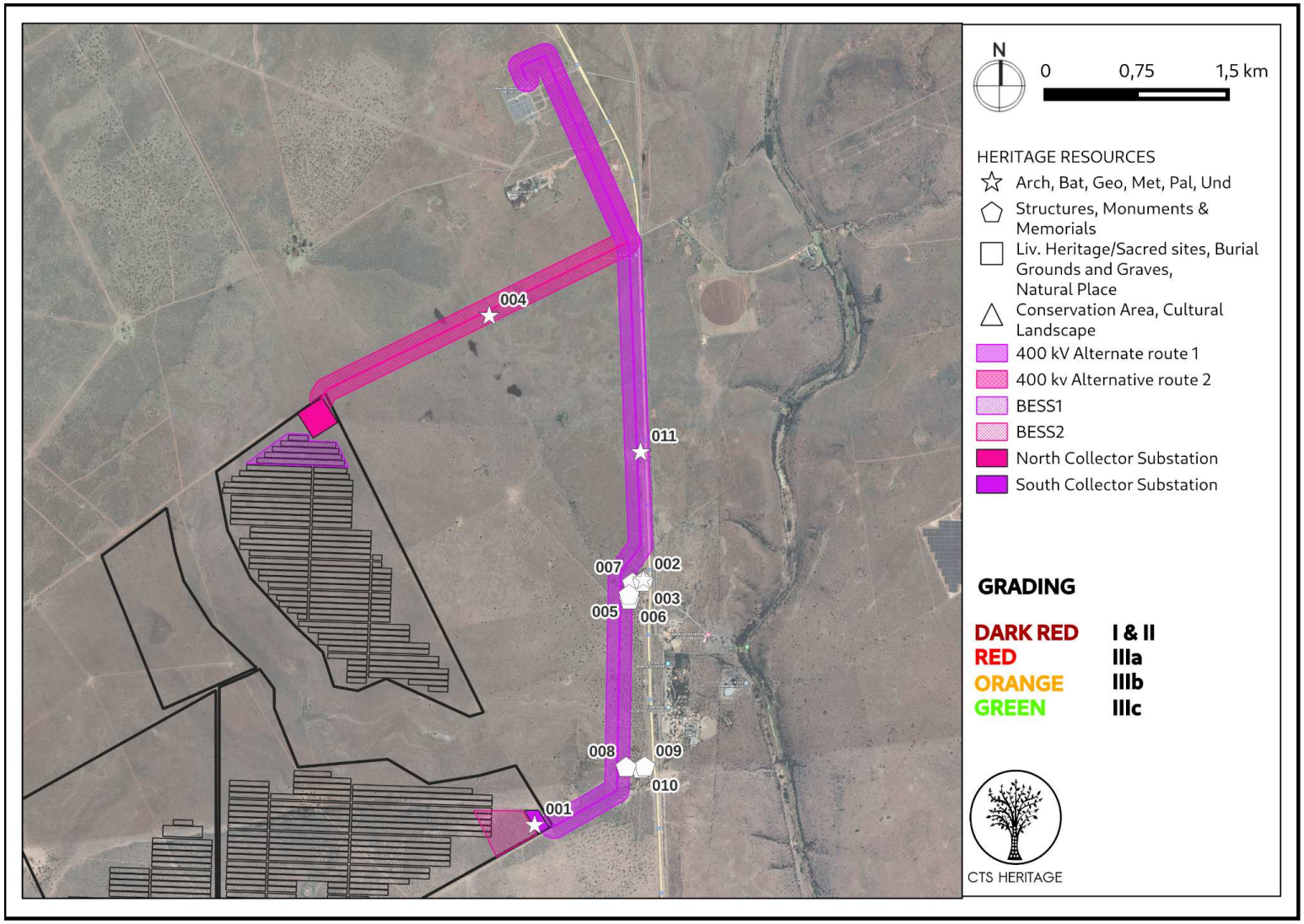


Figure 5.1: All heritage resources within proximity to the development area

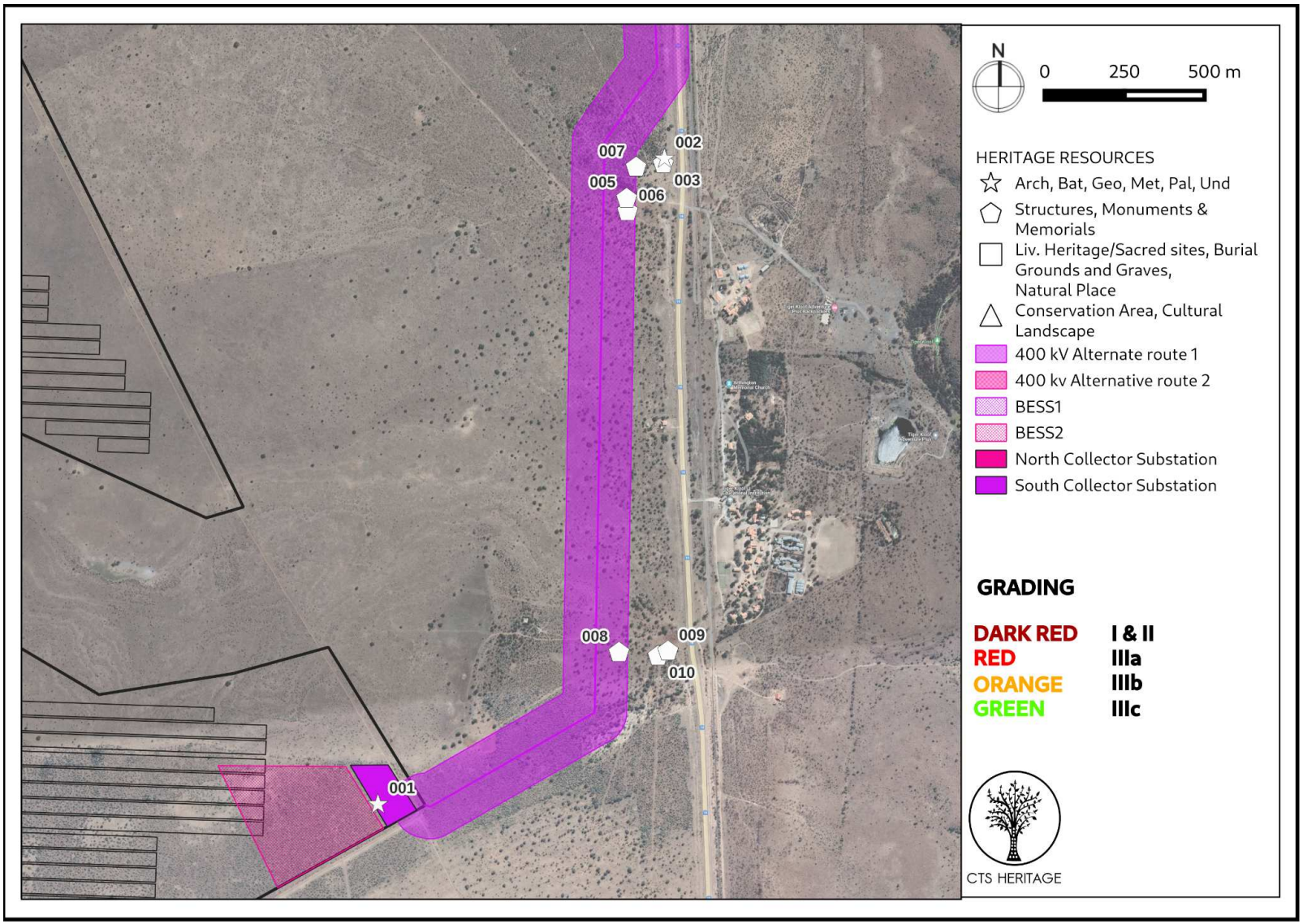


Figure 5.2: Map of heritage resources identified within the development area

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

5.1.1 Cultural Landscape and VIA

No VIA was completed for this project. Due to the existing electrical infrastructure located in the broader area as a result of the existing Mookodi Substation and existing PV facilities, the broader area already has existing EGI infrastructure. As such, it is not anticipated that the proposed development is out of place in this context.

While the cultural landscape of the broader area is dominated by agricultural activities, the area proposed for development is located within a REDZ. The proposed BESS development will form part of the infrastructure required for the Sendawo solar development and is located in close proximity to the substation and operations and maintenance facilities associated with the Sendawo solar development. Furthermore, the proposed BESS is located within an already approved solar facility development footprint which is also located within a belt of approved renewable energy facilities (Figure 8). In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The construction of the proposed BESS is therefore unlikely to result in unacceptable risk or loss, nor will the proposed BESS development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact.

Table 4.1 Impacts of the proposed development to cultural landscape resources

CRITERIA	Without Mitigation	With Mitigation
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	2	2
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	3	3
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	3	3
Impact Duration (D) The length of permanence of the impact on the environmental receptor	4	4
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	2	2
Significance (S) is determined by combining the above criteria: S=(E+D+R+M)xP	**26**	**26**

Mitigation Recommendations	No mitigation is possible.

5.1.2 Archaeology

As was anticipated in the desktop assessment, the heritage observations made during the field assessment consisted of minimal Stone Age archaeology and a number of structures related to the agricultural history of the area. The field assessment completed in March 2023 identified no heritage resources of significance located within either of the proposed grid alignment alternatives, or within the areas proposed for the BESS and substation infrastructure.

Previous heritage assessments completed here (Fourie, 2016) identified a number of heritage resources located within the grid alignment (Table 1). When mapping the findings from 2023 and 2016, it is evident that SAHRIS Sites 131106, 130196 and 130198 (2016) overlap with Observations 004, 010 and 009 (2023) respectively. As such, no further mitigation of these sites is required and the recommendations made in 2016 for these sites (Table 1) are no longer applicable and no further walkdown of the alignment is required.

In 2016, Fourie identified a significant MSA site located along a low ridge which consists of SAHRIS Sites 45516, 45517, 45519, 45520, 45521, 45522, 45525, 45528 and 45529, for which sites 45521 and 45529 fall within both proposed grid alignment alternatives. Based on the information available, an area of high archaeological sensitivity has been identified in Figure 7 below. In order to ensure that no impact to this significant site takes place, it is recommended that a no development buffer of 50m is implemented around sites 45521 and 45529, and the area of high archaeological sensitivity indicated in Figure 7 below is excluded from the development layout.

Table 4.2 Impacts of the proposed development to archaeological resources

CRITERIA	Without Mitigation	With Mitigation
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	5	1
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	1	1
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	5	5
Impact Duration (D) The length of permanence of the impact on the environmental receptor	5	5

Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	5	1
Significance (S) is determined by combining the above criteria: S=(E+D+R+M)xP	**80**	**12**
Mitigation Recommendations	A no development buffer of 50m is implemented around sites 45521 and 45529 and the area identified as archaeologically sensitive in Figure 7 above is excluded from the development layout If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA.	

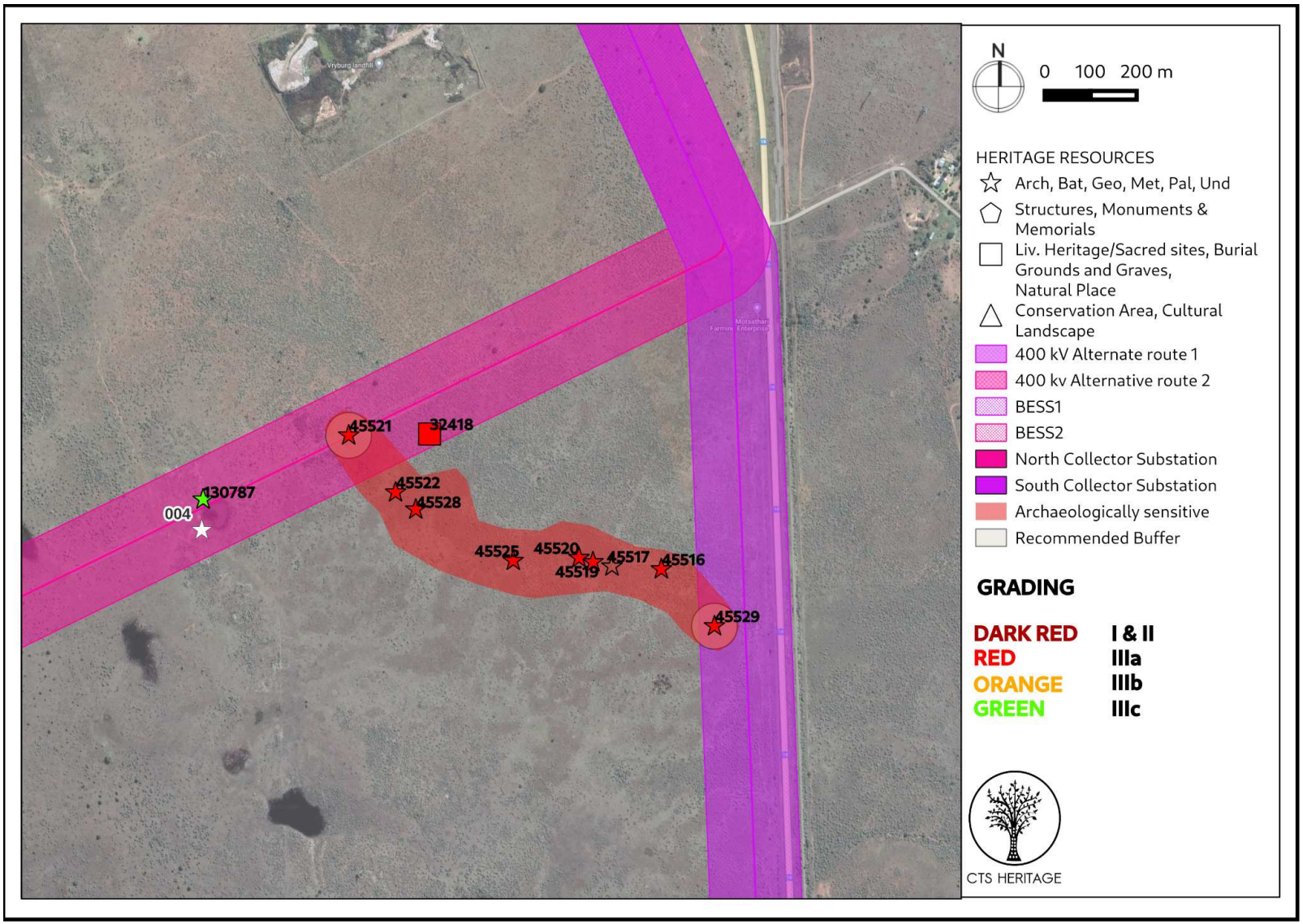


Figure 7: Map of recommended Mitigation measures

5.1.3 Palaeontology

According to the Desktop PIA completed for the project, based on published literature and previous field assessments within the immediate area, it is considered that the impact of the development will be **HIGH**. This is based on the presence of dolomite in the Boomplaas and Clearwater dominated areas, and the research importance of that rock type and its proclivity for hosting caves. The quaternary calcrete deposits overlie the Archaean rocks in the central area of the proposed development to an unknown depth and are in themselves considered of high sensitivity due to their potential in preserving a wide range of vertebrate and invertebrate trace fossils and archaeological remains.

Large areas of the proposed development are located on highly sensitive rock types (Boomplaas, Clearwater and Quaternary deposits) that may preserve important palaeontological evidence. The abundance, preservation and exposure of the palaeontological material is as yet unknown, especially in areas that have a mixture of lithologies present (e.g., Clearwater Formation). It is therefore recommended that a field assessment is made of these areas prior to construction. With regards to the planned 'alternative routes' for the 400kV powerlines, both extend partially over Boomplaas dolomites and so the route should be assessed through a field assessment and decisions about the route should be based on the construction footprint of these powerlines. The eastern end of the powerlines extends largely over Vryburg Formation andesitic lavas, which are of low sensitivity. Given the potential for mixed lithologies in this area, a protocol for fossil reporting by the developer should be implemented.

In his palaeontological assessment, Groenewald (2016) notes that "A small part of the study area is characterised by the presence of significant Stromatolites and that stromatolites are present in almost all the dolomite boulders on site. Some areas have possible remains of cave breccia but no in situ outcrops were recorded." The significant palaeontological observations noted by Groenewald (2016) are all located towards the south of the Sendawo PV 3 area and are located well away from the proposed BESS locations. As such, although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

Table 4.3: Impacts of the proposed development of the PV facilities to palaeontological resources

CRITERIA	Without Mitigation	With Mitigation
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	2	1
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	1	1
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	5	5
Impact Duration (D) The length of permanence of the impact on the environmental receptor	5	5
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	2	1
Significance (S) is determined by combining the above criteria: S=(E+D+R+M)xP	**26**	**12**
Mitigation Recommendations	The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities	

5.2 Sustainable Social and Economic Benefit

The client has indicated that "Programs would be aligned to the IDP of the local and District Municipalities which places focus on programs/opportunities aimed at the development of youth through Skills development and job creation. In addition to the above the seller will implement program in the following sectoral focus areas:

- Education
- Skills Development
- Enterprise Development
- Healthcare

Program will be developed through consultation with the community and the relevant stakeholders."

The project is also intended to connect the approved Sendawo PV facility to the national grid to assist in electricity generation. As such, the anticipated socio-economic benefits outweigh the negative impacts to heritage resources on condition that the recommendations made below are implemented.

5.3 Proposed development alternatives

Alternatives are proposed and are mapped throughout this report. Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

In terms of impacts to heritage resources, the following findings are made:

- There is no preferred alternative in terms of the location of the BESS
- There is no preferred alternative in terms of the location of the Collector Substation
- Grid Corridor Alternative 1 is preferred from a heritage perspective due to the presence of significant archaeological heritage within the alignment of Grid Corridor Alternative 2. However, should the recommendations below be adhered to, there is no preferred alternative for the Grid Corridor.

5.4 Site Verification Statement

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

- The cultural value of the broader area has some significance in terms of its mining and agricultural history

(Moderate)

- Some significant archaeological resources were identified within the broader area (Moderate)
- Some significant palaeontological resources were identified within the broader area, and the geology underlying the development area is very sensitive for impacts to significant fossils (High)

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

5.5 Cumulative Impacts

The proposed BESS development will form part of the infrastructure required for the Sendawo solar development and is located in close proximity to the substation and operations and maintenance facilities associated with the Sendawo solar development. Furthermore, the proposed BESS is located within an already approved solar facility development footprint which is also located within a belt of approved renewable energy facilities (Figure 5). In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The construction of the proposed BESS is therefore unlikely to result in unacceptable risk or loss, nor will the proposed BESS development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact. No additional cumulative impacts have been identified in addition to those already covered in the EIA.

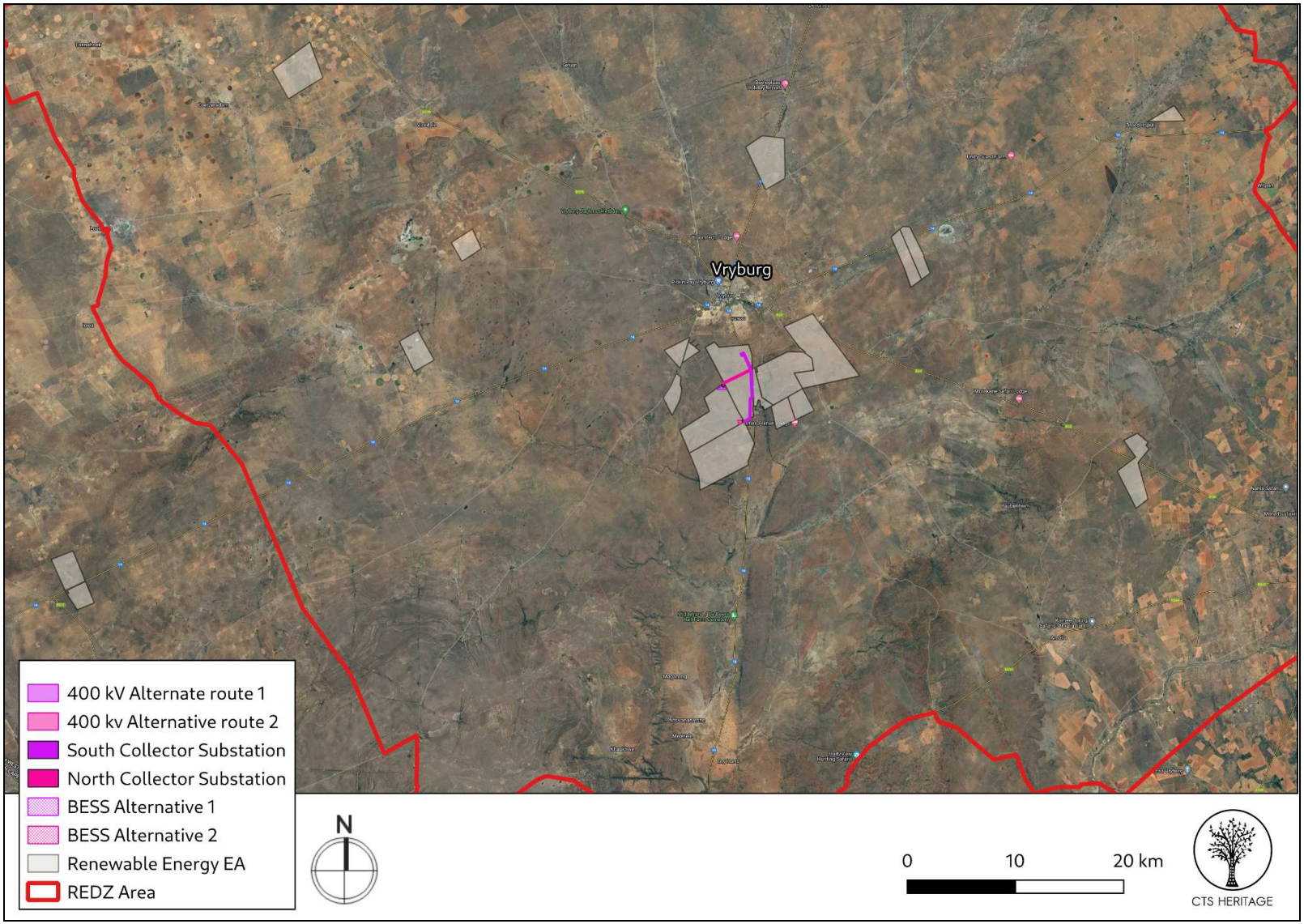


Figure 8: Renewable Energy EAs granted in proximity to the development area, as well as the boundary of the REDZ

6. RESULTS OF PUBLIC CONSULTATION

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

7. CONCLUSION

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. The majority heritage resources identified relate to the historic farm occupation of this area and are considered to be Not Conservation-Worthy. Previous assessments in this area have identified some significant archaeological heritage resources that are located within the proposed grid alignments. Recommendations in this regard are made below.

Although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

There is no objection to the proposed development of Sendawo BESS and grid connection on heritage grounds and no monitoring protocols are recommended. There are no disadvantages or advantages associated with the proposed amendment from a heritage perspective on condition that the mitigation measures included in the Table above are implemented. It should be noted that, although there were no other archaeological or heritage resources identified during the survey conducted for the already approved solar facility; some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward. The following findings have been made:

- No significant archaeological resources were identified in the project area identified for the development of the BESS.
- Archaeological resources of significance are known from the grid corridors. These significant resources must be avoided as per the recommendations below
- No graves or burial grounds were identified in the project area identified for the development of the BESS. However, graves are subterranean in nature and might not have been identified during the initial site visit and survey.
- There are no preferred alternatives for the BESS location from a heritage perspective

- Alternative 1 is preferred for the grid connection from an archaeological perspective due to the possible impacts archaeological heritage
- Based on the known palaeontological sensitivity of the area, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites will be impacted by the development. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

8. RECOMMENDATIONS

There is no objection to the proposed development from an archaeological perspective on condition that:

- A no development buffer of 50m is implemented around sites 45521 and 45529 and the area identified as archaeologically sensitive in Figure 7 above is excluded from the development layout
- Based on the known palaeontological sensitivity of the area, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites will be impacted by the development. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
359	PIA Phase 1	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: COMBINED DESKTOP & FIELD-BASED STUDY Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naledi Local Municipality, North-West Province
382	PIA Desktop	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: DESKTOP STUDY Proposed PV Solar Facility on a portion of the farm Rosendal 673 near Vryburg, Naledi Local Municipality, North-West Province
4265	HIA Phase 1	David Morris	01/04/2014	Appendix D3 Vryburg WWTW Heritage Specialist Report
4826	Palaeontological Specialist Reports	John E Almond	30/11/2013	Proposed Tiger Skloof Photovoltaic Solar Energy Facility near Vryburg, Naledi Local Municipality, North-West Province
6471	HIA Phase 1	Johnny Van Schalkwyk	31/08/2014	BASIC HERITAGE ASSESSMENT FOR THE PROPOSED MOOKODI 132KV PHASE 2 POWER LINES DEVELOPMENT, NORTH WEST PROVINCE
9049	Palaeontological Specialist Reports	John Edward Almond		Palaentological Heritage Assessment: Combined Desktop & Field- Based Study Proposed Sonbesie Solar Plant on the Remaining Extent of the Farm Retreat 671, near Vryburg, Naledi local municipality, North-West Province
9051	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for the Development of the Proposed Khubu Solar Power Plant in the Portion 5 of the Farm CHampions Kloof 731, Vryburg Region, North West Province
9055	HIA Phase 1		31/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED PROTEA SOLAR POWER PLANT ON A PORTION OF THE FARM HARTSBOOM 734, VRYBURG REGION, NORTH WEST PROVINCE
9708	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 1 Heritage Impact Assessment**
9720	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 2 Heritage Impact Assessment**
9721	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 3 Heritage Impact Assessment**
9722	**HIA Phase 1**	**Wouter Fourie**	**19/05/2016**	**SENDAWO POWERLINE ALTERNATIVES SENDAWO PROJECTS Heritage Impact Assessment**

9730	PIA Phase 1	John Almond	07/01/2013	Palaeontological Heritage Assessment: Combined Desktop & Field-based Study Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naldi Local Municipality, North West Province
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
10095	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA DELTA PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 6
10096	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA ECHO PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 67
10098	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA FOXTROT PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9053	Palaeontological Specialist Reports	John E Almond		Palaeontological Heritage Assessment: Combined Desktop & Field-Based Study Proposed Alpha Solar Power Plant on Portion 3 of Farm Middel Pan 605 near Vryburg, Naledi Local Municipality, North West Province
9054	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for The Development of the proposed Meerkat Solar Power Plant on a portion of the farm Vyflings Pan 598IN, Vryburg Region, North West Province
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
7952	AIA Phase 1B	Neels Kruger	23/09/2015	ADDITIONAL ARCHAEOLOGICAL IMPACT STUDY FOR THE PROPOSED CAROCRAFT SOLAR PARK, NALEDI LOCAL MUNICIPALITY, BOPHIRIMA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE
9050		Johnny Van	29/01/2016	Cultural heritage impact assessment for

		Schalkwyk		THE DEVELOPMENT OF THE PROPOSED GAMMA SOLAR POWER PLANT ON PORTION 4 OF THE FARM CHAMPIONS KLOOF 731, VRYBURG REGION, NORTH WEST PROVINCE
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment

CTS HERITAGE

APPENDICES

APPENDIX 1: Archaeological Assessment (2022)

ARCHAEOLOGICAL SPECIALIST STUDY

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

Proposed development of the Sendawo BESS and OHL near Vryburg in the North West Province

Prepared by

CTS HERITAGE
Jenna Lavin
and
Ubique Heritage Consultants

In Association with

WSP

March 2023

Updated April 2023

CTS HERITAGE

EXECUTIVE SUMMARY

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The project entails the construction and operation of the Sendawo 132kV overhead powerline and associated up to 153mW Battery Energy Storage System and substation, that will connect to the operational ESKOM Mookodi Substation

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. The majority heritage resources identified relate to the historic farm occupation of this area and are considered to be Not Conservation-Worthy. Previous assessments in this area have identified some significant archaeological heritage resources that are located within the proposed grid alignments. Recommendations in this regard are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- A no development buffer of 50m is implemented around sites 45521 and 45529 and the area identified as archaeologically sensitive in Figure 8 below is excluded from the development layout
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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

CTS HERITAGE

CONTENTS

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

1. INTRODUCTION

1.1 Background Information on Project

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The project entails the construction and operation of the Sendawo 132kV overhead powerline and associated up to 153mW Battery Energy Storage System and substation, that will connect to the operational ESKOM Mookodi Substation

The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of liquid cooled Lithium-ion batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

A typical up to 153 MW/612MWh BESS system comprises a number of DC Battery Enclosures at a capacity of 2.81 MW. The proposed system has a 4 hour discharge time, with a usable energy of 0.7 MW, hence for a 153 MW/612MWh BESS system, approximately 215 battery enclosures are required.

Each Converter Station comprises of 2 converters (~4200 kW,~1500VDC, - 690Vac) feeding into a single MV transformer (690V/(22kV-33kV)), with the dimensions of each converter measuring 3.0 x 2.0 x 2.2m. A single converter is fed from approximately 7 Battery Enclosures.

The BESS is supplied by a number of outdoor auxiliary transformers ((22kV-33kV)/(220-380V)) to provide auxiliary power to the plant. The MV transformers feed the HV substation which steps the voltage from 22kV to 66kV through one or more HV transformers, in the HV substation connecting to the Eskom grid. The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of Liquid cooled Lithium-ion batteries or Vanadium Redox Flow Batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

The onsite HV substation will be constructed with a maximum footprint of approximately 56 800 m^2 and encloses the 22kV/66kV HV power transformer. A lightning mast with a maximum height of 24m, tower sections, earthing switches, circuit breakers, surge arrestors, busbars and other miscellaneous substation equipment, including a substation building containing MV switchgear, control and protection equipment will also form part of the onsite substation.

The proposed OHPL is a 132 kV single or double steel structure with a kingbird conductor. The powerline will be supported by powerline towers which may be steel lattice (518 H and 518 C) or monopole structures, both options will have a maximum height of 28 m.

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

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400 kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

1.2 Description of Property and Affected Environment

The area proposed for development is dominated by Ghaap Plateau Vaalbosveld. The area is densely vegetated with various grass, plant, shrubs and tree species. *Some of the species observed appear to belong to Acacia, Olea europaea, and Boscia, among* others.

The study area consists of a gently undulating landscape and rocky outcrops are found throughout the site. The geology of the area consists of surface limestone of Tertiary to recent age, as well as dolomite and chert of the Campbell Group.

Several water sources can be found near the northernmost corridor. Dirt roads and farmlands bound the site (Edinburgh 735) to the north, south, east and west. The N18 is situated east of the corridor and substation (Waterloo 730 and Rosendal 673). Animal grazing and small animal burrows (several of which are found around BESS 2, and along the corridors), have disturbed certain areas due to overgrazing and watering holes. Human-made holes and a landfill dumping site are situated near the substation. Several wire-fenced livestock kraals are located throughout the area.

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

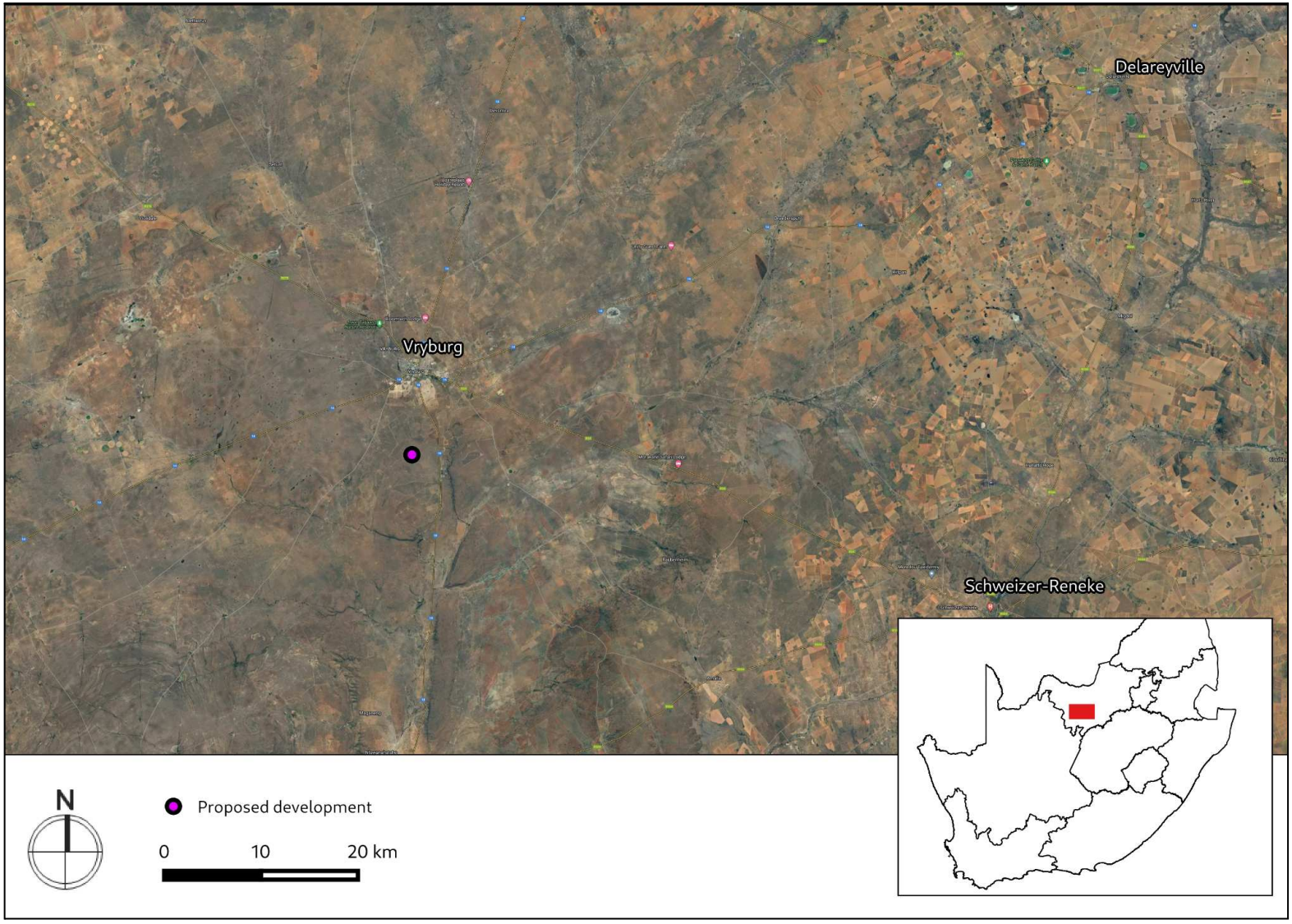


Figure 1.1: Satellite image indicating proposed location of development

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

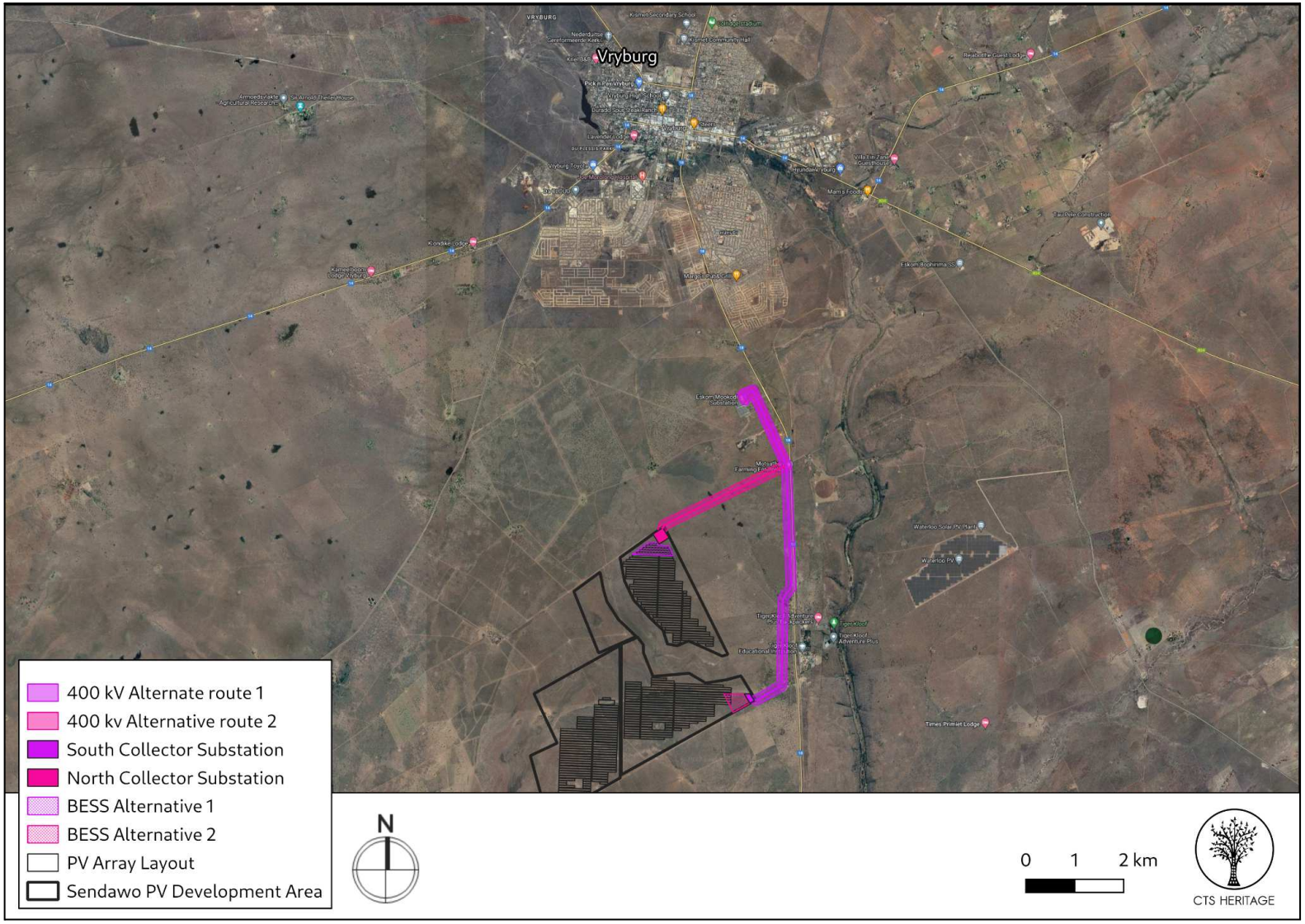


Figure 1.2: Proposed project boundary

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

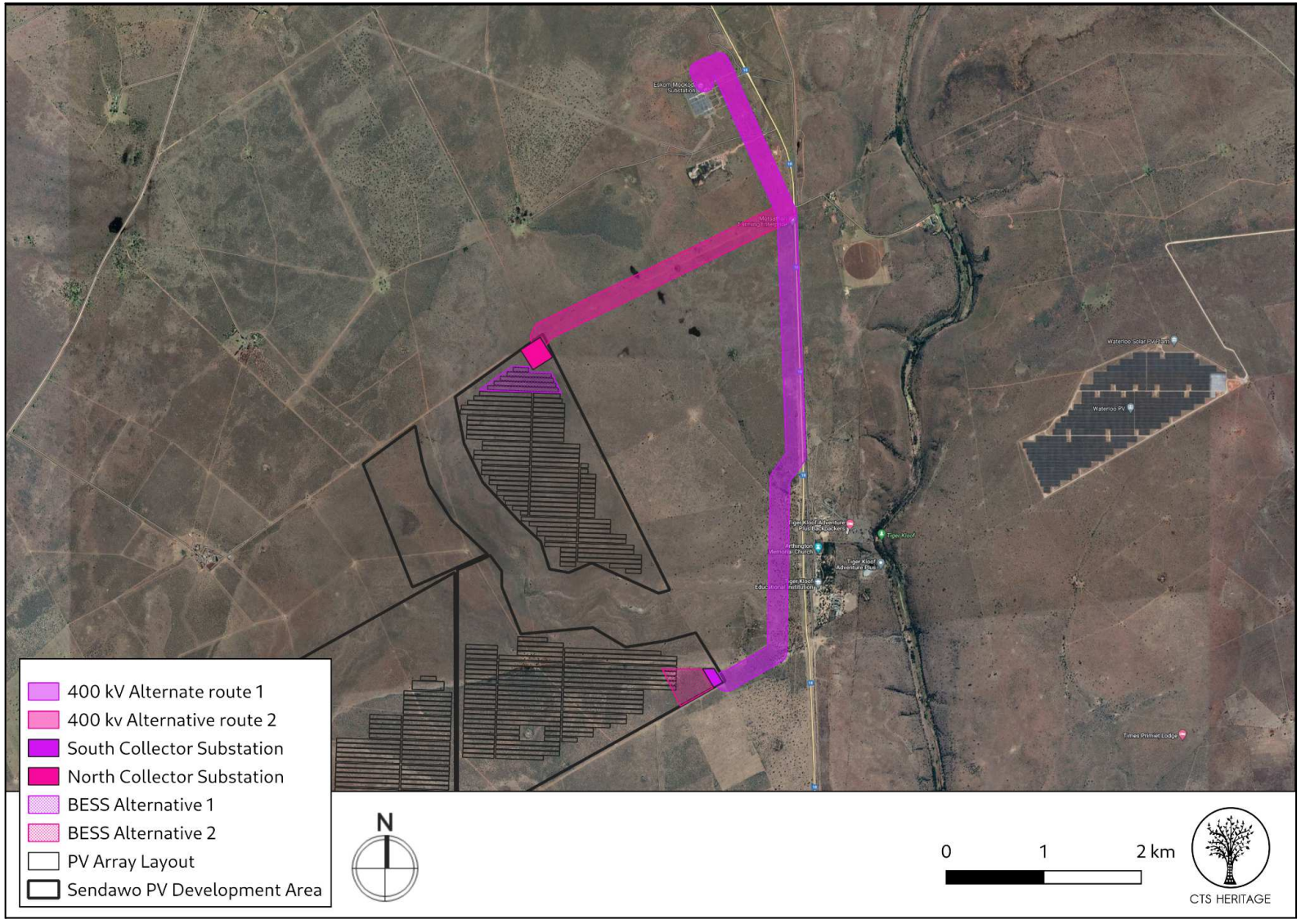


Figure 1.3: Proposed project boundary

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

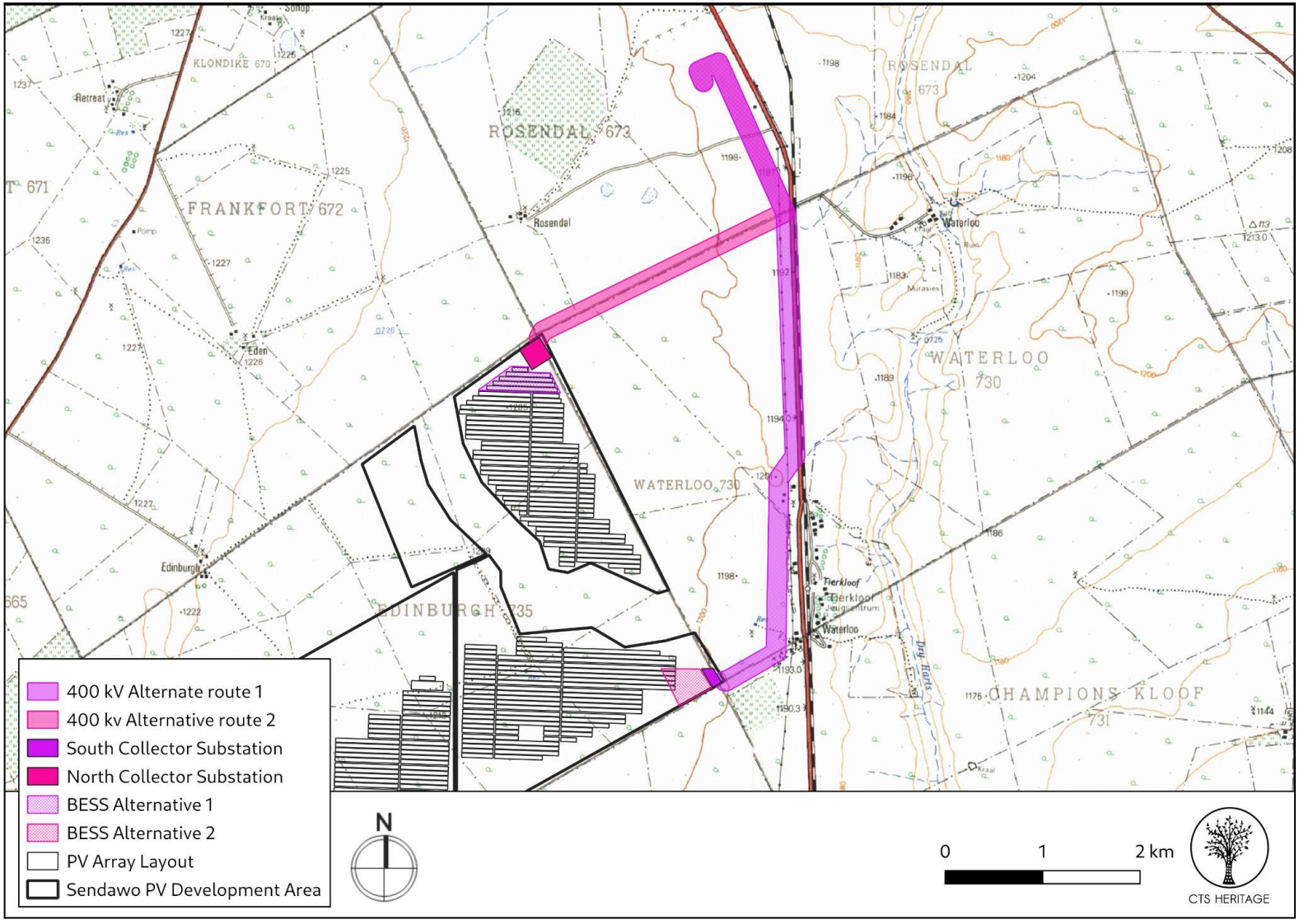


Figure 1.4: Proposed project boundary indicated on the 1:50 000 Topo Map

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

2. METHODOLOGY

2.1 Purpose of Archaeological Study

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

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 23 and 24 March 2023 to determine what archaeological resources are likely to be impacted by the proposed development of the PV facility and grid connection.
- The area proposed for development was assessed on foot, photographs of the context and finds were taken, and tracks were recorded using a GPS.
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.

2.3 Constraints & Limitations

The entire area was surveyed as best as possible and as the vegetation and environment allowed. The site is densely vegetated in certain areas and impedes perfect transects. Fenced animal kraals further restricted direct access, and certain areas had to be reached through gates that were situated far away from the corridors. Where possible, fences were climbed, but it was not a possibility throughout.

On the afternoon of the 23rd a heavy thunderstorm occurred, forcing us to leave the site early. The following day (24th of March) the surface was consistently wet, as it rained (softly and hard) throughout the day.

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment.

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

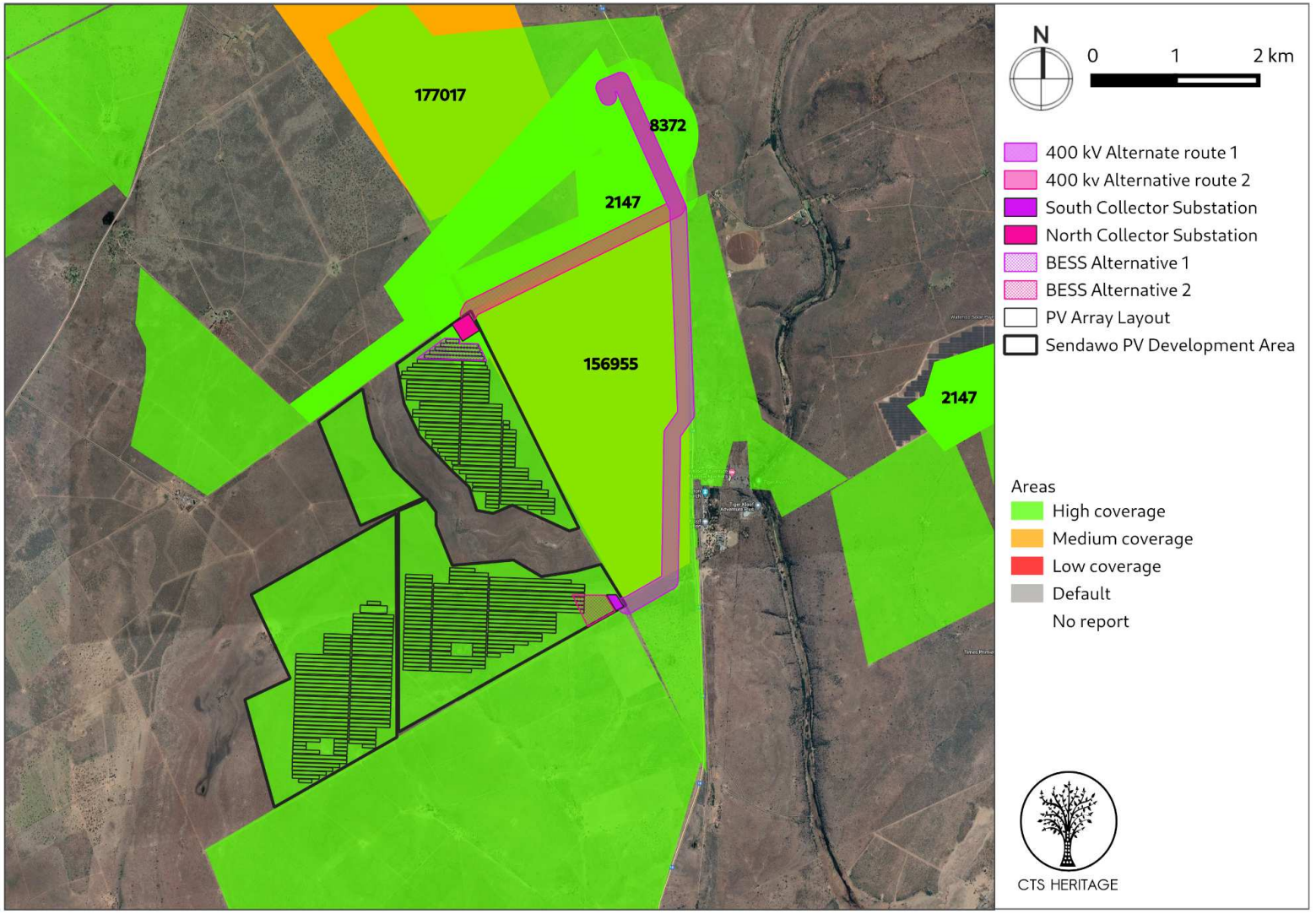


Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Background

This report is drafted for the proposed construction and operation of a Battery Energy Storage (BESS) and a grid connection for the authorised Sendawo Solar Energy Facility. The BESS which will have an extent of no more than 5ha will be developed within the authorised development footprint of the Sendawo PV facility. Two options are proposed for the area proposed for the BESS development, both are located within the area previously assessed for the Sendawo PV facility. This area was thoroughly assessed for impacts to heritage resources in the Heritage Impact Assessment conducted by Fourie (2016, SAHRIS NID 9721). The HIA by Fourie (2016) and an HIA completed by Van Schalkwyk (2018) for an adjacent property is referred to below.

Archaeology and Built Environment Heritage

Vryburg town was established in 1882 as the capital town of the independent Boer Republic of Stellaland. During its short history, the small state became a focal point for conflict between the British Empire and the South African Republic, the two major players vying for control of the territory. After a series of claims and annexations, British fears of Boer expansionism led to its demise and, among other factors, set the stage for the Second Boer War. Before the proclamation of the republic, the area was under the control of competing Korana and Tswana groups, while the United Kingdom laid claim to it as a part of the emerging protectorate of British Bechuanaland. Two of the indigenous groups were under the leadership of chiefs Mankoroane and Montšioa, whom the British regarded as "friendly," and two others under the leadership of chiefs Moshette (a Motswana) and Massouw (a Korana). When a feud erupted between Mankoroane and another chief, each side resorted to recruiting volunteers, promising them land in return for their assistance. After a settlement was negotiated with mediation from the Transvaal Republic, large portions of Mankoroane's land were given to Boer mercenaries who had fought on his adversary's side, and the new inhabitants decided to declare independence and establish the Republic of Stellaland. During the Second Boer War, a concentration camp was established at Vryburg, however this concentration camp is located north of Vryburg town and is therefore located sufficiently far from the area proposed for development that no impact is anticipated.

According to van Schalkwyk et al (2018, SAHRIS NID 510838) "Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over." Van Schalkwyk (2018, SAHRIS NID 510838) notes that Later Stone Age artefacts and rock art are also known from the area. Iron Age people started to settle in the area in the 1500s. According to Van Schalkwyk (2018, SAHRIS NID 510838), "By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province." including the proposed development area. "The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959)."

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

Despite the overall archaeological sensitivity of the broader landscape, the archaeological survey conducted by Fourie (2016) identified limited heritage resources of value within the areas proposed for the BESS facilities. Fourie (2016) notes that "The find spots in the larger study area varied from Later Stone Age (LSA) scatters consisting of flakes, chips and some cores manufactured from fine-grained quartzite, chalcedony, and cryptocrystalline (ccs) material; Middle Stones Age (MSA) lithics consisting of cores, chips and flakes with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Earlier Stone Age (ESA) lithics found at some of these finds spots consisted of a hand axe, cleavers and large flakes. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. No heritage resources related to archaeology or the more recent history was identified in the footprint area of Solar 3" (The proposed BESS locations are within Sendawo Solar Area 3).

The field assessment for the Sendawo Grid connection assessed a corridor that includes the alternatives considered in this report. Two archaeological sites of significance were identified by Fourie (2016) in his assessment. These sites, as well as others that occur within the grid corridor are detailed in the table below:

Table 1: Sites previously identified within the development area

Site ID	Site Name	Corridor	Description	Grade	Mitigation
45521	WATER05	Alt 2	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of high concentration 22-m² of MSA and LSA tools from CCS and Quartzite.	IIIA	Buffer of 50m recommended - See Figure 8
45529	WATER09	Alt 1	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of Artefact count	IIIA	Buffer of 50m recommended - See Figure 8

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

			13-m². LSA dominates with some MSA. Raw material on CCS and quartzite.		
32418	Exhumation of graves at Eskom Mookodi Substation1	Alt 2 (although likely to have been mapped incorrectly)	Permit granted in 2014 to remove the graves at this site to a new location: PGS Heritage was appointed by Eskom Holdings SOC Limited, to effect the relocation of 6 graves located within the Eskom Mookodi substation area. The graves are located next to the substation High Voltage yard and have been fenced off. The graves need to be relocated as the expansion of the substation necessitates their relocation after alternatives for their preservation that were investigated were not viable. Based on this description, this site is likely the same as Sites 46713, 130097 and 130952 but mapped incorrectly	IIIA	NA
138456	SDNP004	Alt 2	Shallow sandy soils on shale and quartzites with minor dolomite. No heritage significance	NCW	NA
131106	SDG001	Alt 2	Low density scatter of MSA lithics over an area of approximately 50 m2. The site is characterised by a large pebble concentration within a dry pan. Same location as Site 130787 Low density scatter of MSA lithics over an area of approximately 50 m2. The site is characterised by a large pebble concentration within a dry pan. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was kept in mind with the development of the mitigation recommendations.	IIIC	Implement walk down of final alignment on power line alignment
131107	SDG002	Alt 2	Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. Same location as Site 130788: Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was	IIIC	Implement walk down of final alignment on power line alignment

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

			kept in mind with the development of the mitigation recommendations.		
130952	VBS003	Both	Originally some graves occurred in this area. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities. Same location as Site 46713 and 130097	IIIA	All cemeteries should have a buffer of at least 20 metres from the outermost graves. Fortunately, many cemeteries are fenced off, which can then be used as a buffer. Likely already exhumed

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

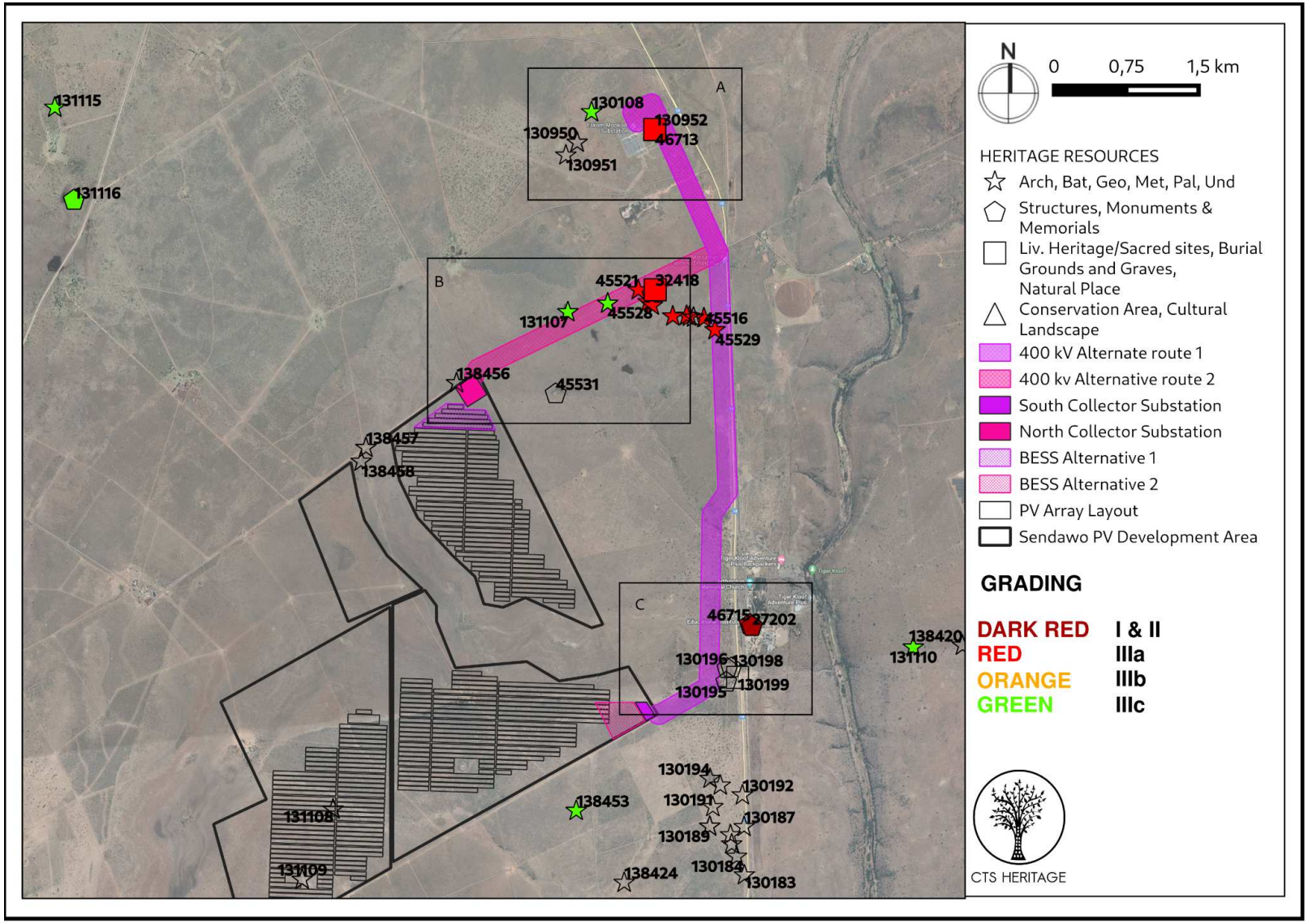


Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

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

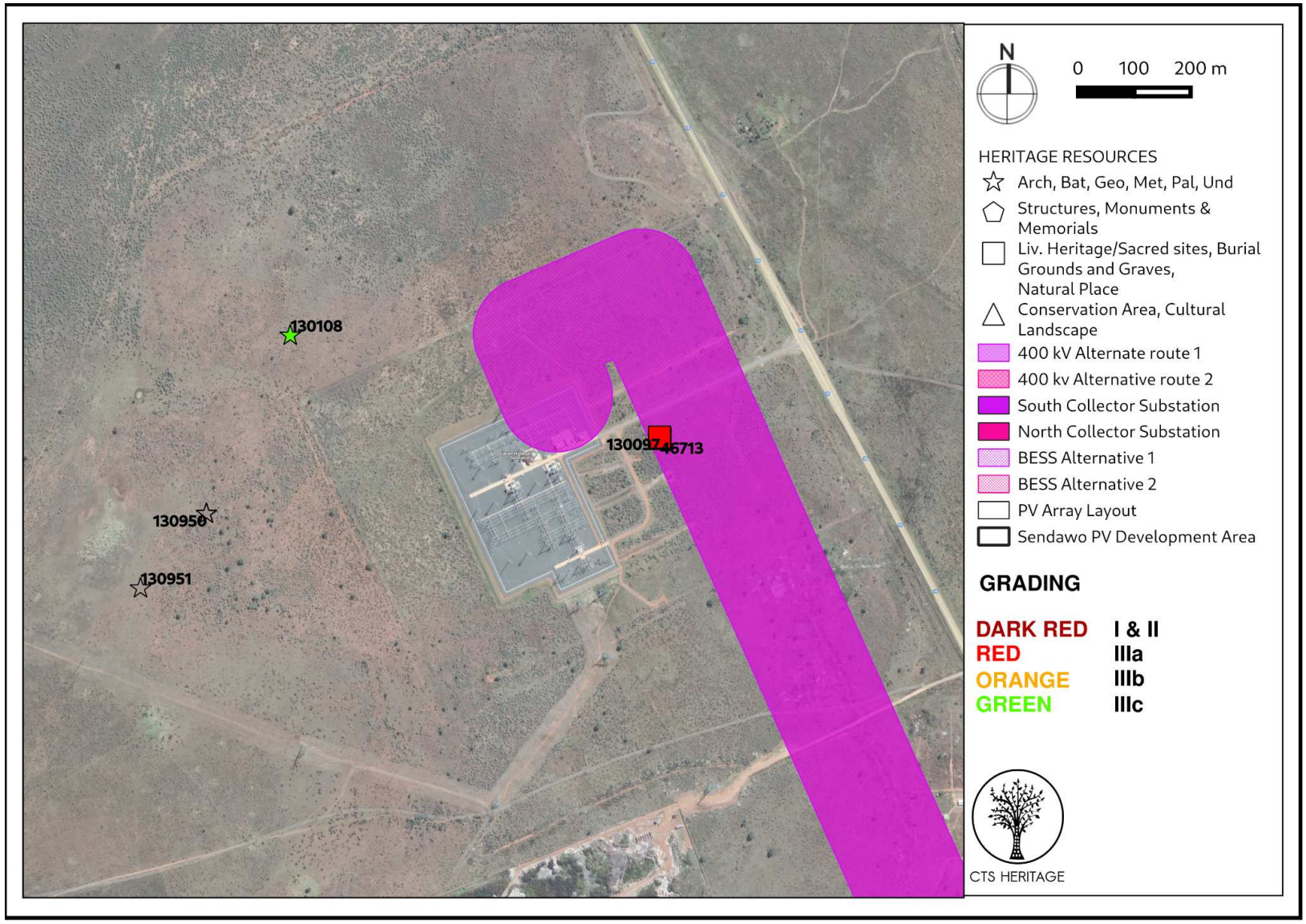


Figure 3.1. Heritage Resources Map. Heritage Resources inset A

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

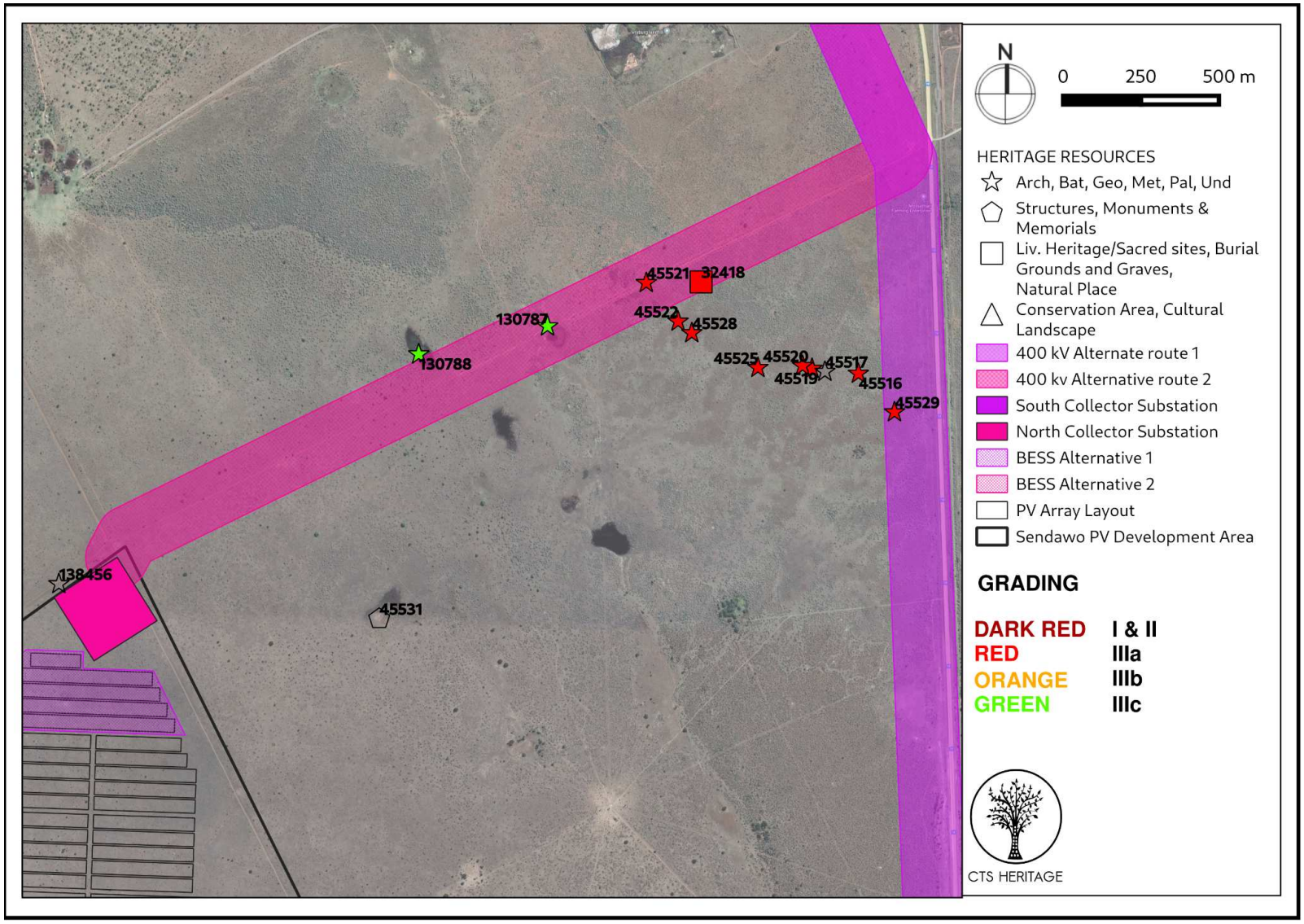


Figure 3.2. Heritage Resources Map. Heritage Resource inset B

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

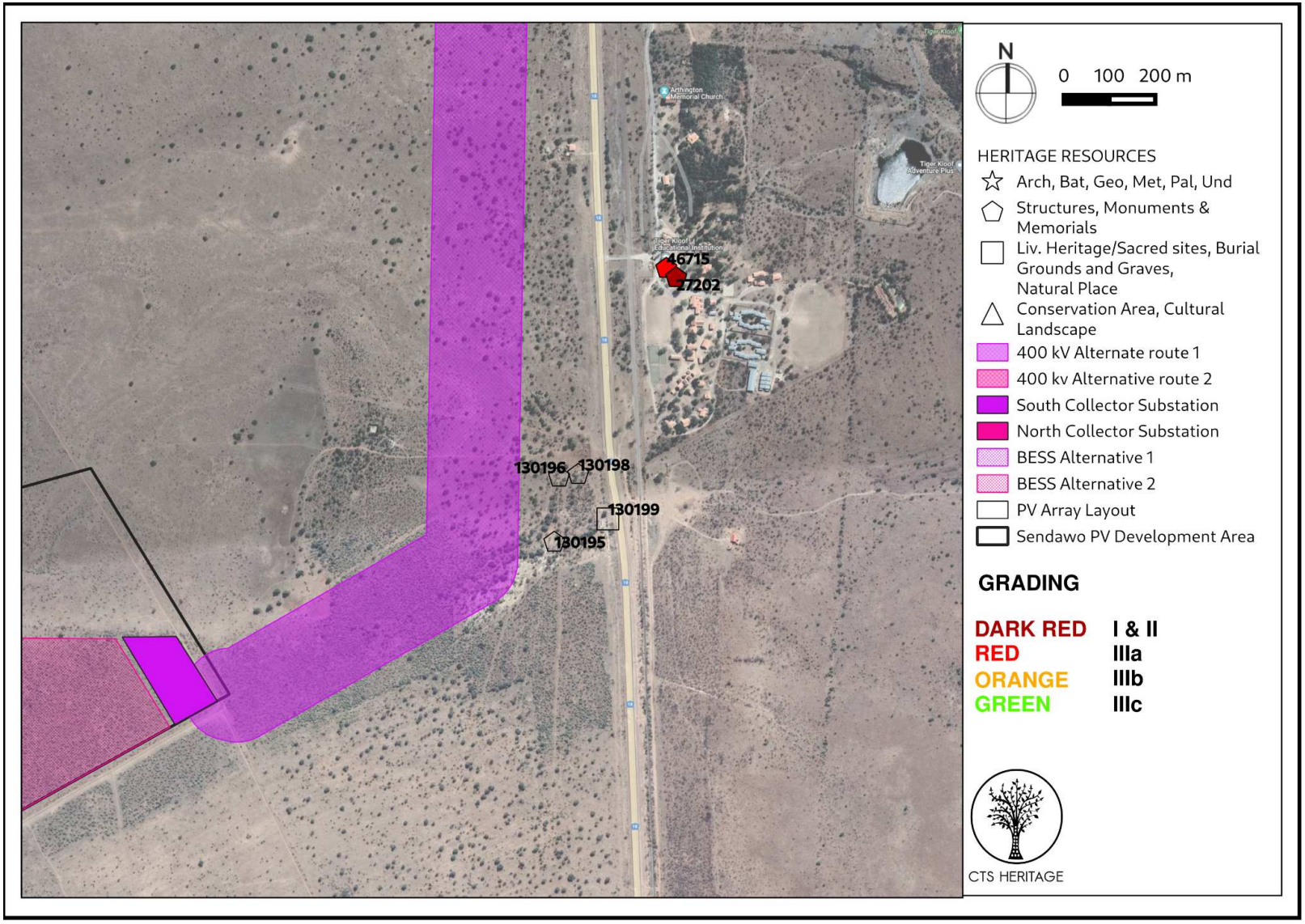


Figure 3.3. Heritage Resources Map. Heritage Resource inset C

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

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

The three lithic occurrences were isolated finds without context and are considered to be of low significance. They are thus Non-Conservation Worthy.

No historical period resources were identified at BESS 1 and 2 or at the alternative areas. Several structural features were noted throughout the survey of the corridors. Some of these features (005-007) are all situated directly within the development footprint of the proposed corridors. Additionally, structural features (002, 003, 009 and 010) were identified just outside of the proposed corridor area.

Resources related to farming activities and farming machines (008) were noted. One of the cement resources had a date as well as a name inscribed on it. These resources (007, 008, 009 and 010) are all likely less than 60 years of age and are therefore considered Non-Conservation Worthy.

The original stonework at resources at 003, 005, and 006 likely date to the early 20th century, however, have been continuously modified (possibly till the 1960s), these are thus considered to be Non-Conservation Worthy. The large midden (002) has 20th-century cultural material. Unfortunately, a Phase 1 will not be able to determine whether there is sub-surface material dating to the early 20th-century.

These historic resources do not appear to have any archaeological or cultural significance; additionally, most of them are likely to be younger than 60 years of age. The structural features that have older stonework (early 20th century) have been modified and are therefore considered to have low cultural or archaeological significance and/or have been disturbed by farming activities.

Figure 4.1 Contextual Images - BESS 1 and Alternative

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

Figure 4.2 Contextual Images - BESS 1 and Alternative

Figure 4.3 Contextual Images - BESS 2 and Alternative

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

Figure 4.4 Contextual Images - BESS 2 and Alternative

Figure 4.5 Contextual Images - Corridor

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

Figure 4.6 Contextual Images - Corridor

Figure 4.7 Contextual Images - Corridor

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

Figure 4.8 Contextual Images - Corridor

Figure 4.9 Contextual Images - Corridor

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

Figure 4.10 Contextual Images - Substation

Figure 4.11 Contextual Images

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

Figure 4.12 Contextual Image - Substation

Figure 4.13 Contextual Images - Substation

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

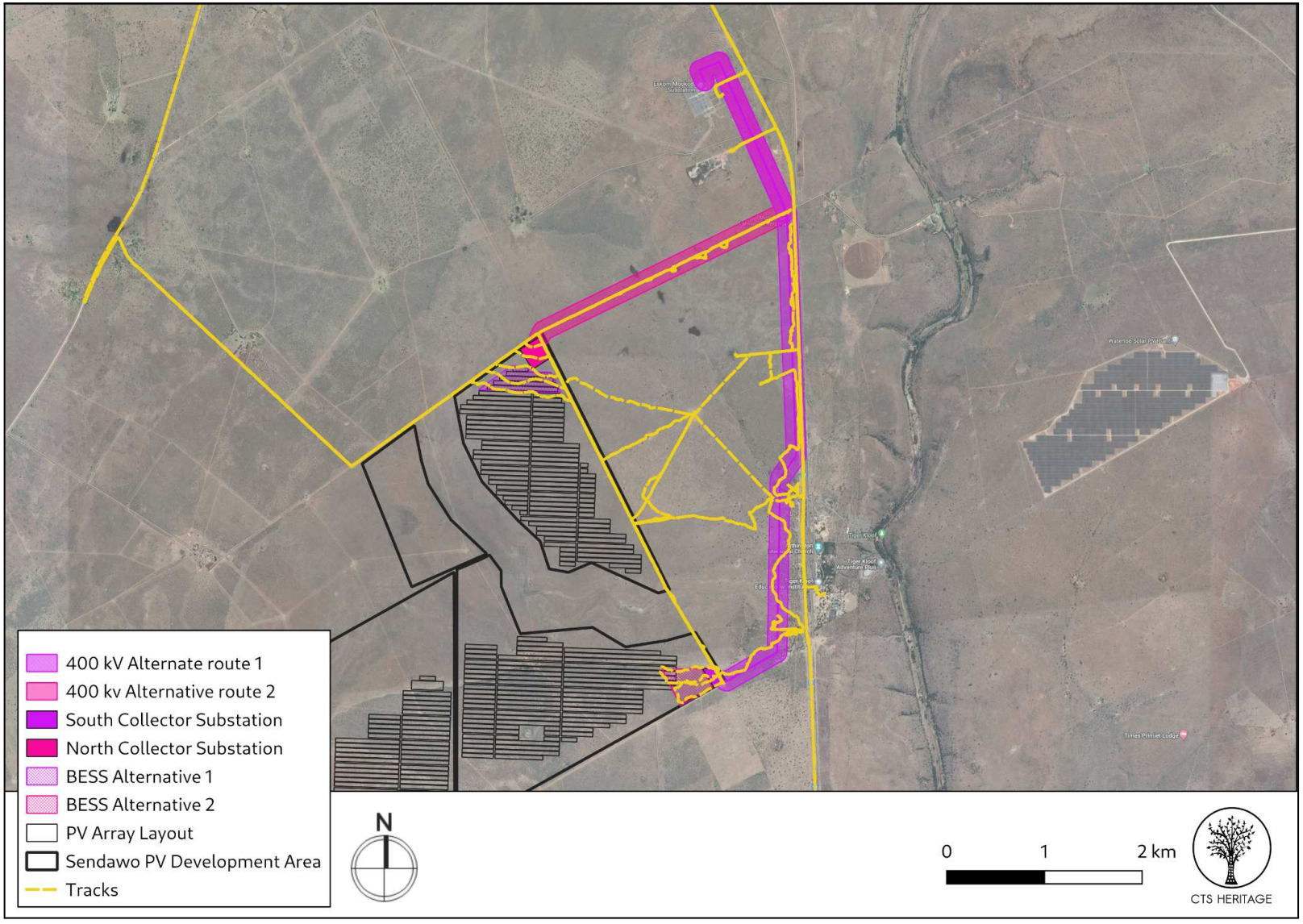


Figure 5.1. Track paths of archaeological field assessment - the dense vegetation impacted the survey (see Constraints and Limitations)

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

4.2 Archaeological Resources identified

Table 1: Observations noted during the field assessment

POINT ID	Description	Type	Co-ordinates		Grading	Mitigation
001	Dolerite flake located within the BESS2 footprint	MSA/LSA	27° 3'48.43"S	24°44'42.26"E	NCW	NA
002	A prominent midden feature with 20th-century glass on the surface. Situated near the kraal (003)	Historic Midden	27° 2'43.25"S	24°45'14.80"E	NCW	NA
003	A large kraal, possibly used for smaller livestock such as sheep/goats. Several additional structural features around the kraal and midden include water troughs. It appears to be unused. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Historic Kraal	27° 2'43.77"S	24°45'14.67"E	NCW	NA
004	Dolerite flake located within near to a rocky outcrop	MSA/LSA	27° 1'32.95"S	24°44'28.69"E	NCW	NA
005	Two structural ruins situated near a modern chicken and goat livestock kraal. They appear to be used as a dumping/storing area. Modern motor vehicle items can be found here, such as a door and several tires. The area is relatively disturbed by current livestock agricultural activities, and no above-ground cultural material was identified. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Ruins	27° 2'47.28"S	24°45'10.51"E	NCW	NA
006	Stone and cement feature Situated near a modern chicken and goat livestock kraal. The area is relatively disturbed by current livestock agricultural activities, and no above-ground cultural material was identified. The original stonework appears to date to the early 20th century. However, it has been modified over the decades with concrete and bricks.	Structure	27° 2'48.58"S	24°45'10.61"	NCW	NA
007	Stone and cement foundation likely associated with the other nearby structures. No above-ground cultural material was identified. The structure was likely broken-down or bulldozed – the area is also disturbed.	Structure	27° 2'44.13"S	24°45'11.58"E	NCW	NA
008	Machinery and water pump hole(?). Two of the cement blocks associated with farming machinery have been marked. Handprints marked one with a horseshoe between them, the other was marked with writing. The inscription says: W. du P.23/3/68. The inscription provides us with a relative date, which indicates that it is less than 60 years of age.	Structure	27° 3'33.11"S	24°45'9.64"E	NCW	NA
009	Structural feature Located near a modern livestock kraal and dirt road. Appears to be a water reservoir along with the foundation of a broken-down structural feature.	Structure	27° 3'32.98"S	24°45'15.20"E	NCW	NA

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

010	One room structure Located near a modern livestock kraal and dirt road. No additional above-ground cultural material was identified.	Structure	27° 3'33.48"S	24°45'14.08"E	NCW	NA
011	Dolerite flake located within near to a rocky outcrop	MSA/LSA	27° 2'9.23"S	24°45'13.94"E	NCW	NA

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

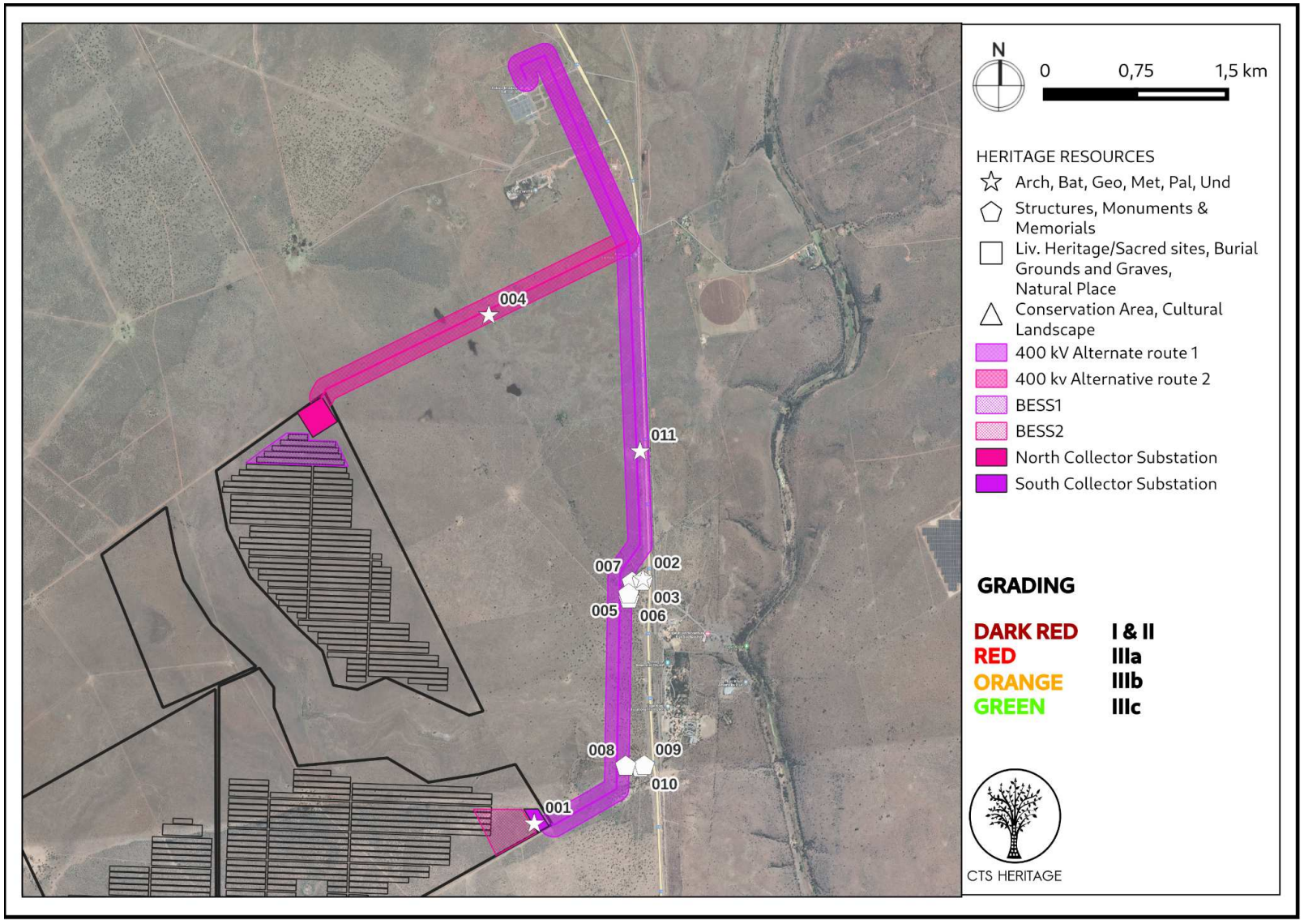


Figure 6.1: Map of all sites and observations noted within the development area

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

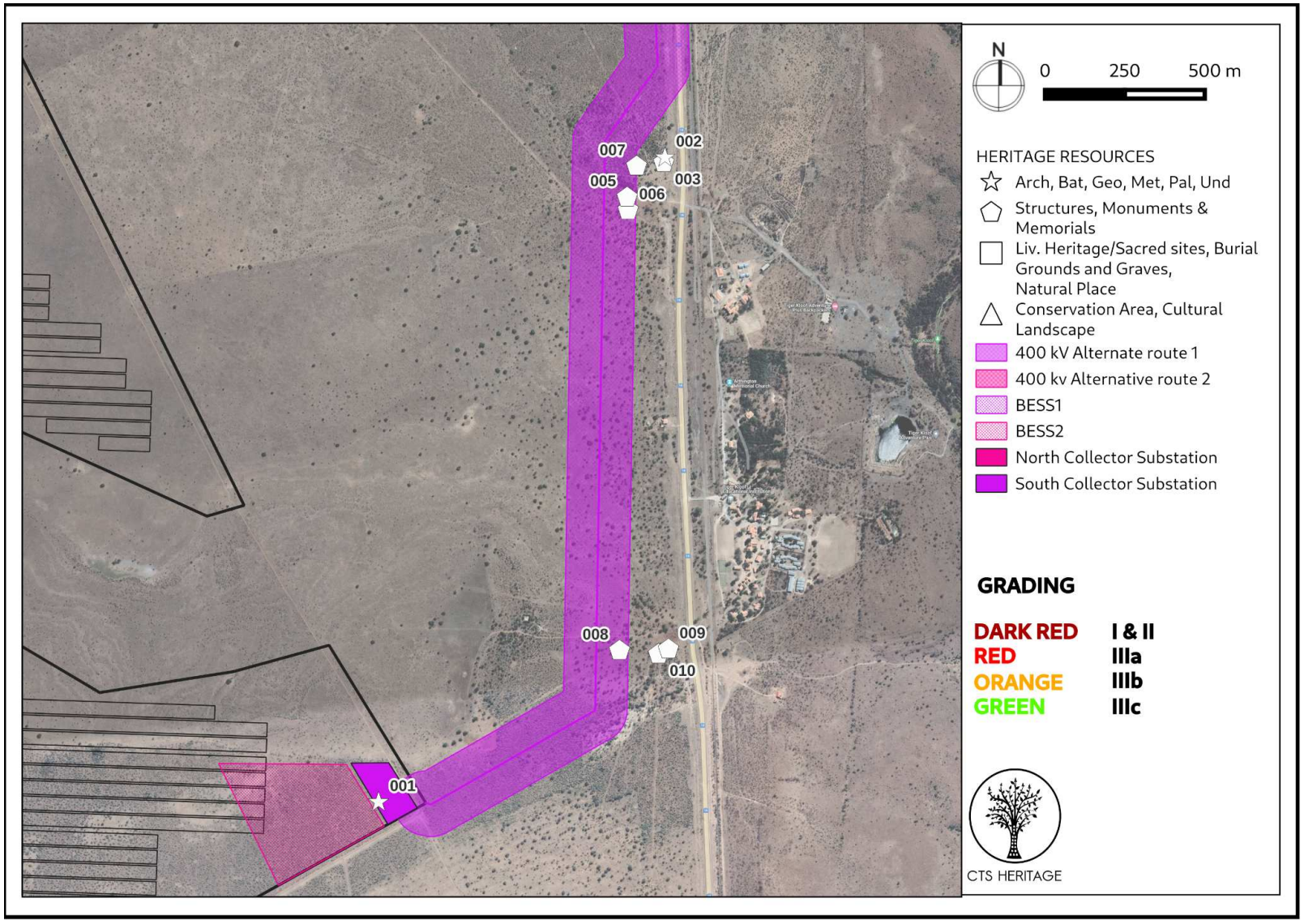


Figure 6.2: Map of all sites and observations noted within the development area

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

4.3 Selected photographic record

(a full photographic record is available upon request)

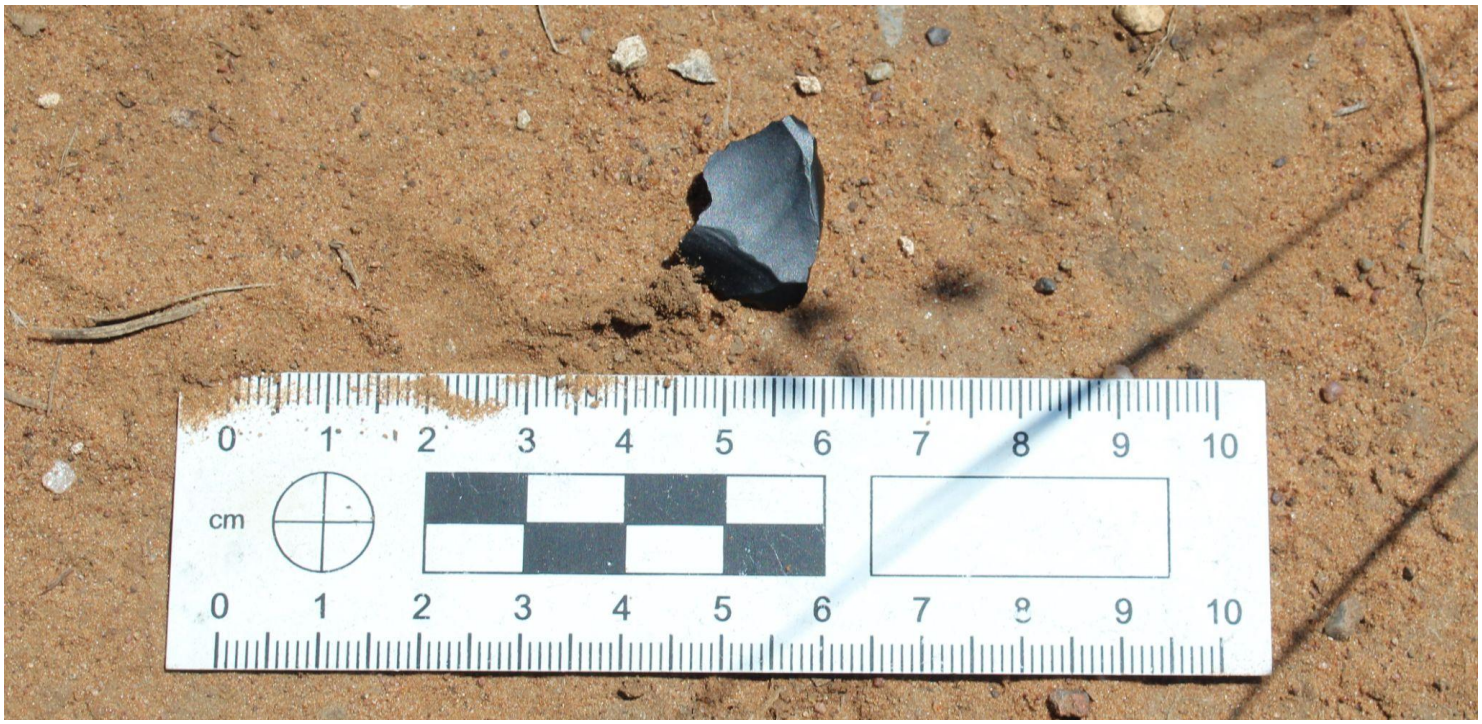


Figure 7.1 001

Figure 7.2 002

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

Figure 7.3 003

Figure 7.4 004

Figure 7.5 005

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

Figure 7.6 006

Figure 7.7 007

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

Figure 7.8 008

Figure 7.9 009

Figure 7.10 010

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

Figure 7.11 011

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

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

As was anticipated in the desktop assessment, the heritage observations made during the field assessment consisted of minimal Stone Age archaeology and a number of structures related to the agricultural history of the area. The field assessment completed in March 2023 identified no heritage resources of significance located within either of the proposed grid alignment alternatives, or within the areas proposed for the BESS and substation infrastructure.

Previous heritage assessments completed here (Fourie, 2016) identified a number of heritage resources located within the grid alignment (Table 1). When mapping the findings from 2023 and 2016, it is evident that SAHRIS Sites 131106, 130196 and 130198 (2016) overlap with Observations 004, 010 and 009 (2023) respectively. As such, no further mitigation of these sites is required and the recommendations made in 2016 for these sites (Table 1) are no longer applicable and no further walkdown of the alignment is required.

In 2016, Fourie identified a significant MSA site located along a low ridge which consists of SAHRIS Sites 45516, 45517, 45519, 45520, 45521, 45522, 45525, 45528 and 45529, for which sites 45521 and 45529 fall within both proposed grid alignment alternatives. Based on the information available, an area of high archaeological sensitivity has been identified in Figure 8 below. In order to ensure that no impact to this significant site takes place, it is recommended that a no development buffer of 50m is implemented around sites 45521 and 45529, and the area of high archaeological sensitivity indicated in Figure 8 below is excluded from the development layout.

6. CONCLUSION AND RECOMMENDATIONS

The survey proceeded with some constraints and limitations, yet the project area was comprehensively surveyed for heritage resources. The majority heritage resources identified relate to the historic farm occupation of this area and are considered to be Not Conservation-Worthy. Previous assessments in this area have identified some significant archaeological heritage resources that are located within the proposed grid alignments. Recommendations in this regard are made below.

Recommendations

There is no objection to the proposed development from an archaeological perspective on condition that:

- A no development buffer of 50m is implemented around sites 45521 and 45529 and the area identified as archaeologically sensitive in Figure 8 below is excluded from the development layout
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

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

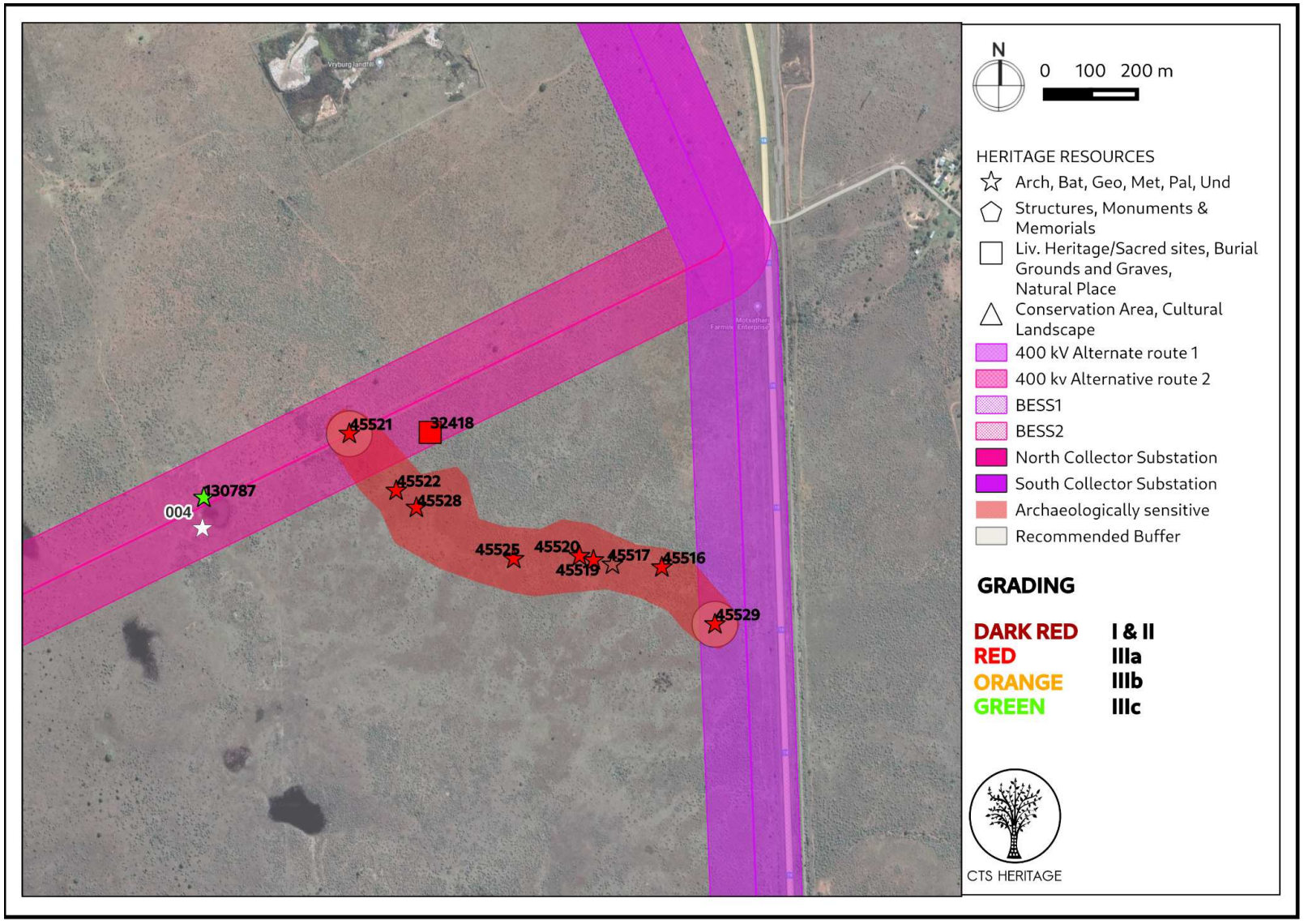


Figure 8: Map of recommended Mitigation measures

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

7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
4265	HIA Phase 1	David Morris	01/04/2014	Appendix D3 Vryburg WWTW Heritage Specialist Report
6471	HIA Phase 1	Johnny Van Schalkwyk	31/08/2014	BASIC HERITAGE ASSESSMENT FOR THE PROPOSED MOOKODI 132KV PHASE 2 POWER LINES DEVELOPMENT, NORTH WEST PROVINCE
9051	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for the Development of the Proposed Khubu Solar Power Plant in the Portion 5 of the Farm CHampions Kloof 731, Vryburg Region, North West Province
9055	HIA Phase 1		31/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED PROTEA SOLAR POWER PLANT ON A PORTION OF THE FARM HARTSBOOM 734, VRYBURG REGION, NORTH WEST PROVINCE
9708	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 1 Heritage Impact Assessment**
9720	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 2 Heritage Impact Assessment**
9721	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 3 Heritage Impact Assessment**
9722	**HIA Phase 1**	**Wouter Fourie**	**19/05/2016**	**SENDAWO POWERLINE ALTERNATIVES SENDAWO PROJECTS Heritage Impact Assessment**
9730	PIA Phase 1	John Almond	07/01/2013	Palaeontological Heritage Assessment: Combined Desktop & Field-based Study Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naldi Local Municipality, North West Province
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
10095	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA DELTA PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 6
10096	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA ECHO PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 67
10098	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA FOXTROT PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF

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

				THE FARM ROSENDAL
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9054	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for The Development of the proposed Meerkat Solar Power Plant on a portion of the farm Vyflings Pan 598IN, Vryburg Region, North West Province
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
7952	AIA Phase 1B	Neels Kruger	23/09/2015	ADDITIONAL ARCHAEOLOGICAL IMPACT STUDY FOR THE PROPOSED CAROCRAFT SOLAR PARK, NALEDI LOCAL MUNICIPALITY, BOPHIRIMA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE
9050		Johnny Van Schalkwyk	29/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED GAMMA SOLAR POWER PLANT ON PORTION 4 OF THE FARM CHAMPIONS KLOOF 731, VRYBURG REGION, NORTH WEST PROVINCE
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment

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

APPENDIX 2: Palaeontological Assessment (2022)

PALAEONTOLOGICAL SPECIALIST STUDY

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

Proposed development of the Sendawo PV BESS and OHL near Vryburg in the North West Province

Prepared by

CTS HERITAGE

And Dr Kimberley Chapelle

In Association with

WSP

October 2022

Updated April 2023

EXECUTIVE SUMMARY

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The Sendawo Battery Energy Storage System (BESS) project entails the construction and operation of an up to 153 MW/612MWh BESS facility and associated infrastructure, at the authorised Sendawo Solar Energy Facility (SEF) Substation near Vryburg in the North West Province.

Based on published literature and previous field assessments within the immediate area, it is considered that the impact of the development will be **HIGH**. This is based on the presence of dolomite in the Boomplaas and Clearwater dominated areas, and the research importance of that rock type and its proclivity for hosting caves. The quaternary calcrete deposits overlie the Archaean rocks in the central area of the proposed development to an unknown depth and are in themselves considered of high sensitivity due to their potential in preserving a wide range of vertebrate and invertebrate trace fossils and archaeological remains.

Large areas of the proposed development are located on highly sensitive rock types (Boomplaas, Clearwater and Quaternary deposits) that may preserve important palaeontological evidence. The abundance, preservation and exposure of the palaeontological material is as yet unknown, especially in areas that have a mixture of lithologies present (e.g., Clearwater Formation).

With regards to the planned 'alternative routes' for the 132 kV powerlines, both extend partially over Boomplaas dolomites there is no preferred alternative from a palaeontological perspective. The selected route should be subject to a walkdown of the final pylon footings to inspect sensitive geology for fossil material. The eastern end of the powerlines extends largely over Vryburg Formation andesitic lavas, which are of low sensitivity. Given the potential for mixed lithologies in this area, a protocol for fossil reporting by the ECO should be implemented. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).

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

CTS HERITAGE

CONTENTS

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

1. INTRODUCTION

1.1 Background Information on Project

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 132 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The project entails the construction and operation of the Sendawo 132kV overhead powerline and associated up to 153mW Battery Energy Storage System and substation, that will connect to the operational ESKOM Mookodi Substation

The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of liquid cooled Lithium-ion batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

A typical up to 153 MW/612MWh BESS system comprises a number of DC Battery Enclosures at a capacity of 2.81 MW. The proposed system has a 4 hour discharge time, with a usable energy of 0.7 MW, hence for a 153 MW/612MWh BESS system, approximately 215 battery enclosures are required.

Each Converter Station comprises of 2 converters (~4200 kW,~1500VDC, - 690Vac) feeding into a single MV transformer (690V/(22kV-33kV)), with the dimensions of each converter measuring 3.0 x 2.0 x 2.2m. A single converter is fed from approximately 7 Battery Enclosures.

The BESS is supplied by a number of outdoor auxiliary transformers ((22kV-33kV)/(220-380V)) to provide auxiliary power to the plant. The MV transformers feed the HV substation which steps the voltage from 22kV to 66kV through one or more HV transformers, in the HV substation connecting to the Eskom grid. The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of Liquid cooled Lithium-ion batteries or Vanadium Redox Flow Batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

The onsite HV substation will be constructed with a maximum footprint of approximately 56 800 m^2 and encloses the 22kV/66kV HV power transformer. A lightning mast with a maximum height of 24m, tower sections, earthing switches, circuit breakers, surge arrestors, busbars and other miscellaneous substation equipment, including a substation building containing MV switchgear, control and protection equipment will also form part of the onsite substation.

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

The proposed OHPL is a 132 kV single or double steel structure with a kingbird conductor. The powerline will be supported by powerline towers which may be steel lattice (518 H and 518 C) or monopole structures, both options will have a maximum height of 28 m.

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment. The maps drafted for this report are also based on an early project description that was intended for a 400kV powerline. However, please note that the assessment has been conducted based on the 132kV powerline information.

1.2 Description of Property and Affected Environment

The area proposed for development is dominated by Ghaap Plateau Vaalbosveld. The area is densely vegetated with various grass, plant, shrubs and tree species. *Some of the species observed appear to belong to Acacia, Olea europaea, and Boscia, among* others.

The study area consists of a gently undulating landscape and rocky outcrops are found throughout the site. The geology of the area consists of surface limestone of Tertiary to recent age, as well as dolomite and chert of the Campbell Group.

Several water sources can be found near the northernmost corridor. Dirt roads and farmlands bound the site (Edinburgh 735) to the north, south, east and west. The N18 is situated east of the corridor and substation (Waterloo 730 and Rosendal 673). Animal grazing and small animal burrows (several of which are found around BESS 2, and along the corridors), have disturbed certain areas due to overgrazing and watering holes. Human-made holes and a landfill dumping site are situated near the substation. Several wire-fenced livestock kraals are located throughout the area.

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

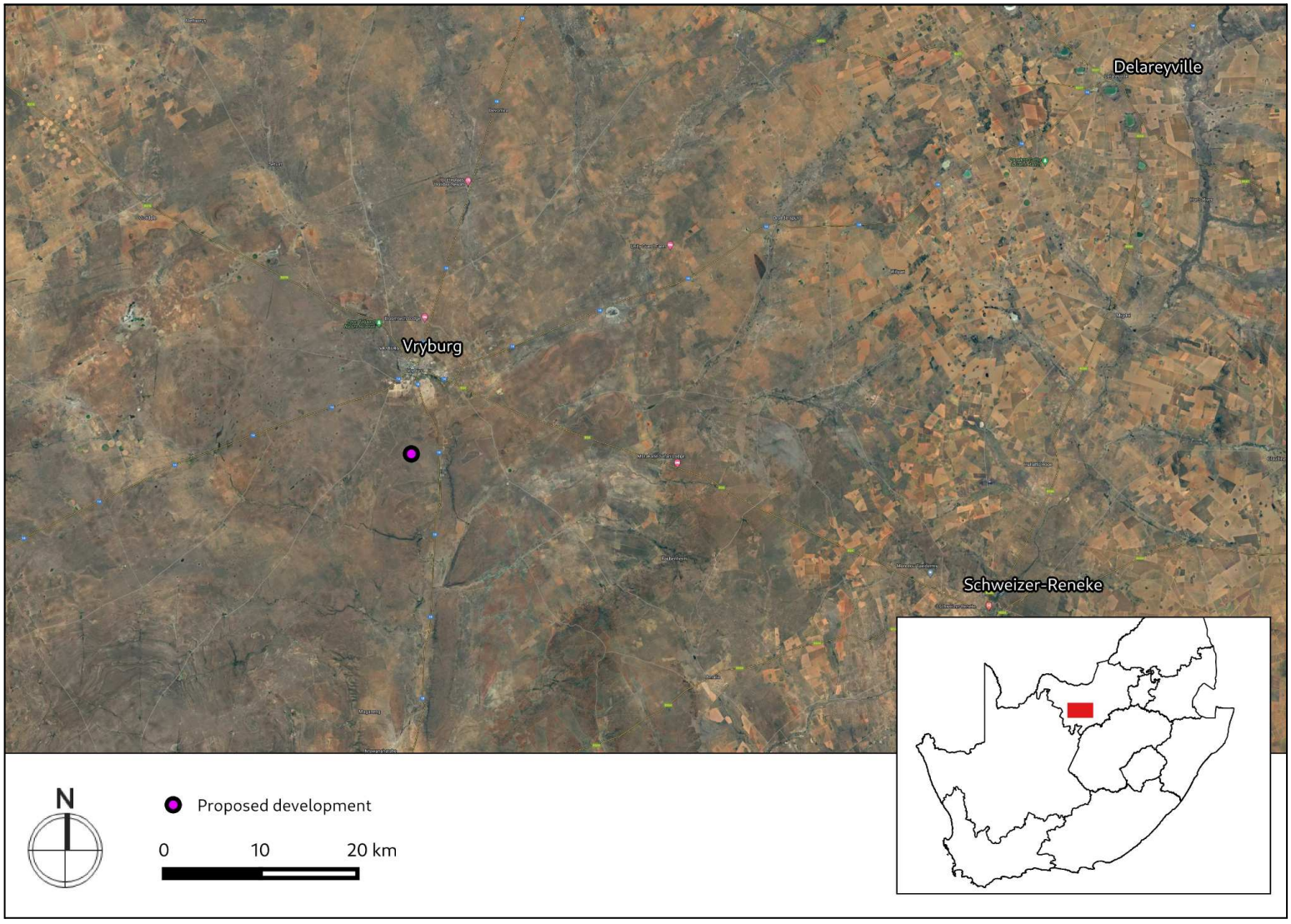


Figure 1.1: Close up satellite image indicating proposed location of study area

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

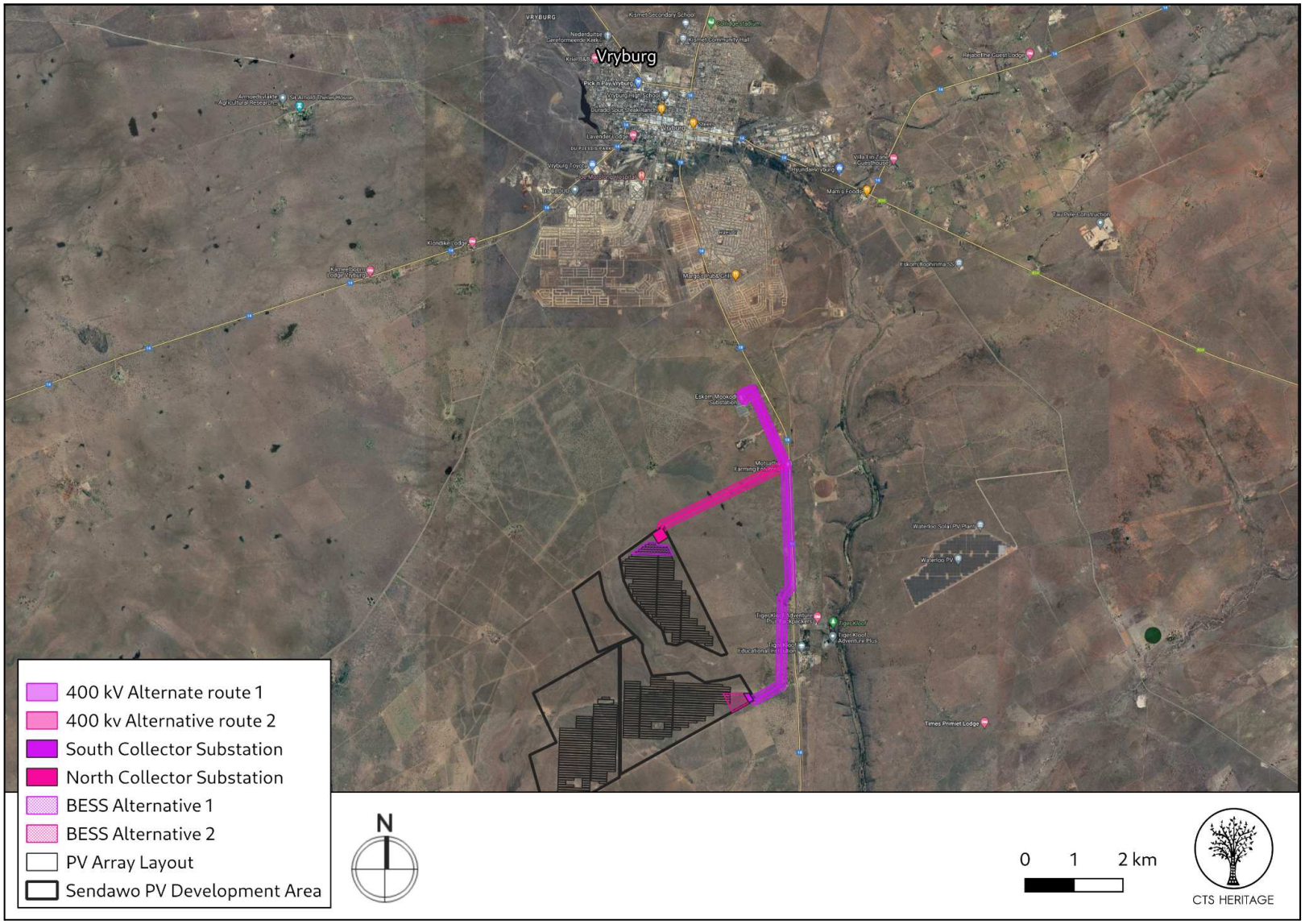


Figure 1.2: Study Area

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

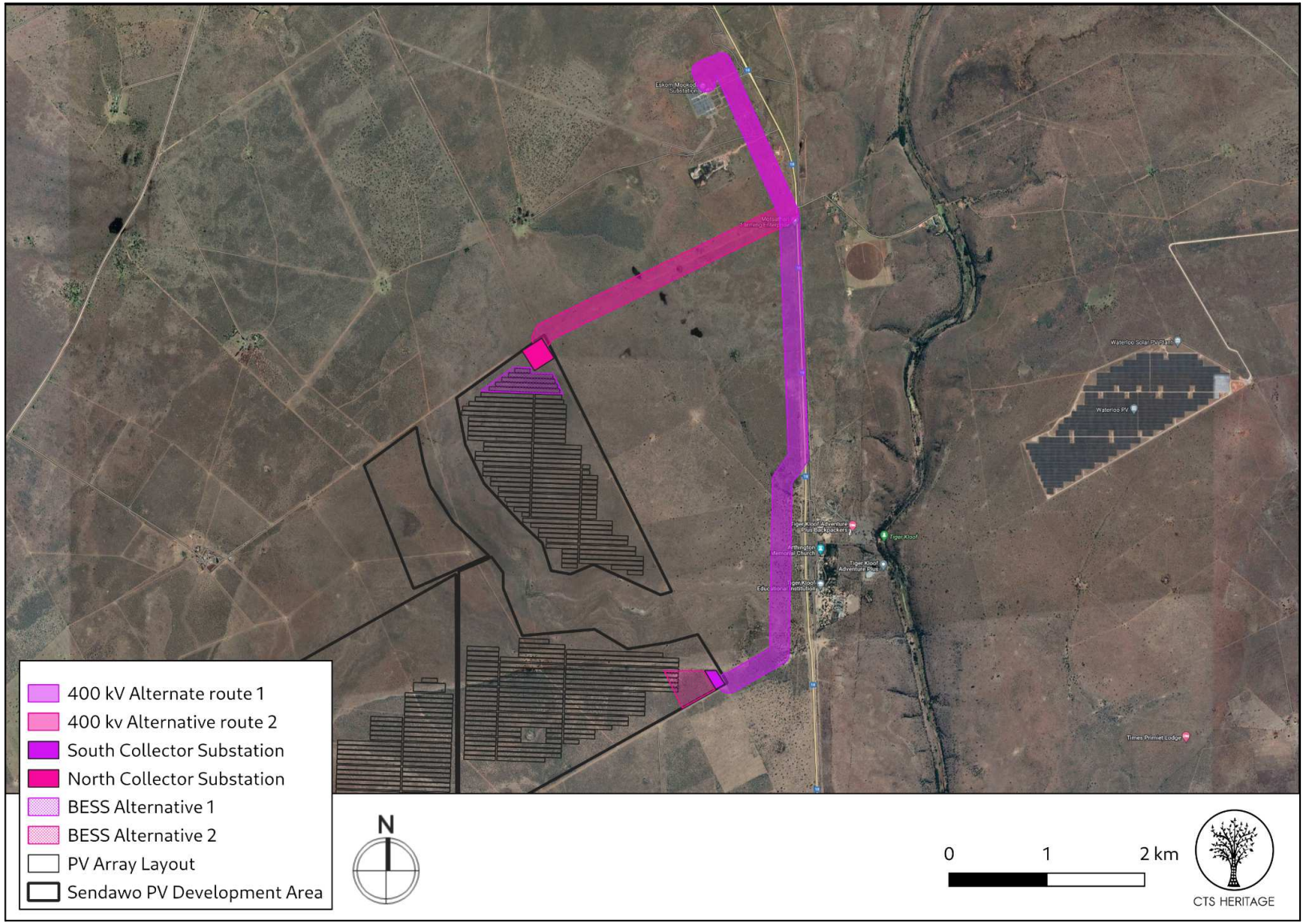


Figure 1.3: Study Area

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

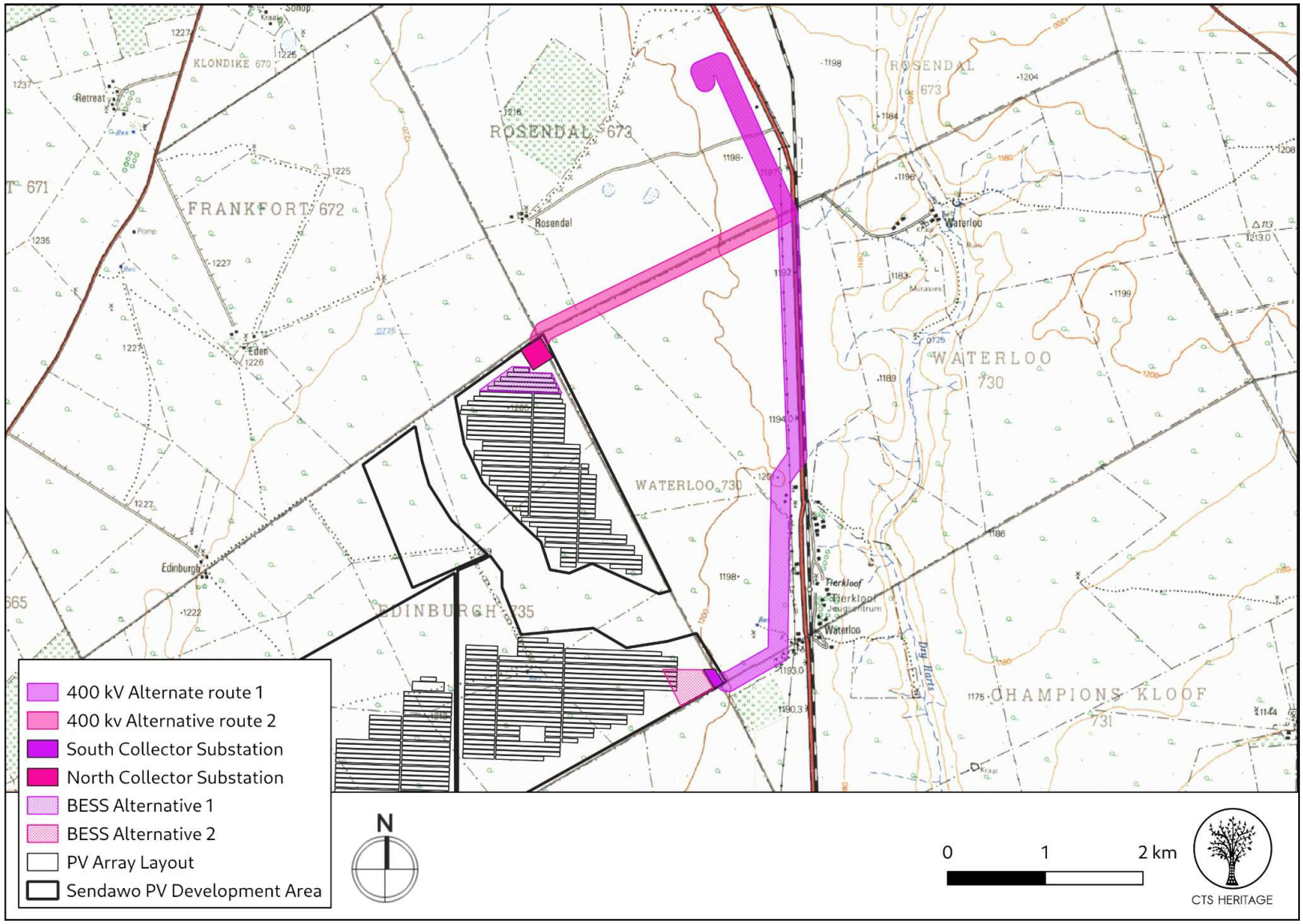


Figure 1.4: Study Area reflected on the 1:50 000 Topo Map

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

2. METHODOLOGY

2.1 Purpose of Palaeontological Study

According to the SAHRIS Palaeosensitivity Map (Figure 4a), the area proposed for development is underlain by sediments of moderate and very high paleontological sensitivity. The purpose of this desktop palaeontological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

2.2 Summary of steps followed

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

Please note that this assessment was conducted on the basis of the original layout where the lay down area wasn't separated from the BESS area. This has been amended in subsequent layouts, however this makes no difference to the outcome of this assessment.

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

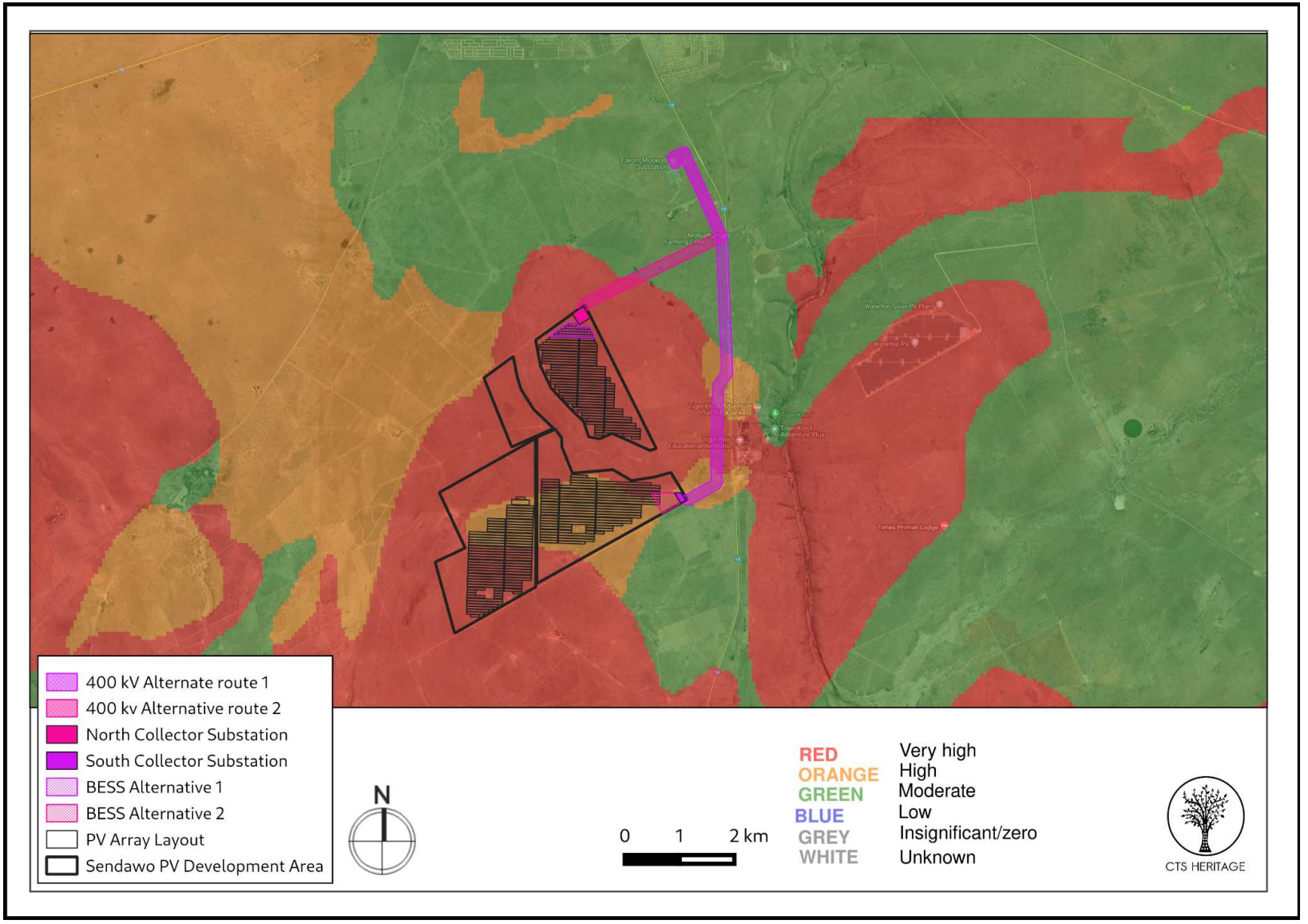


Figure 2: Palaeontological sensitivity of the development area from the SAHRIS PalaeoMap

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

3. SITE SENSITIVITY

According to the SAHRIS Palaeosensitivity Map, the area proposed for the BESS development is underlain by sediments of high palaeontological sensitivity (Figure 4a). According to the extract from the CGS 2724 Christiana Ma, the development area for the Sendawo PV Facility as well as the development area for the BESS is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc) (Figure 4b). The palaeontological impacts associated with the development of the Sendawo solar facilities was assessed by Groenewald (2016). According to Groenewald (2016), the area proposed for the BESS development is underlain by Stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group (Kameeldorns, Rietgat and Bothaville Formations) as well as the lower part of the Transvaal Supergroup (Ghaap Group, Vryburg Formation & Schmidtsdrift Subgroup, including the Boomplaas Formation). In the Vryburg area and further south towards Taung these include some of the oldest (> 2.5 billion years) and best-preserved stromatolites (fossil microbial mounds) known from this period; Stromatolites are recorded from the dolomite layers. Highly fossiliferous Caenozoic cave breccias are also known to occur within the dolomite layers, but are not mapped individually. These fossiliferous deposits often contain more recent mammal and hominid fossils, e.g. in the Cradle of Humankind.

In his palaeontological assessment, Groenewald (2016) notes that “A small part of the study area is characterised by the presence of significant Stromatolites and that stromatolites are present in almost all the dolomite boulders on site. Some areas have possible remains of cave breccia but no in situ outcrops were recorded.” The significant palaeontological observations noted by Groenewald (2016) are all located towards the south of the Sendawo PV 3 area and are located well away from the proposed BESS locations. As such, although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

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

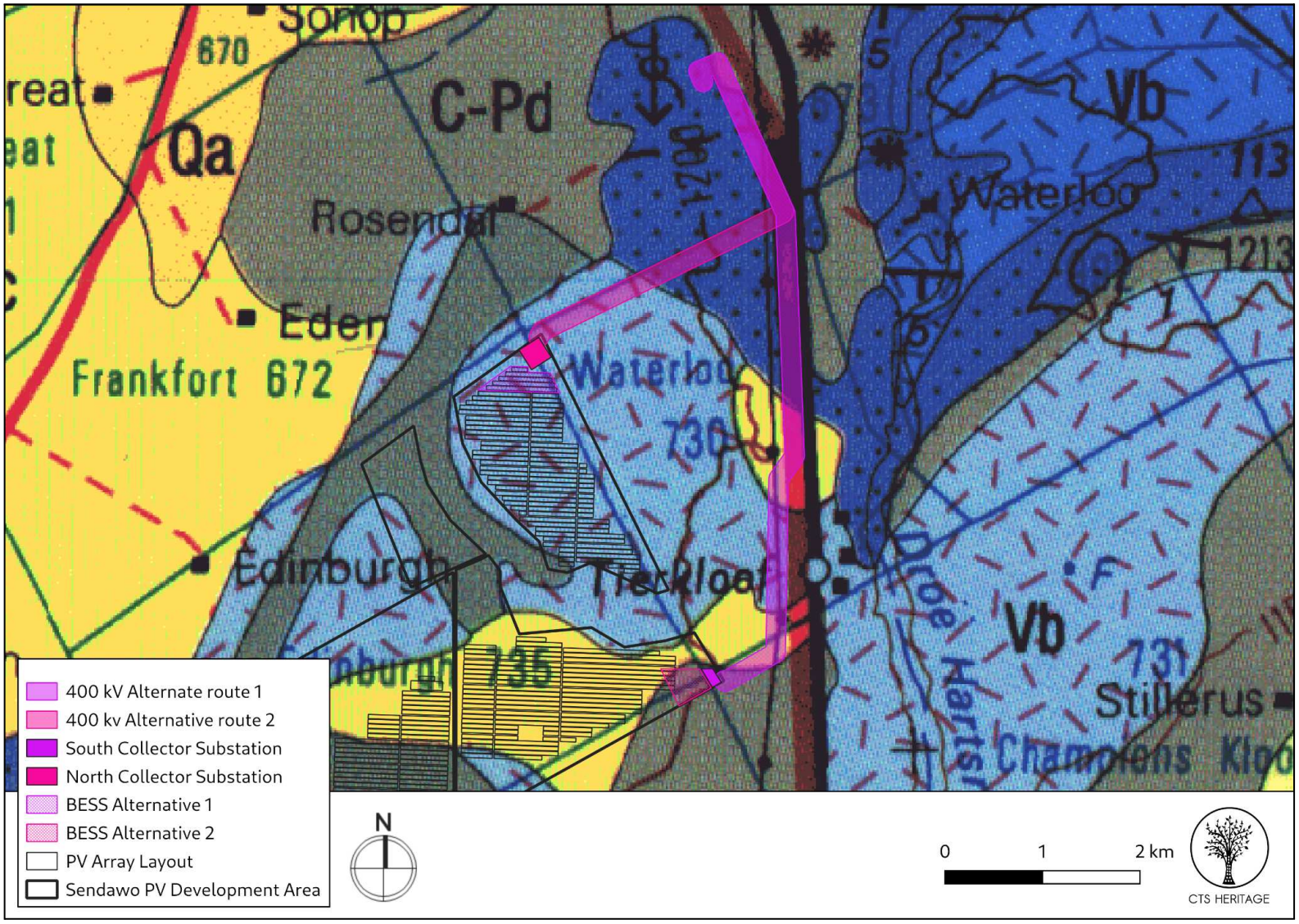
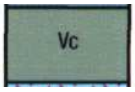
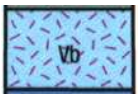


Figure 3. Geology Map. Extract from the CGS 2724 Christiana Map indicating that the development area for the BESS and OHL alternatives is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc), Clearwater Formation (Vc), Boomplaas Formation (Vb) and Vryburg Formation (Vv) of the Ghaap Group

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

Table 1: Geological Summary Table

Geological unit	Age	Lithology	Symbol on figure 3	Fossil heritage	Palaeontological sensitivity	Recommended mitigation
Kalahari Group	Tertiary – Quaternary	Calcretised aeolian and fluvial sands and gravels and hardpans		Root casts and burrows, rare vertebrate fossils, diatom-richcalcretes, fresh water and terrestrial shells, ostracod and charophytes.	High	No action required, any fossil finds to be reported by developer
Dwyka Group	Late Carboniferous – Early Permian 320-290 Mya	Tillite, mudstone, shale, boulder shale and sandstone		Trace fossils, organic-walled microfossils, rare marine invertebrates (e.g., molluscs), fish, vascular plants.	Moderate	No action required, any fossil finds to be reported by developer
Clearwater Formation, Schmidtsdrif Subgroup, Ghaap Group, Griqualand West Supergroup	Vaalian – Late Archaean 2620 Mya	Shale, mudstone, siltstone with interbedded dolomite		Stromatolitic forms of various shapes and sizes (e.g. Almond, 2017)	Very High	Field study (cf. Almond, 2017)
Boomplaas Formation, Schmidtsdrif Subgroup, Ghaap Group, Griqualand West Supergroup	Vaalian – Late Archaean 2630 Mya	Oolitic and stromatolitic dolomite; interbedded quartzite, shale and flagstone		Stromatolitic forms of various shapes and sizes (e.g. Almond, 2017)	Very High	Field study (cf. Almond, 2017)
Vryburg Formation, Griqualand West Supergroup	Vaalian - Late Archaean 2640 Mya	Quartzite, flagstone, conglomerate, dolomite and shale; andesitic lava 		None of note in the andesitic lavas. Dolomites comprise Stromatolitic forms of various shapes and sizes (e.g., Almond, 2017)	Low in andesitic lava exposures	If lavas are present no action required, any fossil finds to be reported by developer. Dolomite exposures should be avoided (cf. Almond, 2017)

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

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Underlying geology of development area

- The oldest rocks exposed in the proposed development area are attributed to the Vaalian (Late Archaean) aged Vryburg Formation, which comprises complex protobasinal interbeds of dolomite, quartzite and andesitic lavas (Eriksson et al., 1995) and is correlated with the Black Reef Formation in the Transvsaal Basin succession. Only andesitic lavas are represented in the planned development area according to the provided geological map. The Vryburg lavas have been described as locally vesicular or blocky and associated with veins and lenses of cherts. The lavas generally represent subaerial flows and are associated with rift-related geological contexts (Eriksson and Reczko, 1995).
- Boomplaas Formation carbonates gradationally overlie the clastic beds of the Vryburg Formation and formed about 2630 mya. Regionally stratigraphically correlated to the lower units of the Malmani dolomites (Oaktree Formation specifically) in the Transvaal Basin (Eriksson et al., 1995), the stromatolitic carbonates formed in an epieric sea that occupied the Griqualand West Basin. These carbonates have been the subject of extensive study in the Transvaal Basin (e.g., Eriksson and Truswell, 1974; Eriksson & Altermann, 1998; Sumner & Grotzinger, 2004) but the Griqualand West correlates have been the subject of less attention but preserve some excellent stromatolitic forms (e.g., Groenwald, 2016; Almond, 2017) that warrant dedicated description and analysis. Boomplaas Formation exposure are thus considered of very high sensitivity. Significant areas of the planned development overlie Boomplaas Formation rocks. Groenewald (2015) associates the very high palaeontological sensitivity to the possible occurrence of caves and fossil-bearing breccias akin to those found in the Cradle of Humankind (specifically Sterkfontein, which is formed within the stratigraphically correlated Oaktree Formation). Groenewald (2015) states that "the *very high fossiliferous potential of the Boomplaas Formation, warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of this formation. All the areas underlain by Dolomite have a very high potential of containing cave breccias with highly sensitive fossil remains including remains of Hominin fossils*".
- Overlying the Boomplaas carbonates are the interbedded clastic and carbonate rocks of the Clearwater Formation, deposited about 2620 mya. Correlated stratigraphically in the Ghaap Plateau Sub-Basin but not in the Transvaal Basin (Eriksson *et al.*, 2006), the interbedded dolomites also preserve stromatolitic forms requiring dedicated study. A large area of the proposed development extends over Clearwater Formation rocks and it is recommended that field study should document the area prior to construction to assess its sensitivity in light of the relatively low resolution geological map provided.
- Unconformably overlying the late Archaean rocks are Late Carboniferous to Early Permian Dwyka Group deposits. Underlying only a small portion of the proposed area of impact of the 132kV Alternative Route 2, Dwyka Group deposits are less sensitive owing to their generally glacial origin. Characterised by a suite of glacial till and fluvial facies, the sediments rarely preserve vertebrate fossil remains. Thin interbeds of mudstone and sandstones are attributed to interglacial periods and within these some trace fossils, occasional invertebrate and fish fossils, and plant fossils can be found (e.g., Almond 2017).

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

- Unconformably overlying all previous rocks in the area are Tertiary to Quaternary sediments of the Kalahari Group. In the area of proposed development calcretes dominate the area and are characterised by hard pan pedogenic carbonates that form as evaporates and cement a range of aeolian, alluvial (generally pan sediments) and colluvial sandstones and fine gravels (Almond & Pether, 2009). The initial sedimentation process preserves few vertebrate fossils but during calcrete formation trace fossils, fragments of fauna, including shells, and freshwater fossils can be preserved. Frequently included in calcretes of the interior of southern Africa are stone tools from Earlier and Middle Stone Age periods (e.g., Canteen Koppie; Walker et al., 2014) and a thorough Archaeological Impact Assessment is encouraged.

4.2 Palaeontological Sensitivity of the Development Area

- Large areas of the proposed development of the Sendawo PV and PV Array Layout overlie geology of significant palaeontological sensitivity. In particular, areas planned that overlie the Late Archaean Boomplaas dolomites and Clearwater Formation are sensitive for two reasons: (1) stromatolite forms are well preserved and poorly described in the academic literature but of significant importance for understanding Archaean palaeoenvrionments; and (2) the occurrence of dolomites in both formations may be associated with the formation of karst caves, which in the stratigraphically correlated Oaktree Formation of the Malmani Dolomites in the Transvaal Basin host Plio-Pleistocene hominin- and stone tool-bearing breccias.
- A central area of the proposed development also overlies Kalahari Group pedogenic carbonates (calcretised sediments) that are considered highly sensitive due to their capacity to preserve not only pedogenic trace fossils but also archaeological material.
- The proposed locations for the BESS stations lie on either Boomplaas dolomite or Clearwater Formation rocks, which are considered highly sensitive.
- Proposed routes for the 132kV powerlines overlie both Boomplaas dolomites and andesitic lavas of the Vryburg Group. Lavas of the Vryburg group are low in sensitivity.
- However, it must be noted that the geological maps provided are generally of low resolution and several of the geological units documents comprise mixed lithologies of differing sensitivity making generalisations about sensitivity in particular areas challenging. It is recommended that field assessment is performed to clarify the exact nature of the geology in the proposed development areas.

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

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Palaeontological Resources

Based on published literature and previous field assessments within the immediate area, it is considered that the impact of the development will be **HIGH**. This is based on the presence of dolomite in the Boomplaas and Clearwater dominated areas, and the research importance of that rock type and its proclivity for hosting caves. The quaternary calcrete deposits overlie the Archaean rocks in the central area of the proposed development to an unknown depth and are in themselves considered of high sensitivity due to their potential in preserving a wide range of vertebrate and invertebrate trace fossils and archaeological remains.

6. CONCLUSION AND RECOMMENDATIONS

Large areas of the proposed development are located on highly sensitive rock types (Boomplaas, Clearwater and Quaternary deposits) that may preserve important palaeontological evidence. The abundance, preservation and exposure of the palaeontological material is as yet unknown, especially in areas that have a mixture of lithologies present (e.g., Clearwater Formation).

With regards to the planned 'alternative routes' for the 132kV powerlines, both extend partially over Boomplaas dolomites there is no preferred alternative from a palaeontological perspective. The selected route should be subject to a walkdown of the final pylon footings to inspect sensitive geology for fossil material. The eastern end of the powerlines extends largely over Vryburg Formation andesitic lavas, which are of low sensitivity. Given the potential for mixed lithologies in this area, a protocol for fossil reporting by the ECO should be implemented. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented (Appendix 1).

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

7. REFERENCES

Almond, J.E. and Pether, J., 2008. Palaeontological heritage of the Northern Cape. *Interim SAHRA*.

Almond, J.E., 2017. Recording and surface sampling of Precambrian stromatolites from the Boomplaas Formation (Ghaap Group) on a portion of the Farm Waterloo 992 near Vryburg, Naledi Local Municipality, North-West Province. *SAHRIS.*

Groenewald, G.H., 2015. Palaeontological Desktop Assessment for the proposed Sendawo Solar PV. Internal Report, PGS Heritage (Pty) Ltd.

Groenewald, G.H., 2016. Proposed construction of the Sendawo Solar Photovoltaic (PV) Energy Facility near Vryburg, Northwest Province. Palaeontological Assessment Report. *SAHRIS.*

Eriksson, P.G. and Altermann, W., 1998. An overview of the geology of the Transvaal Supergroup dolomites (South Africa). *Environmental Geology*, *36*(1), pp.179-188.

Eriksson, P.G. and Reczko, B.F.F., 1995. The sedimentary and tectonic setting of the Transvaal Supergroup floor rocks to the Bushveld Complex. *Journal of African Earth Sciences*, *21*(4), pp.487-504.

Eriksson, K.A. and Truswell, J.F., 1974. Tidal flat associations from a Lower Proterozoic carbonate sequence in South Africa. *Sedimentology*, *21*(2), pp.293-309.

Eriksson, P.G., Hattingh, P.J. and Altermann, W., 1995. An overview of the geology of the Transvaal Sequence and Bushveld Complex, South Africa. *Mineralium Deposita*, *30*(2), pp.98-111.

Eriksson, P.G., Altermann, W., Hartzer, F.J., Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., 2006. The Transvaal Supergroup and its precursors. *The Geology of South Africa*, pp.237-260.

Sumner, D.Y. and Grotzinger, J.P., 2004. Implications for Neoarchaean ocean chemistry from primary carbonate mineralogy of the Campbellrand-Malmani Platform, South Africa. *Sedimentology*, *51*(6), pp.1273-1299.

Walker, S.J., Lukich, V. and Chazan, M., 2014. Kathu Townlands: a high density Earlier Stone Age locality in the interior of South Africa. *PLoS One*, *9*(7), p.e103436.

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

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
359	PIA Phase 1	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: COMBINED DESKTOP & FIELD-BASED STUDY Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naledi Local Municipality, North-West Province
382	PIA Desktop	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: DESKTOP STUDY Proposed PV Solar Facility on a portion of the farm Rosendal 673 near Vryburg, Naledi Local Municipality, North-West Province
4265	HIA Phase 1	David Morris	01/04/2014	Appendix D3 Vryburg WWTW Heritage Specialist Report
4826	Palaeontological Specialist Reports	John E Almond	30/11/2013	Proposed Tiger Skloof Photovoltaic Solar Energy Facility near Vryburg, Naledi Local Municipality, North-West Province
6471	HIA Phase 1	Johnny Van Schalkwyk	31/08/2014	BASIC HERITAGE ASSESSMENT FOR THE PROPOSED MOOKODI 132KV PHASE 2 POWER LINES DEVELOPMENT, NORTH WEST PROVINCE
9049	Palaeontological Specialist Reports	John Edward Almond		Palaentological Heritage Assessment: Combined Desktop & Field- Based Study Proposed Sonbesie Solar Plant on the Remaining Extent of the Farm Retreat 671, near Vryburg, Naledi local municipality, North-West Province
9051	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for the Development of the Proposed Khubu Solar Power Plant in the Portion 5 of the Farm CHampions Kloof 731, Vryburg Region, North West Province
9055	HIA Phase 1		31/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED PROTEA SOLAR POWER PLANT ON A PORTION OF THE FARM HARTSBOOM 734, VRYBURG REGION, NORTH WEST PROVINCE
9708	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 1 Heritage Impact Assessment**
9720	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 2 Heritage Impact Assessment**
9721	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 3 Heritage Impact Assessment**
9722	**HIA Phase 1**	**Wouter Fourie**	**19/05/2016**	**SENDAWO POWERLINE ALTERNATIVES SENDAWO PROJECTS Heritage Impact Assessment**
9730	PIA Phase 1	John Almond	07/01/2013	Palaeontological Heritage Assessment: Combined Desktop & Field-based Study Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naldi Local Municipality, North West Province

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

9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
10095	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA DELTA PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 6
10096	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA ECHO PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 67
10098	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA FOXTROT PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9053	Palaeontological Specialist Reports	John E Almond		Palaeontological Heritage Assessment: Combined Desktop & Field-Based Study Proposed Alpha Solar Power Plant on Portion 3 of Farm Middel Pan 605 near Vryburg, Naledi Local Municipality, North West Province
9054	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for The Development of the proposed Meerkat Solar Power Plant on a portion of the farm Vyflings Pan 598IN, Vryburg Region, North West Province
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
7952	AIA Phase 1B	Neels Kruger	23/09/2015	ADDITIONAL ARCHAEOLOGICAL IMPACT STUDY FOR THE PROPOSED CAROCRAFT SOLAR PARK, NALEDI LOCAL MUNICIPALITY, BOPHIRIMA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE
9050		Johnny Van Schalkwyk	29/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED GAMMA SOLAR POWER PLANT ON PORTION 4 OF THE FARM CHAMPIONS KLOOF 731, VRYBURG REGION, NORTH WEST PROVINCE
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment

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

APPENDIX 3: Heritage Screening Assessment

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS22_078**
SAHRA Case No.	**9721**
Client:	**WSP**
Date:	**March 2023**
Title:	**Proposed development of the Sendawo PV BESS and OHL near Vryburg in the North West Province**

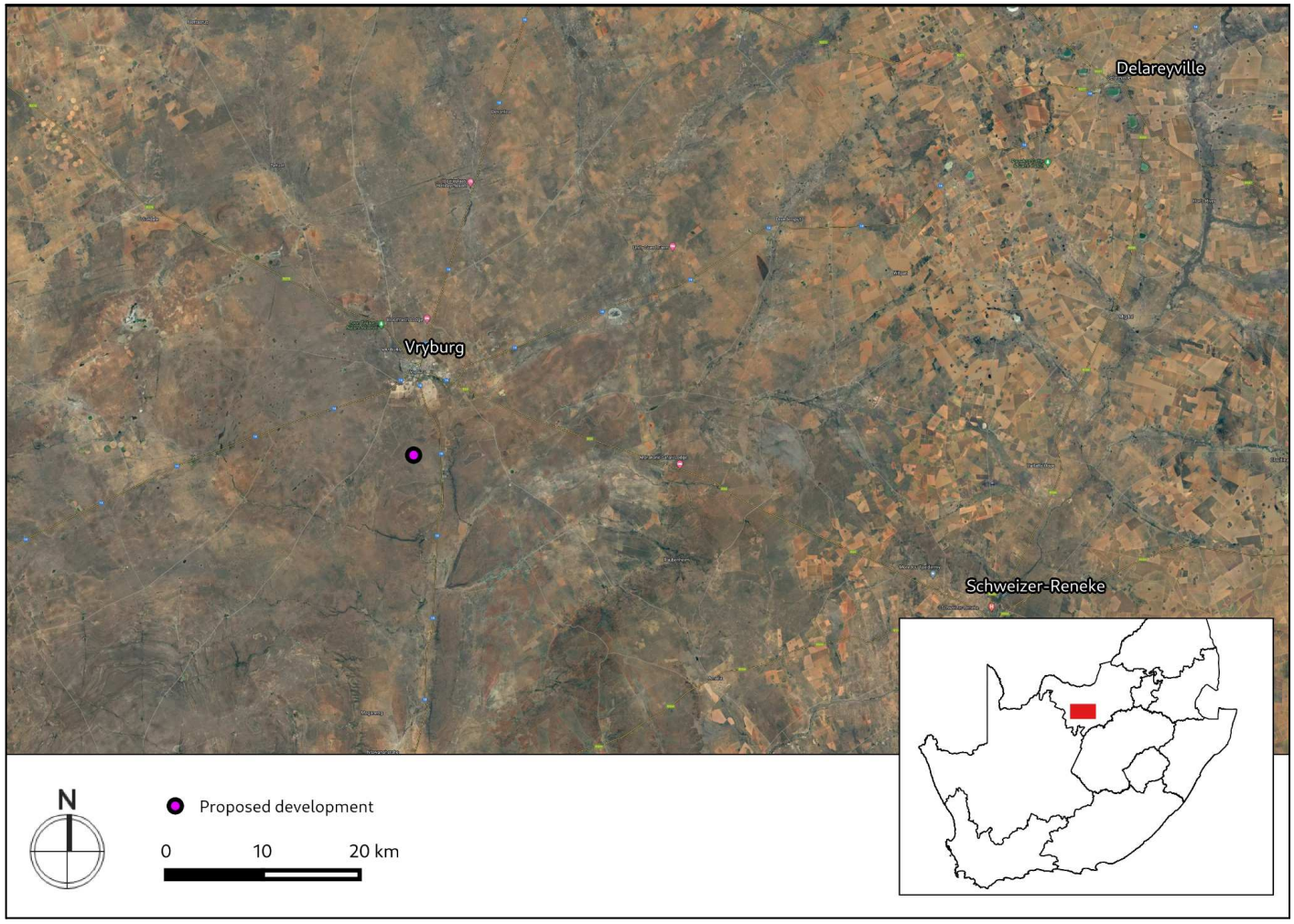


Figure 1a. Satellite map indicating the location of the proposed development in the North West Province

CTS Heritage Recommendation	**RECOMMENDATION** **Based on the information available, it is likely that the proposed grid connection corridor will impact on significant archaeological heritage and as such, it is recommended that a Heritage Impact Assessment is conducted that complies with section 38(3) of the NHRA for the proposed development with special focus on impacts to significant archaeological heritage.**

CTS HERITAGE

1. Proposed Development Summary

The proposed Sendawo BESS facility is located within the Vryburg Renewable Energy Development Zone (REDZ) 6, and the proposed 400 kV OHPL is located within the Northern Strategic Transmission Corridor. The proposed BESS facility will be located off the N18, on Portion 1 of the Farm Edinburgh No 735, approximately 5 km south of the of Vryburg in the North West Province. The Sendawo Battery Energy Storage System (BESS) project entails the construction and operation of a 150 MW/600 MWh BESS facility and associated infrastructure, at the authorised Sendawo Solar Energy Facility (SEF) Substation near Vryburg in the North West Province.

The proposed BESS comprises a number of DC Battery Enclosures, Converter Stations, associated auxiliary transformers and an HV substation. Each DC Battery Enclosure is approximately 10 x 2 x 4 m (l x b x h), and houses a number of liquid cooled Lithium-ion batteries. The enclosure is equipped with a fire detection system, and gas detection and prevention mechanism.

A typical 150MW/600MWh BESS system comprises a number of DC Battery Enclosures at a capacity of 2.81 MW. The proposed system has a 4 hour discharge time, with a usable energy of 0.7 MW, hence for a 150MW/600MWh BESS system, approximately 215 battery enclosures are required.

Each Converter Station comprises of 2 converters (~4200 kW,~1500VDC, - 690Vac) feeding into a single MV transformer (690V/(22kV-33kV)), with the dimensions of each converter measuring 3.0 x 2.0 x 2.2m. A single converter is fed from approximately 7 Battery Enclosures.

The BESS is supplied by a number of outdoor auxiliary transformers ((22kV-33kV)/(220-380V)) to provide auxiliary power to the plant. The MV transformers feed the HV substation which steps the voltage from 22kV to 66kV through one or more HV transformers, in the HV substation connecting to the Eskom grid.

The onsite HV substation will be constructed with a maximum footprint of approximately 56 800 m^2 and encloses the 22kV/66kV HV power transformer. A lightning mast with a maximum height of 24m, tower sections, earthing switches, circuit breakers, surge arrestors, busbars and other miscellaneous substation equipment, including a substation building containing MV switchgear, control and protection equipment will also form part of the onsite substation.

The proposed OHPL is a 400 kV single or double steel structure with a kingbird conductor. The powerline will be supported by powerline towers which may be steel lattice (518 H and 518 C) or monopole structures, both options will have a maximum height of 28 m.

2. Application References

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

3. Property Information

Latitude / Longitude	BESS 1: 27° 2'9.44"S, 24°43'32.37"E

	BESS 2: 27° 2'40.10"S, 24°42'43.39"E
Erf number / Farm number	Portion 1 of the Farm Edinburgh No 735
Local Municipality	Naledi Local Municipality
District Municipality	Dr Ruth Segomotsi Mompati District Municipality
Current Zoning	Grazing land (Still to be rezoned)

4. Nature of the Proposed Development

Total Area	5ha for the BESS and a 4.6km grid servitude
Depth of excavation (m)	<3m
Height of development (m)	Main equipment: Up to 4 m Light poles: maximum height 4.8 m Lightning mast at the Sendawo substation: 20m Powerline towers: Up to 28 m high.

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

For the BESS:

- Approx. 6 m wide access road to BESS (6m wide road surface with 1m drainage on each side of the road), internal roads also up to 6 m wide;
- MV cabling (underground/overhead);
- Fencing around the BESS;
- Temporary laydown area within the BESS footprint;
- Possible firebreak located within the footprint;
- Water supply;

For the grid, existing road infrastructure will be used as far as possible to provide access for construction vehicles during the construction of the line. Thereafter, the roads are used for inspection and maintenance purposes. Where appropriate roads may be upgraded to access transmission lines and substations.

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

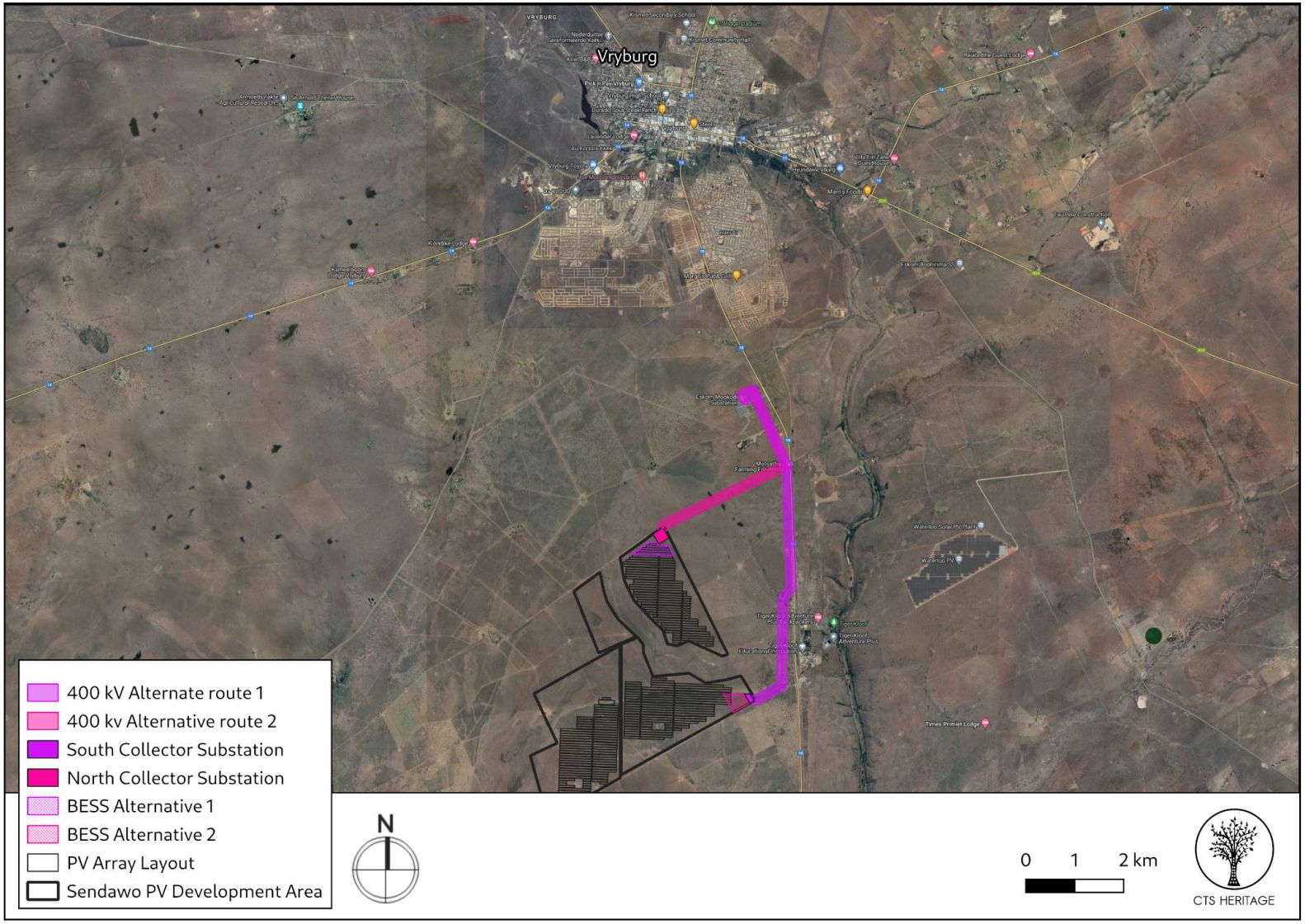


Figure 1b. Overview Map. Satellite image (2022) indicating the proposed development area relative to Vryburg

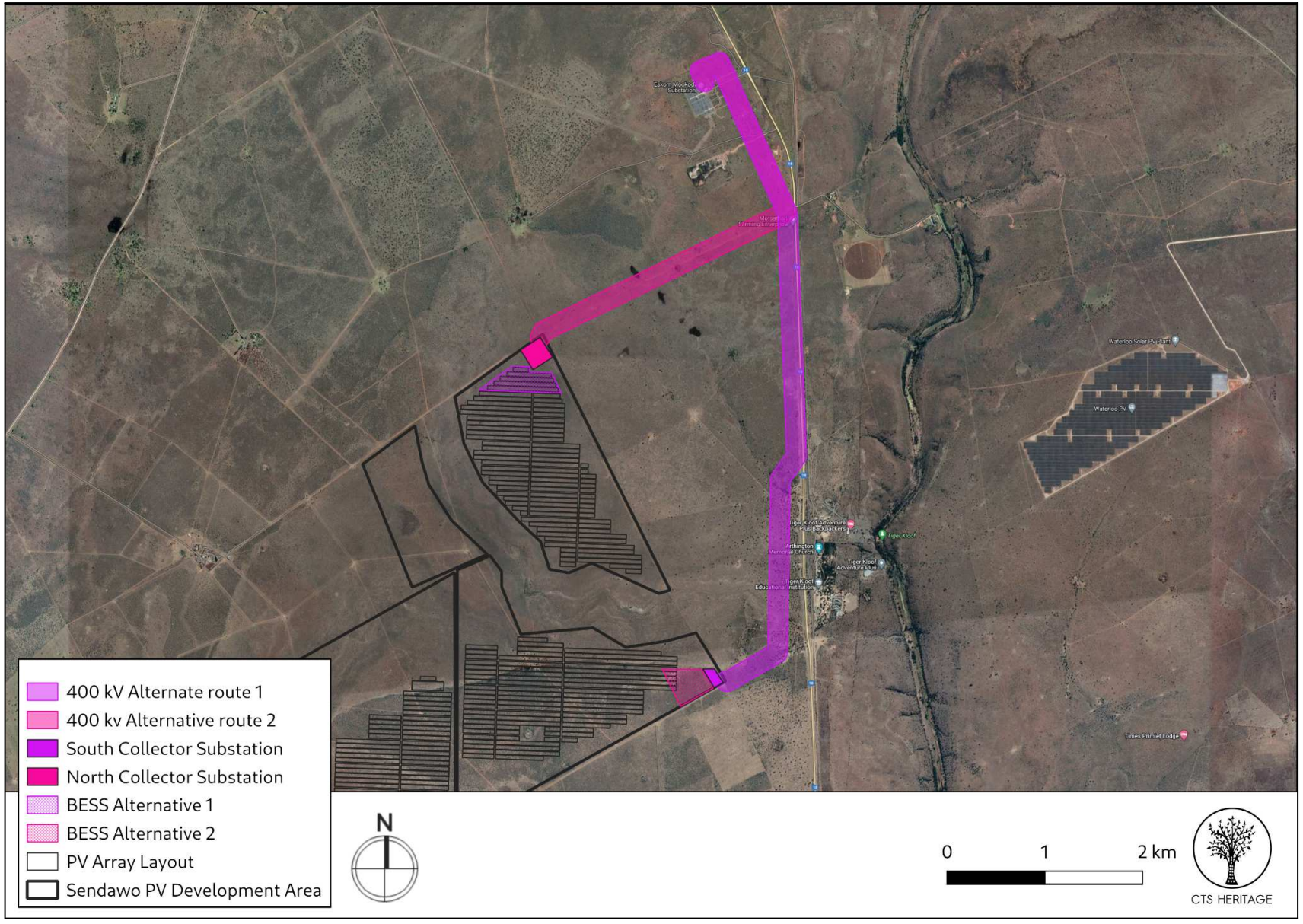


Figure 1c. Overview Map. Satellite image (2022) indicating the proposed development area in the North West Province

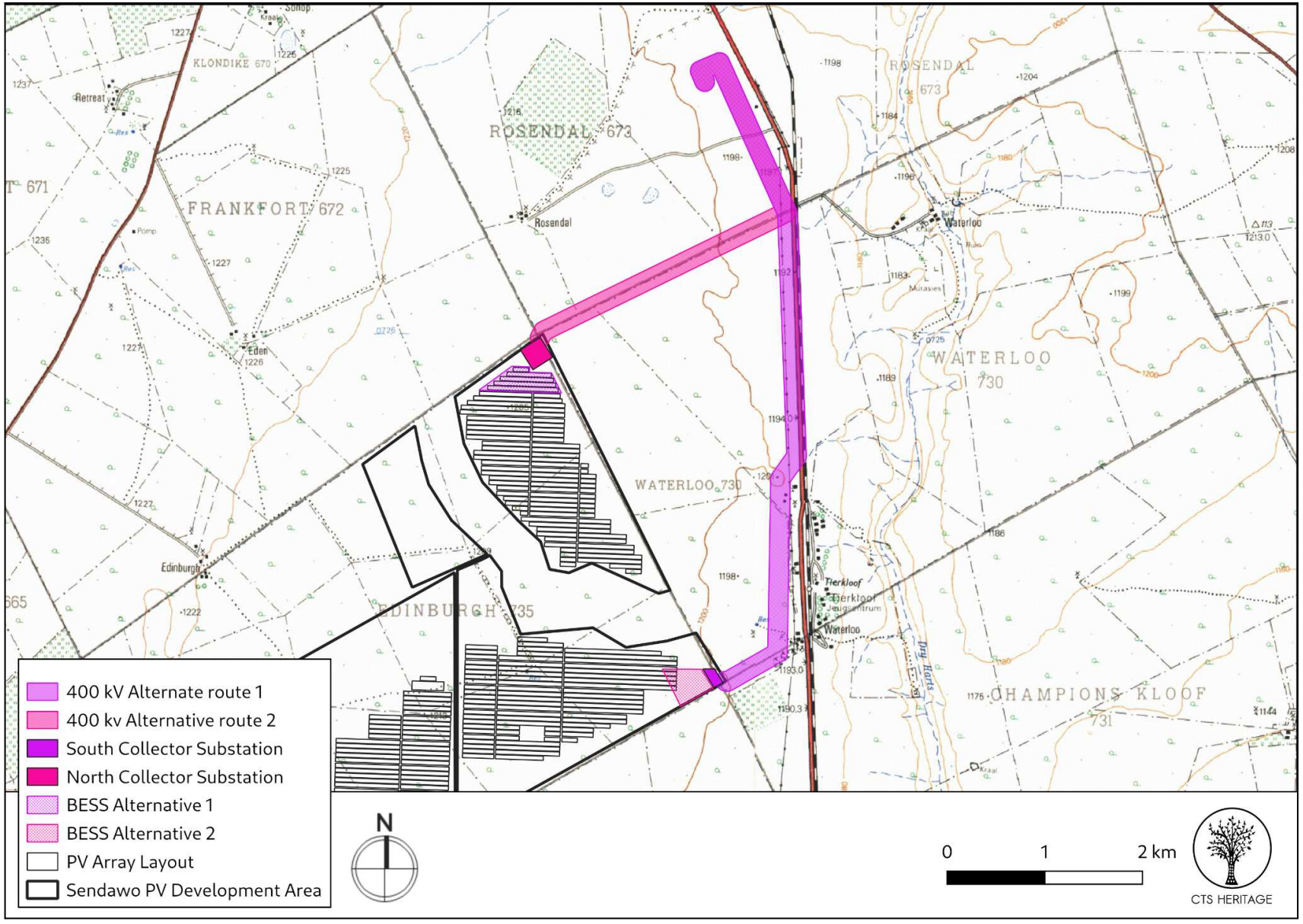


Figure 1d. Overview Map. Extract from the 1:50 000 Topo map indicating the proposed development area

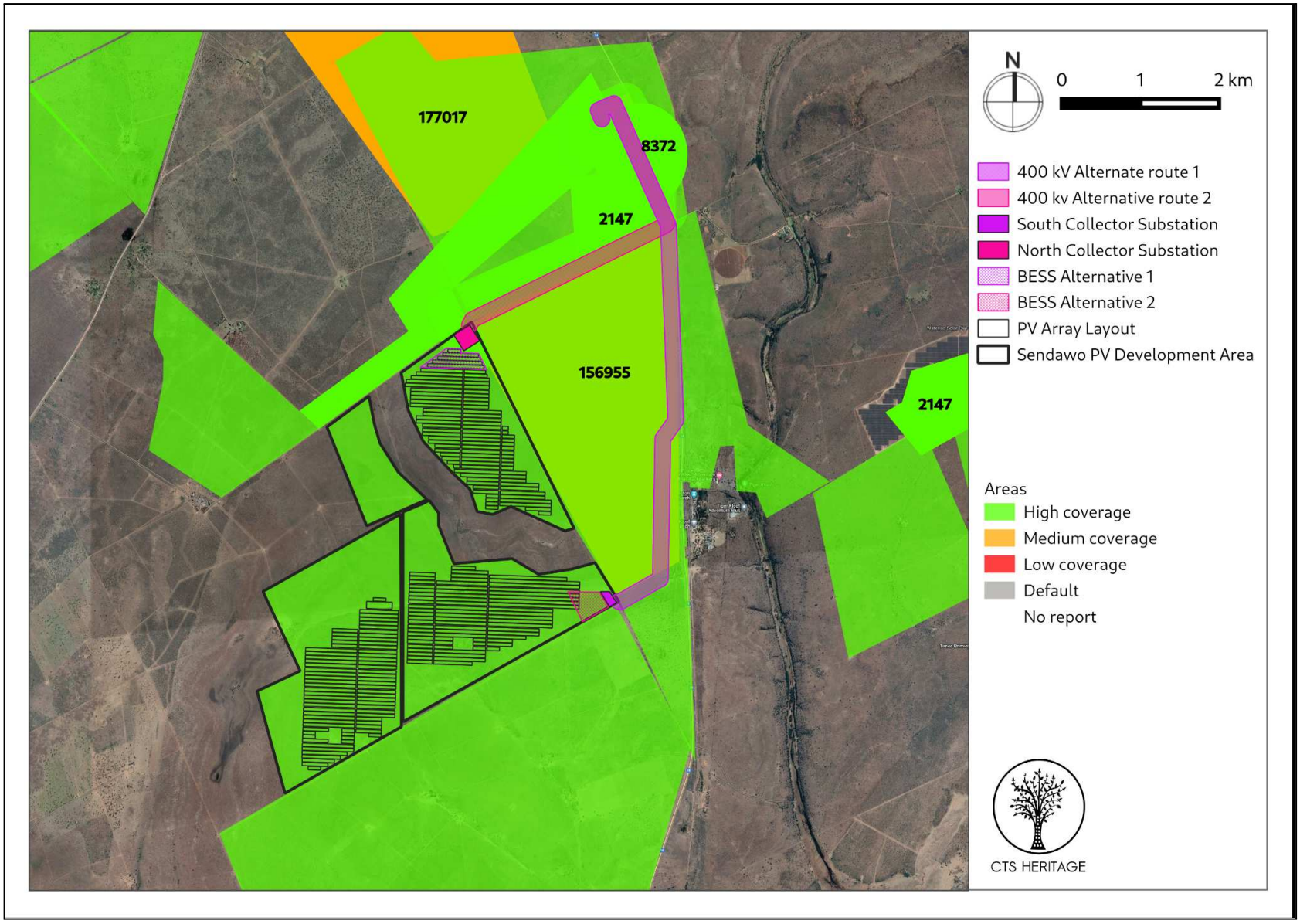


Figure 2a. Previous HIAs Map. Previous Heritage Impact Assessments covering the proposed development area with SAHRIS NIDS indicated. Please see Appendix 2 for a full reference list.

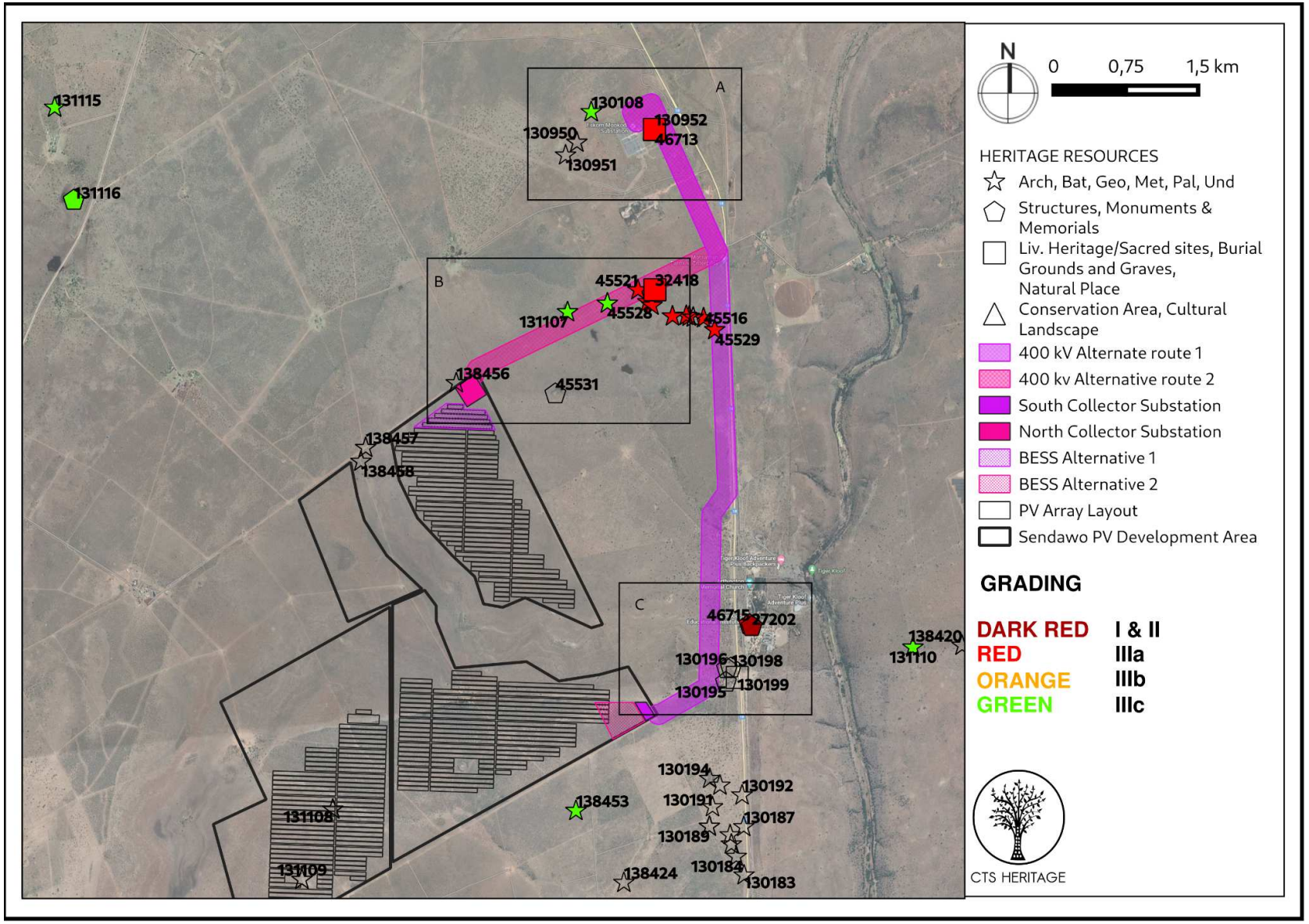


Figure 3. Heritage Resources Map. Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below. Please See Appendix 4 for a full description of heritage resource types.

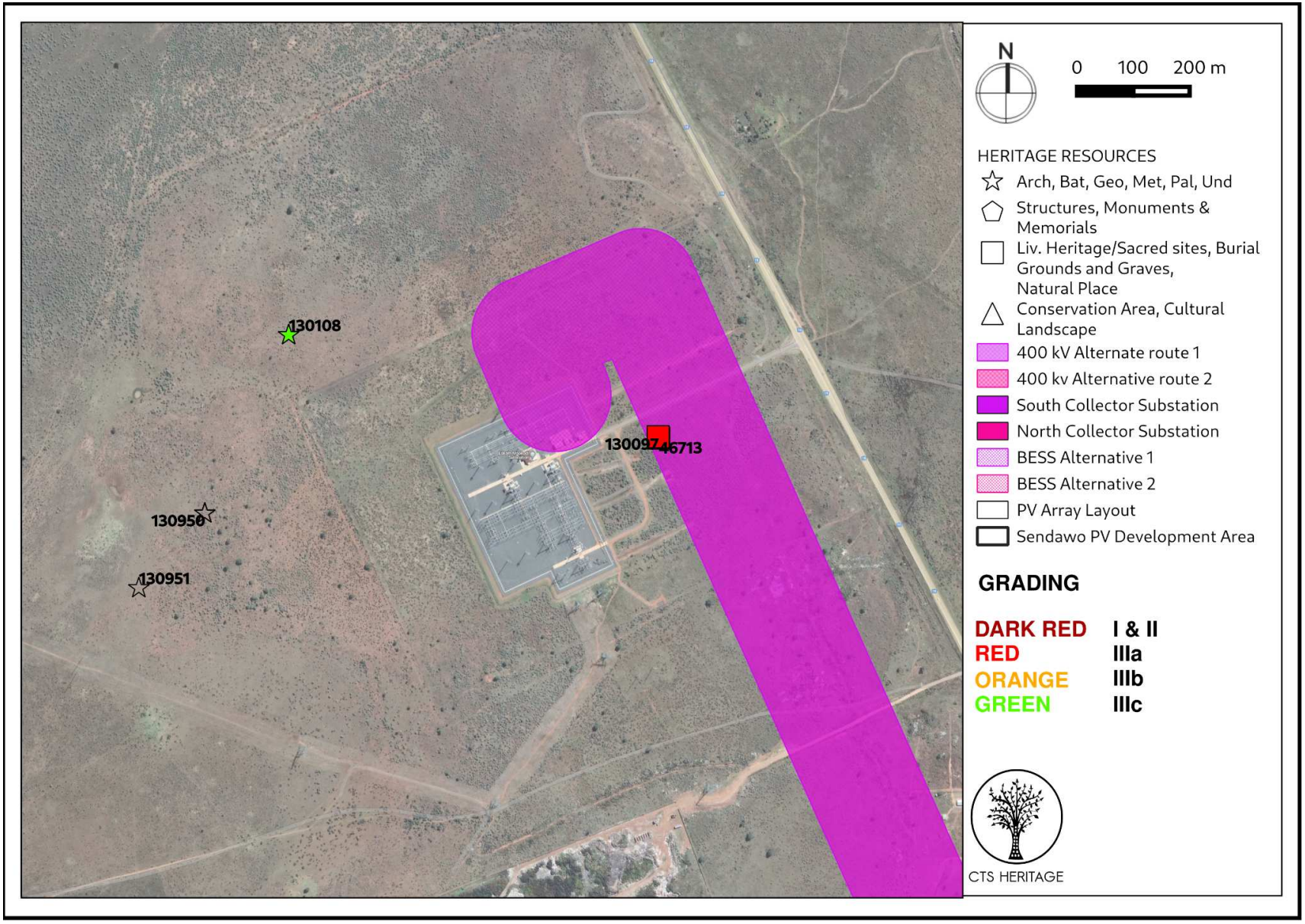


Figure 3a. Heritage Resources Map. Heritage Resources inset A

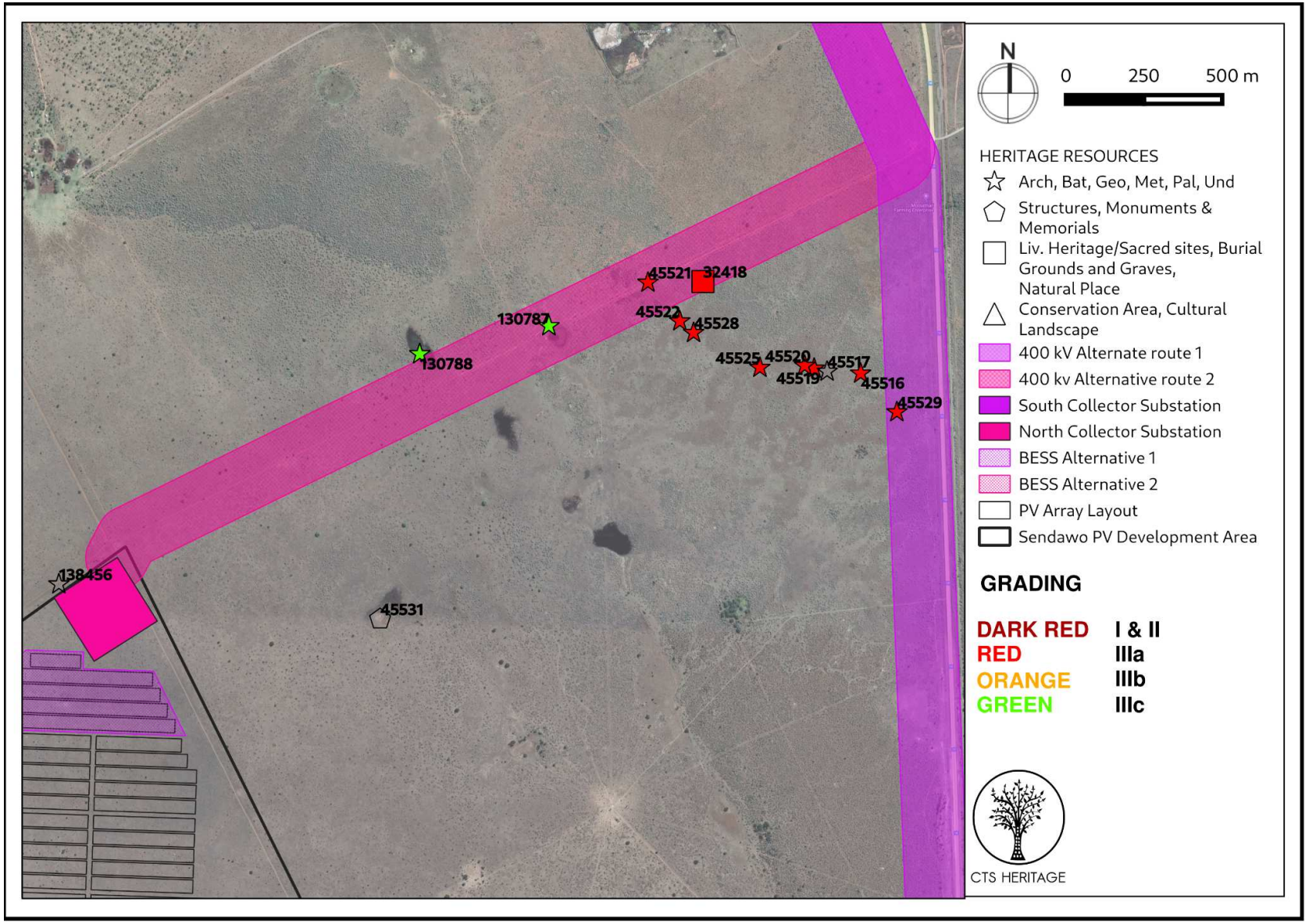


Figure 3b. Heritage Resources Map. Heritage Resource inset B

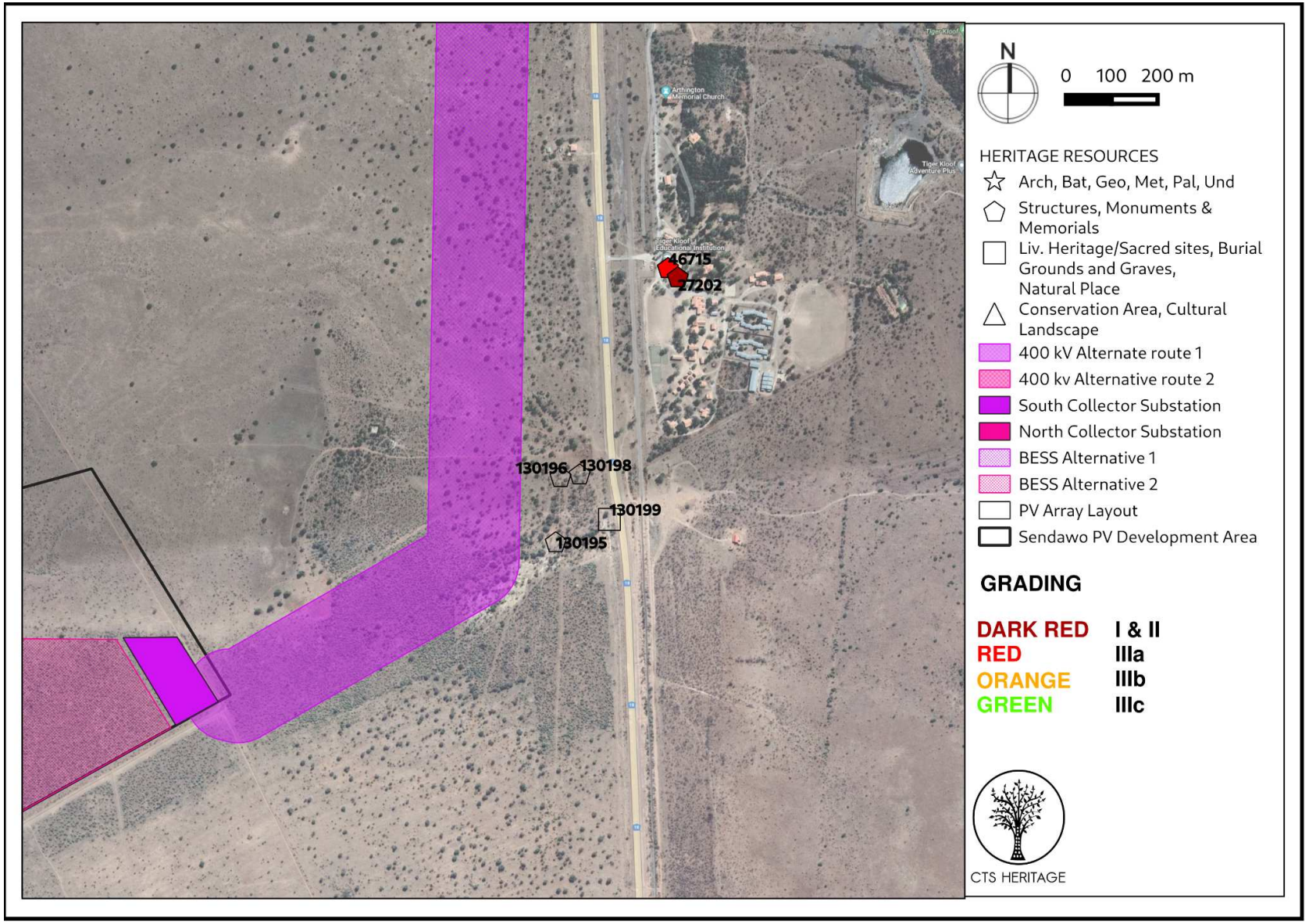


Figure 3c. Heritage Resources Map. Heritage Resource inset C

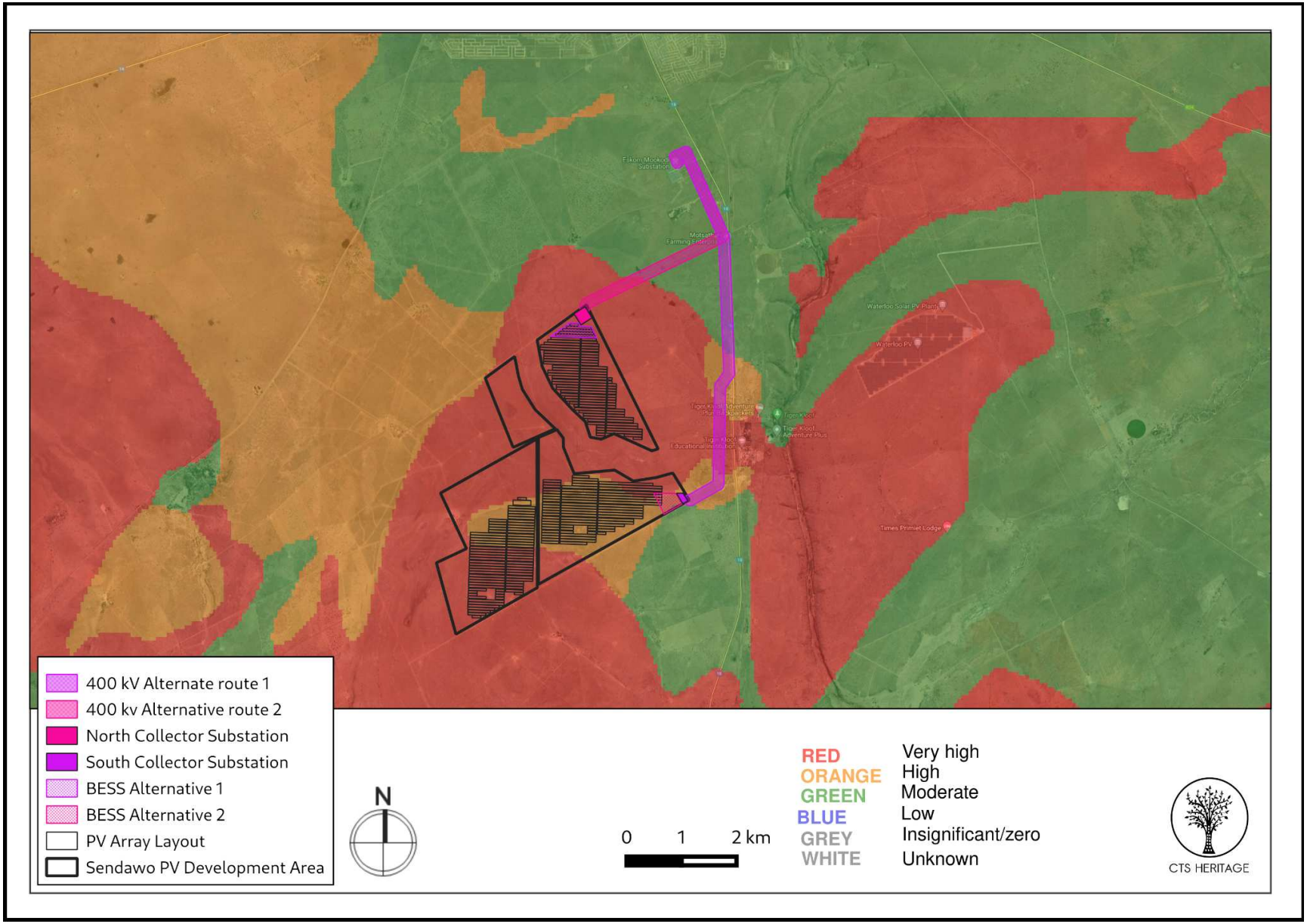


Figure 4a. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area. Please See Appendix 3 for a full guide to the legend.

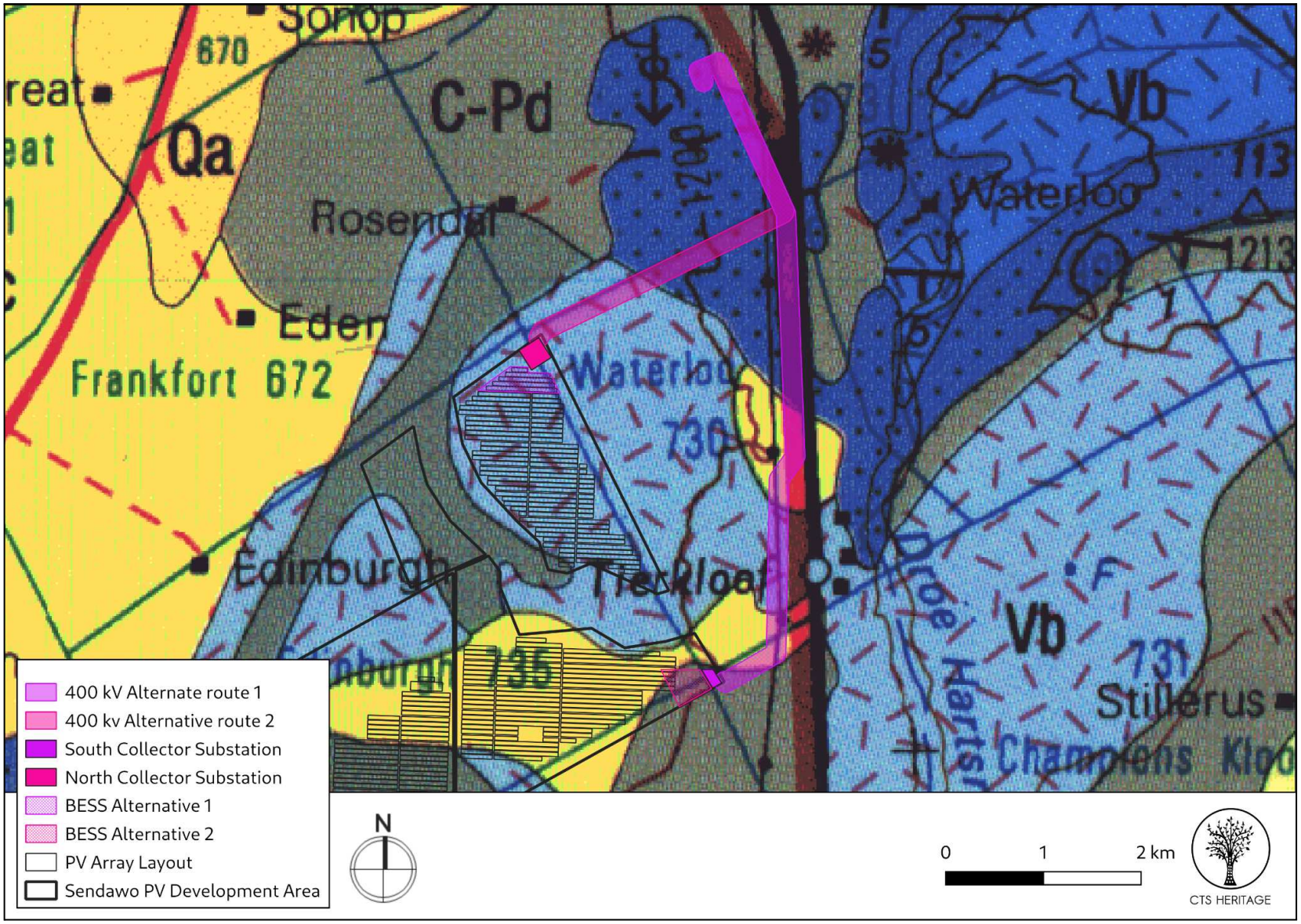


Figure 4b. Geology Map. Extract from the CGS 2724 Christiana Map indicating that the development area for the BESS and OHL alternatives is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc), Clearwater Formation (Vc), Boomplaas Formation (Vb) and Vryburg Formation (Vv) of the Ghaap Group

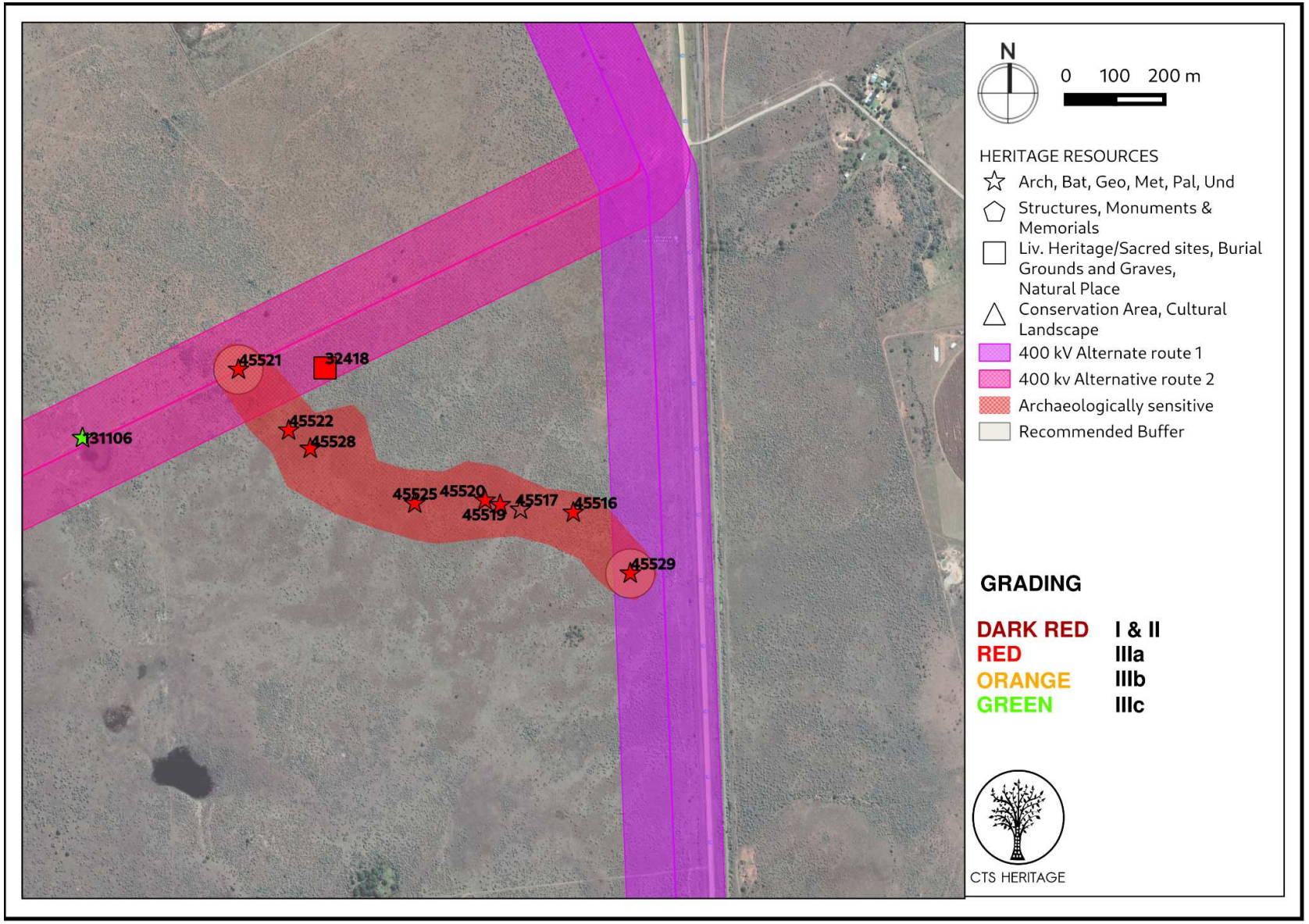


Figure 5. Heritage Resources Map. Heritage Resources with recommended mitigation measures

8. Desktop Heritage Assessment

Background

This report is drafted for the proposed construction and operation of a Battery Energy Storage (BESS) and a grid connection for the authorised Sendawo Solar Energy Facility. The BESS which will have an extent of no more than 5ha will be developed within the authorised development footprint of the Sendawo PV facility. Two options are proposed for the area proposed for the BESS development, both are located within the area previously assessed for the Sendawo PV facility. This area was thoroughly assessed for impacts to heritage resources in the Heritage Impact Assessment conducted by Fourie (2016, SAHRIS NID 9721). The HIA by Fourie (2016) and an HIA completed by Van Schalkwyk (2018) for an adjacent property is referred to below.

Archaeology and Built Environment Heritage

Vryburg town was established in 1882 as the capital town of the independent Boer Republic of Stellaland. During its short history, the small state became a focal point for conflict between the British Empire and the South African Republic, the two major players vying for control of the territory. After a series of claims and annexations, British fears of Boer expansionism led to its demise and, among other factors, set the stage for the Second Boer War. Before the proclamation of the republic, the area was under the control of competing Korana and Tswana groups, while the United Kingdom laid claim to it as a part of the emerging protectorate of British Bechuanaland. Two of the indigenous groups were under the leadership of chiefs Mankoroane and Montšioa, whom the British regarded as "friendly," and two others under the leadership of chiefs Moshette (a Motswana) and Massouw (a Korana). When a feud erupted between Mankoroane and another chief, each side resorted to recruiting volunteers, promising them land in return for their assistance. After a settlement was negotiated with mediation from the Transvaal Republic, large portions of Mankoroane's land were given to Boer mercenaries who had fought on his adversary's side, and the new inhabitants decided to declare independence and establish the Republic of Stellaland. During the Second Boer War, a concentration camp was established at Vryburg, however this concentration camp is located north of Vryburg town and is therefore located sufficiently far from the area proposed for development that no impact is anticipated.

According to van Schalkwyk et al (2018, SAHRIS NID 510838) "Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over." Van Schalkwyk (2018, SAHRIS NID 510838) notes that Later Stone Age artefacts and rock art are also known from the area. Iron Age people started to settle in the area in the 1500s. According to Van Schalkwyk (2018, SAHRIS NID 510838), "By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province." including the proposed development area. "The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959)."

Despite the overall archaeological sensitivity of the broader landscape, the archaeological survey conducted by Fourie (2016) identified limited heritage resources of value within the areas proposed for the BESS facilities. Fourie (2016) notes that "The find spots in the larger study area varied from Later Stone Age (LSA) scatters consisting of flakes, chips and some cores manufactured from fine-grained quartzite, chalcedony, and cryptocrystalline (ccs) material; Middle Stones Age (MSA) lithics consisting of cores, chips and flakes with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Earlier Stone Age (ESA) lithics found at some of these finds spots consisted of a hand axe, cleavers and large flakes. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. No heritage resources related to archaeology or the more recent history was identified in the footprint area of Solar 3" (The proposed BESS locations are within Sendawo Solar Area 3).

The field assessment for the Sendawo Grid connection assessed a corridor that includes the alternatives considered in this report. Two archaeological sites of significance were identified by Fourie (2016) in his assessment. These sites, as well as others that occur within the grid corridor are detailed in the table below:

Site ID	Site Name	Corridor	Description	Grading	Mitigation
45521	WATER05	Alt 2	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of high concentration 22-m² of MSA and LSA tools from CCS and Quartzite.	IIIA	Buffer of 50m recommended - See Figure 5
45529	WATER09	Alt 1	The site consists of a low ridge in the eastern portion of the study area that crosses the study area roughly from the north to the south and south east. The entire ridge is covered in MSA and LSA artefacts where the locally available CCS is exploited. The MSA component is characterised by a high frequency of blades. From casual observation it seems as if a higher frequency of concentration of artefacts are found on the eastern side of the ridge where there is a clear view to the Dry Harts River roughly more than 2km to the east. Where higher artefact concentrations or where a clear edge to a concentration could be determined within the ridge these were recorded as Site 1 A to Site 1 I. These concentrations are how ever seen as part of one knapping site (Site 1) where there is a high ratio of artefacts to cores. This site consists of Artefact count 13-m². LSA dominates with some MSA. Raw material on CCS and quartzite.	IIIA	Buffer of 50m recommended - See Figure 5
32418	Exhumation of graves at Eskom Mookodi Substation1	Alt 2 (although likely to have been mapped incorrectly)	Permit granted in 2014 to remove the graves at this site to a new location: PGS Heritage was appointed by Eskom Holdings SOC Limited, to effect the relocation of 6 graves located within the Eskom Mookodi substation area. The graves are located next to the substation High Voltage yard and have been fenced off. The graves need to be relocated as the expansion of the substation necessitates their relocation after alternatives for their preservation that were investigated were not viable. Based on this description, this site is likely the same as Sites 46713, 130097 and 130952 but mapped incorrectly	IIIA	NA
138456	SDNP004	Alt 2	Shallow sandy soils on shale and quartzites with minor dolomite. No heritage significance	NCW	NA
131106	SDG001	Alt 2	Low density scatter of MSA lithics over an area of approximately 50 m2. The site is	IIIC	Implement walk down of final alignment on power

			characterised by a large pebble concentration within a dry pan. Same location as Site 130787 Low density scatter of MSA lithics over an area of approximately 50 m2. The site is characterised by a large pebble concentration within a dry pan. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was kept in mind with the development of the mitigation recommendations.		line alignment
131107	SDG002	Alt 2	Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. Same location as Site 130788: Low density scatter of MSA and ESA material The site is characterised by the typical Savanna Biome and more specifically in the Ghaap Plateau Vaalbosveld Group the size of the site is about 130 m2. The sites varied from Middle Stone Age (MSA) scatters consisting of flakes and some cores manufactured from coarse-grained quartzite material; Early Stones Age (ESA) lithics consisting of cores and a hand axe with a low occurrence of formal tools. The majority of the material utilised were either lideanite that occur in the form of medium sized boulders or round washed pebbles in the area or coarse-grained quartzite that occur as sporadic outcrops. Most of the lithics were either rolled or heavily weathered with patination evident on many of the lithics. Find spots V07 and V08 have a low significance, however the possibility of subsurface deposits cannot be discounted and was kept in mind with the development of the mitigation recommendations.	IIIC	Implement walk down of final alignment on power line alignment
130952	VBS003	Both	Originally some graves occurred in this area. They were very old and only marked with low stone cairns. As they were located next to the laydown area for the construction of the substation, they were fenced off. They could not be located during the site visit (possibly due to incorrect coordinates). It is also possible that they were relocated during the construction activities. Same location as Site 46713 and 130097	IIIA	All cemeteries should have a buffer of at least 20 metres from the outermost graves. Fortunately, many cemeteries are fenced off, which can then be used as a buffer. Likely already exhumed

Palaeontology

According to the SAHRIS Palaeosensitivity Map, the area proposed for the BESS development is underlain by sediments of high palaeontological sensitivity (Figure 4a). According to the extract from the CGS 2724 Christiana Ma, the development area for the Sendawo PV Facility as well as the development area for the BESS is underlain by Tertiary calcrete and Quaternary alluvium, sand and soils (T-Qc) (Figure 4b). The palaeontological impacts associated with the development of the Sendawo solar facilities was assessed by Groenewald

(2016). According to Groenewald (2016), the area proposed for the BESS development is underlain by Stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group (Kameeldorns, Rietgat and Bothaville Formations) as well as the lower part of the Transvaal Supergroup (Ghaap Group, Vryburg Formation & Schmidtsdrift Subgroup, including the Boomplaas Formation). In the Vryburg area and further south towards Taung these include some of the oldest (> 2.5 billion years) and best-preserved stromatolites (fossil microbial mounds) known from this period; Stromatolites are recorded from the dolomite layers. Highly fossiliferous Caenozoic cave breccias are also known to occur within the dolomite layers, but are not mapped individually. These fossiliferous deposits often contain more recent mammal and hominid fossils, e.g. in the Cradle of Humankind.

In his palaeontological assessment, Groenewald (2016) notes that “A small part of the study area is characterised by the presence of significant Stromatolites and that stromatolites are present in almost all the dolomite boulders on site. Some areas have possible remains of cave breccia but no in situ outcrops were recorded.” The significant palaeontological observations noted by Groenewald (2016) are all located towards the south of the Sendawo PV 3 area and are located well away from the proposed BESS locations. As such, although no palaeontological resources were identified within the area proposed for the BESS development during the field assessment, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites may be impacted. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

Cumulative Impacts

The proposed BESS development will form part of the infrastructure required for the Sendawo solar development and is located in close proximity to the substation and operations and maintenance facilities associated with the Sendawo solar development. Furthermore, the proposed BESS is located within an already approved solar facility development footprint which is also located within a belt of approved renewable energy facilities (Figure 5). In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The construction of the proposed BESS is therefore unlikely to result in unacceptable risk or loss, nor will the proposed BESS development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact. No additional cumulative impacts have been identified in addition to those already covered in the EIA.

Conclusion

There is no objection to the proposed development of Sendawo PV BESS and grid connection on heritage grounds and no monitoring protocols are recommended. There are no disadvantages or advantages associated with the proposed amendment from a heritage perspective on condition that the mitigation measures included in the Table above are implemented. It should be noted that, although there were no other archaeological or heritage resources identified during the survey conducted for the already approved solar facility; some archaeological material, including artefacts and graves can be buried underground and as such, may not have been identified during the initial survey and site visits. In the case where the proposed development activities bring these materials to the surface, work must cease and SAHRA must be contacted immediately to determine a way forward. The following findings have been made:

- No archaeological resources were identified in the project area identified for the development of the BESS.
- Archaeological resources of significance are known from the grid corridors. These significant resources must be avoided as per the table above.
- No graves or burial grounds were identified in the project area identified for the development of the BESS. However, graves are subterranean in nature and might not have been identified during the initial site visit and survey.
- There are no preferred alternatives for the BESS location from a heritage perspective
- Alternative 1 is preferred for the grid connection from an archaeological perspective due to the possible impacts archaeological heritage
- Based on the known palaeontological sensitivity of the area, it remains likely that significant palaeontological heritage in the form of Tertiary-aged fossils or stromatolites will be impacted by the development. As such, the attached Palaeontological Chance Finds Procedure must be implemented for the duration of excavations activities.

- If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.

RECOMMENDATION

Based on the information available, it is not likely that the proposed BESS and grid connection development will impact on significant heritage resources and as such, it is recommended that no further heritage assessments are required on condition that Alternative 1 is preferred for the grid connection and the recommendations included in the table above are implemented.

CTS HERITAGE

APPENDIX 1

List of heritage resources within the development area

Site ID	Site no	Full Site Name	Site Type	Grading
27202	9/2/103/0003	Tiger Kloof, Waterloo 730, District Vryburg	Structures	Grade II
45516	WATER01	Waterloo 730 -01	Artefacts	Grade IIIa
45519	WATER03	Waterloo 730 -03	Artefacts	Grade IIIa
45520	WATER04	Waterloo 730 -04	Artefacts	Grade IIIa
45521	WATER05	Waterloo 730 -05	Artefacts	Grade IIIa
45522	WATER06	Waterloo 730 -06	Artefacts	Grade IIIa
45525	WATER08	Waterloo 730 -08	Artefacts	Grade IIIa
45528	WATER07	Waterloo 730 -07	Artefacts	Grade IIIa
45529	WATER09	Waterloo 730 -09	Artefacts	Grade IIIa
32418	Exhumation of graves at Eskom Mookodi Substation1	Exhumation of graves at Eskom Mookodi Substation	Burial Grounds & Graves	Grade IIIa
46715	MOOK010	Mookodi 010	Building	Grade IIIa
46713	MOOK008	Mookodi 008	Burial Grounds & Graves	Grade IIIa
45531	WATER10	Waterloo 730 -10	Structures	
45517	WATER02	Waterloo 730 -02	Artefacts	
138424	PT-001	PROTEA	Artefacts	Grade IV
138453	HTM-001	HARTSBOOM 734	Artefacts	Grade IIIc

138455	SDNP003	Sendawo PV	Geological	
138456	SDNP004	Sendawo PV	Artefacts	
138457	SDNP005	Sendawo PV	Artefacts	
138458	SDNP006	Sendawo PV	Geological	
130096	2724BA/ Solar/ Farm Rosendal 673/ Site 1	Stone Age factory site	Archaeological	Grade IV
130097	2724BA/ Solar/ Farm Rosendal 673/ Site 2	Burial site	Burial Grounds & Graves	Grade IV
130724	2724DB/ Solar/ Farm Frankfort No 672/ Site V02	Low density scatter	Archaeological	Grade IV
130726	2724DB/ Solar/ Farm Frankfort No 672/ Site V03	Low density scatter	Archaeological	Grade IV
130108	2724BA/ Solar/ Farm Rosendal 673/ Site 2	Archaeological site	Archaeological	Grade IIIc
130183	2724BA/ Solar/ Farm Waterloo 730/ Site 001	Archaeological site	Archaeological	Grade IV
130184	2724BA/ Solar/ Farm Waterloo 730/ Site 002	Archaeological site	Archaeological	Grade IV
130185	2724BA/ Solar/ Farm Waterloo 730/ Site 003	Archaeological site	Archaeological	Grade IV
130186	2724BA/ Solar/ Farm Waterloo 730/ Site 004	Archaeological site	Archaeological	Grade IV
130187	2724BA/ Solar/ Farm Waterloo 730/ Site 005	Archaeological site	Archaeological	Grade IV
130188	2724BA/ Solar/ Farm Waterloo	Arhaeological site	Archaeological	

	730/ Site 006			
130189	2724BA/ Solar/ Farm Waterloo 730/ Site 006	Arhaeological site	Archaeological	Grade IV
130191	2724BA/ Solar/ Farm Waterloo 730/ Site 007	Archaeological site	Archaeological	Grade IV
130787	2724DB/ Solar/ Farm Frankfort No 672/ Site V07	Low density scatter	Archaeological	Grade IIIc
130192	2724BA/ Solar/ Farm Waterloo 730/ Site 009	Archaeological site	Archaeological	Grade IV
130788	2724DB/ Solar/ Farm Frankfort No 672/ Site V08	Low density scatter	Archaeological	Grade IIIc
130193	2724BA/ Solar/ Farm Waterloo 730/ Site 011	Archaeological site	Archaeological	Grade IV
130194	2724BA/ Solar/ Farm Waterloo 730/ Site 014	Archaeological site	Archaeological	Grade IV
130195	2724BA/ Solar/ Farm Waterloo 730/ Site 018	Building	Structures	Grade IV
130196	2724BA/ Solar/ Farm Waterloo 730/ Site 019	Building	Structures	Grade IV
130198	2724BA/ Solar/ Farm Waterloo 730/ Site 020	Homestead	Structures	Grade IV
130199	2724BA/ Solar/ Farm Waterloo 730/ Site 021	Grave yard	Burial Grounds & Graves	Grade IV
131106	SDG001	Sendawo Grid	Artefacts	Grade IIIc
131107	SDG002	Sendawo Grid	Artefacts	Grade IIIc

131108	SDNP001	Sendawo PV 2	Artefacts	Grade IV
131109	SDNP002	Sendawo PV 2	Artefacts	Grade IV
130950	VBS001	VRYBURG SOLAR	Artefacts	Grade IV
130951	VBS002	VRYBURG SOLAR	Artefacts	Grade IV
130952	VBS003	VRYBURG SOLAR	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**
359	PIA Phase 1	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: COMBINED DESKTOP & FIELD-BASED STUDY Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naledi Local Municipality, North-West Province
382	PIA Desktop	John E Almond	01/01/2013	PALAEONTOLOGICAL HERITAGE ASSESSMENT: DESKTOP STUDY Proposed PV Solar Facility on a portion of the farm Rosendal 673 near Vryburg, Naledi Local Municipality, North-West Province
4265	HIA Phase 1	David Morris	01/04/2014	Appendix D3 Vryburg WWTW Heritage Specialist Report
4826	Palaeontological Specialist Reports	John E Almond	30/11/2013	Proposed Tiger Skloof Photovoltaic Solar Energy Facility near Vryburg, Naledi Local Municipality, North-West Province
6471	HIA Phase 1	Johnny Van Schalkwyk	31/08/2014	BASIC HERITAGE ASSESSMENT FOR THE PROPOSED MOOKODI 132KV PHASE 2 POWER LINES DEVELOPMENT, NORTH WEST PROVINCE
9049	Palaeontological Specialist Reports	John Edward Almond		Palaentological Heritage Assessment: Combined Desktop & Field- Based Study Proposed Sonbesie Solar Plant on the Remaining Extent of the Farm Retreat 671, near Vryburg, Naledi local municipality, North-West Province
9051	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for the Development of the Proposed Khubu Solar Power Plant in the Portion 5 of the Farm CHampions Kloof 731, Vryburg Region, North West Province
9055	HIA Phase 1		31/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED PROTEA SOLAR POWER PLANT ON A PORTION OF THE FARM HARTSBOOM 734, VRYBURG REGION, NORTH WEST PROVINCE
9708	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 1**

				Heritage Impact Assessment
9720	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 2 Heritage Impact Assessment**
9721	**HIA Phase 1**	**Wouter Fourie**	**26/05/2016**	**75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY SENDAWO SOLAR 3 Heritage Impact Assessment**
9722	**HIA Phase 1**	**Wouter Fourie**	**19/05/2016**	**SENDAWO POWERLINE ALTERNATIVES SENDAWO PROJECTS Heritage Impact Assessment**
9730	PIA Phase 1	John Almond	07/01/2013	Palaeontological Heritage Assessment: Combined Desktop & Field-based Study Proposed PV Solar Facility on a portion of the farm Waterloo 992 near Vryburg, Naldi Local Municipality, North West Province
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
10095	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA DELTA PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 6
10096	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA ECHO PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 67
10098	HIA Phase 1	Stefan de Kock	15/09/2016	PROPOSED DEVELOPMENT OF THE AMDA FOXTROT PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment

9053	Palaeontological Specialist Reports	John E Almond		Palaeontological Heritage Assessment: Combined Desktop & Field-Based Study Proposed Alpha Solar Power Plant on Portion 3 of Farm Middel Pan 605 near Vryburg, Naledi Local Municipality, North West Province
9054	HIA Phase 1	Johnny Van Schalkwyk		Cultural heritage Impact assessment for The Development of the proposed Meerkat Solar Power Plant on a portion of the farm Vyflings Pan 598IN, Vryburg Region, North West Province
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment
9755	AIA Phase 1	Lloyd Rossouw	04/11/2016	Phase 1 Archaeological Impact Assessment of two borrow pit areas on Farm 506IN near Vryburg, Northwest Province.
7952	AIA Phase 1B	Neels Kruger	23/09/2015	ADDITIONAL ARCHAEOLOGICAL IMPACT STUDY FOR THE PROPOSED CAROCRAFT SOLAR PARK, NALEDI LOCAL MUNICIPALITY, BOPHIRIMA DISTRICT MUNICIPALITY, NORTH WEST PROVINCE
9050		Johnny Van Schalkwyk	29/01/2016	Cultural heritage impact assessment for THE DEVELOPMENT OF THE PROPOSED GAMMA SOLAR POWER PLANT ON PORTION 4 OF THE FARM CHAMPIONS KLOOF 731, VRYBURG REGION, NORTH WEST PROVINCE
1714	HIA Phase 1	Johnny Van Schalkwyk	06/03/2013	Mookodi Integration Project Phase 2 - Heritage Report - Basic Assessment

CTS HERITAGE

APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

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

Full guide to Palaeosensitivity Map legend

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

CTS HERITAGE

APPENDIX 4 - Methodology

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

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

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

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

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

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

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

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

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

DETERMINATION OF THE PALAEONTOLOGICAL SENSITIVITY

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

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

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

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

Low coverage will be used for:

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

Medium coverage will be used for

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

High coverage will be used for

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

RECOMMENDATION GUIDE

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

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

This recommendation is made when:

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

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

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

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

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

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

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

APPENDIX 5 -Summary of Specialist Expertise

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

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

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

APPENDIX 4: Chance Fossil Finds Procedure

CTS HERITAGE

CHANCE FINDS OF PALAEONTOLOGICAL MATERIAL

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

Introduction

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

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

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

Training

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

Actions to be taken

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

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

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

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

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

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

CTS HERITAGE

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

CTS Heritage
34 Harries Street, Plumstead, Cape Town, 7800
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com