DRAFT BASIC ASSESSMENT REPORT

Basic Assessment for the proposed development of the 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV Facility) and Battery Energy Storage System (BESS) and the proposed development of a 132 kV Power Line and associated EGI (i.e., Volta EGI) to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State

APPENDIX C.3

Heritage Impact Assessment and Palaeontology Impact Assessment

CSIR
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Volta PV

HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999)

FOR THE PROPOSED 290 MW VOLTA SOLAR PHOTOVOLTAIC (PV) FACILITY, (i.e., VOLTA PV FACILITY) AND BATTERY ENERGY STORAGE SYSTEMS (BESS), NEAR DEALESVILLE, FREE STATE.

Type of development:

Renewable Energy

Client:

CSIR

Developer:

Volta PV (Pty) Ltd

Report prepared by:

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Project Reference:
Project number 23014
Report date:
First draft: January 2023
Revised report: March 2023

APPROVAL PAGE

Project Name	290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV)
Report Title	Heritage Impact Assessment for the proposed 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV Facility), and Battery Energy Storage System (BESS) near Dealesville, Free State Province.
Authority Reference Number	TBC
Report Status	Final Report
Applicant Name	Volta PV (Pty) Ltd

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	January 2023
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	December 2022
Paleontological Study	Prof Marion Bamford	PhD Paleo Botany	December 2022

DOCUMENT PROGRESS

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Amendments on Document

Date	Report Reference Number	Description of Amendment
2 March 2023	22014	Technical revision and additional site visit
25 March 2023		Project Description revision

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Beyond Heritage reserves the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field or pertaining to this investigation.

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REPORT OUTLINE

Appendix 6 of the GNR 326 Environmental Impact Assessment (EIA) Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA)an indication of the quality and age of base data used for the specialist report	Section 3.4, 7and 8.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 5
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to BA report
(q) Any other information requested by the competent authority	N.A

Executive Summary

Volta PV (Pty) Ltd (the applicant) appointed the Council for Scientific and Industrial Research (CSIR) as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) for the proposed 290 MW Volta Solar Photovoltaic Facility (Volta PV) and Battery Energy Storage System (BESS). The proposed Volta PV and associated BESS is located within the Renewable Energy Development Zone 5. Therefore, the proposed Project requires a BA Process instead of a full Scoping and Environmental Impact Assessment (EIA) Process and will be subjected to a reduced decision-making timeframe of 57 days in line with GN 114 dated February 2018. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on a desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- Large-scale cultivation occurred throughout much of the study area (Figure 1.2). These activities would have destroyed surface indicators of heritage sites if any ever existed in these areas and based on HIA's conducted in the area heritage finds are located at pans or river gravels, rocky outcrops/hills and at farmsteads;
- The study area (and adjacent farm portions) was previously assessed by Orton (2016) who recorded Stone Age scatters, Historical Ruins, Burial sites, and a potential stock enclosure. These are all located outside of the development footprint;
- The current assessment concurs with the findings made by Orton (2016) and finds included Stone Age scatters, ruins and burial sites;
- The palaeontological sensitivity of the study area is moderate to high, and an independent study was conducted for this aspect (Bamford 2022). The study concluded it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr;
- None of the recorded or known sites will be impacted on by the current layout.

The impact on heritage resources is low and the Project can commence provided that the recommendations in this report are adhered to and based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction;
- Recorded heritage features should be indicated on development plans and construction crews should be made aware that these sites should be avoided with the applicable buffer zones;
- Once construction commences all aspects of the Project should be carried out within the approved footprint so as to avoid impacts to heritage resources;
- Any additional changes to the layout should be subjected to a heritage walkdown prior to development.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I: • I act as an independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations, and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 49 A of the Act.of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	26/03/2023

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 23 years. Jaco is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#159) and APHP #114 and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (KZN) as well as the Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, Democratic Republic of the Congo (DRC) Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the International Finance Corporations (IFC) Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BESS: Battery Energy Storage System
BGG Burial Ground and Graves
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EMPr: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS: Geographical Information System
GPS: Global Positioning System
GRP: Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to recently, 100 years ago)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was contracted by the Council for Scientific and Industrial Research (CSIR) to conduct a HIA for the 290 MW Volta Solar Photovoltaic (PV) Facility and associated Battery Energy Storage System (BESS) close to Dealesville, Free State (Figure 1.1 to 1.4). The proposed Volta PV and BESS is located within the Renewable Energy Development Zone 5 (i.e., Kimberley REDZ). Therefore, the proposed Project requires a BA Process instead of a full Scoping and Environmental Impact Assessment (EIA) Process and will be subjected to a reduced decision-making timeframe of 57 days in line with GN 114 dated February 2018. The report forms part of the Basic Assessment (BA) and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed Project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey, finds included Stone Age artefacts, ruins and burial sites. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the Project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed Project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA).

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

1.2 Project Description

Project components and the location of the proposed Project are outlined under Table 2 and 3.

Table 2: Project Description

Project area	Mooihoek (RE/1551) Cornelia (RE/1550) Carlton (RE/74) Vadersrust (RE/822) Oxford (1/1030)
Magisterial District	Tokologo Local Municipality
Central co-ordinate of the development	28°39'0.24"S 25°41'3.20"E
Topographic Map Number	2825DA

Table 3: Infrastructure and Project activities

Project Description for VOLTA PV 290 MW Solar PV and BESS		
Component	**Dimensions / Specifications**	
Solar PV	Height of PV panels:	Max 3,5m
	Capacity of the PV Facility:	290 MW
	Area of PV Array (i.e. proposed area occupied by PV Modules):	500 hectares
	Total developable area (i.e. the area that includes all associated infrastructure within the **fenced** off area of the PV facility):	720 hectares
	Number of inverter-transformer stations:	1050 inverters 30 inverters (per Tx station) x 35 Tx stations 800V/33000V
	Area occupied by inverter-transformer stations and height:	The inverters are distributed evenly and mounted in the array field on a small plinth 2x2m, the 35 Tx stations are distributed evenly throughout the solar arrays each having underground cables (800V) from 30 inverters trenched to them. The Tx stations will have a 33 kV underground cable that carries the power to 33/132kV collector stations as shown on the plan. Datasheets attached for inverters and transformer stations – note this is based on current technology that will evolve and improve. This should reduce the EA impact if anything.
	Number of On-Site Substations Complexes and area occupied by these substations:	Two collector/switching substations each a 200m x 200m footprint. Platform 75m x 75m. Larger area for 132kV overhead lines to turn in.
	Capacity of On-site Substation Complex:	Site A 500 MVA. Site B 500MVA
Construction Compound	Construction camp area (ha):	2 – 3 Ha
	Temporary laydown area (ha):	2 to 3 Ha
Main access roads	Width of access roads (m):	5m

	Length of access roads (km):	Less than 500m
Internal access roads to be constructed between different development portions	Width of access roads (m):	4m
	Length of access roads (km):	Approx. 20km of internal roads – in order for security patrols and to access all the equipment (module cleaning and equipment maintenance)
Upgrading of existing access road/s	Yes / No:	Yes – no tar, only aggregate
	Current width (m):	4m turn into farm
	Upgraded width (m):	5m
Warehouse/Workshop	Maximum height (m):	3,6m
	Footprint (m²):	300m2
Site offices	Number of buildings:	4
	Maximum height (m):	3,6
	Footprint (m²):	500m2
Operational and Maintenance Control Centre Building	Maximum height (m):	2
	Footprint (m²):	300m2
Guard houses	Maximum height (m):	3,6
	Footprint (m²):	100m2
Ablution facilities	Maximum height (m):	3,6
	Footprint (m²):	50m2
Battery storage	Battery technology type (preferred):	Lithium-Ion, Sodium-Ion, Solid State
	Battery technology type (alternative):	Redox Flow, Liquid Metal (https://ambri.com/) and other technology types will be considered
	Location:	See kmz/diagram
	Approx. footprint (ha):	BESS A::Mooihoek BESS N Mooihoek BESS S & Cornelia BESS = TOTAL 26.31ha BESS B:Oxford BESS N, OXFORS BESS C & Oxford BESS N = TOTAL 20.95ha – see attached BESS kmz/diagram
	Maximum height (m):	Containers approx.. 6x3 x 3 (3m max height)
	Capacity:	Site SS A; approx. .550MVA / 2200 Mwh (Store 100% of VOLTA PV average daily yield energy for 4 hours) Site SS B: approx. 450MVA / 1800Mwh
	For the storage and handling of a dangerous goods (e.g., electrolytes), where such storage occurs in containers on site, have a combined capacity of 80 m^3 or more but not exceeding 500 m^3 at any one time?	We have engaged a specialist to advise and ensure we can meet the Health and Safety Compliance and mitigate any hazardous substance risk Debra Mitchell from iSHEcon

1.3 Alternatives

No alternatives were provided, but the area assessed allows for siting of the development to avoid impacts to heritage resources.

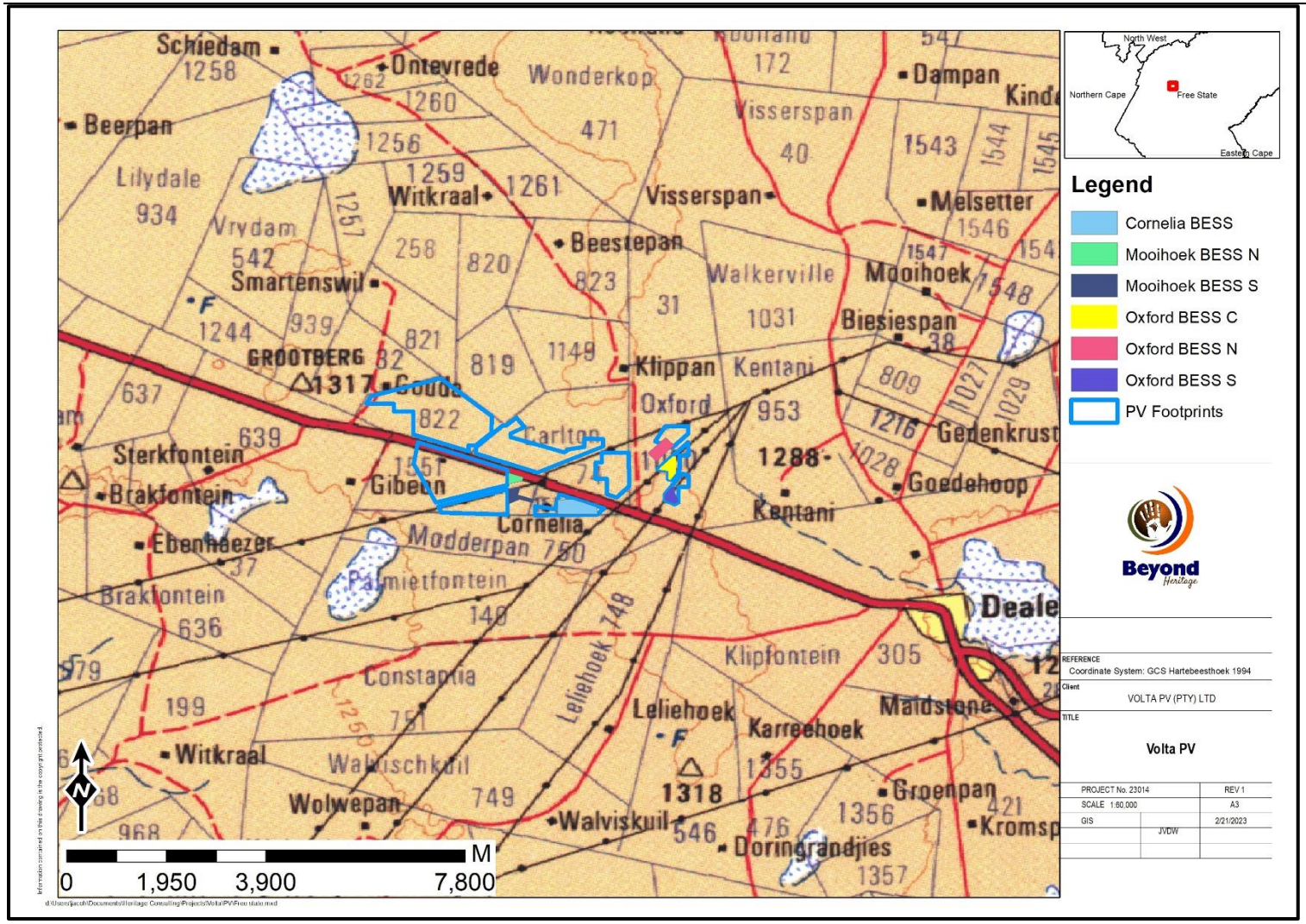


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

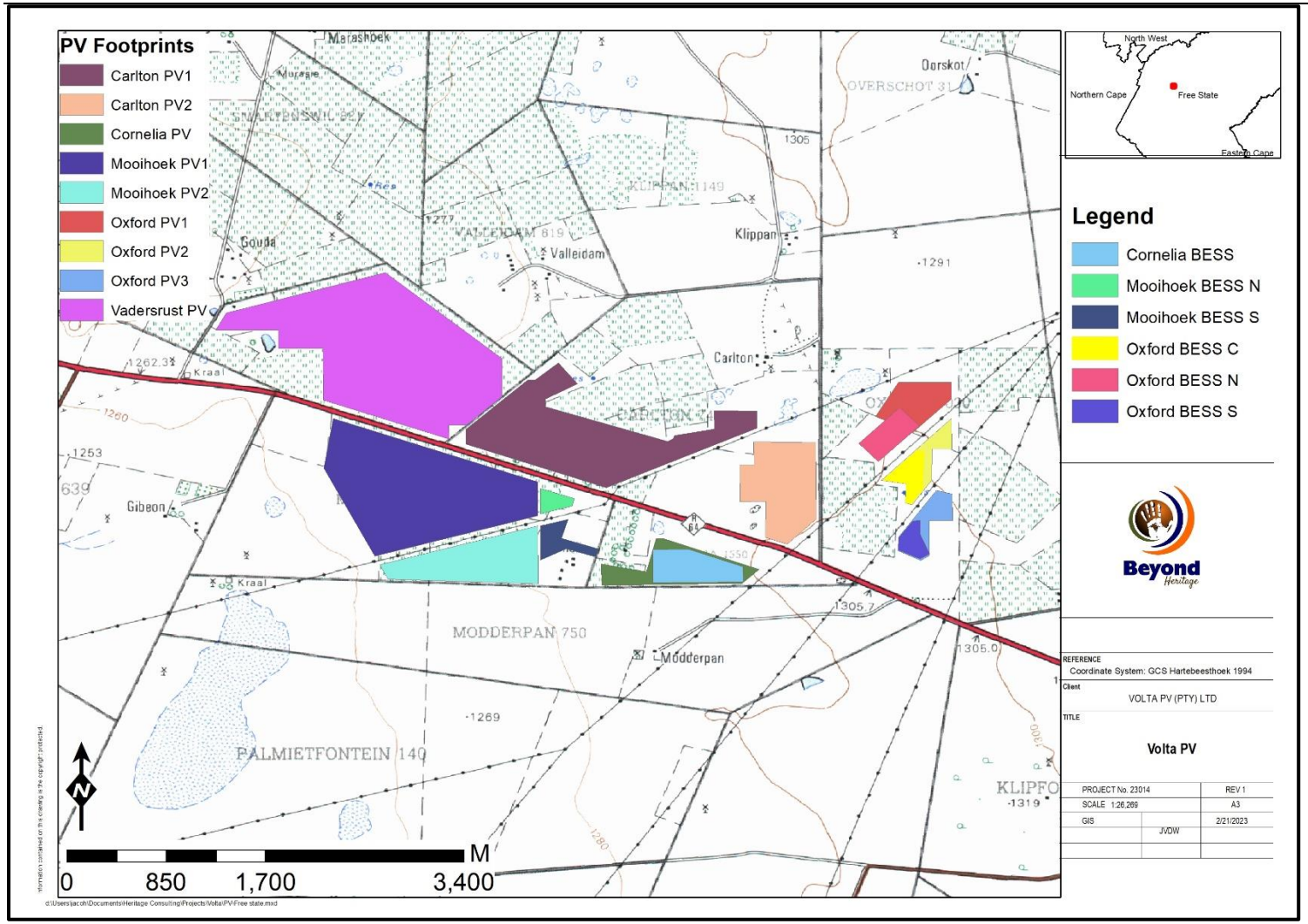


Figure 1.2. Local setting of the Project (1: 50 000 topographical map). Note the extensive cultivation in the study area that would have destroyed surface indicators of heritage sites if any ever existed in these areas.

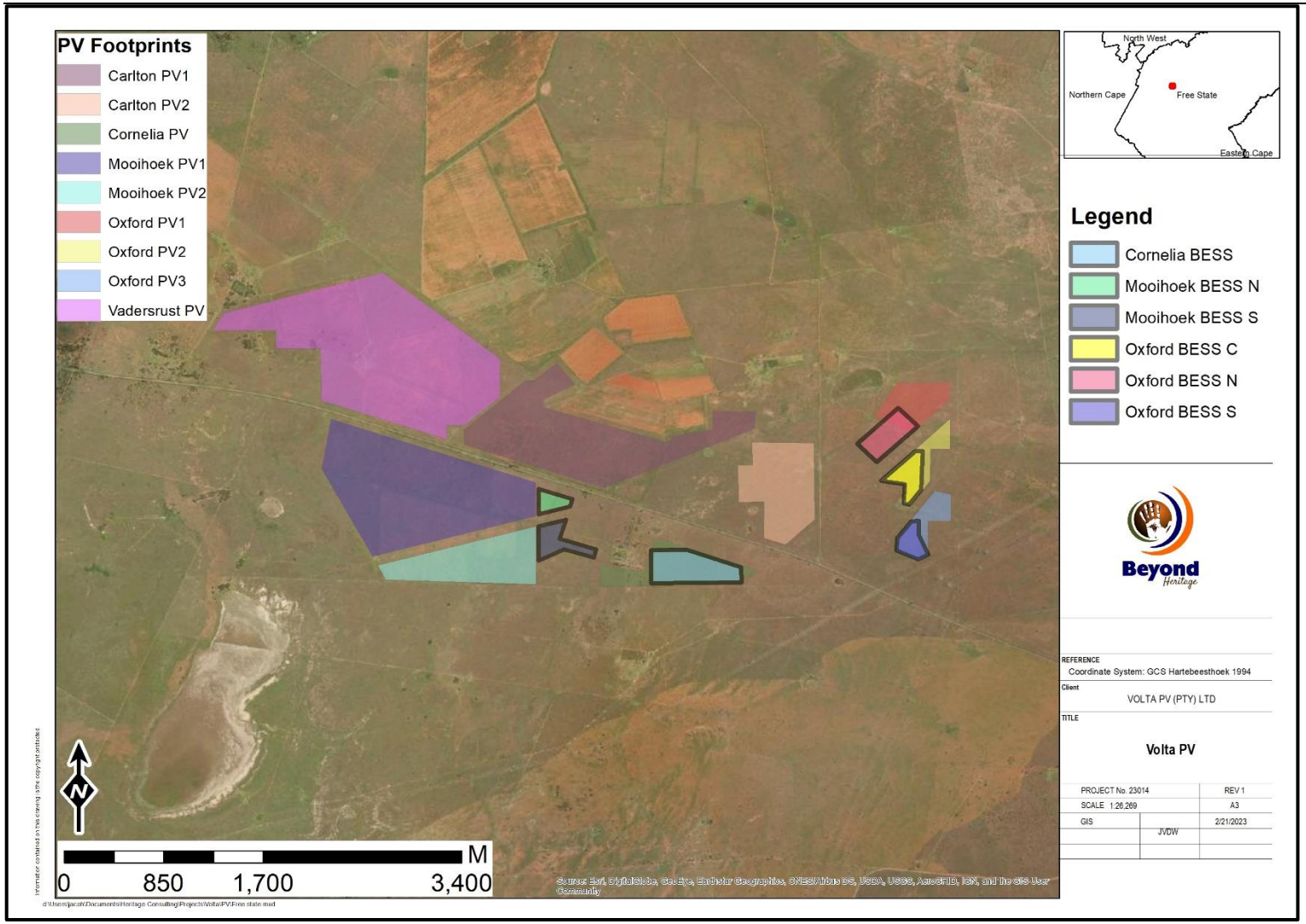


Figure 1.3. Aerial image of the study area.

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), (Act No. 107 of 1998 - Section 23(2)(b))

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resource Agency (PHRA) or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university Cultural Resource Management (CRM) experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the Southern African Development Community (SADC) region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and include (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (NHRA), as well as the National Health Act of 2003 and are under the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925) re-instituted by Proclamation 109 of 17 June 1994 and implemented by CoGHSTA as well as the National Health Act of 2003 and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. . Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under the National Health Act of 2003.

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The results are presented in Section 6.

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation (conducted by the EAP) process is to capture and address any issues raised by community members and other stakeholders during key stakeholder engagement points of the project.

3.4 Site Investigation and site sensitivity verification

The aim of the site visit was to:

a) survey the proposed Project area to understand the heritage character of the development footprint;

b) record GPS points of sites/areas identified as significant areas;

c) determine the levels of significance of the various types of heritage resources recorded in the Project area.

Table 4: Site Investigation Details

	Site Investigation
Date	The week of 11 November 2022 & 27 February 2023
Season	Summer – The time of year and season did influence the survey. The dense grass cover after the summer rains limited heritage visibility. The development footprint was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

The outcomes of the DFFE Screening Tool report identified numerous sites of high heritage sensitivity (see Appendix 1). Based on the site sensitivity verification these areas were avoided by the development with the implementation of buffer zones to ensure the continuous preservation of the sites. Based on the findings of the field survey the current impact areas are of low sensitivity.

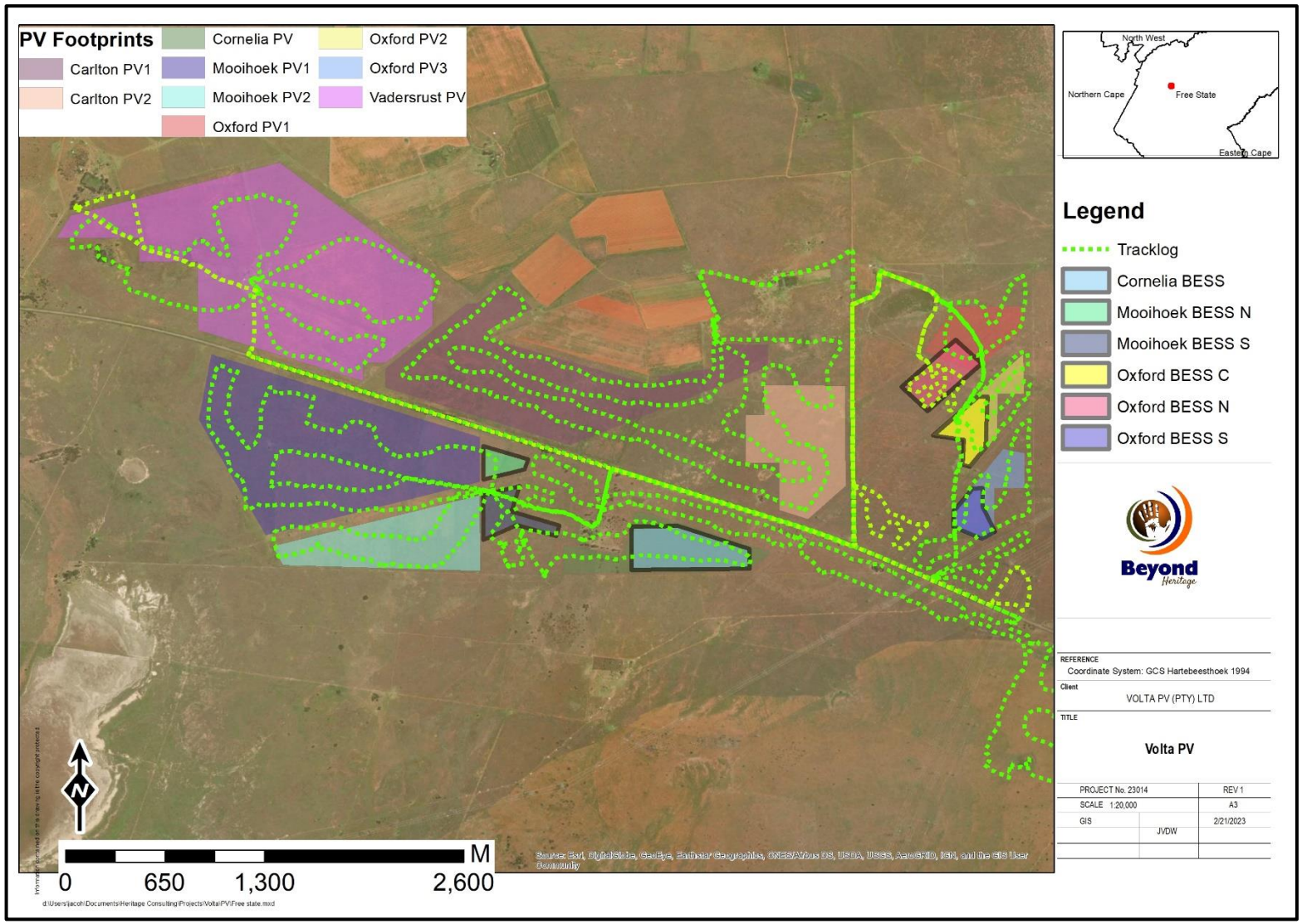


Figure 3.1. Tracklog of the survey path in green.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed Project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2007), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 5: Heritage significance and field ratings

FIELD RATING	***GRADE***	***SIGNIFICANCE***	***RECOMMENDED MITIGATION***
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

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

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

S= (E+D+M) P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

3.7 Limitations, Constraints and Assumptions of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the often ephemeral and sub surface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. Also, dense grass cover hampered ground visibility and although unlikely informal graves could have been undetected during the field survey. This limitation is successfully mitigated with the implementation of a chance find procedure and monitoring of the study area by the ECO. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would be highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

StatsSA provided the following information: According to the 2011 census, Tokologo Local Municipality has a total population of 28 986, of which 84,5% is African Black, 9,9% is white, with the other population groups making up the remaining 5,6%. Of those aged 20 years and older, 6,6% have completed primary school, 27,3% have some secondary education, 17,8% have completed matric and 5,1% have some form of higher education.

9122 people are economically active (employed or unemployed but looking for work), and of these 27,4% are unemployed. Of the 4647economically active youth (15 – 34 years) in the area, 35,8% are unemployed.

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large will be informed of the proposed activity as part of the BA process by the EAP. Site notices, advertisements and notifications were sent out and placed at strategic points and in local newspapers notifying interested and affected parties as part of the process.

An adjacent landowner, Mr Gert Jonker, indicated that there are graves of children located on a portion of Vadersrust 882, apparently near the boundary with Gouda 32, and thus potentially within the PV development area. The headstones have apparently toppled over, and the graves are no longer easy to see. Mr Jonker indicated that he knows this from having leased Vadersrust for a few years from the previous owner. The graves were recorded as VT101 and are located **outside** of the impact area.

6 Literature / Background Study:

6.1 Literature Review focussing on the South African Heritage Resources Information System (SAHRIS) database.

The study area (and adjacent farm portions) was previously assessed by Orton (2016) that recorded Stone Age scatters, Historical Ruins, Burial sites, and a potential stock enclosure. These sites are located outside of the impact footprint and are spatially illustrated in Figure 6.1. In addition, the Cultural Resource Management (CRM) assessments in Table 6 were conducted in the area and consulted for this report:

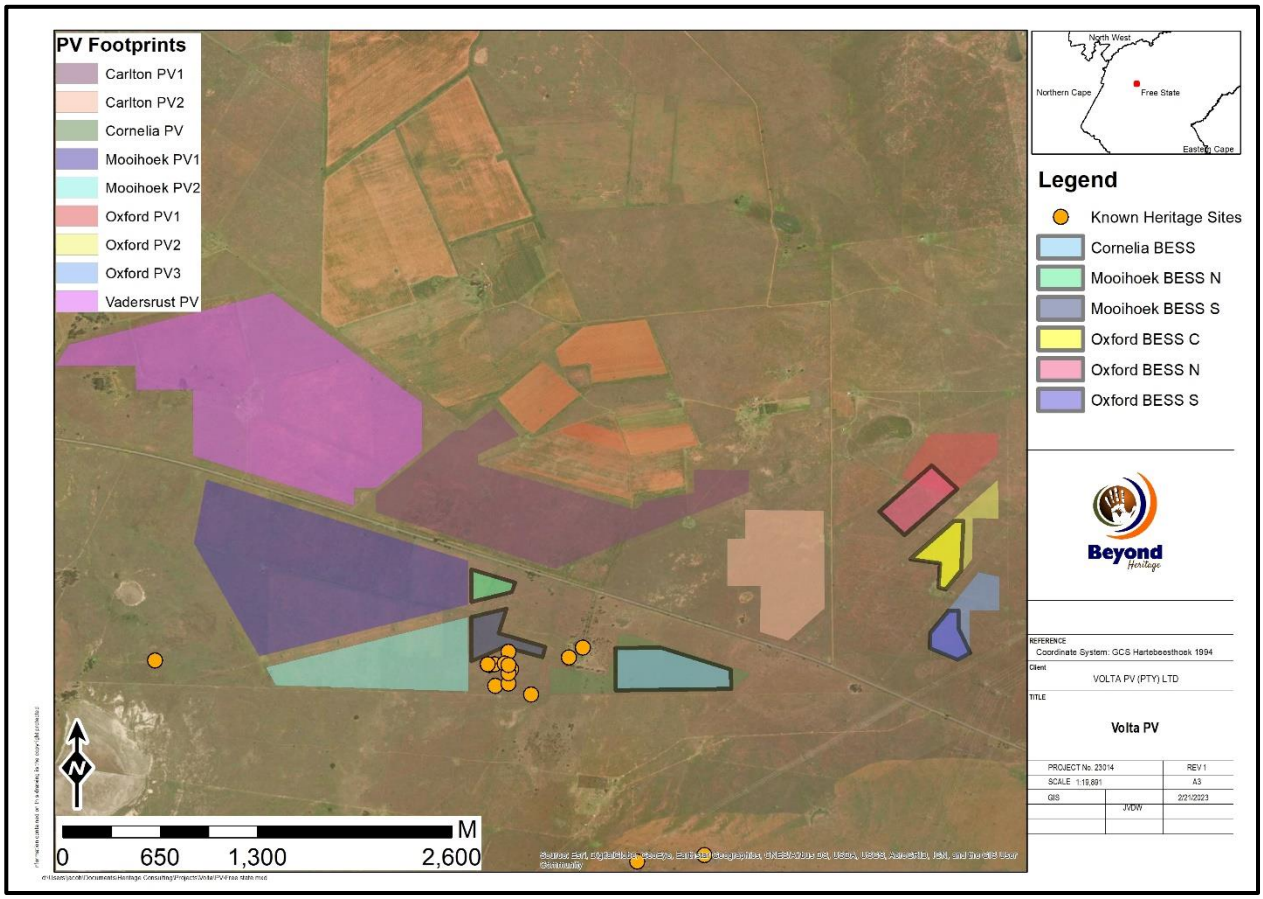


Figure 6.1. Previously recorded features by Orton (2016) in relation to the Project area.

Table 6. CRM reports consulted for the study.

Author	Year	Project	Findings
Orton, J.	2015	Heritage impact assessment for the proposed construction of twelve solar PV facilities near Dealesville, Boshof Magisterial District, Free State.	MSA background scatters, rock engravings, built structures.
Orton, J.	2016a	Heritage Impact Assessment: Scoping and Environmental Impact Assessment for the proposed development of the Edison PV 100 MW Photovoltaic Facility near Dealesville, Free State.	Stone Age scatters, historical ruins, graves, and graveyards
Orton, J.	2016b	Heritage Impact Assessment: Scoping and Environmental Impact Assessment for the proposed Development of the Marconi PV 100 MV Photovoltaic Facility near Dealesville, Free State.	Stone Age scatters, historical ruins, graves, and graveyards.
Orton, J.	2016c	Heritage Impact Assessment: Scoping and Environmental Impact Assessment for the Proposed Development of the Watt PV 100 MW Photovoltaic Facility near Dealesville, Free State.	Stone Age scatters, rock art, a potential stock enclosure, historical ruins, graves, and graveyards.
Orton, J.	2021	Heritage Impact Assessment: Proposed 33 kV Powerline near Dealesville, Boshof Magisterial District, Free State.	Farmhouse ruins, stone foundations, old stock post, MSA scatters
Orton, J.	2022a	Heritage Impact Assessment: Proposed Development of the Springhaas Solar PV Facilities Consisting of Seven New Solar PV Facilities and Associated Infrastructure Near Dealesville in the Free State Province.	Stone Age scatters, historical ruins.
Orton, J.	2022b	Preconstruction Archaeological Survey of the Mainstream Kentani Suite PV Projects (Klipfontein 1), Dealesville, Free State.	Stone Age scatters, historical ruins, graves in small informal graveyards.
Dreyer, C.	2015	First Phase Archaeological & Heritage Assessment Of The Proposed Riverton – Boshof – Dealesville Water Pipe Line, Free State	Graveyards, stone-built farmhouse.
Van Jaarsveld, A.	2006	Hydra-Perseus And Beta-Perseus 765kv Transmission Power Lines Environmental Impact Assessment. Impact On Cultural Heritage Resources.	Stone Age artefacts, rock art.

6.1.1 Google Earth and The Genealogical Society of South Africa (Graves and burial sites)

The Dealesville Main Cemetery is located 4,4 km to the east of the study area.

6.2 Archaeological Background

The archaeological record for the greater study area consists of the Stone Age and Iron Age.

6.2.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For CRM purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable. The three main phases can be divided as follows;

» Later Stone Age (LSA); associated with Khoi and San societies and their immediate predecessors. - Recently to ~30 thousand years ago.

» Middle Stone Age (MSA); associated with Homo sapiens and archaic modern human - . 30-300 thousand years ago.

» Earlier Stone Age (ESA); associated with early Homo groups such as Homo habilis and Homo erectus. - 400 000-> 2 million years ago.

The famous Florisbad skull of an archaic human was discovered by T.F Dreyer roughly 40km southeast of the Project area. During excavations in 1932, fragments of the archaic *Homo sapien* cranium were discovered (Kuman and Clarke 1986). An expansive MSA stone tool assemblage was also discovered at the site with many artefacts showing signs of being retouched after initial production. In 1997, the site was declared as a Provincial Heritage Site by SAHRIS.

The immediate region around the study area has also shown to have high occurrences of stone tools as background scatters as recorded through multiple surveys (Orton 2016a; Orton 2016b; Orton 2016c; Orton 2021; Orton 2022a; Orton 2022b, van Jaarsveld 2006). This indicates a widespread distribution of early human occupation and movement throughout the general area attested by the background scatter of stone tools within the landscape. Stone Age sites situated within the interior are more commonly found near rivers and pans where many artefacts have been discovered within the river gravels (Orton 2016b).

Near Dealesville, around the rocky outcrops, Orton (2015), documented multiple occurrences of Stone Age artefacts as well as various rock engraving sites. These engravings have been associated with San and Khoekhoe groups. These sites are located ~14 km to the south of the study area.

6.2.2 Iron Age

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The Iron Age as a whole represents the spread of Bantu speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age (EIA): Most of the first millennium AD.
- The Middle Iron Age (MIA): 10th to 13th centuries AD.
- The Late Iron Age (LSA): 14th century to colonial period.

The Iron Age is characterised by the ability of people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. During the mid-17th century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007).

No known Iron Age sites of significant have been documented within this region. This could be due to the unfavourable climatic conditions during that period which would not allow for prosperous agricultural activities. The Free State in itself is not known for Early or Middle Iron Age occupation sites. Late Iron Age sites associated with Bantu speaking agro pastoralists can be found spread along the northern and eastern regions of the Free State (Maggs 1976).

6.2.3 Historical Period

In 1899 Dealesville was declared as a township and was named after John Henry Deale, the owner of the farm Klipfontein (Raper 2004). By 1914, Dealesville became a municipality. Historical ruins have been found in the larger region associated with historical settlement of the landscape. The town is currently still an epicentre for maize and sheep farming within the Free State.

6.2.4 Anglo-Boer War

Anglo-Boer war period sites have been found to be scattered along the Free State province. Dealesville itself did not see any significant skirmishes during this period, with the nearest known associated site being the battle of Paardeberg, 60km south of the Project area. The battle took place near the Paardeberg Drift on the Modder River banks between 18th and 27th February 1900 (www.britishbattles.com). The battle ended with General Piet Cronje, the Boer commander surrendering to Lord Roberts of the British troops.

7 Description of the Physical Environment

The Project is located approximately 6km northwest of Dealesville along the R64 and is located on the northern and southern side of the road. The landscape is dominated by large open fields with dense grass cover and scattered thickets of small trees. Large sections of the study area used to be cultivated (Figure 1.2) and are now used for grazing. An overhead transmission lines traverse the study area in a east to west direction with various dirt tracks that criss-cross the study area.

The topography is generally undulating with a few low hills or rocky outcrops scattered across the landscape while several pans dot the larger landscape. Multiple burrow pits are situated along the R64 that is now filled with water after the rains.

Figure 7.1. General view of the landscape south of the R64 showing the overhead transmission lines.

Figure 7.2. General site conditions showing the flat landscape and grass cover.

Figure 7.3. General view of the landscape south of the R64.

Figure 7.4. Animal burrows showing the deep layer of aeolian sand that cover the Project area.

8 Findings of the Survey

8.1 Heritage Resources

Large scale cultivation occurred throughout much of the study area (Figure 1.2). These activities would have destroyed surface indicators of heritage sites if any ever existed in these areas and based on HIA's conducted in the area heritage finds are located at pans or river gravels, rocky outcrops/hills and at farmsteads. The study area (and adjacent farm portions) was previously assessed by Orton (2016) that recorded Stone Age scatters, Historical Ruins, Burial sites, and a potential stock enclosure. The current assessment concurs with the findings made by Orton (2016). Newly recorded observations were numbered numerically and given the prefix VT.

These observation points are spatially illustrated in relation to the facility layout in Figure 8.1, 8.2 and 8.3. Heritage observations are listed in Table 7 with their locations, heritage significance and impact areas. Sites that were recorded previously (Orton 2016) are also included and referenced in the table below where these sites overlap. Field notes of the recorded features together with site photographs are included in Annexure A.

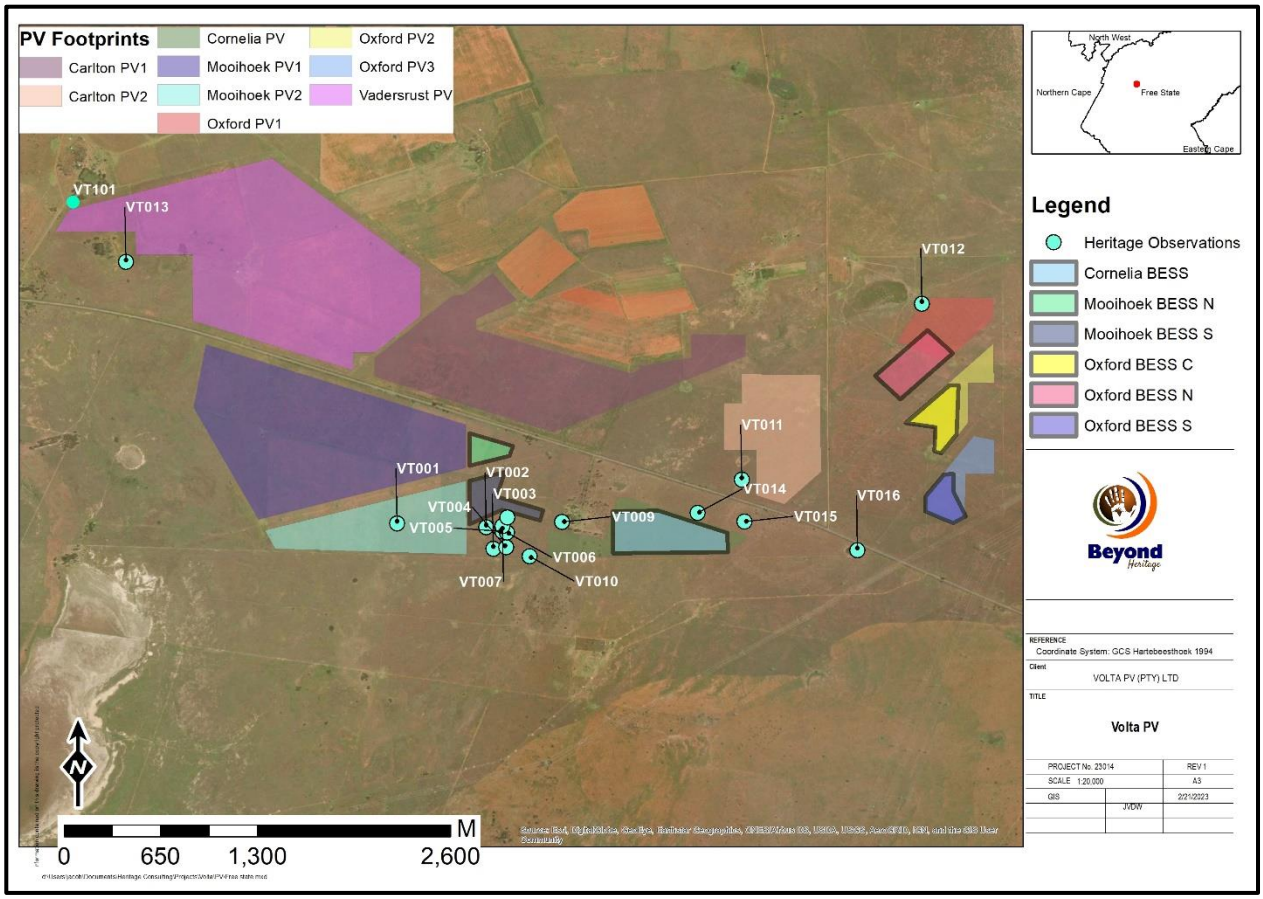


Figure 8.1. Site distribution map showing sites from the current assessment.

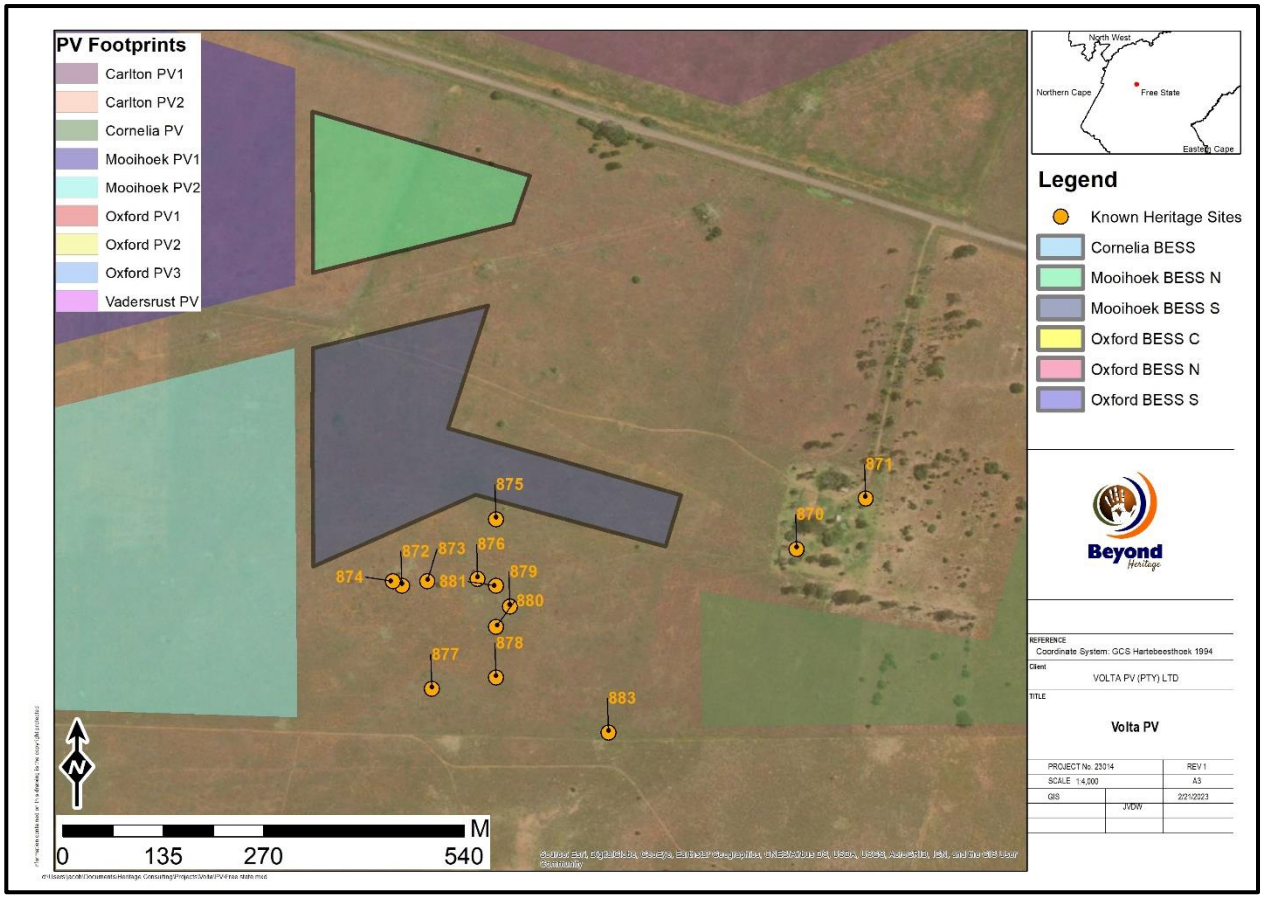


Figure 8.2. Orton (2016) sites relevant to the study area.

Table 7. Recorded heritage features in the Volta study area. Observations highlighted in orange are located within the PV footprint and BESS area and applicable to this assessment.

LABEL	Orton Sites 2016:	LONGITUDE	LATITUDE	TYPE SITE	SIGNIFICANCE
VT001		25° 41' 11.7241" E	28° 39' 24.5485" S	Stone Age Find Spot	Low
VT002	872; 873; 874	25° 41' 31.1136" E	28° 39' 25.3801" S	Multiple Occupation site – Stone Age and historical occupation	Medium
VT003	877	25° 41' 32.6688" E	28° 39' 30.0421" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT004	878	25° 41' 35.5055" E	28° 39' 29.7575" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT005		25° 41' 34.6272" E	28° 39' 26.3197" S	Potential grave site / built environment	Low significance unless proven to be a grave
VT006		25° 41' 35.6425" E	28° 39' 26.5104" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT007	876	25° 41' 34.6416" E	28° 39' 25.1676" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT008	875	25° 41' 35.7180" E	28° 39' 23.2165" S	Built Environment (Ephemeral brick foundations)	Low - Risk = Unmarked graves
VT009	870	25° 41' 47.6663" E	28° 39' 24.1993" S	Built Environment (Cattle Kraal)	Low
VT010		25° 41' 40.5493" E	28° 39' 31.7304" S	Cemetery	High Social significance
VT011		25° 42' 26.7949" E	28° 39' 15.0407" S	Built Environment (remains of excavations)	Low
VT012		25° 43' 06.0636" E	28° 38' 36.6721" S	Stone Age Find Spot	Low
VT013		25° 40' 12.6445" E	28° 38' 27.5605" S	Built Environment (Retainer wall)	Low
VT014		25° 42' 17.1577" E	28° 39' 22.2805" S	Stone Age Find Spot	Low
VT015		25° 42' 27.3671" E	28° 39' 24.1236" S	Stone Age Find Spot	Low
VT016		25° 42' 52.0057" E	28° 39' 30.3876" S	Stone Age Background Scatter	Low to medium
VT017		25° 42' 33.3020" E	28° 39' 23.3802" S	Stone Age Background Scatter	Low to medium
VT101		25° 40' 01.2505" E	28° 38' 14.5211" S	Small burial site situated on the western boundary of the project area ~ 20 from the fence line under a large pepper tree. The burial site contains multiple graves marked by packed stone borders and headstones. Most of the headstones have fallen over and the graves have become overgrown. The graves date from 1880 to 1920	High – Social Significance
	871	25°41'51.60"E	28°39'21.80"S	Various stone, brick and cement features in this area. Not very old cement. This is also the southern end of the tree-lined avenue. It is only the avenue that is significant.	Medium AVOID avenue
	879	25°41'36.10"E	28°39'26.50"S	Stone foundation	Low
	880	25°41'35.50"E	28°39'27.39"S	Stone foundation	Low

	881	25°41'35.50"E	28°39'25.60"S	A single grave packed with dolerite	High Social significance

8.2 Cultural Landscape

Regionally the area is mostly cultivated, and forms part of a landscape characterised by wide scale cultivation and agricultural activities. Development in the study area is limited to farming infrastructure such as access roads, powerline infrastructure, fences, and agricultural structures. A gum tree-lined avenue leading into the farm Cornelia and a large cluster of gum trees marking the site of an old farm complex (Figure 8. 5 and 8.6). The landscape is evolving from a vast open agricultural landscape to a landscape dominated by renewable energy developments and associated infrastructure.

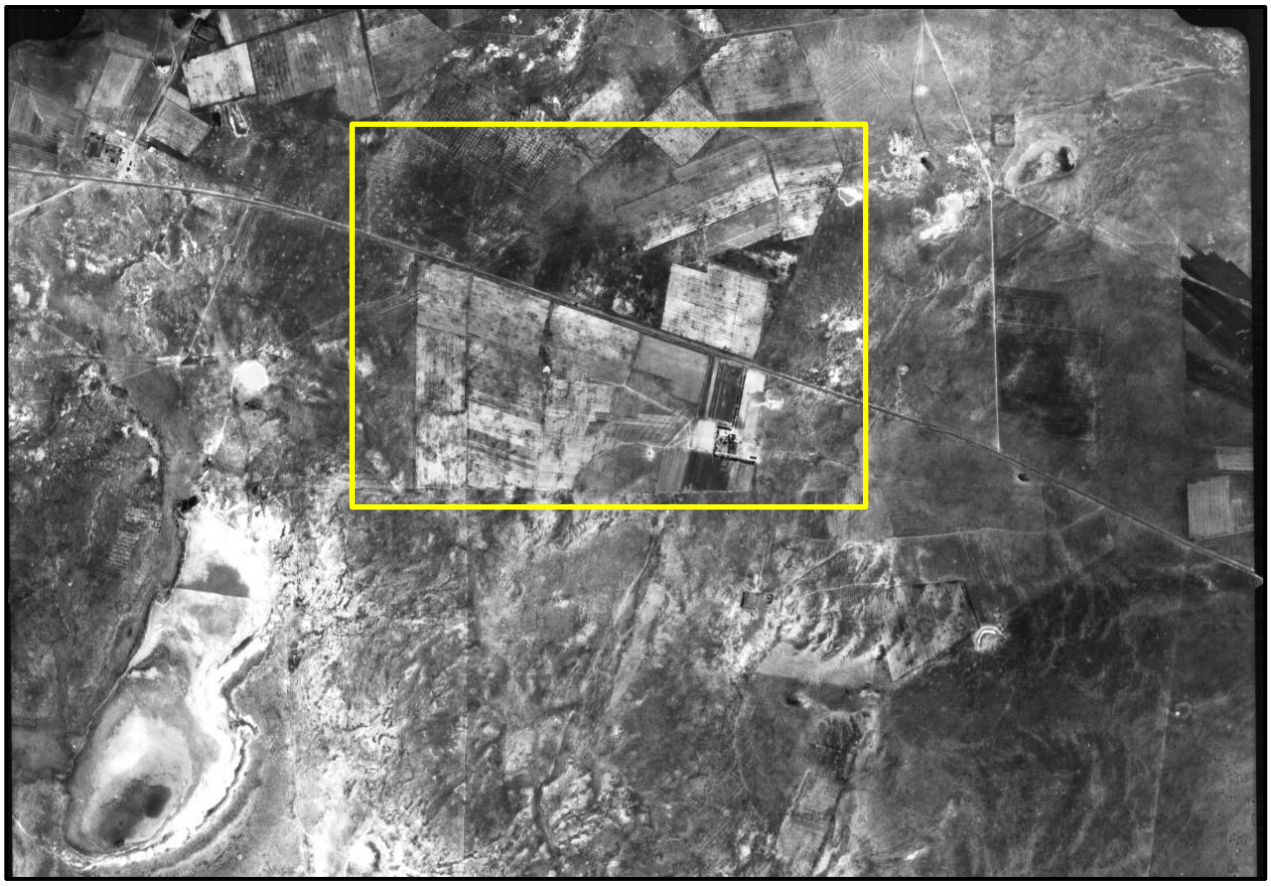
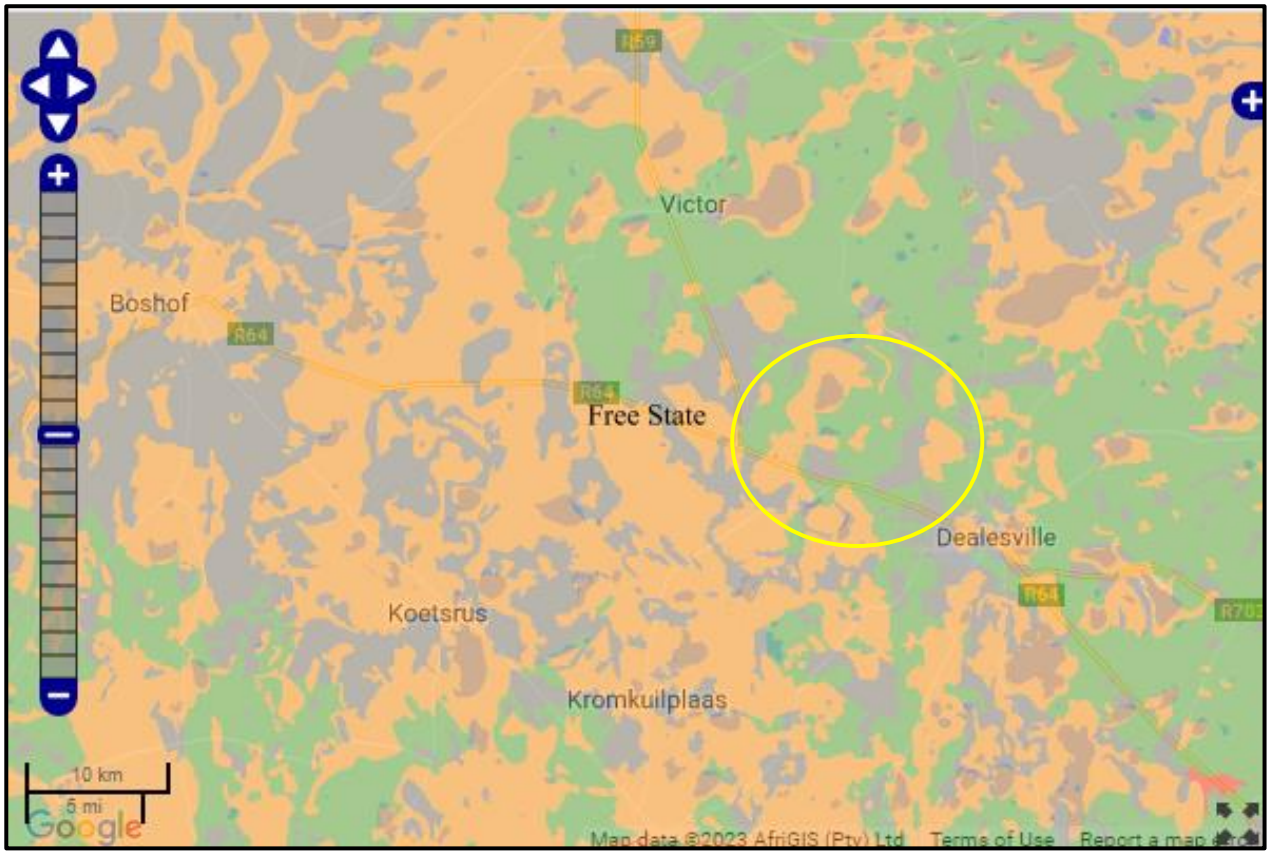


Figure 8.3. 1957 Aerial image with the approximate study area in yellow showing an open landscape characterised by cultivation and road developments.

Figure 8.4. 1991 Aerial image of the approximate study area in yellow – cultivation is still prevalent with visible road developments and farmsteads.

8.3 Paleontological Heritage

The study area is indicated as of mixed paleontological significance on the SAHRA Paleontological map (Figure 8.4) and an independent study (Bamford 2022) was commissioned for this aspect. Bamford (2022) concluded that the proposed site lies on the non-fossiliferous Jurassic dolerite, highly sensitive Quaternary Calcretes and the moderately sensitive Tierberg Formation and Quaternary aeolian sands. Except for the volcanic dolerite, these formations might preserve trace fossils or fragmentary fossils, although none has been recorded from the site. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map

Figure 8.5. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the pre-construction and construction activities. It is assumed that the pre-construction and construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can impact on heritage features and impacts include destruction or partial destruction of non-renewable heritage resources. Impacts during the operation phase is considered to affect the cultural landscape and sense of place. The anticipated visual impact of the proposed facility on the regional visual quality (i.e. beyond 6km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance (Du Plessis 2023).

The main cause of impacts to archaeological resources is physical disturbance of the material itself and its context during removal of topsoil and vegetation as well as the excavations associated with the establishment of infrastructure. In terms of this project the main source of impacts will happen during the following activities.

- Establishment of new roads and upgrade of existing roads;
- Earthworks for temporary infrastructure including laydown areas;
- Visual impact of the PV Facility on the landscape and sense of place;
- Excavation and levelling of the PV facility footprint;
- Trenches for cables and erection of powerlines;
- Influx of people into the area that could desecrate the burial sites;
- Excavations during construction of the sub stations.

9.1.1 Pre-Construction and Construction Phase

The applicant went to great lengths to minimise impacts to heritage resources. The initial HIA by Orton (2016) provided a solid baseline of heritage resources in the study area supplemented by the current assessment and based on these results it was possible to eliminate impacts to significant heritage resources by preserving these sites in-situ with an appropriate buffer zone (more than 50 meters for the remains of ruins and more than 100 meters from the burial site) to facilitate the long-term protection of these features. Implementation of the buffer zones to protect and preserve heritage features will minimise potential impacts by the proposed BESS as well as associated infrastructure.

Based on the current lay out the low-density background Stone Age scatters at VT01 and VT12 will be directly affected by the PV development (Figure 9.1 and 9.2). The recorded isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report and the impact on the occurrences is low.

Burial sites at VT010 and 881(the latter recorded by Orton 2016) as well as the Stone Cairn at VT005 that could represent a burial site are of high social significance. Based on the current lay out none of these sites or the other identified heritage features will be directly impacted on (Table 8).

There is the potential that these sites could be negatively impacted on although they are located outside of the final development footprint during earthworks and other construction activities. The influx of workers into the area could result in them wandering off site and vandalising gravesites or picking up archaeological artefacts. This can be successfully mitigated by ensuring that once construction commences that all aspects of the Project should be carried out within the approved development footprint so as to avoid impacts to sites not falling within the study area. Therefore, the impact by the PV facility during the Pre-Construction and Construction phase is low.

9.1.2 Operation Phase and Decommissioning

No additional impacts are expected during the operation and decommissioning phase.

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures as recommended in this report should be implemented during all phases of the project. Impacts of the Project on heritage resources is expected to be low during all phases of the development (Table 9).

Table 8. Impact and significance of sites recorded in the Volta area.

LABEL	Orton Sites 2016:	TYPE SITE	SIGNIFICANCE	Impact
VT001		Stone Age Find Spot	Low	**Mooihoek PV 2**
VT002	872; 873; 874	Multiple Occupation site - Stone Age and historical occupation	Medium	No Direct Impact
VT003	877	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves	No Direct Impact
VT004	878	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves	No Direct Impact
VT005		Potential grave site / built environment	Low significance unless proven to be a grave	No Direct Impact
VT006		Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves	No Direct Impact
VT007	876	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves	No Direct Impact
VT008	875	Built Environment (Ephemeral brick foundations)	Low - Risk = Unmarked graves	No Direct Impact
VT009	870	Built Environment (Cattle Kraal)	Low	No Direct Impact
VT010		Cemetery	High Social significance	No Direct Impact (107 m away)
VT011		Built Environment (remains of excavations)	Low	No Direct Impact
VT012		Stone Age Find Spot	Low	**Oxford PV 1**
VT013		Built Environment (Retainer wall)	Low	No Direct Impact
VT014		Stone Age Find Spot	Low	No Direct Impact
VT015		Stone Age Find Spot	Low	No Direct Impact
VT016		Stone Age Background Scatter	Low to medium	No Direct Impact
VT017		Stone Age Background Scatter	Low to medium	No Direct Impact
VT101		Cemetery	High Social significance	No Direct Impact (more than 40 m away)
	871	Various stone, brick, and cement features in this area. Not very old cement. This is also the southern end of the tree-lined avenue. It is only the avenue that is significant.	Medium AVOID Avenue	No Direct Impact
	879	Stone foundation	Low	No Direct Impact
	880	Stone foundation	Low	No Direct Impact
	881	A single grave packed with dolerite	High Social significance	No Direct Impact

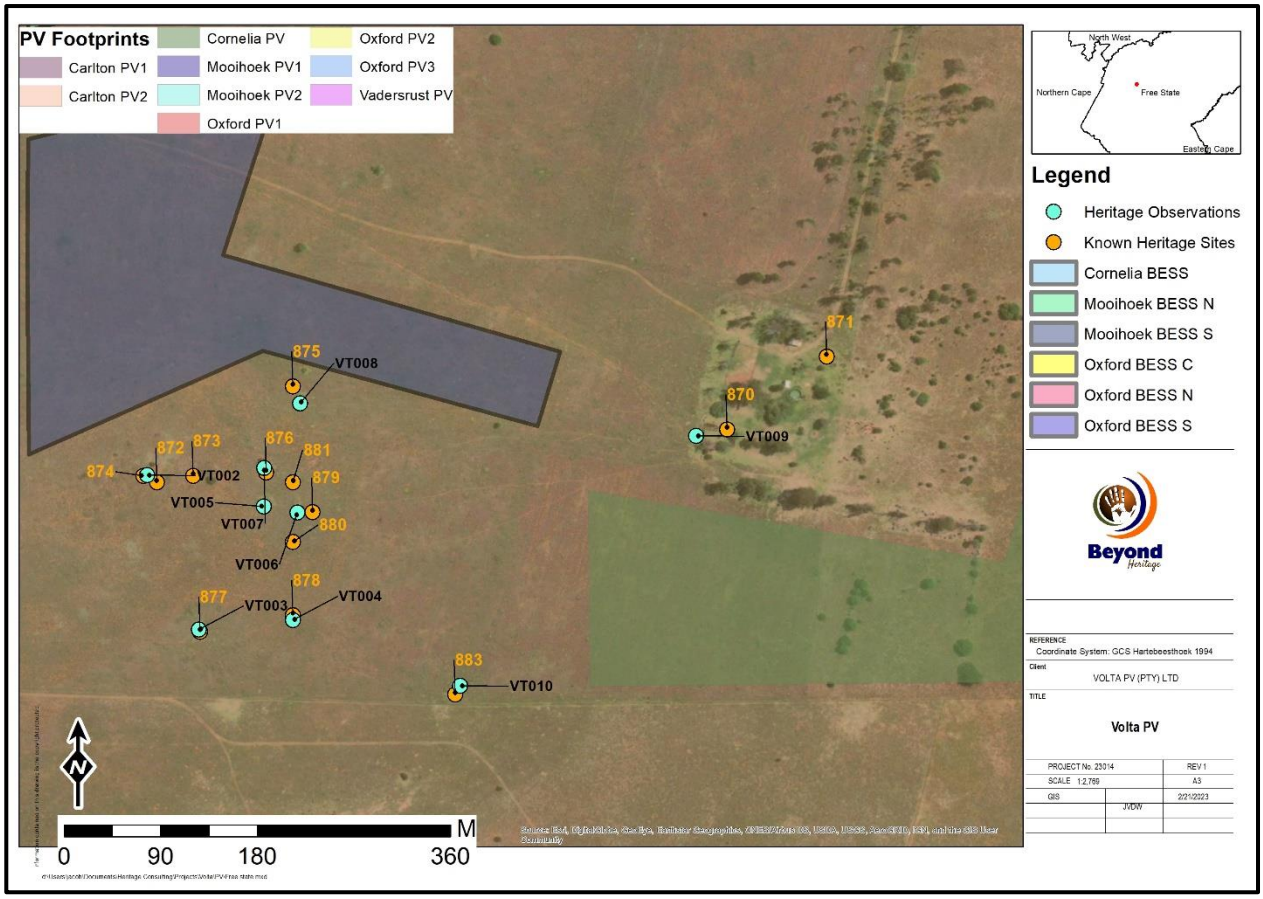


Figure 9.1. Heritage features in relation to the Project area.

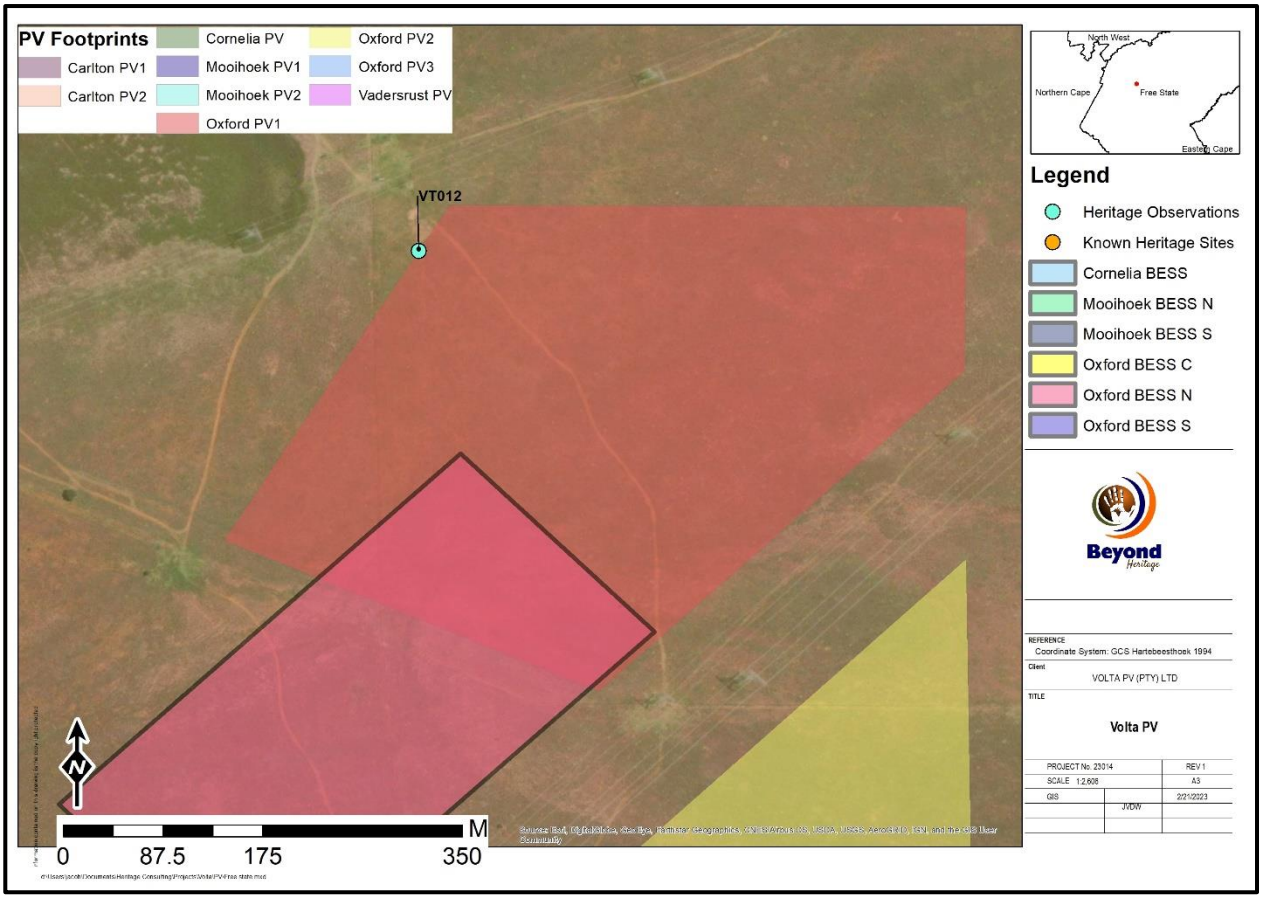


Figure 9.2. Observation VT012 in relation to the project area.

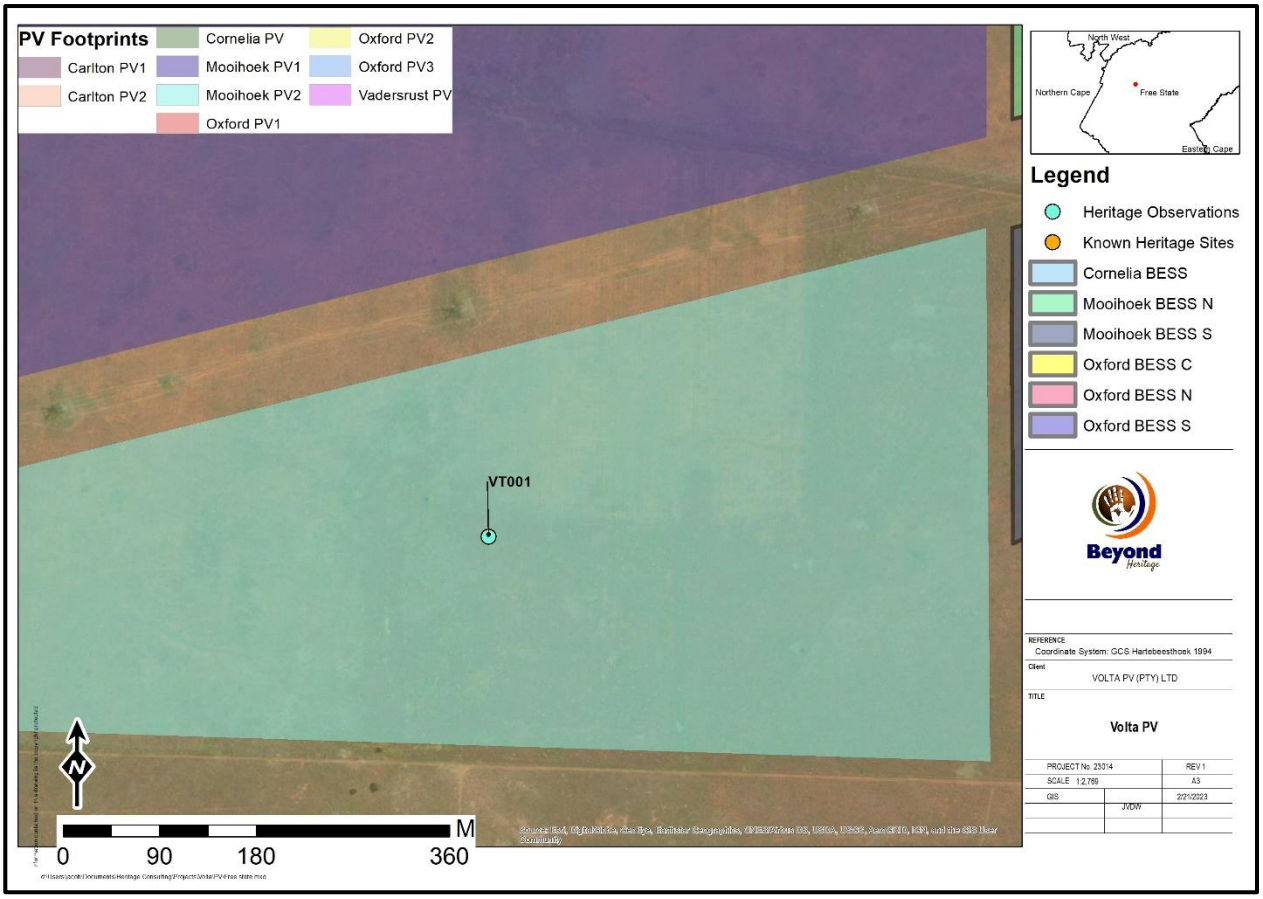


Figure 9.3. Observation VT001 in relation to the study area.

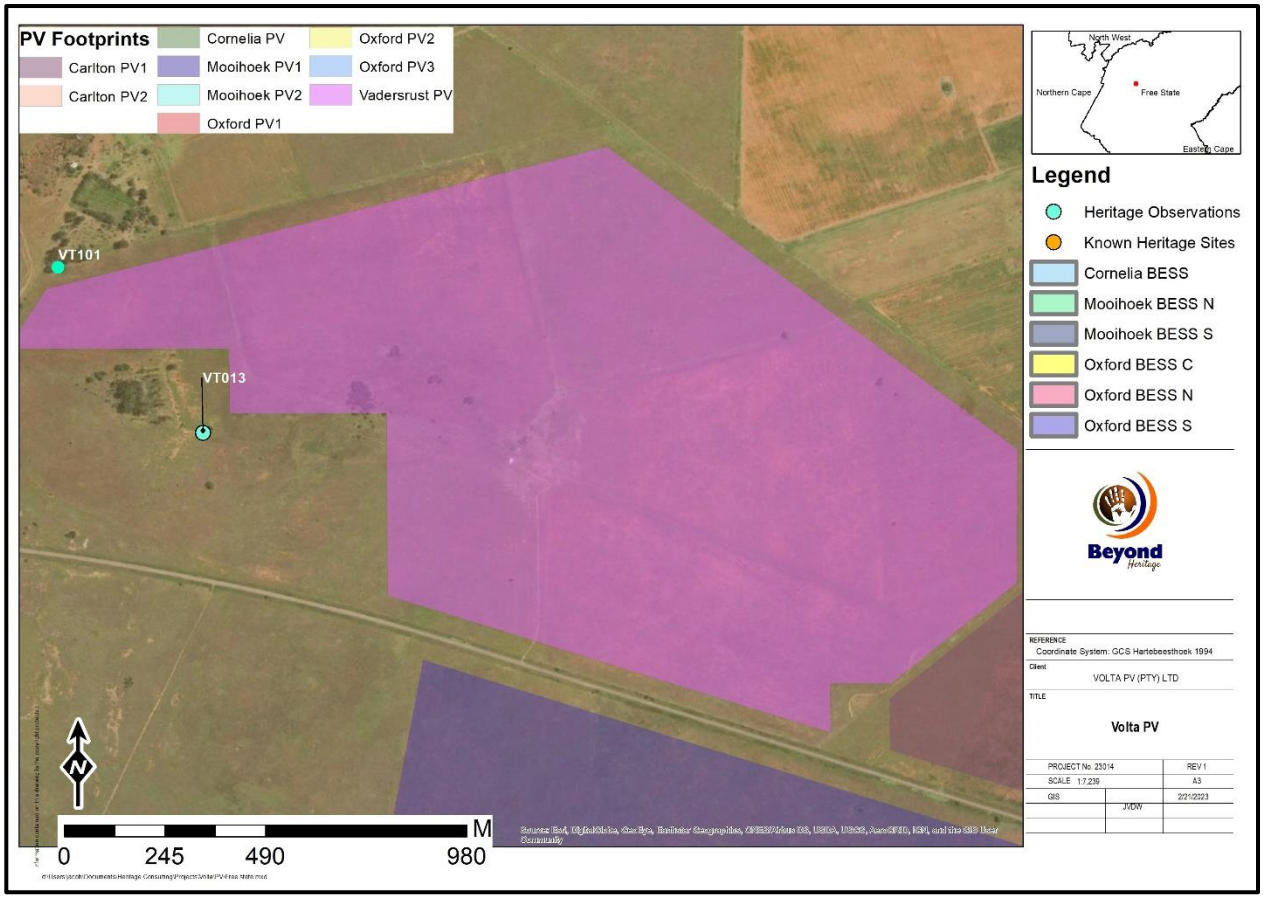


Figure 9.4. Recorded sites VT101 and VT013 in relation to the Project footprint.

9.1.3 Cumulative Impacts

Cumulative impacts considered as an effect caused by the proposed action that results from the incremental impact of an action when added to other past, present, or reasonably foreseeable future actions. (Cornell Law School Information Institute, 2020). Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. In the case of this project, impacts to tangible heritage features are acceptable as no significant heritage resources will be adversely impacted on by the project. The Project is in an area earmarked for the development of Renewable Energy Projects and as such will contribute to the alteration of a vast agricultural landscape to an area characterised by PV developments and associated infrastructure. Due to the high number of surrounding projects (Figure 9.5) the additional impact of this project will have a low cumulative impact on the cultural landscape. Note that the approach for this BA is that the assessment includes all renewable energy and EGI projects within 30 km that have received an EA at the time of starting this BA (i.e. Oct 2022), as well as the proposed project. The information was collected from the National DFFE Renewable Energy EIA Application (REEA) database, 2022 Quarter 3 as well as from the South African Heritage Resources Information System (SAHRIS), and Eskom's Generation Connection Capacity Assessment (2020). The REEA database records the project land parcels, and not the Solar PV footprints, hence the PV-covered areas will occupy a far smaller area than indicated.

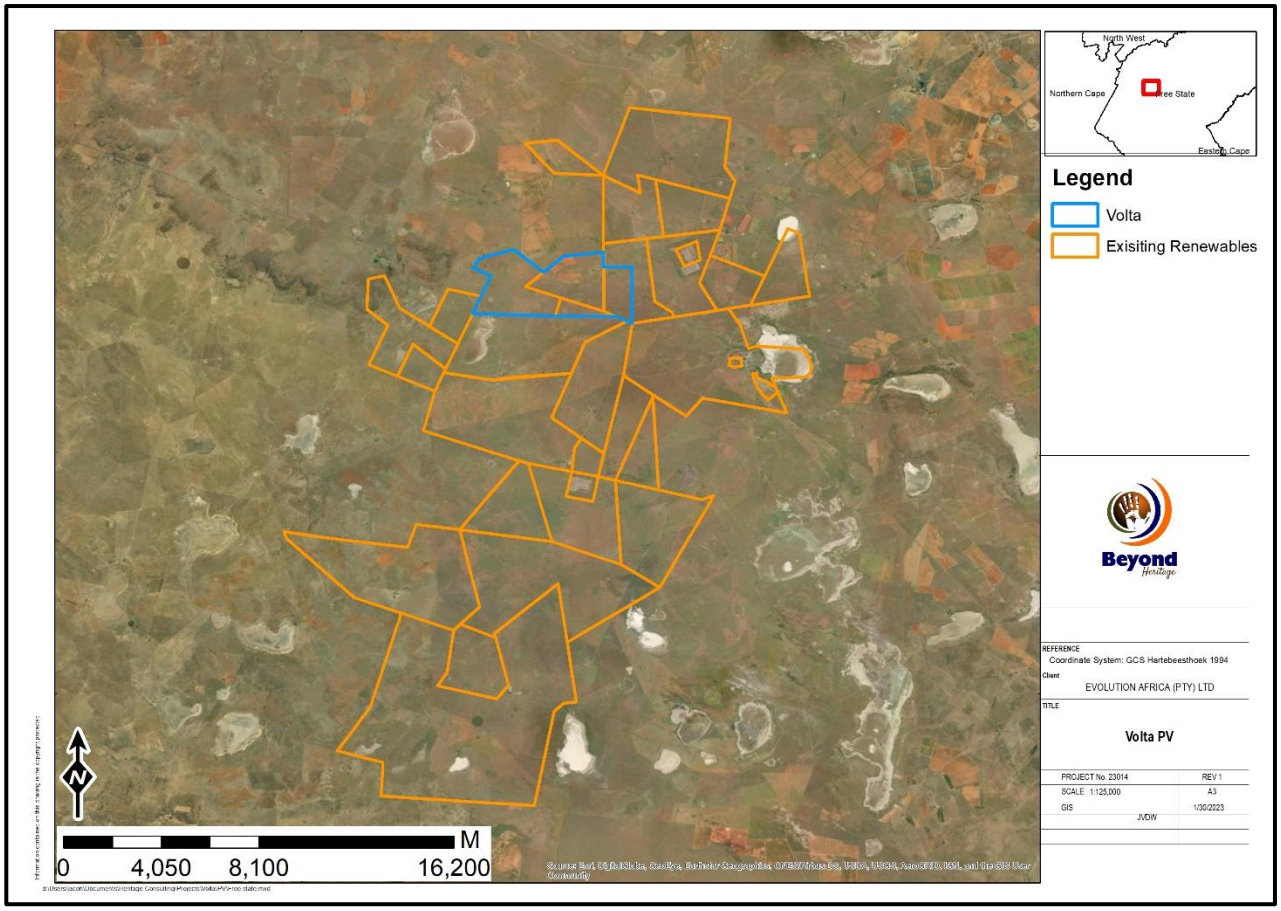


Figure 9.5. Renewable projects within a 30 km radius of the Volta PV Project.

9.1.4 Impact Assessment

Table 9. Impact assessment of the Project on isolated Stone Age scatters (VT01 and VT12).

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**24 (Low)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • The Stone Age Scatters are isolated, out of context and scattered too sparsely to be of significance apart from mentioning them in this report. No additional preconstruction mitigation is required for this aspect.		
Cumulative impacts: The proposed Project will have a low cumulative impact as no significant heritage resources will be adversely affected.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

9.1.5 Indirect impacts:

Indirect impacts can occur during the construction and operation phase of the development. Potential indirect impacts can be mitigated by ensuring that all development activities occur within the development footprint and employees are trained to avoid areas of heritage significance.

9.1.6 The No-Go alternative

From a heritage point of view the project is feasible and the no-go alternative is not required.

10 Conclusion and recommendations

Large scale cultivation occurred throughout much of the study area (Figure 1.2). These activities would have destroyed surface indicators of heritage sites if any ever existed in these areas and based on HIA's conducted in the area heritage finds are located at pans or river gravels, rocky outcrops/hills and at farmsteads. The study area (and adjacent farm portions) was previously assessed by Orton (2016) that recorded Stone Age scatters, Historical Ruins, Burial sites, and a potential stock enclosure.

The applicant went to great lengths to minimise impacts to heritage resources. The initial HIA by Orton (2016) provided a solid baseline of heritage resources in the study area supplemented by the current assessment and based on these results it was possible to eliminate impacts to significant heritage

resources by preserving these sites in-situ with an appropriate buffer zone (more than 50 meters for the remains of ruins and more than 100 meters from the burial site) to facilitate the long-term protection of these features.

Based on the current lay out the low-density background Stone Age scatters at VT01 and VT12 will be directly affected by the PV development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report and the impact on the occurrences is low.

The palaeontological sensitivity of the study area is moderate to high, and an independent study was conducted for this aspect (Bamford 2022). Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr.

The DFFE site sensitivity verification is included as Appendix 1. No adverse impact to heritage resources is expected from the Project and it is recommended that the Project can commence on the condition that the following recommendations (Section 10) are implemented as part of the EMPr and based on approval from SAHRA.

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the Project may only proceed based on approval from SAHRA:

Recommendations:

- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction;
- Recorded heritage features should be indicated on development plans and construction crews should be made aware that these sites should be avoided with the applicable buffer zones;
- Once construction commences all aspects of the Project should be carried out within the approved footprint so as to avoid impacts to heritage resources;
- Any additional changes to the layout should be subjected to a heritage walkdown prior to development.

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines applicable to the Chance Find procedure is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2.2 Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or trace fossils) should be put aside in a suitably protected place. This way the Project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites in the dolomites or the Quaternary bones, rhizoliths, traces. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the Project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished, then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the Project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

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10.4 Potential risk

Potential risks to the proposed Project are the occurrence of intangible features, sub surface cultural material and unrecorded burial sites. This can cause delays during construction and additional costs involved in mitigation, as well as possible layout changes.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 10. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Cultural Resources Chance Finds	Entire Project area	ECO	Weekly (Pre construction and construction phase)	Proactively	• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 11. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction.	Construction	Throughout the Project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
Project Area	Once construction commences all aspects of the Project should be carried out within the approved footprint so as to avoid impacts to heritage resources;	Pre construction and Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report
Project Area	Recorded heritage features should be indicated on development plans and construction crews should be made aware that these sites should be avoided with the applicable buffer zones.	Pre construction and Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report
Project Area	Any additional changes to the layout should be subjected to a heritage walkdown prior to development.	Pre construction and Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 35, 36 and 38 of NHRA	ECO Checklist/Report

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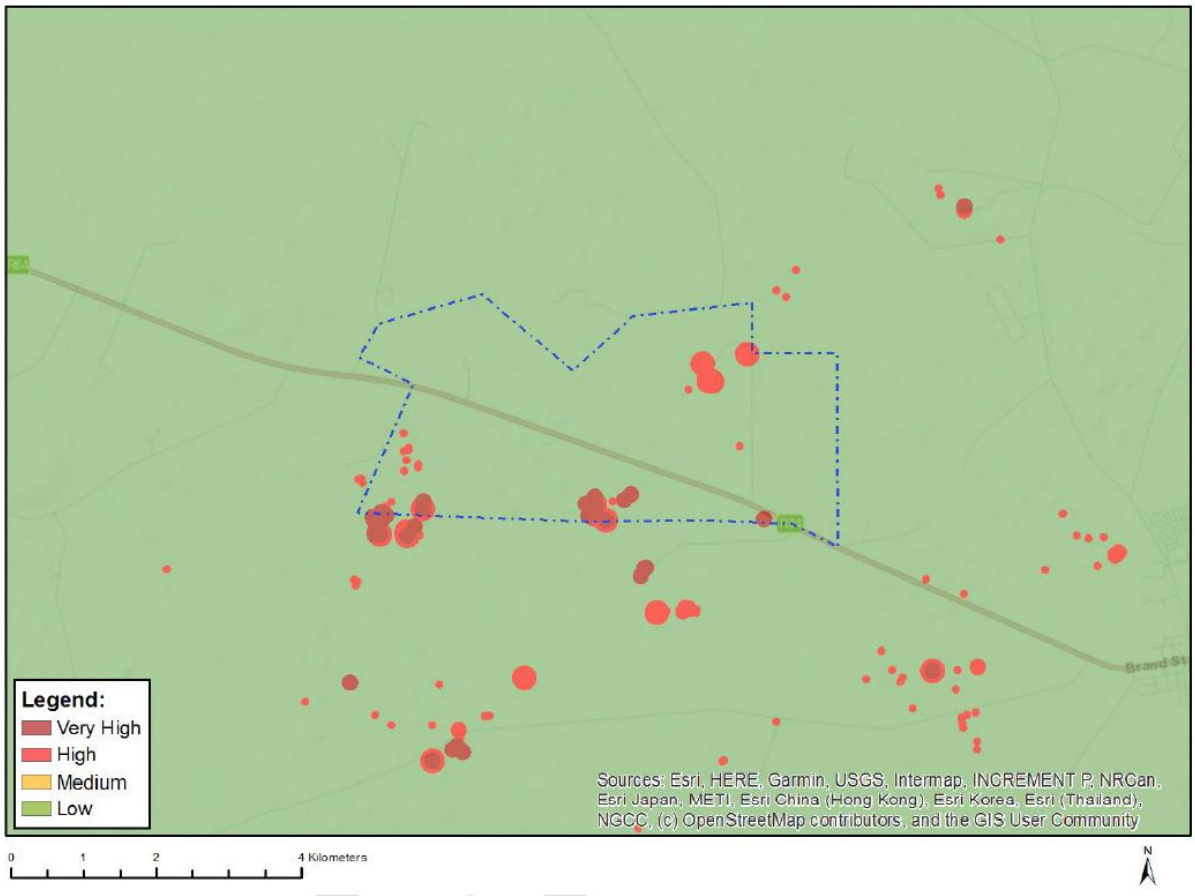
Appendix 1: Department Forestry, Fisheries and Environment (DFFE) National Screening Tool -Site Sensitivity Verification

The Department of Environment, Forestry and Fisheries (DFFE) requires the submission of a report generated from the national web-based environmental Screening Tool. The DFFE Screening Tool for the Volta PV facility indicated very high sensitivity heritage sites (see Map 1). Note that the area screened incorporates the farms but the locations of PV and BESS footprints within the farms avoided very high sensitivity sites. The approach was to avoid sensitive heritage sites. The initial layout of the PV and BESS footprints used the information from the screening tool to avoid sensitive heritage sites. The layout was revised using preliminary data from this studies' site visit to confirm sensitive sites were avoided



Map A1: The DFFE Screening Tool map of the Relative Archaeological and Cultural Heritage Theme Sensitivity for the Volta PV farms.
(source: https://screening.environment.gov.za/screeningtool/#/pages/welcome)