THE PROPOSED SOLARIS FIELDS PV FACILITY BETWEEN GRAHAMSTOWN AND SOMERSET EAST, EASTERN CAPE: WESTERN PRIORITY AREA – 400MW SOLAR PV FACILITY

Heritage Impact Assessment

Issue Date: 11 November 2021
Revision No.: **0.2**
Project No.: 444HIA

PGS HERITAGE

+ 27 (0) 12 332 5305 | +27 (0) 86 675 8077 | contact@pgsheritage.co.za | PO Box 32542, Totiusdal, 0134

Offices in South Africa, Kingdom of Lesotho and Mozambique

Head Office:
906 Bergarend Streets
Waverley, Pretoria,
South Africa

Directors: HS Steyn, PD Birkholtz, W Fourie

Declaration of Independence

I, Cherene de Bruyn, declare that –

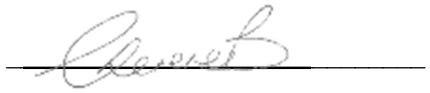
General declaration:

- I act as the independent heritage practitioner 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 heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

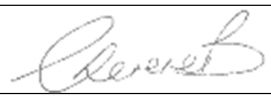
Disclosure of Vested Interest

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

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd
CONTACT PERSON: Cherene de Bruyn – Archaeologist
Tel: +27 (0) 12 332 5305
Email: cherene@pgsheritage.co.za

SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	***THE PROPOSED SOLARIS FIELDS PV FACILITY BETWEEN GRAHAMSTOWN AND SOMERSET EAST, EASTERN CAPE: WESTERN PRIORITY AREA – 400MW SOLAR PV FACILITY 1***		
Control	**Name**	**Signature**	**Designation**
Author	**Cherene de Bruyn**		**Archaeologist/ PGS Heritage**
Internal review	**Wouter Fourie**		**Principal Heritage Specialist**
Reviewed	**Jo-Anne Thomas**		**Environmental Consultant**

CLIENT: Savannah Environmental (Pty) Ltd

CONTACT PERSON: Jo-Anne Thomas
Tel: +27 (0)11 656 3237
E-mail: joanne@savannahsa.com

SIGNATURE: _____

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Savannah Environmental (Pty) Ltd (Savannah) to undertake a Heritage Impact Assessment (HIA) and Palaeontological Impact Assessment (PIA) which will serve to inform the Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) for the proposed Solaris Fields PV Facility between Grahamstown and Somerset East, Eastern Cape.

The proposed development forms part of a cluster of renewable energy development that will include several wind energy facilities as well as solar photovoltaic (PV) facilities. The location of the wind and solar energy facilities and grid connection infrastructure is within the Cookhouse Renewable Energy Development Zone (REDZ) and the Eastern Corridor of the Strategic Transmission Corridors. The site is split into two definitive areas, namely:

- Eastern development area situated close to Makhanda with access from the Nquara Harbour being along the N2 to Grahamstown, along the R335 to Bedford and the development site.
- The Western Priority development area is situated immediately to the west of the N10 up to Somerset East.

This HIA aims to evaluate the possible impacts on heritage resources present within the proposed development footprint of the Solaris Fields PV Facility.

A team of heritage specialists developed an integrated HIA to evaluate the possible immediate and direct impacts on heritage resources present within the footprint and adjacent area for cumulative impacts. Immediate and direct impacts on archaeological and palaeontological resources were addressed through the HIA and a PIA (**Appendix C**).

Site Name and Location

Solaris Fields (Pty) Ltd is proposing the development of a commercial solar PV facility and associated infrastructure on a site located approximately 36km south-east of Somerset East and 28km south-west of Cookhouse within the Blue Crane Route Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province.
The project site consists of four affected properties:

- Portion 9 of the farm Britzkraal No 253,
- Portion 8 (a Portion of Portion 7) of the farm Britzkraal No 253,
- Portion 7 of the farm Britzkraal No 253,
- Portion 1 of farm Bothas Hoop 358

A preferred project site with an extent of ~4037ha has been identified by Solaris Fields (Pty) Ltd as a technically suitable area for the development of the Solaris Fields PV Facility.

It should be noted that the proposed Solaris Fields PV Facility is situated in the Cookhouse REDZ and the Eastern Corridor of the Strategic Transmission Corridors. The REDZ was proclaimed in February 2018 (published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018; and Government Gazette 43528, Notice 786 for consultation with the intention to identify three additional REDZ to the eight REDZ and allows for the completion of a BA in the case of large-scale wind and solar developments situated within the REDZ

Fieldwork

The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was undertaken by way of intensive walkthroughs of the study area. The fieldwork was conducted over several days on 23 March 2020 as well as from 8 to 13 June 2020. This fieldwork team consisted of an archaeologist (Cherene de Bruyn) and a field assistant (Pascal Snyman). No heritage resources or burial grounds were identified within the proposed project footprint.

Palaeontology

According to the PIA conducted by Banzai Environmental (Butler, 2021) the proposed development is underlain by the underlain by the Dwyka Group; the Fort Brown Formation of the Ecca Group (Karoo Supergroup), Adelaide Subgroup (Koonap and Middleton Formations, Beaufort Group, Karoo Supergroup) and the Witteberg Group of the Cape Supergroup, Karoo Dolerite, and Quaternary deposits.

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Dwyka Group is Low, the Collingham Formation, Rippon Formation, Fort Brown Formation of the Ecca Group is Moderate, while the Prince Albert Formation has a High and the Whitehill Formation of the Ecca has a Very High Palaeontological Sensitivity. The Adelaide Subgroup also has a Very High Palaeontological Sensitivity, Dolerite is igneous in origin and thus has an Insignificant Paleontological Sensitivity while that of Quaternary deposits is Low but locally High (Almond et al, 2013; SAHRIS website).

A 3-day site-specific field survey of the development footprint was conducted on foot and by a motor vehicle on 20 November to 23 November 2020. No visible evidence of fossiliferous outcrops was found.

Cultural Landscape

The Solaris Fields Solar PV Facility is located within an area is sparsely populated (less than 10 people per km^2) and consists of a landscape of wide-open spaces and very little development. The entire proposed development envelope is located within the Cookhouse REDZ and Strategic Transmission Corridor. The vegetation cover in the region is primarily grassland and low shrubland, with some forest and woodland occurring along the banks of the Brak and Little Fish Rivers. The terrain morphology is described as lowlands (plains) with parallel hills, and even though the study area is predominantly flat, there are a number of prominent ridges to the south. The Little Fish River (to the north-east) is the only perennial river in the study area.

Impact Statement

Analysis of the various components of the HIA indicates a mitigated low negative impact on heritage resources and are expanded on below.

Historical structures

No historical structures of heritage significance were identified within the footprint area of the PV facility.

Burial Grounds and graves

No burial grounds or graves were identified.

Palaeontology

An assessment of the possible impacts of the proposed project on Palaeontological resources has shown that unmitigated impacts consist of a medium negative impact mostly confined to the construction phase of the project. **By implementing the mitigation measures as listed in this report these impacts can be managed to neutral.**

Cultural landscape

An assessment of the possible impacts of the proposed project on the overall cultural landscape (CL) has shown that unmitigated impacts consist of a high negative impact mostly confined to the construction and operation phase of the project. **By implementing the mitigation measures as listed in this report these impacts can be managed to high negative.**

Cumulative Impacts

Considering the development of other renewable facilities (including wind and solar facilities) located next to the Solaris Fields PV Facility and within the broader Grahamstown (Makanda region) the cumulative unmitigated impacts on the cultural landscape (CL) and palaeontological resources consist of a medium to high negative impact mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of heritage resources. **However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to low negative.**

Recommendations

The following mitigation measures are listed in Table 1.

Table 1 - Heritage management recommendations.

Area and site no.	Mitigation measures
General project area	• Implement a chance to find procedures in case possible heritage finds are uncovered. • A detailed "walk down" of the final approved solar PV locations, access roads, powerlines and substations will be required before construction commences. • Any heritage features of significance identified during this walk down will require formal mitigation (i.e. permitting where required) or where possible a slight change in design could accommodate such resources. • A Heritage management plan (HMP) for the heritage resources needs to be compiled and approved for implementation during construction and operations where heritage features of significance are identified.
Possible graves	• When graves are discovered/ uncovered the site should be demarcated with a 30-meter no-go-buffer-zone and the grave should be avoided. • Undertake archaeological monitoring at earth clearance stage. • If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the ECPHRA under the NHRA and National Health Act regulations. • If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.
Palaeontological finds	• If fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the EO in charge of these developments. • Fossil discoveries ought to be protected and the EO/site manager must report to ECPHRA
Cultural Landscape	Refer to **Table 9** of this report.

Findings

The assessment of the possible impacts on the archaeological, historical and palaeontological resources has shown a Low impact from the Solaris Fields PV Facility project after mitigation measures. It is further considered that the project can have a potential positive influence on such resources in the region when the proposed conservation initiative from the project considers such resources as part of a larger development strategy.

The assessment of the CL indicated that the project will have a significant Moderate to High impact on the CL. The general mitigation measures for renewable energy development in areas of CL significance as proposed by Jansen and Franklin, (2021) as well as Lavin (2021) will still result in a marginal reduction of impact.

It must further be considered that the addition of the infrastructure of the Solaris Fields PV Facility will constitute an additional layer to the CL and must be considered as such within a gazetted REDZ area. Through the implementation of the economically feasible recommendations as set out in the CLA and contained in this report it will be possible to preserve older layers of the CL and in some cases even enhance them through consideration such as the use of older name places in the naming of infrastructure and enhancing local heritage through the incorporation of such structures in project conservation initiatives to name a few.

Analysis of the findings of the SEIA for this project further reveals that the economic benefit for the region and the overall energy needs such project addresses outweighs the need for conservation of cultural resources at all costs. The economic benefit for the region and the overall energy needs such a project address to outweigh the need for the exclusion of the Solaris Fields PV Facility to conserve cultural resources at all costs. Especially where a project is situated within a gazetted REDZ area.

The overall impact of the Solaris Solar PV Facility, on the heritage resources identified during this report, is considered as acceptable after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

Cherene de Bruyn –Author (Heritage Impact Assessment)

- Accredited Professional Archaeologist (ASAPA)

Wouter Fourie – Co-Author (Heritage Impact Assessment)

- Accredited Professional Heritage Practitioner (APHP)
- Accredited Professional Archaeologist (ASAPA)

Dr Elize Butler – Palaeontological Specialist –Bamzai

- Member of the Palaeontological Society of South Africa (PSSA)

Refer to Appendix B for CVs specialist

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

TERMINOLOGY AND ABBREVIATIONS

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Cultural Landscapes Terminology

"perceptual qualities" Aspects of a landscape which are perceived through the senses, specifically views and aesthetics.

"cultural landscape" A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992). Includes and extends beyond the study site boundaries.

"cultural landscape area" These are single unique areas which are the discrete geographical areas of a particular landscape type. Each will have its own individual character and identity, even though it shares the same generic characteristics with other areas of the same type.

"study site" The study site is assumed to include the area within the boundaries of the proposed development

"characteristics" elements, or combination of elements, which make a particular contribution to distinctive character.

"elements" individual components which make up the landscape, such as trees and fences.

"landscape character" A distinct, and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.

"landscape character assessment" This is the process of identifying and describing variation in the character of the landscape. It seeks to identify and explain the unique

combination of elements and features (characteristics) that make landscapes distinctive. This process results in the production of a Landscape Character Assessment.

"sense of place" The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

"scenic route" A linear movement route, usually in the form of a scenic drive, but which could also be a railway, hiking trail, horse-riding trail or 4x4 trail.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influences its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

Earlier Stone Age

The archaeology of the Stone Age between ~300 000 and 3 300 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999, NHRA).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa

Holocene

The most recent geological time period which commenced 10 000 years ago.

Later Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Site

Site in this context refers to an area place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

Table 2 – List of abbreviations used in this report

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
BA	Basic Environmental Assessment
BESS	Battery energy storage system
BGG	Burial Grounds and Graves
CL	Cultural Landscape
CLA	Cultural Landscape Assessment
CRM	Cultural Resource Management
DFFE	Department of Forestry, Fisheries and the Environment
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIA practitioner	Environmental Impact Assessment Practitioner
ESA	Earlier Stone Age
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
O&M	Operation and Maintenance
PGS	PGS Heritage (Pty) Ltd
PIA	Palaeontological Impact Assessment
PV	Photovoltaic
RE	Renewable Energy
REDZ	Renewable Energy Development Zone
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SEIA	Social Economic Impact Assessment
VIA	Visual Impact Assessment
WEFs	Wind Energy Facilities

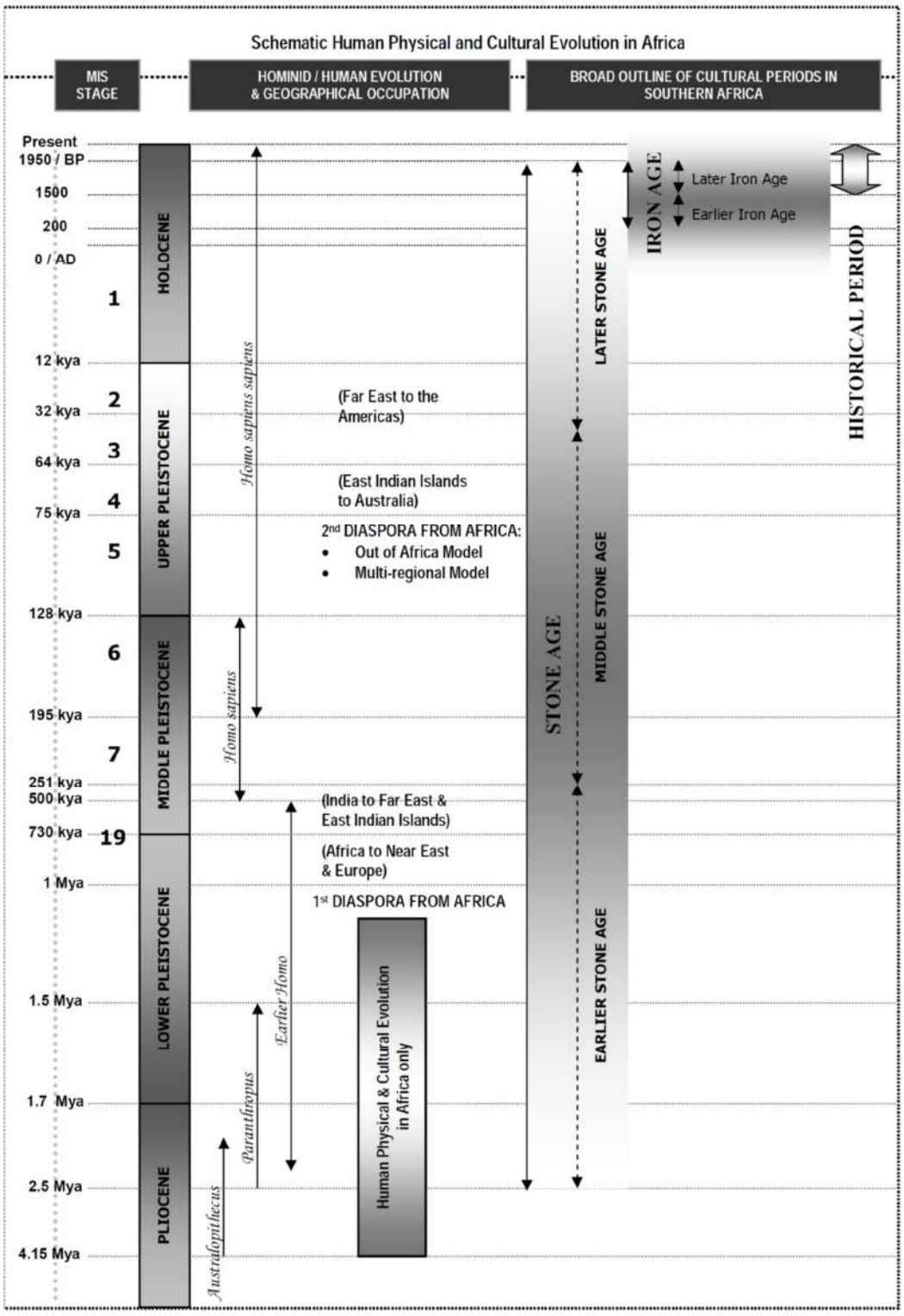


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Savannah Environmental (Pty) Ltd (Savannah) to undertake a Heritage Impact Assessment (HIA) and Palaeontological Impact Assessment (PIA) which will serve to inform the Basic Assessment Report (BAR) and Environmental Management Programme (EMPr) for the proposed Solaris Fields Solar PV Facility between Grahamstown and Somerset East, Eastern Cape.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area considered for the development of the Solaris Fields Solar PV Facility. The HIA aims to inform the BAR in the development of a comprehensive EMPr to assist the project applicant in responsibly managing the identified heritage resources in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

The staff at PGS have a combined experience of nearly 90 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

Cherene de Bruyn, the author of this report, is registered with ASAPA as a Professional Archaeologist and is accredited as a Principal Investigator and Field Director, she is further also a member of the International Association for Impact Assessment South Africa (IAIASA). She holds a MA in Archaeology, BSc (Hons) in Physical Anthropology and a BA (Hons) in Archaeology.

Elize Butler the director of Banzai Environmental (Pty) Ltd has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 10 years. She has been conducting Palaeontological Impact Assessments since 2014.

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current vegetation cover. Due to time restrictions and the large extent of the proposed project area the survey was limited to priority areas, that most likely to contained heritage resources. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4 Identification of Policies, Legislation, Standards & Guidelines

1.4.1 *Statutory Framework: The National Heritage Resources (Act 25 of 1999)*

The NHRA has applicability, as the study forms part of an overall HIA in terms of the provisions of Section 34, 35, 36 and 38 of the NHRA and forms part of a heritage scoping study that serves to identify key heritage resources, informants, and issues relating to the palaeontological, archaeological, built environment and cultural landscape, as well as the need to address such issues during the impact assessment phase of the HIA process.

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources are specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under s38(8) and requires comment from the Eastern Cape Provincial Heritage Resources Authority (ECPHRA).

1.4.2 *Section 3 - National estate*

3)Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

a) its importance in the community, or pattern of South Africa's history;
b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;

d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
i) sites of significance relating to the history of slavery in South Africa.

1.4.3 *Section 34 – Structures*

According to Section 34 of the NHRA, no person may alter, damage or destroy any structure, which forms part of the sites built environment older, that is 60 years without the necessary permits from the relevant provincial heritage authority.

1.4.4 *Section 35 – Archaeology, Palaeontology and Meteorites*

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, Palaeontological Impact Assessments (PIA) is required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period.

1.4.5 *Section 36 – Burial Grounds & Graves*

A section 36 permit application is made to the ECPHRA which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the following conditions:

Permitting requirements for burial grounds and graves older than 60 years to the ECPHRA:

a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves.
b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
d) ECPHRA may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

1.4.6 *Section 38 HIA as a Specialist Study within the EIA in terms of Section 38(8)*

The NHRA Section 38 (HIA) application to ECPHRA is required when the proposed development triggers one or more of the following activities:
Permitting requirements for demolition of built environment features:

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

In this instance, the heritage assessment for the property is to be undertaken as a component of the BA process for the project. Provision is made for this in terms of Section 38(8) of the NHRA, which states that:

An HIA report is required to identify, and assess archaeological resources as defined by the Act, assess the impact of the proposal on the said archaeological resources, review alternatives and recommend mitigation (see methodology above).

Section 38 (3) Impact Assessments are required, in terms of the statutory framework to conform to basic requirements as laid out in Section 38(3) of the NHRA. These are:

- The identification and mapping of heritage resources in the area affected
- The assessment of the significance of such resources
- The assessment of the impact of the development on the heritage resources

- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development
- Consideration of alternatives
- Plans for mitigation in the future.

1.4.7 *Cultural Heritage Survey Guidelines and Assessment Tools for Protected Areas in South Africa, May 2017 (Gazetted Dec 2017)*

This guide is meant for those who work in Protected Areas and manage cultural heritage resources. The guide should be used together with the NHRA, the National Environmental Management Act: Protected Areas Act, 2003 (Act No. 57 of 2003), the SAHRA and the ECPHRAGuidelines on Norms and Standards. In lieu of minimum standards guidelines for cultural landscapes assessment specifically in South African legislation, the CHG offers cultural heritage survey guidelines and assessment tools that can be used for the purposes of CLA's in the EIA process.

Tools for inventories of different categories of cultural heritage resources

- Intangible Cultural Heritage

Types: a) Elements of folklore and traditional crafts
b) Elements of oral tradition

- Cultural Landscapes

Characteristics: a) processes – spatial pattern, land uses, response to natural features and cultural traditions
b) components – circulation, boundaries, vegetation, structural types, cluster arrangements, archaeological types, small-scale elements
c) perceptual qualities – views and aesthetics.

1.4.8 *World Heritage Convention*

The United Nations Educational, Scientific and Cultural Organization (UNESCO) Operational Guidelines for the World Heritage Convention (2017) define Cultural Landscapes as:

- Cultural properties that represent the "combined works of nature and of man". They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.
- Cultural landscapes should be selected based on their representation in terms of a clearly defined geo-cultural region and also for their capacity to illustrate the essential and distinct elements of such regions.

- Cultural landscapes often reflect the specific techniques of sustainable land use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature.

1.4.9 *Renewable Energy Development Zone*

The proposed Solaris Fields PV Facility is situated in the Cookhouse Renewable Energy Development Zone (REDZ) and the Eastern Corridor of the Strategic Transmission Corridors. The REDZ was proclaimed in February 2018 (published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018; and Government Gazette 43528, Notice 786 for consultation with the intention to identify three additional REDZ to the eight REDZ) and allows for the completion of a BA in the case of large-scale wind and solar developments situated within the REDZ.

1.4.10 *Notice 648 of the Government Gazette 45421*

Although the minimum standard for archaeological (2007) and palaeontological (2012) assessments were published by SAHRA, Government Notice (GN) 648 requires sensitivity verification for a site selected on the national web-based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this GN is listed in **Table 3** and the applicable section in this report noted.

Table 3 - Reporting requirements for GN648.

GN 648	**Relevant section in report**	**Where not applicable in this report**
2.2 (a) a desk top analysis, using satellite imagery;	section 4	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	section 5	-
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web based environmental screening tool;	section 5	-
2.3(b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	Section 5 provides a description of the current use and confirms the status in the screening report	

An assessment of the Environmental Screening tool provides the following sensitivity ratings for archaeological and heritage resources **(Figure 2)** as well as palaeontological resources as a medium to high (**Figure 3).**

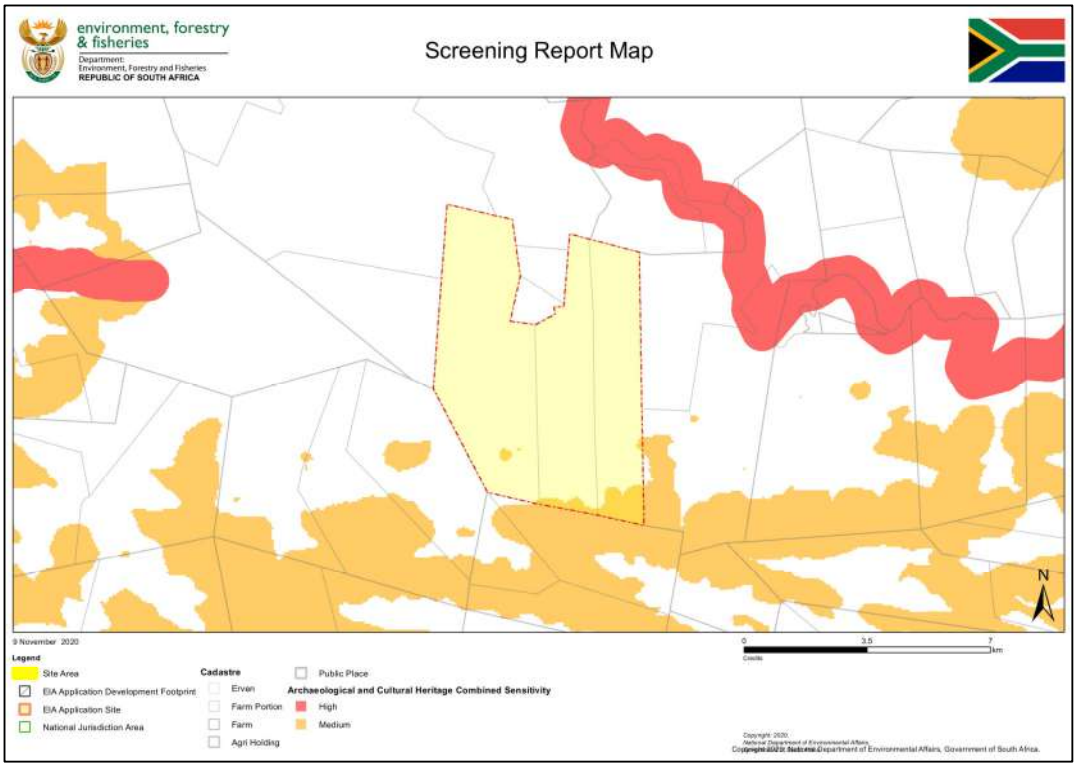


Figure 2: Environmental screening tool - archaeological and heritage sensitivity that includes the Solaris Fields PV Facility project area.

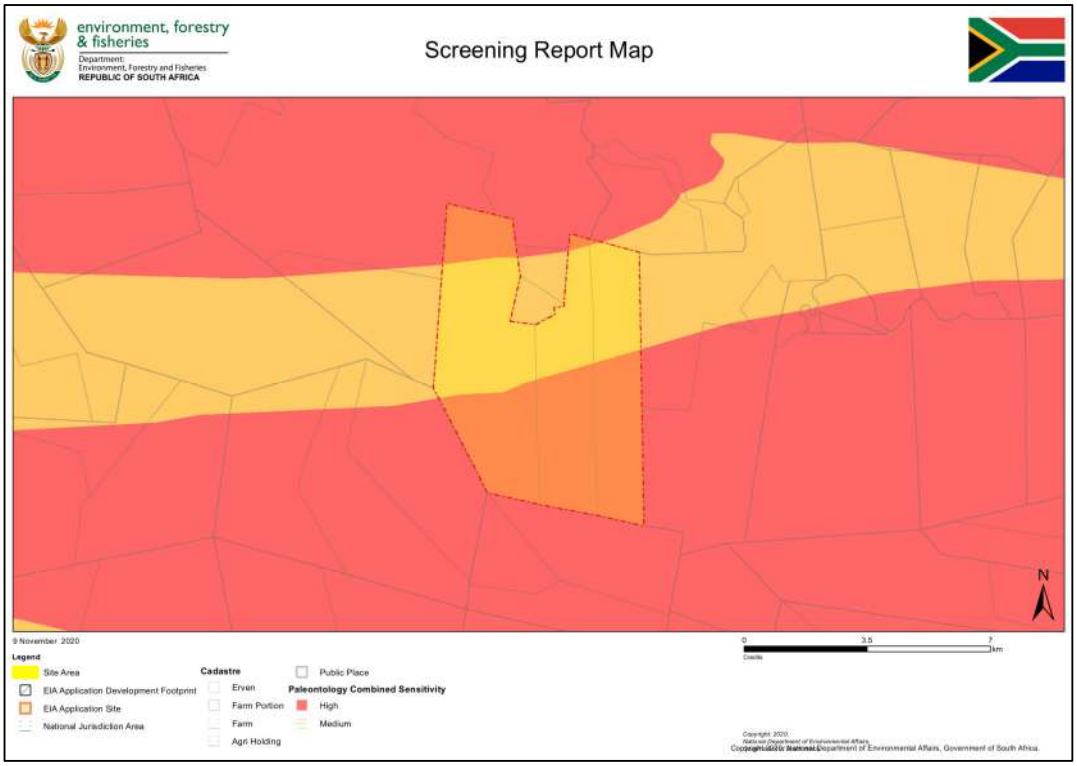


Figure 3: Environmental screening tool - palaeontology sensitivity that includes the Solaris Fields PV Facility project area.

1.4.11 *NEMA – Appendix 6 requirements*

The HIA report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) Appendix 6 requirements for specialist reports as indicated in the table below. For ease of reference, the table below provides cross-references to the report sections where these requirements have been addressed. It is important to note, that where something is not applicable to this HIA, this has been indicated in the table below.

Table 4 - Reporting requirements as per NEMA, as amended, Appendix 6 for specialist reports.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**Relevant section in report**	**Comment where not applicable.**
1.(1) (a) (i) Details of the specialist who prepared the report	Page 2 of Report – Contact details and company	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to **Appendix C**	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 3	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 67	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3 and 4	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3 and **Appendix A and B**	-
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 4 and 5	-
(g) An identification of any areas to be avoided, including buffers	Section 4	-
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 4 and Section 4	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 7 and 8	
(k) Any mitigation measures for inclusion in the EMPr	Section 4	
(l) Any conditions for inclusion in the environmental authorisation		Non required

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 4, 5 and 7	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 8	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 8	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study		Not applicable. A public consultation process was handled as part of the BA and EMPr process.
(p) A summary and copies if any comments that were received during any consultation process		Not applicable. To date no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.		Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	NEMA Appendix 6 and GN648 SAHRA guidelines on HIAs, PIAs and AIAs	

2 SITE LOCATION AND DESCRIPTION

2.1 Locality and Site Description

The following project background and technical description have been supplied by Savannah.

Solaris Fields Fields (Pty) Ltd is proposing the development of a commercial solar PV facility and associated infrastructure on a site located approximately 36km south-east of Somerset East and 28km south-west of Cookhouse within the Blue Crane Route Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province. The entire extent of the site falls within the Cookhouse REDZ and within the Eastern Corridor of the Strategic Transmission Corridors. The facility is known as the Solaris Fields PV Facility.

A preferred project site with an extent of ~4037ha has been identified by Solaris Fields Fields (Pty) Ltd as a technically suitable area for the development of the Solaris Fields PV Facility. The project site consists of four affected properties:

- Portion 9 of the farm Britzkraal No 253,
- Portion 8 (a Portion of Portion 7) of the farm Britzkraal No 253,
- Portion 7 of the farm Britzkraal No 253,
- Portion 1 of farm Bothas Hoop 358

The site is split into two definitive areas, namely:

- Eastern development area situated close to Grahamstown with access from the Nquara Harbour being along the N2 to Grahamstown, along the R335 to Bedford and to the development site.
- The Western Priority development area is situated immediately to the west of the N10 up to Somerset East.

The following infrastructure is encountered in the area:

- Provincial roads (R334);
- Residential properties:
- Agricultural properties;
- Railway lines;
- Power lines.

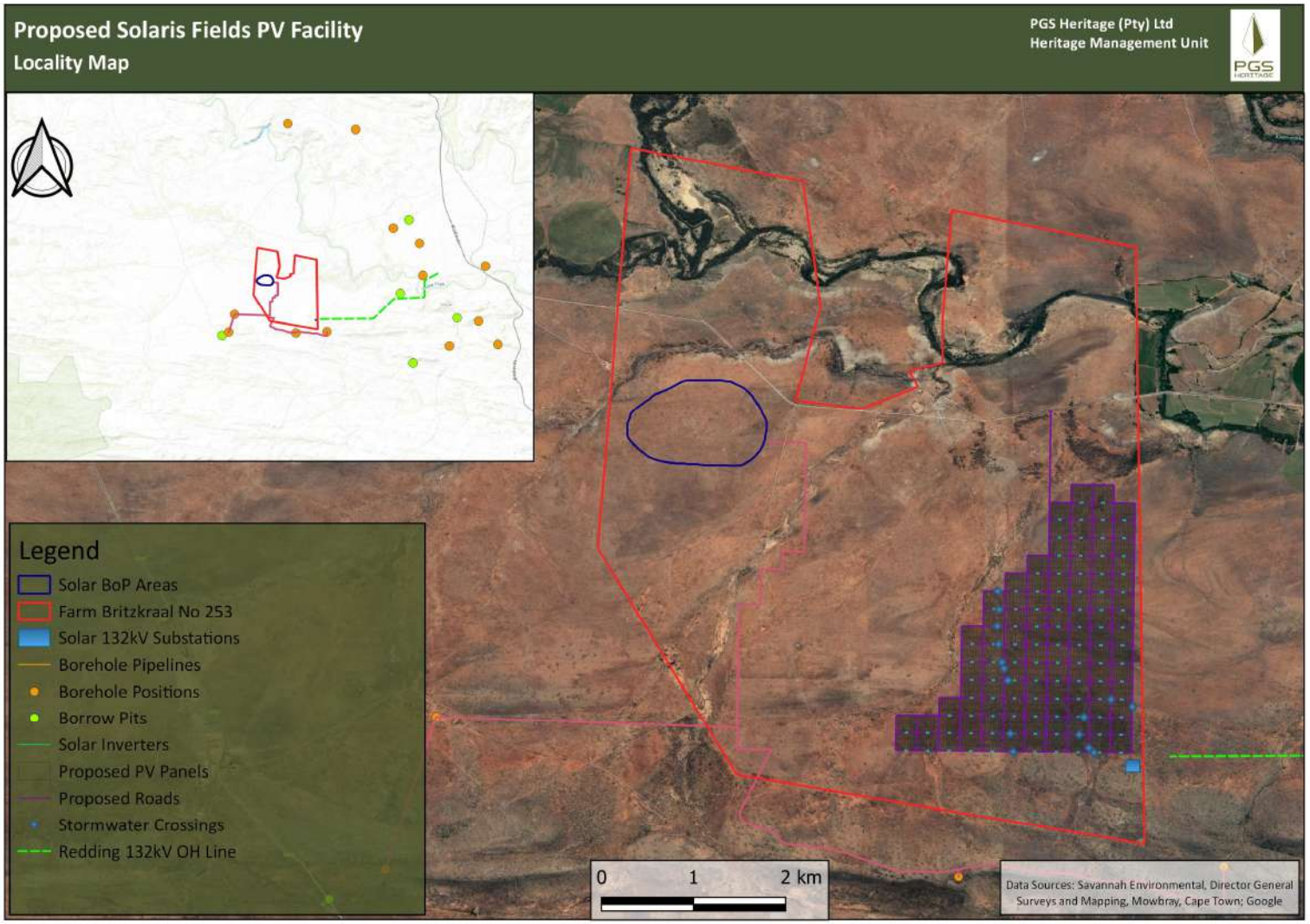


Figure 4 - Locality map of the Solaris Fields PV Facility illustrating the proposed development footprint (i.e. proposed infrastructure) within a regional context

2.2 Project description

The following project background and technical description have been supplied by Savannah.

A development envelope for the placement of the solar facility infrastructure (i.e. development footprint) has been identified within the project site and assessed as part of the BA process. The development envelope is ~500ha in extent and the much smaller development footprint of ~350ha will be placed and sited within the development envelope. The development footprint will contain the following infrastructure to enable the solar facility to generate up to 400MW:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components, lain underground where practical.
- A 132/33kV on-site collector substation to be connected to a proposed 400kV Main Transmission Substation (MTS) located to the north-east of the site via a new 132kV overhead power line (twin turn dual circuit line). The development of the proposed 400kV Main Transmission Substation will be assessed as part of the separate BA process in order to obtain Environmental authorisation.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Temporary laydown areas.
- Access roads to the site and between project components with a width of approximately 4,5m. The main access points will be 8m wide.
- Water supply pipelines from onsite boreholes.
- A temporary concrete batching plant.
- Staff accommodation (temporary).
- Operation and Maintenance buildings including a gate house, security building, control centre, offices, warehouses, a workshop and visitor's centre.

The new 132kV overhead power line to connect to the solar facility to the proposed 400kV Main Transmission Substation will follow a route north-east of the project site to complete the connection. The power line will therefore cross properties located to the north-east of the project site. The majority of these properties form part of the project sites of the adjacent proposed wind farms which forms part of the cluster of renewable energy facilities proposed. The power line is being assessed within a 300m grid connection corridor which will provide for the avoidance of sensitive environment areas and features and allow for the micro-siting of the power line within the corridor..

2.2.1 *Consideration of Alternatives:*

For this project, no other alternatives have been proposed. Alternative layouts for the project could be proposed, if required, depending on the outcome of the several specialist studies forming part of the EIAs process..

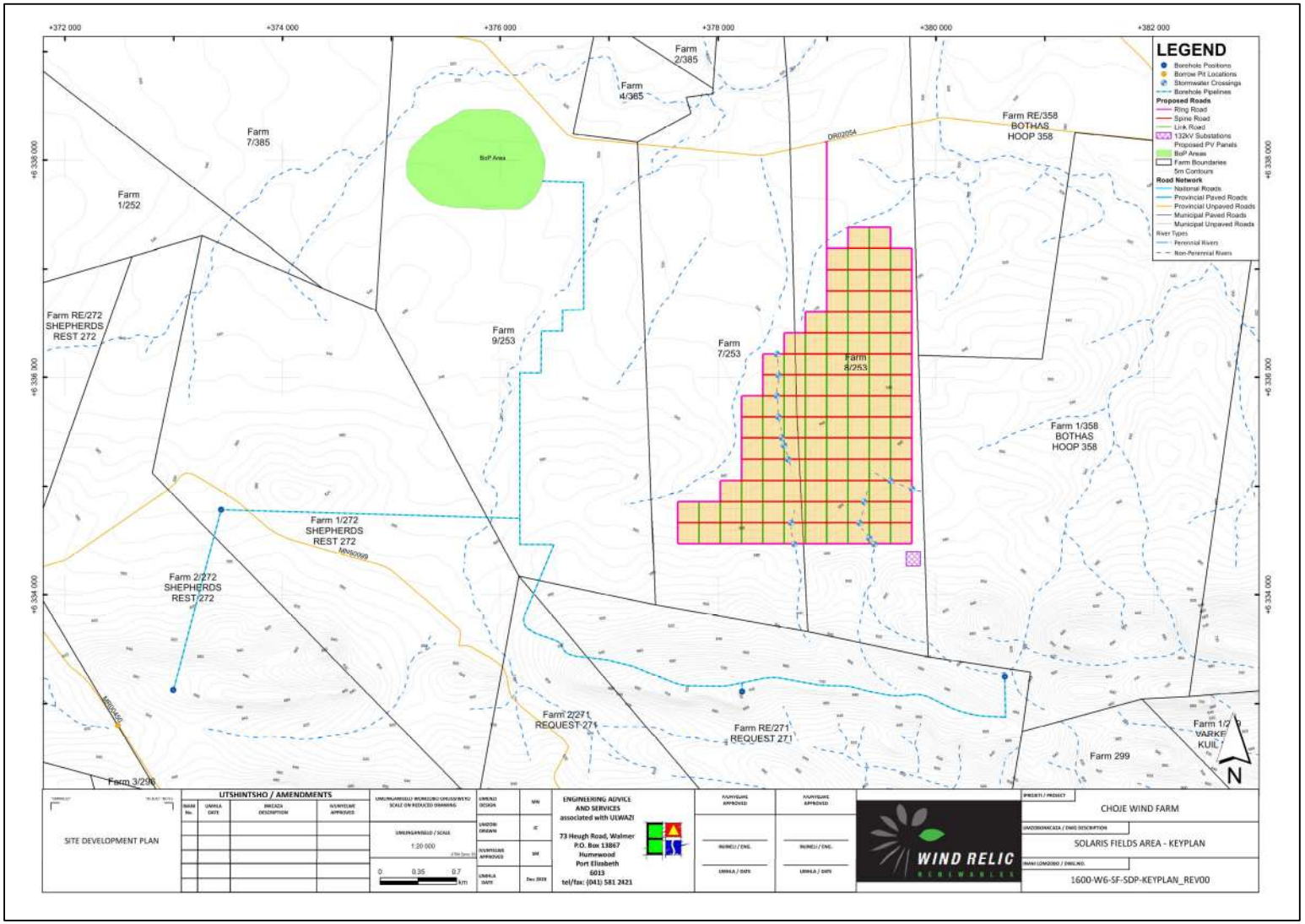


Figure 5 -Solaris Fields PV Facility Site Development Plan (Provided by WindRelic).

3 CURRENT STATUS QUO

3.1 Site Description

The project area falls within the existing agricultural areas surrounding Makhanda (previously known as Grahamstown) and Somerset-East.

According to Mucina & Rutherford (2006) the Solaris Fields PV Facility project area is characterised by the following vegetation type; Albany Broken Veld.

- Albany Broken Veld: *Low mountain ridges and hills with an open grassy karroid dwarf shrubland with scattered low trees (Boscia oleoides, Euclea undulata, Pappea capensis, Schotia afra var. afra) with a matrix of dwarf shrubs (Becium burchellianum, Chrysocoma btuse) and grasses (Eragrostis btuse)" (*Mucina & Rutherford, 2006; Sanbi, 2021).

Existing surrounding land uses associated with the project area include a combination of:

- farming and agricultural areas, and
- dirt roads.

As a result, the vast majority of the site footprint overlays highly disturbed terrain. Overall, the accessibility of the project footprint area was fairly good.

Figure 6 - View of the farm Britzkraal 253.

Figure 7 - View of the flat grassy plains on the farm Britzkraal 253.

4 ASSESSMENT METHODOLOGY

This HIA report was compiled by PGS for the proposed development of the Solaris Fields Solar PV Facility. The applicable maps, tables and figures, are included as stipulated in the NHRA and the NEMA. The HIA process consisted of three steps:

Step I –Desktop Study: A detailed archaeological and historical overview of the study area and surroundings was undertaken. This work was augmented by an assessment of reports and data contained on the South African Heritage Resources Information System (SAHRIS). Additionally, an assessment was made of the available historic topographic maps. All these desktop study components were undertaken to support the fieldwork.

Step II – Physical Survey: The fieldwork was conducted over several days on 23 March 2020 as well as from 8 to 13 June 2020. This fieldwork team consisted of an archaeologist (Cherene de Bruyn) and a field assistant (Pascal Snyman). The fieldwork for the Palaeontological component was completed by a palaeontologist, Elize Butler over a 3-day site-specific field survey from 20 November to 23 November 2020 (as described in the PIA -**Appendix C**).

Step III – The final step involved the recording and documentation of relevant heritage resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

4.1 Archaeological specific methodology

Additional to the preceding methodological description the archaeological methodology included fulfilling the requirements of the NHRA (section 35 and 36) that protects the following features in the landscape:

- Material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- Graves and burial grounds, including ancestral graves, royal graves, graves of traditional leaders, graves of victims of conflict, historical graves and cemeteries, and other human remains not covered by the National Health Act (61 of 2003).

4.2 Palaeontological specific methodologies

In summary, the approach to PIA was as follows. Fossil bearing rock units occurring within the broader study area is determined from geological maps and relevant geological sheet explanations as well as

satellite images. Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological database. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, the palaeosensitivity of the development area and impact significance of the proposed development is assessed together with recommendations for any further specialist palaeontological studies or mitigation. This PIA was undertaken in line with the SAHRA 2016 Minimum Standards for the palaeontological component of heritage impact assessment.

The PIA is contained in Appendix C of this report.

4.3 Cultural Landscape Assessment

4.3.1 *Desktop analysis (including using satellite imagery) and literature review.*

- Review of relevant Visual Impact Assessment (VIA) and Socio-economic Impact Assessment reports (SEIA) on the proposed Solaris Fields PV Facility as well as other relevant assessment reports from the proposed and operational Cookhouse Wind Energy Facilities (WEF);
- Review of relevant academic literature and articles on the cultural landscape (CL) assessment;
- Review of relevant academic literature and articles on the cultural heritage of the regional study area;
- Review of historic and current maps of the study area and surrounds;

4.3.2 *Community engagement*

Limited contact with landowners or farm labourers in and around the proposed development were done as part of the HIA, when they were available, to identify any heritage resources (buildings, kraals, graves, and rock art sites) and to ascertain whether any meaningful intangible heritage resources are associated with any of the built structures or natural features.

The socio-economic impact assessment report for the proposed Solaris Fields PV Facility was consulted to gain insight into cultural landscapes concerns that may have been raised.

5 OVERVIEW OF STUDY AREA AND SURROUNDING LANDSCAPE

5.1 Overview of Study Area and Surrounding Landscape

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Early Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better-made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago (Korsman, & Meyer, 1999; Klein, 2000). Some sites dating to the ESA have been identified in the general area. These are usually concentrations of stone tools found close to watercourses (van Schalkwyk, 2010). One of the more important ESA sites occurs at Ananzi Springs, near Uitenhage. This is the only ESA site in the Eastern Cape that has been excavated (Webley and Hall, 1998). Ananzi Springs was excavated by the late HJ Deacon in the 1970s and wood and seed material, as well as a large number of stone artefacts, was found in situ in the spring deposits (Binneman et al, 2011). Scatters of ESA tools are also often found in hollows between sand dunes like the site of Geelhoutboom near Humansdorp (Webley and Hall, ibid). ESA stone artefacts have been found in the Addo Elephant National Park and amongst the gravels of old river terraces which line most of the Coega River and estuary (Booth, 2011). Furthermore, a scatter of some possible ESA stone artefacts was recorded on one of the adjacent properties with the area of the already authorised Cookhouse Wind Energy Facility (Booth, 2011). *No ESA sites are known from the immediate vicinity of the footprint area.*
250 000 to 40 000 years ago	The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique (Korsman, & Meyer, 1999). Several MSA sites have been identified in the Eastern Cape. Klasies River sites are located on the Tsitsikamma coast between Port Elizabeth and Plettenberg Bay and provide information about anatomically modern people who lived in southern Africa between 110 000 and 120 000 years ago (Steele, 2001; Mitchell, 2002). The Klasies River Mouth was excavated in 1967–1968. During the excavation's pieces of shell, animal bones and some human remains were found, that were associated with an MSA occupation of the site (Rightmire & Deacon, 1991). Evidence of MSA occupation has been found at Strathalan Cave B, located in the Maclear district, north-eastern Cape, approximately 500 km North-east of Uitenhage by Opperman (1996). Apart from stone tools, Opperman also excavated several hearths and grass beddings at the site. A MSA cave site, Howiesons Poort is located near Grahamstown (Shaw & Jameson, 2002). Several stone artefacts including backed blades were excavated from the site. In 1979 Opperman conducted research in the Stormberg region. During this time, he excavated a trench at Grassridge Rockshelter, which is located in the

DATE	DESCRIPTION
	interior region of the Eastern Cape at the base of the Stormberg Mountains contains a rich sequence of late Pleistocene and Holocene occupations (Collins *et al.,* 2017). Opperman focused on the MSA and Late Stone Age (LSA) occupation of the site and identified several stone-age tools. During a rescue excavation by Gess (1969), two MSA lithic artefacts and bone tools were excavated from the Aloe site near St Georges Strand, Port Elizabeth. The Albany Museum database holds records of the occurrence of MSA stone artefacts around the Cradock area and the Department of Archaeology has curated MSA stone artefacts in its collection from the Cradock area including Highlands Rock Shelter excavated by H.J. Deacon during the 1970's (Booth, 2011). *No MSA sites are known from the immediate vicinity of the footprint area.*
40 000 years ago, to the historic past	A number of Later Stone Age (LSA) sites are known to occur in the region, located to the west and north of the study area. The majority of archaeological sites date from the past 10 000 years and are associated with the campsites of San hunter-gatherers and Khoi pastoralists (Binneman *et al.,* 2011). Research by Binneman has shown that a number of very important LSA sites occur in the Kabeljousrivier area (inland of Jeffreys Bay). These sites include artefacts other than stone tools, like ostrich eggshell beads, bone arrowheads, small bored stones and occasionally wood fragments with incised markings (van Schalkwyk, 2010). Archaeologists believe that LSA people moved between the coast and the inland areas according to a seasonal pattern. Rock art sites are also associated with the LSA. These rock art sites are found mostly in the sandstone caves and shelters around Uitenhage, Grahamstown and Alicedale (Webley and Hall, 1998). Another rock shelter, Mafusing 1 containing LSA lithics, pottery and rock art is located near Matatiele. The site was excavated in 2011 as part of the Matatiele Archaeology and Rock Art or MARA research programme (Pinto *et al.,* 2018). There are many San hunter-gatherer sites in the nearby Groendal Wilderness Area and adjacent mountains. Here, caves and rock shelters were occupied by the San during the LSA and contain numerous paintings along the walls. The last San/KhoiSan group was killed by Commando's in the Groendal area in the 1880's (Binneman *et al.,* 2011). LSA stone artefact manufacture site and ceramic sherds have also been found in the Winterberg Mountain Range (Booth, 2011). LSA occupational deposits of the few caves and rock shelters surrounding Grahamstown that have been excavated, namely Melkhoutboom in the Suurberg (Deacon 1976), Wilton near Alicedale, Uniondale about 20km north-east of Grahamstown (Leslie-Brooker 1987), Springs Rock Shelter and Glen Craig situated immediately north and north-east of Grahamstown, and Edgehill and Welgeluk located on the Koonap River some 40km to the north of Grahamstown (Hall 1985). *No LSA sites are known from the immediate vicinity of the footprint area.*
AD 450 – AD 750	In the Eastern Cape, Early Iron Age (EIA) sites asscoated with early farming communities dating to around the eighth century AD (700s) have been identified at Kulubele on the Kei River and Canasta Place near East London. Excavations at Kulubele have identified evidence of ironworking, ceramic sculptures, grain pits and sheep bones, and highly decorated potsherds have been found at Canasta Place (Fourie, 2011). However, Canasta Place probably

DATE	DESCRIPTION
	represents the most southerly evidence of early farmers in the Eastern Cape (Hall & Webley, 1998). EIA sites have also been found within the Great Kei River Valley (Booth, 2011). EIA sites have also been recorded by Opperman's (1987) during his research at Colwinton (located approximately 400km north east of Uitenhage) and Bonawe, near Barkley East (Mazel, 1992). At these sites, Iron age ceramics date to AD775. Bonawe rock shelter is located near Elliot, approximately 500km north-east of Uitenhage. The site contains both end-Pleistocene and Holocene material (Booth, 2012). Some 2 000 years ago Khoi pastoralists occupied the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goat and cattle) and ceramic vessels to southern Africa (Binneman, 2011). *No EIA sites are known from the immediate vicinity of the footprint area.*
AD 1650 – AD 1850	Hilltop settlement is mainly associated with Later Iron Age (LIA) settlement patterns asscoated with early farming communities that occurred during the second millennium AD (Booth, 2011). LIA settlements have been formally recorded by the Albany Museum and cover a relatively extended area including within the nearby Koonap River Valley between Bedford and Grahamstown (Booth, 2011). The Nguni groups of South African can be divided into four distinct groups: the Zulu-speaking peoples, the Xhosa-speaking peoples, the Swazi people from Swaziland and adjacent areas and the Ndebele people (SA History, 2019c). Around the 1600s the Xhosa groups began expanding their power. Tshawe founded the Xhosa kingdom by defeating the Cirha and Jwarha groups (Peires, 1982; SA History, 2019c). His descendants expanded the kingdom by settling in new territory and bringing people living there under the control of the amaTshawe (SA History, 2019c). As the Xhosa expanded their influence westwards, the came into contact with Khoi and San groups. The Khoi and San groups were later intermarried into the Xhosa culture Jwarha groups (SA History, 2019c). His descendants expanded the kingdom by settling in new territory and bringing people living there under the control of the amaTshawe (SA History, 2019c). From about 1700, emaXhoseni, the place of the Xhosa or Xhosaland, stretched roughly along the seaboard of South Africa between the Mbashe River and the Sundays River, from the slopes of the Khahlamba, Amathole and Winterberg mountains down the coast (Peires, 1982; Fourie, 2011). As the first European settlers started moving north from the Cape they came into contact with Xhosa speaking groups. In the Eastern Cape, the 18th and 19th centuries is marked with conflict and wars between the European settlers and the Xhosa groups (SA History, 2019c). A marked change in the conflict appeared in 1820, when John Brownlee founded a mission on the Tyhume River near Alice, and William Shaw established a chain of Methodist stations throughout the Transkei (SA History, 2019c). There are records of Observation Posts that were constructed under the leadership of Sir John Cradock, to keep the Xhosa from crossing the Fish River (Booth, 2011). These were in place and functioning between 1812 and 1817. Positions of observation posts include Addo Heights Post (Addo), Rautenbach's Drift (Addo), Sandflats (Paterson), Coerney, Swartwaterspoort and Kommadagga (Coetzee 1994; Booth, 2011). Several historical features

DATE	DESCRIPTION
	and buildings were recorded during the survey for the already authorised Cookhouse Wind Energy Facility. *No LIA sites are known from the immediate vicinity of the footprint area*

5.2 Historical Background of Grahamstown, Riebeeck East

5.2.1 *Grahamstown (now known as Makhanda)*

Before the arrival of the British settlers, the Albany, Bathurst and Alexandria regions were known as the Zuurveld (Corry, 1920). When Britain reoccupied the Cape in 1806, the new administration found itself faced with several conflicts with the Xhosa on the Eastern frontier, as the border, the Great Fish River, was regularly breached by raiders who attacked the white farmers in the region (Erasmus, 1995). In 1811 the Xhosa launched a full-scale attack against the settlers (Erasmus, 1995). This attack is known as the fourth frontier war (Erasmus, 1995). During the attack, some 20 000 Xhosa warriors stormed and drove away from the settlers once and for all (Erasmus, 1995). Many of the structures in the region were severely damaged.

In an effort to counter such an invasion Governor Sir John Cradock decided to build a line of blockhouses along the Fish River, and Colonel John Graham was selected for the task (Erasmus, 1995). When Colonel John Graham came upon the partially destroyed remains of the Rietfontein homestead he decided to build his military headquarters and garrison there (Erasmus, 1995). Grahamstown was founded in 1812 by Colonel John Graham as a frontier garrison post near the Xhosa territory (Cory, 1920). The plans for the new village were drawn up by John Knobel, the district surveyor of Uitenhage, and the first residential stands were sold in 1815 (Erasmus, 1995). The Rietfontein homestead was repaired and served as the garrison's officers mess (Erasmus, 1995). The first school in Grahamstown opened in 1814 near the wall of the garrison (Erasmus, 1995). Convent High, seen as the first "proper" school in Grahamstown opened in 1849 (Erasmus, 1995). On 22 April 1819, a large number of Xhosa warriors, under the leadership of Nxele (or Makanda), launched an attack against the British colonial forces. During the fifth frontier war, about 10 000 Xhosa Nxele (or Makanda) attacked the garrison (Erasmus, 1995). The 350 men at the garrison stood their ground and drove away the Xhosa leaving 1000 dead (Erasmus, 1995). With the arrival of settlers in 1820 and their migration through the eastern cape, they began to farm (Erasmus, 1995). Records relating to the distribution of the 1820 Settlers suggest that the point at which the wagon parties divided and went their respective ways took place on the farm called Assegai Bosch (Webley 2007). Here the wagon tracks split either to Salem or to Grahamstown (Webley & Way-Jones, 2007).
In 1822 Grahamstown was proclaimed the seat of the magistracy of the new district of Albany (**Figure 8),** with Colonel Jacob Cuyler appointed as the first landdrost (Erasmus, 1995).

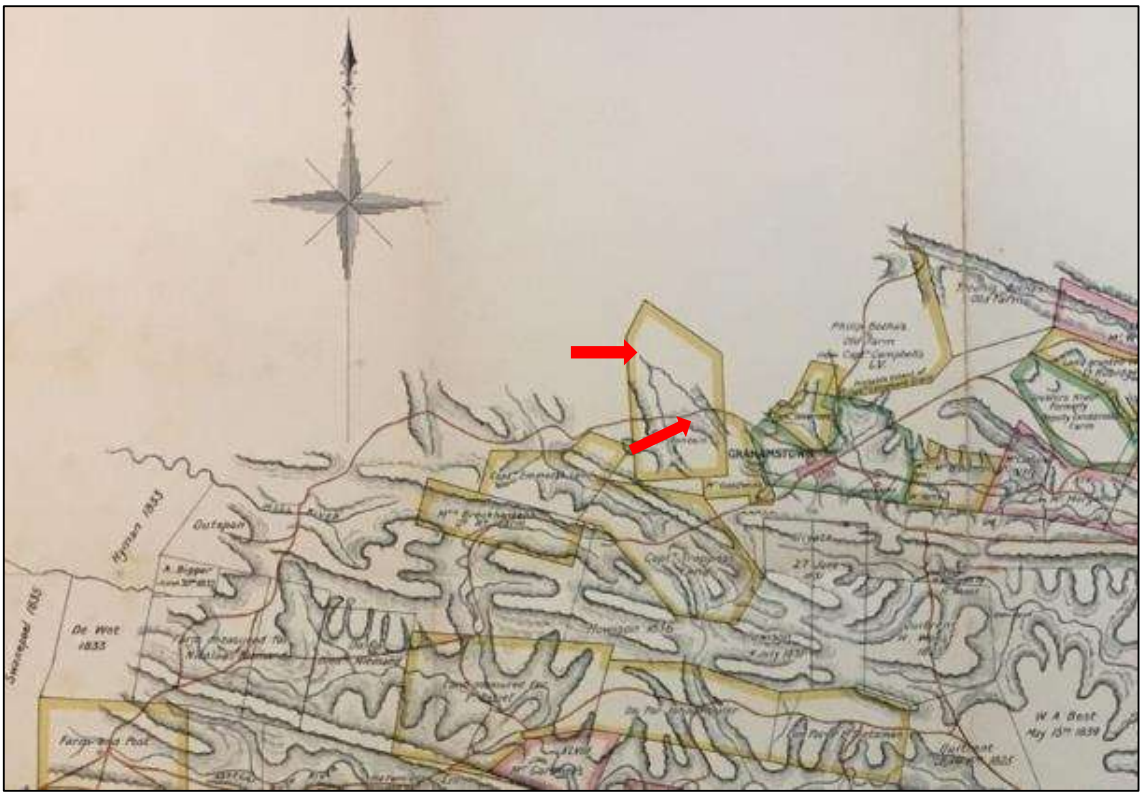


Figure 8 - Map showing District of Albany in the Colony of Good Hope, and the location of the old roads, and the approach to Grahamstown through the farm "Zyfer Fontein'' and ''Mr Goodwins (Red Arrow) (Source: Campbell, 1897). The study area is located to the northwest of Grahamstown and not depicted on the map.

In 1822 Grahamstown was proclaimed the seat of the magistracy of the new district of Albany, with Colonel Jacob Cuyler appointed as the first landdrost (Erasmus, 1995). In 1962 the town received full municipal status (Erasmus, 1995). Throughout 1834-1850 conflict still brewed between the Xhosa's and the settlers. During this time the sixth, seventh and eight frontier war was fought (Figure 10) (Erasmus, 1995). Several heritage sites are located to the east of Grahamstown including the declared Provincial Heritage Site of Fraser's Camp Signal Tower, constructed in 1843 during the Frontier Wars and the nearby Fraser's Camp, constructed a few years earlier (1835 / 1836), as well as the Maranatha Mission, dating to circa. 1909 (Van Ryneveld, 2016).

Figure 9 - Map showing of the Eastern Frontier in 1860 (Source: Militaryhistorysa, 2017). (Study area depicted by the red square).

5.2.2 *Riebeek East*

In 1820 British Settlers was sent to colonize the Zuurveld area and to act as a buffer between the new colonies in the west and the Xhosa tribes in the east. The settlement of the British settlers led to an "anglicizing" of the area (Riebeeck East, 2013). Many of the independent Afrikaner farmers that lived in the area remained loyal to the Dutch Reformed Church and had to travel to Graaf-Reinet and Uitenhage to attend church services (Riebeeck East, 2013). The Afrikaans speaking community of farmers in the Albany District sent a petition for their own church, but this was declined on the basis that the English church in Grahamstown should be used by the Dutch congregation in the same way that the Dutch church in Cape Town is used by the English (Riebeeck East, 2013). One of those signatories to this petition was Piet Retief, one of the leaders of the Great Trek (Riebeeck East, 2013).

In 1830 another petition to the government was sent, and Captain Campbell, the civil commissioner was instructed to appoint elders and deacons (Theal, 2010). The new elders and deacons were installed by reverent Alexander Smith in January 1831 (Theal, 2010). The first visiting preacher was Dr George Morgan who presided at the first church gathering on 7th May 1831 on the farm Driefontein (Theal, 2010; Riebeeck East, 2013). On 2 April 1839, the church appointed Dr John Pears, as the first resident clergy (Theal, 2010; Riebeeck East, 2013). In April 1840 the church council bought the farm Mooimeisiesfontein,

for the purpose of establishing a village and building a church (Theal, 2010; Riebeeck East, 2013). The farm Mooimeisiesfontein had belonged to Mr Piet Retief (Theal, 2010). The village of Riebeek was established in 1842 and was named in honour of the first Dutch Governor of the Cape, Jan van Riebeeck. Its name was amended to Riebeek East in about 1881 to differentiate it from its namesake in the Division of Malmesbury (SA History, 2019).

5.2.3 *Cookhouse*

Located on the west bank of the Great Fish River, which, until 1819 formed the eastern boundary of the Cape Colony (Erasmus, 1995). The origin of the name of the town is still debated (Van Schalkwyk, 2011). Troops patrolling the boundary often camped in these parts and eventually built small stone houses in which they sheltered and cooked (Erasmus, 1995). Some of these “cookhouses” were still visible into the 20th century, although most of them have disappeared (Erasmus, 1995). The railway from Port Elizabeth to the diamond fields in Kimberley reached Cookhouse in 1880 (Erasmus, 1995). The original railway between Cookhouse and Bedford runs over the Farm Request as well as the original road between Cookhouse and Grahamstown (now known as Makhanda) (Booth, 2011). According to various databases consulted it has approximately 15 houses, buildings and other structures listed as provincial heritage sites.

5.2.4 *Somerset East*

As early as 1771 land was allotted to farmer Willem Prinsloo on the banks of the Little Fish River at the Foot of the Boschberg (Erasmus, 1995). Later, part of this land came into possession of Louis Trichardt. Trichardt’s successful cultivation of tobacco on his land prompted Lord Charles Somerset to establish Somerset Farm (Erasmus, 1995). Lord Charles Somerset, the governor at the Cape from 1814 to 1826, founded in 1814 an experimental farm in the shadow of the Boschberg. Here many different crops were grown, including tobacco which was in short supply due to the British-American War (Gaigher, 2010). After the ending of that war, tobacco production on the farm ceased but it continued to help provision the army garrison (Gaigher, 2010).

In 1825 a township was laid out on the grounds of this farm and was named after Lord Somerset (Gaigher, 2010). The "East" was to distinguish it from the other Somerset ("West") near Cape Town and was only added 30 years later. The first street of this new township was Paulet Street, at the foot of the Boschberg, and still contains many properties dating from this early era (Gaigher, 2010). In 1835 a volunteer mounted unit of about 170 of the town's citizens was formed to take part in the 6th Frontier War and also saw action in subsequent wars (Gaigher, 2010). When Dr William Gill, the district surgeon, died in 1863 he bequeathed most of his estate for an institution of higher learning but with the stipulation that none of the money is spent on erecting or acquiring buildings (Gaigher, 2010). According to the SAHRIS database Somerset East has approximately 15 houses, buildings and other structures listed as Grade II sites.

5.3 Archival/historical maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Topographic maps (1:50 000) for various years (1946,1976 and 1989) were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The maps were also used to assess the possible age of structures located, to determine whether they could be considered as heritage sites. Map overlays were created showing the possible heritage sites identified within the areas of concern, as can be seen below **(Figure 10-Figure 12).**

The relevant topographical maps include:

- Grahamstown Topographic map. 1901.
- 3325BA Bracefield, surveyed in 1967 and drawn in 1968 by the Trigonometrical Survey Office. Printed and published by the Government Printer 1968.
- 3325BA Bracefield, surveyed by the Chief Director of Surveys and Mapping. Printed and published by the Government Printer 1986.
- 3325BB Kommadagga, surveyed in 1967 and drawn in 1968 by Trigonometrical Survey Office. Printed and published by the Government Printer 1968.
- 3325BB Kommadagga, surveyed by the Chief Director of Surveys and Mapping. Printed and published by the Government Printer 1986

It can be seen that all the map sheets consulted depict the entire project area surrounded by several huts, as well as old agricultural fields. Historical roads are also depicted.

No SG Diagrams were found for the following:

- Farm Botha's Hoop 358
- Farm Britzkraal No 253

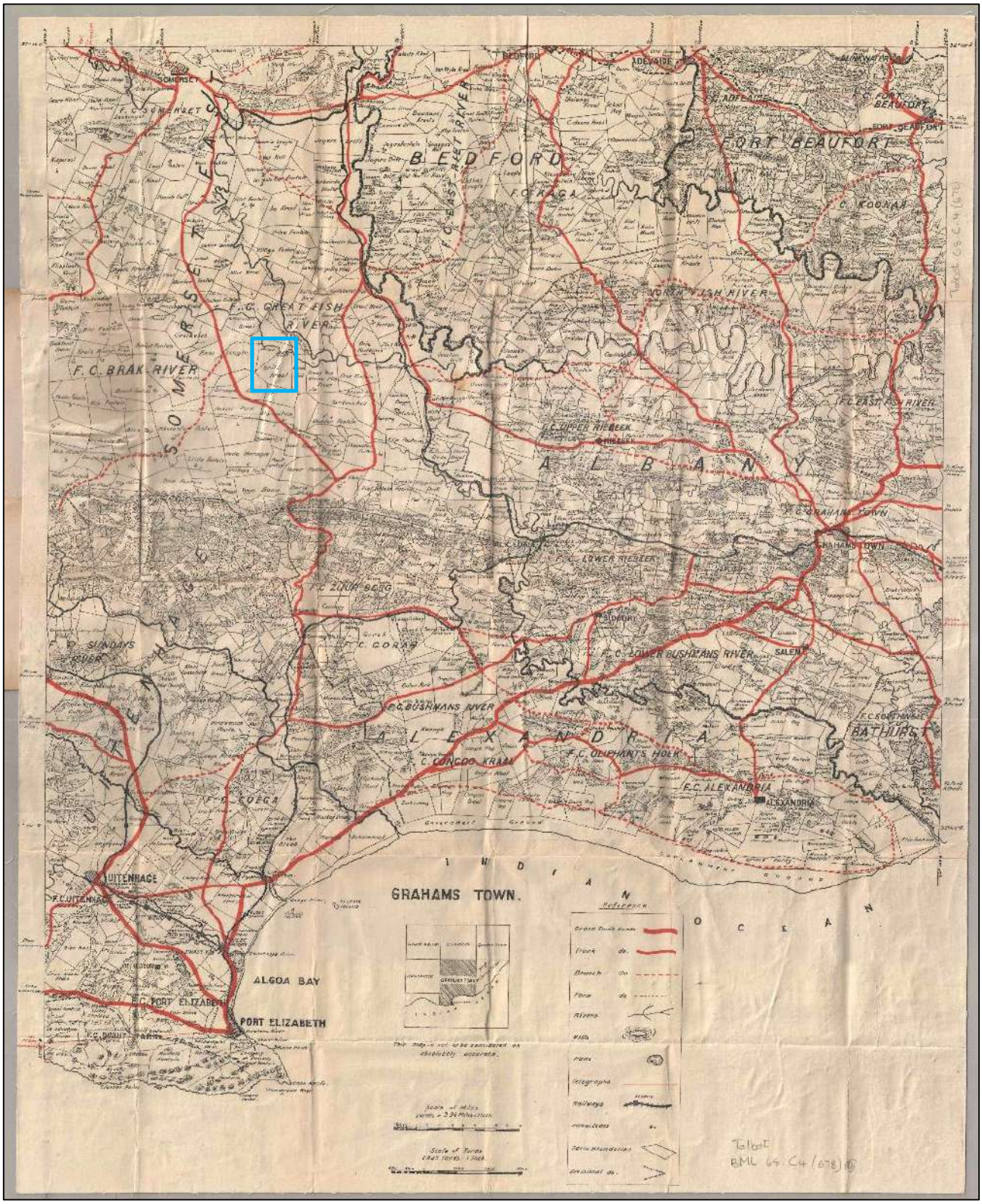


Figure 10 –Topographic map Grahams Town dating to 1901 showing the several farms, in the project area (blue polygon).

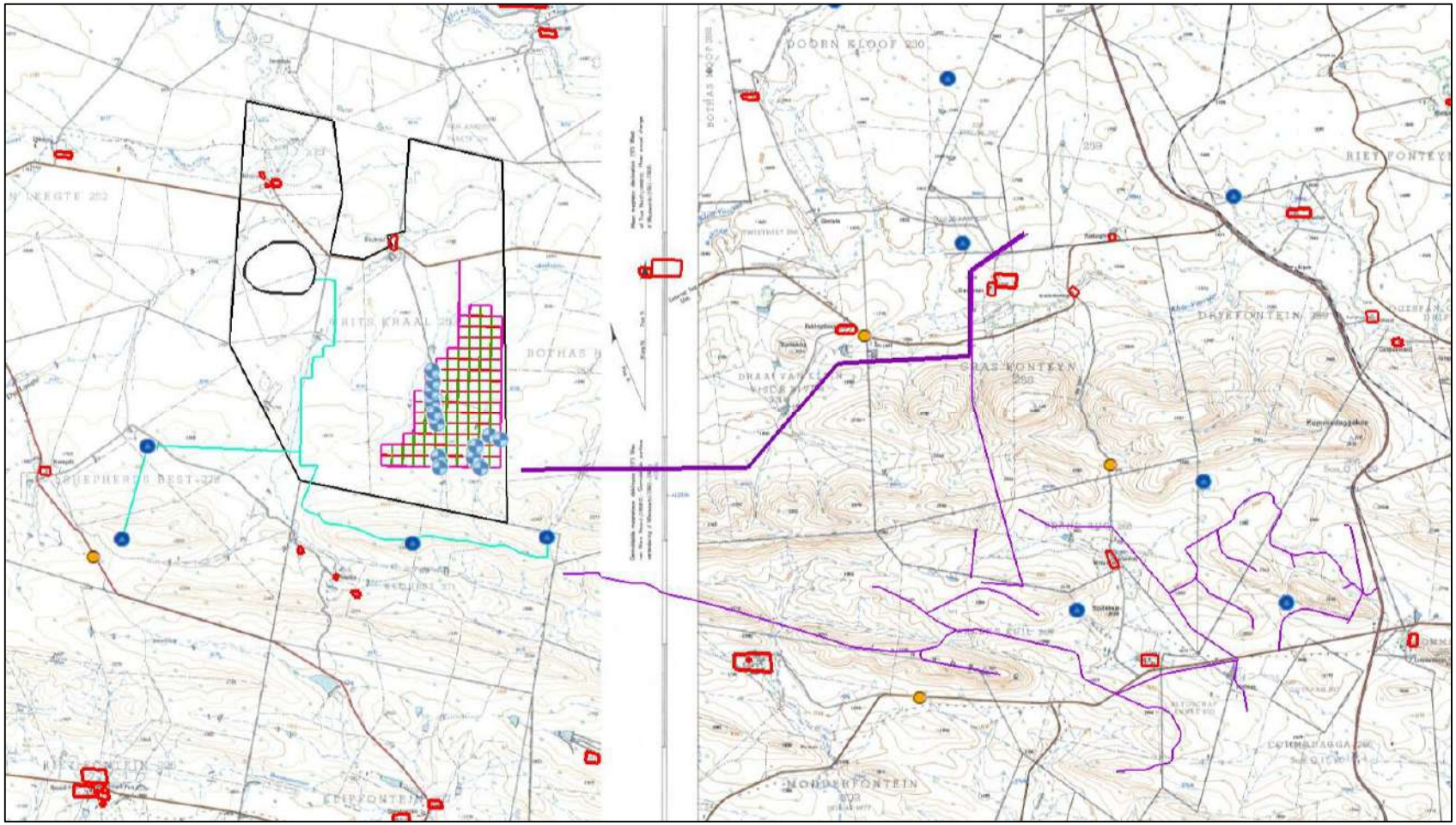


Figure 11 – First Edition Topographic maps (1:50 000) 3325BA Bracefield (1968) and 3325BB Kommadagga (1967) showing the farm Britzkraal, with several heritage features (red polygons) located in close proximity to the project area (black polygon).

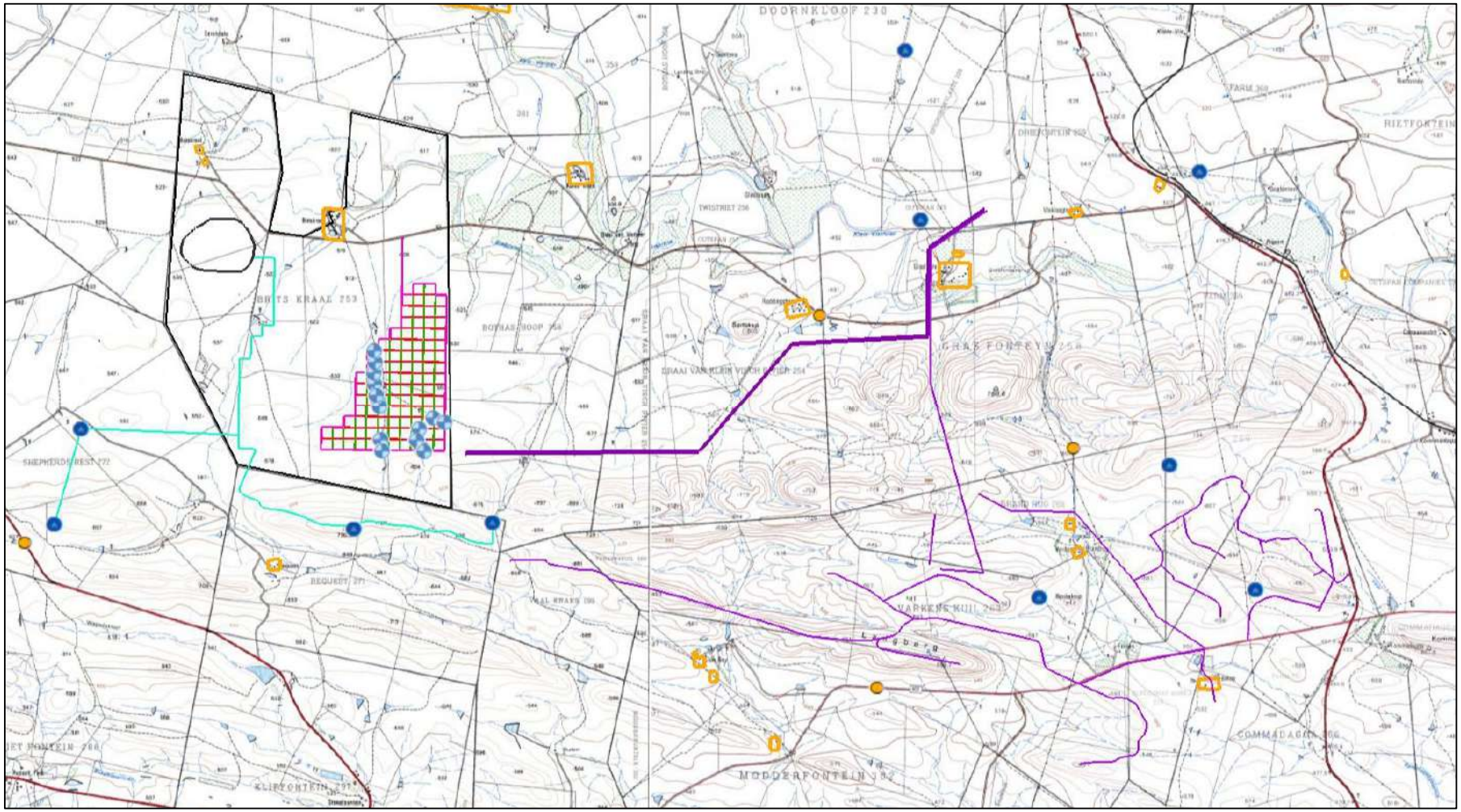


Figure 12 – Second Edition Topographic maps (1:50 000) 3325BA Bracefield (1986) and 3325BB Kommadagga (1986) showing the farm Britzkraal, with several heritage features (orange polygon) located in close proximity to the project area (black polygon).

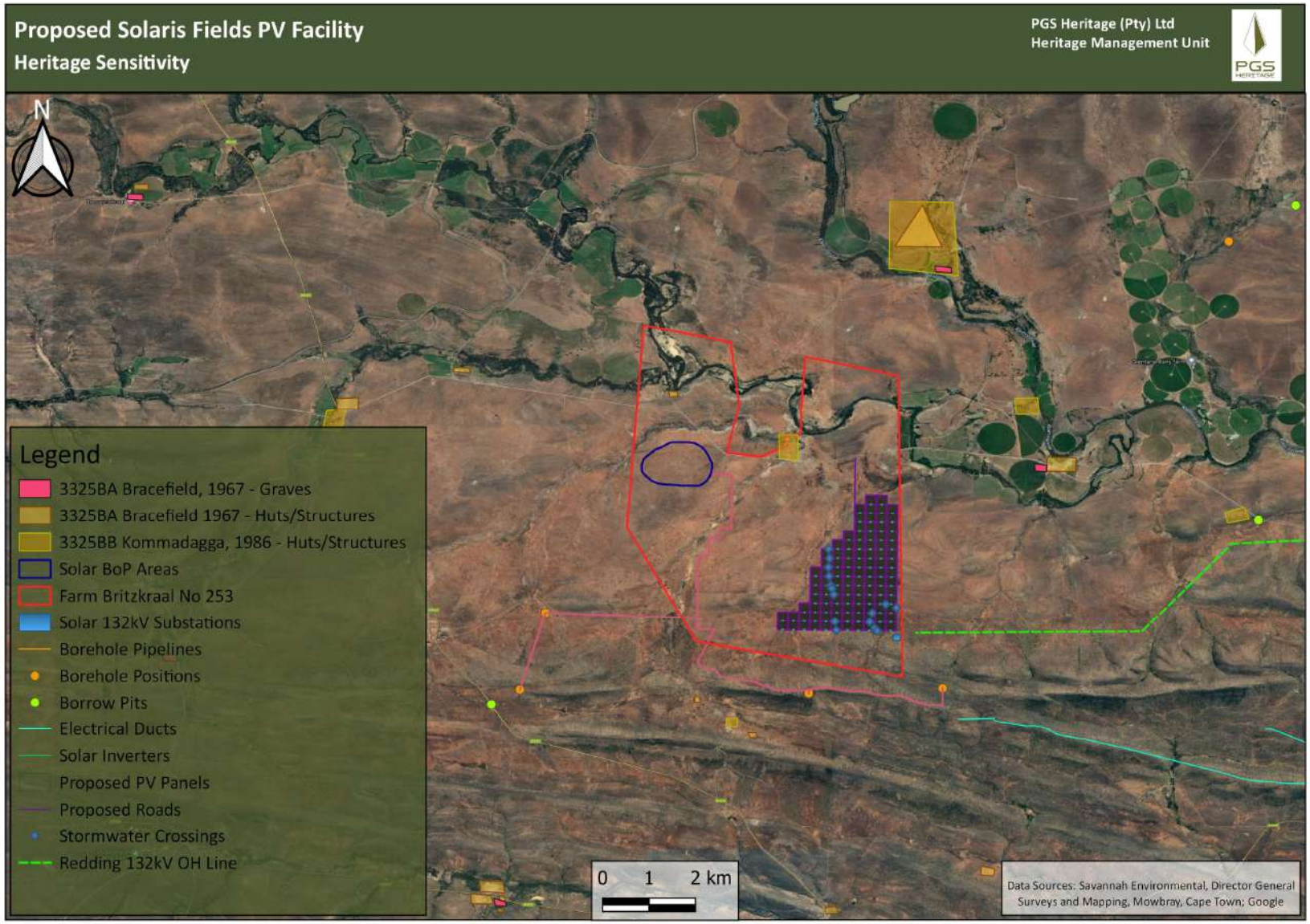


Figure 13 – Heritage sensitivity map indicating possible sensitive areas around and within Solaris Fields PV Facility – Overview map.

5.4 Palaeontological background

The geology of the proposed Western Block renewable energy facilities is indicated on the 1: 250 000 3224 Graaff-Reinet (1993) and 3324 Port Elizabeth (1990) Geological Maps **(Figure 14**Error! Reference source not found.**).**

The Western Block of the Renewable Energy Facilities is underlain by the:

- Dwyka Group
- Collingham Formation, Whitehill Formation, Prince Albert Formation, Rippon Formation, Fort Brown Formation (Ecca Group, Karoo Supergroup),
- Koonap Formation, Middleton Formation and Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup),
- Dolerite

5.4.1 *Dwyka Group*

The Permo-Carboniferous Dwyka Group is the oldest deposit in the Karoo Supergroup and spans the Late Carboniferous to Early Permian. The Dwyka Group overlies the glaciated Precambrian bedrocks in the north and unconformably and paraconformably the Cape Supergroup in the south. In the east, it overlies the Natal Group and Msikaba Formation unconformably. Glacial pavements underlying the Dwyka Group has well-developed striations (specifically in the north) (Johnson et al, 2006). The Dwyka Group is believed to be deposited in a marine basin (Visser, 1989). South Africa was covered by an ice sheet during the Dwyka. These deposits were thus deposited in a cold, glacially dominated environment. This Group consists mainly of gravelly sediments with mudstones with scraped and facetted pebbles and subordinate vorved shales. Dark grey tillite was deposited by retreating glaciers (Visser et al, 1987) and thus the Dwyka is known for its rich assemblage of dropstones of various sizes.

The Permo-Carboniferous Dwyka Group is known for its trackways (trace fossils) that was formed by fish and arthropods, while fossilized faeces have also been recovered. Body fossils consist of gastropods, invertebrates and marine fish. Fossil plants from this group include a rich diversity of conifers, cordaitaleans, glossopterids, ginkgoaleans, horsetails, lycopods, pollens and spores ferns (Almond and Pether, 2008).

5.4.2 *The Ecca Group*

Ecca Group consists of the following Formations (from youngest to oldest Formation):

- The **Prince Albert Formation** is confined to the south-western half of the Karoo Basin. The northern facies are characterised by the predominance of greyish to olive-green, micaceous shale and grey, silty shale, as well as a pronounced transition from the underlying glacial deposits. Dark-grey to black carbonaceous shale and fine- to medium-grained feldspathic arenite and wacke are also present. The southern facies is characterised by the predominance of dark-grey, pyrite-

bearing, splintery shale, siltstone and the presence of dark-coloured chert and phosphatic nodules and lenses.

- The mudrocks of the **Whitehill Formation** consist of shale that is very thinly laminated and contains up to 14% carbonaceous material. The Whitehill Formation loses its distinctive lithological character towards the northeast with its lower part containing siltstone and very fine-grained sandstone.
- Outcrops of the **Collingham Formation** are confined to the southern and western margins of the Main Karoo Basin. The formation is generally between 30 and 70m thick and comprises a rhythmic alternation of thin, continuous beds (average 5cm) of hard, dark grey, siliceous mudrocks and very thin beds (average 2cm) of softer yellowish tuff (K-bentonite). In the western part of the area, minor sandstone and siltstone units occur in the upper half of the formation, while the distinctive Matjiesfontein Chert Bed (0.2-0.6m thick) is present in the lower half.
- The **Ripon Formation** consists of poorly sorted, fine- to very fine-grained lithofeldspathic sandstone alternating with dark grey clastic rhythmite and mudrock.
- The **Fort Brown Formation** consists of rhythmite and mudrock with minor sandstone intercalations and displays an overall coarsening-upward tendency. At certain localities, one or more fairly prominent sandstone units occur some distance below the upper contact. Individual sand/silt and silt/clay layers comprising rhythmite units of similar thickness, ranging from a few millimetres to a few centimetres, are laterally persistent.

The fossil assemblage of the **Ecca Group** is trace fossils. This trace fossil assemblage of the non-marine Mermia Ichnofacies, is dominated by the ichnogenera Umfolozia (arthropod trackways) and Undichna (fish swimming trail) as well as mesosaurid reptiles, palaeoniscoid fish, small eocarid crustaceans, insects, trace fossils (king crab trackways. shark coprolites), palynomorphs (organic-walled spores and pollens), petrified wood (mainly of primitive gymnosperms, silicified or calcified), sparse vascular plant remains (Glossopteris leaves, lycopods etc).

5.4.3 *Adelaide Subgroup*

The proposed development is underlain by a series of Karoo sandstones, mudstones and shales, deposited under fluvial environments of the Adelaide Subgroup that forms part of the Beaufort Group. The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods and was deposited on land through alluvial processes. The Beaufort Group covers a total land surface area of approximately 200 000 km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup, and is divided into the Adelaide subgroup and the overlying Tarkastad subgroup. The Adelaide subgroup rocks are deposited under a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments.

In the south-eastern portion of the Karoo Basin, the Adelaide Subgroup consists of the Koonap, Middleton and Balfour Formations. West of 24° the Adelaide Subgroup is represented by the Abrahamskraal and Teekloof Formations and in the north the Group is represented by the Normandien Formation. The Adelaide

Subgroup is approximately 5 000 m thick in the southeast, but this decreases to about 800m in the centre of the basin which decreases to about 100 to 200m in the north. The Koonop Formation is about 1 300 m, Middleton 1 600 m and the Balfour Formation approximately 200 m thick. The Abrahamskraal Formation is about 2 500 m thick and the Teekloof Formation 1 000 m. The Normandien Formation is only about 320 m thick.

The Adelaide Subgroup contains alternating greyish-red, bluish-grey, or greenish-grey mudrocks in the southern and central parts of the Karoo Basin with very fine to medium-grained, grey lithofeldspathic sandstones. In the northern Normandien formation the basin consists of coarse to very coarse sandstones and granulostones. Coarsening–upward cycles are present in the lower part of the Normandien Formation while the mudrocks and sandstone units usually form fining-upward cycles. These cycles are positioned on erosion surfaces which is overlain by a thin intraformational mud-pellet conglomerate and vary in thickness from a few meters to tens of meters. Singular sandstone units could vary from 6m to 60m in the south thinning northwards but thick sandstone units are also present in the northern Normandien Formation.

Thicker sandstones of the Adelaide are usually multi-storey and usually have cut-and-fill features. The sandstones are characterized internally by horizontal lamination together with parting lineation and less frequent trough cross-bedding as well as current ripple lamination. The bases of the sandstone units are extensive beds, while ripple lamination is usually confined to thin sandstones towards the top of the thicker units.

The mudrocks of the Adelaide Subgroup usually have massive and blocky weathering apart from in the Normandien and Daggaboersnek Member. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout.

The Lower Adelaide Subgroup consists of the following formations:

Koonap Formation: Transitional brackish lacustrine to fluvial. Greenish-grey sandstones grading upwards into fine-grained siltstones and mudstones.

Middleton Formation: Semi-arid climate supported a lush flora and fauna that thrived along meander belts and semi-permanent lakes. Cyclic deposits of lenticular sandstone bodies grading into greenish-grey mudstone. The thickest formation in this succession, constituting 37% of the Beaufort Group and 47% of the Adelaide Subgroup. The formation has lenses of red mudstone which are likely to have been deposited in a sub-aerial fluvial environment. The Middleton Formation is known for its Glossopteris fossils plant assemblages. At their peak development during the Permian these plants inhabited a diversity of ecological niches, which includes riverine forests which were dominated by conifers, cycadeoids and ginkos. Diverse assemblages of insects are also recorded from this Formation. This Formation is represented by a rich assemblage of vertebrates found in the *Pristerognathus, Tropidostoma* and *Cistecephalus* Assemblage Zones of the Karoo Basin, (Rubidge et al, 1995; MacRae, 1999; McCarthy and Rubidge, 2005). The *Eodicynodon* and *Tapinocephalus* Assemblage Zones are present in the Kroonap Formation. The

Eodicynodon AZ is characterised by *Eodicynodon* and *Tapinocaninus* fossils. The *Tapinocephaus* AZ has a rich diversity of Therapids, dinocephalia, while fish, amphibia and plant fossils are also present.

Balfour Formation: The upper part of the Adelaide Subgroup and part of what was called lower to middle Beaufort. The Balfour Formation has an abundant assemblage of vertebrates. Fossils of the Balfour Formation includes vertebrates from the *Daptocecphalus* and *Lystrosaurus* Assemblage Zones (AZ) (Rubidge et al, 1995; MacRae, 1999; McCarthy and Rubidge, 2005; Johnson et al, 2009). Several important trace fossil assemblages, comprising vertebrate tracks and casts of vertebrate burrows have also been described from this Formation (Groenewald, 1996; Johnson *et al*., 2009).

5.4.4 *Karoo Dolerite Suite*

The Karoo Dolerite Suite is a volcanic suite which consists of igneous rocks and is thus unfossiliferous. This Suite was formed approximately 183 million years ago in the Early Jurassic. It is characterised by a superficial feeder system to the flood basalt eruptions and is best developed in the Karoo Basin. Flood basalts usually do not form noticeable volcanic structures but with a succession of eruptions form a suite of fissures of sub-horizontal lava flows that may vary in thickness from a couple of meters to thousands of meters. The Karoo Dolerite Suite is a widespread system of igneous bodies (dykes, sills) that encroached into the sediments of the Main Karoo Basin. Karoo lavas preserved today are erosional remnants of a more extensive lava cap that covered much of southern Africa.

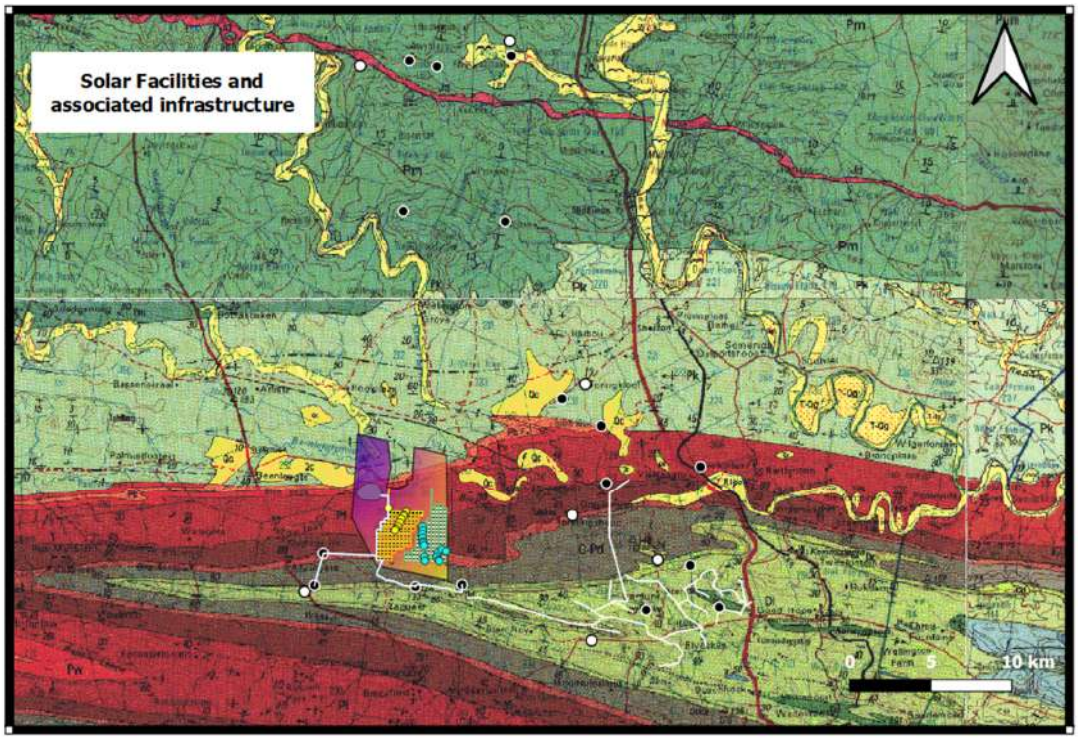


Figure 14 - Extract of the 1:250 000 3224 Graaff-Reinet (1993) and 3324 Port Elizabeth (1990) Geological Maps indicating the Solaris Fields and Sun Garden PV Facilities.

5.5 Cultural and Living Heritage Background

The creation of the Cookhouse REDZ, and the ensuing applications for WEFs in this area has resulted in several HIAs having been compiled for the region since 2009/2010. All these reports have addressed the region's archaeological and palaeontological heritage.

5.5.1 *Archaeological Resources*

Archaeological stone age and iron age material are very sparse in the region. Several graded heritage sites of high local heritage significance have been identified in and around Cookhouse and Makhanda (Grahamstown), including palaeontological sites and rock art.

5.5.2 *Historical Resources*

The CL of the area between and surrounding Makhanda (Grahamstown) and Somerset East is sparsely populated with several farmsteads and their associated structures located on the valley floors of this hilly and mountainous region. The farmsteads are connected through several farm roads and old historic ox-wagon routes that link the local communities to the busy towns of Makhanda (Grahamstown) and Somerset East. The area proposed for the Solaris Fields Solar PV Facility has a low to high heritage significance. Many of the old farm buildings, stone houses and churches in the area contain architectural elements that are older than 60 years and fall with the general protection of the NHRA (25 of 1999).

Historically the region surrounding Makhanda (Grahamstown) and Somerset East has been occupied by pre-colonial farmers and herders as well as European settlers since the 1750s (Booth, 2013). Several structures, including forts, signalling towers, monuments and memorials found in this area, provide further evidence of the conflicts and wars fought between the British and Xhosa who occupied the region. The town of Grahamstown (now known as Makhanda) was established as a result of the frontier wars of 1812 (Marchsal, 2008). The Fish river that is located to the east of Grahamstown (Makhanda) was historically the border between the Xhosa and the British (Booth, 2013).

This cultural significance of the area comprises of both tangible and intangible heritage. According to SAHRIS there are seventy (70) declared Provincial Heritage sites located around Makhanda (Grahamstown), consisting of historical structures and burial grounds, one (1) declared Provincial heritage site is located in Riebeeck East consisting of the Mooimeisiesfontein Farm, the well-known farm of Piet Retief, and fifteen (15) declared sites around Somerset East consisting of historical structures and buildings. Several graded heritage sites of high local heritage significance have also been identified in and around Cookhouse and Makhanda (Grahamstown). These sites include burial grounds and graves, monuments and memorials, stonewalling, as well as historical structures. These structures speak to the living heritage that is widespread on this cultural landscape. In terms of the tangible heritage, several historical structures (including old churches, farmsteads and stone houses) and burial grounds have been identified in the area.

5.6 Previous Archaeological and Heritage Studies in and around the Study Area

A scan of the SAHRIS database has revealed the following studies conducted in and around the study area of this report. These studies are summarised below in ascending date order:

- WEBLEY, L & WAY-JONES, M. F. 2007. Phase 1 heritage impact assessment on erven 1,44,7586 and 4979, Rhodes University, Grahamstown, Eastern Cape. Prepared for Rhodes University. **No archaeological material was observed.**
- NEL, J. & DE KAMPER, G. 2008. Heritage resources scoping survey & preliminary assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape. Prepared for Environmental Resource Management in Southern Africa. **Sixty-five sites, including fossils, Early, Middle and Late Stone Age, Historical sites and structures and graves were observed during the survey.**
- VAN SCHALKWYK, L. 2008. Heritage impact assessment of four borrow pits, Ndlambe and Makana Municipalities, Greater Cacadu Region, Eastern Cape Province, South Africa. Prepared for BKS (Pty) Ltd. **No heritage resources were identified within any of the proposed development areas.**
- ANDERSON, G. 2009. Heritage survey of the proposed Waainek Wind Farm, Grahamstown, Eastern Cape. Prepared for Coastal and Environmental Services. **No heritage sites were identified in the affected area.**
- BINNEMAN, J. AND BOOTH, C. 2009. A Phase 1 archaeological heritage impact assessment for the proposed subdivision and rezoning of Erf 8517, Grahamstown, Makana Municipality, Cacadu District Municipality, for the purposes of constructing residential and town housing, and business centre. Prepared for Conservation Support Services. **The area is of low cultural sensitivity. No archaeological sites were found.**
- GAIGHER, S. 2010. Heritage Impact Assessment for the Proposed Upgrading of the Storm Water Drainage Network for the Town of Somerset East, Eastern Cape Province. **Only one area containing an informal cemetery was identified.**
- HALKETT, D. & WEBLEY, L. 2010. Heritage Scoping Assessment of a proposed Wind Energy Facility to be situated on farms in the Cookhouse District, Eastern Cape. Prepared for Savannah Environmental (Pty). **No heritage sites or features were identified.**
- HALKETT, D. & WEBLEY, L. & ORTON, J.& PINTO, H. 2010. Heritage impact assessment of the propose Amakhala-Emoyeni wind energy facility, Cookhouse District, Eastern Cape. Prepared for Savannah Environmental (Pty). **Historical features, buildings and graveyards associated with farms are present within the study area.**
- BOOTH, C. 2011A. A Phase 1 Archaeological Impact Assessment for the proposed Cookhouse Ii Wind Energy Facility, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty). **Isolated surface scatters of predominantly MSA stone artefacts, a LSA site, and some historical ceramics were observed.**
- BOOTH, C. 2011B. Phase 1 archaeological impact assessment for the Golf Course Development On Portions 1 and 2 of the Farm Willow Glen and Portion 6 of Belmont Farm, Grahamstown,

Makana Municipality, Cacadu District Municipality, Eastern Cape Province. Prepared for Coastal and Environmental Services. **No archaeological heritage material remains or sites were found.**

- NILSSEN, P. 2011. Proposed development of the Plan 8 Grahamstown Wind Energy Project: including Farms Gilead 361, Peynes Kraal 362 and Tower Hill 363, Grahamstown, Makana Municipality, Eastern Cape Province. Prepared for Coastal & Environmental Services. **Two unmarked graves, a cave with rock art, stone age artefacts and an old horse/oxen-drawn plough were observed in the area.**
- VAN SCHALKWYK, J. 2011. Heritage impact assessment for the proposed Eskom 400kv Electricity Transmission Line, Neptune To Poseidon Substations, East London To Cookhouse, Eastern Cape. **Several stone and iron age sites were identified.**
- VAN RYNEVELD, K. 2011. Cultural heritage impact assessment upgrade of the National Route 10 Section 3(N10/3) from Baviaans River to Rietvlei (Vrischgewaagd), between Cookhouse and Cradock, Eastern Cape, South Africa. Prepared for MPM Environmental Consultants. **No Stone Age or Iron Age sites were identified, while 2 Colonial structures and a grave was found.**
- BINNEMAN, J. 2013. An archaeological walkthrough survey of the turbine footprint for the proposed Phase 1 Amakhala Emoyeni Wind Energy Facility, Cookhouse District, Blue Crane Route Municipality, Eastern Cape Province. **The study area investigated appears to be of low archaeological and historical sensitivity**.
- BINNEMAN, J. 2013. A Phase 1 Archaeological Impact Assessment of the proposed new substation and 132kv power line and the Nojoli Wind Farm near Cookhouse, Blue Crane Route Local Municipality, Cacadu District, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd. **The study area investigated appears to be of low archaeological and historical sensitivity.**
- BINNEMAN, J. 2014. An archaeological walkthrough survey of the final layout of the proposed Nojoli Wind Energy Facility near Cookhouse, Blue Crane Route Local Municipality, Bedford District, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd. **The study area investigated appears to be of low archaeological and historical sensitivity.**
- BINNEMAN, & REICHERT, K. 2015. An archaeological walkthrough survey of the final optimised layout of the authorised Nxuba Wind Farm near Cookhouse, Blue Crane Route Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd. **Only a few isolated weathered Middle Stone Age stone tools of low heritage significance were observed.**
- VAN RYNEVELD, K. 2016. Phase 1 Archaeological & Cultural Heritage Impact Assessment – Proposed Hempel Quarry, Crusher and Stockpile Area, Farm No 604, near Grahamstown, Makana Local Municipality, Eastern Cape. Prepared for Terreco Environmental. **No archaeological or cultural heritage was identified.**
- SMUTS. K. & LAVIN, J. 2017. Heritage impact assessment for the proposed Spitskop Wef 132kv Power Lines. Prepared for Terramanzi Group (Pty) Ltd. **Six MSA artefacts were found**

5.7 Findings of historical desktop study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (**Figure 13**).

5.7.1 *Heritage Sensitivity*

The sensitivity maps were produced by overlying:

- Satellite Imagery;
- Current Topographical Maps; and
- First to third edition Topographical Maps dating from the 1960's to 1980s.

This enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads, huts and farmsteads);
- Archaeological Sensitive areas; and
- Structures/Buildings.

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 5.**

Table 5 -Tangible heritage sites in the study area

Name	Description	Legislative protection
Archaeology - Iron Age Sites	Older than 100 years	NHRA Sect 3 and 35
Architectural Structures	Possibly older than 60 years	NHRA Sect 3 and 34
Graves and Burial Grounds	60 years or older	NHRA Sect 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix in **Table 6.**

Table 6 - Landform type to heritage find matrix

LANDFORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters, LIA settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Watering holes/pans/rivers	LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements
Forested areas	LIA sites

6 FIELDWORK AND FINDINGS

A controlled surface survey was conducted on foot and by vehicle by a heritage specialist and student intern from PGS. The fieldwork component was done by means of a walkthrough of the study and was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was conducted over several days on 23 March 2020 as well as from 8 to 13 June 2020. The tracklogs (in yellow) for the survey are indicated in **Figure 15.**

During the survey of the Solaris Fields PV Facility, no heritage sites of significance were identified.

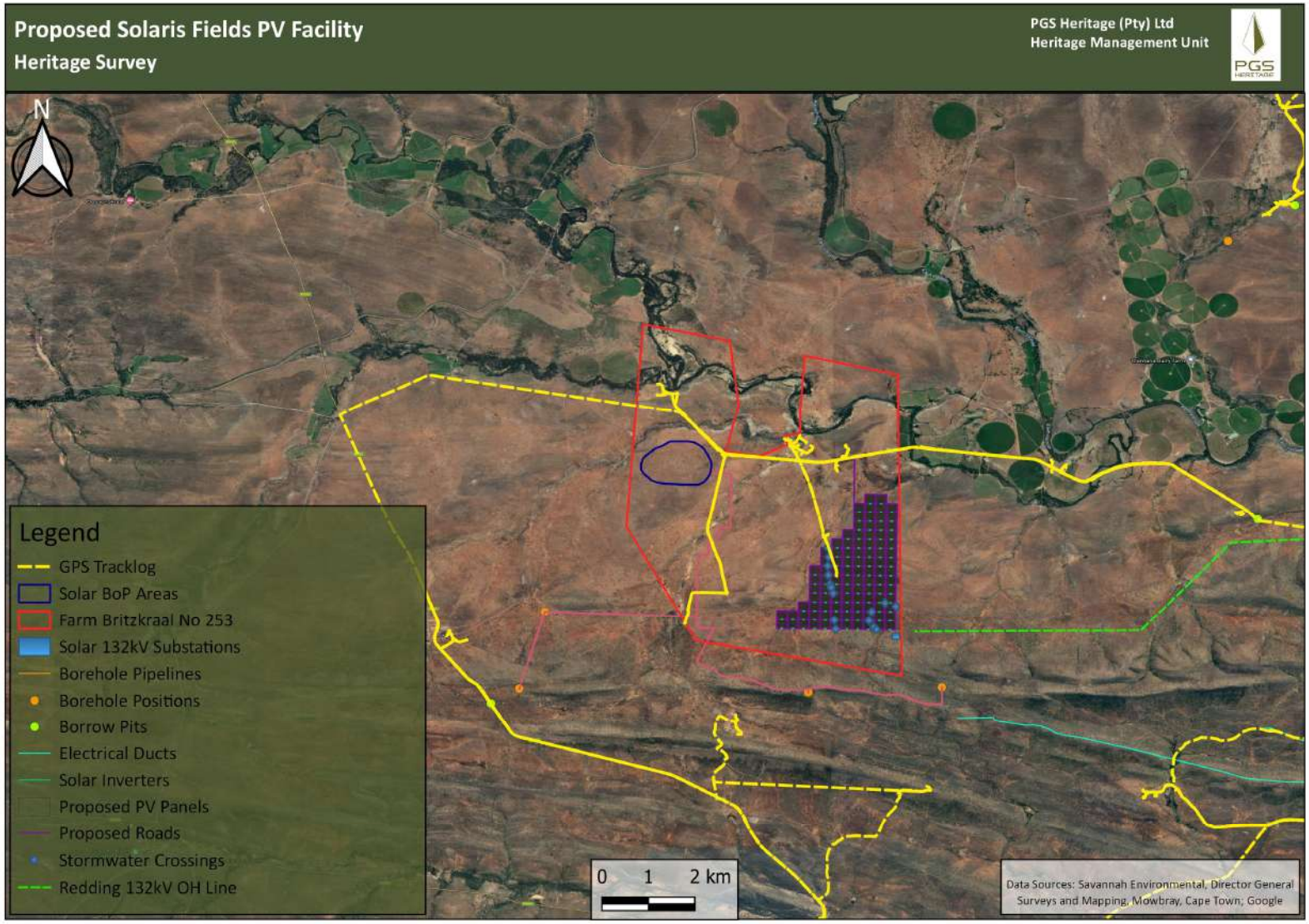


Figure 15 – Locality of the heritage resource and heritage survey tracks in the study area.

7 PALAEONTOLOGY

According to the PIA conducted by Banzai Environmental (Butler, 2021) the proposed development is underlain by the underlain by the Dwyka Group; the Fort Brown Formation of the Ecca Group (Karoo Supergroup), Adelaide Subgroup (Koonap and Middleton Formations, Beaufort Group, Karoo Supergroup) and the Witteberg Group of the Cape Supergroup, Karoo Dolerite, and Quaternary deposits.

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Dwyka Group is Low, the Collingham Formation, Rippon Formation, Fort Brown Formation of the Ecca Group is Moderate, while the Prince Albert Formation has a High and the Whitehill Formation of the Ecca has a Very High Palaeontological Sensitivity. The Adelaide Subgroup also has a Very High Palaeontological Sensitivity, Dolerite is igneous in origin and thus has an Insignificant Paleontological Sensitivity while that of Quaternary deposits is Low but locally High (Almond et al, 2013; SAHRIS website).

A 3-day site-specific field survey of the development footprint was conducted on foot and by a motor vehicle on 20 November to 23 November 2020. No visible evidence of fossiliferous outcrops was found.

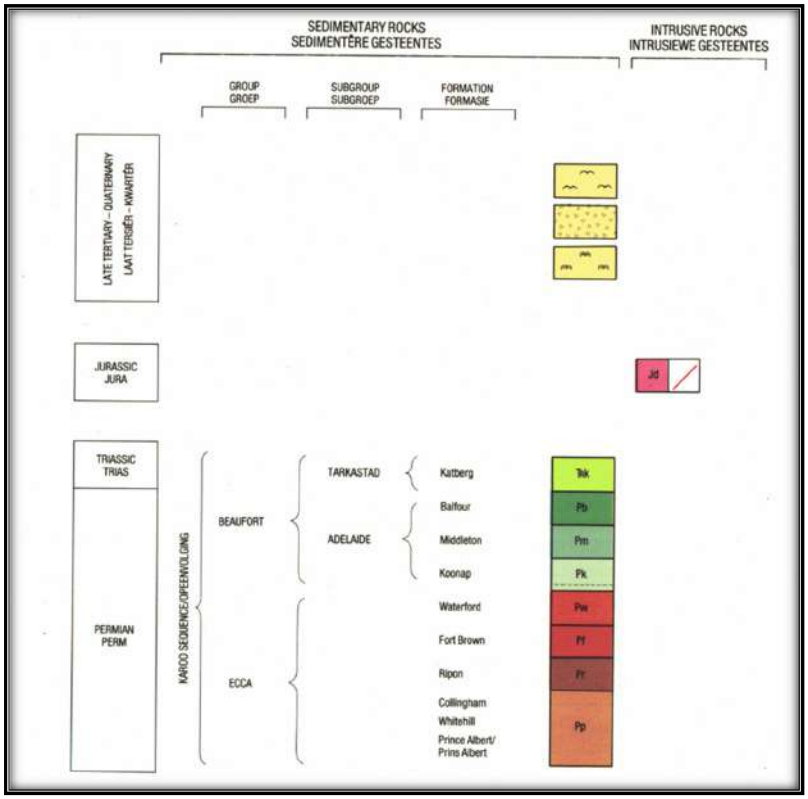


Figure 16 - Extract of the 1:250 000 3324 Port Elizabeth Geological Map (Council of Geosciences [Pretoria]) indicating the Western Block (including Solaris Fields PV Facility) Renewable Facilites.

Legend

Symbol	Stratigraphy	Lithology
Single bird figure	Quaternary	Alluvium
Qc	Quaternary	Calcrete
Jd	Dolerite	
Pb	Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup)	Sandstone and Grey mudstone
Pm	Middleton Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup)	Sandstone; grey and red mudstone
Pk	Koonap Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup)	Sandstone, shale and grey mudstone
Pf	Fort Brown Formation (Ecca Group, Karoo Supergroup	Shale
Pr	Rippon Formation (Ecca Group, Karoo Supergroup)	Sandstone and shale
Pp	Collingham Formation, Whitehill Formation, Prince Albert Formation (Ecca Group, Karoo Supergroup)	Shale, thin yellow tuff and chert beds
C-Pd	Dwyka	Tillite

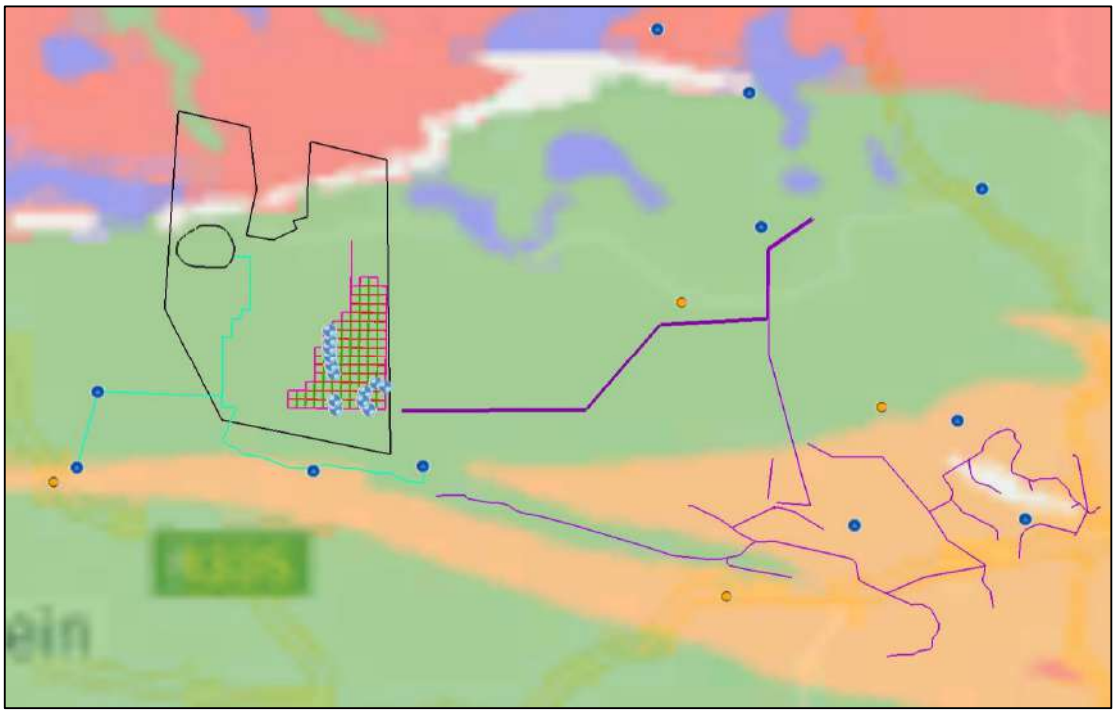


Figure 17 - Overlay of the Solaris Fields PV Facility on the palaeosensitivity map from the SAHRIS database. This shows that most of the proposed development footprint falls in an area that is coloured green and orange, which is rated as Moderate to High sensitivity.

Table 7 - SAHRIS palaeosensitivity ratings table.

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.

8 CULTURAL LANDSCAPE

As part of assessing the impact of Solar PV Facilities on archaeological and historical resources, CLA's have become a significant factor when considering proposed Solar Developments. The areas investigated for the proposed Solaris Fields PV Facility within the Blue Crane Route Local Municipality and the Sarah Baartman District Municipality in the Eastern Cape Province is considered to have medium cultural heritage significance.

Sections of this CLA is taken from the VIA, conducted for the Solaris Fields PV Facility by Lourens du Plessis of LOGIS, who is a Professional Geographical Information Sciences (GISc) Practitioner.

8.1 Cultural landscapes

According to Booth (2016), "*Cultural landscapes can be interpreted as complex and rich extended historical records conceptualised as organisations of space, time, meaning, and communication moulded through the cultural process."* Because cultural landscapes can be associated with people of specific events, they represent the interface between the effect of human culture and identity has had on physical places, and the meanings these spaces have in human memory. At its core the CL represents both the 'natural' ecological processes and phenomena, as well as the changes emerging from the process of transformation of the landscape by communities who use, live and transform specific regions/areas, adapting it to their needs (Jansen & Franklin, 2021). These transformed spaces, along with cultural values, regional identities and traditions are what one generation inherits from the previous. As such when evaluating the significance of the CL it is important to understand and consider all its components including tangible and intangible aspects; as well as the natural and cultural processes that have transformed the area.

In 1992 the World Heritage Committee, defined cultural landscapes as "*a representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal*" (UNESCO, 2020).

8.1.1 *Cultural landscapes in a REDZ Zone*

The proposed Solaris Fields PV Facility is situated in the Cookhouse REDZ and the Eastern Corridor of the Strategic Transmission Corridors specifically designated for large-scale wind and solar energy facilities. With the development of WEF and Solar PV Facilities within the REDZ zone it is expected that the "*cultural landscape of an area will be changed to be dominated, or at least heavily altered, by renewable energy development"* (Lavin, 2021). Several WEF, powerlines and substations has been developed in the broader region. These modern developments do constitute a transformation of the cultural landscape, through the addition of another layer of human intervention. According to Lavin

(2021) the creating of an additional layer onto the CL of an area, within a REDZ is acceptable. However, the negative impact (the destruction of older archaeological or historical layers) of the Cultural landscape should not be ignored.

These impacts can be mitigated in various ways. As such it should be noted that the addition of the Solaris Fields Solar PV Facility to this area will create another layer to the exciting CL. In this assessment, the aim is to ensure that other aspects of the CL are not destroyed or overridden as a result of this additional layer.

8.2 The Solaris Fields Cultural Landscape

The Solaris Fields PV Facility can be divided into various landscape character areas with several cultural heritage resource types. These units were determined by taking the larger landscape context into consideration in order to understand the character and cultural heritage values that underpin the proposed development site. This section was informed by the VIA conducted by du Plessis (2021).

8.2.1 *Solaris Fields – Land Use*

The majority of the study area is sparsely populated (less than 10 people per km^2) and consists of a landscape of wide-open spaces and very little development. The relatively low rainfall has as a consequence that the region has not been transformed by dryland agriculture, with irrigated agriculture (crop circles) and dryland crop production primarily limited to areas along the Brak and Little Fish Rivers.

Besides the limited cultivation of crops, the study area is largely in a natural state, with mainly sheep and game farming as additional economic activities.

Farm residences, or homesteads, dot the landscape at an irregular interval. These homesteads are generally located at great distances from each other (i.e. more than 3km apart). Some of these within the study area include:

- Britskraal 1 and 2
- Sarahdale
- Stillerus
- Rooiplaas
- Jordaanskraal
- Karee Krans
- Glentana
- Alwingate
- Request
- Draai van Visrivier
- Glen Roy

- Stonefountain
- Russel Park

Most of these homesteads are located on farms earmarked for the proposed Redding Wind Farm.

There is an airfield (Henry's Flats Aerodrome) to the far north of the study area, approximately 5.5km north of the proposed PV facility (at the closest). The airfield is currently not in use. The airfield and the Jordaanskraal homestead are located on farms earmarked for the proposed Rippon Wind Farm. There is also another airfield (indicated on the SA 1:50 000 topographical maps) at the Glentana homestead (dairy farm) as well, but it appears to be under irrigation and not functioning as an airfield anymore.

The entire proposed development envelope is located within the Cookhouse REDZ and Strategic Transmission Corridor. Applications that have been approved or constructed include (du Plessis, 2021):

- Amakhala Emoyeni Wind Farm
- Cookhouse Wind Farm
- Golden Valley Wind Farm
- Msenge Emoyeni Wind Farm
- Nxuba Wind Farm
- Waainek Wind Farm
- Golden Valley Wind Farm

8.2.2 *Vegetation*

The vegetation cover in the region is primarily grassland and low shrubland, with some forest and woodland occurring along the banks of the Brak and Little Fish Rivers. The floodplains of these rivers are indicated as Southern Karoo Riviere, whilst the grassland and low shrubland is referred to as Albany Broken Veld. In the higher lying ridges to the south, the vegetation type is Kowie Thicket (du Plessis, 2021).

8.2.3 *Mountainous ridges*

The study area occurs on land that ranges in elevation from approximately 465m (in the south-east) to 730m (at the top of the hills to the south of the proposed PV facility). The terrain surrounding the farm is predominantly flat with an even slope towards the north. The proposed development envelope itself is located at an average elevation of 536m above sea level (du Plessis, 2021):

8.2.4 *Riverine corridors*

The terrain morphology is described as lowlands (plains) with parallel hills, and even though the study area is predominantly flat, there are a number of prominent ridges to the south. The Little Fish River (to the north-east) is the only perennial river in the study area. Besides the Little Fish River there are a number of non-perennial drainage lines and farm dams. The Brak River is the most prominent non-

perennial river. It feeds into the Little Fish River near the Draai van Visrivier homestead. The region is relatively arid and is referred to as the Nama-Karoo Biome (Lower Karoo Bioregion). The average rainfall is indicated at between 300 – 500mm per annum. (du Plessis, 2021).

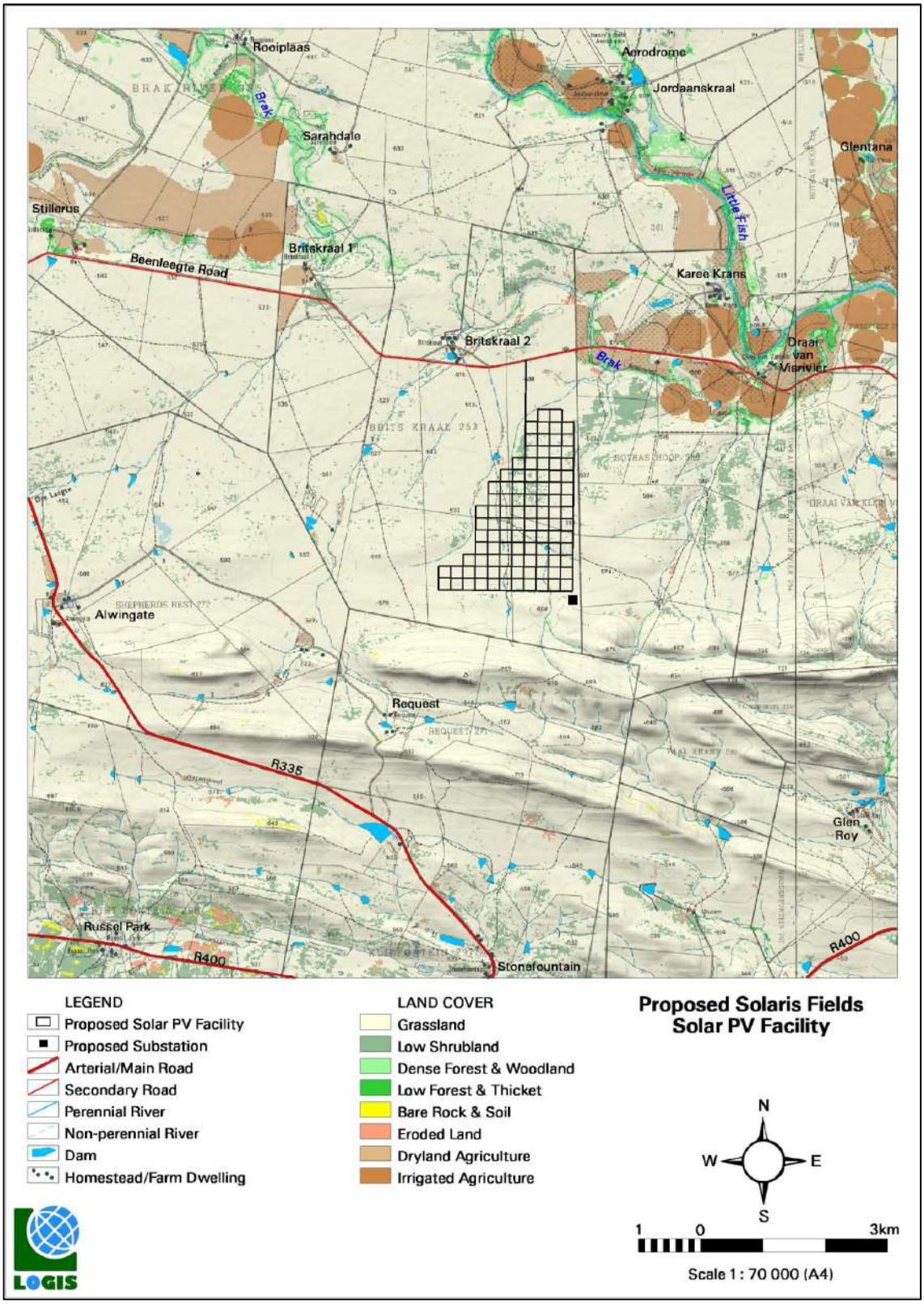


Figure 18 – Map of the land cover and broad land use patterns. Protected areas are indicated n green (Source: LOGIS/Du Plessis, 2021).

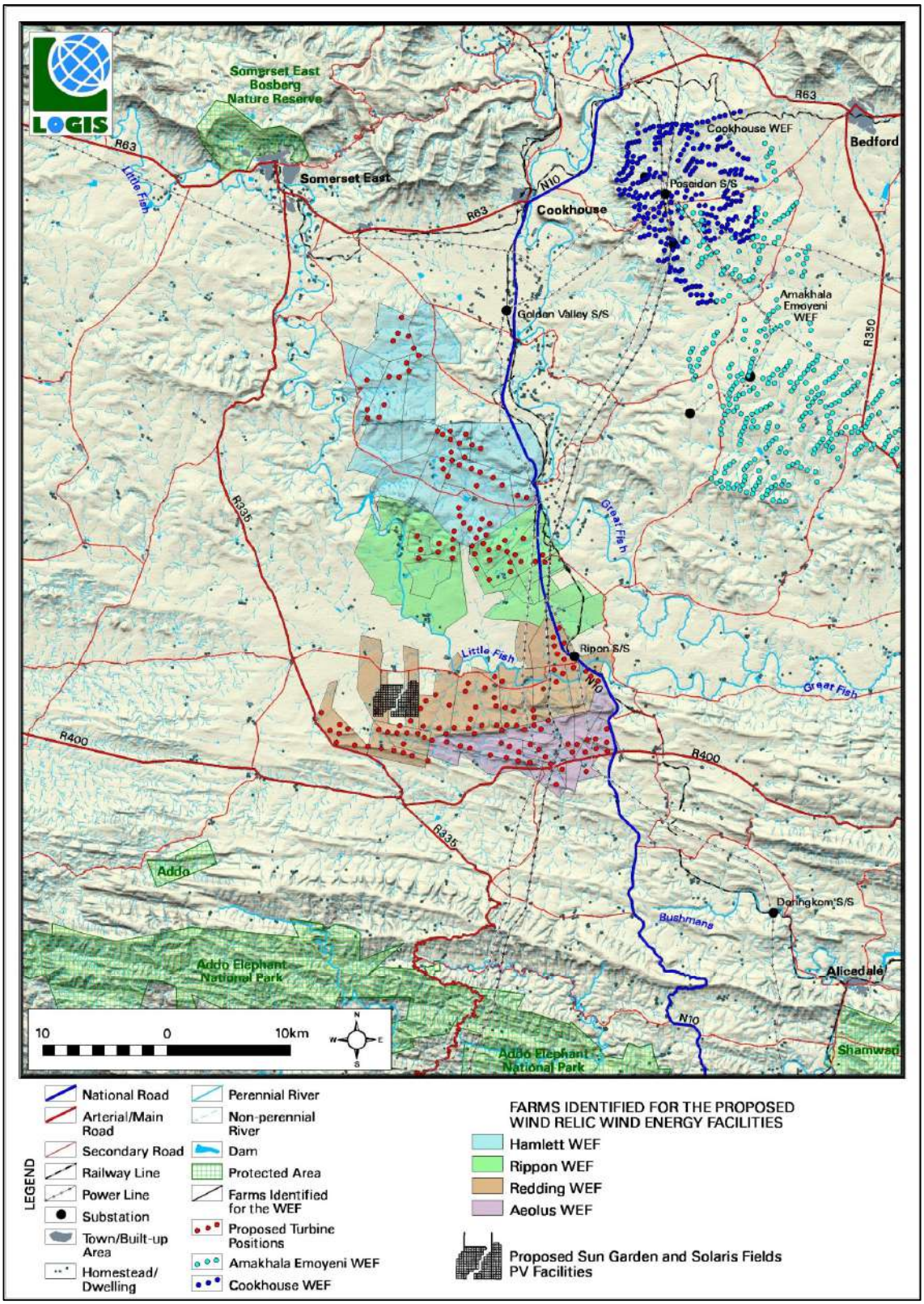


Figure 19 - Renewable energy applications and existing WEFs within the region (Source: LOGIS/Du Plessis, 2021).

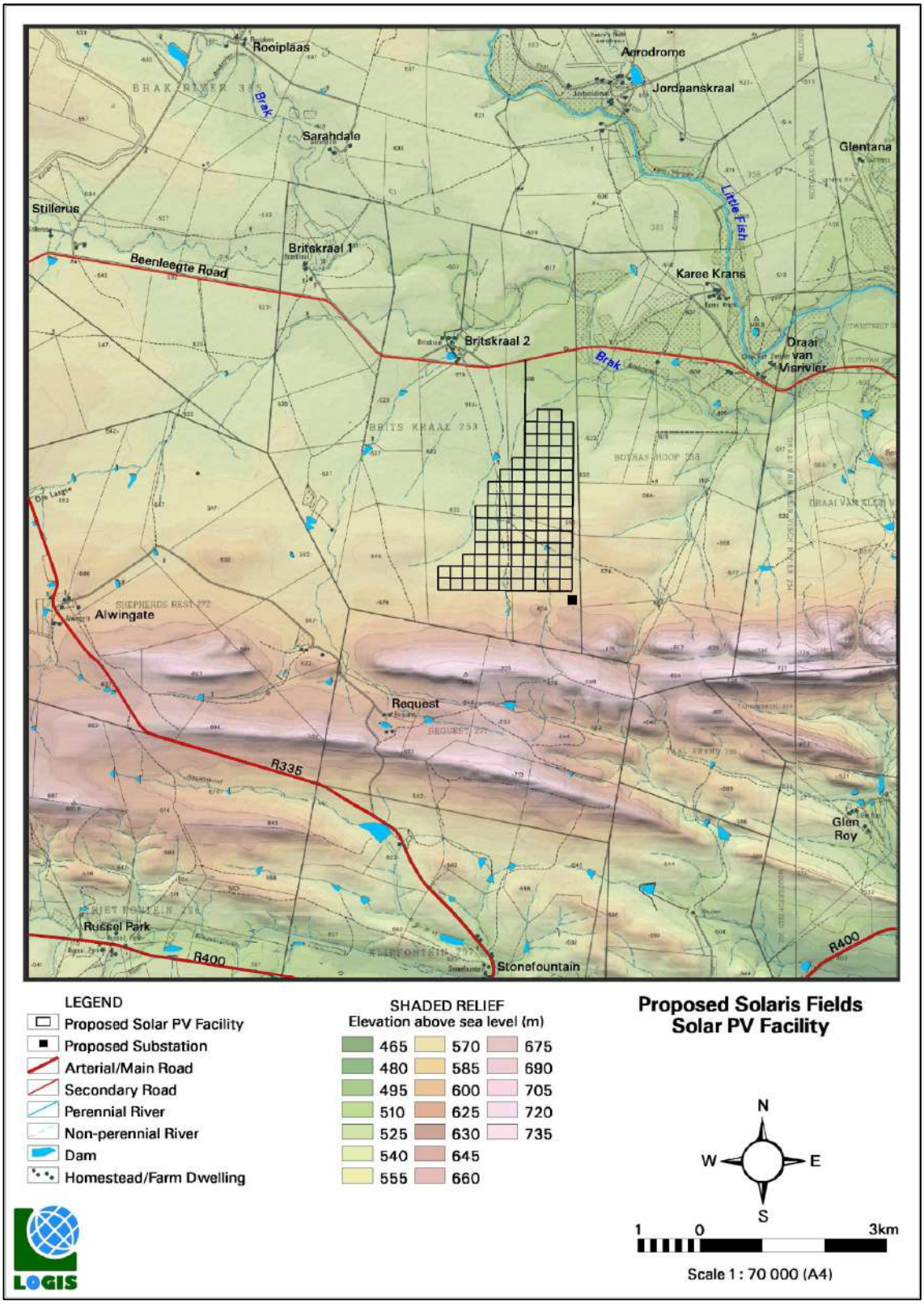


Figure 20 - Map of the Terrain morphology (Source: LOGIS/Du Plessis, 2021)

The man-made and natural heritage resources interacting with the above characteristic landscape types are:

8.2.5 *Historic farmsteads*

Three Farmsteads (**SF-01, SF-04, SF-05**) (including outbuildings and stonewalling features and built environment structures.), three sites containing labourer houses (**SF-02, SF-09, SF-10**), a shed (**SF-03**), and the remains of three foundations of structures (**SF-06, SF-07 and SF-08**) were identified to the north of the Sun Garden Solar PV Facility. The historical structures and Farmsteads are situated adjacent or close to the existing roads that pass through the homesteads **(Figure 21)**

Several farmsteads, labourer cottages and remains of structures are located in the northern section of the Farm Britzkraal No 253. None of the above are located close to the proposed PV facility.

A house with stone dressing was identified (GPS: S-33.076008 E25.666594) on Portion 9 of the farm Britzkraal No 253. The house is used as overnight accommodation for game hunters (**Figure 22 - Figure 23).** Approximately 240m northwest of the house with stone dressing, an old shed was observed (GPS: -33.074144 25.665228)(**Figure 24).** The remains of a brick structure (GPS: -33.085192 25.691033) are located approximately 140m north of the main far house. The walls, windows roof and doors of the structure have been removed, and the house has been abandoned (**Figure 27**). The ruins of an old stable were found located 70m north of the main farmhouse (GPS: -33.085744 25.690708). Only the foundations were still visible. Several labourers cottages were also identified on Portion 7,8 and 9 of the farm Britzkraal No 253. Many of the labourer cottages have been abandoned and are in a dilapidated state (**Figure 29 - Figure 31).** These structures are of low heritage significance.

The old Britzkraal farmhouse (GPS: -33.086325 25.690831) is located in the northern section of the farm. The walls, windows and doors of the house have been removed, and the house has been abandoned. Aerial Photograph (141_009_19421), dating to 1939, from the CDNGI Geospatial Portal (http://www.cdngiportal.co.za/cdngiportal/) shows several structures at the Britzkraal farmstead **(Figure 25 - Figure 26**). The old Britzkraal farmhouse is an example of the local vernacular architecture of the region and of heritage significance. It was rated as IIIB with medium heritage significance.

The farmsteads and historical structures were considered as having a medium to low cultural significance and has been allocated a heritage grading of Medium heritage significance and heritage rating of IIIB and a Low Heritage significance and heritage rating of IIIC. These sites fall under the Protection of Section 34 of the National Heritage Resources Act 25 of 1999.

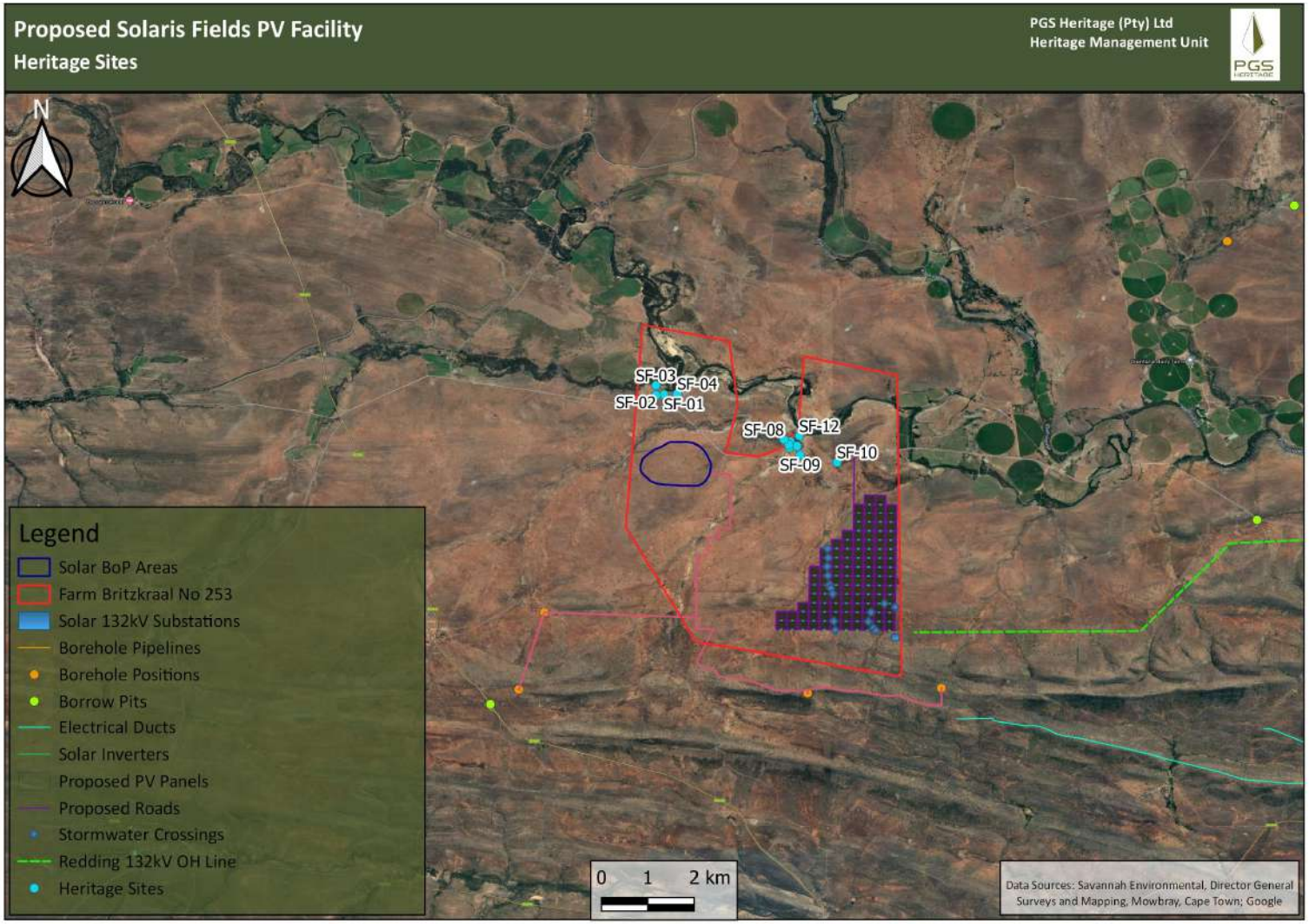


Figure 21 - Map indicating the location of the identified heritage sites on the Farm Britzkraal No 253 in relation to the Solaris Fields PV Facility.

Figure 22 - View of A house, with a stone dressing, was found located on the farm Britzkraal 253 (SF-01). The house is used as overnight accommodation for game hunters.

Figure 23 - A house with stone dressing was found on the farm Britzkraal 253 (SF-04). The house is covered in a stone dressing. A low stone wall also surrounds the house.

Figure 24 – View of a shed that is used for storing farming equipment (SF-03).

Figure 25 - A dilapidated house with a small outbuilding was found on the farm Britzkraal 253.

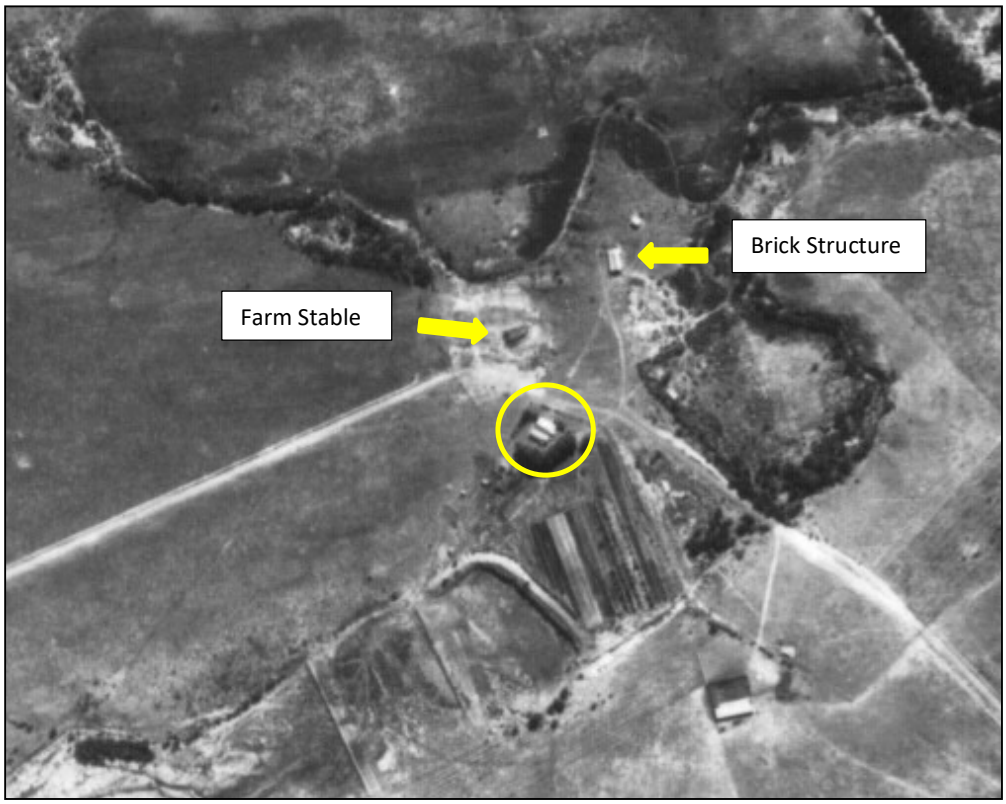


Figure 26 - Section of Aerial Photograph (141_009_19421), dating to 1939, showing the Britzkraal farmstead (SF-05). The main farmhouse is indicated by the yellow circle, while the remains of an old stable (SF-07) and brick structure (SF-06) are indicated by the arrow.

Figure 27 - A dilapidated brick house (SF-06) was found on the farm Britzkraal 253. The walls, windows roof and doors of the house have been removed, and the house has been abandoned.

Figure 28 - The ruins of an old stable were found on the farm Britzkraal 253 (SF-07). Only the ruined foundations remained.

Figure 29 - A dilapidated brick house was found on the farm Britzkraal 253 (SF-08). The windows and doors of the house have been removed, and the house has been abandoned.

Figure 30 - Several labourer houses were found on the farm Britzkraal 253 (SF-02))

Figure 31 - A dilapidated brick labourer house was found on the farm Britzkraal 253 (SF-09)). The windows and doors of the house have been removed, and the house has been abandoned.

Figure 32 -A ruined brick labourer house was found on the farm Britzkraal 253 (SF-10). The windows and doors of the house have been removed, and the house has been abandoned

8.2.6 *Burial Grounds and Graves*

Two burial grounds (**SF-11** and **SF-12**) in the northern section of Portion 7 of the Farm Britzkraal 253 were identified (**Figure 21).**

The historical family or labourer cemeteries are usually situated within close proximity or apart of the homestead or labourer cottages. Several graves belonging to the Lombard family as well as labourers were also located in the northern section of the farm **(Figure 33 - Figure 34).**

The graves/burials are considered as having a high cultural significance and have been allocated a heritage grading of High heritage significance and heritage rating of IIIA and fall under the Protection of Section 36 of the NHRA.

Figure 33 - Sixteen graves were found on the farm Britzkraal 253 (SF-11). Several of the graves contained packed stones, or were marked with headstones or uprght stones. The graves belong to the Lombard family.

Figure 34 - Twenty labourer graves were found on the farm Britzkraal 253 (SF-12). The graves contained packed stones, and some graves had metal name boards. Some of the names have weathered away..

8.2.7 *Historic routes and gateways*

The N10 national road provides motorised access to the region from the city of Port Elizabeth, the largest urban centre closest to the site (approximately 130km by road). Another 16km gravel road (the Beenleegte secondary road) provides the quickest access to the proposed development site from the N10. This road splits off from the N10 near the Rippon Substation (du Plessis, 2021).

Several historic routes and ox-wagon trails cross the farms to neighbouring farmsteads and towns. Many of the roads were used to link the various Cape Colony military posts located on farms between Grahamstown and Somerset (**Figure 35- Figure 37).**

Figure 35 - Access road from the N10 to the proposed project site. (du Plessis, 2021).

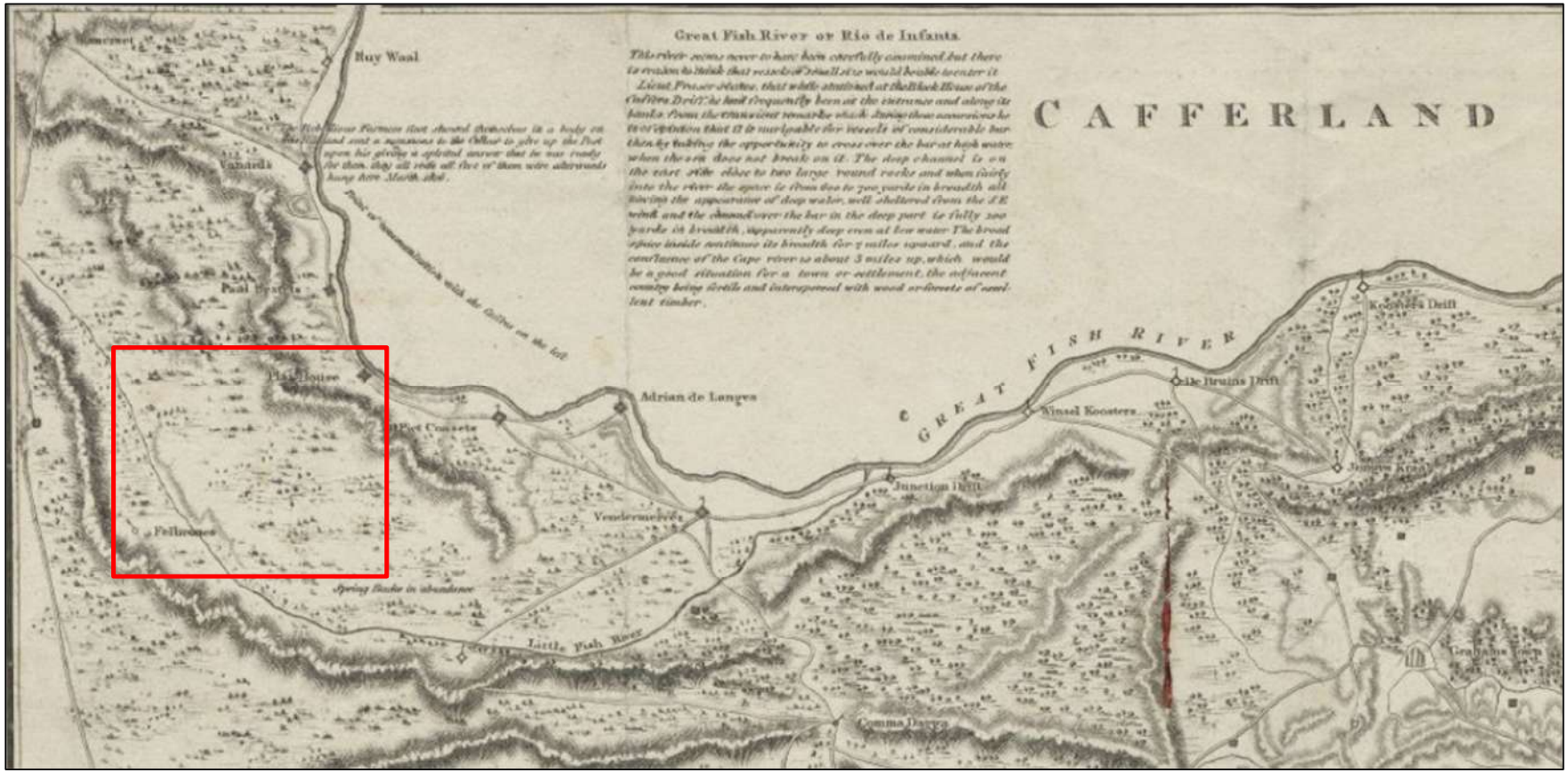


Figure 36 - Section of the Military Sketch of a part of the Colony of the Cape of Good Hope indicating the different Military Posts, Farms, Roads, and Rivers. Faithfully Delineated By Wily of His Majesty's 83 Regt in the year 1816. Several military posts are located on the farms between Grahamstown and Somerset. The posts were connected by several roads linking each of the farms. Approximate location of the Solaris Fields PV Facility indicated by the red square (Cartographer: Wily & Faden, 1818).

Figure 37 - Section of the Plan of the Eastern Frontier Cape of Good Hope (Cartographer: Reid, 1847). Note the various roads interlinking the various farms between Grahamstown and Somerset, as well as the meandering Great Fish River and Little Fish River that runs through the area. Approximate location of the Solaris Fields PV Facility is indicated by the red square.

8.2.8 *Conservation areas*

There are no designated protected areas within the region and there are no other identified tourist attractions or destinations within the study area (du Plessis, 2021).

9 SOCIO-ECONOMIC PROJECT INITIATIVE

In this section, the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development, as prescribed by Section 38(3)(d) requirement of the NHRA will be discussed.

The SEIA for Solaris Fields Solar PV Facility was completed by Matthew Keeley, a Senior Development Economist, and Elena Broughton, the Unit Manager: Innovation and Sustainable Development; Senior Development Economist of Urban-Econ Development Economists in 2021.

9.1 Potential Economic Impacts As A Result Of The Solar Energy Facility

9.1.1 *Economic Impacts During the Construction Phase*

The following table outlines the potential economic impacts during the construction phase of the proposed Solaris Fields PV Facility. The total impact on production/business sales is likely to equate to R 9,2 billion (direct, indirect and induced) for the duration of construction and will largely be spent in the Eastern Cape. The total impact on Gross Domestic Product GDP (direct, indirect, and induced) is likely to be R 1,8 billion and create 3 116 Full Time Equivalent (FTE) employment positions over the period of 30 months. These will largely be felt through the construction sector and through the value chains associated with the construction of a solar PV facility.

9.1.2 *Economic Impacts During the Operational Phase*

The table below provides the potential economic impacts during the operational phase of the proposed Solaris Fields PV Facility this specifically relates to the impact derived from the anticipated direct spend in the maintenance and upkeep of the facility.

The total impact on production/business sales is likely to equate to R 334.4 million (direct, indirect, and induced) per annum and will largely be spent in the Eastern Cape. The total impact on GDP (direct, indirect, and induced) is likely to be R 120,6 million per year. It is anticipated that 113 South African based FTE employment positions will be created for the operation of the proposed solar PV facility per annum. The total impact on employment will be 113 FTE employment positions which will largely be experienced in the utility sector and other value chains associated with solar PV facility operations.

10 IMPACT ASSESSMENT

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. Direct, indirect and cumulative impacts will be assessed in terms of the following criteria:

- **Nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of very short duration (0–1 year) – assigned a score of 1;
  - the lifetime of the impact will be of short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will 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 the complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. The 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 (a 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) x P

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

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

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

10.1 Heritage Impacts

During the survey no heritage sites were identified.

10.1.1 *Historical structures*

No historic structures were identified in the proposed Solaris Fields PV Facility Development footprint.

10.1.2 *Burial Grounds and graves*

No burial grounds or graves were identified in the proposed Solaris Fields PV Facility Development footprint.

10.2 Palaeontological Impacts

According to the PIA the site is underlain by the the Dwyka Group, Collingham Formation, Whitehill Formation, Prince Albert Formation, Rippon Formation, Fort Brown Formation (Ecca Group, Karoo Supergroup), Koonap Formation, Middleton Formation and Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup), and Dolerite.

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Dwyka Group is Low, the Collingham Formation, Rippon Formation, Fort Brown Formation of the Ecca Group is Moderate, while the Prince Albert Formation has a High and the Whitehill Formation of the Ecca has a Very High Palaeontological Sensitivity. The Adelaide Subgroup has a Very high

Palaeontological Sensitivity while Dolerite is igneous in origin and thus has an Insignificant Paleontological Sensitivity (Almond et al, 2013; SAHRIS website). The proposed area of the project footprint occurs in an area where the palaeontology is assessed as being rated as Low to Very High sensitivity (red and blue).

According to the PIA the impact significance before mitigation on the Paleontological resources will be MODERATE negative before mitigation. *Only the study site will be affected by the proposed development.* The possibility of the impact occurring **is very likely**. The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will reduce this impact rating to an acceptable LOW negative impact.

Table 8 - Impact Assessment Table for Palaeontological Resources (After Butler, 2020)

Nature: The excavations and site clearance of the PV Facilities will involve extensive excavations into the superficial sediment cover as well as into the underlying bedrock. These excavations will change the existing topography and may destroy and seal-in fossils at or below the ground surface. These fossils will then be unavailable for research Impacts on Palaeontological Heritage are likely to happen only within the construction phase. No impacts are expected to occur during the operation phase.		
	Without mitigation	**With mitigation**
Extent	Development area (1)	Development area (1)
Duration	Permanent (5)	Medium-term (3)
Magnitude	High (8)	Minor (2)
Probability	Highly Probable (4)	Improbable (1)
Significance	**Medium (-56)**	**Low (+6)**
Status (positive or negative)	Negative	Neutral
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation procedure: See Chance find protocol **Chance Find Procedure** • If a chance find is made the person responsible for the find must immediately **stop working** and all work must cease in the immediate vicinity of the find. • The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the Environmental Officer (EO) (if appointed) or site manager. The EO must report the find to the relevant Heritage Agency (ECPHRA). (Contact details: ECPHRA, 16 Commissioner Street, East London, 5201; info@ecphra.org.za; 043 745 0888; https://www.ecphra.org.za/). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.		

- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report, the Heritage Agency will inform the EO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the EO (or site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development.

Residual Impacts:
Loss of fossil heritage

10.2.1 *Impact on Cultural Landscape elements*

According to the VIA (de Plessis, 2021), an impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development represents existing visual disturbances.

The anticipated visual impact of the proposed PV facility on the regional visual quality, and by implication, on the sense of place, is difficult to quantify but is generally expected to be of low significance. This is due to the relatively low viewer incidence within close proximity to the proposed development site.

Table 9 - Impact Assessment Table for Cultural Landscape

Nature of Impact: Impact on historic CL elements by all phases of development.		
	Without mitigation	***With mitigation***

Extent	Broader Regional Area **(5)**	Regional **(3)**
Duration	Permanent **(5)**	Permanent **(5)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Definite **(5)**	Definite **(5)**
Significance	High **(80)**	High **(60)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Cumulative impacts:
Complete or whole-scale changes to the environment or sense of place

Residual impacts:
The character of the landscape will remain changed permanently after the duration of the project as over time the sense of place will change. It is unlikely that the infrastructure will be decommissioned.

Mitigation:

- Mitigation measures as proposed in the HIA for the proposed Solaris Fields PV Facility development that reduces negative impacts on the land use patterns and living heritage will reduce the impact of this facility on the overall load.
- The mitigation measures proposed for heritage resources will reduce the negative cumulative impact on the CL and should be implemented as recommended.

According to the VIA of LOGIS by Du Plessis (2021) no mitigation of the impact on the sense of place of the region or the CL is possible as the structures will be visible regardless. However, the following general mitigation measures are proposed:

Planning:

- Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.

Operations:

- Maintain the general appearance of the facility as a whole.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use.
- Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.

General mitigation measures for renewable energy development in areas of CL significance as proposed by Jansen and Franklin, (2021) as well as Lavin (2021) is recommended:

Ecological:

- Species and ecosystem loss should be prevented by limiting fragmentation in the landscape, and should therefore adhere to the following general recommendations:
- Remaining areas of endemic and endangered natural vegetation should be conserved.
- High and Very High Sensitivity Ecological areas (crest lines and drainage lines), should be protected from development.
- Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed.
- Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site, it helps to sensitively keep to the character.
- The principle of 'tread lightly' must be applied for any activity (and associated development requirements e.g. toilets for the construction process) should be emphasised.

Aesthetic:

- Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc;
- The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape that does not have to be standard containers that clutter the landscape.
- Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site.
- Where additional infrastructure (i.e. roads) is needed, the upgrade of existing roads to accommodate the development should be the first consideration. The local material such as the rocks found within the area could be applied to address stormwater runoff from the road to prevent erosion.
- Infrastructure improvement, including new roads and upgrades to the road network, should be appropriate to the rural context (scale, material etc.).
- The layout of the turbines should have an emphasis on place-making, i.e. landscape-related heritage considerations, as opposed to standard infrastructure driven requirements;
- Prevent the construction of new buildings/structures on visually sensitive, steep, elevated or exposed slopes, ridgelines and hillcrests. Retain the integrity of the distinctive landscape character;
- Scale and massing should be sensitive to the surrounding landscape, although this is challenging with regard to the development of WEFs.
- Avoid visual clutter in the landscape by intrusive signage, and the intrusion of commercial corporate development along roads
- Avoid development of infrastructure (such as buildings and power lines), on crests or ridgelines due to the impact on the visual sensitivity of skylines.
- Retain view-lines and vistas focused on prominent natural features such as mountain peaks or hills, as these are important place-making and orientating elements for experiencing the cultural landscape.

Historic:

- The integrity of the historic farm werfs should be maintained and protected.
- Names of routes and watercourses that refer to traditional use during the time of the hunter-gatherers and herders, as well as the colonial era, should be celebrated.
- Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs.
- In some cases, remnant planting patterns (even single trees) uphold the historic character of an area. Interpretation of these landscape features as historic remnants should occur.
- Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed.
- Where the historic function of a building/site is still intact, the function has heritage value and should be protected. Please take note of the items listed below:
- Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained.
- The new roads should display minimum scale designs where possible.
- Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of barriers to traditional access routes. (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.
- Respect existing patterns, typologies and traditions of settlement-making by promoting the continuity of heritage features. These include: (a) indigenous; (b) colonial; and (c) current living heritage in the form of tangible and intangible associations to place.

- Respect traditional werf settlement patterns by considering the entire werf as the component of significance. This includes the backdrop of the natural landscape against which it is sited, as well as its spatial structure. Any development that impacts the inherent character of the werf component should be discouraged.

Social:

- Care should be taken that existing functions such as outspan areas (see criteria for these under historic) are not lost in the development stages, as it fulfils an important function within the cultural landscape.
- The local community around the development should benefit from job opportunities created by the proposed development.

Economic:

- Sheep or game farming should be allowed to continue in the area and between the panels where feasible.
- Care should be taken to reduce visual impact from surrounding tourism areas, by following the recommendations included in the VIA.

10.3 Cumulative Impacts

This section evaluates the possible cumulative impacts on heritage resources with the addition of the Solaris Fields Solar PV Facility. Cumulative impacts are those impacts that act together to affect the same heritage resources within the region. Increased development in the greater Study Area will have a number of cumulative impacts on heritage resources. In this instance the cumulative impacts that could result from a combination of the proposed and current projects as well as other actual or proposed future developments in the broader area. The cumulative impacts considered below assumes that mitigation measures have been applied.

Table 10 - Cumulative Impact Assessment Table for Palaeontological Resources (After Butler, 2020)

Nature: Cumulative impacts on fossil remain preserved at or beneath the ground surface.		
	Overall impact of the proposed project considered in isolation	***The cumulative impact of the project and other projects in the area***
Extent	Low (1)	High (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (-56)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Low
Mitigation: See Chance Find Protocol		
Residual Impacts: Loss of fossil heritage		

There are currently several applications being made for the development of renewable energy facilities in the area surrounding the Solaris Fields PV Facility development site. The study area may ultimately encompass the Redding WEF, two solar energy facilities (Sun Garden and Solaris

Fields PV Facilities) and the larger region the Hamlett, Rippon and Aeoulus WEFs, as well as the existing Cookhouse, Golden Valley, Nxuba, Nojoli and Amakhala Emoyeni WEFs. According to the VIA, the significance of the visual impacts on the sense of place within the region (i.e. beyond a 20km radius of the development and within the greater region) is expected to be of low significance (du Plessis, 2021).

However, according to the VIA (du Plessis, 2021) the cumulative visual impact of the proposed Solaris Fields PV Facility, the study area may ultimately encompass the Redding WEF, two solar energy facilities (Sun Garden and Solaris Fields PV Facilities) and the larger region the Hamlett, Rippon and Aeoulus WEFs, as well as the existing Cookhouse, Golden Valley, Nxuba, Nojoli and Amakhala Emoyeni WEFs.

The construction and operation of all of these renewable energy facilities is expected to increase the cumulative visual impact of industrial-type infrastructure within the region. See Table 16 below.

Table 11 - Cumulative Impact Assessment Table for Cultural Landscape.

Nature of Impact: The potential cumulative visual impact of Solaris Fields PV Facilities and WEF on the cultural landscape		
	Overall impact of the proposed project considered in isolation	***Cumulative impact of the project and other projects in the area***
Extent	Regional **(3)**	Broadrer Regional Area **(4)**
Duration	Permanent **(5)**	Long term **(4)**
Magnitude	Low **(4)**	Very high **(10)**
Probability	Definite **(5)**	Highly probable **(4)**
Significance	High **(60)**	High **(72)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation measures:		
Residual impacts: The visual impact will be removed after decommissioning, provided the Solaris Fields Solar PV facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain. The character of the landscape will remain changed permanently after the duration of the project as over time the sense of place will change. It is unlikely that the infrastructure will be decommissioned.		

10.4 Consideration of the socio-economic benefit relative to heritage resources

In this section, the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development, as prescribed by Section 38(3)(d) requirement of the NHRA will be discussed. This section is based on the SEIA (Keely & Broughton, 2021)

From the data obtained from surveyed landowners on which the various associated Wind Farm projects are to be developed, it is estimated that agricultural operations (including hunting and tourism) in the directly affected area employ approximately 50-60 people, the majority of whom are permanent employees. Most of the employees live on the farm and are those who do not, live in Cookhouse, Paterson, or Somerset East. An additional 35 people live on the farms who are not labourers.

It is recognised that many farms in the area practice a combination of crop, livestock and hunting activity. As such, most farms are involved in all three land uses as indicated previously. The dominant activity currently undertaken on farms that were surveyed was agriculture but, notable numbers of tourist activities occur on the farms. The following observations were made regarding land use:

- All of the farmers are commercial farmers
- Goats and sheep were the most common animals found in the area (6 150 animals) followed by game (580 animals and then beef cattle (150 animals) across all respondents surveyed
- The average size of property owned was 2 946 and ranged between 850 and 7 300 ha
- The majority of labourers live on the farms they work on with their family members
- Livestock animals reared for sale and kept for the production of food products include goats, sheep, and cattle
- All of the farms were the primary residence of the farm owner
- Very few, if any, international tourists visit directly affected farms for tourism or hunting
- Approximately 65 domestic tourists visited the area in a year. All being for hunting
- Some of the farms have accommodation facilities for visitors
- Farms receive visitors mostly between April and December
- Some of the game farms earn income through the trading of live game

The immediate area surrounding the proposed Sun Garden Solar PV Facility is very similar in terms of land use however there is no evidence of any tourism accommodation facilities offering overnight opportunities. In terms of the Blitzkraal Farm itself on which the largest footprint of the PV Facility will be developed, current economic activity can be described as follows:

- Agricultural activity is mainly focused on small-stock farming, this includes 120 Boer goats, 850 merino sheep and 150 dormer sheep. Limited cattle are kept on the property which consist of 11 Tuli cattle and 2 Jersey cattle.
- The total grazing area on the farm is approximately 2 700 ha.
- Only dryland agriculture is practised with no irrigation.
- There are around 5 residential houses on the property.
- Five families live permanently on the property, with a total of 4 permanent employees and 1 temporary employee all of whom reside on the property.
- Storage facilities comprise of 1 shearing shed and 5 storage facilities
- The owners intend to diversify, or expand farming operations if feasible and farm upgrades are likely to be undertaken on the farm which include fencing upgrades, adding irrigation and facilities to intensify farming operations and increasing livestock numbers, maintenance and upgrades of the current facilities, etc.

- The development is expected positively impact employment there is a possibility that more jobs will be created as the farming operations intensify and expand and no job losses are projected.

The affected landowners have indicated that the potential revenue received from rental income derived from the PV facility could be utilised to invest in solutions to mitigate challenges currently facing the agricultural industry in the surrounding area i.e., droughts, feed prices etc. In addition, the owners are exploring options to diversify their farming activity and move into more intensive forms of agricultural activity, producing niche products for the regional market. Their intention is to retain all existing labour on the farm, and hopefully increase employment numbers when the need arises

Keeping the above in mind the findings of the SEIA (2021) summarise that:

"The assessment of the proposed facility, and its net effect from a socio-economic perspective, indicates that the project would generate greater socio-economic benefits during both the construction and operational phases than the potential losses that could occur as a result of its establishment. Stimulation of production, employment, government revenue, skills development and household income as a result of the investment in the project and its subsequent operations will outweigh possible production, employment and household income losses that could be experienced by local businesses affected by changes in the areas aesthetic and visual resources. It should be noted though that the positive and negative impacts will be distributed mostly amongst different receptors but will not result in inequality. Adherence to the proposed mitigation measures, however, would ensure that the offset of impacts is more balanced and that it also takes into account communities and businesses that will be negatively affected.

The positive effects generated by the project will not offset many of the negative impacts. These include impacts on the sense of place and property and business values that could occur during both construction and operation, the effect on social and economic infrastructure, and crime and social conflicts in the area that could be created during only the construction phase. These impacts though will only affect local communities either temporarily or over the long term. These impacts are not highly significant and can be traded off for the net positive impact created by the project in terms of production, employment, government revenue, community benefits and households' earnings. This means that when compared with the no-go option, the proposed project is associated with greater socio-economic benefits.

The net positive impacts associated with the development and operation of the proposed solar energy facility are expected to outweigh the net negative effects. The project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be largely concentrated in the local and national economies. Due to this imbalance, it is

recommended that the mitigation measures suggested being strictly adhered to. Application of these mitigation measures will ensure that the negative impacts on the nearby farms and businesses are minimised and that the distribution of the potential benefits of the project are more balanced".

The economic benefit for the region and the overall energy needs such a project address to outweigh the need for the conservation of cultural resources at all costs. Especially where a project is situated within a gazetted REDZ area.

10.5 Management recommendations and guidelines

10.5.1 *Construction phase*

The project will encompass a range of activities during the construction phase, including ground clearance, the establishment of construction camp areas and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however, foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in a little alteration of the land surface, but still, need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

10.5.2 *Grave Management Plan guidelines*

- The HIA identified several burial Grounds and Graves (BGG). These will require management and mitigation if any of the resources will be affected by any construction-related activities. The following should be included in the Management Plan to be drafted for the BGG to be retained *in situ* in the project area:
    - Direct what needs to be done, how the identified and accidentally discovered BGG must be protected and managed, and who will be responsible;
    - Define the goals to be achieved and the type of activities;
    - Guide any future construction or development-related activities;
    - Determine the monitoring methodology;

- Assist with stakeholder engagement and identification of interested parties, if needed;
- Explain the permitting procedure;
- Describe any professional requirements and clarify responsibilities;
- Identify the significance of the heritage resources and provide guiding principles for activities on site;
- Identify the site value and provide guiding principles for activities on-site;
- Minimise loss or avoid adverse impacts on heritage resources;
- Ensure that cultural heritage is incorporated in spatial planning and linked to social strategies;
- Improve the understanding of cultural heritage and the contribution it makes to the broader management processes; and
- Ensure that proper investigation, recording and stakeholder meetings take place.
- Includes the Chance Finds Procedure, which outlines the process to follow if any culturally significant heritage resources are found during construction/or operation related activities.

10.5.3 *Chance find procedure*

- A heritage practitioner/archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.
- An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner/archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor, therefore, should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner/archaeologist.

10.5.4 *Possible finds during construction and operation*

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities could uncover the following:

- stone foundations;
- ash middens associated with the historical structures that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives.

- unmarked graves

10.6 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 12** gives guidelines for lead times on permitting.

Table 12 - Lead times for permitting and mobilisation.

Action	Responsibility	Timeframe
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and ECPHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and ECPHRA	2 weeks
Relocation of burial grounds or graves in the way of construction	Service provider – Archaeologist, ECPHRA, local government and provincial government	6 months

10.7 Heritage Management Plan for EMPr implementation

Table 13 - Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	• Implement a chance to find procedures in case possible heritage finds are uncovered. • A detailed "walk down" of the final approved solar facility locations, access roads, powerlines and substations will be required before construction commences. • Any heritage features of significance identified during this walk down will require formal mitigation (i.e. permitting where required) or where possible a slight change in design could accommodate such resources. • A Heritage management plan (HMP) for the heritage resources needs to be compiled and approved for implementation during construction and operations where heritage features of significance are identified.	Construction	During construction	Applicant EO Heritage Specialist	EO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from ECPHRA under Section 36 and 38 of NHRA	EO Monthly Checklist/Report
Possible graves	• When graves are discovered/ uncovered the site should be demarcated with a 30-meter no-go-buffer-zone and the grave should be avoided. • Undertake archaeological monitoring at earth clearance stage. • If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the	Construction	During Construction	Applicant EO Heritage Specialist	EO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from ECPHRA under Section 36 and 38 of NHRA	EO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	ECPHRA under the NHRA and National Health Act regulations. • If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.						
Palaeontological finds	• If fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the EO in charge of these developments. • Fossil discoveries ought to be protected and the EO/site manager must report to ECPHRA	Construction	Construction	Applicant EO Palaeontologist	Monthly	Ensure compliance with relevant legislation and recommendations from ECPHRA under Section 35 of NHRA	Final report to be used by the develop to apply for a destruction permit under s35 of the NHRA
Cultural Landscape	Refer to **Table 9** of this report.	Construction	Construction	Applicant EO Heritage Specialist	EO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from ECPHRAunder Section 36 and 38 of NHRA	EO Monthly Checklist/Report

11 CONCLUSIONS

The HIA has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries. Through data analysis and a site investigation, the following issues were identified from a heritage perspective.

The fieldwork component of the study was aimed at identifying tangible remains of archaeological, historical and heritage significance. The fieldwork was undertaken by way of intensive walkthroughs of the study area. The fieldwork was conducted over several days on 23 March 2020 as well as from 8 to 13 June 2020. This fieldwork team consisted of an archaeologist (Cherene de Bruyn) and a field assistant (Pascal Snyman). No heritage resources or burial grounds were identified within the proposed project footprint.

11.1.1 *Palaeontology*

According to the PIA conducted by Banzai Environmental (Butler, 2021) the proposed development is underlain by the underlain by the Dwyka Group; the Fort Brown Formation of the Ecca Group (Karoo Supergroup), Adelaide Subgroup (Koonap and Middleton Formations, Beaufort Group, Karoo Supergroup) and the Witteberg Group of the Cape Supergroup, Karoo Dolerite, and Quaternary deposits.

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Dwyka Group is Low, the Collingham Formation, Rippon Formation, Fort Brown Formation of the Ecca Group is Moderate, while the Prince Albert Formation has a High and the Whitehill Formation of the Ecca has a Very High Palaeontological Sensitivity. The Adelaide Subgroup also has a Very High Palaeontological Sensitivity, Dolerite is igneous in origin and thus has an Insignificant Paleontological Sensitivity while that of Quaternary deposits is Low but locally High (Almond et al, 2013; SAHRIS website).

11.1.2 *Cultural Landscape*

The Solaris Fields Solar PV Facility is located within an area is sparsely populated (less than 10 people per km^2) and consists of a landscape of wide-open spaces and very little development. The entire proposed development envelope is located within the Cookhouse REDZ and Strategic Transmission Corridor. The vegetation cover in the region is primarily grassland and low shrubland, with some forest and woodland occurring along the banks of the Brak and Little Fish Rivers. The terrain morphology is described as lowlands (plains) with parallel hills, and even though the study area is predominantly flat, there are a number of prominent ridges to the south. The Little Fish River (to the north-east) is the only perennial river in the study area.

11.2 Impact Statement

Analysis of the various components of the HIA indicates a mitigated low negative impact on heritage resources and are expanded on below.

11.2.1 *Historical structures*

No historical structures of heritage significance were identified.

11.2.2 *Burial Grounds and graves*

No burial grounds or graves were identified.

11.2.3 *Palaeontology*

An assessment of the possible impacts of the proposed project on palaeontological resources has shown that unmitigated impacts consist of a medium negative impact mostly confined to the construction phase of the project. **By implementing the mitigation measures as listed in this report these impacts can be managed to a neutral.**

11.2.4 *Cultural landscape*

An assessment of the possible impacts of the proposed project on the overall CL has shown that unmitigated impacts consist of a high negative impact mostly confined to the construction and operation phase of the project. **By implementing the mitigation measures as listed in this report these impacts can be managed to high negative.**

11.2.5 *Cumulative Impacts*

Considering the development of other WEF located next to the Solaris Fields PV Facility and within the broader Grahamstown (Makanda region) the cumulative unmitigated impacts on Historical structures, Burial ground and graves as well as palaeontological resources consist of a medium to high negative impact mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of heritage resources. **However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to low negative.**

11.3 Recommendations

The following mitigation measures are listed in **Table 19.**

Area and site no.	Mitigation measures
General project area	• Implement a chance to find procedures in case possible heritage finds are uncovered. • A detailed “walk down” of the final approved PV footprint, access roads, powerlines and substations will be required before construction commences.

Area and site no.	Mitigation measures
	• Any heritage features of significance identified during this walk down will require formal mitigation (i.e. permitting where required) or where possible a slight change in design could accommodate such resources. • A HMP for the heritage resources needs to be compiled and approved for implementation during construction and operations where heritage features of significance are identified.
Possible graves	• When graves are discovered/ uncovered the site should be demarcated with a 30-meter no-go-buffer-zone and the grave should be avoided. • Undertake archaeological monitoring at earth clearance stage. • If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the ECPHRA under the NHRA and National Health Act regulations. • If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.
Palaeontological finds	• If fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the EO in charge of these developments. • Fossil discoveries ought to be protected and the EO/site manager must report to ECPHRA.
Cultural Landscape	Refer to **Table 9**Error! Reference source not found. of this report.

Findings

The assessment of the possible impacts on the archaeological, historical and palaeontological resources has shown a Low impact from the Solaris Fields PV Facility project after mitigation measures. It is further considered that the project can have a potential positive influence on such resources in the region when the proposed conservation initiative from the project considers such resources as part of a larger development strategy.

The assessment of the CL indicated that the project will have a significant Moderate to High impact on the CL. The general mitigation measures for renewable energy development in areas of CL significance as proposed by Jansen and Franklin, (2021) as well as Lavin (2021) will still result in a marginal reduction of impact.

It must further be considered that the addition of the infrastructure of the Solaris Fields PV Facility will constitute an additional layer to the CL and must be considered as such within a gazetted REDZ area. Through the implementation of the economically feasible recommendations as set out in the CLA and contained in this report it will be possible to preserve older layers of the CL and in some cases even enhance them through consideration such as the use of older name places in the naming of infrastructure and enhancing local heritage through the incorporation of such structures in project conservation initiatives to name a few.

Analysis of the findings of the SEIA for this project further reveals that the economic benefit for the region and the overall energy needs such project addresses outweighs the need for conservation of cultural resources at all costs. The economic benefit for the region and the overall energy needs such a project address to outweigh the need for the exclusion of the Sun Garden Solar PV facility to conserve cultural resources at all costs. Especially where a project is situated within a gazetted REDZ area.

The overall impact of the Solaris PV facility, on the heritage resources identified during this report, is considered as acceptable after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

12 REFERENCES

BERGH, J.S. (ed.). 1999: Geskiedenis Atlas van Suid-Afrika: Die Vier Noordelike Provinsies. J.L. van Schaik. Pretoria.

BROQUET, C.A.M. 1992. The sedimentary record of the Cape Supergroup: a review. In: De Wit, M.J. & Ransome, I.G. (Eds.) Inversion tectonics of the Cape Fold Belt, Karoo and Cretaceous Basins of Southern Africa, pp. 159-183. Balkema, Rotterdam.

CHISHOLM, H. 1911. "Algoa Bay". Encyclopædia Britannica. (11th ed.). Cambridge: Cambridge University Press. p. 655.

COETZEE, C. 1994. Forts of the Eastern Cape: Securing a frontier 1799-1878. University of Fort Hare: King Williams Town.

COLLINS, B. & WILKINS, J. and AMES, C. 2017. Revisiting the holocene occupations at Grassridge Rockshelter, Eastern Cape, South Africa. South African Archaeological Bulletin 72 (206): 162–170.

CORY, G. 1920. Grahamatown, in Souvenir in Commemoration of the Centenary of the 1820 Settlers of Albany April 1820-April 1920. East London Daily Dispatch

DEACON, H.J. 1976. Where Hunters Gathered: A Study of Holocene Stone Age people in the Eastern Cape. South African Archaeological Society Monograph Series, No. 1.

ENCYCLOPAEDIA BRITANNICA. 2006. Port Elizabeth. Internet: https://www.britannica.com/place/Port-Elizabeth-South-Africa#accordion-article-history. Accessed: 22 January 2020

ERASMUS. 2014. On Route in South Africa. Jonathan Ball Publishers.3rd Edition. Johannesburg

GESS, W. H. R. 1969. Excavation of a pleistocene bone deposit at Aloes near Port Elizabeth. The South African Archaeological Bulletin, 24(93): 31-32.

HALL, S. L. 1985. The Prehistory of Grahamstown and its Environs. In Daniel, J.B. Mcl; Holleman, W.; Jacot Guillardmod, A. Grahamstown and its Environs. Grahamstown, Albany Museum.

HALL, S. & BINNEMAN, J. F. 1987. Later Stone Age Burial Variability in the Cape: A Social Interpretation. South African Archaeological Society 42(146): 140–152.

HALL, S AND WEBLEY, L. 1998. Chapter 27: Archaeology and Early History, in Lubke, R and De Moor, I. Field Guide to the Eastern and Southern Cape Coasts. Cape Town: University of Cape Town Press.

HUFFMAN, T. 2007. Handbook to the Iron Age of Pre-Colonial Farming Societies in South Africa. Pietermaritzburg: University of KwaZulu-Natal Press.

LEIN, R. G. 2000. The Earlier Stone Age of Southern Africa. The South African Archaeological Bulletin, 27(172): 107-122.

KORSMAN, S.A. & MEYER, A. 1999. Die Steentydperk en rotskuns. In Bergh, J.S. (red.). Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies. Pretoria: J.L.van Schaik.

MAZEL, A. D. 1992. Early pottery from the eastern part of southern Africa. The South African Archaeological Bulletin, 47(155): 3-7.

MITCHELL, P. 2002. The Archaeology of Southern Africa. Cape Town: Cambridge University Press.

MUCINA, L. & RUTHERFORD, M. C. 2006. Vegetation Map of South Africa, Lesotho and Swaziland. Pretoria: SANBI.

MYLES, P. B. 2017. Maritime Clusters and the Ocean Economy: An Integrated Approach to Managing Coastal and Marine Space. Oxon: Routledge

OPPERMAN, H., 1982. Some research results of excavations in the Colwinton Rock Shelter, north-eastern Cape. The South African Archaeological Bulletin, 37(136): 51-56.

OPPERMAN, H. 1987. The Later Stone Age of the Drakensberg Range and its foothills. Oxford: British Archaeological Reports International Series 339.

OPPERMAN, H. 1996. Strathalan Cave B, north-eastern Cape Province, south Africa: Evidence for human behaviour 29,000-26,000 years ago. Quaternary International, 33: 45-53

PEIRES, J. B. 1982. The House of Phalo: A History of the Xhosa People in the Days of Their Independence. Los Angeles: University of California Press

PINTO, H., ARCHER, W., WITELSON, D., REGENSBERG, R., EDWARDS BAKER, S., MOKHACHANE, R., RALIMPE, J., NDABA, N., MOKHANTSO, L., LECHEKO, P. & CHALLIS, S. 2018. The Matatiele Archaeology and Rock Art (MARA) Program Excavations: The Archaeology of Mafusing 1 Rock Shelter, Eastern Cape, South Africa. Journal of African Archaeology, 16(2): 145-167.

RASMUSSEN, R. K. 1978. Migrant Kingdom: Mzilikazi's Ndebele in South Africa. London: Rex Collings

REDGRAVE, J.J. 1947. Port Elizabeth in bygone days. Cape Town: Rustica Press.

RIGHTMIRE, G. P. & DEACON, H.J. 1991. Comparative studies of Late Pleistocene human remains from Klasies River Mouth, South Africa, Journal of Human Evolution, 20(2): 131-156

SHAW, I. & JAMESON, R. 2002. A Dictionary of Archaeology. UK: Blackwell Publishers Ltd

THEAL, G. M. 2010. History of South Africa Since September 1795. Cambridge: Cambridge University Press

WADLEY. L. 2007. The Middle Stone Age and Later Stone Age. In Bonner, P. & Esterhuysen, A. & Jenkins, T. A Search for Origins: Science, History and South Africa's 'Cradle of Humankind'. Johannesburg: Wits University Press. Pg 122 -135.

WEBSTER, L.J. 1978. Visit to Table Hill Farm and Hilton. Annals of the Grahamstown Historical Society, 2(3): 71-79.

WESSELS, A. 2010. The Anglo-Boer War 1889-1902: White Man's War, Black Man's War, Traumatic War. Bloemfontein: African Sun Media.

Unpublished

ANDERSON, G. 2009. Heritage survey of the proposed Waainek Wind Farm, Grahamstown, Eastern Cape. Prepared for Coastal and Environmental Services.

BEATER, J. 2014. Proposed New 15ml Concrete Reservoir, Lenasia South. Heritage Impact Assessment. Prepared for Johannesburg Water.

BINNEMAN, & REICHERT, K. 2015. An archaeological walkthrough survey of the final optimised layout of the authorised Nxuba Wind Farm near Cookhouse, Blue Crane Route Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

BINNEMAN, J. 2013. A Phase 1 Archaeological Impact Assessment of the proposed new substation and 132kv power line and the Nojoli Wind Farm near Cookhouse, Blue Crane Route Local Municipality, Cacadu District, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

BINNEMAN, J. 2013. An archaeological walkthrough survey of the turbine footprint for the proposed Phase 1 Amakhala Emoyeni Wind Energy Facility, Cookhouse District, Blue Crane Route Municipality, Eastern Cape Province.

BINNEMAN, J. 2014. An archaeological walkthrough survey of the final layout of the proposed Nojoli Wind Energy Facility near Cookhouse, Blue Crane Route Local Municipality, Bedford District, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

BINNEMAN, J. AND BOOTH, C. 2009. A Phase 1 archaeological heritage impact assessment for the proposed subdivision and rezoning of Erf 8517, Grahamstown, Makana Municipality, Cacadu District Municipality, for the purposes of constructing residential and town housing, and business centre. Prepared for Conservation Support Services.

BOOTH, C. 2011A. A Phase 1 Archaeological Impact Assessment for the proposed Cookhouse Ii Wind Energy Facility, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty).

BOOTH, C. 2011B. Phase 1 archaeological impact assessment for the Golf Course Development On Portions 1 and 2 of the Farm Willow Glen and Portion 6 of Belmont Farm, Grahamstown, Makana Municipality, Cacadu District Municipality, Eastern Cape Province. Prepared for Coastal and Environmental Services.

BOOTH, C. 2012. An Archaeological Desktop Study for the Proposed Elliot Wind Energy Facility on a site west of Elliot, Sakhisizwe Local Municipality. Prepared for Savannah Environmental.

BOOTH, C. 2013. A phase 1 archaeological impact assessment (AIA) for the proposed N2 national route (N2-13) between Grahamstown and the Fish River Bridge as well as six borrow pits and three quarries, Eastern Cape Province. Prepared for Coastal and Environmental Services (CES).

BUTLER, E. 2021. Palaeontological Impact Assessment for the proposed development of a cluster of renewable energy facilities between Somerset East and Grahamstown in the Eastern Cape. Prepared for Savannah Environmental (Pty) Ltd.

DU PLESSIS, L. 2021. Visual Impact Assessment. Proposed Solaris Fields Solar PV Facility, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

GAIGHER, S. 2010. Heritage Impact Assessment for the Proposed Upgrading of the Storm Water Drainage Network for the Town of Somerset East, Eastern Cape Province.

HALKETT, D. & WEBLEY, L. & ORTON, J.& PINTO, H. 2010. Heritage impact assessment of the proposed Amakhala-Emoyeni wind energy facility, Cookhouse District, Eastern Cape. Prepared for Savannah Environmental (Pty).

HALKETT, D. & WEBLEY, L. 2010. Heritage Scoping Assessment of a proposed Wind Energy Facility to be situated on farms in the Cookhouse District, Eastern Cape. Prepared for Savannah Environmental (Pty).

HALL, S. 1990. Hunter-gatherer-fishers of the Fish River Basin: A Contribution to the Holocene Prehistory of the Eastern Cape. Unpublished PhD thesis. Stellenbosch: University of Stellenbosch.

JANSEN, L. & FRANKLIN, M. 2021. Cultural Landscape Assessment, including heritage design indicators, the proposed development of the Pienaarspoort 1 and 2 Wind Energy Facility (WEF), on the Farms Bruwelsfontein 249 portion 0, Drinkwaterskloof 251 (REF), and Melkbosch Kraal 250 portion 1 near Touwsrivier, Western Cape. Prepared for Savannah Environmental (Pty).

KEELY, M. & BROUGHTON, E. 2021. Socio-Economic Impact Assessment Report for the proposed Solaris Fields Solar PV Facility and associated infrastructure in the Eastern Cape. Prepared for Savannah Environmental (Pty).

LAVIN, J. 2021. Cultural Landscape Assessment As Part Of The Heritage Impact Assessment Process In Renewable Energy Development Zones. Letter for Savannah Environmental (Pty).

LESLIE-BROOKER, M. 1987. An Archaeological Study of the Uniondale Rockshelter, Albany District, Eastern Cape. Master of Arts thesis: University of Stellenbosh

LOTTER, M. G. 2016. The archaeology of the lower Sundays River Valley, Eastern Cape Province, South Africa: an assessment of Earlier Stone Age alluvial terrace sites. PHD Thesis. Johannesburg: University of the Witwatersrand.

MARSHAL, R. 2008. A social and cultural history of Grahamstown, 1812 to c1845. Unpublished MA Thesis. Grahamstown: Rhodes University

NEL, J. & DE KAMPER, G. 2008. Heritage resources scoping survey & preliminary assessment Transnet Freight Line EIA, Eastern Cape and Northern Cape. Prepared for Environmental Resource Management in Southern Africa.

NILSSEN, P. 2011. Proposed development of the Plan 8 Grahamstown Wind Energy Project: including Farms Gilead 361, Peynes Kraal 362 and Tower Hill 363, Grahamstown, Makana Municipality, Eastern Cape Province. Prepared for Coastal & Environmental Services.

SMUTS. K. & LAVIN, J. 2017. Heritage impact assessment for the proposed Spitskop Wef 132kv Power Lines. Prepared for Terramanzi Group (Pty) Ltd.

STEELE, J. 2001. First-millennium agriculturist ceramics of the Eastern Cape, South Africa: an investigation into some ways in which artefacts acquire meaning. MA Thesis. Pretoria: University of South Africa.

VAN RYNEVELD, K. 2011. Cultural heritage impact assessment upgrade of the National Route 10 Section 3(N10/3) from Baviaans River to Rietvlei (Vrischgewaagd), between Cookhouse and Cradock, Eastern Cape, South Africa. Prepared for MPM Environmental Consultants.

VAN RYNEVELD, K. 2016. Phase 1 Archaeological & Cultural Heritage Impact Assessment – Proposed Hempel Quarry, Crusher and Stockpile Area, Farm No 604, near Grahamstown, Makana Local Municipality, Eastern Cape. Prepared for Terreco Environmental.

VAN SCHALKWYK, J. 2011. Heritage impact assessment for the proposed Eskom 400kv Electricity Transmission Line, Neptune To Poseidon Substations, East London To Cookhouse, Eastern Cape.

VAN SCHALKWYK, L. 2008. Heritage impact assessment of four borrow pits, Ndlambe and Makana Municipalities, Greater Cacadu Region, Eastern Cape Province, South Africa. Prepared for BKS (Pty) Ltd.

WEBLEY, L & WAY-JONES, M. F. 2007. Phase 1 heritage impact assessment on erven 1,44,7586 and 4979, Rhodes University, Grahamstown, Eastern Cape. Prepared for Rhodes University.

Digital sources

CDNGI GEOSPATIAL PORTAL. 2021. Aerial Photo (141_009_19421). Internet: http://cdngiportal.co.za/photocentres/OTHER_SCALES_PAN/141/141_009_19421.jpg Assessed: 05/10/2021

MILITARYHISTORYSA. 2017. An overview of the East Cape Frontier Wars. Internet: https://militaryhistorysa.wordpress.com/2017/04/02/1-an-overview-of-the-east-cape-frontier-wars/ Accessed: 2 March 2020

NATIONAL SCREENING TOOL. 2017. Environmental screening tool. Internet: https://screening.environment.gov.za/screeningtool/#/pages/welcome Accessed: 1 October 2020.

RIEBEECK EAST. 2013. History of Riebeeck East - South Africa. Internet: http://www.riebeeckeast.co.za/history.html. Accessed: 28 February 2020

REID, J. 1847. Plan of the Eastern Frontier Cape of Good Hope and the adjacent country of the Kaffir Tribes included between the Great Fish and Kei Rivers. Internet: http://catalog.afriterra.org/viewMap.cmd?number=1001 Accessed: 29 August 2021

SA HISTORY. 2019. Riebeek East. Internet: https://www.sahistory.org.za/place/riebeek-east. Accessed: 28 February 2020.

UNESCO. 2020. Cultural Landscapes. Internet: https://whc.unesco.org/en/culturallandscape/#1 Accessed: 15 October 2020.

WILY, W. H. & FADEN, W. 1818. Military Sketch of that part of the Colony of the Cape of Good Hope. Internet: http://catalog.afriterra.org/viewMap.cmd?number=622 Accessed: 29 August 2021

Appendix A

Heritage Assessment Methodology

The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted by vehicle through the proposed project area by a qualified heritage specialist. The survey was conducted over one day (21 August 2019), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
    - Low - <10/50m2
    - Medium - 10-50/50m2
    - High - >50/50m2
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate development activity position;
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (Error! Reference source not found. and Error! Reference source not found.**)**.

Table A 1: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table A 2: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area.	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
		Internal alterations should not necessarily be regulated.	
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

Appendix B

Project team CV's

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
  - Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
  - Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

Key Work Experience

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Malawi, Mauritius, Zimbabwe and the Democratic Republic of the Congo

PROFESSIONAL CURRICULUM FOR CHERENE DE BRUYN

Professional Archaeologist for PGS Heritage

Key Qualifications

2016-2017	MA in Archaeology University College London, United Kingdom
2015	BSC Honours in Physical Anthropology, University of Pretoria, South Africa
2013	BA Honours in Archaeology University of Pretoria, South Africa
2010-2012	BA (General) University of Pretoria, South Africa Major subjects: Archaeology and Anthropology

Professional Qualifications:

Association of Southern African Professional Archaeologists - Professional Member (#432)

International Association for Impact Assessment South Africa - Member (#6082)

Association of Southern African Professional Archaeologists - CRM Accreditation

- Principal Investigator: Grave relocation
- Field Director: Colonial period archaeology, Iron Age archaeology
- Field Supervisor: Rock art, Stone Age archaeology
- Laboratory Specialist: Human Skeletal Remains

Languages:

Afrikaans & English

Summary of Experience

Expertise in Heritage Impact Assessment Management, Historical and Archival Research, Archaeology, Physical Anthropology, Grave Relocations, Fieldwork, Geographic Information Systems and Project Management including *inter alia* -

Involvement in various grave relocation projects

- Grave exhumation, test excavations and grave "rescue" excavations in the various provinces of South Africa.
- Permit applications with SAHRA BGG and AMAFA for grave relocation projects.

Involvement with various Heritage Impact Assessments,

- Heritage Impact Assessments and Management for various projects within Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West and Western Cape Province.
- Archaeological Walkdowns for various projects.
- Desktop, archival and heritage screening for projects.

EMPLOYMENT SUMMARY:

Positions Held

- 2020 – to date: Archaeologist - PGS Heritage
- 2019: Manager of the NGT ESHS Heritage Department – NGT Holdings
- 2018 – 2019: Archaeologist and Heritage Consultant – NGT Holdings
- 2015-2016: Archaeological Contractor - BA3G, University of Pretoria
- 2014 – 2015: DST-NRF Archaeological Intern, FARC, University of Pretoria

ELIZE BUTLER

Palaeontologist for Banzai Environmental

PROFESSION: Palaeontologist

YEARS' EXPERIENCE: 26 years in Palaeontology

EDUCATION:

B.Sc Botany and Zoology, 1988

University of the Orange Free State

B.Sc (Hons) Zoology, 1991

University of the Orange Free State

Management Course, 1991

University of the Orange Free State

M. Sc. *Cum laude* (Zoology), 2009

University of the Free State

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

Registered as a PhD fellow at the Zoology Department of the UFS

2013 to current

Dissertation title: A new gorgonopsian from the uppermost D*aptocephalus Assemblage Zone*, in the Karoo Basin of South Africa

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part-time Laboratory assistant — Department of Zoology & Entomology University of the Free State Zoology 1989-1992

Part-time laboratory assistant

Department of Virology

University of the Free State Zoology 1992

Research Assistant

National Museum, Bloemfontein 1993 – 1997

Principal Research Assistant

National Museum, Bloemfontein

and Collection Manager

1998–currently

TECHNICAL REPORTS

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed Westrand Strengthening Project Phase II.

E. Butler. 2019. Palaeontological Field Assessment for the proposed Sirius 3 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province

E. Butler. 2019. Palaeontological Field Assessment for the proposed Sirius 4 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province

E. Butler. 2019. Palaeontological Field Assessement for Heuningspruit PV 1 Solar Energy Facility near Koppies, Ngwathe Local Municipality, Free State Province.

E. Butler. 2019. Palaeontological Field Assessment for the Moeding Solar Grid Connection, North West Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological studies for the Proposed Agricultural Development on Farms 1763, 2372 And 2363, Kakamas South Settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological studies: of Proposed Agricultural Development, Plot 1178, Kakamas South Settlement, Kai! Garib Municipality

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Waste Rock Dump Project at Tshipi Borwa Mine, near Hotazel, Northern Cape Province:

E. Butler. 2019. Palaeontological Exemption Letter for the proposed DMS Upgrade Project at the Sishen Mine, Gamagara Local Municipality, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed Integrated Environmental Authorisation process for the proposed Der Brochen Amendment project, near Groblershoop, Limpopo

E. **Butler. 2019.** Palaeontological Desktop Assessment of the proposed updated Environmental Management Programme (EMPr) for the Assmang (Pty) Ltd Black Rock Mining Operations, Hotazel, Northern Cape

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed Kriel Power Station Lime Plant Upgrade, Mpumalanga Province

E. Butler. 2019. Palaeontological Impact Assessment for the proposed Kangala Extension Project Near Delmas, Mpumalanga Province.

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed construction of an iron/steel smelter at the Botshabelo Industrial area within the Mangaung Metropolitan Municipality, Free State Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological studies for the proposed agricultural development on farms 1763, 2372 and 2363, Kakamas South settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological Studies for Proposed formalisation of Gamakor and Noodkamp low cost Housing Development, Keimoes, Gordonia Rd, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological Studies for proposed formalisation of Blaauwskop Low Cost Housing Development, Kenhardt Road, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed mining permit application for the removal of diamonds alluvial and diamonds kimberlite near Windsorton on a certain portion of Farm Zoelen's Laagte 158, Registration Division: Barkly Wes, Northern Cape Province.

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed Vedanta Housing Development, Pella Mission 39, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.

E. Butler. 2019. Palaeontological Desktop Assessment for The Proposed 920 Kwp Groenheuwel Solar Plant Near Augrabies, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment for the establishment of a Super Fines Storage Facility at Amandelbult Mine, Near Thabazimbi, Limpopo Province

E. Butler. 2019. Palaeontological Impact Assessment for the proposed Sace Lifex Project, Near Emalahleni, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Rehau Fort Jackson Warehouse Extension, East London

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Environmental Authorisation Amendment for moving 3 Km Of the Merensky-Kameni 132KV Powerline

E. Butler. 2019. Palaeontological Impact Assessment for the proposed Umsobomvu Solar PV Energy Facilities, Northern and Eastern Cape

E. Butler. 2019. Palaeontological Desktop Assessment for six proposed Black Mountain Mining Prospecting Right Applications, without Bulk Sampling, in the Northern Cape.

E. Butler. 2019. Palaeontological field Assessment of the Filling Station (Rietvlei Extension 6) on the Remaininng Portion of Portion 1 of the Farm Witkoppies 393JR east of the Rietvleidam Nature Reserve, City of Tshwane, Gauteng

E. Butler. 2019. Palaeontological Desktop Assessment Of The Proposed Upgrade Of The Vaal Gamagara Regional Water Supply Scheme: Phase 2 And Groundwater Abstraction

E. Butler. 2019. Palaeontological Desktop Assessment Of The Expansion Of The Jan Kempdorp Cemetry On Portion 43 Of Farm Guldenskat 36-Hn, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Residential Development On Portion 42 Of Farm Geldunskat No 36 In Jan Kempdorp, Phokwane Local Municipality, Northern Cape Province

E. Butler. 2019. Palaeontological Impact Assessment of the proposed new Township Development, Lethabo Park, on Remainder of Farm Roodepan No 70, Erf 17725 And Erf 15089, Roodepan Kimberley, Sol Plaatjies Local Municipality, Frances Baard District Municipality, Northern Cape

E. Butler. 2019. Palaeontological Protocol for Finds for the proposed 16m WH Battery Storage System in Steinkopf, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter of the proposed 4.5WH Battery Storage System near Midway-Pofadder, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter of the proposed 2.5ml Process Water Reservoir at Gloria Mine, Black Rock, Hotazel, Northern Cape

E. Butler. 2019. Palaeontological Desktop Assessment for the Establishment of a Super Fines Storage Facility at Gloria Mine, Black Rock Mine Operations, Hotazel, Northern Cape:

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed New Railway Bridge, and Rail Line Between Hotazel And The Gloria Mine, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter Of The Proposed Mixed Use Commercial Development On Portion 17 Of Farm Boegoeberg Settlement Number 48, !Kheis Local Municipality In The Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Diamond Mining Permit Application Near Kimberley, Sol Plaatjies Municipality, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Diamonds (Alluvial, General & In Kimberlite) Prospecting Right Application near Postmasburg, Registration Division; Hay, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed diamonds (alluvial, general & in kimberlite) prospecting right application near Kimberley, Northern Cape Province.

E. Butler. 2019. Palaeontological Phase 1 Impact Assessment of the proposed upgrade of the Vaal Gamagara regional water supply scheme: Phase 2 and groundwater abstraction

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed seepage interception drains at Duvha Power Station, Emalahleni Municipality, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment letter for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng.

E. Butler. 2019. Palaeontological Phase 1 Assessment letter for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng.

E. Butler. 2019. Palaeontological field Assessment for the Proposed Upgrade of the Kolomela Mining Operations, Tsantsabane Local Municipality, Siyanda District Municipalitty, Northern Cape Province, Northern Cape

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed feldspar prospecting rights and mining application on portion 4 and 5 of the farm Rozynen 104, Kakamas South, Kai! Garib Municipality, Zf Mgcawu District Municipality, Northern Cape

E. Butler. 2019. Palaeontological Phase 1 Field Assessment of the proposed Summerpride Residential Development and Associated Infrastructure on Erf 107, Buffalo City Municipality, East London.

E. Butler. 2019. Palaeontological Desktop Impact Assessment for the proposed re-commission of the Old Balgray Colliery near Dundee, Kwazulu Natal.

E. Butler. 2019. Palaeontological Phase 1 Impact Assessment for the Proposed Re-Commission of the Old Balgray Colliery near Dundee, Kwazulu Nata.l

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery.

E. Butler. 2019. Palaeontological Impact Assessment and Protocol for Finds of a Proposed New Quarry on Portion 9 (of 6) of the farm Mimosa Glen 885, Bloemfontein, Free State Province

E. Butler. 2019. Palaeontological Impact Assessment and Protocol for Finds of a proposed development on Portion 9 and 10 of the Farm Mimosa Glen 885, Bloemfontein, Free State Province

E. Butler. 2019. Palaeontological Exemption Letter for the proposed residential development on the Remainder of Portion 1 of the Farm Strathearn 2154 in the Magisterial District of Bloemfontein, Free State

E. Butler. 2019. Palaeontological Field Assessment for the Proposed Nigel Gas Transmission Pipeline Project in the Nigel Area of the Ekurhuleni Metropolitan Municipality, Gauteng Province

E. Butler. 2019. Palaeontological Desktop Assessment for five Proposed Black Mountain Mining Prospecting Right Applications, Without Bulk Sampling, in the Northern Cape.

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and an Integrated Water Use Licence Application for the Reclamation of the Marievale Tailings Storage Facilities, Ekurhuleni Metropolitan Municipality - Gauteng Province.

E. Butler. 2019. Palaeontological Impact Assessment for the Proposed Sace Lifex Project, near Emalahleni, Mpumalanga Province.

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Golfview Colliery near Ermelo, Msukaligwa Local Municipality, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Kangra Maquasa Block C Mining development near Piet Retief, in the Mkhondo Local Municipality within the Gert Sibande District Municipality

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Amendment of the Kusipongo Underground and Opencast Coal Mine in Support of an Environmental Authorization and Waste Management License Application.

E. Butler. 2019. Palaeontological Exemption Letter of the Proposed Mamatwan Mine Section 24g Rectification Application, near Hotazel, Northern Cape Province

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Extension of the South African Nuclear Energy Corporation (Necsa) Pipe Storage Facility, Madibeng Local Municipality, North West Province

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Piggery on Portion 46 of the Farm Brakkefontien 416, Within the Nelson Mandela Bay Municipality, Eastern Cape

E. Butler. 2020. Palaeontological field Assessment for the proposed Rietfontein Housing Project as part of the Rapid Land Release Programme, Gauteng Province Department of Human Settlements, City of Johannesburg Metropolitan Municipality

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Choje Wind Farm between Grahamstown and Somerset East, Eastern Cape

E. Butler. 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application for the Prospecting of Diamonds (Alluvial, General & In Kimberlite), Combined with A Waste License Application, Registration Division: Gordonia And Kenhardt, Northern Cape Province

E. Butler. 2020. Palaeontological Impact Assessment for the Proposed Clayville Truck Yard, Ablution Blocks and Wash Bay to be Situated on Portion 55 And 56 Of Erf 1015, Clayville X11, Ekurhuleni Metropolitan Municipality, Gauteng Province

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Hartebeesthoek Residential Development

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Mooiplaats Educational Facility, Gauteng Province

E. Butler. 2020. Palaeontological Impact Assessment for the Proposed Monument Park Student Housing Establishment

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Standerton X10 Residential and Mixed-Use Developments, Lekwa Local Municipality Standerton, Mpumalanga Province

E. Butler. 2020. Palaeontological Field Assessment for the Rezoning and Subdivision of Portion 6 Of Farm 743, East London

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Matla Power Station Reverse Osmosis Plant, Mpumalanga Province

CONFERENCE CONTRIBUTIONS

NATIONAL

PRESENTATION

Butler, E., Botha-Brink, J., and F. Abdala. A new gorgonopsian from the uppermost *Dicynodon Assemblage Zone*, Karoo Basin of South Africa.18 the Biennial conference of the PSSA 2014.Wits, Johannesburg, South Africa.

INTERNATIONAL

Attended the Society of Vertebrate Palaeontology 73th Conference in Los Angeles, America. October 2012.

CONFERENCES: POSTER PRESENTATION

NATIONAL

Butler, E., and J. Botha-Brink. Cranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. University of the Free State Seminar Day, Bloemfontein. South Africa. November 2007.

Butler, E., and J. Botha-Brink. Postcranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle.14th Conference of the PSSA, Matjesfontein, South Africa. September 2008:

Butler, E., and J. Botha-Brink. The biology of the South African non-mammaliaform cynodont *Galesaurus planiceps*.15th Conference of the PSSA, Howick, South Africa. August 2008.

INTERNATIONAL VISITS

Natural History Museum, London
July 2008

Paleontological Institute, Russian Academy of Science, Moscow November 2014

CTS HERITAGE

18 June 2021

Jo-Anne Thomas
Savannah Environmental

Dear Ms Thomas,

RE: CULTURAL LANDSCAPE ASSESSMENT AS PART OF THE HERITAGE IMPACT ASSESSMENT PROCESS IN RENEWABLE ENERGY DEVELOPMENT ZONES

Legislative Mandate

The National Heritage Resources Act (NHRA, Act 25 of 1999) primarily employs two mechanisms to ensure the effective conservation and management of significant heritage resources. These mechanisms are the Formal Protections detailed in Part I of Chapter II of the NHRA and the General Protections detailed in Part II of Chapter II of the NHRA. Formal Protections include the declaration of National and Provincial Heritage Sites, Heritage Areas as well as the establishment of the Heritage Register. The General Protections include permitting requirements for alterations to structures that are older than 60 years (Section 34) and permit requirements for impacts to archaeological and palaeontological heritage resources (Section 35), amongst others.

Applications for renewable energy developments, in general, fall under section 38 of the NHRA, a section that falls within Part II of Chapter II - the General Protections. This section of the heritage legislation is triggered by developments of a certain scale, size or nature such as the change of character to a site exceeding 5000m^2. Section 38(8) of the NHRA specifically deals with such developments that also trigger other legislation that requires an assessment of impacts, for example, in terms of NEMA.

Section 38(8) of the NHRA requires that any assessment of impacts from such developments also include an assessment of impacts to heritage resources that satisfies certain criteria detailed in section 38(3) of the NHRA. Section 38(8) also requires heritage authorities to comment on such heritage impact assessments, and that the relevant decision-making authorities (such as the DEFF) take this comment into consideration prior to issuing the authorisation (such as the Environmental Authorisation or equivalent). This is to ensure that any significant heritage resources that may be impacted by the proposed development are identified and appropriately managed or mitigated against impacts prior to authorisation.

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

In terms of section 38(3) of the NHRA, it is required that impacts to all heritage resources be assessed in an HIA. "All heritage resources" includes archaeological heritage, palaeontological heritage, the built environment as well as the cultural landscape more broadly.

Cultural Landscape

According to Jensen (2020), "The idea of a cultural landscape is fundamental. The term may be given varied meanings, yet, at its core, it unites the products of so-called 'natural' ecological processes and phenomena on the one hand, and the products emerging from the processes of transformation of the 'natural' site by people in constructing their 'built' world, on the other. Any area consists of many sites, most of which have been inhabited by people for thousands of years. These places have been moulded, shaped and changed both by natural processes and by people engaged in adapting the environment to their pursuits.

Cultural landscapes are what one generation inherits from another: in them are embedded values held dear by those gone by. It is the duty and task of any one generation to evaluate that which is inherited and to take appropriate decisions for the future: not only from the perspective of the short-term and how it may be useful to them in a selfish way, but also from a more inclusive communal and longer-term view. It may be considered human nature to act with self-interest, hence the need for government ideals and guidance, such as an appropriate planning and heritage resources control system whereby the longer term and the public good may be addressed responsibly."

According to the African Landscape Convention "Landscapes are the result of unique combinations of biophysical, cultural and social processes evolving over time and interwoven with memory, perception and tradition. They include land, water systems, marine areas and island configurations and play a vital role in human nurture, fulfilment and in shaping individual and collective identity.

Landscapes range from the outstanding and the memorable, to the familiar and the commonplace. All landscape architects practicing in Africa, notably members of IFLA Africa, representing a diverse array of cultures spread across the continent, have a duty to care for and ensure that the distinctive characteristics and potential of their landscapes are not compromised through insensitive or inappropriate change, and that their communities are not diminished or endangered by inappropriate development.

Landscape shapes the culture and identity of a community, a neighbourhood, a city and a nation. Landscape is the powerful connection between communities and the land, the places where people live, work and play. It is the physical, social and cultural context of our lives. It gives us a unique sense of place. The sustainable management and planning of resilient landscapes and

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

communities includes the preservation of common and distinctive heritage, improving ecological health and well-being, increasing the productive capabilities of land and encouraging sustainable approaches to development and change. This approach aims to maintain important life-supporting functions such as water quality and biodiversity, while providing for the appropriate utilisation of landscapes for sustainable social, cultural, and economic development.

The importance of the deep and fundamental relationship that indigenous and other peoples of the African continent have with the natural world must be acknowledged and respected. These attitudes and beliefs should influence and inform the ways in which we approach the protection, planning, design and management of our landscapes. The scope and nature of the pressures on the landscape continue to increase and a comprehensive set of principles is now required to counter these pressures and to support the diverse aspects of contemporary landscape practice in our Region. This Landscape Convention sits within a global context and framework that comprises a series of National Landscape Charters and Conventions coordinated through the International Federation of Landscape Architects (IFLA). Other significant statements about our approaches and attitudes to the landscape include, but are not limited to, the ICOMOS Charter (1964), the European Landscape Convention (2001), the Florence Declaration (2012), the Matera Resolution (2013) and the IFLA Global Accord (2017)."

REDZ Areas

In an effort to encourage renewable energy development in South Africa, the DFFE has gazetted a number of Renewable Energy Development Zones (REDZ) in which the development of renewable energy developments are actively encouraged through various incentive mechanisms. These REDZ areas were identified following the completion of a Strategic Environment Assessment (SEA) process. While the SEA process conducted did attempt to take impacts to archaeological and palaeontological heritage resources into consideration given the data available at the time, there is insufficient evidence that the SEA process looked at the identification of significant cultural landscapes in the identification of these REDZ areas.

As such, we are left in a position where broad impacts to cultural landscape heritage from renewable energy development are required to be assessed on a project-by-project basis in the HIA process. This can be unsatisfactory as REDZ areas have been gazetted for renewable energy development and the opportunity to take a broader, guiding approach to handling cultural landscapes in REDZ areas was not realised.

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

Renewable Energy and the Cultural Landscape

In REDZ areas, there is a reasonable expectation that the cultural landscape of an area will be changed to be dominated, or at least heavily altered, by renewable energy development. In fact, this is the intention of the REDZ areas.

As indicated above, the cultural landscape is defined as the interaction between people and the places that they have occupied and impacted. In some places in South Africa, the cultural landscape can be more than 1 million years old where we find evidence of Early Stone Age archaeology (up to 2 million years old), Middle Stone Age archaeology (up to 200 000 years old), Later Stone Age archaeology (up to 20 000 years old), evidence of indigenous herder populations (up to 2000 years old) as well as evidence of colonial frontier settlement (up to 300 years old) and more recent agricultural layers.

Modern interventions into such landscapes, such as renewable energy development, constitute an additional layer onto the cultural landscape which must be acceptable in REDZ areas. The primary risk in terms of negative impact to the cultural landscape resulting from renewable energy development lies in the eradication of older layers that make up the cultural landscape. There are various ways that such impact can be mitigated.

Example

For example, Jensen (2020) recommends the following as general guidelines for renewable energy development in areas of cultural landscape significance:

Ecological Criteria:

- Species and ecosystem loss should be prevented by limiting fragmentation in the landscape, and should therefore adhere to the following general recommendations:
    - Remaining areas of endemic and endangered natural vegetation should be conserved.
    - High and Very High Sensitivity Ecological areas (crest lines and drainage lines), should be protected from development
    - Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed.
- Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site, it helps to sensitively keep to the character.

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

- The principle of 'tread lightly' must be applied for any activity (and associated development requirements e.g. toilets for the construction process) and should be emphasised.

Aesthetic Criteria

- Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc;

- The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape that does not have to be standard containers that clutter the landscape.

- Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site.
- Where additional infrastructure (i.e. roads) is needed, the upgrade of existing roads to accommodate the development should be the first consideration. The local material such as the rocks found within the area could be applied to address stormwater runoff from the road to prevent erosion.
- Infrastructure improvement, including new roads and upgrades to the road network, should be appropriate to the rural context (scale, material etc.).
- The layout of the turbines should have an emphasis on place-making, i.e. landscape-related heritage considerations, as opposed to standard infrastructure driven requirements;
- Prevent the construction of new buildings/structures on visually sensitive, steep, elevated or exposed slopes, ridgelines and hillcrests. Retain the integrity of the distinctive landscape character;
- Scale and massing should be sensitive to the surrounding landscape, although this is challenging with regard to the development of WEFs.
- Avoid visual clutter in the landscape by intrusive signage, and the intrusion of commercial, corporate development along roads
- Avoid development of infrastructure (such as buildings, wind turbines and power lines), on crests or ridgelines due to the impact on the visual sensitivity of skylines.
- Retain view-lines and vistas focused on prominent natural features such as mountain peaks or hills, as these are important place-making and orientating elements for experiencing the cultural landscape.

Historic Criteria

- The integrity of the historic farm werfs should be maintained and protected.

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

- Names of routes and watercourses that refer to traditional use during the time of the hunter-gatherers and herders, as well as the colonial era in the Cape, should be celebrated.
- Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs.
- In some cases, remnant planting patterns (even single trees) uphold the historic character of an area. Interpretation of these landscape features as historic remnants should occur.
- Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed.
- Where the historic function of a building/site is still intact, the function has heritage value and should be protected. Please take note of the items listed below:
- Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained.
- The new roads should display minimum scale designs where possible.
- Maintain traditional movement patterns across rural landscapes or to places of socio-historical value. (a) Avoid privatization or the creation of barriers to traditional access routes. (b) Retain old roadways, which have been replaced by newer roads, for use as recreation trails.
- Respect existing patterns, typologies and traditions of settlement-making by promoting the continuity of heritage features. These include: (a) indigenous; (b) colonial; and (c) current living heritage in the form of tangible and intangible associations to place.
- Respect traditional werf settlement patterns by considering the entire werf as the component of significance. This includes the backdrop of the natural landscape against which it is sited, as well as its spatial structure. Any development that impacts the inherent character of the werf component should be discouraged.

Social Criteria

- Care should be taken that existing functions such as outspan areas (see criteria for these under historic) are not lost in the development stages, as it fulfils an important function within the cultural landscape.
- The local community around the development should benefit from job opportunities created by the proposed development;

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

CTS HERITAGE

Economic Criteria

- Sheep or game farming should be allowed to continue below the wind turbines, alternatively, the areas below the turbines should be rehabilitated to increase biodiversity in the area.
- Care should be taken to reduce visual impact from surrounding tourism areas, by following the recommendations included in the Visual Impact Assessment

Importantly, these recommendations cannot be used as a one-size-fits-all approach to managing the negative impacts of renewable energy development on significant cultural landscapes. However, they can be used as a guide to ensure that the layers that make up a cultural landscape are conserved and enhanced as part of the creation of new renewable energy layers on the cultural landscape.

Please feel free to contact me should you have any further questions or concerns in this regard.

Yours sincerely

Jenna Lavin

Cedar Tower Services (Pty) Ltd t/a CTS Heritage
Reg: 2013/211135/07 VAT No: 4160278950
34 Harries Street, Plumstead, Cape Town, 7945
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

Appendix D

Palaeontological Impact Assessment