

# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed  
development of the Vhuvhili Solar  
Photovoltaic (PV) Facility near Secunda in  
the Mpumalanga Province



## CHAPTER 12:

# Palaeontology Impact Assessment

# Palaeontological Impact Assessment for the Proposed Development of the Vhuvhili Solar Photovoltaic Energy Facility near Secunda, Mpumalanga Province

Prepared by: Marion Bamford – revised 03 November 2022

## Executive Summary

The Project Applicant, Vhuvhili Solar RF (Pty) Ltd (hereafter referred to as the “Project Applicant”), is proposing to design, construct and operate the Vhuvhili Solar Photovoltaic (PV) Energy Facility (SEF) and its associated infrastructure approximately 7 km south-east of the town of Secunda in the Mpumalanga Province. The proposed Vhuvhili SEF will have a capacity of up to 300 MW and is subject to a full Scoping and Environmental Impact Assessment (S&EIA) process. The electricity generated by the proposed Vhuvhili SEF will be transferred from the proposed on-site substation at the proposed Vhuvhili SEF via a 132 kV power line that extends approximately 12 km in length to the proposed switching station at the proposed Mukondeleli WEF.

This report comprises the Palaeontological Impact Assessment to inform the S&EIA process

The proposed Vhuvhili on-site substation hub connections (both alternatives, i.e. Alternative 1 (A-B) and Alternative 2 (C-D)) are on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve fossil plants of the *Glossopteris* flora. No fossils are likely to occur in the overlying soils but might occur below ground in undisturbed shales but would only be discovered once excavations commence. Mitigation would be the removal of any fossils found once excavations commence. The impact would only be during the construction phase. The impact before mitigation is low, and the impact post-mitigation is very low.

It is therefore recommended that the proposed Vhuvhili SEF and associated be approved from a Palaeontological perspective, provided a Fossil Chance Find Protocol be included in the Environmental Management Programme (EMPr) and should be adhered to, as applicable.

**Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).**

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
ai	Details of the specialist who prepared the report,	Appendix 1
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix 1

	<b>A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:</b>	<b>Relevant section in report</b>
b	A declaration that the person is independent in a form as may be specified by the competent authority	Appendix 2
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Sept-Nov 2022
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Sections 2, 12
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Summer, not relevant for ploughed fields
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 7
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 10
g	An identification of any areas to be avoided, including buffers	N/A; section 14
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;	Figures 2-5
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 8
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 9; Fig 5
k	Any mitigation measures for inclusion in the EMPr	Section 13
l	Any conditions for inclusion in the environmental authorisation	Section 13
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 13
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 14
nii	If the opinion is that the proposed activity 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 14
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A for Palaeontology
p	A summary and copies of any comments that were received during any consultation process	Appendix 3
q	Any other information requested by the competent authority.	Appendix 3
r	Where a government notice gazetted 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.	N/A

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## 1. BACKGROUND

Vhuvhili Solar RF (Pty) Ltd, the Applicant, is proposing to construct the Vhuvhili Solar Photovoltaic Energy Facility (SEF), which comprises a maximum capacity of 300 MW, and associated infrastructure in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality near Secunda in the Mpumalanga province. The electricity generated by the proposed Vhuvhili SEF will be transferred from the Vhuvhili on-site substation to the switching station at the proposed Mukondeleli Wind Energy Facility (WEF) via a 132 kV power line that extends approximately 12 km in length.

It is important to note that this PIA is being undertaken as part of the Scoping and EIA (S&EIA) process currently being undertaken for the proposed Vhuvhili SEF, including the on-site substation and Battery Energy Storage System (BESS). The proposed 132 kV power line to transfer the electricity from the proposed Vhuvhili SEF to the proposed Mukondeleli WEF switching station is subject to a separate Basic Assessment (BA) currently being undertaken by the Project Applicant. The proposed Mukondeleli WEF, including the on-site switching station to which the proposed 132 kV power line will connect, is also subject to a separate S&EIA process (NEAS: MPP/EIA/0001099/2022), as summarised below.

**Table 2: Details of this S&EIA and other S&EIA and BA processes underway**

Project	Process	Authority Reference Number	EAP	Status	Subject of this application and BA process
Proposed Vhuvhili SEF	S&EIA	NEAS: MPP/EIA/0001063/2022	Paul Lochner (CSIR) (EAP 2019/745)	Draft EIA Report submitted	No
Proposed on-site substation and BESS complex at the proposed Vhuvhili SEF site					
Proposed Vhuvhili-to-Mukondeleli 132 kV power line and associated EGI	BA	To be assigned	Paul Lochner (CSIR) (EAP 2019/745)	Application submitted and Draft BA Report released for public comment	Yes
Proposed Mukondeleli WEF	S&EIA	NEAS: MPP/EIA/0001099/2022	WSP	Final Scoping Report submitted	No

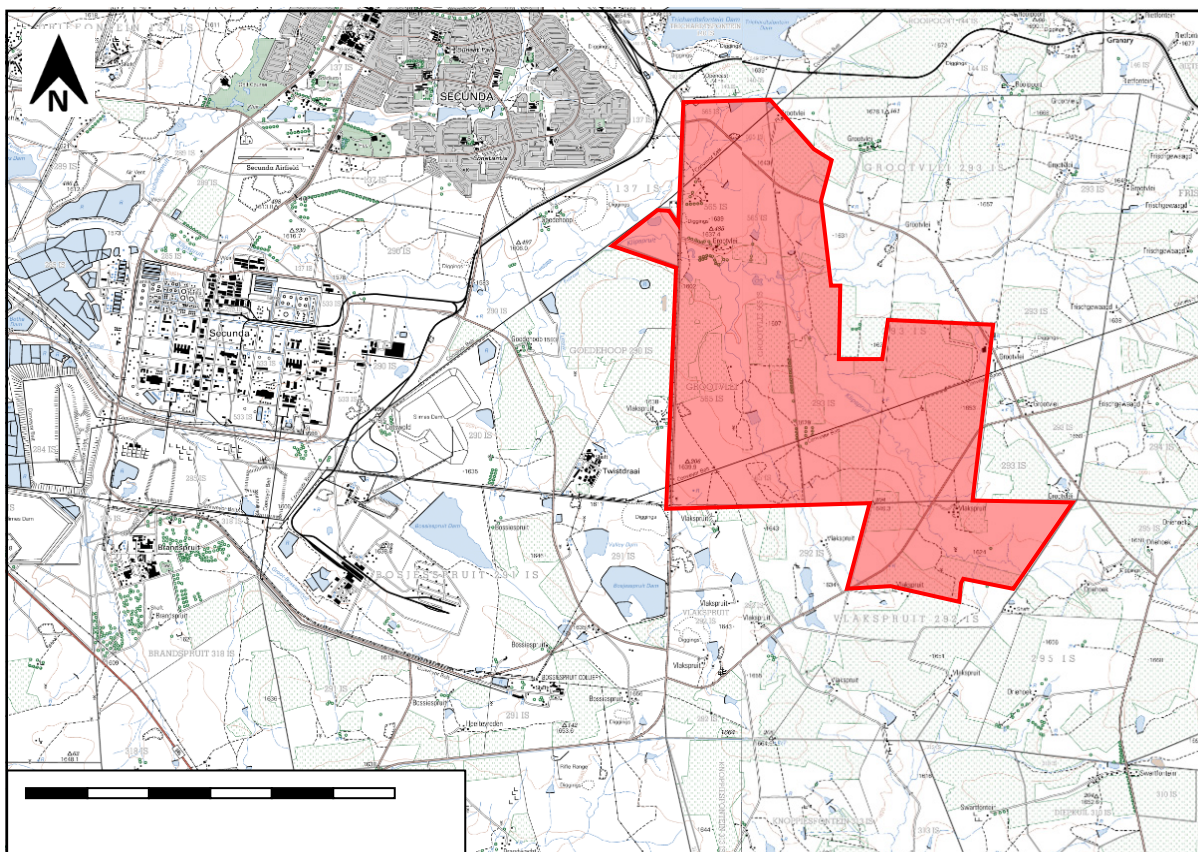
ASHA Consulting (Pty) Ltd (ASHA) was appointed by ENERTRAG South Africa (Pty) Ltd (ENERTRAG) to conduct a Heritage Impact Assessment (HIA) to provide an assessment of the potential impacts to heritage resources that might occur through the proposed development

of the Vhuvhili SEF and associated infrastructure. Professor Marion Bamford was sub-contracted by Dr Jayson Orton of ASHA to undertake a Palaeontology Impact Assessment (PIA) as part of the HIA.

The proposed Vhuvhili SEF site is indicated in Figure 1 below. The farm portions which were assessed for the proposed development of the Vhuvhili SEF and associated infrastructure are included in Table 3.

**Table 3: Farm portions that were assessed by the specialist for the proposed Vhuvhili SEF project**

Farm name	Farm No.	Farm Portion	SG code
GROOTVLEI	584	RE	TOIS0000000058400000
GROOTVLEI	293	23	TOIS0000000029300023
GROOTVLEI	293	18	TOIS0000000029300018
GROOTVLEI	293	20	TOIS0000000029300020
GROOTVLEI	293	21	TOIS0000000029300021
POVERTY ACRES	585	RE	TOIS0000000058500000
VLAKSPRUIT	292	22	TOIS0000000029200022
VLAKSPRUIT	292	21	TOIS0000000029200021



**Figure 1: Extract from 1:50 000 topographic map 2629CA&CB showing the location of the proposed Vhuvhili SEF site (red shaded polygon). Source: Chief Directorate: National Geo-Spatial Information. Website: [www.ngi.gov.za](http://www.ngi.gov.za). (Source: Orton, 2022)**

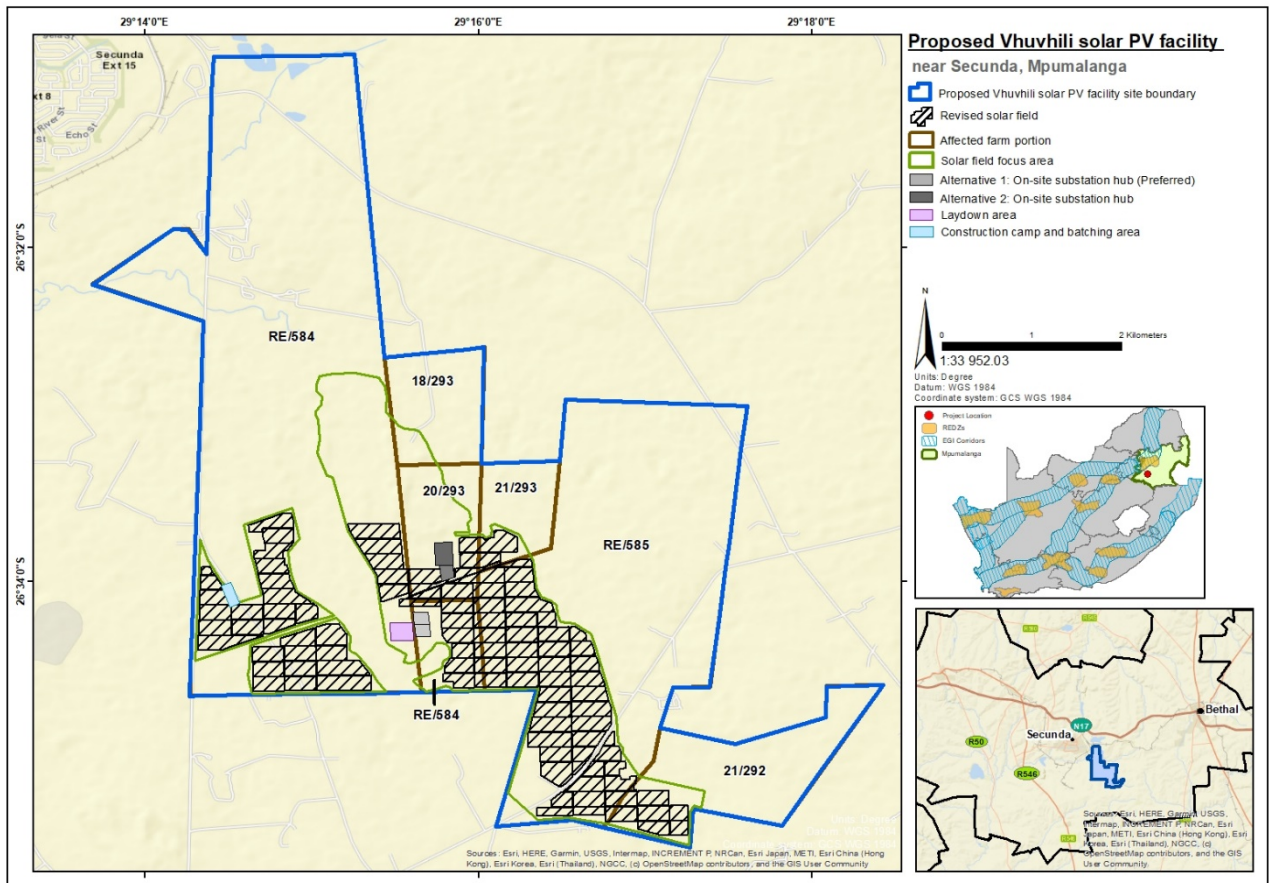
## 2. PROJECT DESCRIPTION

The proposed Vhuvhili SEF and associated infrastructure include the following components as shown below:

- Solar PV panels and tracker height of up to 6m;
- Internal cabling between project components connected to a 22V/132kV transformer;
- Overhead power lines to connect to a onsite substation;
- A workshop area for maintenance;
- Medium voltage (22 or 33 kV) internal cabling connecting the turbines will be laid underground;
- A Battery Energy Storage System (BESS) comprising of several utility scale battery modules within shipping containers or an applicable housing structure on a concrete foundation and an onsite substation; and
- A 33/132kV on-site Substation (SS) to feed electricity generated by the proposed Vhuvhili SEF into the switching station at the proposed Mukondeleli Wind Energy Facility (WEF) via a dedicated 132 kV overhead power line. The Mukondeleli WEF is subject to a separate application and Scoping and Environmental Impact Assessment (S&EIA) process (DARDLEA NEAS Reference Number: MPP/EIA/0001099/2022). The on-site SS will accommodate 1 x 132kV incoming feeder bay, 1x 132kV outgoing feeder bay and a motorised isolator with protection and metering.

The on-site Substation and BESS complex will be located within an area of approximately 10 ha to allow for micro-siting of the BESS components and to accommodate internal roads (as required), a temporary construction laydown area, and a firebreak around the BESS footprint.

Two on-site substation and BESS hub alternatives have been identified for assessment as part of the EIA process; i.e., Alternative 1 (A-B) and Alternative 2 (C-D) (Refer to Figure 2). Some flexibility was maintained during the assessment phase so that the layout could be refined to avoid sensitive areas.



**Figure 2: Layout map for the proposed Vhuvhili Solar PV Facility showing the updated project footprint and layout of the proposed PV array within the boundary of the affected properties, (Source: CSIR, 2022)**

The key technical details for the Vhuvhili SEF and associated infrastructure are provided in Chapter 2 of the EIA Report.

### 3. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE STUDY

All aspects of the proposed development are relevant, since excavations for foundations may impact on palaeontological remains.

### 4. TERMS OF REFERENCE

- Describe regional and local features of the receiving environment in terms of Palaeontology;
- Map sensitive palaeontology features;
- Assess (identify and rate) the potential palaeontology impacts of the proposed Vhuvhili SEF and associated infrastructure during the construction, operational and decommissioning phases;
- Identify relevant legislation and legal requirements; and



- Provide recommendations on possible mitigation measures, rehabilitation procedures, and management guidelines. These mitigation measures will inform the Environmental Management Programme.

## **5. DETAILS OF SPECIALIST**

The Palaeontological inputs have been provided by Marion Bamford who is a Professor; Director of the Evolutionary Studies Institute. She is Member of the Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg. She has been conducting Palaeontological Impact Assessments for various development proposals (please see curriculum vitae included as Appendix 1). She is a member of various professional bodies/ associations including the Palaeontological Society of Southern Africa, the Royal Society of Southern Africa, the Academy of Sciences of South Africa and the International Organization of Palaeobotany

A signed specialist statement of independence is included in Appendix 2 of this report.

## **6. LEGISLATIVE CONTEXT**

### **a. National Heritage Resources Act (NHRA) No. 25 of 1999**

The NHRA protects a variety of heritage resources as follows:

- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old;

Following Section 2, the definition applicable to the above protections is as follows:

- Palaeontological material: “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”;

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. The South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the Mpumalanga DARDLEA.

## **7. APPROACH AND METHODOLOGY**

A desktop PIA was undertaken for the proposed Vhuvhili SEF project to comply with the regulations of the SAHRA in terms of Section 38(8) of the NHRA. A palaeontological site visit

has been completed in October 2021. In October 2021 the adjacent Farm Goedenoeeg 290 was surveyed for the Becrux SEF project (Bamford in CTS21\_215\_Savannah\_Secunda\_PVs). No fossils of any kind were seen during the site visit. The recently ploughed agricultural land has deep, dark soils, more or less flat topography, and no rocky outcrops.

## 8. ASSUMPTIONS AND LIMITATIONS

It is well known that fossils do not occur in Jurassic dolerite because it is of volcanic origin. Fossils are preserved in sedimentary rocks. Fossils of the Glossopteris flora have been recorded from the carbonaceous shales and mudstones from some sites in the Vryheid Formation but they are by no means ubiquitous. Much of the area has been cultivated for agriculture for decades which means the rocks are covered by much younger soils. Since soils are the product of weathering and breakdown of rocks, plus humus, they do not preserve fossils either. Therefore, there is only a chance of finding fossils in the underlying rocks of the Vryheid formation and in surface outcrops. Further complicating the palaeontology, wetlands generally do not preserve fossils because the moisture and drying out destroys the delicate impressions of plants in the shales. In summary, fossils are very unlikely to occur on the ground surface in the northwestern part of the project footprint (Vhuvhili on-site substation hub). Fossils might occur below ground in the mostly dry and un-weathered shales of the Vryheid Formation, but this will not be determined until excavations for foundations commence.

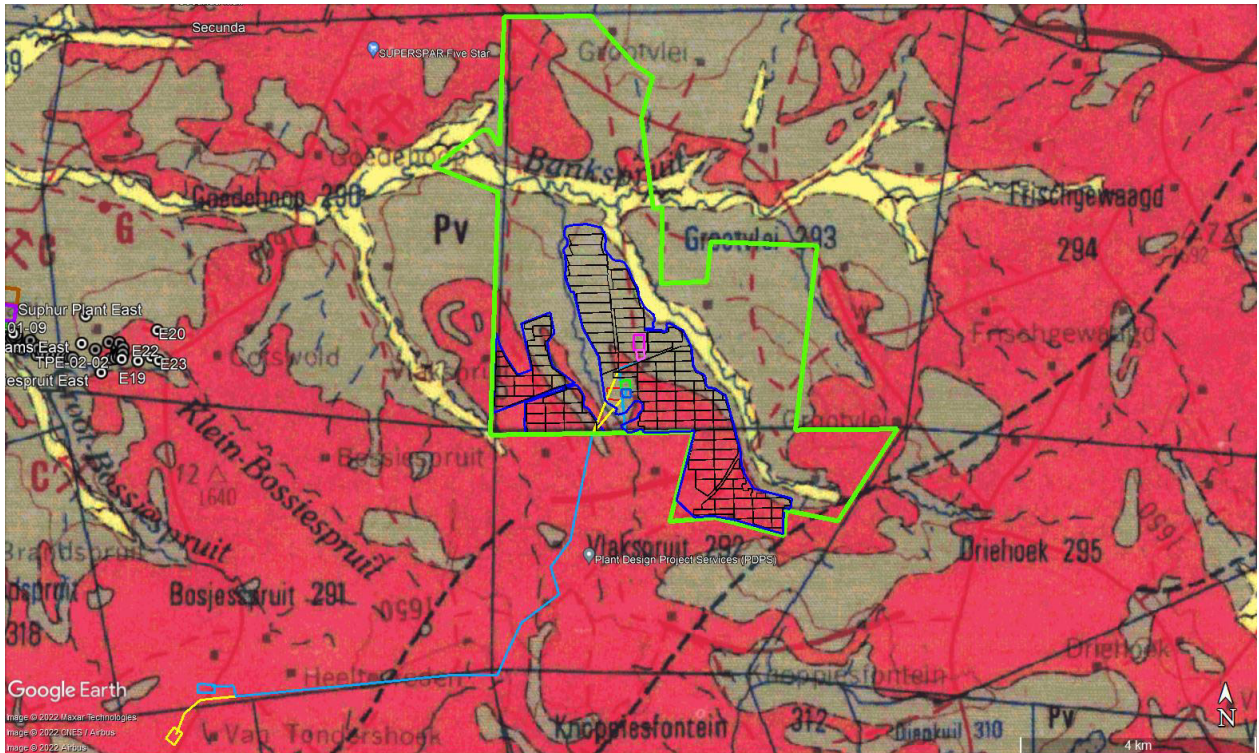
## 9. DESCRIPTION OF THE PALAEOLOGY AND GEOLOGY OF THE STUDY AREA

### Project location and geological context

The Geological map of the Vhuvhili study area is shown in Figure 3. An explanation of symbols for the geological map and approximate ages is included in Table 4.

**Table 4: Explanation of symbols for the geological map and approximate ages (2006. Johnson et al., 2006; Partridge et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.**

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Quaternary ca 1.0 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 183 Ma
Pv	Vryheid Fm, Ecca Group, Karoo Shale, siltstone, sandstone, coal SG	seams	Early Permian Ca 280-270 Ma



**Figure 3: Geological map of the Vhuvhili SEF study area. The location of the proposed project is indicated within the yellow rectangles. Abbreviations of the rock types are explained in Table 4. (Map extracted) from the Geological Survey 1: 250 000 map 2628 East Rand. Geology Map with the Vhuvhili SEF study area and updated layout (Source: Golder Associates Africa (Pty) Ltd, 2022)**

According to the geological map (Figure 3) the proposed Vhuvhili SEF site lies on three different geological strata:

- a. The southern sections are on non-fossiliferous dolerite of Jurassic age.
- b. Mostly the moderately sensitive Quaternary alluvium and sands along the rivers and streams are likely to be avoided based on the ecological criteria. Any fossils occurring here would be transported and fragmented so of limited scientific value.
- c. The central parts are on shales and sandstones of the Vryheid Formation (Early Permian Ecca Group, Karoo Supergroup) that are potentially fossiliferous and so very highly sensitive according to the SAHRIS palaeosensitivity map. Potential fossils would be associated with the coal seams and would be impressions of the Glossopteris flora (Glossopteris leaves, lycopods, sphenophytes, ferns and early gymnosperms; Plumstead, 1969). In this Witbank coalfield of Mpumalanga, coal seams 1-5 (from base to top) are present at various levels below the ground surface. Seams 2 and 4 are the thickest seams (Snyman, 1998, based on core material) and the uppermost seam, No 5, is between 12 and 45m below the surface. In all areas, the uppermost seam is overlain by soils, shales and sandstones of varying thicknesses.

The project lies in the central part of the Karoo Basin where the older rocks of the Ecca Group are exposed. They are intruded by the non-fossiliferous igneous rocks, the dolerite dykes of Jurassic age. Along the rivers and streams, much younger transported alluvium and sands overlie the older rocks.

During the Late Carboniferous and Early Permian times (ca 300-250 million years ago) Africa was part of the continental landmass known as Gondwanaland. Southern Africa was positioned over the South Pole and was covered by a number of ice-sheets. These melted as the landmass moved slowly northwards and the sediments deposited from the ice sheets formed the Dwyka Group, the basal group of the Karoo Supergroup. Over time the large inland Karoo Sea filled with sediments and shrank. Overlying the Dwyka Group tillites and diamictites are the Ecca Group shales and sandstones that include coal seams formed by the buried peats that were the result of a very lush flora that had become established on the deltas and flood plains around the Karoo Sea. The next layers of infilling shales and sandstones are called the Beaufort Group, followed by the Stormberg Group as the sea shrank while the basin filled. Finally, all these sediments were capped by the massive basaltic outpourings of the Drakensberg Group. Associated with these eruptions are numerous dykes and sills that have intruded through the Karoo Group sediments. This signalled the end of the Karoo Supergroup. Since the underlying rocks, mostly the Transvaal Supergroup in the north and the Namaqua-Natal Group in the south, formed an undulating topography, as well as the flexure of this forearc basin, the Karoo sediments are not continuous across the basin. In particular, the coal seams are discontinuous because of the above, but also because the local setting and varied plant distributions affect the type and thickness of coal seams (Plumstead, 1969; McRae, 1999; McCarthy and Rubidge, 2005; Johnson et al., 2006).

Coal seams are layers of peat that have been buried and altered by temperature from geothermal energy, and pressure from the increasing overburden. The original plant matter that formed the peats is no longer distinguishable but impressions and compressions of plants can be preserved in the carbonaceous shales and siltstones between, above and below the coal seams. These Permian plants belong to the Glossopteris flora that includes Glossopteris leaves, seeds, reproductive structures, wood and roots, as well other plants such as lycopods, sphenophytes, ferns, cordaitales and early gymnosperms (Plumstead, 1969, Anderson et al., 1999).

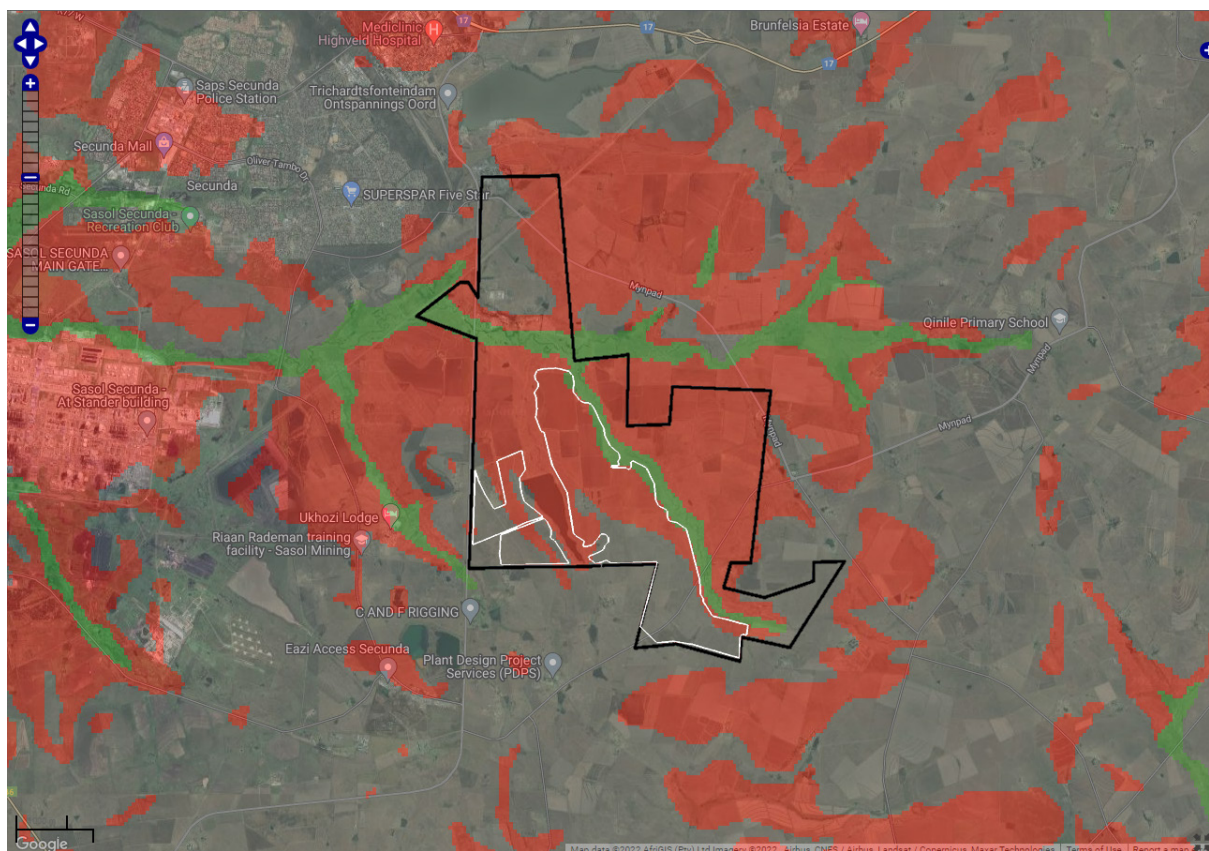
Plants were diverse and abundant but during the early Permian there were very few vertebrates present as they evolved in the later Permian. In addition, for the preservation of fossil plants to occur requires reducing and anoxic environments, while bones can tolerate more oxidising environment. Therefore, one seldom finds fossil plants and animals in the same site (Cowan, 1995).



## Palaeontology of the project footprint

The rocks present are those of the Jurassic dolerite dykes that do not preserve any fossils because they are of volcanic origin, and the Vryheid Formation shales that might preserve fossils of the *Glossopteris* flora associated with the coal seams. All these rocks are covered by modern soils; in some cases, they are quite deep and cultivated. Soils do not preserve fossils because they are formed by weathered sediments and organic matter.

In this area, known as the Highveld Coalfield, the uppermost seam, No 5, is more than 30 m below the surface (Kriel, Fig 16 in Snyman, 1998) and is covered by soil, interbedded shale and sandstone. No fossils are likely to occur in the sandstone as it is too coarse-grained but plant impressions might occur in the shales. The SAHRIS palaeosensitivity map for the proposed Vhuvhili SEF is provided in Figure 4.



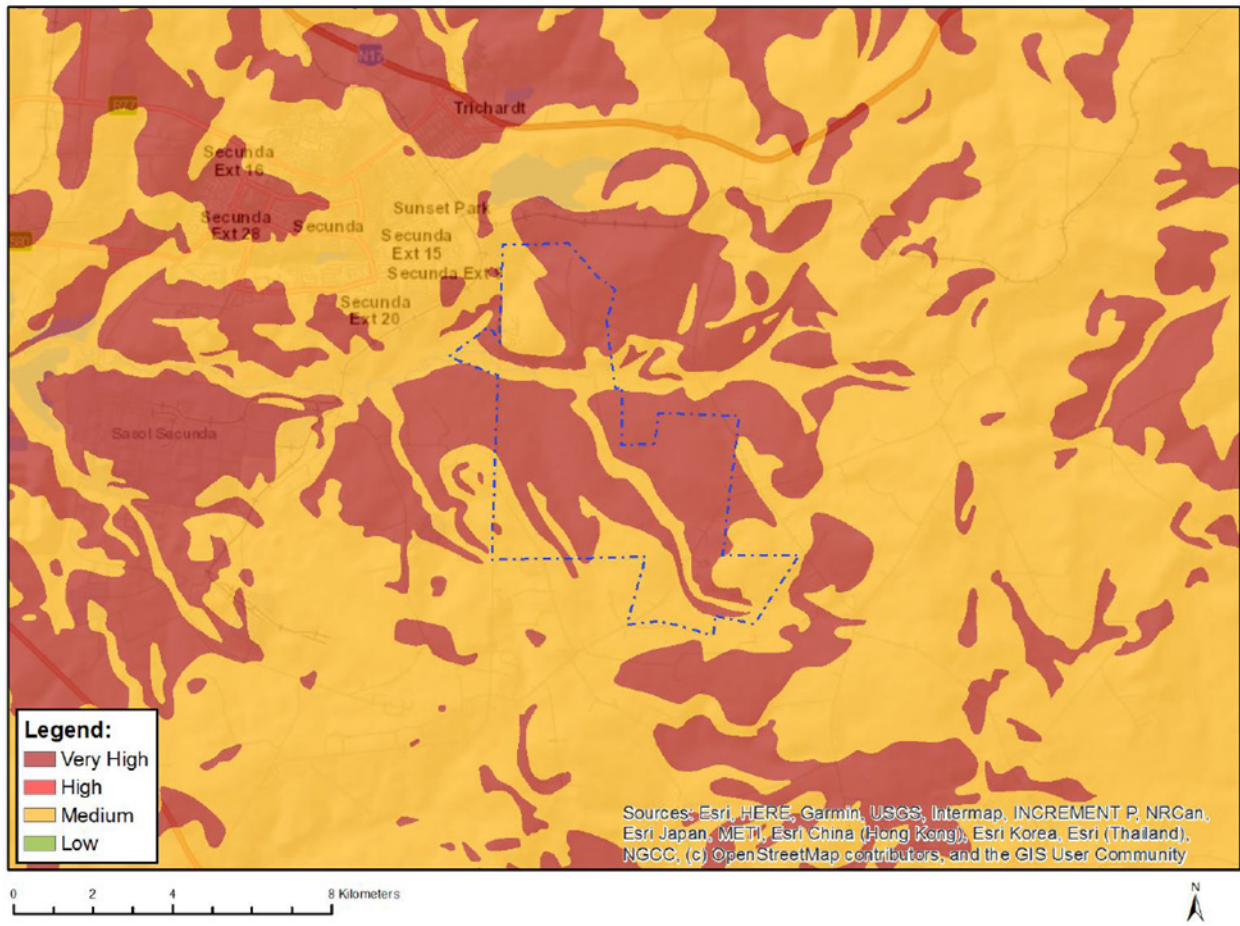
**Figure 4: SAHRIS palaeosensitivity map for the proposed Vhuvhili SEF. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; green = moderate; grey = insignificant/zero.**

It should be noted that the proposed Vhuvhili SEF is partly on very highly sensitive rocks.

## **10.PALAEONTOLOGY SITE SENSITIVITY VERIFICATION**

The National Screening Tool map for palaeontology indicates a combination of medium and very high sensitivity both within the project area and in the wider surroundings (Figure 5). The project palaeontologist (Prof. Marion Bamford) indicates that the red areas are indeed very highly sensitive because the rocks are Vryheid Formation and could have fossils of the

*Glossopteris* flora. The orange areas, however, are not sensitive since they are largely dolerite (zero sensitivity) but with some overlying fluvial sediments dolerite along the river and its tributaries in the centre of the site and which would be moderately sensitive). The palaeontological specialist thus disputes the screening tool map in that the stated sensitivity is too high over some parts and correct in others.



**Figure 5: Screening tool map showing the site to be of medium to very high palaeontological sensitivity (orange and dark red shading respectively).**

## 11. COMMENTS RECEIVED FROM SAHRA

With the release of the Draft Scoping Report for comment for the proposed Vhuvhili SEF, an application for the proposed Vhuvhili SEF was created on SAHRIS and all documents pertaining to the Environmental Authorisation Application Process were uploaded to the application. CaseID: 18822 was assigned to this application. A HIA (Scoping inputs) was prepared by ASHA Consulting (Pty) Ltd and was included in Appendix G.7 of the Draft and Final Scoping Reports. A desktop Palaeontology study was prepared by Professor Marion Bamford and was included in Appendix G.8 of the said reports. These documents were uploaded to the SAHRIS application.

SAHRA provided comments on the Draft Scoping Report which was released for a 30-day public commenting period (see comments from SAHRA dated 14 July 2022 in Appendix 3a of this report). SAHRA requested that a field-based PIA of the proposed development be conducted. In the scoping inputs provided, Professor Bamford noted that a site visit will not be conducted as the adjacent property was surveyed. SAHRA indicated that they do not accept the survey that was done on the adjacent property.

Professor Bamford replied to the comments from SAHRA via a letter dated 19 July 2022 (please refer to Appendix 3 (b) of this report for a copy of the letter) to motivate that a site visit is not required. The letter was uploaded to the SAHRIS application.

In the letter Professor Bamford requested SAHRA to reconsider the request for a field-based PIA based on the following reasons:

1. In essence a site survey has already been done on this site by the archaeologist, Dr Jayson Orton, and he could find no rocky outcrops that could potentially have fossils.
  2. The adjacent site observations confirm this observation of no surface fossils for the Vhuvhili site.
  3. As can be seen from the satellite imagery (attached to the letter included in Appendix 3(b)), the site has been farmed and the land is disturbed.
  4. The geological maps (and so the palaeosensitivity) are based on drill core results and not surface exposures. See bold below from the report that is in progress.
  5. It is highly unlikely that the PV panels and infrastructure will penetrate below 12m from the land surface to where the uppermost fossils might occur (in case they do a fossil chance find protocol will be added to the report).
- b. The southern sections are on non-fossiliferous dolerite of Jurassic age.
- c. Mostly the moderately sensitive Quaternary alluvium and sands along the rivers and streams are likely to be avoided based on the ecological criteria. Any fossils occurring here would be transported and fragmented so of limited scientific value.
- d. The central parts are on shales and sandstones of the Vryheid Formation (Early Permian Ecca Group, Karoo Supergroup) that are potentially fossiliferous and so very highly sensitive according to the SAHRIS palaeosensitivity map. Potential fossils would be associated with the coal seams and would be impressions of the *Glossopteris* flora (*Glossopteris* leaves, lycopods, sphenophytes, ferns and early gymnosperms; Plumstead, 1969). In this Witbank coalfield of Mpumalanga, coal seams 1-5 (from base to top) are present at various levels below the ground surface. Seams 2 and 4 are the thickest seams (Snyman, 1998, based on core material) and the uppermost seam, No 5, is between 12 and 45m below the surface. In all areas, the uppermost seam is overlain by soils, shales and sandstones of varying thicknesses.

The Vryheid Formation lies on the uneven topography of pre-Karoo or Dwyka Group rocks in the northern and northwestern margins, but lies directly on the Pietermaritzburg Formation in the central and eastern part. The lithofacies show a number of upward-coarsening cycles, some very thick, and they are essentially deltaic in origin. There are also delta-front deposits, evidence of delta switching, and fluvial deposits with associated meandering rivers, braided streams, back swamps or interfluves and abandoned channels (Cadle et al., 1993; Cairncross, 1990; 2001; Johnson et al., 2006). Coal seams originated where peat swamps developed on broad abandoned alluvial plains, and less commonly in the backswamps or interfluves. Most of the economically important coal seams occur in the fluvial successions (ibid). In the east (Mpumalanga and northern KwaZulu Natal), the Vryheid Formation can be subdivided into a lower fluvial-dominated deltaic interval, a middle fluvial interval, and an upper fluvial-dominated deltaic interval again (Taverner-Smith et al., 1988).

#### **Summary and request for SAHRA to reconsider the request for a field-based PIA**

“Specialists are not obliged to, nor are allowed to, dig or excavate the project areas to see below the sands and soil, and since we have already verified that there are no surface fossils, we have to wait until the excavations commence to know what is below the surface. Therefore, I request that you do not insist on a site visit before the excavations have commenced (and then, only when fossils are found).”

#### **Interim Comment provided by SAHRA (dated 19 August 2022) in response to the letter of motivation submitted by Professor Bamford (Interim comment included in Appendix 3(c))**

“The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit notes the submitted heritage reports and additional Letter of Recommendation for Exemption for further palaeontological assessments.

SAHRA must highlight that palaeontological field assessments by archaeologists are not accepted, however the Motivation letter for Recommendation for further palaeontological assessment is accepted. At this stage of the EA application process, SAHRA does not require any further assessment of the impact to heritage resources.

SAHRA will provide further comments once the draft EIA inclusive of appendices is submitted for review. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.”

The Draft EIA Report for the proposed Vhuvhili SEF, including the PIA and the HIA (Archaeology and Cultural Landscape) that was prepared by Dr Jayson Orton, will be uploaded to the SAHRIS website for SAHRA’s comment. Comments that will be received from SAHRA



will be included in the Final EIA Report that will be submitted to the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) for decision-making.

## **12.ASSESSMENT OF IMPACTS**

### **Specialist Impact Assessment Criteria**

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the proposed development. The assessment of impacts includes direct, indirect as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts will include:

1. Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
2. Determine future changes to the environment that will occur if the activity does not proceed;
3. An understanding of the activity in sufficient detail to understand its consequences; and
4. The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is to be applied to the prediction and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

1. **Direct impacts** on our fossil heritage will occur only during the construction phase but only if there are fossils present in the site of each foundation or excavation, i.e. not between the substations or between the power line poles.
2. **Cumulative impacts** are not relevant because each site is unique and may or may not have any fossils below ground. Once fossils have been destroyed or removed there can be no additional impact as it is finite.
3. **Nature of impact** – the damage or destruction of fossils could happen if any fossils occur in the rocks that will be excavated for foundations, piping, and amenities. Fossils are part of our National Heritage and provide evidence of past life and environments so they are of scientific interest with respect to evolutionary processes, past ecosystems and

biodiversity. By understanding the interaction between plants, animals and climate, we can better understand and plan for future climate change.

4. **Spatial extent** – The size of the area that will be affected by the risk/impact:
  1. Site specific; only the area that will be excavated is relevant for palaeontology because fossils can be in isolated areas, or lots of fossils (usually plants) can occur in layers over wide areas, such as in the shales associated with coal seams. In the latter setting, the fossils are likely to be all from the same flora.
  
5. **Duration** – The timeframe during which the risk/impact will be experienced:
  1. Very short term (instantaneous); fossils are not living so if damaged or destroyed this is a finite event.
  
6. **Reversibility of impacts** - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  1. The reversibility is moderate with mitigation because fossils can be removed when they are found, donated to a research centre of museum and protected for future generations or for research;
  2. Low reversibility of impacts; or
  
7. **Irreplaceability of resource loss caused by impacts** – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase) will be:
  1. Moderate irreplaceability of resources; although the individual fossil is not replaceable, in this formation the fossil plants, when present, are numerous. Mitigation and collection of fossils will have a positive impact on the science.

***Using the criteria above, the impacts will further be assessed in terms of the following:***

8. **Consequence** – The anticipated severity of the impact:
  1. Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected). Fossils do not affect the modern environment.
  
9. **Probability** – The probability of the impact occurring:

1. Very unlikely (<30% chance of occurring); it is very unlikely that fossils occur in the covering soils and sandstones that will be excavated, but there is small chance that fossils may occur below the ground surface in the shales (probably several metres below the surface).

10. **Significance** – Pre-mitigation the consequence is moderate and the probability is very unlikely which give a consequence of moderate (4). Post-mitigation where any fossils occurring are removed and rescued, the significance is reduced to a very low risk/impact (5). The significance is rated qualitatively as follows against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 6:

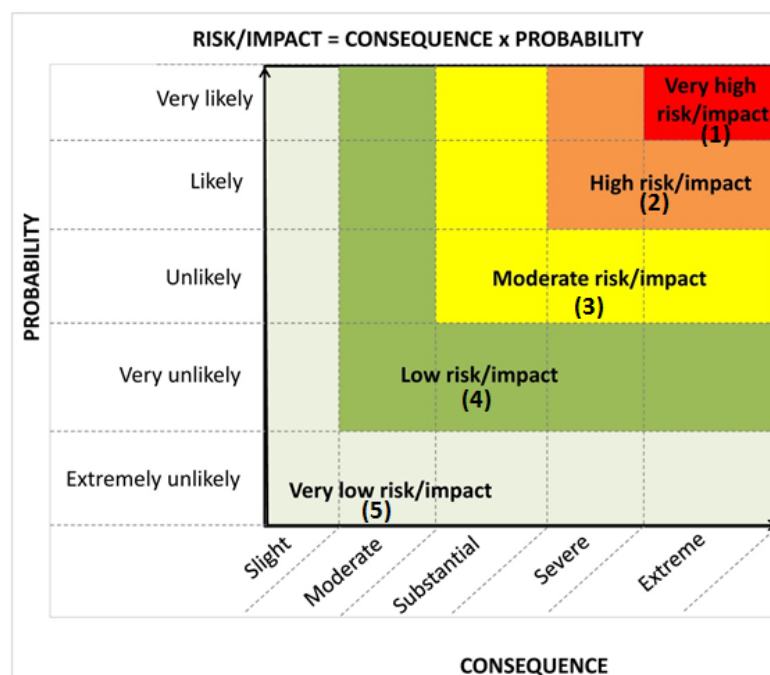


Figure 6: Guide to assessing risk/impact significance as a result of consequence and probability.

11. **Significance** – Will the impact cause a notable alteration of the environment?

1. Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
2. Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
3. Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);

4. High (the risk/impacts will result in a major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); or
5. Very high (the risk/impacts will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks must be ranked as follows in terms of significance:

6. Very low = 5;
  7. Low = 4;
  8. Moderate = 3;
  9. High = 2; and
  10. Very high = 1.
12. **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
    1. Neutral - environment overall will not be affected. Loss of fossils will not affect the environment but would only be a loss to science and heritage so have a minor social impact.
  13. **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
    1. High because the geology is well mapped and from the literature and experience, we know that fossils do not occur in overlying soils, and are only sporadically distributed in the shales. Mitigation (collection of fossils) would have a positive scientific and social impact.

Impacts will then be collated into an EMPr and these will include the following:

***Collation of impacts for the EMPr.***

Any impact on the palaeontology will occur only during the construction phase. No fossils will occur in the overlying soils but they might be present below ground but this is unknown until



the rocks are broken open during the excavations for foundations for poles, substations and infrastructure. Monitoring of the rocks excavated by the responsible person, then mitigation in the form of rescuing and collection of fossils means they will not all be destroyed but will be preserved for future generations and scientific research (See Fossil Chance Find Protocol in Section 13).

Once the fossils, if present, have been removed then there would be no impact during operation or decommissioning phase.

**Assessment of impacts:**

The assessment of impacts is provided below in Tables 5 and 6.

**Table 5: Table for rating of potential Palaeontological impacts for the proposed Vhuvhili SEF and associated infrastructure (including the Vhuvhili SEF on-site substation alternatives 1 and 2).**

<b>Havili on-site substation connections – Alternatives 1 and 2</b>						
<i>Impact</i>	<i>Impact Criteria</i>		<i>Significance and Ranking (Pre-Mitigation)</i>	<i>Potential mitigation measures</i>	<i>Significance and Ranking (Post-Mitigation)</i>	<i>Confidence Level</i>
<b>Construction Phase</b>						
<b>Damage or destruction of palaeontological materials in excavations</b>	Status	Neutral	Low	Removal of all fossils on discovery	Very low	High
	Spatial extent	Site only				
	Duration	Very short				
	Consequence	Moderate				
	Probability	Very unlikely				
	Reversibility	Yes				
	Irreplaceability	Not				
<b>Operational Phase (N/A)</b>						
<b>Decommissioning Phase (N/A)</b>						

The main impact identified is the potential damage and/or destruction of palaeontological heritage resources during the construction and decommissioning phases of the proposed Vhuvhili SEF project. No impacts have been identified for the Operational phase.

<i>Impact</i>	<i>Impact Criteria</i>		<i>Significance and Ranking (Pre-Mitigation)</i>	<i>Potential mitigation measures</i>	<i>Significance and Ranking (Post-Mitigation)</i>	<i>Confidence Level</i>
<b>PALAEONTOLOGY</b>						
<b>DIRECT IMPACTS - CONSTRUCTION AND DECOMMISSIONING PHASE</b>						
Damage and/or destruction of palaeontological heritage resources	<i>Status</i>	Negative	Moderate	Construction phase monitoring to be undertaken to remove any fossils found on the surface or below ground (EMPr).	Very low	High
	<i>Spatial Extent</i>	Site				
	<i>Duration</i>	Permanent				
	<i>Consequence</i>	Substantial				
	<i>Probability</i>	Very likely				
	<i>Reversibility</i>	Non-reversible				
	<i>Irreplace-ability</i>	High				

**Table 6: Table for rating of potential Cumulative Palaeontological impacts for the proposed Vhuvhili SEF and associated infrastructure (including the Vhuvhili SEF on-site substation alternatives 1 and 2).**

<b>Vhuvhili on-site substation connections – Alternatives 1 and 2</b>						
<i>Impact</i>	<i>Impact Criteria</i>		<i>Significance and Ranking (Pre-Mitigation)</i>	<i>Potential mitigation measures</i>	<i>Significance and Ranking (Post-Mitigation)</i>	<i>Confidence Level</i>
<b>Construction Phase</b>						
Damage or destruction of palaeontological materials in excavations	Status	Neutral	Low	Removal of all fossils on discovery	Very low	High
	Spatial extent	Site only				
	Duration	Very short				
	Consequence	Moderate				
	Probability	Very unlikely				
	Reversibility	Yes				
	Irreplaceability	Not				
<b>Operational Phase (N/A)</b>						
<b>Decommissioning Phase (N/A)</b>						

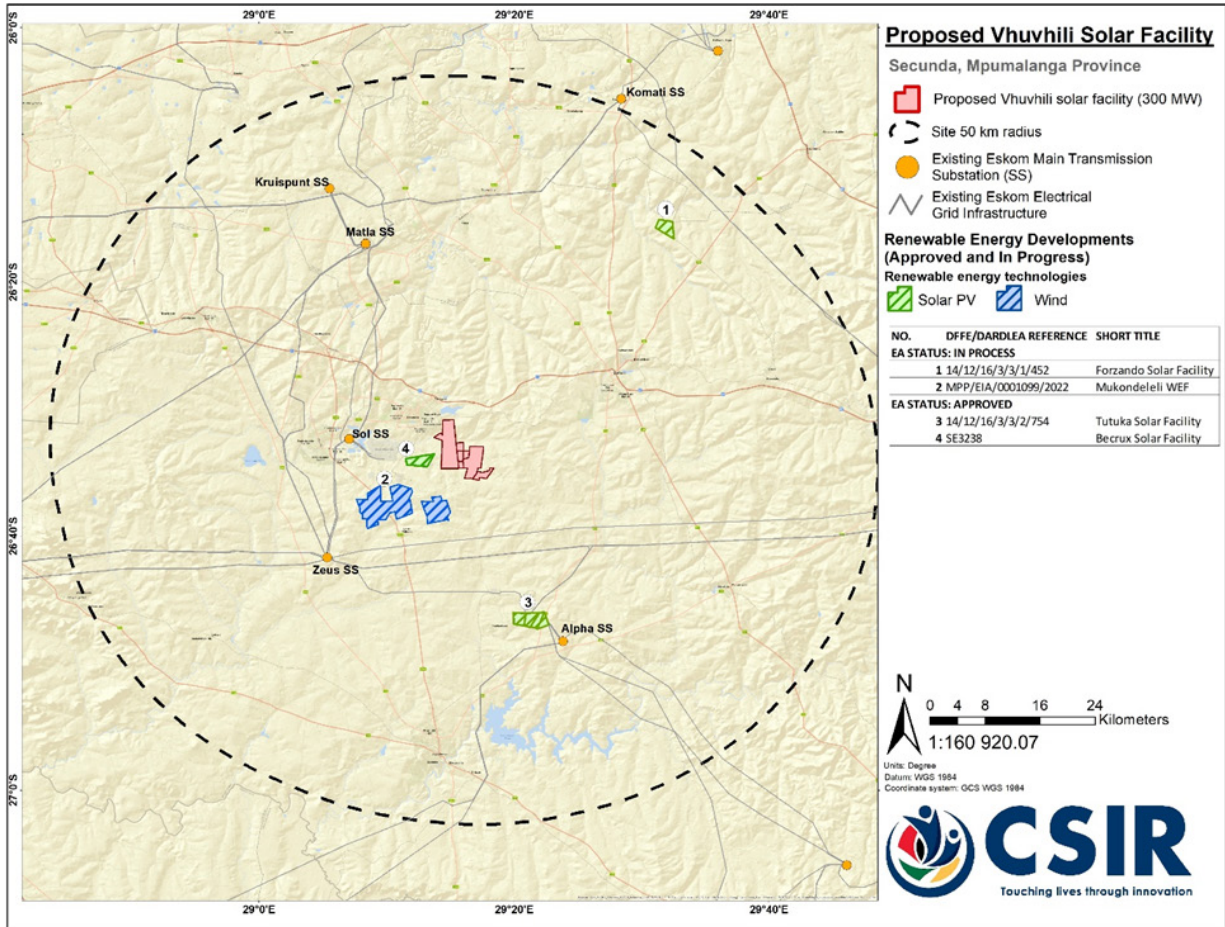
The main cumulative impact identified is the potential damage and/or destruction of palaeontological heritage resources during the construction and decommissioning phases of the proposed Vhuvhili SEF project and other Renewable Energy Facilities within the area. No impacts have been identified for the Operational phase.

<i>Impact</i>	<i>Impact Criteria</i>		<i>Significance and Ranking (Pre-Mitigation)</i>	<i>Potential mitigation measures</i>	<i>Significance and Ranking (Post-Mitigation)</i>	<i>Confidence Level</i>
<b>PALAEONTOLOGY</b>						
<b>DIRECT IMPACTS - CONSTRUCTION AND DECOMMISSIONING PHASE</b>						
Damage and/or destruction of palaeontological heritage resources	<b>Status</b>	<i>Negative</i>	<b>Moderate</b>	<i>Construction phase monitoring to be undertaken to remove any fossils found on the surface or below ground (EMPr).</i>	<i>Very low</i>	<i>High</i>

#### **Other renewable energy facilities (Cumulative projects)**

The Vhuvhili SEF project is not located within a Renewable Energy Development Zone. Four other Renewable Energy Facilities have been identified within a radius of 50 km from the proposed Vhuvhili SEF according to the South African Renewable Energy EIA Application Database (DFFE REEA 2022 Q2 database) (Figure 3.7). Three REFs have received EA and one is in process (Figure 7):

- The authorised Tutuka 65.9 MW Solar Photovoltaic (PV) Energy Facility and its associated infrastructure (Ref: 14/12/16/3/3/2/754).
- The authorised Forzando North Coal Mine Solar PV Facility, 9.5MW, (Ref: 14/12/16/3/3/1/452).
- The authorised Becrux SEF.
- The proposed Mukondelelei WEF (NEAS Reference: MPP/EIA/0001099/2022).



**Figure 7: Vhuvhili SEF site (pink) in relation to other REF applications within a 50 km radius (red); concurrently proposed Enertrag Mukondeleli WEF site properties outlined in light blue (Source: CSIR, 2022)**

### The No-Go alternative

If the project was not implemented, then the site would stay as it currently is (impact significance of neutral). Although the palaeontological impacts with implementation would be greater than the existing impacts, the socio-economic benefits and the production of renewable energy to potentially produce green Hydrogen and green Aviation Fuel for Sasol is more significant and suggests that the No-Go option is less desirable.

### Substation Alternatives

Two on-site substation and BESS hub alternatives have been identified for assessment as part of the EIA process; i.e., Alternative 1 and Alternative 2 (Refer to Figure 2). Both alternatives are acceptable from a heritage perspective.

### **13. Monitoring Programme and Fossil Chance Find Protocol – to commence once the excavations / drilling activities begin.**

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

### **14. RECOMMENDATIONS**

The proposed Vhuvhili SEF site and both alternatives for the Vhuvhili SEF on-site substation are on potentially fossiliferous rocks BUT no fossils would occur on the ground surface (cultivation and wetland) but might occur below ground. Therefore, the fossil chance find protocol should be followed (Section 13). Both alternatives for the proposed Vhuvhili SEF on-site substations (Alternative 1: A-B) and Alternative 2 (C-D) are acceptable from a Palaeontological perspective

Since the site visit by the archaeologist for this project confirmed that the land has been ploughed and planted in the last few decades, it is unlikely that any fossils will be seen before excavations commence. Therefore, from a palaeontological perspective, the proposed Vhuvhili SEF and associated infrastructure, are acceptable on condition that the following mitigation measure should be adhere to:

A Fossil Chance Find Protocol (as per Section 13) should be included in the EMPr and should be adhered to as follows "If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible."

## **15. REFERENCES**

Bamford, M.K. October 2021. Palaeontological Impact Assessment for the two proposed PV facilities south of Secunda, Mpumalanga Province. In CTS21\_215\_ Secunda\_PVs. Author: Jenna Lavin.

Geological Map from the Geological Survey 1: 250 000 map 2628 East Rand.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

<https://sharis.sahra.org.za/map/palaeo>

Snyman, C.P., 1998. Coal. In: Wilson, M.G.C., and Anhaeusser, C.P., (Eds). The Mineral Resources of South Africa: Handbook, Council for Geosciences 16, 136-205.



## **APPENDICES**

### **APPENDIX 1: CURRICULUM VITAE**

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Please refer to Appendix A in Part B of the EIA Report

## **APPENDIX 2: SPECIALIST DECLARATION**

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Please refer to Appendix B in Part B of the EIA Report

## APPENDIX 3 (A): COMMENTS RECEIVED FROM THE SOUTH AFRICAN HERITAGE RESOURCES AGENCY (SAHRA)

### Vhuvhili Solar Photovoltaic Facility near Secunda, Mpumalanga Province

Our Ref:



an agency of the  
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South African Heritage Resources Agency | 111 Harrington Street | Cape Town  
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www.sahra.org.za

Enquiries: Natasha Higgitt  
Tel: 021 462 4502  
Email: nhiggitt@sahra.org.za  
CaseID: 18822

Date: Thursday July 14, 2022  
Page No: 1

### Interim Comment

**In terms of Section 38(3), 38(8) of the National Heritage Resources Act (Act 25 of 1999)**

Attention: Emoyeni Project Management (Pty) Ltd

**The Project Applicant, Vhuvhili Solar RF (Pty) Ltd is proposing to design, construct and operate the Vhuvhili Solar Photovoltaic (PV) Energy Facility, and associated infrastructure approximately 7 km south-east of the town of Secunda in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality in the Mpumalanga Province.**

CSIR have been appointed by Emoyeni Project Management (Pty) Ltd to conduct an Environmental Authorisation (EA) Application for the proposed Vhuvhili Solar Photovoltaic Facility near Secunda, Mpumalanga Province.

A draft Scoping Report (DSR) has been submitted in terms of the National Environmental Management Act, 1998 (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations. The proposed development will include the construction of PV panels, a Battery Energy Storage System (BESS), on-site 33/132 kV substation, construction laydown area, operations and maintenance areas, workshops, site offices and meeting room, guard houses, ablution facilities, inverter/transformer stations, underground cables and internal powerline, access roads, internal roads, fencing, storm water channels within a development area of 3 115 ha.

Marion Bamford and ASHA Consulting (Pty) Ltd have been appointed to provide heritage specialist input as required by section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA).

*Bamford, M. 2022. The proposed development of the Vhuvhili Solar PV project southeast of Secunda, Mpumalanga Province – Palaeontology comment for Scoping Report*

The proposed development area is underlain by shales and sandstones of the Vryheid Formation that are potentially fossiliferous and may include fossils such as Glossopteris Flora. These sediments are overlain by moderately sensitive Quaternary alluvium and sands along the rivers and streams. A survey was conducted on the adjacent farm in 2021 and no fossils were identified.

## Vhuvhili Solar Photovoltaic Facility near Secunda, Mpumalanga Province

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CaseID: 18822

Date: Thursday July 14, 2022  
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*Orton, J. 2021. Heritage Scoping Report for the proposed Vhuvhili Solar PV Facility*

A total of 15 heritage resources were identified within the proposed development area. These include five (5) burial grounds of Grade IIIA heritage significance, two (2) possible graves of Grade IIIA heritage significance, four (4) stone walled features of Grade GPB heritage significance and four (4) stone walled features of Grade GPC heritage significance.

Recommendations provide in the report include the following:

- No mitigation is required for archaeological resources as no significant resources are known. A preconstruction survey of the final footprint will serve to confirm whether any sensitive sites are present and mitigation recommendation would be made at the time;
- Graves and potential should all be avoided. It is suggested that the proponent plan for a larger area so that all graves identified during a preconstruction survey can be excised from the footprint but left in situ. The alternative of moving the graves is not recommended. All graves should be fenced with farmstyle fence and pedestrian gate;
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

### Interim Comment

The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit notes the submitted heritage specialist reports. SAHRA requests that a field-based PIA of the proposed development be conducted. The survey of the adjacent property is not accepted.

Further comments will be issued upon receipt of the field-based PIA and draft EIA documents inclusive of appendices.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

**Vhuvhili Solar Photovoltaic Facility near Secunda, Mpumalanga Province**

**Our Ref:**



an agency of the  
Department of Arts and Culture

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CaseID: 18822

Date: Thursday July 14, 2022  
Page No: 3

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Natasha Higgitt  
Heritage Officer  
South African Heritage Resources Agency

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Phillip Hine  
Manager: Archaeology, Palaeontology and Meteorites Unit  
South African Heritage Resources Agency

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**ADMIN:**  
Direct URL to case: <https://sahris.sahra.org.za/node/599387>  
(DARDLEA, Ref: )

**APPENDIX 3 (B): RESPONSE LETTER OF MOTIVATION FROM THE PALAEOLOGY SPECIALIST, PROFESSOR MARION BAMFORD**

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Palaeosciences Centre, East Campus, 1 Jan Smuts Avenue, Braamfontein, Johannesburg  
Private Bag 3, WITS 2050, Johannesburg, SOUTH AFRICA Tel: 011 717 6682

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[Marion.bamford@wits.ac.za](mailto:Marion.bamford@wits.ac.za)

19 July 2022

Ms Natasha Higgett  
Heritage Officer Archaeology, Palaeontology & Meteorites Unit  
South African Heritage Resources Agency  
111 Harrington Street  
Cape Town 8001

Dear Ms Higgett

**RE: Request for Exemption for further Palaeontological Impact Assessment for the proposed Vhuvhili Solar Voltaic (PV) Energy Facility, Secunda.**

With respect to the interim comment (18822) my reply is to the palaeontology aspect of the SAHRA as explained below

**Overview:** The Project Applicant, Vhuvhili Solar RF (Pty) Ltd is proposing to design, construct and operate the Vhuvhili Solar Photovoltaic (PV) Energy Facility, and associated infrastructure approximately 7 km south-east of the town of Secunda in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality in the Mpumalanga Province.

CSIR have been appointed by ENERTRAG South Africa (Pty) Ltd to conduct an Environmental Authorisation (EA) Application for the proposed Vhuvhili Solar Photovoltaic Facility near Secunda, Mpumalanga Province.

In the **Interim Comment** you have requested that a site visit be done: "SAHRA requests that a field-based PIA of the proposed development be conducted. The survey of the adjacent property is not accepted." I am asking you to reconsider this request for the following reasons:

1. In essence a site survey has already been done on this site by the archaeologist, Dr Jayson Orotan, and he could find no rocky outcrops that could potentially have fossils.
2. The adjacent site observations confirm this observation of no surface fossils for the Vhuvhili site.



3. As can be seen from the satellite imagery (attached), the site has been farmed and the land is disturbed.
  4. The geological maps (and so the palaeosensitivity) are based on drill core results and not surface exposures. See **bold** below from the report that is in progress.
  5. It is highly unlikely that the PVs and infrastructure will penetrate below 12m from the land surface to where the uppermost fossils might occur (in case they do a fossil chance find protocol will be added to the report).
- b. The southern sections are on non-fossiliferous dolerite of Jurassic age.
  - c. Mostly the moderately sensitive Quaternary alluvium and sands along the rivers and streams are likely to be avoided based on the ecological criteria. Any fossils occurring here would be transported and fragmented so of limited scientific value.
  - d. The central parts are on shales and sandstones of the Vryheid Formation (Early Permian Ecca Group, Karoo Supergroup) that are potentially fossiliferous and so very highly sensitive according to the SAHRIS palaeosensitivity map. Potential fossils would be associated with the coal seams and would be impressions of the *Glossopteris flora* (*Glossopteris* leaves, lycopods, sphenophytes, ferns and early gymnosperms; Plumstead, 1969). In this Witbank coalfield of Mpumalanga, coal seams 1-5 (from base to top) are present at various levels below the ground surface. **Seams 2 and 4 are the thickest seams (Snyman, 1998, based on core material) and the uppermost seam, No 5, is between 12 and 45m below the surface. In all areas, the uppermost seam is overlain by soils, shales and sandstones of varying thicknesses.**

The **Vryheid Formation** lies on the uneven topography of pre-Karoo or Dwyka Group rocks in the northern and northwestern margins, but lies directly on the Pietermaritzburg Formation in the central and eastern part. The lithofacies show a number of upward-coarsening cycles, some very thick, and they are essentially deltaic in origin. There are also delta-front deposits, evidence of delta switching, and fluvial deposits with associated meandering rivers, braided streams, back swamps or interfluves and abandoned channels (Cadle et al., 1993; Cairncross, 1990; 2001; Johnson et al., 2006). Coal seams originated where peat swamps developed on broad abandoned alluvial plains, and less commonly in the backswamps or interfluves. Most of the economically important coal seams occur in the fluvial successions (ibid). In the east (Mpumalanga and northern KwaZulu Natal), the Vryheid Formation can be subdivided into a lower fluvial-dominated deltaic interval, a middle fluvial interval, and an upper fluvial-dominated deltaic interval again (Taverner-Smith et al., 1988).

#### **Summary and request**

Specialists are not obliged to, nor are allowed to, dig or excavate the project areas to see below the sands and soil, and **since we have already verified that there are no surface fossils**, we have to wait until the excavations commence to know what is below the surface. Therefore, I request that you do not insist on a site visit before the excavations have commenced (and then, only when fossils are found).

Yours faithfully



Prof Marion Bamford  
Palaeobotanist; PhD (Wits 1990)



Fig 1: Vhuvhuli Solar PVs – whole area.



Fig 2: Vhuvhili Solar PVs – western area close-up.



Fig 3: Vhuvhili Solar PVs – central area closeup.



Fig 4: Vhuvhili Solar PVs – eastern area closeup.

**Key References cited:**

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

Snyman, C.P., 1998. Coal. In: Wilson, M.G.C., and Anhaeusser, C.P., (Eds). The Mineral Resources of South Africa: Handbook, Council for Geosciences 16, 136-205.

Palaeosensitivity map:

<https://sahris.sahra.org.za/map/palaeo>

**Declaration of Independence**

This letter has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by ASHA Consulting, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford


Signature:



**APPENDIX 3 (C): INTERIM COMMENT RECEIVED FROM THE SOUTH AFRICAN HERITAGE RESOURCES AGENCY (SAHRA), DATED 19 AUGUST 2022, IN RESPONSE TO THE LETTER OF MOTIVATION FROM PROFESSOR BAMFORD**

**Uvuvhu Solar Photovoltaic Facility near Sapunda, Mpumalanga Province**

Our Ref:



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CaseID: 18522

Date: Friday August 19, 2022  
Page No: 1

**Interim Comment**

**In terms of Section 33(3), 33(8) of the National Heritage Resources Act (Act 25 of 1999)**

Attention: ENERTRAG South Africa (Pty) Ltd

The Project Applicant, **Uvuvhu Solar RF (Pty) Ltd** is proposing to design, construct and operate the **Uvuvhu Solar Photovoltaic (PV) Energy Facility**, and associated infrastructure approximately 7 km south-east of the town of **Sapunda** in the **Govan Mbeki Local Municipality** and the **Gert Sibande District Municipality** in the Mpumalanga Province.

CSIR have been appointed by ENERTRAG South Africa (Pty) Ltd to conduct an Environmental **Authorisation** (EA) Application for the proposed **Uvuvhu Solar Photovoltaic Facility** near **Sapunda**, Mpumalanga Province.

A draft Scoping Report (DSR) has been submitted in terms of the National Environmental Management Act, 1998 (NEMA) and the 2017 NEMA Environmental Impact Assessment (EIA) Regulations. The proposed development will include the construction of PV panels, a Battery Energy Storage System (BESS), on-site 33/132 kV substation, construction laydown area, operations and maintenance areas, workshops, site offices and meeting room, guard houses, ablution facilities, inverter/transformer stations, underground cables and internal powerline, access roads, internal roads, fencing, storm water channels within a development area of **3 115 ha**.

Marion Bamford and ASHA Consulting (Pty) Ltd have been appointed to provide heritage specialist input as required by section 24(4)(b)(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA).

**Bamford, M. 2022. The proposed development of the Uvuvhu Solar PV project southeast of Sapunda, Mpumalanga Province – **Background** comment for Scoping Report**

The proposed development area is underlain by shales and sandstones of the Vryheid Formation that are potentially fossiliferous and may include fossils such as Glossopteris Flora. These sediments are overlain by moderately sensitive Quaternary alluvium and sands along the rivers and streams. A survey was conducted on the adjacent farm in 2021 and no fossils were identified.

**Orton, J. 2021. Heritage Scoping Report for the proposed Uvuvhu Solar PV Facility**





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A total of 15 heritage resources were identified within the proposed development area. These include five (5) burial grounds of Grade IIIA heritage significance, two (2) possible graves of Grade IIIA heritage significance, four (4) stone walled features of Grade GPB heritage significance and four (4) stone walled features of Grade GPC heritage significance.

Recommendations provide in the report include the following:

- + No mitigation is required for archaeological resources as no significant resources are known. A preconstruction survey of the final footprint will serve to confirm whether any sensitive sites are present and mitigation recommendation would be made at the [time](#).
- + Graves and potential should all be avoided. It is suggested that the proponent plan for a larger area so that all graves identified during a preconstruction survey can be excised from the footprint but left in situ. The alternative of moving the graves is not recommended. All graves should be fenced with [topographic fence](#) and pedestrian [gate](#).
- + If any archaeological material or human burials are uncovered during the course of [development](#) then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

In an Interim Comment issued on the 14/07/2022, SAHRA requested that a field-based PIA of the proposed development be conducted as the survey of the adjacent property was not accepted. Since the issuing of the Interim Comment, a Letter of Motivation for Exemption has been submitted for review (18/07/2022).

**Bamford, M. 2022. Motivation letter for [Bamford](#) desktop study for the proposed [Wuuh](#) solar PV project near [Geyser](#) in the [Mpumalanga Province](#).**

The specialist requests that the requirement for a field-assessment be reconsidered based on the following:

- + A site survey was conducted by an archaeologist, and no fossils were [identified](#).
- + The adjacent site observation confirms no surface fossils for the [Wuuh](#) development;
- + The development footprint has been farmed and is [disturbed](#).
- + The geological maps and associated [palaeo](#)-sensitivity are based on drill core results and are not indicative of surface [exposures](#).
- + It is unlikely that the proposed development will penetrate below 12 m to where the uppermost fossils

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Case ID: 18522

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may occur.

The moderately sensitive Quaternary alluvium and sands will be avoided based on ecological criteria. The potentially fossiliferous Vryheid formation shales and sandstones are located between 12 and 45 m below the surface. The specialist concludes by requesting that no site visit be insisted upon until excavations have commenced and only if fossils are uncovered.

#### Interim Comment

The SAHRA Archaeology, ~~Paleontology~~, and Meteorites (APM) Unit notes the submitted heritage reports and additional Letter of Recommendation for Exemption for further ~~paleontological~~ assessments.

SAHRA must highlight that ~~paleontological~~ field assessments by archaeologists are not accepted, however the Motivation letter for Recommendation for further ~~paleontological~~ assessment is accepted. At this stage of the EA application process, SAHRA does not require any further assessment of the impact to heritage resources.

SAHRA will provide further comments once the draft EIA inclusive of appendices is submitted for review.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

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Natasha Higgitt  
Heritage Officer  
South African Heritage Resources Agency

**Vuvuzela Solar Photovoltaic Facility near Sanyo, Mpumalanga Province**

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A handwritten signature in black ink, appearing to read 'Phillip Hine', is written over a light blue horizontal line.

Phillip Hine

Manager: Archaeology, ~~Environment~~ and Meteorites Unit  
South African Heritage Resources Agency

**ADMIN:**

Direct URL to case: <https://sahra.sahra.org.za/moder/589387>  
(DARDLEA, Ref: [\[link\]](#))