

# **HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED KHOE WIND ENERGY FACILITY, BETWEEN TOUWSRIVER AND MONTAGU, WESTEN CAPE PROVINCE**

(Assessment conducted under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999) as part of an Environmental Impact Assessment)

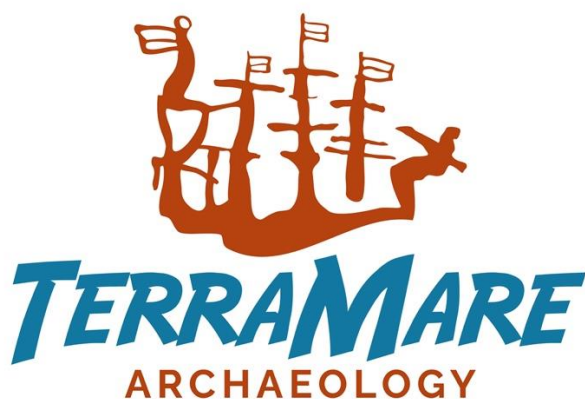
Prepared for:

**ERM Southern Africa (Pty) Ltd**

On behalf of:

**FE Hugo & Khoe (Pty) Ltd**

Final: 5 August 2024



Prepared by

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## EXECUTIVE SUMMARY

### *Project Name*

Khoe Wind Energy Facility.

### *Location*

The approximate centrepont of the project area is:

-33.598263° S / 19.880407° E

### *Locality Plan*

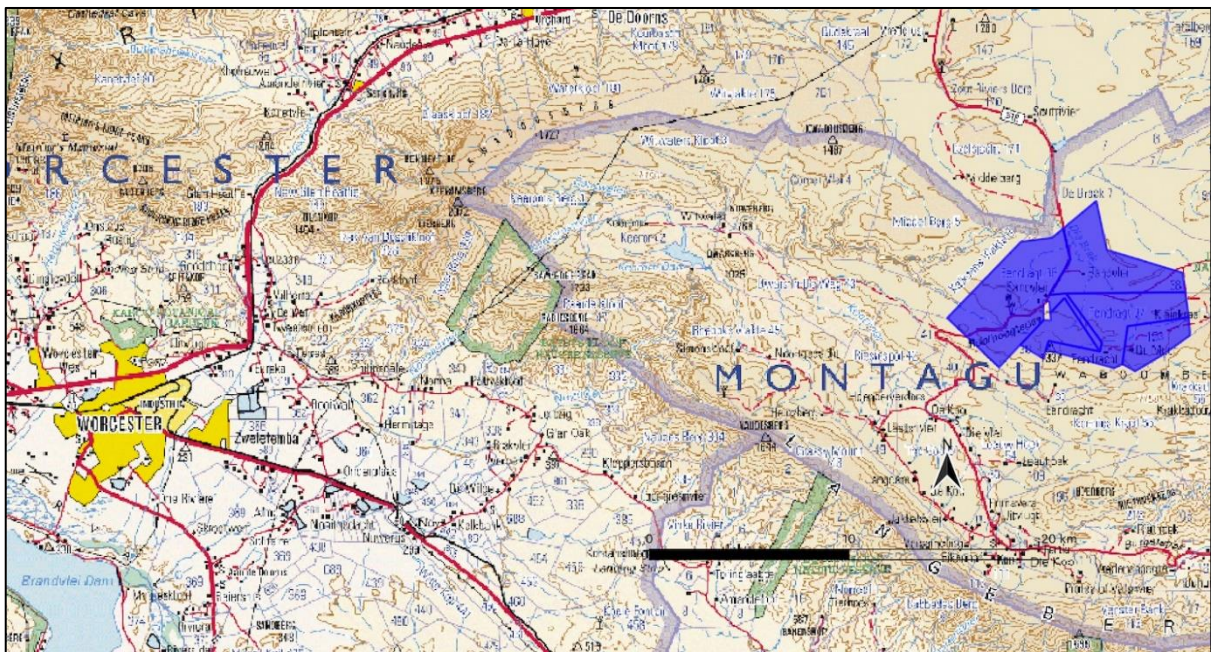


Figure 1: Extract from 1:250 000 topographical map sheet showing the farm portions on which the Khoe Wind Energy Facility is proposed. De Doorns in the Hex River Valley is located approximately 18.5 km to the north west (Source: 1:250 000 chart 3319 Worcester, National Geo-spatial Information, <http://www.ngi.gov.za>).

### *Description of Proposed Development*

TerraMare Archaeology (Pty) Ltd was appointed by ERM Southern Africa (Pty) Ltd, on behalf of **FE Hugo & Khoe** (Pty) Ltd, to conduct a heritage impact assessment for the proposed Khoe Wind Energy Facility between Touwsriver and Montagu in the Western Cape.

The proposed WEF will be located on Portions 1, 2 and 11 of Farm 38 (Eendragt), Farm 193 and the remainder of Farm 37 (Eendragt), in the Cape Winelands District Municipality.

### *Heritage Impact Assessment*

The heritage impact assessment comprised an archaeological site visit and impact assessment of the proposed development site by TerraMare Archaeology and a desk-based palaeontological impact assessment conducted by Dr Marion Bamford. As requested by Heritage Western Cape (HWC) in their response to the Notice of Intent to Develop, the results of the visual impact assessment were considered in the heritage impact assessment. The results of these studies have been integrated into this heritage impact assessment which

assesses the impacts of the project on heritage resources.

The Khoe WEF site was visited by John Gribble and Gail Euston-Brown of TerraMare Archaeology as part of a heritage field survey conducted for this project and the nearby Hugo WEF between 8 and 11 April 2024.

### ***Findings***

The palaeontological assessment indicates that the proposed Khoe WEF is underlain by several coastal to shallow marine formations of the Table Mountain and Bokkeveld Groups of the Cape Supergroup, of Early to Middle Devonian age (c. 410 – 390 Ma), some of which have fossils preserved within them.

According to SAHRA's palaeo-sensitivity map, the Khoe WEF footprint is in an area of generally very high or high palaeontological sensitivity. However, a palaeontological assessment for the adjacent proposed Ezelsjacht WEF found that because of the high levels of tectonic deformation of the fossiliferous bedrock, and the marked near-surface weathering of both mudrock and sandstone within that project area, the actual palaeontological sensitivity of that project area is much lower than indicated on the SAHRA map.

Based on experience and the lack of any previously recorded fossils from the area, Bamford (2024) indicates that it is extremely unlikely that any fossils would be preserved in the overlying soils of the Quaternary and there is a moderate to small chance that fossils may occur in the mudstones of the Ceres Subgroup or in the Table Mountain and Bokkeveld Groups bedrock. This potential is very variable and is negatively affected by the folding and tectonic deformation of these formations within the Cape Fold Belt mountains.

The palaeontological impact assessment makes the following recommendation:

- A Fossil Chance Find Protocol should be added to the EMP. If fossils are found by the Environmental Control Officer (ECO) or other responsible person once excavations have commenced, they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends an alternative approach.

There has been little previous archaeological research around the proposed Khoe WEF and desktop information available for this report was limited to a small number of previous archaeological assessments in the region.

Based on these reports, it was assumed prior to the TerraMare Archaeology site visit that Stone Age resources in and around the Khoe WEF would be rare. This was confirmed by the site visit which found virtually no evidence, apart from occasional, isolated stone artefacts, of archaeological sites within the area that will form part of the Khoe WEF development footprint.

The very low archaeological signature of the Khoe WEF area is in part due to the geology of the area where caves and rock shelters are rare. It is also the result of the exposed high ground that makes up much of the WEF which is unlikely to have attracted more than passing prehistoric human use and occupation and where the presence of archaeological sites and material is the exception rather than the rule.

It is TerraMare Archaeology's experience that there may be archaeological material buried within the Quaternary sands which mantle portions of the site. Earthworks and excavations for

the project may encounter and disturb such buried archaeological material if it is present and the following mitigation measures are recommended:

- A pre-construction archaeological walkdown survey of the final WEF layout is conducted by a suitably qualified archaeologist.
- In the event of archaeological resources being encountered during the course of development, work within 50 m of the find must be halted and the find reported to the Environmental Control Officer. The ECO must inform HWC so that mitigatory action can be determined and be implemented if necessary. The find may require inspection or collection/excavation by an archaeologist. Such heritage is the property of the state.

No identifiable graves have been recorded in the development areas but there it is possible that human remains could be encountered during construction work. It is recommended that:

- Should human remains be encountered, work within 50 m of the find must cease, the remains must be left *in situ* but made secure and HWC must be notified immediately so that mitigatory action can be determined and be implemented.

The cultural landscape within which the Khoe WEF is proposed is rugged, with steep hills and mountainsides in the west and south which are largely natural and undeveloped. On the lower slopes and valley bottoms in the east, the landscape contains a patchwork of dryland oat and wheat fields.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities and the apparent lack of archaeological and other heritage sites on the project site suggest that the landscape of the Khoe WEF project site was of limited significance to, and thus lightly used and occupied by a succession of pre-colonial people. The modern land-use on the WEF site and surrounding area does not significantly alter its natural character. The area is remote and sparsely populated, and the landscape is largely natural and with only a light agricultural overlay comprised of dryland field, gravel roads, occasional farm tracks, fence lines, and the handful of historical built environment nodes described earlier.

The construction of the Khoe WEF will disrupt the rural sense of place and affect views of the landscape and impacts arising from construction of the WEF are potentially high negative. This may be reduced if suitable measures to mitigate the intrusion of WEF infrastructure and activities associated with the project in the landscape can be implemented.

It is recommended that such mitigation measures could include:

- The screening of infrastructure area(s) from the R318,
- Keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view,
- Ensuring that night-time light pollution is minimized, and
- Keeping construction and maintenance-related activities in designated and approved areas.

## **Conclusion**

This assessment has found that the area identified for the proposed Khoe WEF is a heritage environment of variable sensitivity but that significant impacts on palaeontological and

archaeological resources arising from the project are unlikely and no fatal flaws have been identified. Impacts to the cultural landscape are expected to be significant, but these can be reduced through the implementation of suitable mitigatory measures. If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

Despite the impacts to the cultural landscape, it is expected that mitigation measures will allow impacts to be managed.

It is our considered opinion, therefore, that the proposed Khoe WEF may be authorised, but subject to the recommendations contained within this report.

***Author/s and Date***

Heritage Impact Assessment: John Gribble, TerraMare Archaeology, 2024.

Archaeological Impact Assessment: Incorporated in the HIA.

Palaeontological Impact Assessment: Dr Marion Bamford, 2023.

Visual Impact Assessment: Lourens du Plessis, LOGIS, 2024.

## CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a <i>curriculum vitae</i> ;	Preface pages and Appendix A
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Sections 5.3
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 5
(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 7
(g) an identification of any areas to be avoided, including buffers;	Section 7
(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 3-6
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.5
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Sections 7 and 8
(k) any mitigation measures for inclusion in the EMPr;	Section 11
(l) any conditions for inclusion in the environmental authorisation;	Section 11

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion—  i. as to whether the proposed activity, activities or portions thereof should be authorised;  iA. Regarding the acceptability of the proposed activity or activities; and  ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 12
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 5.6 & Appendix C
(p) any other information requested by the competent authority	N/A
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

## **DETAILS OF THE SPECIALIST**

This specialist assessment has been undertaken by John Gribble of TerraMare Archaeology (Pty) Ltd.

John Gribble is registered with the Association of Southern African Professional Archaeologists (ASAPA) with registration number 43 and is accredited by the Cultural Resources Management Section of ASAPA as:

- Principal Investigator: Maritime and Colonial Archaeology.
- Field Director: Stone Age Archaeology.

A curriculum vitae is attached as Appendix A below and a signed and certified specialist statement of independence is attached as Appendix B.



## GLOSSARY

**Archaeology:** 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.

**Caenozoic:** The youngest geological deposits, formed during the most recent geological period (approximately 2.6 million years ago to present).

**Cultural landscape:** The combined works of people and natural processes as manifested in the form of a landscape

**Early Stone Age:** The archaeology of the Stone Age between 700 000 and 2 500 000 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).

**Late Stone Age:** The archaeology of the last 20 000 years associated with fully modern people.

**Middle Stone Age:** The archaeology of the Stone Age between 20 000-300 000 years ago associated with early modern humans.

**National Estate:** The collective heritage assets of the Nation

**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.

**Quaternary:** The geologic time period that encompasses the most recent 2.6 million years. It comprises the Pleistocene (2.6 Ma – 10,000 years ago) and the Holocene (10,000 years ago to the present) and is characterised by a series of global glacial cycles.

**SAHRA:** South African Heritage Resources Agency – the compliance authority which protects national heritage.

**Structure (historic):** Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

## **ACRONYMS**

<b>ACO</b>	ACO Associates cc
<b>DFFE</b>	Department of Fisheries, Forestry and the Environment
<b>DTM</b>	Digital Terrain Model
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>ERM</b>	ERM Southern Africa (Pty) Ltd
<b>ESA</b>	Early Stone Age
<b>GIS</b>	Geographical Information System
<b>GPS</b>	Global Positioning System
<b>HIA</b>	Heritage Impact Assessment
<b>HWC</b>	Heritage Western Cape
<b>LSA</b>	Late Stone Age
<b>MSA</b>	Middle Stone Age
<b>MW</b>	Megawatts
<b>Ma</b>	Million years
<b>NEMA</b>	National Environmental Management Act
<b>NHRA</b>	National Heritage Resources Act
<b>NID</b>	Notice of Intent to Develop
<b>REEA</b>	Renewable Energy EIA Application
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System
<b>WTG</b>	Wind Turbine Generator

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# 1 INTRODUCTION

TerraMare Archaeology (Pty) Ltd was appointed by ERM Southern Africa (Pty) Ltd (ERM), on behalf of FE Hugo & Khoe (Pty) Ltd, to conduct a heritage impact assessment for the proposed Khoe Wind Energy Facility between Touwsriver and Montagu in the Western Cape.

The proposed WEF will be located on Portions 1, 2 and 11 of Farm 38 (Eendragt), Farm 193 and the remainder of Farm 37 (Eendragt), in the Cape Winelands District Municipality between Touwsriver and Montagu in the Western Cape (Figure 1 and Figure 2).

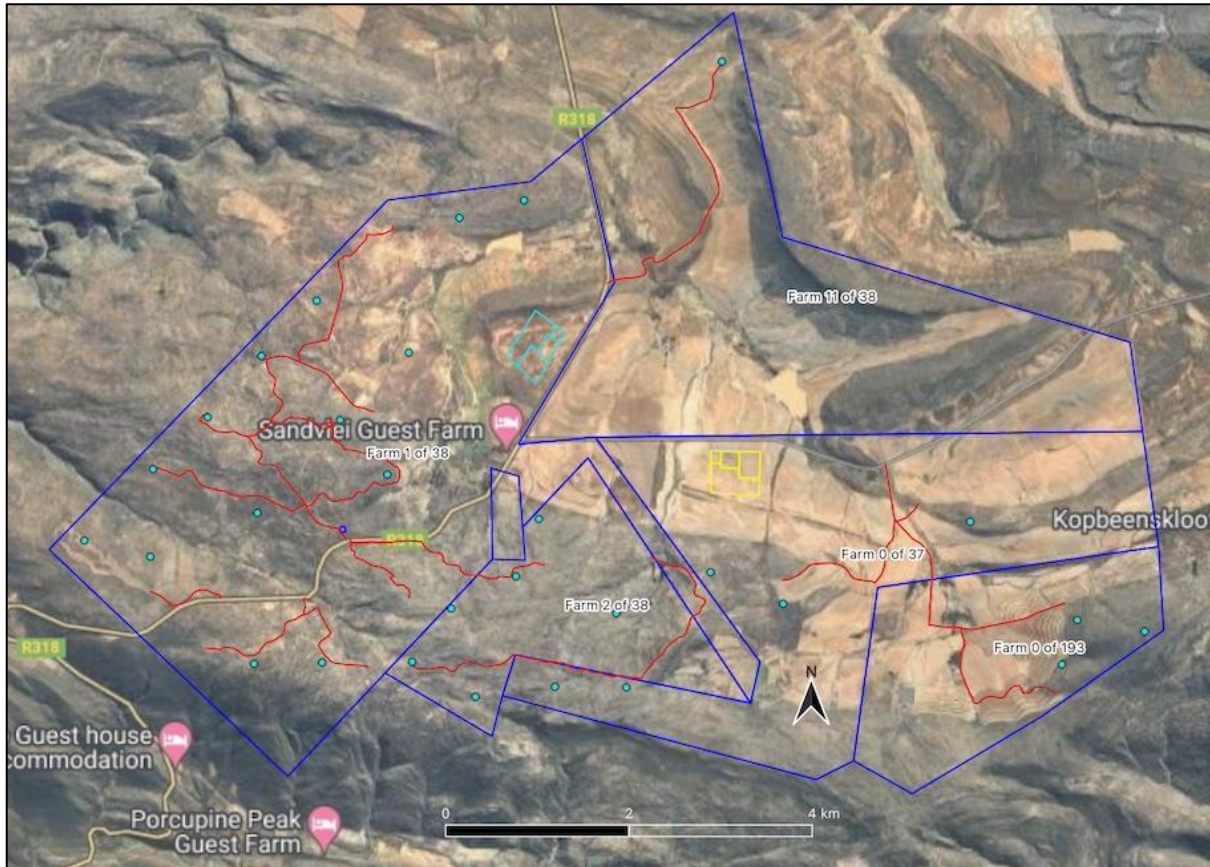


Figure 2: Proposed Khoe WEF turbine layout (blue dots), existing access roads (red lines) and the preferred and alternative infrastructure areas (pale blue and yellow polygons respectively). The R318 passes through the western half of the proposed WEF and down the Rooiberg Pass (bottom left) into the Koo Valley (Source: Google Earth).

# 2 DEVELOPMENT PROPOSAL

The proposed Khoe WEF will comprise of up to 29 turbines, with a maximum installed generation capacity of up to 290 megawatts (MW). The available project specifications are shown in Table 1 below:

Table 1: Khoe WEF Project Specifications

WEF Technical Details Components	Description / Dimensions
Maximum Generation Capacity	up to 290MW
Type of technology	Onshore Wind

<b>WEF Technical Details Components</b>	<b>Description / Dimensions</b>
Number of Turbines	Up to 29
WTG Hub Height from ground level	up to 150m
Blade Length	up to 100m
Rotor Diameter	up to 200m
Structure height (Tip Height)	up to 250m
Structure orientation	Wind regiment dependent
Operations and maintenance buildings (O&M building) with parking area	up to 1 HA
Site Access	Via the R318
Area occupied by inverter transformer stations/substations	up to 2.5 HA
Capacity of on-site substation	132/33kv
Battery Energy Storage System footprint	up to 5 HA
BESS type	Lithium-ion as the preferred technology
Length of internal roads	TBD
Width of internal roads	Access roads to the site and between project components with a width of approximately 4.5 m and a servitude of 13.5 m.
Internal Cabling	Cabling between the turbines, to be laid underground where practical.

The WEF will straddle the R318 approximately 19 km south of the N1, and lies between Touwsrivier to the north-east, De Doorns to the north-west and the Koo Valley to the south (Figure 1 and Figure 2).

The proposed turbine footprint and associated facility infrastructure will cover an area of up to 4113ha, depending on the final design.

An on-site substation with a capacity up 132 kV is proposed, with an up to 33 kV overhead / underground export powerline will be installed. It is not known at this stage what the route or length of this grid connection powerline will be, or along what route the cabling will be installed.

### **3 TERMS OF REFERENCE**

TerraMare Archaeology was commissioned to produce this HIA as part of an Environmental Impact Assessment (EIA) process for the proposed Khoe WEF, as required by the National Environmental Management Act (No. 107 of 1998), as amended.

In their response to a Notice of Intent to Develop (NID) submitted in November 2023, Heritage Western Cape (HWC) indicated that a HIA that satisfies the provisions of Section 38(3) of the National Heritage Resources Act (25 of 1999) (NHRA) must be submitted and must include the following:

- An assessment of impacts on archaeology
- An assessment of impacts on palaeontology
- An assessment of impacts on visual impact on the cultural landscape.

HWC's NID response is attached to this report as Appendix C.

This HIA aims to meet these requirements by identifying heritage resources which may be impacted during the construction, operation and decommissioning phases of the Khoe WEF, assessing their significance and providing recommendations for mitigation.

This document therefore includes the following:

- A desk-top level heritage literature review to assess the potential for archaeological, cultural and historic sites in the proposed development area,
- The results of an archaeological site visit undertaken to identify and document heritage resources that may be affected by the project,
- A desktop palaeontological impact assessment (PIA) to assess whether palaeontological features will be affected by the project, and
- A summary of the findings of the visual impact assessment (VIA) in respect of potential impacts on the cultural landscape.

The results of the studies listed above are integrated in this HIA report, along with an assessment of the sensitivity and significance of any heritage resources, an evaluation of the potential impacts on them of the construction, operation and decommissioning of the project, and recommendations for measures to mitigate any negative impacts of the project on them.

The HIA must be submitted for comment to HWC as the relevant statutory commenting body under the National Environmental Management Act (NEMA), as amended.

## **4 RELEVANT LEGISLATION**

### **4.1 *National Heritage Resources Act (No 25 of 1999)***

The National Heritage Resources Act (NHRA) came into force in 2000 with the establishment of the South African Heritage Resources Agency (SAHRA), replacing the National Monuments Act (No. 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government. In the Western Cape this is Heritage Western Cape.

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or



significance.

In terms of the definitions provided in Section 2 of the NHRA, heritage resources potentially relevant to this assessment are:

- Material remains of human activity which are in a state of disuse and are in or on land [which includes land under water] and which are older than 100 years, including artefacts, human and hominid remains and artificial features,
- 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,
- 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,
- Any movable property of cultural significance which may be protected in terms of any provisions of the NHRA, including any archaeological artefact or palaeontological specimen, and
- Intangible heritage such as traditional activities, oral histories and places where significant events happened.

As per the definitions provided above, these cultural heritage resources are protected by the NHRA and a permit from HWC is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site or material.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

Section 38 of the NHRA requires a HIA for certain kinds of development. In relation to this project, the relevant activities are:

- A development which will change the character of a site exceeding 5000 m<sup>2</sup> in extent (Section 38(1)(c)(i)), and
- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300 m in length (Section 38(1)(a)).

#### **4.1.1 Grading of Heritage Resources**

The South African heritage resources management system is based on grading, in terms of which the appropriate level of management responsibility to a heritage resource is assigned.

Grading, according to Winter & Oberholzer (2013) is “generally based on the intactness, rarity and representivity of the resource, as well as its role in the larger landscape or cultural context”.

The grading of heritage resources is conducted in terms of Section 3 of the NHRA which suggests the following criteria for assigning heritage significance:

- Importance in the community or pattern in South Africa’s history,
- Possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage,

- Potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage,
- Importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects,
- Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group,
- Importance in demonstrating a high degree of creative or technical achievement during a particular period,
- Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons,
- Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa, and
- Significance in relating to the history of slavery in South Africa.

The generally accepted heritage resource grades are shown in Table 2 below.

Table 2: Grading of heritage resources (Source: Baumann & Winter 2005: Box 5).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

#### **4.1.2 Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999)**

SAHRA has published minimum standards for heritage studies which have been applied to this HIA (see SAHRA, no date). The minimum standards indicate which specialist studies should form part of a HIA, discusses impact assessment methodologies, sets out the requirements for heritage-related consultation as part of heritage assessments, and provides generic report templates for the various reports required by SAHRA in terms of Section 38 of the NHRA.

Similarly, HWC has published its *Guide for Minimum Standards for Archaeology and Palaeontology Reports Submitted to Heritage Western Cape* (HWC, 2021) which lays out its requirements for a range of reports, including specialist reports produced during the impact assessment process.

This HIA complies with both SAHRA and HWC’s minimum standards and is based on the report template for Section 38 (1 and 8) HIAs set out in Section 9.2. of the former document.

#### **4.2 National Environmental Management Act (Act No 107 of 1998)**

The National Environmental Management Act (NEMA), as amended, provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation process have been promulgated in terms of NEMA and include the EIA Regulations, 2014 as amended (GNR R326/2017) and Listing Notices 1 – 3 (GNR 324, 325 and 327/2017). These regulations were amended in April 2017 by Government Notices 324, 325, 326 and 327.

The development proposed for this project triggers a number of activities in the Listing Notices and, in terms of GNR 325 therefore, the project will be subject to a EIA process and The Energy Team (Pty) Ltd will be required to obtain a positive Environmental Authorisation from the Department of Fisheries, Forestry and the Environment (DFFE) prior to commencement of the proposed activities.

## 5 METHODOLOGY

This study was commissioned as an assessment of the impacts of the proposed Khoe WEF on the heritage resources of the area. This section provides an outline of the approach and methodology used in the study.

### 5.1 Archaeological and Heritage Literature Review and Information Sources

A survey of available and relevant heritage literature was carried out to assess the general heritage context within which the Khoe WEF will be set.

This included a review of published material and available unpublished reports, including those generated for previous archaeological assessments and heritage studies that have been conducted in the vicinity of the project site.

The 1:50 000 maps sheets for the area, Google Earth satellite images and historical maps and aerial photos were interrogated for evidence of heritage resources within the Khoe WEF project site.

Other information sources used in this report are presented in Table 3 below.

Overall, the quality of the available data is suitable for the purpose of informing this report.

Table 3: Information sources used in this assessment

Data/Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo- Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
SG Diagrams	Cape Farm Mapper	Various	Spatial	Copies of historical Surveyor General diagrams
Aerial photographs	Chief Directorate: National Geo- Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Satellite imagery	Google Earth	Various	Spatial	Current and historical satellite imagery of the study area and immediate surrounds

Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals and websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

## 5.2 Study Area

The study area for the proposed Khoe WEF comprises the five farm portions listed above.

The assessment of the full extents of the affected farms, rather than just the proposed project footprint, allows the identification and assessment of less immediate heritage sensitivities such as potential visual impacts on the cultural landscape.

## 5.3 Archaeological Field Assessment

The Khoe WEF site was visited by John Gribble and Gail Euston-Brown of TerraMare Archaeology as part of a heritage field survey conducted for this project and the nearby Hugo WEF between 8 and 11 April 2024.

The field team each carried a hand-held GPS receiver loaded (set to the WGS84 datum) with the Khoe WEF project site outlines, proposed WTG and infrastructure locations, and new proposed access roads and existing farm roads captured from Google Earth. Additional points of potential heritage interest identified from Google Earth or other mapping sources were also load onto the GPS units.

The travelled tracks of the field team were logged by the GPS units and waypoints were entered into the units at the location of any identified heritage resources (see Figure 3). Appendix D contains the detail of the observations made in the field.

Photographs were taken at times of the sites and heritage resources located and to provide context for the landscape setting of the proposed WEF.

The fieldwork protocol also required the grading of any finds of heritage resources, using the system set out by Baumann and Winter (2005) referred to above.

The analysis of the very few heritage resources recorded is based on the experience of the team members who are familiar with the standard classification systems for this artefactual material and can roughly date and characterise an archaeological site based on its visible content and artefacts.

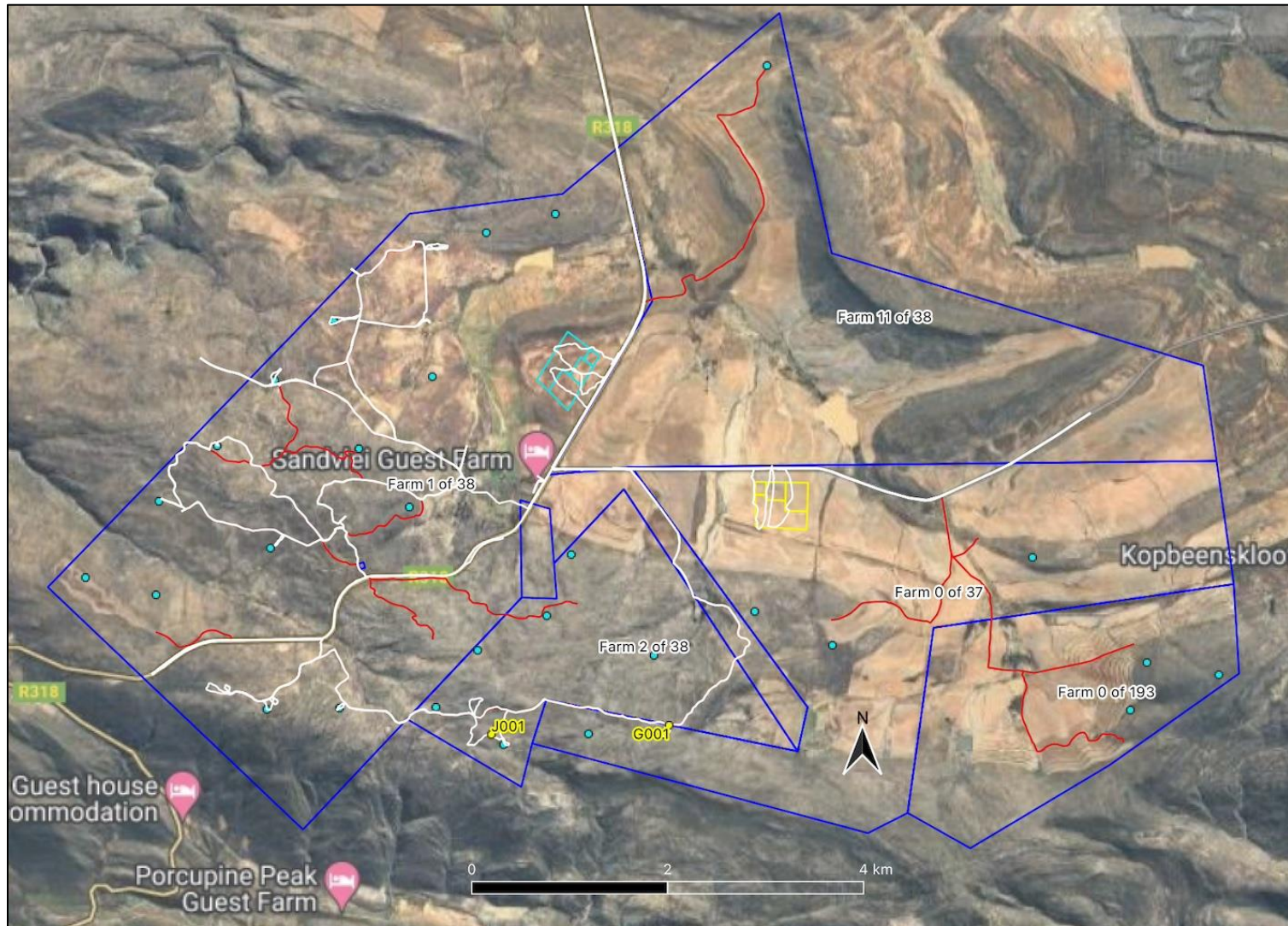


Figure 3: Archaeological site visit tracks (white lines) overlaid on the farm portion (dark blue) and the proposed Khoe WEF development infrastructure elements. The numbered points represent the archaeological and other heritage occurrences recorded during the archaeological site visit (Source: Google Earth).

No archaeological material was removed from the project site, and all observations were based on visible surface material.

The survey took place in late summer and the uncultivated portions of the study area were covered in generally dense montane fynbos. Ground visibility was limited in these areas, but they tended to correspond with high ground where experience has shown that archaeological sites and material seldom occur. Visibility and access were sufficient for survey purposes and did not adversely affect the outcome of the study.

#### **5.4 Palaeontological Assessment**

According to the SAHRIS palaeosensitivity map the Khoe WEF is located in an area of mixed high to very high palaeontological sensitivity.

A palaeontological impact assessment (PIA) was commissioned from Dr Marion Bamford of the University of the Witwatersrand as part of the HIA (Bamford, 2024). The PIA is attached to this report as Appendix E.

The PIA comprised a desktop review of relevant palaeontological and geological mapping for the area including the 1:250 000 Worcester 3319 (1979) Geological Map (Council for Geosciences, Pretoria) and the relevant sheet explanations.

Relevant literature, palaeontological databases, and published and unpublished records were consulted to determine the likelihood of fossils occurring in the affected area. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases (eg <https://sahris.sahra.org.za/map/palaeo>).

The desktop study was used to determine the impact significance of the Khoe WEF on palaeontological resources and recommendations for further studies or mitigation were provided.

#### **5.5 Assumptions and Limitations**

The TerraMare Archaeology was unable to reach all areas of the proposed WEF on account of heavy rain during the site visit. The area received 100 mm of rain in a single night (half of the average annual rainfall) which resulted in Ou Muur (Re 193) and Eendracht (Re 37) being cut off from the road and the WTGs in the eastern corner of the WEF being inaccessible. Elsewhere in the WEF area, although going was heavy, access was possible.

##### **5.5.1 Palaeontology**

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the quartzites, mudstones, sandstones, shales and sands are typical for the country and some might contain fossil plants, traces of bioturbation and invertebrate. The overlying soils and sands of the Quaternary period would not preserve fossils (Bamford, 2024).

##### **5.5.2 Archaeology**

As indicated already, the archaeological survey was carried out at the surface only and any completely buried archaeological sites or material will have not been located or recorded.

Although we believe that most of the relevant archaeological assessments and HIAs from the area have been located and reviewed, it is acknowledged that some reports may not have

been identified for review.

### **5.5.3 Cumulative Impacts**

The consideration and assessment of cumulative impacts is based on the list of approved Wind and Solar PV projects in the Renewable Energy EIA Application (REEA) Database (2023\_Q4) located within 30 km of the Khoe WEF (Figure 8).

The assessment of cumulative impacts is also limited by the quality of other heritage surveys in the region, which can be variable and the density of such other project reports.

### **5.6 Public Participation**

As required by the NEMA, a 30 day public participation took place between 8 January and 8 February 2024 during which comment was sought on the EIA Scoping Report. Due to the lapse of the previous application, the proposed development was subject to reapplication under a new reference number and an additional 30 day scoping public participation period was undertaken between 29 February and 2 April 2024.

The EIA Scoping Report, which included the Heritage Scoping Report (Gribble, 2024) was circulated to Interested and Affected Parties (I&APs), including HWC, the Langeberg Local Municipality, the Cape Winelands District Municipality and the Hex River Valley Heritage and Conservation Society, for comment.

According to the Comments and Responses Report for the public participation exercise, heritage-related comments were received from HWC and the Hex River Valley Heritage and Conservation Society.

The HWC comment was their NID response, which is described in Section 3 above and appended to this report (Appendix C), which confirmed the requirement that a HIA is produced and that it include archaeological and palaeontological assessments, and reference the visual impact assessment. This report meets those requirements.

The comment from the Hex River Valley Heritage and Conservation Society related to both the Khoe and Hugo WEFs. It indicated that they were “satisfied that the necessary and essential heritage and cultural investigations ... have been undertaken, completed and professionally dealt with, and that the preliminary findings and reports (to date) reveal that the project complies with the statutory and regulatory requirements in this regard”.

They stressed that it is “incumbent on the senior project managers of the [projects] to ensure that they heed the due processes in terms of the ongoing heritage and cultural compliance requirements throughout the erection of the facilities, the commissioning phase and the management of the facilities into the future”. In conclusion they stated that they “have no reservations but ... support this project and look forward to seeing it become a reality”.

## **6 RECEIVING ENVIRONMENT**

The Khoe WEF will be situated in semi-arid, rolling hilly terrain at the extreme western end of the Langeberg Range of the Cape Fold Mountains, and on the extreme western edge of the Karoo basin. The project site contains a mix of hills in the east and centre, and more mountainous terrain in the west above the Hex River Valley (Plate 1 - Plate 3).



Plate 1: View of landscape of Khoe WEF looking east from near WTG 49 (Photo: J Gribble).





Plate 2: View from the top of the Rooiberg Pass looking north-east across the Khoe WEF (Photo: J Gribble).



Plate 3: View of the area around proposed WTG 17 showing the thick montane fynbos and underlying Table Mountain Sandstone bedrock (Photo: J Gribble).

Geologically, the project site lies in the central part of the Cape Supergroup rocks where the Early and Middle Devonian rocks of the Ceres Subgroup (Bokkeveld Group, Cape Supergroup) are well represented (Bamford, 2024). The site is underlain by Table Mountain sandstone, which crops out as rocky ridges and scarps, with Bokkeveld Group mudrock-dominated units in between on the lower-lying terrain. A good deal of these dominant bedrock groups is covered by Late Caenozoic superficial deposits and particularly the Bokkeveld Group units are poorly exposed at surface (Almond, 2022) (Figure 4).

At lower elevations the vegetation is Succulent Karoo and is dominated by dwarf, succulent shrubs, of which the Vygies (Mesembryanthemaceae) and Stonecrops (Crassulaceae) are particularly prominent. On the higher mountain slopes are dominated by a montane fynbos which includes numerous members of the Proteaceae family.

The properties on which the Khoe WEF is proposed are rural farms and are zoned agricultural. Historically the land has been and continues to be used for a mix of stock and arable farming and other uses such as flower harvesting.

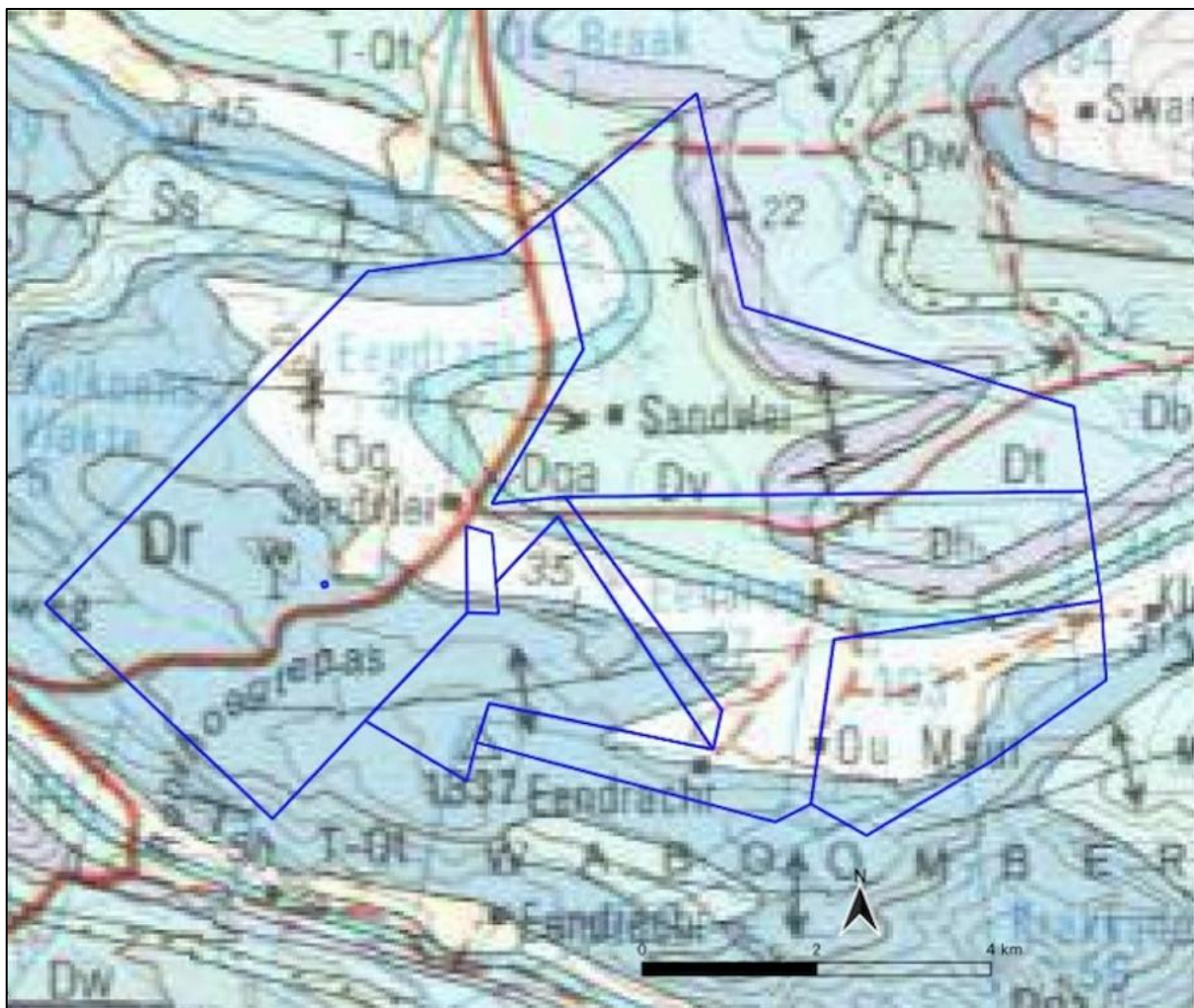


Figure 4: Proposed Khoe WEF location (blue polygons) superimposed on the geological chart of the area between Worcester and Montagu. Abbreviations of the rock types are explained in Table 4. (Source: 1:250 000 geological chart 3319 Worcester, Council for Geoscience).

## 7 SITE SPECIFIC BASELINE

### 7.1 Project Geology

The Khoe WEF lies in the central part of the Cape Supergroup rocks where the Early and Middle Devonian rocks of the Ceres Subgroup (Bokkeveld Group, Cape Supergroup) are well represented (Figure 4 and Table 4) (Bamford, 2024).

Table 4: Explanation of symbols for the geological map and approximate ages (Penn-Clarke et al., 2018a; Thamm and Johnson, 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project

Symbol	Group/Formation	Lithology	Approximate Age
T-Qc	Tertiary-Quaternary	Calcrete	Quaternary Ca 1.0 Ma to Present
Dw	Waaboomborg Fm, Bidouw Subgroup, Bokkeveld Group, Cape SG	Mudrock, siltstone, sandstone	Middle Devonian Ca 382 Ma
Db	Boplaas Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Sandstone	Middle Devonian
Dt	Tra-Tra Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Mudrock, siltstone	Middle Devonian
Dh	Hex River Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Sandstone	Middle Devonian
Dv	Voorsteenhoek Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Mudrock, siltstone	Middle Devonian Ca 393-382 Ma
Dga	Gamka Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Sandstone	Early Devonian
Dg	Gydo Fm, Ceres Subgroup, Bokkeveld Subgroup, Cape SG	Mudrock, siltstone	Early Devonian
Dr	Rietvlei Fm, Nardouw Subgroup, Table Mountain Group, Cape SG	Sandstone	Early Devonian Ca 419-393 Ma

The Cape Supergroup comprises a series of siliciclastic sediments that were deposited in a passive margin basin and is underlain by Cambrian rocks of the Saldanian Orogeny and Pan African depositional cycles. It is overlain by the Karoo Basin sequence (Thamm and Johnson, 2006).

Representing some 170 million years of earth history, and up to 10 km of strata, the Cape Supergroup has since been deformed by the Cape Orogeny. It extends along the southern Cape coast for about 1000 km (Thamm and Johnson, 2006).

There are three major subdivisions, the basal Table Mountain Group, the Bokkeveld Group and the Witteberg Groups, which range in age from the Early Ordovician (ca 500 million years (Ma)) to the Early Carboniferous (ca 330 Ma). The subgroups and formations differ slightly east and west of the 21° line of longitude.

The Table Mountain Group is sandstone dominated and was deposited in shallow marine, glacial and fluvial environments. No subgroup name is given to the basal formations but the upper formations, Silurian to Devonian, are grouped into the Nardouw Subgroup. The Nardouw Subgroup comprises three formations, with the basal Goudini and Skurweberg Formations. The upper formation west of 21°E is known as the Rietvlei Formation.

Five formations are recognised in the Ordovician component of the Table Mountain Group and west of ca 21°E are from the base upwards, the Pieknierskloof, Graafwater, Peninsula, Pakhuis and Cedarberg Formations.

The Bokkeveld Group has fossiliferous shale and sandstone units with a series of upward coarsening cycles that were attributed to repeated basin-ward progradation of wave-dominated deltas (Thamm and Johnson, 2006). Penn-Clarke et al. (2018) have reinterpreted the setting to rather have been a succession that accumulated in a storm-and-wave dominated deltaic palaeoenvironment.

The middle Devonian Bokkeveld Group has been divided into the basal Ceres Subgroup with five formations that stretch across the whole of the southern Cape. From the base upwards these formations are the Gydo, Gamka, Voorstehoek, Hex River, Tra-Tra and Boplaas Formations (Thamm and Johnson, 2006; Penn-Clarke et al., 2018a, b). To the west of 21°E the upper Bokkeveld Bidouw Subgroup five formations are recognised, the Waboomberg, Wupperthal, Klipbokkop, Osberg and Karoopoort Formations.

The Table Mountain Group, sandstone-dominated units (Rietvlei, Gamka and Hexrivier Formations) tend to build rocky ridges and scarps, while the intervening mudrock-dominated Bokkeveld Group subunits (Gydo, Voorstehoek and Tra Tra Formations) underlie, low-lying terrain and are generally poorly exposed at surface (Almond 2022).

In some of the low-lying areas where the conditions have alternated between wet and dry cycles during the Tertiary and Quaternary, calcrete has formed (Bamford, 2024).

## **7.2 Palaeontology**

Both Bamford (2024) and Almond (2022), the latter in a study conducted for the proposed Ezelsjacht WEF to the north of the Khoe WEF, indicate that the proposed Khoe WEF is underlain by several coastal to shallow marine formations of the Table Mountain and Bokkeveld Groups of the Cape Supergroup, of Early to Middle Devonian age (c. 410 – 390 Ma). It was during this period that the first terrestrial plants, bony fish and insects evolved and spread on the land, from precursors in the seas.

Although southern Africa, then located in the middle of Gondwanaland, was positioned over or close to the South Pole and was covered by a series of ice sheets (Visser, 1989; Isbell et al., 2012), some of the fine-grained shallow water and marginal mudstones and siltstones have fossils preserved within them (Plumstead, 1969; Theron, 1972; MacRae, 1999; Thamm and Johnson, 2006; Penn-Clarke et al., 2018). With the repeated cycles of sea level rise and fall and resulting shifts from marine to shoreline to fluvial and delta settings and back again, there is a complex series of environments with the resident faunas.

The Ordovician lower Table Mountain Group preserves trace fossils, and invertebrates such as brachiopods, trilobites, eurypterids, conodonts and chitinozoans. There are records of invertebrate fossils, known as the Malvinokaffric Faunal Assemblage, in the Silurian – early Devonian upper Nardouw Subgroup and the whole of the Bokkeveld Group, while the Witteberg Group has records of fish and plants as well as invertebrates such as brachiopods, bivalves, gastropods and trilobites. More recent research has shown that the Malvinokaffric fauna of Gondwanaland (Bokkeveld Group) is somewhat different from the northern hemisphere fauna (Penn-Clarke et al., 2018b).

Witteberg Group plants comprise fragments of the lycopods *Palaeostigma sewardii* and *Haplostigma irregularis* (both taxa need revising). Collections were made by Johannes Theron and farms are listed in Anderson and Anderson (1985:21).

From the Waaipoort Formation plant remains, such as lycopod stems and ferns, and invertebrate remains such as giant eurypterids and palaeoniscoid and acanthodian fish, have been described (in Thamm and Johnson, 2006).

The Ceres Subgroup has abundant marine benthic (bottom-dwelling) invertebrate fossils such as brachiopods, bivalves, trilobites, cephalopods, crinoids, ophiuroids, hyoliths, cricoconarids, corals and gastropods (Hiller and Theron, 1988; Theron and Johnson, 1991; Thamm and Johnson et al., 2006; Penn-Clarke et al., 2018a). These marine fossils occur mostly in the mudrock units while plant fossils occur in the sandstone units. Some units also show extensive bioturbation based on the presence of trace fossils of burrows, such as *Planolites*, *Skolithos* and *Arenicolites*.

According to SAHRA's palaeo-sensitivity map (see <https://sahris.sahra.org.za/map/palaeo>), the Khoe WEF footprint is in an area of generally very high or high palaeontological sensitivity (Figure 5). However, Almond's (2022) assessment for the Ezelsjacht WEF found that because of the high levels of tectonic deformation of the fossiliferous bedrock, and the marked near-surface weathering of both mudrock and sandstone within that project area, the actual palaeontological sensitivity of that project area is much lower than indicated on the SAHRA map. According to Almond (2022), none of the fossil sites he recorded in the Ezelsjacht WEF area were very well preserved and all represent common, widely distributed forms, of limited scientific or conservation value.

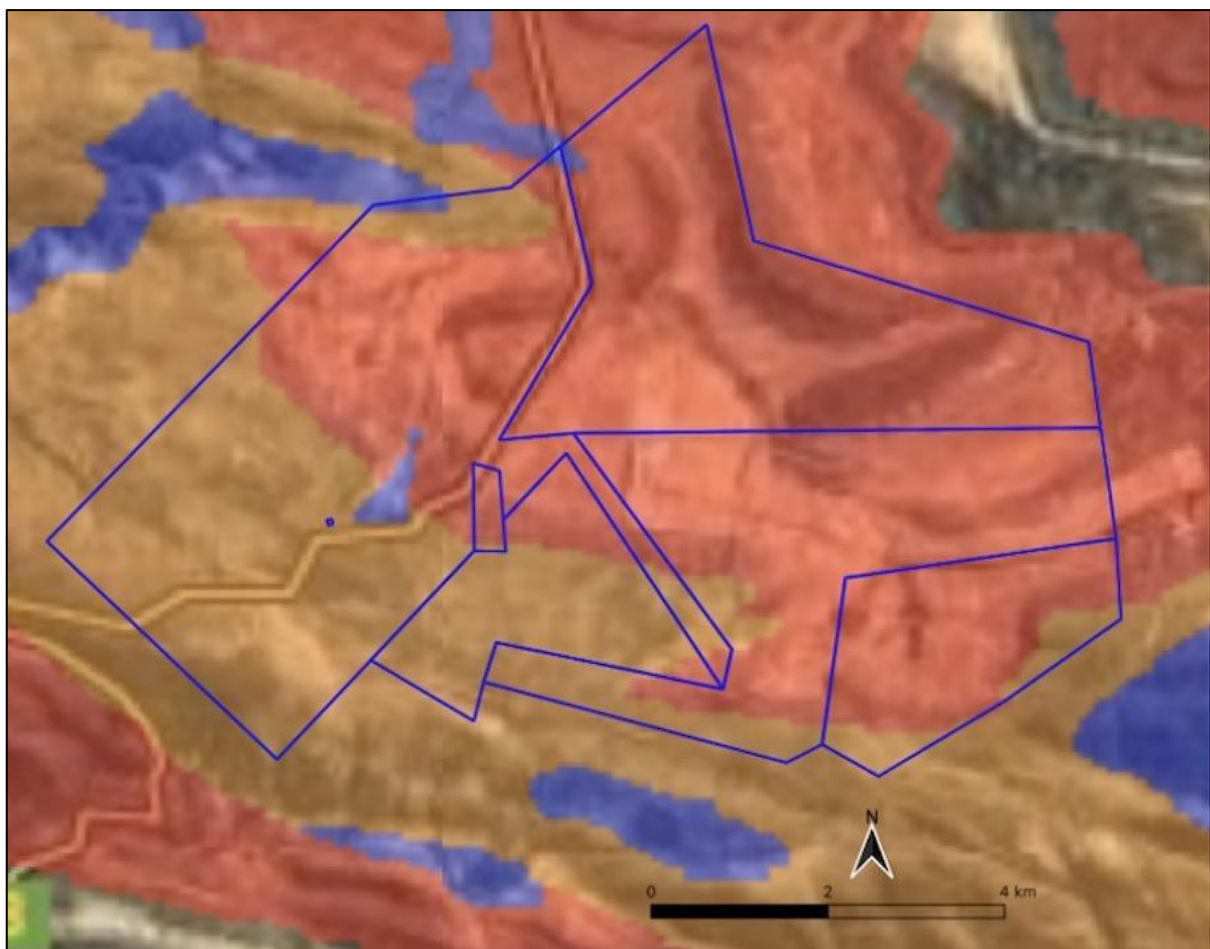


Figure 5: Extract from the SAHRA palaeo-sensitivity map showing the generally high (yellow) and very high (red) palaeontological sensitivity of the Khoe WEF project area (Source: <https://sahris.org.za/map/palaeo>).

### **7.3 Archaeology**

The South African interior has been occupied by people for hundreds of thousands of years as testified by the vast “litter” of stone artefacts that blanket the landscape and which range from heavily weathered Early (ESA) and Middle Stone Ages (MSA) lithics, the former dating back as much as half a million years ago, to the more recent Later Stone Age (LSA) artefacts deposited within the last 30,000 years.

There has been little previous archaeological research around the proposed Khoe WEF and desktop information available for this report was limited to a small number of previous archaeological assessments in the region (see Figure 6).

In 2012 ACO Associates conducted an archaeological assessment prior to the raising of the Keerom Dam wall, west of the WEF site (Halkett, 2012) (Figure 6). Although the assessment recorded a number of stone age artefacts around the periphery of the dam, “the majority of these are isolated finds (probably ESA or MSA) amongst which no diagnostic formal elements were noted” (Halkett 2012:8).

Kaplan has undertaken two archaeological assessments to the north-east of the Khoe WEF towards Touwsrivier. In 2010 he surveyed an area at Nougga proposed for agricultural expansion and recorded large numbers of scattered stone artefacts dating from the Middle (MSA) and Later Stone Ages (LSA). He also located what he referred to as a LSA factory site with many stone artefacts, including a number of formal tools (Kaplan 2010). His second assessment was for the proposed Vredefort solar energy facility south of Touwsriver (Figure 6), where he again found a widespread background scatter of mainly MSA lithics of the sort that is common in the Karoo.

It is important to note that both of Kaplan’s study areas were inland of and located about 350 m lower than the mountainous and hilly Khoe WEF study area (Kaplan, 2015).

Most recently, Orton (2023) conducted an archaeological assessment for the proposed Ezelsjacht WEF which is located a little more than 1 km north of the Khoe WEF (Figure 6). The results of Orton’s survey for the Ezelsjacht WEF reflected the well-established finding that archaeological materials and sites are not common in high-lying terrain, with only a few archaeological sites found. The most important was a LSA site with several retouched stone artefacts, and a scatter of LSA materials in a small dune field. Also reported were some historical archaeological resources comprising mainly stone-walled kraals (Orton, 2023).

A larger number of archaeological assessments have been conducted in the Hex Valley and below the Langeberg around Robertson, but the environment in these areas is so different to the Khoe WEF study area that the heritage resources present there are not relevant to the current study.

Based on Orton’s (2023) findings at the adjacent Ezelsjacht WEF and in common with many other projects on high-lying terrain, it was assumed prior to the TerraMare Archaeology site visit that Stone Age resources in and around the Khoe WEF would be rare. This was confirmed by the archaeological site visit in April 2024 which found virtually no evidence, apart from occasional, isolated stone artefacts, of archaeological sites within the area that will form part of the Khoe WEF development footprint.

Potentially archaeologically sensitive areas in the landscapes like that of the Khoe WEF

include springs, pans and watercourses because of the natural resources they offered and attracted, outcrops of rock suitable for stone tool making, and rock shelters or overhang on the skirts or slopes of hills and mountains for the shelter they could provide.

The very low archaeological signature of the Khoe WEF area is in part due to the geology of the area where caves and rock shelters are rare. It is also the result of the exposed high ground that makes up much of the Khoe WEF which is unlikely to have attracted more than passing prehistoric human use and occupation and where the presence of archaeological sites and material is the exception rather than the rule.

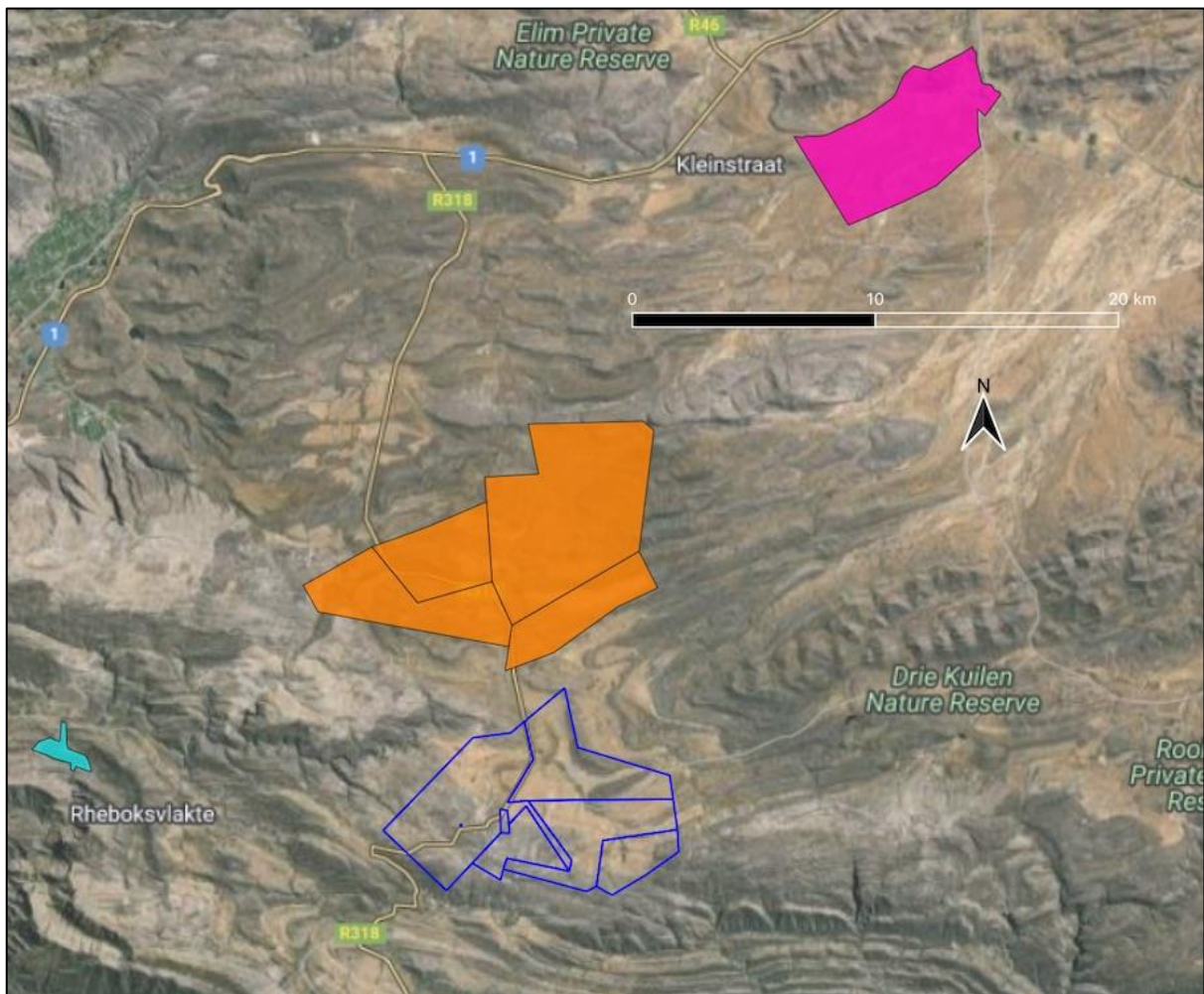


Figure 6: Previous archaeological assessments in the vicinity of the Khoe WEF (dark blue polygons). Vrededorst SEF = pink; Keerom Dam = pale blue; Ezelsjacht WEF = orange (Source: Google Earth).

#### **7.4 Historical Built Environment**

In terms of the National Heritage Resources Act, any built structure older than 60 years is considered to be historical and enjoys protection under the Act.

Available historical survey diagrams for the farms within the Khoe WEF footprint indicate that their parent farms were well-established by the second half of the 19<sup>th</sup> century and it is highly likely that the area had in fact been used and settled by farmers of European descent at least a century before.

The earliest colonial use of this area would have been for seasonal transhumant grazing. This



was followed by a formal but still haphazard system of loan farms, where a farmer could rent an area of land, usually centred on a spring or water source, from the authorities at the Cape for a nominal annual fee.

After the permanent British occupation of the Cape in the early 19<sup>th</sup> century, land tenure was formalised into a system of quitrents that resulted in the land divisions in the area that are in place today.

This long temporal span of agricultural use of the land suggests that there will be historical buildings and structures on particularly the older farms portions in the area. A comparison of the earliest 1:50,000 topographic map sheet for the area (1969), aerial photography dating from the 1940s and 1960s and modern satellite imagery in a GIS indicates that the farming settlement nodes at Sandvlei (1/38), Sandvlei (11/38), Ou Muur (Farm Re 193) and Eendracht (Re 37) were already established in the 1940s.

The TerraMare Archaeology site visit confirmed the presence of an old farm complex on Sandvlei (1/38) consisting of a stone-built farmhouse and barn and several packed stone kraals and stock pens. The house is not occupied and appears to have been altered at some time in the past to serve as an agricultural building. The complex is generally well-maintained.

Although the heavy rain during the site visit meant that Ou Muur (Re 193) and Eendracht (Re 37) were cut off from the road, the field team was able to confirm the presence on the latter of a historical farmhouse and outbuilding. At Ou Muur the earliest aerial photograph dated 1949 of the area shows a farm complex in existence on the site by that date ([http://cdngiportal.co.za/photocentres/30K\\_PAN/225\\_Worcester/225\\_009\\_02880.jpg](http://cdngiportal.co.za/photocentres/30K_PAN/225_Worcester/225_009_02880.jpg)).

A comparison of layout of the Khoe WEF with these historical built environment nodes shows that in no instance will WEF infrastructure be located less than 800 m from a historical building.

### **7.5 Engravings and Rock Art**

No rock or engravings were recorded within the Khoe WEF during the site visit.

### **7.6 Graves and Burials**

No identifiable graves were recorded within the WEF development footprint during the site visit.

The historical farm complexes in the WEF area, and potentially also any older, abandoned settlement nodes, can be expected to have cemeteries or burials associated with them, but a review of satellite imagery for this report did not find any clear evidence for such.

Pre-colonial graves could occur almost anywhere in the WEF area, but the remote and mountainous nature of much of the area suggests that they are unlikely in those areas. Such burials are seldom marked, except possibly by a cairn of stones, and often occurred in places like riverbanks, where soft sand made burial easy.

### **7.7 Cultural Landscape**

The concept of “cultural landscapes” finds expression in Article 1 of the World Heritage Convention 1972 where it is defined as a category of cultural heritage site which is representative of the “combined works of nature and of man”. Although not referenced in the NHRA, a consideration of any proposed development within the context of the cultural landscape within which it is proposed has become a standard requirement of HIA’s in South

Africa.

The term "cultural landscape" as embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes are thus 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 (<https://whc.unesco.org/en/culturallandscape/#1>).

The Operational Guidelines (2008) of the World Heritage Convention define three main categories of cultural landscape, namely:

- **Clearly defined landscapes designed and created intentionally by people.** This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
- **Organically evolved landscapes.** These result from an initial social, economic, administrative, and/or religious imperative and have developed their present form by association with and in response to their natural environment. Such landscapes reflect that process of evolution in their form and component features and fall into two sub-categories:
  - **a relict (or fossil) landscape** in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
  - **a continuing landscape**, which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time, it exhibits significant material evidence of its evolution over time.
- **Associative cultural landscapes.** The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

Sauer's (1925) definition of the cultural landscape referenced by Orton (2023) is useful: "The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result". The natural landscape acted on by human agents comprises components such as rocks, soils, mountains, plains, tall and short vegetation, rivers, springs and pans. Each of these features will have influenced how people interacted with the landscape.

In respect of the landscape within which the Khoe WEF is proposed, the geology and climate of the area have produced rugged landforms characterised by steep hills and mountainsides in the west and south which are largely natural and undeveloped. On the lower slopes and valley bottoms in the east, the landscape contains a patchwork of dryland oat and wheat fields.

The paucity of natural landscape features that could have served as foci for pre-colonial human activities and the apparent lack of archaeological and other heritage sites on the project site suggest that the landscape of the Khoe WEF project site was of limited significance to,

and thus lightly used and occupied by a succession of pre-colonial people.

The modern land-use on the WEF site and surrounding area does not significantly alter its natural character. The area is remote and sparsely populated, and the landscape is largely natural and with only a light agricultural overlay comprised of dryland field, gravel roads, occasional farm tracks, fence lines, and the handful of historical built environment nodes described earlier.

In their *Inventory and Policy Framework for Heritage and Scenic Resources*, Winter and Oberholzer (2013) identified the Rooihoogte / Burger's Pass, built by Thomas Bain and dating to 1877, as having "high historical, technological and scenic value". A portion of the pass falls within the southern half of the Khoe WEF (Figure 7). They also define the R318, which is straddled by the Khoe WEF as a "scenic / linking route of secondary importance".

The proposed Khoe WEF is, therefore, situated in what may be described as an organically evolved, continuing landscape which is overwhelmingly natural, with only a relatively light human imprint.

The construction and operation of the WEF will introduce an industrial element into the landscape which will alter the character or sense of place of the landscape in which it will operate.

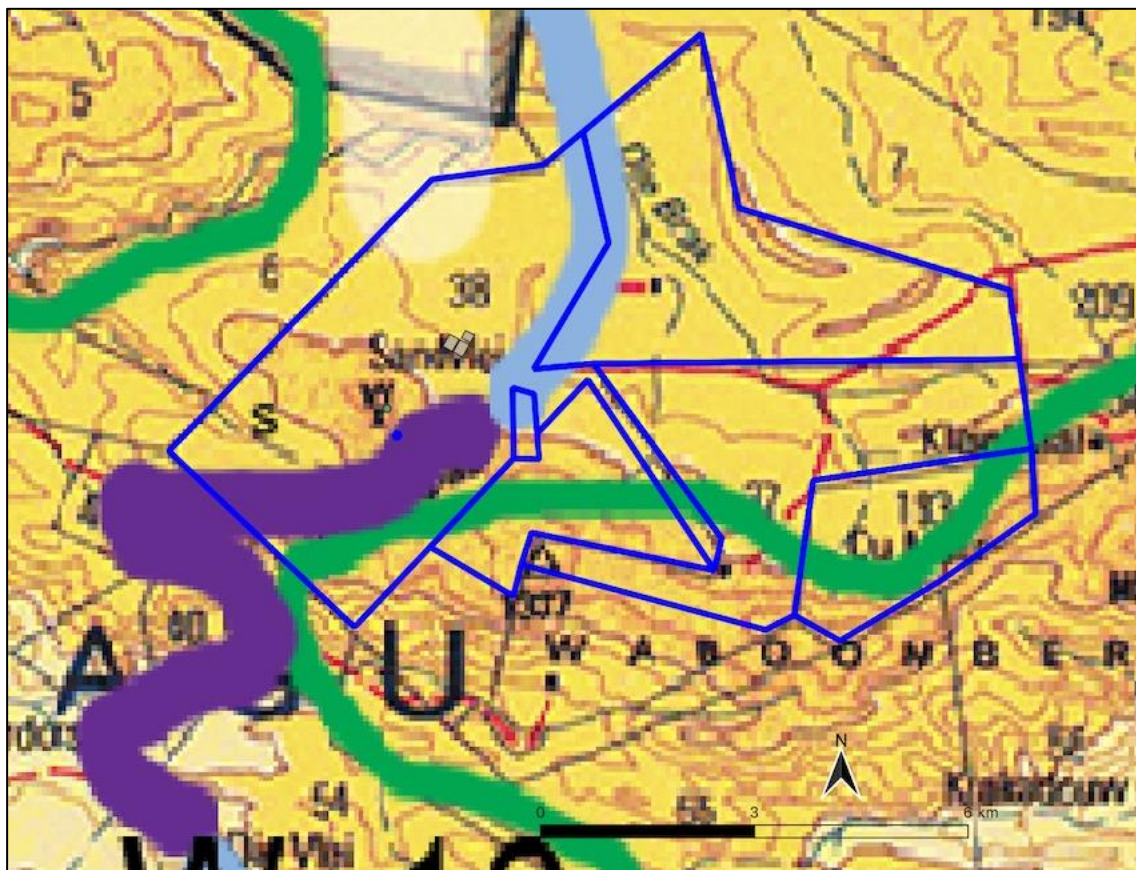


Figure 7: Overlay of Winter and Oberholzer (2013) Heritage and Scenic Resources map of the area with the footprint of the Khoe WEF. The purple line indicates the Rooihoogte Pass, and the pale blue line is the R318 (Source: Winter and Oberholzer (2013)).

## 7.8 Visual Assessment

The scoping phase visual impact assessment for the Khoe WEF was conducted by Lourens du Plessis of LOGIS (Du Plessis, 2024).

The visual study was undertaken using Geographical Information System (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed facility. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by the Japan Aerospace Exploration Agency Earth Observation Research Centre, in the form of the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model (Du Plessis, 2024).

The study was supported by a site visit on 6 September 2023 to verify the results of the spatial analyses and to identify any additional site-specific issues that required addressing in the VIA.

The study area for the VIA includes a minimum 20 km buffer zone or area of potential visual influence, around the WEF footprint. The study area contains mountain ranges, protected areas and existing high voltage powerlines and substations.

From a visual perspective, Du Plessis (2024) notes that there is no seasonal influence on the results of the impact assessment, and as such regardless of the timing of the site visit, the level of confidence for the assessment and findings is high.

Visually the construction and operation of the proposed Khoe WEF will impact potentially sensitive visual receptors within but not restricted to a 20km radius of the proposed project development site.

The greater environment with its wide open, undeveloped landscapes and a number of protected areas is considered to have a high visual quality. The Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low owing to the low growing vegetation and the high contrast of the proposed wind turbines within the surrounding environment (Du Plessis, 2024).

## 8 IMPACT ASSESSMENT

During the construction of the WEF, the following activities may result in direct, physical impacts to the landscape and to heritage resources that lie in or on it:

- Excavations to construct the foundations for WTGs and other WEF infrastructure,
- Leveling of ground for WTG and other laydown areas,
- Construction of roads or tracks to service the installation of the WTGs and their longer-term maintenance during operation, and
- Introduction of vehicles, machinery and people into environment.

The introduction of semi-industrial features to the area can have an impact on the cultural landscape.

The best method for managing impacts to heritage resources is avoidance or the exclusion of the resource from project activities that may cause impacts. If this is not possible, then some form of mitigation is required to manage the impacts. This is generally considered a second best approach, as *in situ* preservation, wherever possible is always the preferred option.

Heritage resources are highly context sensitive and the main cause of impacts to such sites is physical disturbance of the material itself and its context. The construction of the Khoe WEF can be expected to have direct and indirect impacts:

- Construction Phase:
  - Impacts to palaeontology
  - Impacts to archaeology
  - Impacts to the cultural landscape
- Operational Phase:
  - Impacts to the cultural landscape
- Decommissioning:
  - Impacts to the cultural landscape.

Impacts to palaeontological resources, archaeological sites and materials and the cultural landscape are assessed below. The baseline assessment above indicates that direct impacts to known elements of the historical built environment and known graves and burials will not occur and these two heritage receptors are thus scoped out of this assessment. Measures to deal with any chance finds of burials are included in the recommendations made in Section 11 below

### **8.1 Methodology**

The approach applied to this HIA for determining the significance of potential impacts aligns with the requirements of Appendix 3 of the EIA Regulations, 2014 (as amended). The methodology is set out in Appendix F.

### **8.2 Assessment of Impacts to Palaeontology**

**Nature of impacts:** The likely impact of the proposed development on fossil heritage within the Khoe WEF is determined based on the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged.

The construction phase of the proposed WEF will entail extensive surface clearance (e.g. for internal roads, WTG and construction laydown areas) as well as excavations into the superficial sediment cover and underlying bedrock (e.g. for wind turbine foundations). These activities have the potential to directly impact fossiliferous rocks and any fossil material they contain.

**Extent of impacts:** Direct impacts will be limited to the footprint of the activity being undertaken.

**Significance of impacts:** The SAHRIS palaeo-sensitivity map and PIA (Bamford, 2024) indicate that the Khoe WEF is an area of generally high to very high palaeontological sensitivity. Excavations for WTG foundations and other WEF-related activities which disturb fossiliferous bedrock may result in impacts to palaeontology which are destructive and permanent.

However, based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying soils of the Quaternary (Bamford, 2024). There is a moderate to small chance that fossils may occur in

the mudstones of the Ceres Subgroup or in the Table Mountain and Bokkeveld Groups bedrock. This potential is very variable and is negatively affected by the folding and tectonic deformation of these formations within the Cape Fold Belt mountains (Almond, 2022; Bamford, 2024).

**Status of impacts:** Because palaeontological material is non-renewable, any impacts on it are considered both permanent and irreversible and the destruction of palaeontological material is thus usually considered to be negative.

However, opportunities for the advancement of science and knowledge can result from the exposure of fossiliferous strata, provided that the mitigation measures recommended below are implemented.

Significant impacts on palaeontological resources during the construction of the Khoe WEF are thus not anticipated but should they occur, they are assessed as follows:

Table 5: Assessment of Impacts to Palaeontological Resources

<b>Impact Phase:</b> Construction					
<b>Nature of the impact:</b> Disturbance or destruction of fossil material					
<b>Description of Impact:</b> Disturbance or destruction of palaeontological material resulting from earthworks and excavations associated with the construction of the WEF, particularly (but not exclusively) excavations for foundations for WTGs.					
<b>Impact Status:</b> Negative					
	<b>E</b>	<b>D</b>	<b>R</b>	<b>M</b>	<b>P</b>
<b>Without Mitigation</b>	Local	Permanent	Irreversible	Low	Low Probability
<b>Score</b>	2	3	5	2	2
<b>With Mitigation</b>	Local	Permanent	Irreversible	Very Low	Low Probability
<b>Score</b>	2	3	5	1	2
<b>Significance Calculation</b>	<b>Without Mitigation</b>		<b>With Mitigation</b>		
<b>S=(E+D+R+M)*P</b>	Low Negative Impact (22)		Low Negative Impact (22)		
Mitigation measures to reduce risk or enhance opportunities: <ul style="list-style-type: none"> <li>The ECO must be informed of the very high palaeontological significance of the WEF area.</li> <li>The Fossil Chance Find Protocol contained in the PIA which is designed to record all unexpected fossils associated with the geological formations on site must: <ul style="list-style-type: none"> <li>be implemented during the construction WEF, and</li> <li>be included as part of the EMPr for this project.</li> </ul> </li> <li>If fossils are exposed during construction they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends an alternative approach</li> <li>Recommendations contained in the PIA must be approved by HWC for inclusion in the EMPr for the project.</li> </ul>					
<b>Residual impact</b>	<i>Provided the mitigation measures have been implemented there will be no residual impacts.</i>				

### 8.3 Assessment of Impacts to Archaeology

**Nature of impacts:** The heritage and scientific potential of an archaeological site is highly

dependent on its geological and spatial context and the main cause of impacts to archaeological sites arising from developments such as the Khoe WEF is physical disturbance and destruction of this context.

The main impacts to archaeological sites and materials, should they occur during the construction of the Khoe WEF, will be direct impacts arising from the construction of access roads, lay-down areas, for example, and the excavation of the foundations for the WTGs.

**Extent of impacts:** It is expected that impacts will be limited to the footprint of the activity being undertaken. There is a chance that the deep excavations for WTG bases could impact buried archaeological material, as could the excavation of cable trenches and the construction of access roads. All such potential impacts are likely to be limited to the area of disturbance.

The survey of the study area has shown that appears to be very little archaeological material within the WEF. This, in turn, means that the potential for impacts to archaeology is low and should they occur, they will be highly localised and limited to the area of disturbance.

**Significance of impacts:** From the information collected for the HIA, indications are that impacts to pre-colonial archaeological sites and material are unlikely or will be very limited.

In terms of buried archaeological material, it is never possible to be sure of what lies below the ground. However, indications from the survey are that archaeological sites are very sparse in the development area. The impacts caused by the construction of footings and other ground disturbance for the WEF are thus likely to be negligible.

**Status of impacts:** Because archaeological material is non-renewable, any impacts on it are considered both permanent and irreversible and the destruction of archaeological material is thus usually considered to be negative.

However, opportunities for the advancement of science and knowledge about a place can result, provided that the recommended mitigation measures are implemented in the event of an unexpected find.

Significant impacts on archaeological resources during the construction, operational and de-commissioning phases of the Khoe WEF are thus not anticipated but should they occur, they are assessed as follows:

Table 6: Archaeological Impact Assessment

<b>Impact Phase:</b> Construction					
<b>Nature of the impact:</b> Disturbance or destruction of archaeological sites and/or materials					
<b>Description of Impact:</b> Disturbance or destruction of archaeological sites and/or materials resulting from earthworks and excavations associated with the WEF. This includes:					
<ul style="list-style-type: none"> <li>• Excavations to construct the foundations for WTGs and other WEF infrastructure,</li> <li>• Leveling of ground for WTG, laydown areas and the substation, and</li> <li>• Construction of roads or tracks to service the installation of the WTGs and their longer-term maintenance during operation.</li> </ul>					
<b>Impact Status:</b> Negative					
	<b>E</b>	<b>D</b>	<b>R</b>	<b>M</b>	<b>P</b>

<b>Without Mitigation</b>	Local	Permanent	Irreversible	Low	Low Probability
<b>Score</b>	2	3	5	2	2
<b>With Mitigation</b>	Local	Permanent	Irreversible	Very Low	Low Probability
<b>Score</b>	2	3	5	1	2
<b>Significance Calculation</b>	<b>Without Mitigation</b>		<b>With Mitigation</b>		
<b>S=(E+D+R+M)*P</b>	Low Negative Impact (24)		Low Negative Impact (22)		
Mitigation measures to reduce residual risk or enhance opportunities:					
<ul style="list-style-type: none"> <li>• A pre-construction archaeological walkdown survey of the final WEF layout is recommended.</li> <li>• In the event of archaeological resources being encountered during the course of development, work within 50 m of the find must be halted and the find reported to the ECO. The ECO must inform HWC so that mitigatory action can be determined and be implemented if necessary. The find may require inspection or collection/excavation by an archaeologist.</li> <li>• Should human remains be encountered, activities work in the vicinity of the find must cease, the remains must be left <i>in situ</i> but made secure and HWC must be notified immediately so that mitigatory action can be determined and be implemented.</li> </ul>					
Residual impact	<i>Provided the necessary mitigation measures have been implemented there will be no residual impacts.</i>				

#### 8.4 Assessment of Impacts to the Cultural Landscape

**Nature of impacts:** The cultural landscape is likely to be the heritage resource most affected by the construction of the Khoe WEF.

The creation of laydown areas and batching plants, the introduction of construction equipment and the activities associated with construction will disrupt the rural sense of place and affect views of the landscape. Similar impacts can be expected during the decommissioning of the WEF at the end of its life.

**Extent of impacts:** Impacts to the cultural landscape will be local in extent.

**Significance of impacts:** The impacts of the Khoe WEF on a generally rural landscape during construction, operation, and decommissioning will occur because of the presence of the facility in the landscape.

The construction and decommissioning phases are both temporary, however, and much of the construction activity is likely to be screened from the R318 by topography and distance. Although both the preferred and alternative construction infrastructure areas are close to and visible from the R318, the use of these areas and the visual intrusion this will create will cease once the construction of the WEF is complete.

During the operational phase of the WEF there will continue to be an impact on the cultural landscape arising from the presence of the WTGs, the substation, power lines, etc. in this otherwise rural landscape. The topography of the site and wider area is generally such that it will not screen the turbines, and they will be highly visible in the landscape. At the same time, however, the lack of significant topographic features means there will be less visual competition between landscape and turbines. At night the red navigation lights on the turbines will be visible over a wide area and will alter the sense of place.



**Status of impacts:** Impacts to the cultural landscape arising from construction of the Khoe WEF in a rural area with identified scenic value are potentially high negative. This may be reduced to moderate negative if suitable measures to mitigate the intrusion of WEF infrastructure and activities associated with the project in the landscape can be implemented.

Mitigation measures could include, the screening of infrastructure area(s), keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view, and ensuring that night-time light pollution is minimized. Maintenance activities should remain in designated and approved areas. While daytime impacts will not be much reduced by mitigation, having the red navigation lights off at night will greatly reduce impacts then.

The significance of impacts on the cultural landscape during the construction, operational and de-commissioning phases of the Khoe WEF are assessed as follows:

Table 7: Assessment of Impacts to the Cultural Landscape

<b>Impact Phase:</b> Construction, Operation and Decommissioning					
<b>Nature of the impact:</b> Disruption of the cultural landscape due to the presence of construction equipment and activity					
<b>Description of Impact:</b> Disruptions to views and sense of place resulting from the construction activities, and the introduction of WEF infrastructure into the landscape.					
<b>Impact Status:</b> Negative					
	<b>E</b>	<b>D</b>	<b>R</b>	<b>M</b>	<b>P</b>
<b>Without Mitigation</b>	Local	Long-term	Irreversible	High	Definite
<b>Score</b>	2	4	5	4	5
<b>With Mitigation</b>	Local	Long-term	Recoverable	Moderate	Definite
<b>Score</b>	2	4	3	3	5
<b>Significance Calculation</b>	<b>Without Mitigation</b>		<b>With Mitigation</b>		
<b>S=(E+D+R+M)*P</b>	High Negative Impact (75)		Moderate Negative Impact (60)		
Mitigation measures to reduce risk: <ul style="list-style-type: none"> <li>Keep the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view.</li> <li>In particular the infrastructure area(s) should be screened if possible, and noise and light pollution kept to a minimum.</li> <li>Decommissioning - Ensure effective rehabilitation of all areas following advice of the relevant specialist.</li> </ul>					
Residual impact	<i>The implementation of mitigation measures will reduce residual impacts.</i>				

### 8.5 Cumulative Impacts

Cumulative impacts, or effects, can be described as “changes to the environment that are caused by an action in combination with other past, present and future human actions”. They are the result of multiple activities whose individual direct impacts may be relatively minor but which, in combination with others result are significant environmental effects (DEAT 2004:5).

For the most part, cumulative effects or aspects thereof are too uncertain to be quantifiable,

due mainly to a lack of data availability and accuracy. This is particularly true of cumulative effects arising from potential or future projects, the design or details of which may not be finalised or available and the direct and indirect impacts of which have not yet been assessed.

For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities.

The consideration and assessment of cumulative impacts below is based on the list of approved Wind and Solar PV projects indicated in the Renewable Energy EIA Application Database (2023\_Q4), located within 30 km of the proposed Khoe WEF.

Two small approved solar energy projects are located below the Langeberg, south-west of the Khoe WEF and two others are proposed approximately 13 km to the north-east near Touwsrivier. Lastly, the proposed Ezelsjacht and Hugo WEFs lie directly north of the Khoe site along the R318 (Figure 8).

Cumulative impacts to palaeontological material are difficult to assess because of the very variable distribution of fossils within the underlying bedrock of the region. Much of the region around the Khoe WEF is indicated as high or very high sensitivity on the SAHRA palaeo-map, and where impacts do occur, they can thus be expected to be significant. However, the patchy nature of the palaeontological resource, and the negative effects of the folding and tectonic deformation of the bedrock formations described by Bamford (2024) and Almond (2022) means that the risk of impacts are reduced, and with mitigation, a low (negative) cumulative impact significance can be expected.

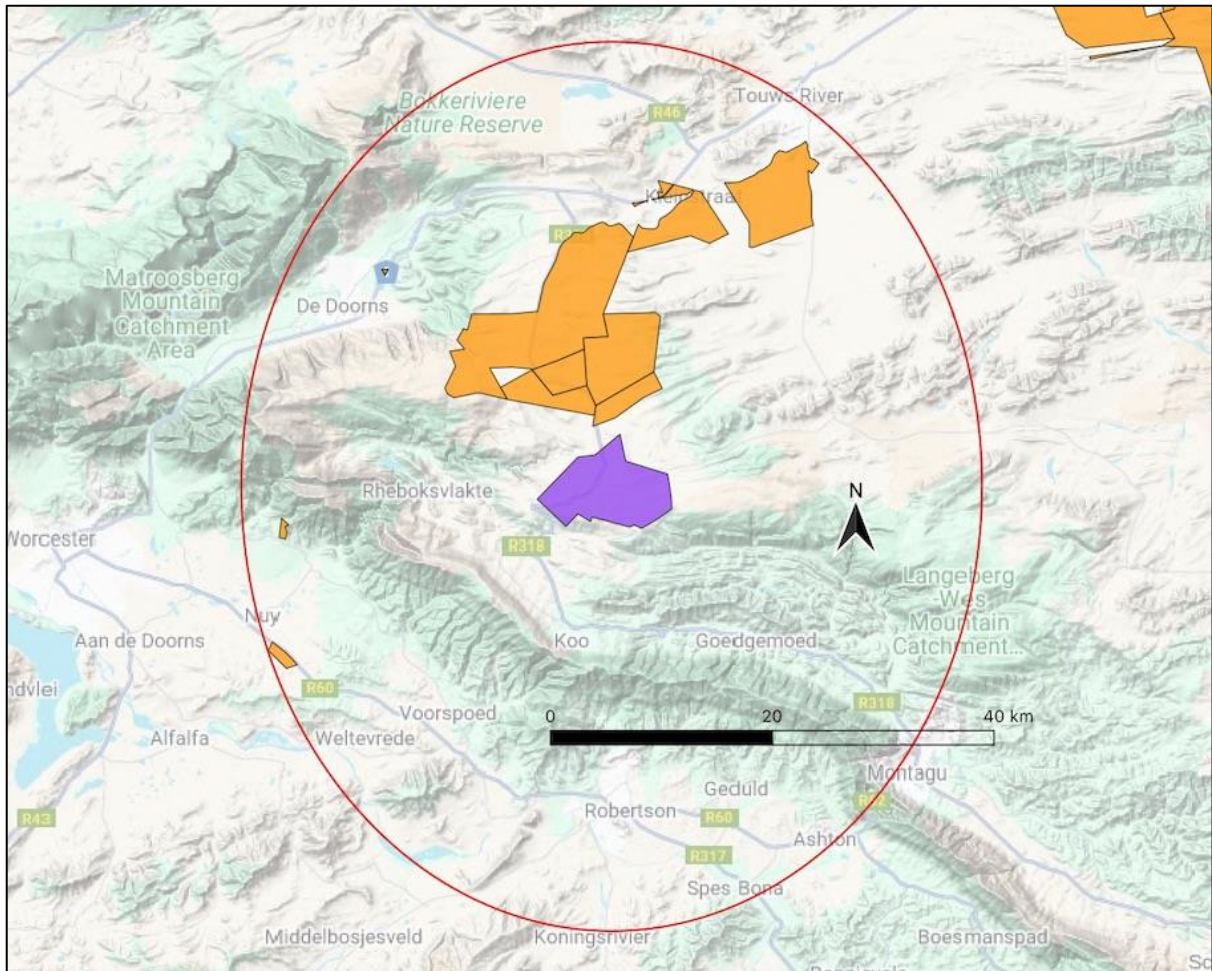


Figure 8: Projects considered in the cumulative impact assessment for the Khoe WEF. The Khoe WEF is indicated by the purple polygon. The other projects considered are indicated by the orange polygons.

As with palaeontology, cumulative impacts to archaeological sites and/or materials are difficult to assess, again because of the variable distribution of sites and materials across the landscape and because of the differences in the quality of surveys and reporting on different projects. Field observations made in previous assessments in the vicinity of the Khoe WEF indicate that archaeological sites and materials are not common in the area and that, provided appropriate mitigation measures are implemented, a low (negative) cumulative impact significance can be expected.

Impacts to the cultural landscape are considered to be the main driver of cumulative impacts on heritage resources and could be extensive if multiple projects are constructed in the vicinity, particularly if these projects are highly visible. These cumulative impacts cannot be fully mitigated but the implementation of the recommendations of visual consultants across all projects would likely reduce impacts from high to medium negative if highly sensitive areas are avoided.

The projects considered here have and will follow a similar iterative impact assessment process, and have and will be designed to reduce impacts to all heritage resources as far as practicably possible. The implementation of mitigation measures recommended for individual projects will ensure that cumulative impacts to heritage resources can be managed and mitigated.

## **9 SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS**

Section 38(3)(d) of the NHRA requires that a heritage impact assessment must “evaluate the impact of [a] development on heritage resources relative to the sustainable social and economic benefits to be derived from the development”.

The proposed construction of the Khoe WEF has the potential to impact heritage resources, although this can be mitigated through the implementation of the measures proposed below.

Thus, while there may be impacts on heritage resources arising from the construction of the Khoe WEF, it is likely that these will be outweighed by the sustainable social and economic benefits accruing from the contribution this facility will make to the development of a sustainable energy supply for South Africa and the Western Cape.

## **10 THE NO-GO ALTERNATIVE**

If the Khoe WEF project is not implemented, the site will stay as it currently is, with no new impacts to heritage resources.

Although the heritage impacts likely to arise from the Khoe WEF project would be greater than the existing, negligible, agriculture-related impacts, the loss of socio-economic benefits is more significant and suggests that the no-go option is less desirable in heritage terms.

## **11 RECOMMENDED MITIGATION MEASURES FOR INCLUSION IN ENVIRONMENTAL MANAGEMENT PROGRAMME**

### **11.1 Palaeontology**

With regard to palaeontological resources the PIA makes the following recommendations:

- A Fossil Chance Find Protocol should be added to the EMP. If fossils are found by the Environmental Control Officer (ECO) or other responsible person once excavations have commenced, they should be rescued and a palaeontologist called to assess and collect a representative sample, unless HWC recommends an alternative approach.

### **11.2 Archaeology**

The field survey identified very little surface archaeological material within the area that will form part of the Khoe WEF. It is TerraMare Archaeology’s experience that there may be archaeological material buried within the Quaternary sands which mantle portions of the site, potentially covering the whole range from the ESA to the LSA and possibly historical archaeology. Earthworks and excavations for the project may encounter and disturb such buried archaeological material if it is present and the following mitigation measure is recommended:

- A pre-construction archaeological walkdown survey of the final WEF layout must be conducted by a suitably qualified archaeologist.
- In the event of archaeological resources being encountered during the course of development, work within 50 m of the find must be halted and the find reported to the ECO. The ECO must inform HWC so that mitigatory action can be determined and be implemented if necessary. The find may require inspection or collection/excavation by

an archaeologist. Such heritage is the property of the state.

No identifiable graves have been recorded in the development areas but it is possible that human remains could be encountered during construction work. It is recommended that:

- Should human remains be encountered, within 50 m of the find must cease, the remains must be left *in situ* but made secure and HWC must be notified immediately so that mitigatory action can be determined and be implemented.

### **11.3 Cultural Landscape**

Impacts to the cultural landscape arising from construction of the Khoe WEF can be reduced if suitable measures to mitigate the intrusion of WEF infrastructure and activities associated with the project in the landscape are implemented. It is recommended that such mitigation measures could include:

- The screening of infrastructure area(s) from the R318,
- Keeping the construction and decommissioning duration as short as possible and as much of the activity as possible out of the public view,
- Ensuring that night-time light pollution is minimized, and
- Keeping construction and maintenance-related activities in designated and approved areas.

## **12 CONCLUSION**

This assessment has found that the area identified for the proposed Khoe WEF is a heritage environment of variable sensitivity but that significant impacts on palaeontological and archaeological resources arising from the project are unlikely and no fatal flaws have been identified. Impacts to the cultural landscape are expected to be significant, but these can be reduced through the implementation of suitable mitigatory measures. If the project were not implemented, the site would stay as it currently is with a neutral impact significance.

Despite the impacts to the cultural landscape, it is expected that mitigation measures will allow impacts to be managed.

It is our considered opinion, therefore, that the proposed Khoe WEF may be authorised, but subject to the recommendations contained within this report.

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## **APPENDIX A: HIA SPECIALIST CURRICULUM VITAE**

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**Profession:** Archaeologist (Maritime)

**Date of Birth:** 15 November 1965

**Parent Firm:** TerraMare Archaeology (Pty) Ltd

**Position in Firm:** Director & Senior Archaeologist

**Years of experience:** 33

**Nationality:** South African

### **Education:**

1979-1983 Wynberg Boys' High School

1986 BA (Archaeology), University of Cape Town

1987 BA (Hons) (Archaeology), University of Cape Town

1990 Master of Arts, (Archaeology) University of Cape Town

### **Employment:**

- September 2023 – present: TerraMare Archaeology, Director and Senior Archaeologist
- September 2017 – August 2023: ACO Associates, Senior Archaeologist and Consultant
- 2014-2017: South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit
- 2012-2018: Sea Change Heritage Consultants Limited, Director
- 2011-2012: TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology
- 2009-2011: EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology
- 2005-2009: Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine
- 1996-2005: National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist
- 1994-1996: National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office

### **Professional Qualifications and Accreditation:**

- Member: Association of Southern African Professional Archaeologists (ASAPA) (No. 043)



- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

### **Experience:**

I have more than 30 years of professional archaeological and heritage management experience. After completing my postgraduate studies and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. In 1996 I became the NMC's first full-time maritime archaeologist and in this regulatory role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I established Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change traded until 2018, providing archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy.

In the UK I was also involved in strategic projects which developed guidance and best practice for the UK offshore industry with respect to the marine historic environment. This included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector (*Historical Environment Guidance for the Offshore Renewable Energy Sector* (2007) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (2010)). I was also manager and lead author in the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry, and in the 2009 *UK Continental Shelf Offshore Oil and Gas and Wind Energy Strategic Environmental Assessment* for Department of Energy and Climate Change. In 2013-14 I was lead author and project co-ordinator on *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom* and in 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South Africa in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was appointed as Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant. While at ACO I carried out a wide range of terrestrial and maritime archaeological assessments, many of which are listed in the following section. In 2018 I conducted an assessment of the potential impacts of marine mining on South Africa's palaeontological and archaeological heritage

for the Council for Geoscience, on behalf of the Department of Mineral Resources.

On 1 September 2023 I left ACO to establish my own consultancy, TerraMare Archaeology (Pty) Ltd, which will provide specialist assessment and management services and advice for both terrestrial and maritime archaeological heritage.

I have been a member of the Association of Southern African Professional Archaeologists (No. 043) for nearly thirty years and am accredited by ASAPA's Cultural Resource Management section.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and served as a member of its Bureau between 2009 and 2018.

Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project'.

I served on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee between 2014 and 2023.

#### **Selected Project Reports:**

Gribble, J. 2017. *Archaeological Assessment of Farm No 8/851, Drakenstein*. Unpublished report prepared for Balwin Properties Pty Ltd. ACO Associates.

Gribble, J. 2017. *Archaeological Assessment of Bosjes Phase 2, Farm 218 Witzenberg*. Unpublished report prepared for Farmprops 53 (Pty) Ltd. ACO Associates.

Gribble, J. 2017. *Canal Precinct, V&A Waterfront: Heritage Impact Assessment*. Unpublished report prepared for Nicolas Baumann Urban Conservation and Planning. ACO Associates.

Gribble, J. 2017. *Archaeological Assessment of the proposed dam on the farm Constantia Uitsig, Erven 13029 and 13030, Cape Town*. Unpublished report prepared for SLR Consulting (South Africa) (Pty) Ltd). ACO Associates.

Gribble, J. 2017. *Archaeological Assessment of Erf 4722 Blouvillei, Wellington*. Unpublished report prepared for Urban Dynamics Western Cape (Pty) Ltd. ACO Associates.

Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed Phezukomoya Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.

Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed San Kraal Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.

Gribble, J. 2018. *Integrated Heritage Impact Assessment of the Peter Falke Winery on Farm 1558 Groenvlei, Stellenbosch*. Unpublished report prepared for Werner Nel Environmental Consulting Services. ACO Associates.

Gribble, J. & Halkett, D. 2018. *Heritage Impact Assessment for a Proposed Extension of the Kaolin*

*Mine on Portion 1 of the Farm Rondawel 638, Namaqualand District, Northern Cape.* Unpublished report prepared for Rondawel Kaolien (Pty) Ltd. ACO Associates.

Gribble, J. 2019. *Archaeological Impact Assessment for Proposed Sand Mining on Portion 2 of Farm Kleinfontein 312, Klawer District, Western Cape.* Unpublished report prepared for Green Direction Sustainability Consulting (Pty) Ltd. ACO Associates.

Halkett, D. & Gribble, J. 2018. *Archaeological/Heritage Report for the Expansion of the Current Granite Mining at Oeranoep and Ghaams, Northern Cape Province.* Unpublished report prepared for Klaas Van Zyl. ACO Associates.

Gribble, J. 2018. *Potential Impacts of Marine Mining on South Africa's Palaeontological and Archaeological Heritage.* Report prepared for Council for Geoscience. ACO Associates.

Gribble, J. 2018. *Maritime Heritage Impact Assessment: Block ER236, Proposed Exploration Well Drilling.* Unpublished report prepared for ERM Southern Africa (Pty) Ltd. ACO Associates.

Gribble, J. 2018. *Maritime Heritage Impact Assessment: IOX Cable Route.* Unpublished report prepared for ERM Southern Africa. ACO Associates.

Gribble, J. 2018. *Archaeological Assessment of the Terrestrial Portion of the IOX Cable Route.* Unpublished report prepared for ERM Southern Africa. ACO Associates.

Gribble, J. 2018. *Archaeological Assessment: Erven 11122, 11123, 11124, 11125, 11126, 11127 and Re 11128, Corner Frere Street and Albert Road, Woodstock, Cape Town.* Unpublished report prepared for Johan Cornelius. ACO Associates.

Gribble, J. 2018. *Maritime Heritage Impact Assessment: Expansion of Diamond Coast Aquaculture Farm on Farm 654, Portion 1, Kleinzee, Northern Cape.* Unpublished report prepared for ACRM. ACO Associates.

Gribble, J. 2018. *Heritage Impact Assessment: Ship Repair Facility, Port of Mossel Bay.* Unpublished report prepared for Nemaï Consulting. ACO Associates.

Gribble, J. 2018. *Archaeological Assessment: Sites B and C, Portwood Ridge Precinct, V&A Waterfront.* Unpublished report prepared for Urban Conservation. ACO Associates.

Gribble, J. 2018. *Heritage Impact Assessment: Zandrug, Farm Re 9/122, Cederberg.* Unpublished report prepared for Cederberg Environmental Assessment Practice. ACO Associates.

Gribble, J. and Hart, T.G. 2018. *Initial Assessment Report and Motivation for Exploratory Permit, Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown.* Unpublished report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.

Gribble, J. and Hart, T.G. 2018. *Initial investigation report with respect to human remains found at Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown.* Unpublished permit report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.

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6 And 7, Algoa Bay, Eastern Cape Province. Unpublished report prepared for Anchor Research & Monitoring (Pty) Ltd. ACO Associates.

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Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Leliefontein to Conmarine Bulk Water Pipeline, between Paarl and Wellington*. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. ACO Associates.

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**APPENDIX B: SPECIALIST DECLARATION – J GRIBBLE**

(See separate pdf file)

## APPENDIX C: HWC NID RESPONSE

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**Our Ref:** HM / CAPE WINELANDS / BREEDE VALLEY / KHOE WEF / FARM 38, 193, 37  
**Case No.:** HWC23110807SB1124  
**Enquiries:** Stephanie Barnardt  
**E-mail:** Stephanie.Barnardt@westerncape.gov.za  
**Tel:** 021 483 5959



**Applicant: Khosi Ngema / John Gribble**  
[Khosi.Ngema@erm.com](mailto:Khosi.Ngema@erm.com); [john.gribble@terramarearchaeology.com](mailto:john.gribble@terramarearchaeology.com)

**RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: HIA REQUIRED**  
**In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape**  
**Provincial Gazette 6061, Notice 298 of 2003**

### **NOTIFICATION OF INTENT TO DEVELOP: PROPOSED KHOE WIND ENERGY FACILITY ON MULTIPLE PROPERTIES BETWEEN TOUWSRIVER AND MONTAGU, SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)**

The matter above has reference.

Heritage Western Cape is in receipt of your application for the above matter received. This matter was discussed at the Heritage Officers Meeting held on 14 December 2023.

You are hereby notified that, since there is reason to believe that the proposed Khoe wind energy facility on multiple properties between Touwsriver and Montagu will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of Section 38(3) of the NHRA be submitted. Section 38(3) of the NHRA provides

- (3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): **Provided that the following must be included:***
- (a) *The identification and mapping of all heritage resources in the area affected;*
  - (b) *an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
  - (c) *an assessment of the impact of the development on such heritage resources;*
  - (d) *an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
  - (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
  - (f) *if heritage resources will be adversely affected by the proposed development, The consideration of alternatives; and*
  - (g) *plans for mitigation of any adverse effects during and after the completion of the proposed development.*

(Our emphasis)

This HIA must in addition have specific reference to the following:

- Archaeological impact assessment
- Palaeontological impact assessment
- Visual Impact on the Cultural landscape Assessments

The HIA must have an overall assessment of the impacts to heritage resources which are not limited to the specific studies referenced above.

The required HIA must have an integrated set of recommendations.

The comments of relevant registered conservation bodies; all Interested and Affected parties; and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

PAGE 2 OF 2

**Our Ref:** HM / CAPE WINELANDS / BREEDE VALLEY / KHOE WEF / FARM 38, 193, 37  
**Case No.:** HWC23110807SB1124  
**Enquiries:** Stephanie Barnardt  
**E-mail:** Stephanie.Barnardt@westerncape.gov.za  
**Tel:** 021 483 5959



If applicable, applicants are strongly advised to review and adhere to the time limits contained the Standard Operational Procedure (SOP) between DEADP and HWC. The SOP can be found using the following link <http://www.hwc.org.za/node/293>

Kindly take note of the HWC meeting dates and associated agenda closure date in order to ensure that comments are provided within as Reasonable time and that these times are factored into the project timeframes.

HWC reserves the right to request additional information as required.  
Should you have any further queries, please contact the official above and quote the case number.

**Sneha R  
Jhupsee**

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Sneha Jhupsee  
**Acting Assistant Director: Professional Services**



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## APPENDIX D: HERITAGE SITES RECORDED DURING THE 2024 FIELD SURVEY

Site	Location	Description	Grading
J001	-33.616409°S / 19.863193°E	Isolated quartzite flake. Possibly MSA	NCW
J009	-33.598319°S / 19.863426°E	Old farm complex on Sandvlei (1/38). Stone-built farmhouse and barn and several packed stone kraals and stock pens. House not occupied and appears to have been altered at some time in the past to serve as an agricultural building.	3C
J010	-33.618100°S / 19.892415°E	Historical farmhouse and outbuilding. Ou Muur	3C
G001	-33.615699°S / 19.879533°E	Isolated MSA flake on dark haematite-like stone. Located on uplands	NCW

Note : NCW = Not conservation worthy

## **APPENDIX E: PALAEOONTOLOGICAL IMPACT ASSESSMENT**

(See separate pdf file)

## APPENDIX F: IMPACT ASSESSMENT METHODOLOGY

This impact assessment uses a Seven-Step approach based on the Hacking (2001) methodology for determining the significance of impacts pre, and post mitigation,

**Step 1:** Predict potential impacts by means of an appraisal of:

- Site Surveys,
- Project-related components and infrastructure,
- Activities related with the project life-cycle,
- The nature and profile of the receiving environment and potential sensitive environmental features and attributes,
- Input received during public participation from all stakeholders, and
- The relevant legal framework applicable to the proposed development

**Step 2:** Determination of whether the potential impacts identified in **Step 1** will be *direct* (caused by construction, operation, decommissioning or maintenance activities on the proposed development site or immediate surroundings of the site), *indirect* (not immediately observable or do not occur on the proposed development site or immediate surroundings of the site), *residual* (those impacts which remain after post mitigation) and *cumulative* (the combined impact of the project when considered in conjunction with similar projects in proximity).

**Step 3:** Description and determination of the significance of the predicted impacts in terms of the criteria below to ensure a consistent and systematic basis for the decision-making process. Significance is numerically quantified on the basis score of the following impact parameters:

1. **Extent (E)** of the impact: The geographical extent of the impact on a given environmental receptor.
2. **Duration (D)** of the impact: The length of permanence of the impact on the environmental receptor.
3. **Reversibility (R) of the impact:** The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change
4. **Magnitude (M)** of the impact: The degree of alteration of the affected environmental receptor.
5. **Probability (P)** of the impact: The likelihood of the impact actually occurring.

A widely accepted numerical quantification of significance is the formula: **S=(E+D+R+M)\*P**.

(*Significance=(Extent+Duration+Reversibility+Magnitude) \* Probability*).

The following has also been considered when determining the significance of a potential impact.

1. **Nature (N)** of the impact: A description of what causes the effect, what will be affected, and how it will be affected.
2. **Status (S)** of the impact: described as either positive, negative or neutral
3. **Cumulative impacts.**
4. Inclusion of **Public comment.**

The significance of environmental impacts is determined and ranked by considering the criteria presented in Table 1 below. All criteria are rank according to 'Very Low', 'Low', 'Moderate', 'High' and 'Very High' and are assigned scores of 1 to 5 respectively.

Table 1: Defining the significant in terms of the impact criteria.

Impact Criteria	Definition	Score	Criteria Description
<b>Extent (E)</b>	Site	1	Impact is on the site only
	Local	2	Impact is localized inside the activity area
	Regional	3	Impact is localized outside the activity area
	National	4	Widespread impact beyond site boundary. May be defined in various ways, e.g. cadastral, catchment, topographic
	International	5	Impact widespread far beyond site boundary. Nationally or beyond
<b>Duration (D)</b>	Immediate	1	On impact only
	Short term	2	Quickly reversible, less than project life. Usually up to 5 years.
	Medium term	3	Reversible over time. Usually between 5 and 15 years.
	Long term	4	Longer than 10 years. Usually for the project life.
	Permanent	5	Indefinite
<b>Magnitude (M)</b>	Very Low	1	No impact on processes
	Low	2	Qualitative: Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration.  Quantitative: No measurable change; Recommended level will never be exceeded.
	Moderate	3	Qualitative: Moderate deterioration, discomfort, Partial loss of habitat /biodiversity /resource or slight or alteration.  Quantitative: Measurable deterioration; Recommended level will occasionally be exceeded.
	High	4	Qualitative: Substantial deterioration death, illness or injury, loss of habitat /diversity or resource, severe alteration or disturbance of important processes.



Impact Criteria	Definition	Score	Criteria Description
			Quantitative: Measurable deterioration; Recommended level will often be exceeded (e.g. pollution)
	Very High	5	Permanent cessation of processes
Reversibility (R)	Reversible	1	Recovery which does not require rehabilitation and/or mitigation.
	Recoverable	3	Recovery which does require rehabilitation and/or mitigation.
	Irreversible	5	Not possible, despite action. The impact will still persist, and no mitigation will remedy or reverse the impact.
Probability (P)	Improbable	1	Not likely at all. No known risk or vulnerability to natural or induced hazards
	Low Probability	2	Unlikely; low likelihood; Seldom; low risk or vulnerability to natural or induced hazards
	Probable	3	Possible, distinct possibility, frequent; medium risk or vulnerability to natural or induced hazards.
	Highly Probable	4	Highly likely that there will be a continuous impact. High risk or vulnerability to natural or induced hazards
	Definite	5	Definite, regardless of prevention measures.

The *significance* (s) of potential impacts identified according to the criteria above has been colour coded for the purpose of comparison. This colour coding will be used in impact tables.

Significance is deemed Negative (-)			Significance is deemed Positive (+)		
0 - 30	31 - 60	61 - 100	0 - 30	31 - 60	61 - 100
Low	Moderate	High	Low	Moderate	High

**Step 4:** Determination of practical and reasonable mitigation measures based on specialists' inputs and field observations following the mitigation hierarchy (avoid, minimise, manage, mitigate, or rehabilitate).

**Step 5:** Evaluation of predicted residual impacts after implementation of mitigation measures.

**Step 6:** Determination of the significance of the impact taking into consideration the predicted residual impacts after implementation of mitigation measures.

**Step 7:** Based on an acceptable significance of the impact, determination of the need and desirability of the proposed development and an opinion as to whether the development should proceed or not.

The Assessment of the significance of potential impacts is then populated in an Impact

Summary Table.