SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

Heritage Impact Assessment

DFFE Reference:	TBA
Report Prepared by:	PGS Heritage Pty Ltd
Issue Date:	123 April 2022
Version No.:	3.0
HWC reference:	21061102

Declaration of Independence

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

Disclosure of Vested Interest

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

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd

CONTACT PERSON: Wouter Fourie – Heritage Specialist and Archaeologist

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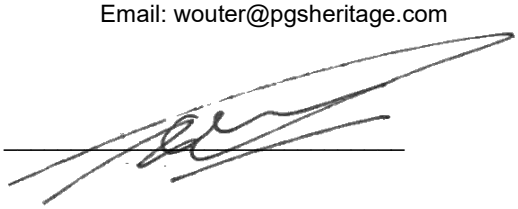
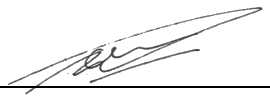
Email: wouter@pgsheritage.com

SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	Heritage Impact Assessment for the proposed construction of The Koup 1 Wind Energy Facility and Associated Grid Infrastructure, Near Beaufort West, Western Cape Province, South Africa		
Control	**Name**	**Signature**	**Designation**
Author	**Wouter Fourie**		**Principal Heritage Specialist**
Reviewed	**Michelle Guy**		**SiVEST/Environmental Division**

Date:	23 April 2022
Document Title:	Heritage Impact Report
Author:	Wouter Fourie
Revision Number:	3
Checked by:	
For:	SiVEST Environmental Division

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

HERITAGE IMPACT ASSESSMENT

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVest (PTY) Ltd (SiVEST), on behalf of Genesis ENERTRAG Koup 1 Wind (Pty) Ltd (Genesis), to undertake the assessment of the proposed construction of the Koup 1 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa.

1. SITE NAME

The Koup 1 WEF and grid infrastructure.

2. LOCATION

The proposed WEF and associated grid connection infrastructure is located approximately 55km south of Beaufort West in the Western Cape Province and is within the Beaufort West and Prince Albert Local Municipalities, in the Central Karoo District Municipality (**Figure 1**).

The WEF application site is approximately 4279.398 hectares (ha) in extent and incorporates the following farm portions:

- The Farm Riet Poort No 231
- Portion 11 of the Farm Brits Eigendom No 374
- Portion 15 of the Farm Brits Eigendom No 374
- Portion 5 of farm 380
- Portion 10 of farm 380
- Portion 11 of farm 380

A smaller buildable area (2445.667 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Genesis and this area is likely to be further refined with the

exclusion of sensitive areas determined through various specialist studies being conducted as part of the EIA process.

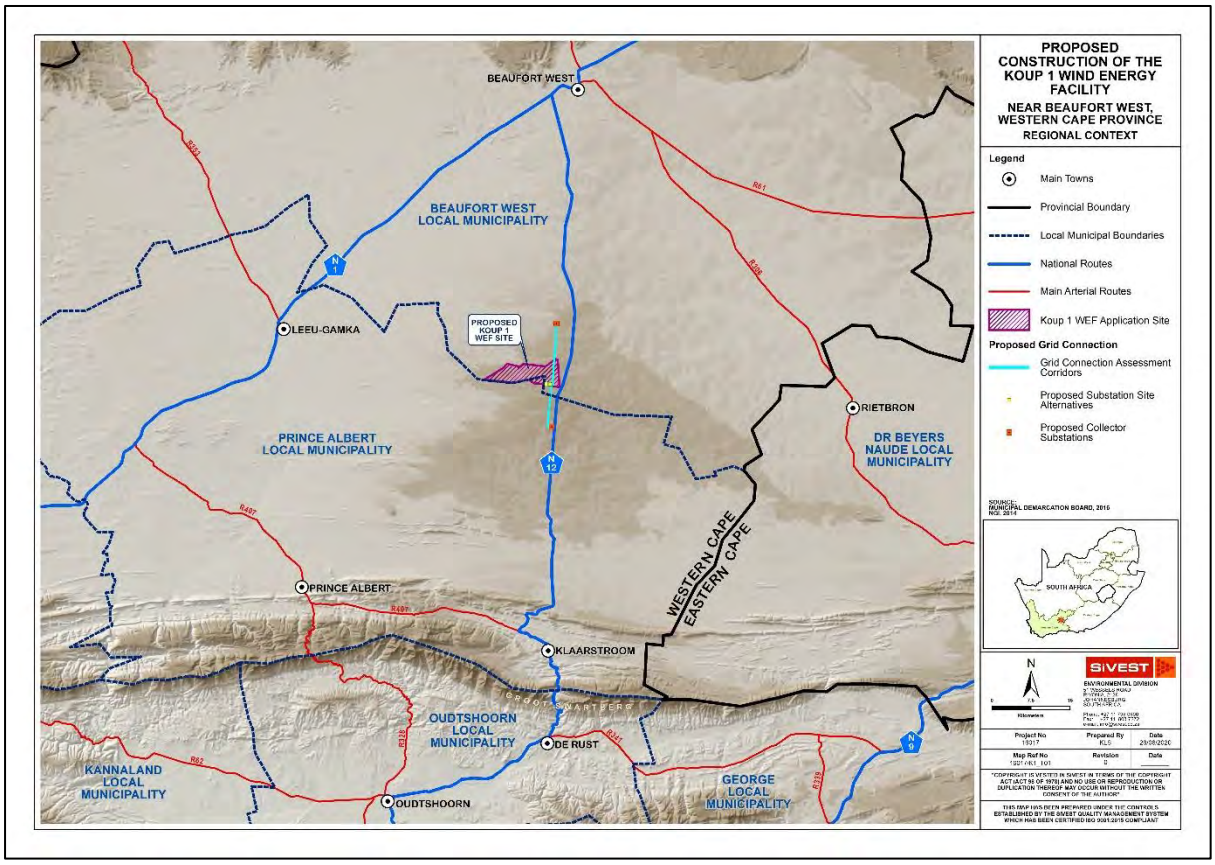


Figure 1: Locality of study area

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW (**Figure 2**). The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line (**Figure 3**). A BESS will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

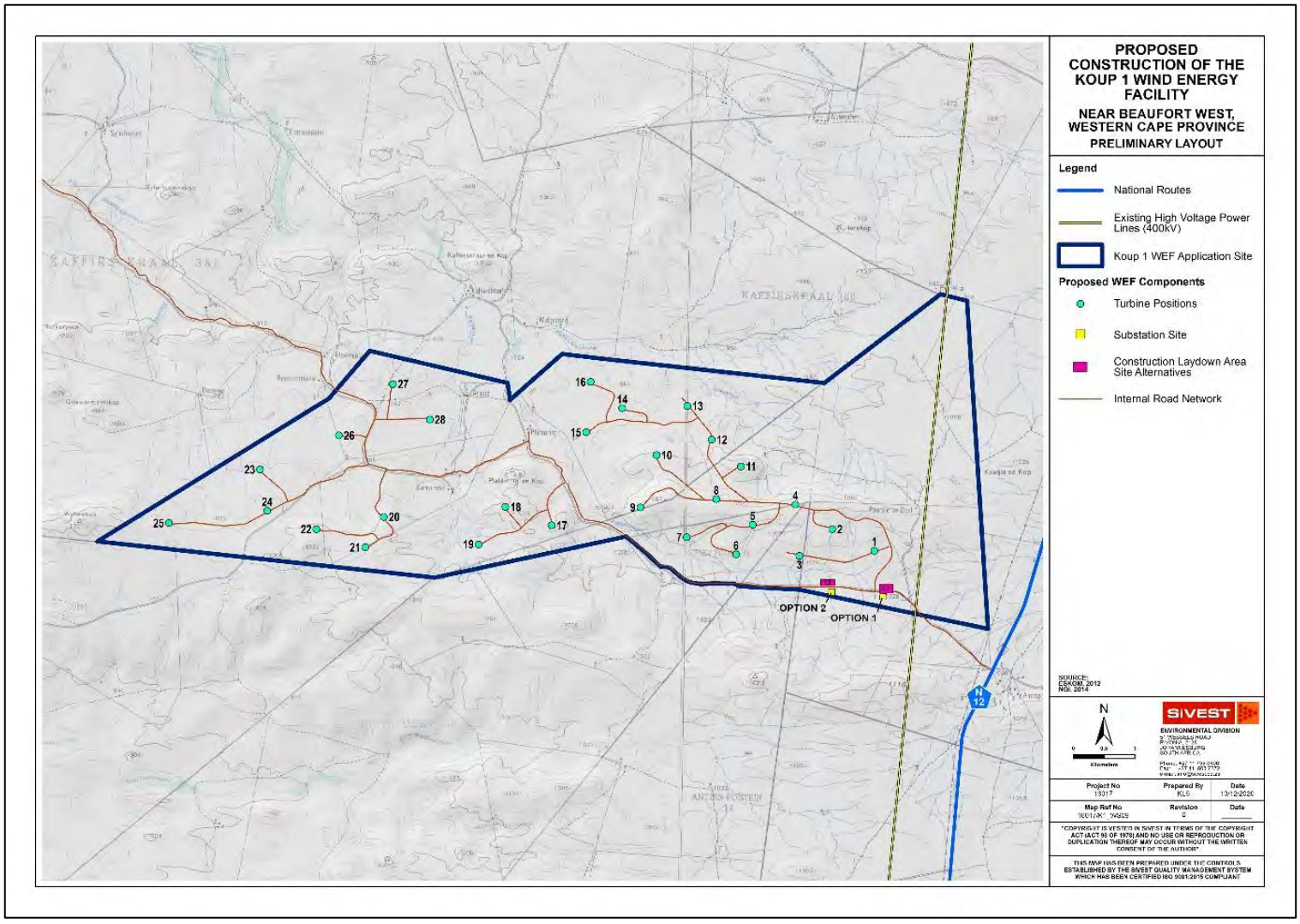


Figure 2: Alternatives originally proposed and considered as part of the Koup 1 WEF assessment process.

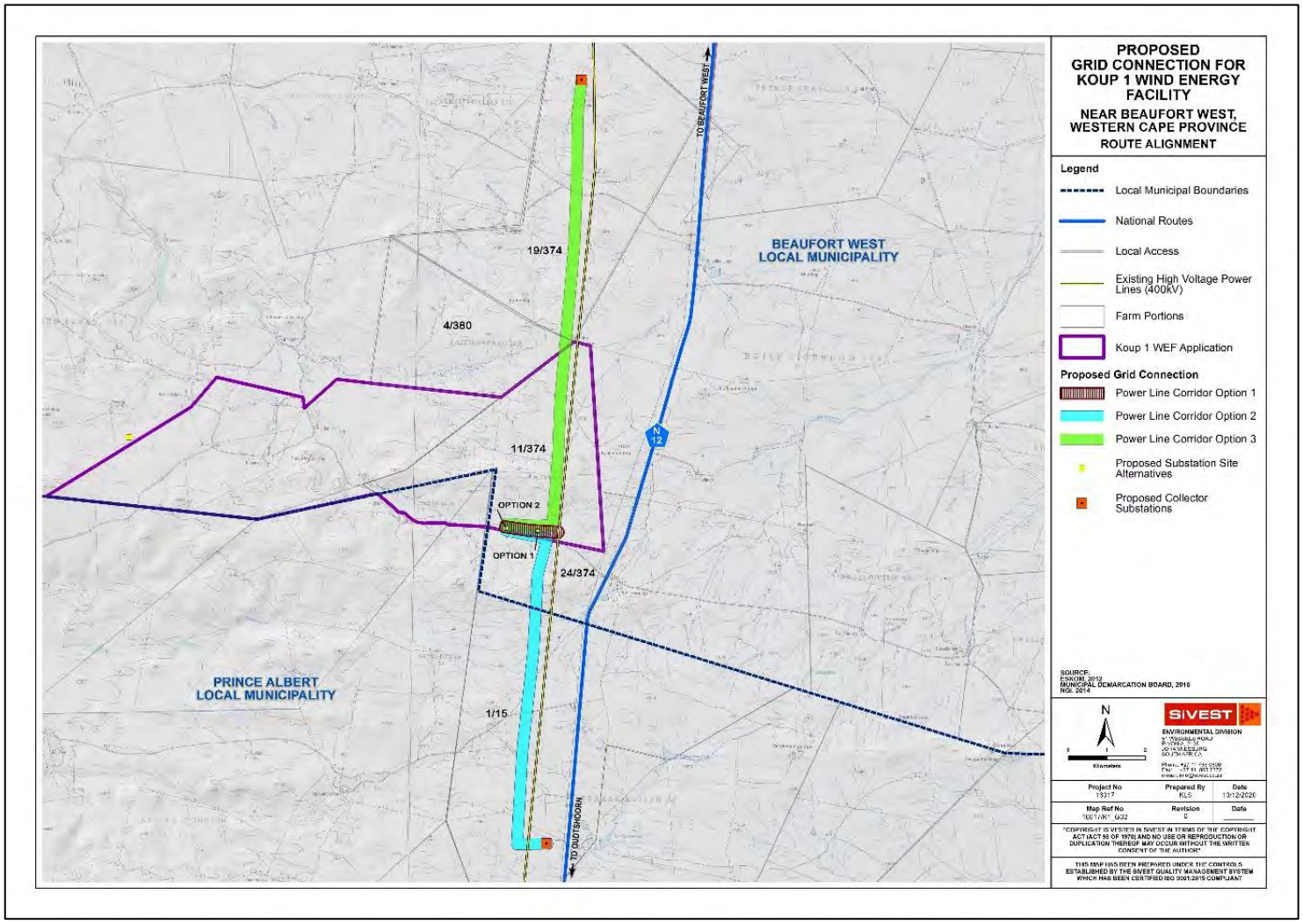


Figure 3: Proposed 132kV Power Line Route Alignments originally considered as part of the assessment process.

4. HERITAGE RESOURCES IDENTIFIED

A selective archaeological, palaeontological, and cultural landscape survey of the study area was conducted between November 2020 and July 2021. Focus was placed on the areas identified for the placement of the proposed turbines and associated internal roads, laydown areas and substation sites within the larger assessment area. Farmsteads and structures were documented from their property boundaries when access was restricted.

4.1 Archaeology, built environment and burial grounds and graves

The fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 18 tangible cultural heritage resources. One archaeological site (**KO_18**) was rated as having low heritage significance. Four graves, burial grounds, and possible graves (**KO-06 – KO-09**) were rated as having high heritage significance. Two structures (**KO-03**, **KO-05**) were rated as having medium heritage significance, 1 structure (**KO-02**) was rated as having low heritage significance and 2 structures (**KO-01; KO-04**) were rated as having no heritage significance.

Three farmsteads or the remains of farmsteads were identified and constitutes the extent that of physical remains of current and historical adaptation to the challenging landscape. The farms of Platdorings (**KO-04-06**), Arbeid (**KO_19**) and Kareerivier (**KO_01-03** and **KO_07-08**) are located close to areas where historically water could be sources and, in most cases, these are dry riverbeds with cultivatable floodplains. Associated with all three farmsteads several burial grounds and graves (**KO-06 – KO-09**) were identified. Although the various heritage elements in each of these farmsteads do not all constitute having a high or medium significance. The combination of the build environment, burial grounds and graves, as well as the utilisation off the landscape create a cultural landscape and all three cases a medium to high cultural significance.

Eight find spots (**KO_10 – KO_17**) comprise several low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the MSA, although both LSA and earlier ESA material was identified. All the artefact assemblages (**including KO-18**) occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.

4.2 Palaeontology

Palaeontological Impact assessment (PIA) determined that the study area is underlain by continental (fluvial / lacustrine) sediments of the Abrahamskraal and Teekloof Formations (Lower Beaufort Group, Karoo Supergroup) which are of Middle to Late Permian age. These bedrocks contain sparse,

unpredictable to locally concentrated vertebrate fossils as well as rare trace fossils (*e.g.* tetrapod burrows) and plant material of scientific and conservation value. A substantial number of new fossil vertebrate sites (cranial and post-cranial material of large-bodied dinocephalians, small dicynodonts, rare tetrapod burrow casts) have been recorded during within the WEF project area during the short site visit, while several more sites have previously been mapped shortly outside its margins. These palaeontological sites, together with their sedimentological context, provide important data for on-going research into the pattern and causes of the Middle Permian Mass Extinction Event on land around 260 million years ago.

Scientifically-valuable and legally-protected fossil heritage resources preserved at or beneath the ground surface within the project footprint are potentially threated by clearance and bedrock excavations during the construction phase of the WEF and grid connection (*e.g.* for access roads, wind turbine foundations). The majority of the recorded fossil sites lie outside the project footprint but most of the WEF and grid connection footprint has yet to be palaeontologically surveyed on foot. A significant number of unrecorded sites almost undoubtedly lies within of very close to the project footprint.

No Very High Sensitivity or No-Go palaeontological sites or areas have been identified within the Koup 1 WEF or grid connection project areas. Since all known fossil sites can be readily mitigated through professional recording and collection of fossil material in the pre-construction phase, no recommendations for micro-siting of infrastructure such as wind turbine, pylon positions or access roads are therefore made at this stage.

4.3 Cultural Landscape

The Koup region is a significant cultural landscape that reflects the relationship between man and nature over a period. This relationship has generally been sustainable, where biodiversity and ecological systems have been maintained in the utilisation of the landscape expressed in specific land use patterns. The surrounding land use indicates a social appreciation of the natural environment with low impact stock farming with limited farmstead crop cultivation. The vastness and relative homogenous nature of the cultural landscape is, however, often undervalued. If careful contextual planning is not followed, it will rapidly result in a cluttered wasteland. This does not mean that development is discouraged, but rather that the implementation of wind and solar energy farms should be planned holistically.

The findings of this report, coupled with the proposed layout for development of wind turbines, which considers appropriate placement in terms of wind energy capacity, concludes that the development can be permitted within the site if the report's recommendations are followed. The mitigating recommendations in this report consider the ecological, aesthetic, historic and socio-economic value lines that underpin the layers of significance that combine to create the character of the place and the cultural landscape of the Koup. These recommendations include road and farmstead complex buffers which incorporate cultivated areas and graves, steep slope and ridgeline no-go areas as well as consideration of the unique land form of the site, CBA and ESA no-go areas, as well as mechanisms to support the non-landowner residents that live on the site in being bale to continue their indigenous land

use patterns, knowledge and social systems. These mitigations will reduce the impact on the surrounding landscape and heritage resources but due to the high visual impact of the turbines, largely a result of their height, the negative impact to the cultural landscape cannot be removed, only reduced from very high to moderate.

5. FINAL PROPOSED WEF LAYOUT

The final proposed WEF layout has considered the sensitivities identified during the 2021 field assessment. Grid Option 1 was not feasible as Eskom won't allow two collectors within a small radius, while Grid Option 3 has been eliminated because of identified bird nests. The route of the chosen Grid Option 2 and the preferred wind turbine, construction laydown area and substation site layout is shown in **Figure 4** and **Figure 5**.

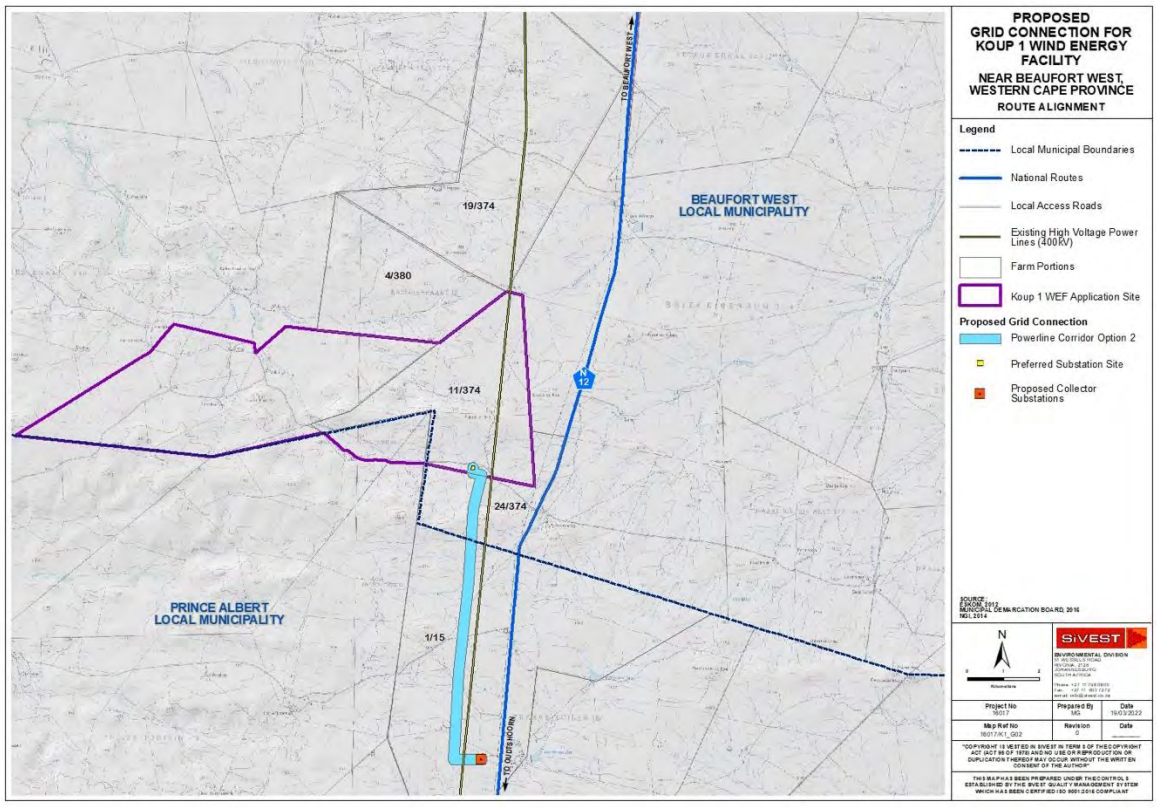


Figure 4: Final proposed 132kV Power Line Route Alignment (Option 2) for Koup 1.

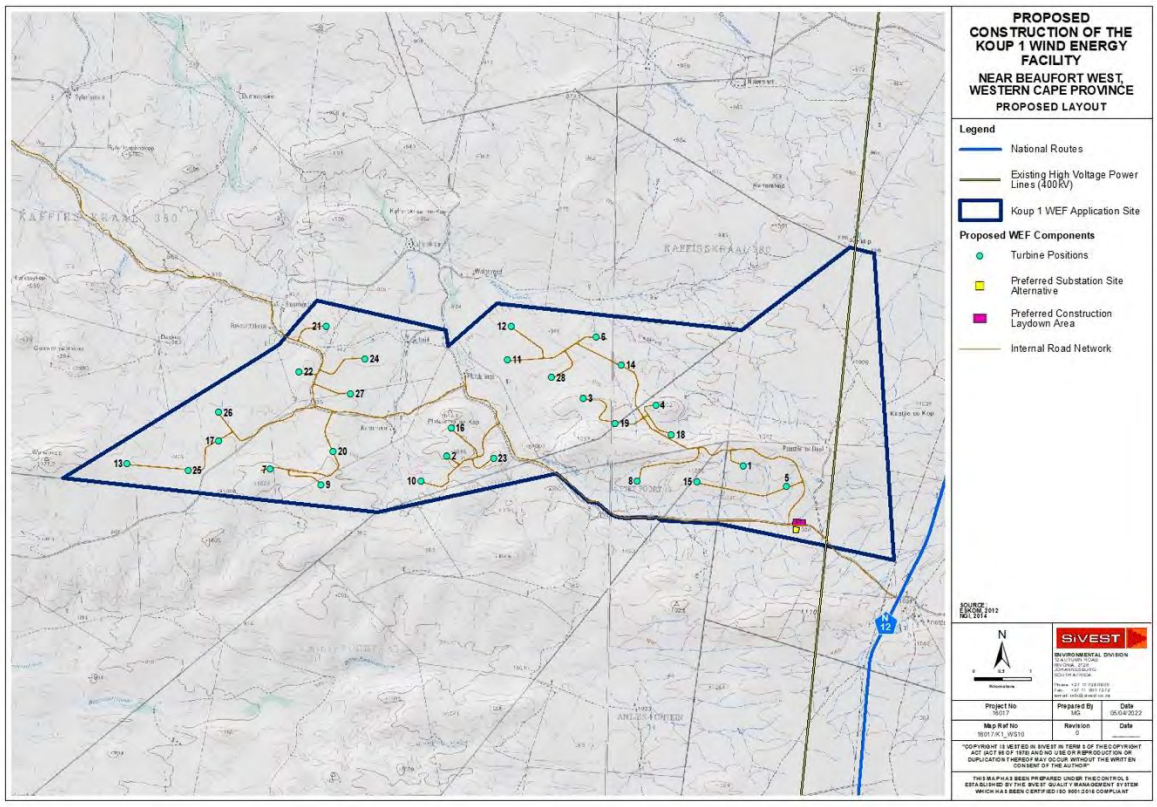


Figure 5: Final Proposed Layout for the Turbines, Construction Laydown Area, and Substation Site Positions for Koup 1.

6. ANTICIPATED IMPACTS ON HERITAGE RESOURCES

The pre-construction and construction phase of the proposed WEF will entail extensive surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (*e.g.* for widened or new access roads, wind turbine foundations, hardstanding areas, on-site substation, underground cables, construction laydown area, O&M building and BESS). Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The finalised layout has considered the sensitivities identified during the field assessment. By selecting the Grid Option 2, the possible pre-construction impacts calculated on the tangible cultural heritage resources is overall MODERATE NEGATIVE rating but with the implementation of the recommend buffers and management guidelines will be reduced to a LOW NEGATIVE impact.

The impact on the cultural landscape through the development of the Koup1 WEF and grid infrastructure is calculated to have a VERY HIGH negative impact and specifically on the aesthetic and historical components of the cultural landscape. This impact is further projected the stay VERY HIGH when incorporating the cumulative impacts projected with the other sic (6) project within 35k m of Koup 1. By

implementing the recommended mitigation measures and design indicators this negative impact can potentially reduce to MODERATE.

7. RECOMMENDATIONS

The calculated impact as summarised in **Section 8** of this report confirms the impact of the new Koup 1 WEF and associated grid connection infrastructure will be reduced with the implementation of the mitigation measures (Section **10.5)** for the cultural heritage resources. This finding in addition to the implementation of a chance finds procedure, as part of the EMPr, will mitigate possible impacts on unidentified heritage resources.

The conclusion of the combined specialist studies has culminated in the following heritage indicators and development buffers:

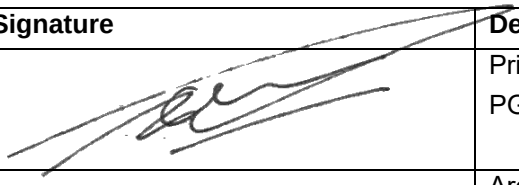
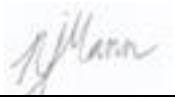
- A 1000m buffer to either side of the N12 for turbine and infrastructure placement (pink buffer);
- 300m buffer to either side of identified significant historic farm roads (pink) for turbine placement, substation and laydown area (buffer not shown in map, only roads identified);
- 800m buffer around historic farmsteads (red circles) for turbine placements (single turbines currently proposed for the edges of some of these buffers are acceptable); and
- 50m outer boundary buffer for roads and infrastructure around farmsteads including cultivated areas and graves – integrity of farmstead complex as a whole should be retained and no WEF roads running through farmstead complexes;
- 200m freestanding graded heritage structure buffer for new roads and infrastructure;
- 100m buffer from cemetery or unmarked burial for all development;
- existing roads to be used with minimal upgrade as far as possible;
- no-go areas on mountain ridges and steep slopes (over 10%) for all infrastructure;
- riverine corridors 100yr flood line buffer (ecological) or 100m buffer (archeological) whichever is further (buffers not indicated);
- CBA and ESA no-go areas for all development (green shading);
- Koup poort buffer (light blue shading) included in the 300m farm road buffer; and
- a preconstruction micro-survey for turbines, access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained.

Further, the following change to the current proposed layout is recommended:

- Turbine 11 must be relocated outside of the historic farmstead buffer;
- the proposed substation should be located to the north of the farm entrance road;
- the laydown area and substation should be located outside the 300m farm road buffer without impacting on the riverine corridor flood line and slopes over 3%; and

- new access roads must be relocated to avoid slopes over 10% and visually sensitive slopes impacting on the views from the historic farm roads.

8. AUTHOR/S AND DATE

Date:	**23 April 2022**	
Name	**Signature**	**Designation**
Wouter Fourie		Principal Heritage Specialist PGS Heritage
Nikki Mann		Archaeologist PGS Heritage
Dr John Almond		Palaeontologist Natura Viva
Emmylou Rabe Bailey		Cultural Landscape Specialist Hearth Heritage

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page ii of Report- Contact details and company Section 1.2 and **Appendix A**
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 7, 8 and 11
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 8 and 9
g) an identification of any areas to be avoided, including buffers;	Section 10
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;	Section 10
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
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;	Executive summary and section 9, 10, and 11
k) any mitigation measures for inclusion in the EMPr;	Section 10
l) any conditions for inclusion in the environmental authorisation;	Section 10 and11

m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10
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, and where applicable, the closure plan;	Executive Summary; Section 11
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
q) any other information requested by the competent authority.	
2) 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.	NEMA Appendix 6 and GN648

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KOUP 1 WIND ENERGY FACILITY AND ASSOCIATED GRID INFRASTRUCTURE, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

HERITAGE IMPACT ASSESSMENT

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Glossary of Terms

Archaeological resources

This includes:

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

Cultural significance

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

Development

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

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

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).

Heritage resources

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

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

Holocene

The most recent geological time period which commenced 20 000 years ago.

Late Stone Age

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

Late Iron Age (Early Farming Communities)

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

Middle Stone Age

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

Site

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

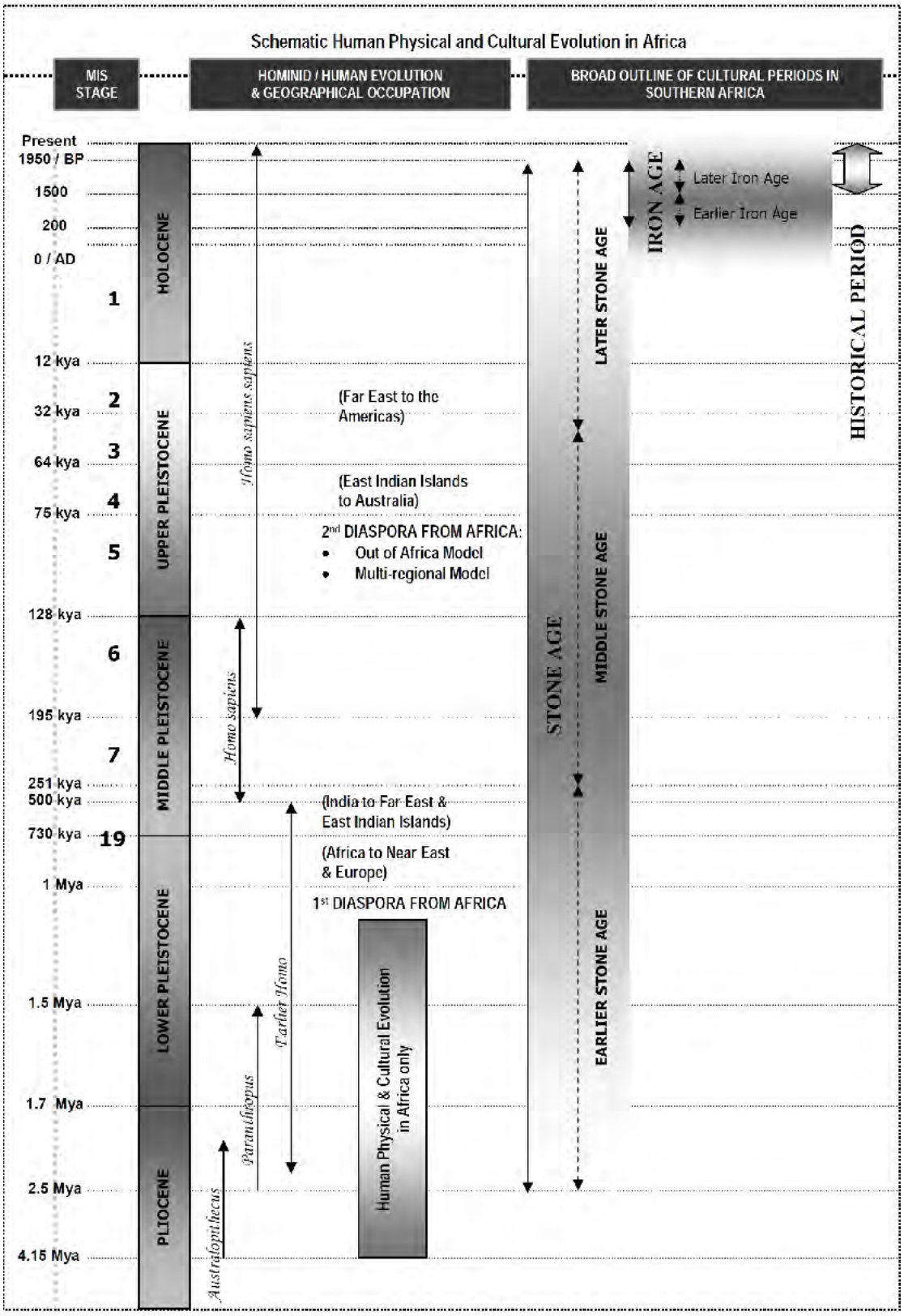


Figure 6: Human and Cultural Timeline in Africa (Morris, 2008)

List of Abbreviations

Abbreviations	Description
AIA	Archaeological Impact Assessment
APHP	Association of Professional Heritage Practitioners
ASAPA	Association of South African Professional Archaeologists
BESS	Battery Energy Storage System
CRM	Cultural Resource Management
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
Genesis	Genesis ENERTRAG Koup 1 Wind (Pty) Ltd
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NCA	National Competent Authority
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
O&M	Operation and Maintenance
PGS	PGS Heritage (Pty) Ltd
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SIVEST	SiVEST (PTY) Ltd
WEF	Wind Energy Facility

1. INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVEST (PTY) Ltd (SiVEST), on behalf of Genesis ENERTRAG Koup 1 Wind (Pty) Ltd (Genesis), to undertake the Heritage Impact Assessment (HIA) the proposed Koup 1 Wind Energy Facility (WEF) and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa.

1.1 Terms of reference

The aim of the study is to identify possible archaeological heritage sites and finds that may occur in the proposed development area. The HIA aims to inform the Environmental Impact Assessment (EIA) in the development of a comprehensive Environmental Management programme (EMPr) to assist the project applicant in responsibly managing the identified heritage resources in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

1.2 Specialist Credentials

This HIA was compiled by PGS.

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

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

Nikki Mann, author of the Archaeological Impact Assessment (AIA) report, graduated with her Master's degree (MSc) in Archaeology and is registered as a Professional Archaeologist with the ASAPA.

Dr John Almond, author of the Palaeontological Impact Assessment (PIA), has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey

/ Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa.

Emmylou Rabe Bailey, author of the Cultural Landscape Assessment (CLA), director of Hearth Heritage consultancy, has over 10 years of experience in the heritage field, in the public and private sectors. Emmylou holds an MA in Archaeology and Heritage Conservation from the University of Leicester, UK (2008), specialising in the assessment, conservation and representation of archaeological resources and cultural landscapes. Her BA(Hons) in Environmental Science and Archaeology was interdisciplinary research that focused on heritage assessment, conservation and management of the Luyolo Cultural Landscape in Simonstown, Cape Town (UCT, 2002). Emmylou's PhD in Environmental Anthropology (Rhodes University) around conservation and care ethics in cultural landscapes is currently on hold. Emmylou is an Accredited Professional Heritage Practitioner with the APHP and registered with the ASAPA as a Professional Archaeologist. She also sits on Heritage Western Cape Council and the HWC Archaeology, Palaeontology and Meteorites Permitting Committee.

1.3 Assessment Methodology

This HIA report was compiled by PGS for the proposed development of the Koup 1 WEF. The applicable maps, tables, and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

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

Step II – Physical Survey: The fieldwork was conducted over several days between November 2020 and July 2021). The fieldwork for the AIA was conducted by archaeologist, Nikki Mann and Wynand van Zyl, between 9 June and 23 July 2021. The fieldwork for the PIA was completed by a palaeontologist, John Almond over a 5-day site-specific field survey from 14 to 19 November 2020 (as described in the PIA), while the component for the Cultural Landscape Assessment by a cultural landscape specialist (archaeologist/anthropologist/heritage specialist), Emmylou Rabe Bailey, over 4 days from 22-24 June 2021 (as described in the CLA), which aimed at locating and documenting sites falling within the proposed development footprint.

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

1.3.1 Archaeological specific methodology

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

- Material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency, and which is older than 100 years, including any area within 10m of such representation;
- Graves and burial grounds, including ancestral graves, royal graves, graves of traditional leaders, graves of victims of conflict, historical graves and cemeteries, and other human remains not covered by the Human Tissue Act (1983) (Act No 65 of 1983).

1.3.2 Palaeontological specific methodologies

In summary, the approach to PIA was as follows. Fossil bearing rock units occurring within the broader study area is determined from geological maps and relevant geological sheet explanations as well as satellite images. Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological database. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, the palaeosensitivity of the development area and impact significance of the proposed development is assessed together with recommendations for any further specialist palaeontological studies or mitigation. This PIA was undertaken in line with the HWC 2021 Minimum Standards for the palaeontological component of heritage impact assessment.

1.3.3 Cultural Landscape Assessment specific methodologies

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

- Review of Desktop Beaufort West Heritage Survey and Beaufort West Municipal SDF.
- Review of Central Karoo District Spatial Development Framework.

- Review of relevant Archaeological Impact Assessment (AIA), Heritage Impact Assessment (HIA), Visual Impact Assessment (VIA) and Socio-economic Impact Assessment reports (SEIA) on the proposed Koup 1 and adjacent Koup 2 proposed WEFs as well as other relevant assessment reports from the surrounding area;
- Review of relevant academic literature and articles on cultural landscape assessment;
- Review of relevant academic literature and articles on the cultural heritage of the regional study area;
- Review of relevant policies and legislation on cultural landscapes assessment, scenic drives and route assessment and heritage assessment in EIA process;
- Review of historic and current maps of the study area and surrounds;
- Review of REDZs Strategic Environmental Assessment (SEA) reports (DEA, 2015); and
- Review of relevant international cultural landscapes best practice.

1.3.3.2 Preliminary field survey

The field survey of cultural landscape elements was conducted by a cultural landscapes specialist (archaeologist/anthropologist/heritage specialist) over 4 days from 22-24 June 2021 (mid-Winter). The survey was conducted in a vehicle on existing farm access roads and on foot where no vehicle access was possible. Cultural heritage resources and cultural landscape elements falling within and adjacent to the proposed development footprint were identified, mapped and photographed where appropriate. The season for fieldwork did not impact the research for this study.

1.3.3.3 Recording

Recording and documentation of relevant cultural heritage and cultural landscape elements, the assessment of resources in terms of the specialist requirements for CLA criteria, report writing, mapping and recommendations.

The significance of the cultural landscape is based on the examination of the

The significance of the cultural landscape is based on the examination of the

- processes (spatial pattern, land uses, response to natural features and cultural traditions);
- components (circulation, boundaries, vegetation, structural types, cluster arrangements, archaeological types, small-scale elements); and
- perceptual qualities (views and aesthetics), which are then utilized to identify and assess the relationships between the patterns of human use, the natural environment and cultural beliefs and attitudes.

Evaluation of provisionally identified heritage elements' significance according to World Heritage Convention Operational Guidelines (2017) and NHRA (Act 25 of 1999) as is required as part of the BA process.

1.3.3.4 Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

HWC (2016), uses a system in which resources of local significance are divided into Grade IIIA – high significance, Grade IIIB – medium significance and Grade IIIC - low local or contextual significance, with a Not Conservation Worthy (NCW) grading for sites of very low or no significance and generally not requiring mitigation or other interventions).

It should be noted that without further research and investigation of the intangible and living heritage found at the Koup 1 and 2 study site or surrounding area, a valuable and true assessment of the significance of the heritage resources and elements is not possible, and any grading assigned is subject to further work to confirm the proposed gradings. Notwithstanding, this report has drawn from other research to inform gradings and is confident that the proposed gradings herein have considered the most common significance assignments.

1.3.3.5 Sensitivity mapping for cultural landscapes (SEA, 2015)

Landscape sensitivity was determined as part of this study through the identification of natural, scenic and cultural resources which have aesthetic, social and economic value to the local community, the region, and society as a whole. The resources considered include features of topographic, geological or cultural interest, together with landscape grain or complexity. Protected landscapes, such as national parks, nature reserves, game parks or game farms, as well as heritage sites, add to the cultural value of an area and were thus considered as essential criteria in the determination of landscape sensitivities. Landscape sensitivity was further determined by taking into account existing receptors in the area including settlements, national roads, arterial roads, scenic routes, and tourist destinations such as guest farms and resorts.

1.3.3.6 Community engagement

Limited interviews with tenants and labourers on the properties proposed for development and land owners around the proposed development were done as part of the cultural landscape assessment to identify any values associated with identified heritage resources and to ascertain whether any meaningful intangible heritage resources are associated with any of the built structures or natural features. Further research/ other studies beyond the brief of this BA would be required to determine the significance of the intangible or living heritage of the Koup cultural landscape. The findings of this report must be shared with identified interested and affected parties in the EIA public participation process in order to further ascertain any intangible cultural resources that may exist on the landscape that have not been identified. Notably it is critical that the non-landowner residents on and surrounding the properties proposed for development also be included as I&APs in the process.

1.4 Site Significance classification standards

The various specialist heritage reports utilise the classification system as developed by HWC (2021) (**Table 1** and **Table 2**).

Table 1 : Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare.	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay		
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 2: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings	High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
		and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

2. ASSUMPTIONS AND LIMITATIONS

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites, the layered histories associated with the area, specifically in terms of intangible and living heritage resources associated to the cultural landscape and

the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well.

The fieldwork was hampered by the mountainous terrain of the farms and made access and thus coverage of the farms difficult.

The following identified assumptions should be noted:

- That the reports and information provided to Hearth Heritage by the client and EAP are true and correct at the time of submission.
- That the development infrastructure will be removed, and rehabilitation of the landscape completed as per the EMPr for these developments in the decommissioning phase and not recommissioned.
- That the status quo of the landscape was 'as usual' during the fieldwork period and that residents or labourers, stock or other relevant cultural elements were not altered for the survey period.

The following identified limitations should be noted:

- No previous specialist cultural landscapes research for the immediate area was available, however HIA studies in the area have been done and were consulted for information. Similarities to landscape character and elements in the region to other areas where CLA studies have been done, allowed for use of these studies in analysis and recommendations for development in this report (Jansen and Franklin, 2020).
- No stakeholder participation was conducted to determine intangible or living heritage resources for the purposes of the cultural landscape assessment.
- Due to the historical layering of the landscape and associated history and memory of conflict, dispossession and disempowerment, the values attributed to the landscape and heritage resources are varied and do not necessarily align to give a definitive single significance to the site. Perceptions of sense of place vary over time and place and from one individual to the next depending on their relationship to the landscape and the proposed development. Without a detailed and extensive consultation process with all potential stakeholders, including non-landowners (labourers, tourists, youth), the full significance of the cultural landscape and impact of the proposed development on it, cannot be accurately determined. The depth and complexity of values assigned to heritage resources in this landscape is beyond the scope of this report for the EIA, but should be further developed in the EIA process through stakeholder engagement by qualified heritage specialists to determine the full impact of the proposed development on the cultural landscape and inform mitigation accordingly.
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed WEF and therefore the potential impact

of lighting at night was not assessed at a detailed level. However, lighting requirements are relatively similar for all WEFs and as such, general measures to mitigate the impact of additional light sources on the ambiance of the nightscape were provided in the VIA (Schwartz, 2021).

- Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.
- Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil etc), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.
- Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.
- The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (e.g. of commercial mining companies) - that is not readily available for desktop studies.
- Absence of a comprehensive computerised database of fossil collections in major RSA institutions which can be consulted for impact studies.

In the case of the combined Koup 1 WEF project area bedrock exposure is often remarkably good in highly-dissected, hilly regions but is highly constrained by extensive superficial deposits in areas of low relief (e.g. NE sector of Koup 1 WEF project area), as well as, to a lesser extent, by shrubby vegetation. The project area is very extensive (> 4000 ha) and with remarkably few access roads, probably because much of the area is not currently being farmed at present. Unavoidably, only a small fraction of the entire project area could be surveyed on foot within the time available (5 days). Short days, low angle light and occasional rainy weather in winter further constrained the field survey.

Nevertheless, sufficient (c. 150-200) bedrock exposures – including many of excellent quality - were examined during the course of the five-day field study to assess the palaeontological heritage sensitivity of the main rock units represented within the combined Koup 1 and Koup 2 WEF and grid connection study area. Since access permission for sectors of the grid connection project area lying outside the combined WEF project area was not available at the time of the palaeontological field survey, these sectors are only treated at a desktop level in the present report.

Comparatively few academic palaeontological studies or palaeontological impact assessments have been carried out hitherto in this region of the Great Karoo, so any new data from impact studies here are of scientific interest. Confidence levels for this impact assessment are rated as medium, despite the unavoidable constraints of limited time and access in the project area.

3. TECHNICAL DESCRIPTION

3.1 Project Location

The proposed WEF and associated grid connection infrastructure is located approximately 55km south of Beaufort West in the Western Cape Province and is within the Beaufort West and Prince Albert Local Municipalities, in the Central Karoo District Municipality (**Figure 7**).

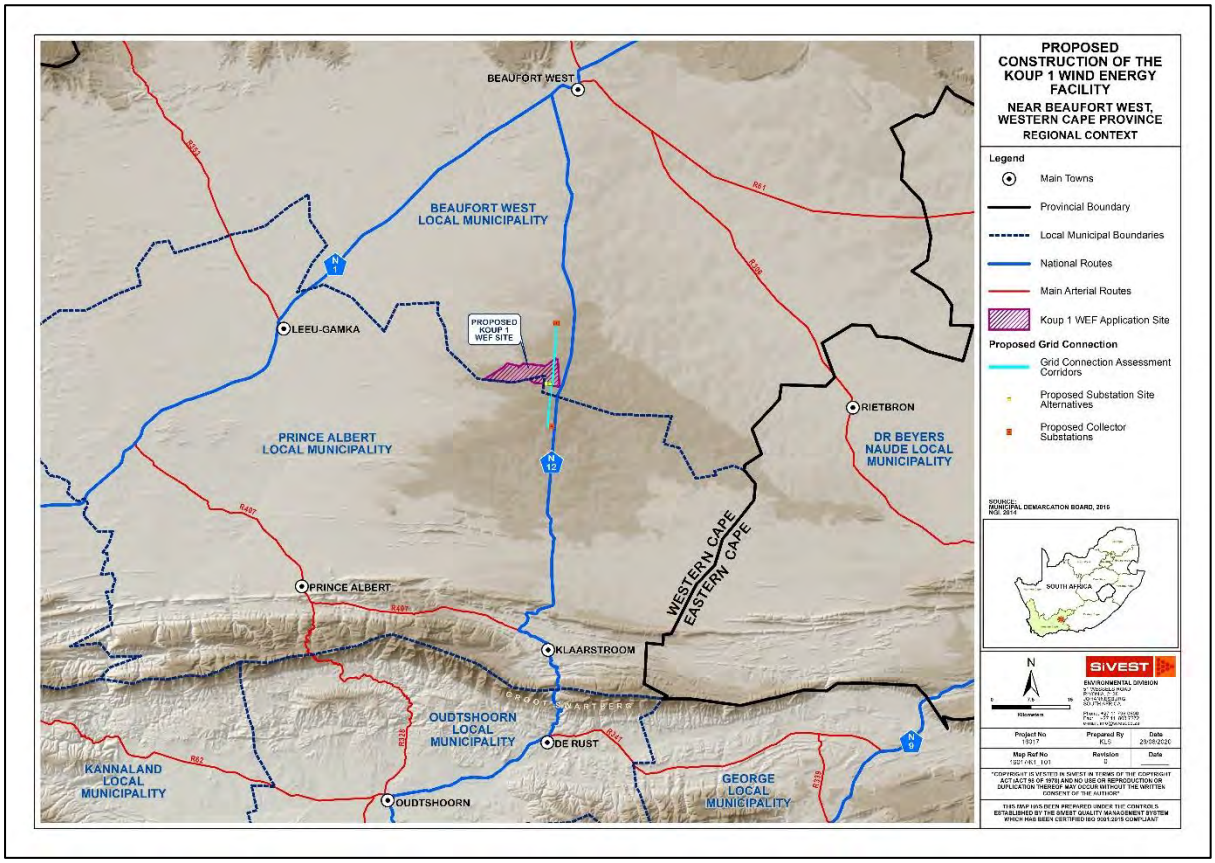


Figure 7: Regional Context Map

3.1.1 WEF

The WEF application site as shown on the locality map below (**Figure 8**) is approximately 4279.398 hectares (ha) in extent and incorporates the following farm portions:

- The Farm Riet Poort No 231
- Portion 11 of the Farm Brits Eigendom No 374
- Portion 15 of the Farm Brits Eigendom No 374

- Portion 5 of farm 380
- Portion 10 of farm 380
- Portion 11 of farm 380

A smaller buildable area (2445.667 ha) has however been identified as a result of a preliminary suitability assessment undertaken by Genesis and this area is likely to be further refined with the exclusion of sensitive areas determined through various specialist studies being conducted as part of the EIA process.

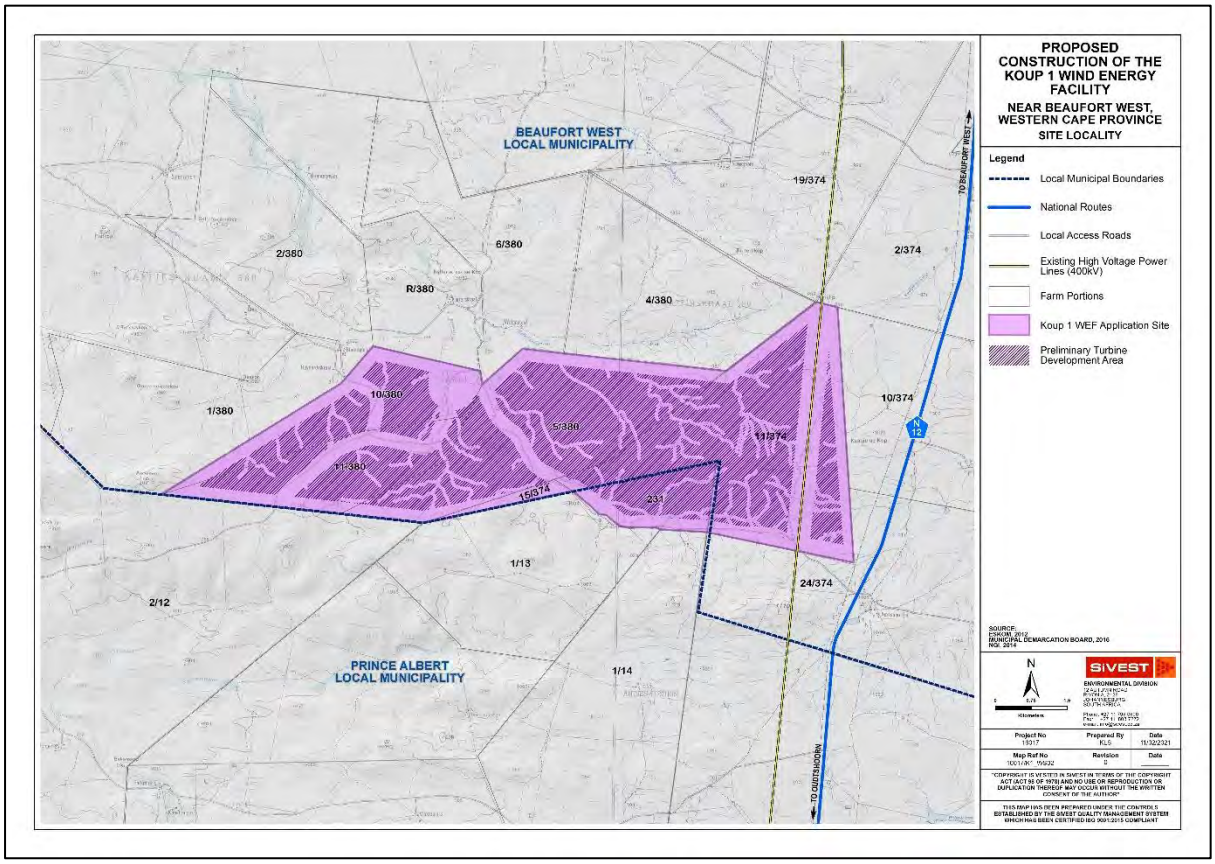


Figure 8: Koup 1 WEF Site Locality

3.1.2 Grid Connection

At this stage, it is proposed that a 132kV overhead power line will connect the Koup 1 WEF on-site switching substation / collector to the national grid either by way of an off-site collector substation, or via a direct tie-in to existing 400kV transmission lines that traverse the Koup 1 WEF project site (**Figure 9**). Three route options have been assessed.

The finalised project proposal has considered the sensitivities identified during the 2021 field assessment. Grid Option 1 was not feasible as Eskom won't allow two collectors within a small radius, while Grid Option 3 has been eliminated because of identified bird nests. The route of the chosen Grid Option 2 is shown in **Figure 10**.

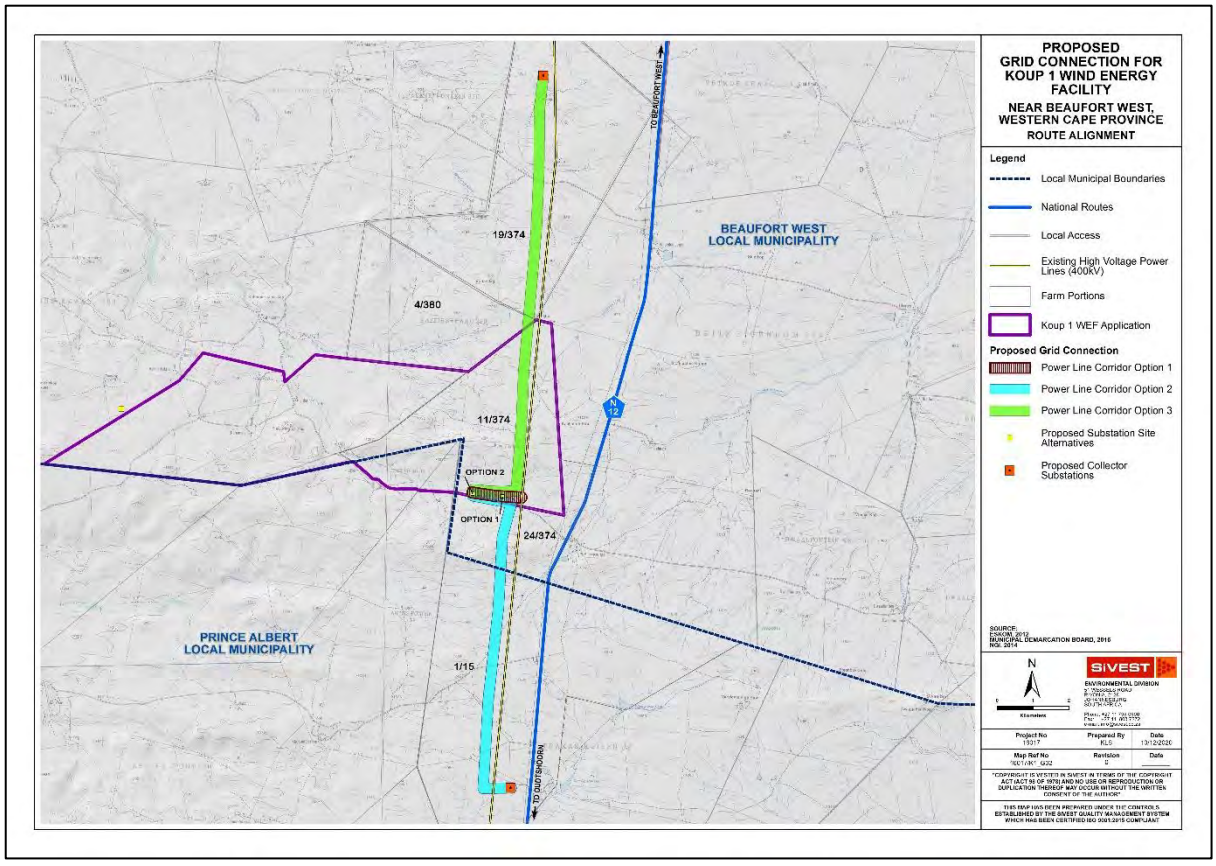


Figure 9: Proposed 132kV Power Line Route Alignments originally considered as part of the assessment process.

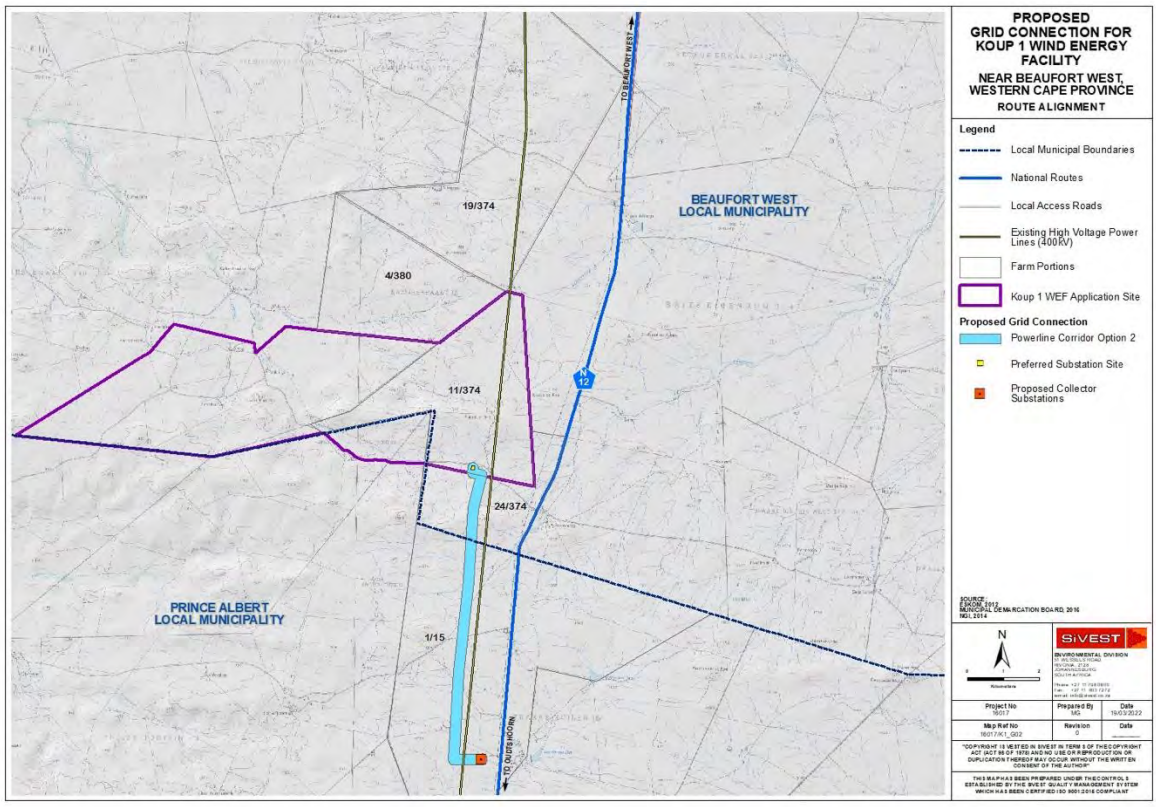


Figure 10: Final proposed 132kV Power Line Route Alignment (Option 2) for Koup 1.

3.2 Project Description

It is anticipated that the proposed Koup 1 WEF will comprise twenty-eight (28) wind turbines with a maximum total energy generation capacity of up to approximately 140MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. A BESS will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

3.2.1 Wind Farm Components

- Up to 28 wind turbines, each between 5.6MW and 6.6MW, with a maximum export capacity of approximately 140MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process;

- Each wind turbine will have a hub height and rotor diameter of up to approximately 200m;
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 90m x 50m (total footprint of approx. 4 500m2) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development;
- Each wind turbine will consist of a foundation of up to approximately 15m x 15m in diameter. In addition, the foundations will be up to approximately 3m in depth;
- Electrical transformers adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to 33kV;
- One (1) new 33/132kV on-site substation and/or combined collector substation, occupying an area of approximately 1.5 ha . The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in the WEF EIA and in the grid infrastructure BA (substation and 132kV overhead power line) to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom. The current applicant will retain control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction ;
- The wind turbines will be connected to the proposed substation via medium voltage (33kV) cables. Cables will be buried along access roads wherever technically feasible.
- A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks;
- Internal roads with a width of between 8m and 10m will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via an existing gravel road from the N12 National Route;
- One (1) construction laydown / staging area of up to approximately 2.25ha. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town;
- One (1) permanent Operation and Maintenance (O&M) building, including an on-site spares storage building, a workshop and an operations building to be located on the site identified for the construction laydown area.
- A wind measuring lattice (approximately 120m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions;
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height; and

- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.

3.2.2 Grid Components

The proposed grid connection infrastructure to serve the Koup 1 WEF will include the following components:

- One (1) new 33/132kV on-site substation and/or collector substation, occupying an area of up to approximately 1.5 ha. The proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in both the EIA for the WEF and in the BA for the grid infrastructure to allow for handover to Eskom. The applicant will remain in control of the low voltage components (i.e. 33kV components) of the substation, while the high voltage components (i.e. 132kV components) of this substation will likely be ceded to Eskom shortly after the completion of construction; and
- One (1) new 132kV overhead power line connecting the on-site and/or collector substation either to an off-site collector substation, or via a direct tie-in to the existing 400kV overhead power lines and thereby feeding the electricity into the national grid. Power line towers being considered for this development include self-supporting suspension monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be approximately 25m.

3.3 Layout alternatives

3.3.1 Wind Energy Facility

Design and layout alternatives will be considered and assessed as part of the EIA. These include alternatives for the Substation locations and also for the construction / laydown area. The site alternatives considered are shown in **Figure 11** and the final proposed layout is shown in **Figure 12**.

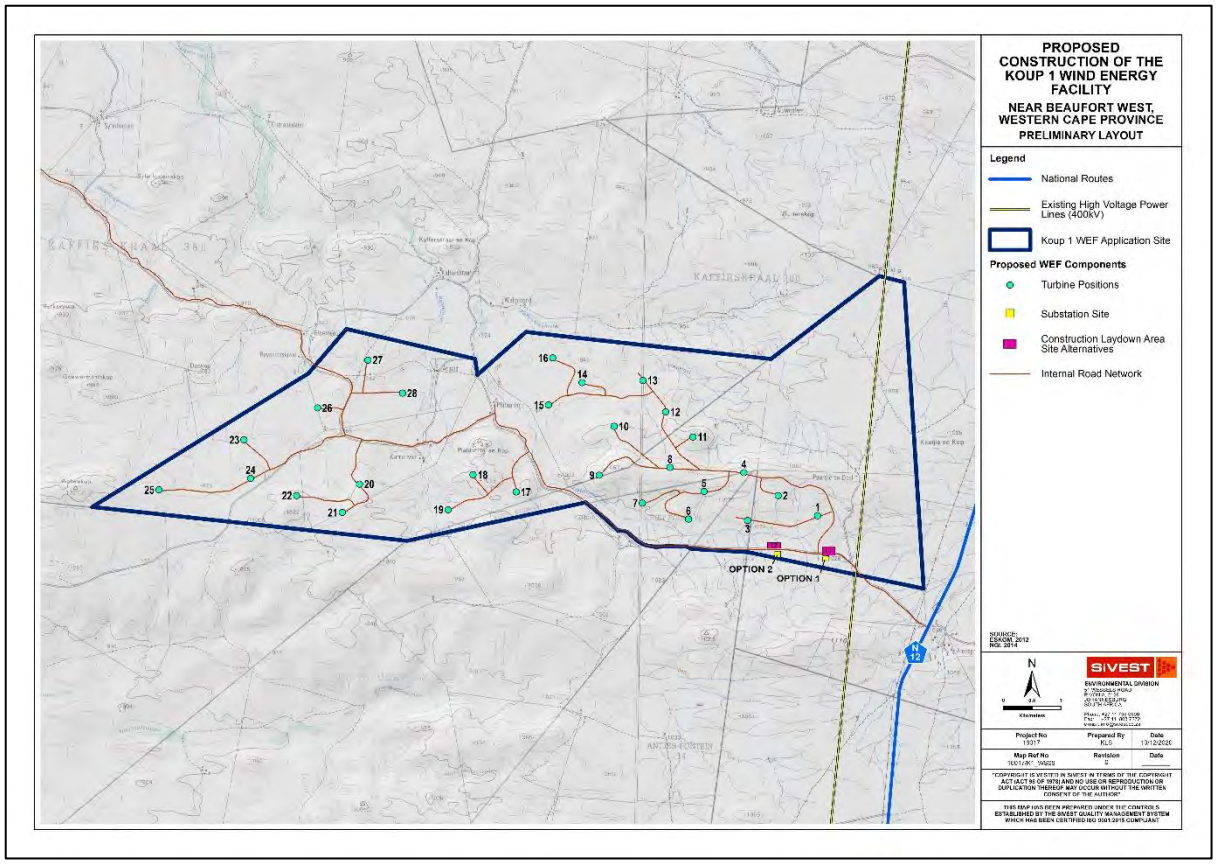


Figure 11: Alternatives originally proposed and considered as part of the Koup 1 WEF assessment process.

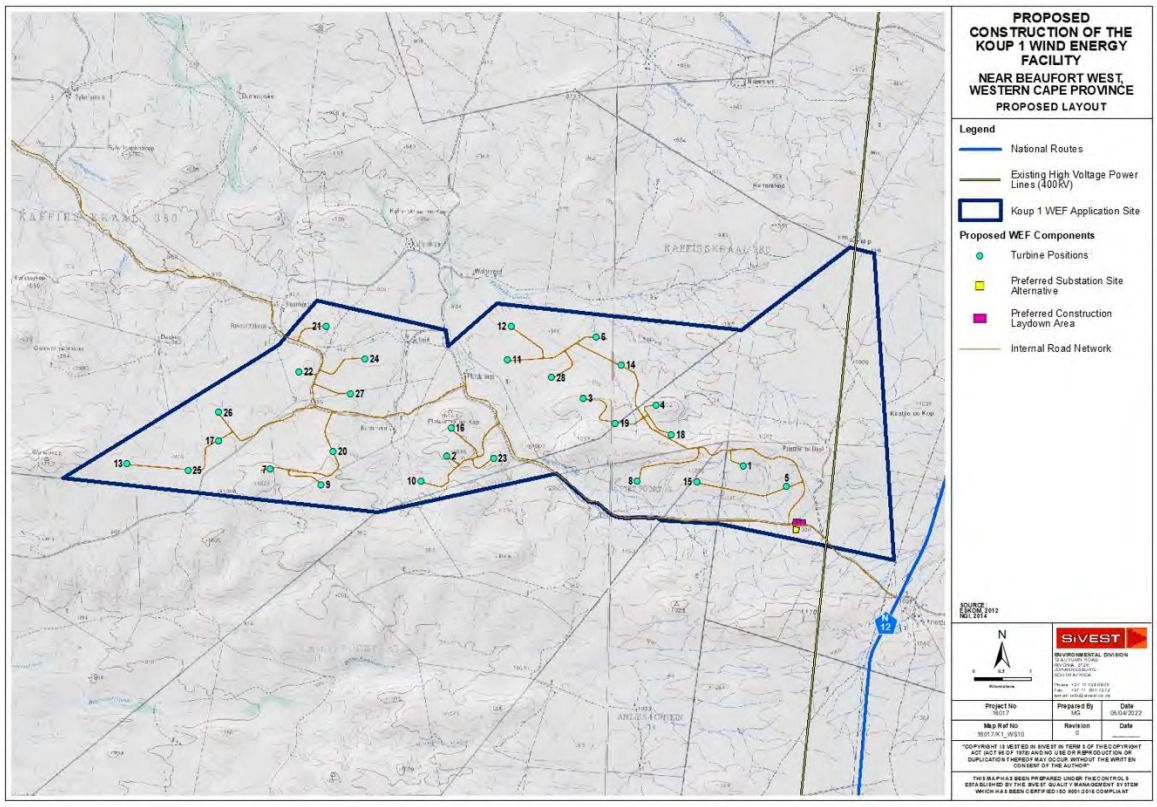


Figure 12: Final Proposed Layout for the Turbines, Construction Laydown Area, and Substation Site Positions for Koup 1.

3.3.2 Grid Components

The grid connection infrastructure proposals include two (2) switching and collector substation site alternatives and three (3) power line route alignment alternatives (**Figure 4**). These alternatives will be considered and assessed as part of the BA process and will be amended or refined to avoid identified environmental sensitivities.

All three (3) power line route alignments will be assessed within a 300m wide assessment corridor (150m on either side of power line). These alternatives are described below:

- Power Line Corridor Option 1 is approximately 1.3km in length, linking either substation / collector Option 1 or Option 2 to the existing 400kV transmission lines.
- Power Line Corridor Option 2 is approximately 9.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the south, adjacent to the existing 400kV transmission lines.

- Power Line Corridor Option 3 is approximately 12.9km in length, linking either substation / collector Option 1 or Option 2 to a proposed Collector Substation to the north, adjacent to the existing 400kV transmission lines.

As shown in **Figure 10**, the chosen grid connection is Option 2.

3.3.3 No-go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF and / or grid connection infrastructure projects. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

4. LEGAL REQUIREMENT AND GUIDELINES

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

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

4.1.1 Section 35 – Archaeology, Palaeontology and Meteorites

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

4.1.2 Section 36 – Burial Grounds & Graves

A section 36 permit application is made to the HWC or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and must conserve and generally care

for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. HWC must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the following conditions:

Permitting requirements for burial grounds and graves older than 60 years (prehistoric) and historic burials to the HWC:

a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves.
b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
d) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

4.1.3 Section 38 HIA as a Specialist Study within the EIA in Terms of Section 38(8)

A NHRA Section 38 (Heritage Impact Assessments) application to HWC is required when the proposed development triggers one or more of the following activities:
Permitting requirements for demolition of built environment features:

a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of a site,
    i. exceeding 5 000 m2 in extent; or
    ii. ii. involving three or more existing erven or subdivisions thereof; or
    iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
d) the re-zoning of a site exceeding 10 000 m2 in extent; or

e) any other category of development provided for in regulations by HWC or a provincial heritage resources authority

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

This is an HIA submitted to the relevant authority in terms of Section 38(8) of the National Heritage Resources Act. The commenting authority is the HWC.

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

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

- The identification and mapping of heritage resources in the area affected
- The assessment of the significance of such resources
- The assessment of the impact of the development on the heritage resources
- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development
- Consideration of alternatives
- Plans for mitigation in the future

The identification and evaluation of cultural landscapes for this EIA has been conducted according to the NHRA. While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and ”landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, some of the points in Section 3(3) speak directly to cultural landscapes.

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998), as amended (NEMA), the project is subject to a BA. The present report provides the cultural landscapes assessment component. HWC is required to provide comment on the proposed project to facilitate final decision making by the DFFE. The relevant sections of legislation are included here to

emphasize the detail and definitions on what qualifies as cultural landscapes, intangible heritage and living heritage.

4.1.4 NHRA definitions of terms applicable to assessment of cultural landscape:

Heritage resources are protected under the NHRA. As part of this assessment, resources were, as far as possible, assigned sensitivity ratings according to Section 3(3) of this act, which provides a guideline for evaluating the cultural significance of heritage resources according to the following criteria:

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

Cultural heritage values (significance) as outlined in the NHRA, refers to qualities and attributes possessed by places or objects: these values can be aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance; for the past, present and future generations. These values may manifest themselves in places and physical features but can also be associated with intangible qualities such as people's associations with or feelings for a place or item or other elements such as cultural practices, knowledge, songs, legends and stories.

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

This guide is meant for those who work in Protected Areas and manage cultural heritage resources. The guide should be used together with the National Heritage Resource Act, 1999 (Act No 25 of 1999) (NHRA), the National Environmental Management Act: Protected Areas Act, 2003 (Act No. 57 of 2003), the South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Agency

(PHRA) Guidelines on Norms and Standards. In lieu of minimum standards guidelines for cultural landscapes assessment specifically in South African legislation, the CHG offers cultural heritage survey guidelines and assessment tools that can be used for the purposes of CLA's in the EIA process.
Tools for inventories of different categories of cultural heritage resources

- Intangible Cultural Heritage Types:
    - Elements of folklore and traditional crafts
    - Elements of oral tradition
- Cultural Landscapes Characteristics:
    - processes – spatial pattern, land uses, response to natural features and cultural traditions
    - components – circulation, boundaries, vegetation, structural types, cluster arrangements, archaeological types, small-scale elements
    - perceptual qualities – views and aesthetics

4.1.6 Spatial Development Frameworks and Heritage Surveys

The Western Cape Provincial Government: Heritage and Scenic resources: Inventory and Policy Framework for the Western Cape, September 2014 Version 5 by Winter & Oberholzer, identifies and grades the scenic resources within the Western Cape. The aim of the framework study was so that cultural and scenic resources of significance could be identified and rated so that they could be included in all Spatial Development Frameworks (SDF's) to avoid inappropriate planning applications. The Winter & Oberholzer (2014) study focuses on the regional level. The Central Karoo District Municipal Spatial Development Framework (2019) recognises the landscape character, scenic assets and built environment heritage resources of the region as "excellent scenic" and "sense of place, heritage and tourism assets… in its landscape quality". Further it emphasizes the need to protect the sensitive biodiversity and water catchment conservation areas in the region. The Beaufort West Municipal Spatial Development Framework (2013, CNdV Africa) recognises the need for sensitivity in scale for wind farm developments on the local area and does a rudimentary inclusion of the Desktop Beaufort West Heritage Survey by Abrahamse with Bridgman (2013), which considered the built environment and cultural landscape of the Beaufort West municipality.

4.1.7 Scenic Routes

A scenic route is usually a public street designated as a scenic drive by a governing body in recognition of the high visual amenity alongside that public street, including background vistas of a mountain, open country, a coastline or a town; usually in the form of a scenic drive, but which could also be a railway, hiking trail, horse-riding trail or 4x4 trail. Although not directly stipulated in the NHRA, "scenic routes" are considered as a category of heritage resource in the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for involving heritage specialists in the EIA process, and Baumann and Winter (2005) comment that the visual intrusion of development on a scenic

route should be considered a heritage issue. The Central Karoo SDF and the Beaufort West SDF recognise the N12 as an important scenic route with significant viewsheds that need to be protected from insensitively-scaled development.

4.1.8 World Heritage Convention

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

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

Cultural landscapes fall into three main categories, namely:

- The most easily identifiable is the clearly defined landscape designed and created intentionally by man. 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.
- The second category is the organically evolved landscape. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:
- a relict (or fossil) landscape is one 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 is one 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.
- The final category is the associative cultural landscape. The inscription of such landscapes on the World Heritage List is justifiable by the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent.

4.1.9 Notice 648 of the Government Gazette 45421

Although minimum standards for archaeological and palaeontological assessments were published by Heritage Western Cape (2021), GN.648 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this Government Notice (GN) are listed in Table 3 and the applicable section in this report noted. The screening tool indicated a low archaeological and cultural heritage significance (**Figure 13** and **Figure 14**).

Table 3 : Reporting requirements for GN648

GN 648	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	Section 7	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Section 6	-
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;	Section 6	-
2.3(b) contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	Section 6 provides a description of the current use and confirms/doesn't confirm the status in the screening report.	-

Separate screening reports are included in the AIA and PIA appendices for the project.

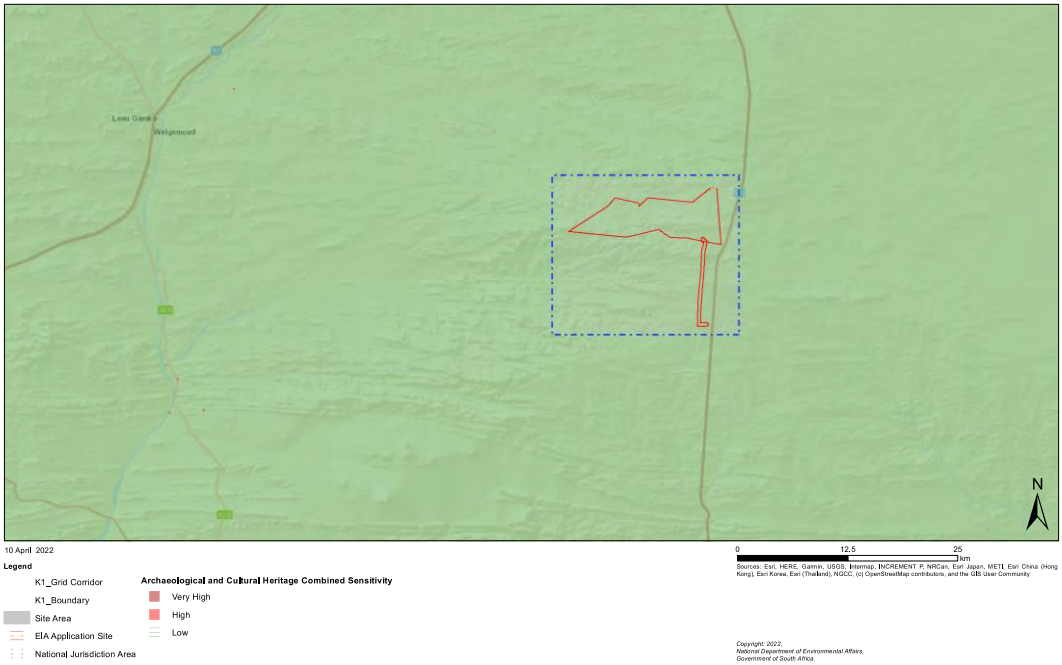


Figure 13: Archaeological sensitivity map for the Koup 1 WEF project area abstracted from the DFFE Screening tool

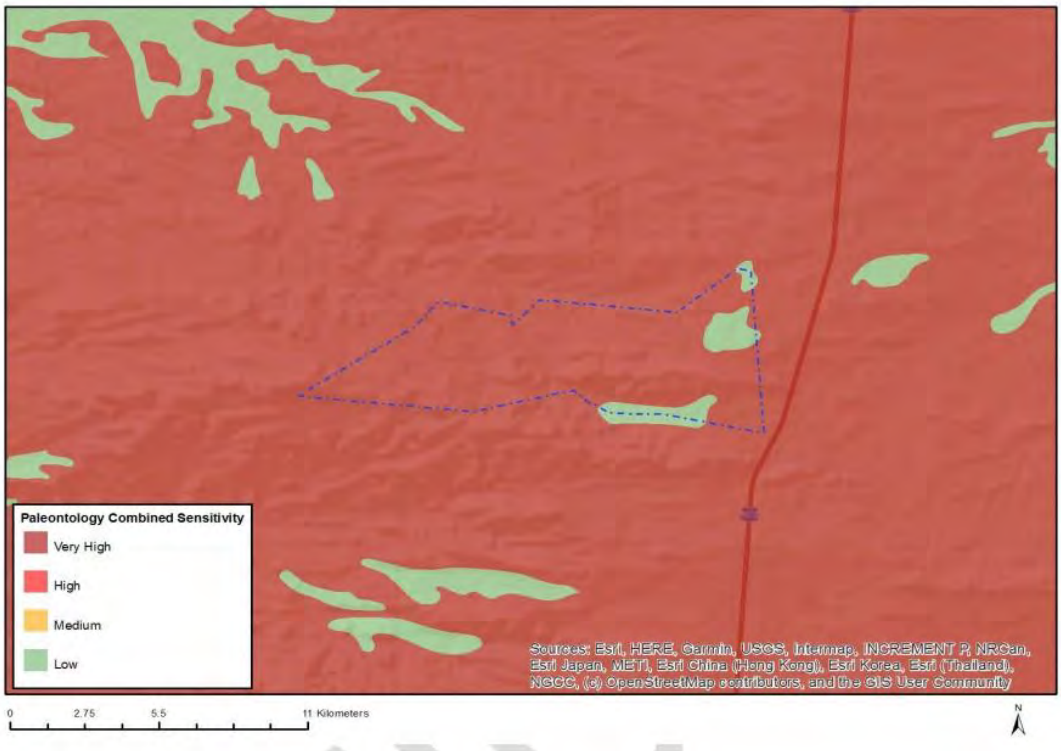


Figure 14: Paleontological sensitivity map for the Koup 1 WEF project area abstracted from the DFFE Screening tool

4.1.10 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) Appendix 6 requirements for specialist reports as indicated in the table on page vi and vii of this report.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The proposed development area is located approximately 55km south of the town of Beaufort West in the Western Cape Province. The study area is located within an arid and sparsely vegetated region of the Karoo which is currently experiencing a drought (**Figure 15**). This has resulted in farms in the area being restricted to farming small numbers of livestock, which include Dorper sheep, cattle and game which included kudu, gemsbok, and small buck.

The study area is underlain by Karoo Supergroup sedimentary rocks. Rock types encountered include mudstones, siltstone, carbonates, and fine-grained sandstones, some of which have been silicified and metamorphosed. The hilly terrain and flat plains (**Figure 17**) have undergone extensive erosion with the development of scree slopes and rocky gullies (**Figure 16**). The low lying flat sandy plains (often bioturbated; with areas of sheet wash) are frequently cut by ephemeral streams.

The vegetation of the study area is typical of the Nama-Karoo biome and comprised grasses, stunted shrubs and thorn trees which are established along stream courses (Palmer & Hoffman, 1997; **Figure 18**). Therefore, the archaeological visibility of the area was ideal for surveying.

The study area is serviced by the formal N12, graded gravel roads and farm tracks (**Figure 20**). Existing infrastructure includes farmsteads with associated structures, fences, windmills, and dams. Radio masts, telephone towers and trigonometric beacons were observed on hills.

Figure 15: Regional Koup landscape with Nieuweveld Mountain range on the horizon and typical farmstead landscape planting and fencing in foreground.

Figure 16: General regional view of landscape from the top of a ridge within the study area (facing SE).

Figure 17: Typical hillock observed within the study area.

Figure 18: Sparsely vegetated flat plain with scattered rock fragments (facing north).

Figure 19: Flat plain with gravel surface in the north-western section of the WEF.

Figure 20: Main gravel farm road.

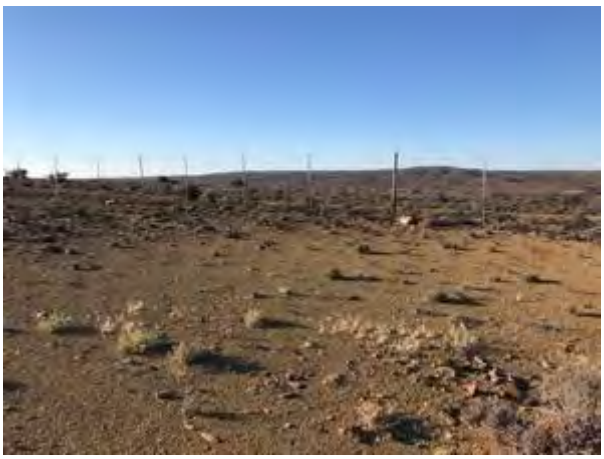


Figure 21: Example of farm fencing within the study area.

Figure 22: Proposed area for substation site option 1 (facing east towards N12).

Figure 23: Proposed area for substation site option 2.

6. BACKGROUND RESEARCH

This section seeks to describe the historical origins of the receiving environment.

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an internet literature search was conducted, and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

6.1 Archival/Historical Maps

Historical topographic maps (1:50 000) for various years (1965, 1987, 2005) were available for utilisation in the background study. These maps were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA.

There were several structures identified within the vicinity of the proposed development area. Most of the structures were identified as farmsteads are illustrated in the 1965 topographic map 3222CD (**Figure 24, Figure 25**).

6.1.1 1: 50 000 Topographical Map 3222DC and 3222CD - First Edition 1965

A section of the First Edition of the 3222DC and 3222CD Topographical Sheet is depicted in **Figure 24** and **Figure 25.** This map sheet was based on aerial photography undertaken in 1962, was surveyed in 1965 and was printed by the Trigonometrical Survey Office in 1966.

Several sites containing farmsteads are depicted in the vicinity of the study area. All these identified sites are likely to be at least 56 years old.

6.2 Aspects of the area's history

6.2.1 Previous Heritage Studies in area

It is well known that the Karoo contains a long and rich archaeological record dating from the ESA to the historic period. However, vast areas of the region have yet to be subjected to systematic analytical research.

Scatters of ESA through to LSA artefacts have been widely reported in the general vicinity of Beaufort West. This is a result of the erosional nature of the environment, which tends to leave artefacts exposed on the surface rather than buried beneath layers of sediment. To date, heritage studies in the area have shown that these artefacts have occurred in secondary contexts, often associated with gravel deposits, having been subjected to erosion of the soils in which they were once deposited (Dreyer 2005; Halkett 2009; Kaplan 2006, 2007; Orton 2010; Webley & Hart 2010a, 2010b; Webley & Lanham 2011). Although context is generally poor, the Karoo is still regarded as a region that is very rich in archaeological and historical heritage.

Historical resources, such as farmsteads, kraals and graves, are also observed within the Beaufort West region (Halkett 2009; Webley & Hart 2010b). To the northeast of Beaufort West, rock engravings have been identified on dolerite boulders that are characteristic of parts of the Karoo (Orton, 2010; Parkington *et al*., 2008). The lack of caves and rock shelters in the Karoo region, results in the majority of archaeological sites in the area being classified as open-air sites. As such, the artefacts are generally not *in-situ* and organic remains are rarely preserved.

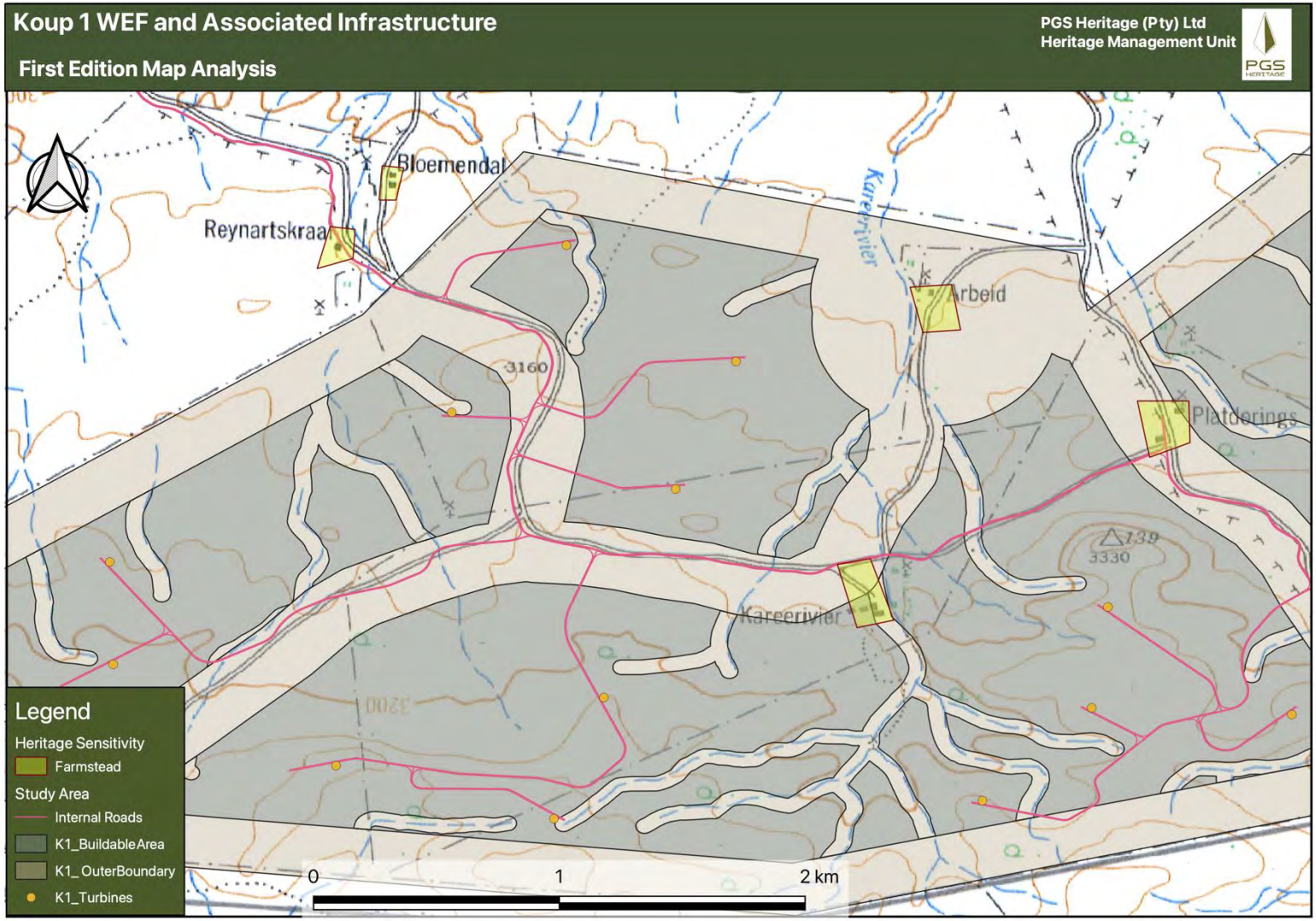


Figure 24: First Edition of 3222CD Topographic Map 1: 50 000 dating to 1965, showing the proposed Koup 1 WEF, with several possible heritage features located within and near the project area.

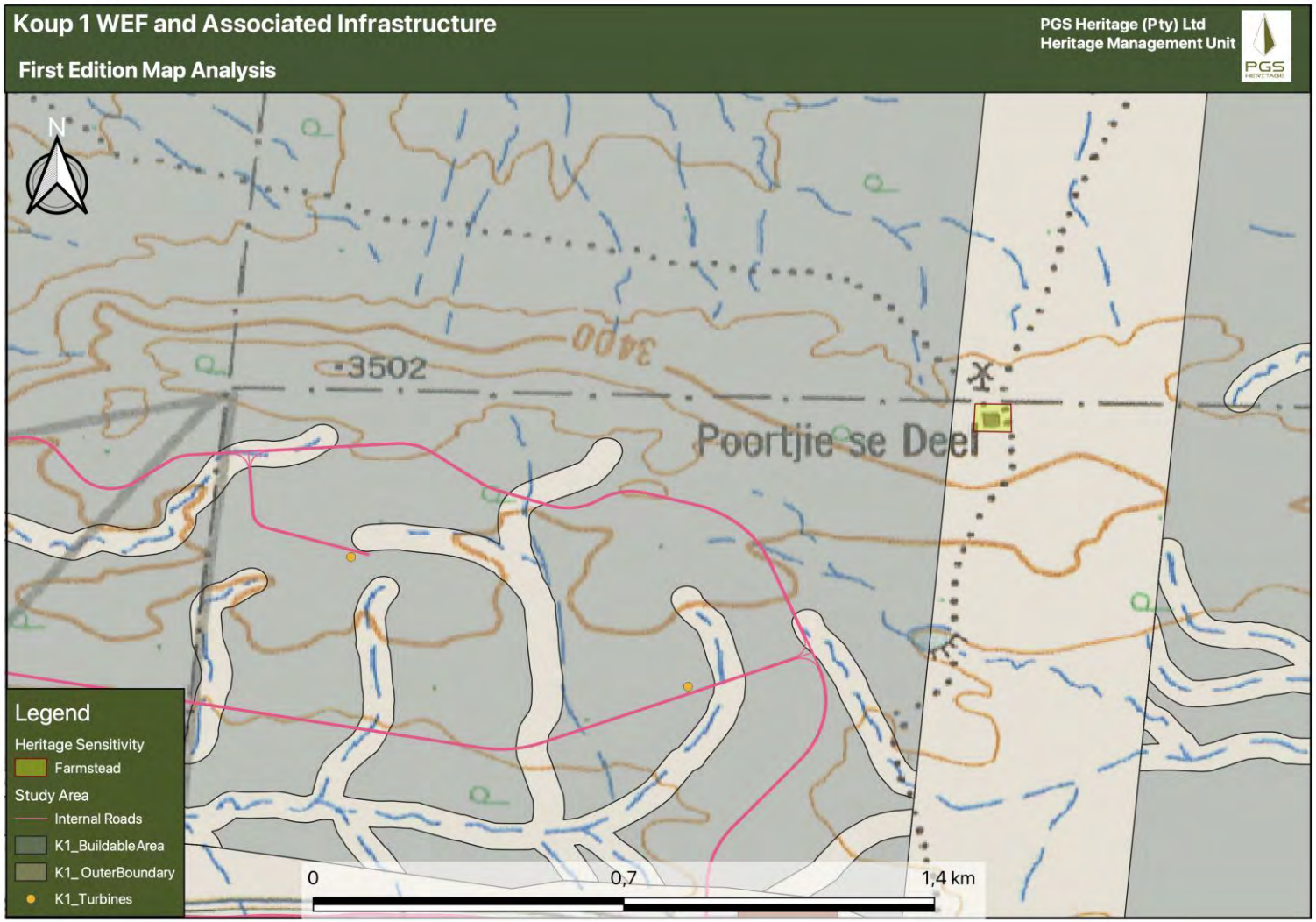


Figure 25: First Edition of 3222DC Topographic Map 1: 50 000 dating to 1965, showing the proposed Koup 1 WEF, with several possible heritage features located within the proposed grid corridor.

A review of SAHRIS has revealed that a number of other archaeological studies have been performed within the wider vicinity of the study area. The following studies were conducted around the study area of this report:

- ***Cape Archaeological Survey (CAS) cc and Associates. 2016. Heritage Impact Assessment: Proposed Construction of Two Power Lines & Three Substations for the Mainstream Wind Energy Facility. Land Parcel Beaufort West, Remainder of Farm Trakaskuilen No 15, Portion 1 Trakaskuilen No 15, Portion 1 of Witpoortje No 16.*** *CAS was appointed by SiVest Environmental Division on behalf of their client Mainstream Renewable Power South Africa (Pty) Ltd to conduct an AIA report. The study area was situated on the N12 between Beaufort West and Klaarstroom. Several MSA open sites, positioned on the summit areas of low rides and koppies, were identified. There was also a general background presence of MSA with occasional flakes or cores observed in the open. There was little evidence of LSA activity in the area. Most of the raw material used was a fine-grained chert with a reddish outer patina (grey when flaked). In terms of colonial period archaeology, there were several farm complexes with buildings, historic dumps and derelict structures. The area hadn't been systematically studied or researched, so the archaeological sensitivity of the proposed wind farm on archaeological features was seen as high.*
- ***Dreyer, C. 2005. Archaeological and historical investigation of the proposed residential developments at the farms Grootfontein 180 & Bushmanskop 302, Beaufort West, south-western Cape.*** *The study area is located approximately 20km west of Beaufort West. Scattered and isolated lithics were found in the area. A trihedra, Acheulian or Victoria West I handaxe, a bifacial worked Oldowan chopper with minimal retouch, a number of isolated flakes and core flakes and several small assemblages of LSA scrapers were identified. On the flood plain near the Sand River, fragments of ostrich eggshell and one single ostrich eggshell bead were also identified.*
- ***Fourie, W. 2018. AIA: Proposed Construction of a Linking Station, two (2) Power Lines and two (2) On-site Substations for the Beaufort West and Trakas Wind Farms, near Beaufort West in the Western Cape Province.*** *PGS Heritage (Pty) Ltd (PGS) was appointed by SiVEST to undertake an Archaeological Impact Assessment (AIA). The study area was located approximately 50km south of Beaufort West. Two archaeological sites and seven findspots were identified. The archaeological resources identified during the fieldwork comprised a large number of Stone Age surface artefact scatters. These were primarily from the MSA, although both LSA and earlier ESA material was identified. All of these artefact assemblages occurred in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.*
- ***Halkett, D. 2009. An archaeological assessment of uranium prospecting on portions 1, 3 and 4 of the farm Eerste Water 349, and remainder of the farm Ryst Kuil 351, Beaufort West.*** *ACO Associates was appointed by Ferret Mining and Environmental Services (Pty) Ltd*

to undertake a scoping survey. Heritage sites were quite sparse in the area. Pre-colonial stone age sites (ESA, MSA and LSA) and colonial sites related to farming and settlement (incl. cemeteries, small ruined dwellings, stone kraal, fragments of annular ware and transfer printed refined earthenware ceramics) were identified. There were patinated and polished ESA/MSA artefacts made of hornfels and siltstone. LSA material is rarer but one scatter of LSA material was identified in close proximity to a dry river course.

- ***Kinahan, J. 2008. Archaeological Baseline Survey of the Proposed Ryst Kuil Uranium Project.*** *Kinahan was appointed by Turgis Consulting (Pty) Ltd on behalf of UraMin-Mago-Lukisa JV Company (Pty) Ltd to cnduct an archaeological baseline survey. The study area was located approximately 45km southeast of Beaufort West. In general, the study area was characterised by a low density of surface material, with much displacement by sheet erosion. None of the ESA material (isolated quartzite artefacts) were in-situ as all showed evidence of fluvial transport. Isolated MSA finds were observed. These finds probably formed part of a continuous surface scatter but lateral disturbance may have greatly exaggerated the distribution and number of these sites. The lack of focal points in the landscape means that there were no major MSA site concentrations. MSA artefacts were dominated by quartzite and hornfels. There was also some evidence of Levallois core production and a few Howieson's Poort segments found at a number of sites. Isolated and local scatters of LSA materials were also apparent. A number of these sites were associated with lithic raw material sources (chert and hornfels outcrops). Late pre-colonial sites included a number of suspected hut circles and short lengths of stone walling, as well as possible burial cairns. Historic stone structures (dry-stone construction and mud-brick construction) along with imported items (crockery and rifle cartridges) were also noted.*
- ***Nilssen, P. 2011. Archaeological Impact Assessment. Proposed Beaufort West Photovoltaic (Solar) Park: southern portion of properties; 2/158 Lemoenkloof, RE 9/161 Kuilspoort, RE 162 Suid-lemoensfontein and RE 1/163 Bulskop, Beaufort West, Western Province.*** *The study area was approximately 8km south east of Beaufort West. The finds included numerous isolated and very low-density scatters of Stone Age artefacts ranging in age from the ESA to the LSA. Due to their temporally mixed nature and the absence of other faunal/cultural remains, these finds were considered to be of low heritage significance. There were also several archaeological occurrences that represented isolated events that were recorded as medium to high heritage significance.*
- ***Orton, J. 2011. Heritage Impact Assessment for a proposed Photo-Voltaic Facility on Steenrots Fontein 168/1, Beaufort West Magisterial District, Western Cape. University of Cape Town: Archaeology Contracts Office.*** *The UCT Archaeological Contracts Office was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct a HIA. Most of the archaeological material was likely MSA (background scatters) and the artefacts were*

generally weathered. Historical material included fragments of a bottle and fragments of an annular ware bowl. All of the finds were recorded as low significance.

- ***Webley, L. & Halkett, D. 2015. Archaeological Impact Assessment: Proposed Uranium Mining and Associated Infrastructure on Portions of the Farms Quaggasfontein and Rystkuil* near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape.*** *Webley and Halkett were appointed by Ferret Mining & Environmental Services (Pty) Ltd, on behalf of a client, to conduct an AIA report. Archaeological material comprised small numbers of ESA artefacts, scatters of MSA and occasional LSA. The majority were manufactured on indurated shales (hornfels) and some artefacts were manufactured from a chert band. Artefact numbers were very low and of low significance. One LSA site, Site D009, was located on the banks of a little stream. Amongst the identified lithics, was a characteristic LSA drill and thumbnail scraper.*
- ***Webley, L. & Lanham, J. 2011. Heritage Assessment of the Proposed upgrade to the stormwater retention facilities at Beaufort West, Western Cape.*** *Archaeology Contracts Office (ACO) were appointed by Kayad Knight Piesold (Pty) Ltd to conduct a heritage impact assessment. No heritage resources were identified.*
- ***Vidamemoria Heritage Consultants. 2015. Heritage Impact Assessment: DR 2403 Central Karoo, Beaufort West – Central Karoo District Municipality, Western Cape.*** *Vidamemoria was appointed by Aurecon South Africa (Pty) Ltd to conduct a HIA for a proposed borrow pit. The study area was located approximately 44.5km southeast of Murraysburg. No heritage resources were identified.*
- ***Vidamemoria Heritage Consultants. 2012. Heritage Impact Assessment: DR 2308 Central Karoo, Beaufort West – Central Karoo District Municipality, Western Cape.*** *Vidamemoria was appointed by Aurecon South Africa (Pty) Ltd to conduct a HIA for a proposed borrow pit. The study area was located approximately 40km southwest of Beaufort West. Low density scatters of mixed MSA and LSA artefacts were observed in a secondary context and were of low archaeological heritage significance.*

Table 4: Summary of archival data found on the general area.

DATE	DESCRIPTION
Early Stone Age (2.5 million to 250 000 years ago)	The Earlier Stone Age (ESA) is the first phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago. Isolated ESA lithics, including occasional handaxes have been reported from the area surrounding Beaufort West, but they are generally quite ephemeral. Kinahan (2008) identified 7 ESA sites during an assessment of Ryst Kuil. He recorded isolated quartzite artefacts and

	commented that “none of the ESA material was considered to be in primary context and therefore of little research value”. No Early Stone Age sites are known within the immediate vicinity of the study area. However, this is probably due more to a lack of research on the surroundings of the study area rather than a lack of sites.
Middle Stone Age (250 000 to 40 000 years ago)	The Middle Stone Age (MSA) is the second oldest phase identified in South Africa’s archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called ‘prepared core’ technique. Within the region around Beaufort West, heritage reports have shown that MSA artefacts are widespread and occur in isolated as well as relatively dense concentrations over large areas. According to Kinahan (2008), the MSA sites in the area of his assessment (Ryst Kuil) “probably formed part of a continuous surface scatter almost without focal points”. He noted that the MSA artefacts were mainly made from quartzite and hornfels. No Middle Stone Age sites are known within the immediate vicinity of the study area. However, this is probably due more to a lack of research on the surroundings of the study area rather than a lack of sites.
Later Stone Age (40 000 years ago to the historic past)	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. According to heritage reports conducted in the region, LSA artefacts are not as common as ESA and MSA stone artefacts in the area. Artefacts are generally made from hornfels and in some cases chert which was most likely sourced from a chert horizon that caps some of the low hills in the area. LSA artefacts are generally located close to dry river courses (Kinahan, 2008; Halkett, 2009). There have also been hut circles and stone kraals identified which have been interpreted as representing pre-colonial pastoralist groups. No Later Stone Age sites are known in the vicinity of the study area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the study area than a lack of sites.
17th – 19th Century	Beaufort West historically was an important centre for sheep farming, trade and transport. This was also an area of interaction between various cultural groups. During the eighteenth and early nineteenth century the Koup was one of the last refuges of the San. A shortage of surface water meant that populations of San hunter-gatherers, and later Khoekhoe pastoralists were confined to areas with springs. During the second half of the 18th century, farmers started moving northward into the Karoo, settling in areas known as the Nuweveld and the Koup (**Figure 26**, **Figure 27**).

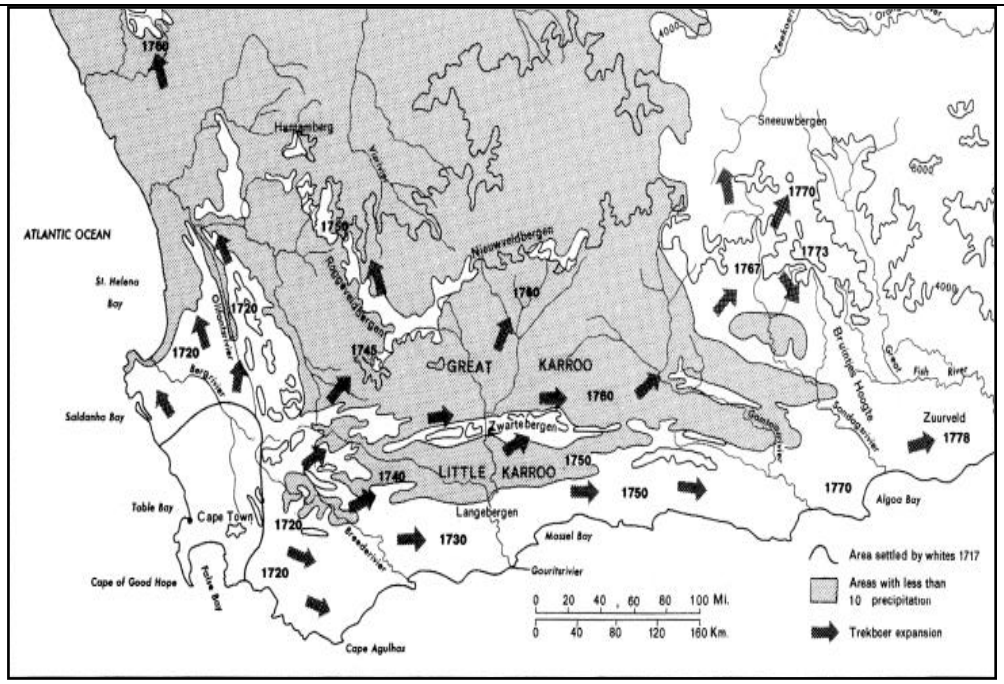
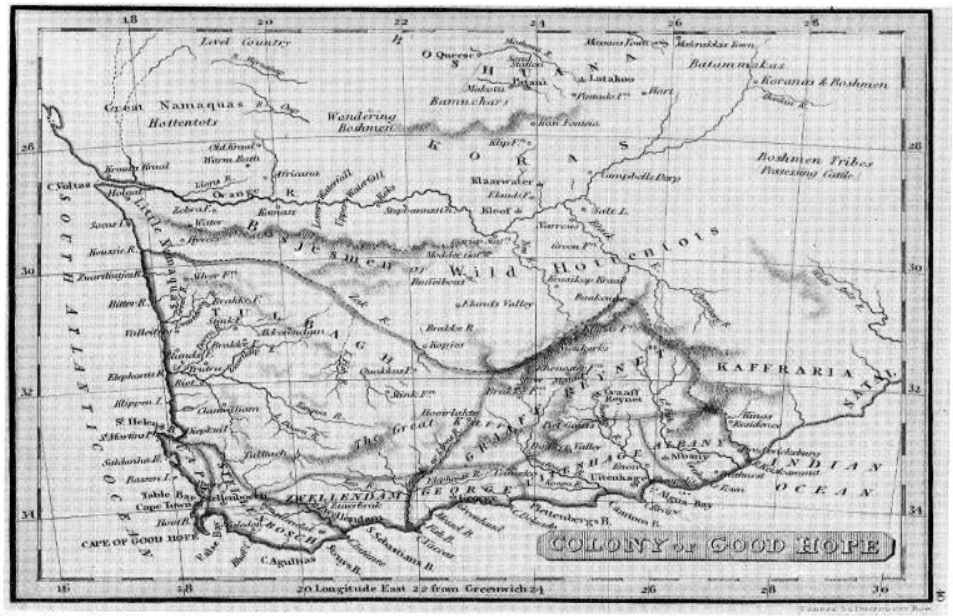


Figure 26: Trekboer and colonial expansion by 1717-1788 in the study region (Reference: Guelke & Shell 1992: 818).



The Cape Colony, 1820

Figure 27: Early map of the Cape illustrates the expansion of farmers towards the east and northeast Karoo (Reference: Watson, R.L. 1990).

The movement of small groups of Xhosa into the Karoo during the 18th century resulted from a century of frontier wars in the Eastern Cape. The movement of Xhosa into the Karoo accelerated subsequent to the great cattle killing of 1856 and 1857. Many Xhosa migrated into the Karoo in search of work in order to survive. Many of these migrants fleeing starvation in the devasted

	lands east of the Kei River helped build some of the beautiful stone kraals that have become a feature of the Karoo. The Koup[1] and Nieweveld were regional names given to the Karoo interior prior to the establishment of towns Graaff Reinet and Beaufort West. The first European settlers, the trekboers, moved inland from the Cape in the early 1700s, as arable land closer to Cape Town became scarce and to escape the perceived overbearing control of the Dutch landdrosts (**Figure 28**). The first official land grants had to be large enough to support stock farming (mostly sheep) within this semi-arid region, and thus the first farmers were given loan farms of 300 morgen each. As a result, the area remained sparsely populated, although it hosted parties of hunters who moved through the region periodically in search of big game. In these conditions, the farmers had to be completely self-sufficient due to their distance from any towns or law officials. In the early years of the 19th Century after the British Occupation at the Cape, it was decided to create a new "sub-landdrost" between Tulbugh and Graaff-Rienet to address some of the violence and unrest in this region. A landdrost, an institution of Dutch origin, was a post created in the newly settled districts of the colony that extended rights to collect tax, police, prosecute and carry out sentences to a local representative of the government authority. When the two landdrosts from Tulbagh and Graaff-Reinet – J.H. Fisher and Andries Stockenstrom – were sent to select a suitable site for the new landdrost, they chose an area of one of the first treckboers to the area, Abraham de Clercq's farm, Hooyvlakte, with its permanent source of water, upon which to locate the new town. His farm had five springs on it, and both the Gamka and Kuils rivers ran through the land, which as a result was extremely fertile: Baird writes that de Clercq was able to cultivate orchards and vineyards – something that would have been unachievable on most other farms in the region due to the aridity of the area and the reliance on groundwater (2007: 29). Once Beaufort West was established as a town, it remained very isolated within the region. Even in 1900, Beaufort West was fairly isolated from the surrounding church and mission towns that had been established in the Cape Colony.

1 Also spelt 'Coup', 'Ghaup' and 'Gouph' in early written records. 'Koup' has been suggested to mean tail fat or 'stertvet' most likely related to the local fat-tailed sheep, the livestock of indigenous pastoralists.

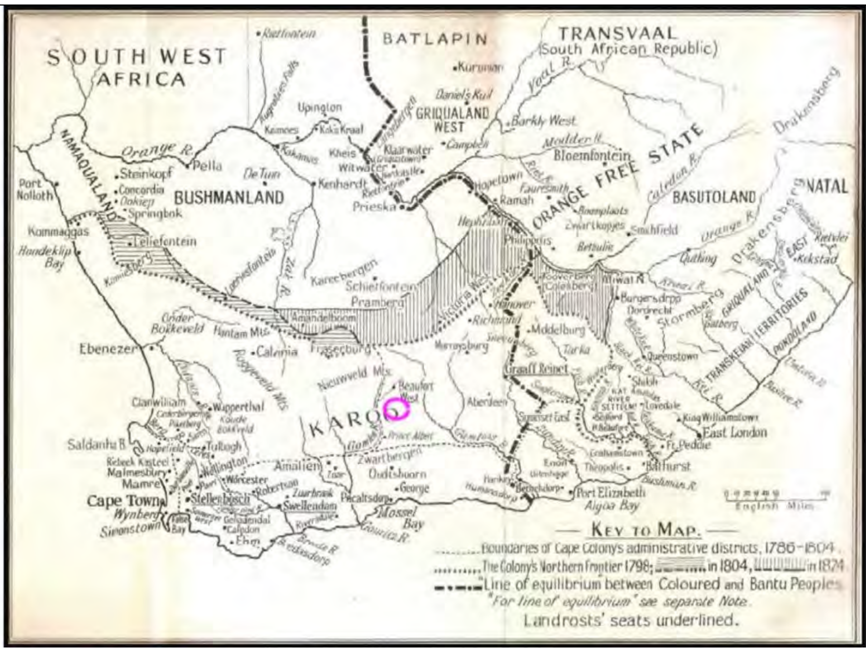


Figure 28: C19th Cape Frontier map (Marais, 1935) showing approximate location of Koup WEF (pink).

6.3 Palaeontological context

The eastern margins of the project area (eastern sector of Koup 1 WEF project area *plus* much of grid line project area) lie on the margins of the Aberdeen *Vlaktes*, an ancient peneplanated land surface of possible Miocene age (Partridge & Maud 1987). Relief here is generally low, with gentle hillslopes largely mantled with colluvium (scree, hillwash). Elevations are around 1000 to 1100 m amsl. in this region which forms a watershed between west- and east-flowing drainage systems. Bedrock exposure here is localized and often very poor due to the pervasive mantle of Late Caenozic superficial deposits such as alluvium, eluvium, sheetwash deposits and skeletal soils.

Further towards the west (central and eastern Koup 1 WEF) the terrain is more dissected, hillslopes are steeper and bedrock exposure levels are much higher, occasionally superb by southern Karoo standards. This applies even to the more readily weathered and eroded Beaufort Group mudrock facies. Several of the ridges and peaks here are named and given their concordance, most of them are probably erosional outliers of the Aberdeen *Vlakes* surface which is more extensively preserved further east. The highest elevation is Wolwekop (1022 m amsl) on southern edge of the combined WEF project area with isolated lower peaks to the north such as Turksvykop (950 m), Gouwermentskop (984), Daskop (962), Platkop (908 m), and Syfeerfonteinkop (910 m). Drainage is largely *via* intermittent flowing (non-perennial) water courses. It flows mainly to the N and NW into the major, ancient Gamka River drainage system *via* small tributaries of the Veldmansrivier such as the Kareerivier, Platdoringrivier, Pieterskraalrivier, Diepkloof and Houtbosrivier but there are also minor streams running to the west into the Gatsrivier.

The geology of the Koup 1 WEF project area is covered by 1: 250 000 geology sheet 3222 Beaufort West (Council for Geoscience, Pretoria; Johnson & Keyser 1979) (**Figure *29***). The greater part of the lower-lying terrain here is underlain by Middle Permian continental sediments of the **Abrahamskraal Formation** (Lower Beaufort Group / Adelaide Subgroup, Karoo Supergroup) (*Pa*, pale green in **Figure *29***) (Johnson & Keyser 1979, Johnson *et al.* 2006). It is likely most of the bedrocks here can be largely or entirely assigned to the mudrock-dominated **Karelskraal Member** situated at the top of the very thick Abrahamskraal Formation succession, but this requires confirmation from detailed field mapping that is beyond the scope of the present PIA study. The broadly west-east trending ridges and associated *koppies* located within the WEF project area, especially towards its southern and northern margins, are built of the conformably overlying, sandstone-rich **Poortjie Member** which lies at the base of the **Teekloof Formation** (Adelaide Subgroup) (*Pt*, dark green in **Figure *29***). The sedimentology of the Abrahamskraal – Teekloof transition has been addressed recently by Paiva (2015). Early Jurassic intrusions of the **Karoo Dolerite Suite** are not mapped within the project area but do occur closer to the Great Escarpment at Beaufort West.

The **Abrahamskraal Formation** (*Pa* in **Figure 29**) is a very thick (*c*. 2.4 km) succession of fluvial deposits laid down in the Main Karoo Basin by meandering rivers on an extensive, low-relief floodplain during the Middle Permian Period, some 268-261 million years ago (Rossouw & De Villiers 1952, Johnson & Keyser 1979, Turner 1981, Theron 1983, Smith 1979, 1980, 1990, 1993a, 1993b, Smith & Keyser 1995a, Loock *et al*., 1994, McCarthy & Rubidge 2005, Johnson *et al*., 2006, Wilson *et al.* 2014, Cole *et al.* 2016). These sediments include (a) lenticular to sheet-like channel sandstones, often associated with thin, impersistent intraformational breccio-conglomerates (larger clasts mainly of reworked mudflakes, calcrete nodules, *plus* sparse rolled bones, teeth, petrified wood), (b) well-bedded to laminated, grey-green to purple-brown floodplain mudrocks with common pedocrete horizons (calcrete nodules formed in ancient soils), (c) thin, sheet-like crevasse-splay sandstones, as well as more (d) localized playa lake deposits (*e.g.* wave-rippled sandstones, laminated mudrocks, limestones, evaporites). A number of yellowish-green to reddish-weathering, silica-rich “chert” horizons are also found. Some of these appear to be secondarily silicified mudrocks or limestones of possible lacustrine origin but at least some contain high levels of reworked volcanic ash (tuffs and tuffites). A wide range of sedimentological and palaeontological observations point to deposition under seasonally arid climates. These include, for example, the abundance of calcretes and evaporites (silicified gypsum pseudomorphs or “desert roses” *cf* Keyser 1968), reddened mudrocks, sun-cracked muds, “flashy” river systems, sun-cracked fossil bones, well-developed seasonal growth rings in fossil wood, rarity of fauna, and little evidence for substantial bioturbation or vegetation cover (*e.g.* root casts) on floodplains away from the river banks.

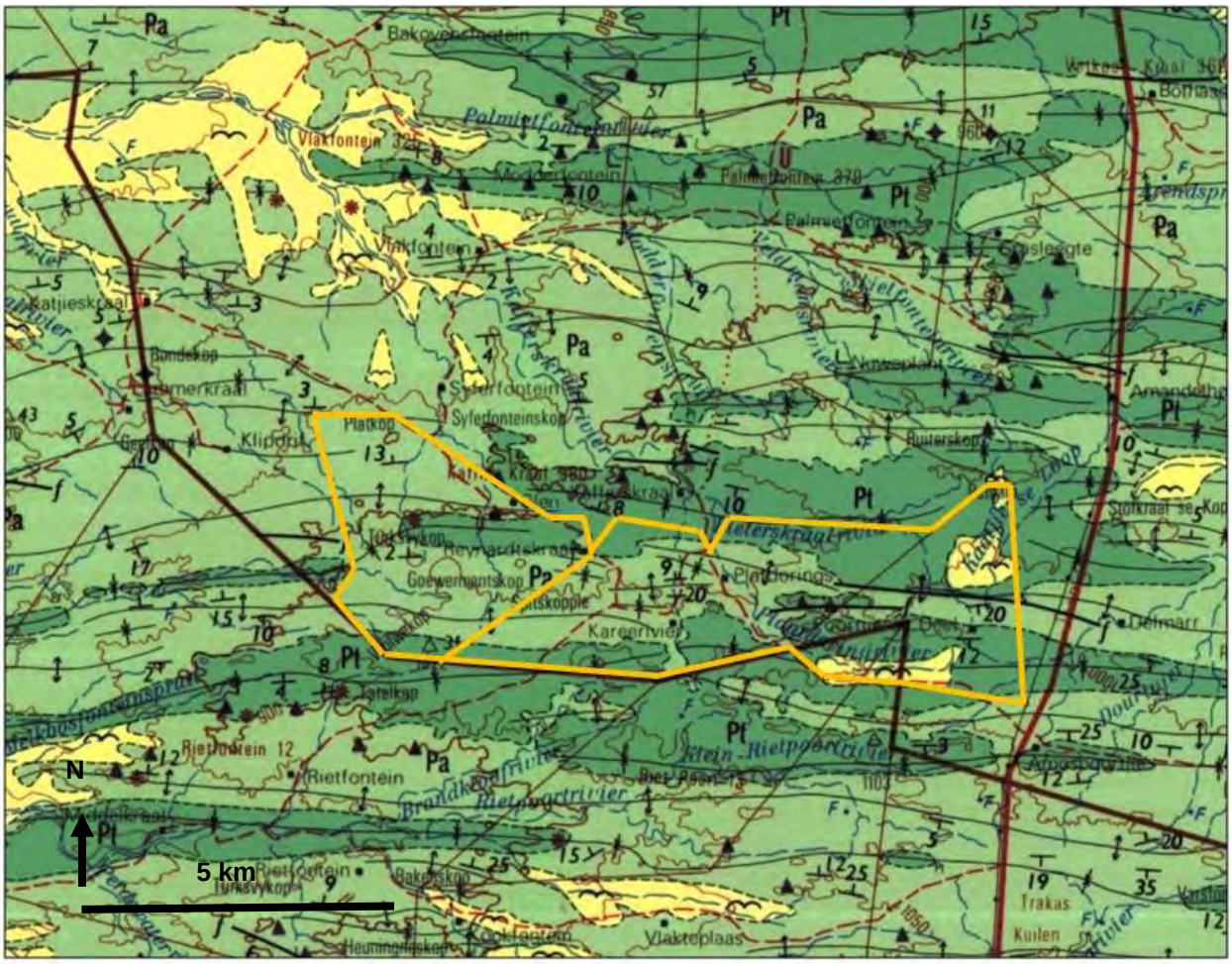


Figure 29: Extract from 1: 250 000 geology sheet 3222 Beaufort West showing the boundaries of the combined Koup 1 and Koup 2 WEF project area to the south of Beaufort West (yellow polygons). Note numerous W-E trending fold axes in the region which falls within the northern margins of the Cape Fold Belt. Pa (pale green) = Abrahamskraal Formation (Adelaide Subgroup, Lower Beaufort Group). Pt (dark green) = Teekloof Formation (Adelaide Subgroup, Lower Beaufort Group). Yellow = Late Caenozoic / Quaternary superficial sediments, including alluvium, sheet wash, colluvium, soils, locally cemented by pedocretes such as calcrete. To the west of the N12 and largely outside the WEF project area triangular symbols indicate fossil localities within the *Pristerognathus* Assemblage Zone (*N.B.* This fossil biozone data is now outdated – see updated stratigraphic chart presented below). A single fossil site for the underlying *Tapinocephalus* Assemblage zone (star symbol) is indicated c. 4 km to the NW of the combined WEF project area.

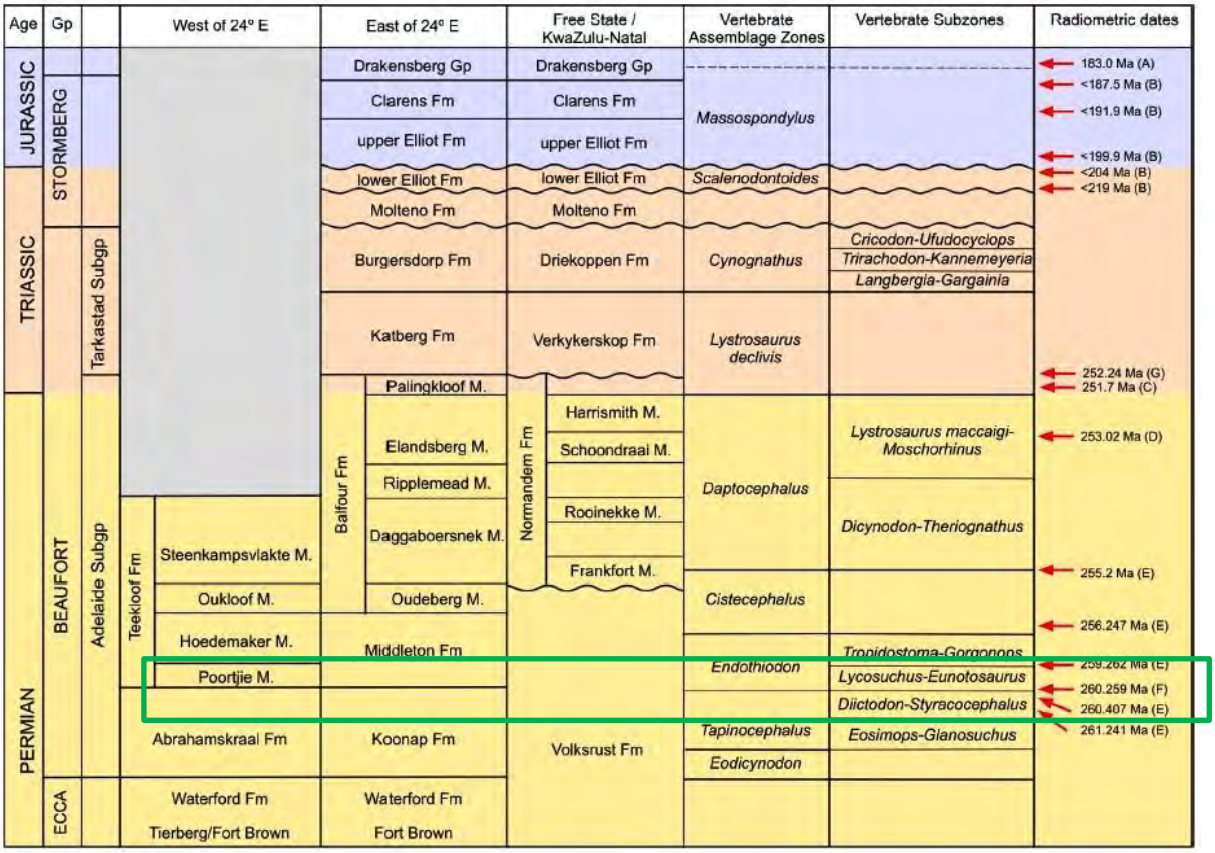


Figure 30: Stratigraphic subdivision of the Karoo Supergroup with the rock units and fossil biozones most relevant to the present PIA study outlined in green (Modified from Smith *et al.* 2020). In the combined Koup WEF project area fossil assemblages within the uppermost Abrahamskraal Formation (Karelskraal Member) and lower part of the Poortjie Member of the Teekloof Formation are now assigned to the *Diictodon-Styracocephalus* Assemblage Zone.

6.4 Findings of the historical desktop study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (**Figure 31**).

6.4.1 Possible Heritage Finds

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. Archaeological surveys and studies in the area have shown rocky outcrops, dry riverbeds, riverbanks, and confluence to be prime localities for archaeological finds and specifically Stone Age sites (Kinahan, 2008; Halkett, 2009; Webley & Halkett, 2015).

The analysis of the studies conducted in the area assisted in the development of the following landform to heritage find matrix in Table 5

Table 5. Dry river courses have been referenced as having possible heritage sensitivity within the study area (**Figure 31**). It must be noted that the proposed development layout for the most part has excluded river courses from the footprint.

Table 5: Landform type to heritage find matrix

LAND FORM TYPE	HERITAGE TYPE
Crest and foot hill	MSA scatters
Pans/ dry river courses	LSA/MSA scatters
Outcrops	Occupation sites dating to LSA
Farmsteads	Historical archaeological material

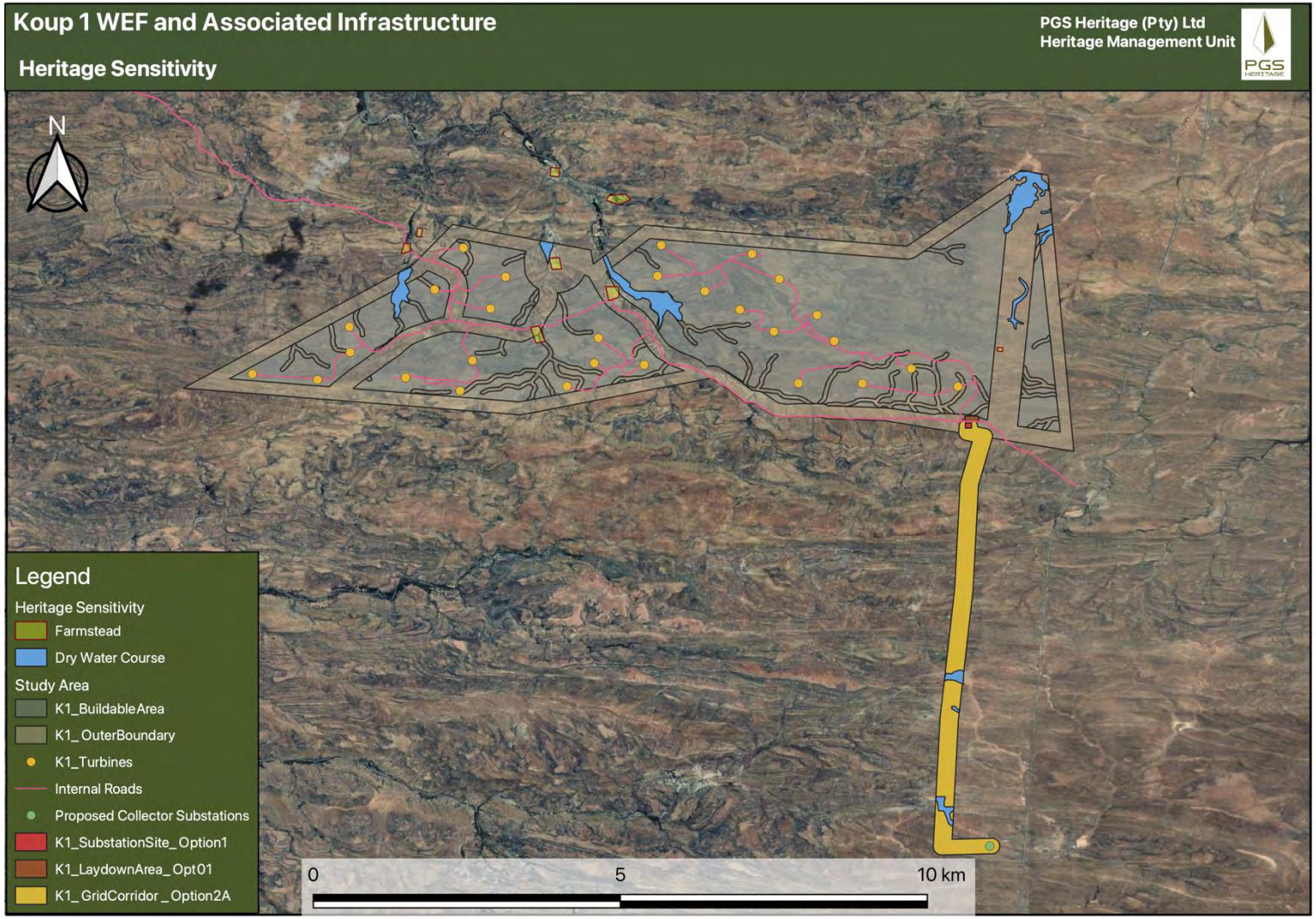


Figure 31: Possible heritage sensitivity areas; Farmstead (incl. structures; red polygon) and Dry Water Courses (blue polygon) within the Koup 1 WEF study area.

7. HERITAGE RESOURCE – STATUS QUO

A selective survey of the study area was conducted between November 2020 and July 2021. Focus was placed on the areas identified for the placement of the proposed turbines and associated internal roads, laydown areas and substation sites within the larger assessment area. Farmsteads and structures were documented from their property boundaries when access was restricted.

7.1 Archaeology and built environment

The archaeological fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 18 tangible cultural heritage resources (**Figure 44** to **Figure 47**).

The heritage resources identified during the fieldwork extends temporarily from the MSA through to the early to mid 21st century. These tangible heritage resources are Archaeological sites and find spots with a low heritage significance as in the case of site **KO_18** and the eight finds spots which comprise several low-density Stone Age surface artefact scatters.

Figure 32: Fine-grained sandstone artefact

Figure 33: Silicified mudstone artefacts

Three farmsteads or the remains of farmsteads were identified and constitutes the extent that of physical remains of current and historical adaptation to the challenging landscape. The farms of Platdorings (**KO-04-06**), **(Figure 34**) Arbeid (**KO_19**) (**Figure 35**) and Kareerivier (**KO_01-03** and **KO_07-08**) (**Figure 36**) are located close to areas where historically water could be sources and, in most cases, these are dry riverbeds with cultivatable floodplains. Associated with all three farmsteads several burial grounds and graves (**KO-06**

– KO-09) (**Figure 37** and **Figure 38**) were identified. Although the various heritage elements in each of these farmsteads do not all constitute having a high or medium significance. The combination of the build environment, burial grounds, and graves, as well as the utilisation off the landscape create an associated cultural landscape and all three cases a medium to high cultural significance.

Figure 34: One of the currently inhabited Platdoorn homesteads with Platdoring se Kop behind.

Figure 35: Arbeid dwellings

Figure 36: Kareerivier homestead front façade

Figure 37: Kareerivier cemetery of the Bothma family

Figure 38: View of three of the graves situated in a row at KO-06 associated with the farmstead at Platdorings

7.2 Palaeontological heritage

The study area contains large areas of dissected hilly terrain with good to excellent exposure of both mudrock and sandstone facies of the potentially fossiliferous Lower Beaufort Group Sizeable portions of the Koup 1 WEF project area, especially in the NE, show low relief and here the bedrocks are mantled by Late Caenozoic superficial sediments (*e.g.* alluvium, soils, surface gravels) of low palaeontological sensitivity. During the 5-day palaeontological field survey numerous (over 50) new vertebrate fossil sites were recorded within the more accessible portions of the combined WEF and grid connection study area (**Figure 48**). Selected fossil specimens from the WEF project area are illustrated in Figure 39 to Figure 43 below with explanatory figure legends.

The main categories of fossils found here, associated with both sandstone and mudrock facies as well as downwasted surface gravels, include:

- Surface scatters and rare concentrations of disarticulated to semi-articulated skull and post-cranial skeletal elements of large-bodied tetrapods within the lower parts of the Karelskraal Member and apparently also within the lowermost part of the Poortjie Member. Most or all of these specimens are probably referrable to one or (possibly) more members of **tapinocephalid Dinocephalia** ("horrible heads") but diagnostic cranial or dental material is very rare (Alternatively, some of the material might be **pareisaur reptile** in origin but the presence of this group remains unconfirmed).

Much of the bony material is fragmentary, secondarily mineralised (*e.g.* by pyrite), weathered (*e.g.* suncracked) and probably unidentifiable, so is of limited research or conservation interest. Some bones are encased within ferruginous carbonate pedocrete concretions or sandstone. However, a number of specimens are of scientific value and, if threatened by the proposed development, should be formally collected for storage in a museum collection (*e.g.* Iziko Museums, Cape Town). These include a concentration of several cranial fragments of very thick-skulled tapinocephalids (probably *Criocephalosaurus*) from the lower Poortjie Member on the Farm Bloemendal (Loc. 724), just N of and outside the WEF project area. These specimens may represent the remains of some of the last dinocephalians that survived the end-Middle Permian Extinction Event; a few other examples of this genus are recorded in the Beaufort West area (*cf* Day *et al.* 2015a, Almond 2020a).

- Small-bodied herbivorous **dicynodonts** are the commonest fossils found in both the lower Karelskraal Member and the Poortjie Member.
- Sparse records of **trace fossils** include several (mostly equivocal) sandstone burrow casts of tetrapods, possible smaller-scale invertebrate burrows as well as fine horizontal burrows associated with subaqueous or pond margin microbial mats.

Figure 39: Large proximal limb bone of a large-bodied tetrapod (probably dinocephalian) embedded within dark Karelskraal Member mudrocks (Loc. 665) (Scale is 15 cm long).

Figure 40: Weathered-out large vertebrae collected from stream gravels downslope of the in situ specimen illustrated above and probably belonging to the same animal (Loc. 665) (Top RHS block 15 cm across).

Figure 41: In situ, ferruginized partial postcranial skeleton of a dinocephalian therapsid embedded within Karelskraal Member mudrocks (Loc. 603) (Scale = 15 cm).

Figure 42: Skull of a small dicynodont from the Karelskraal Member (Loc. 631) showing a broad

Pyrite pseudomorph crystals within some of the bones as well as rippled sandstones in the vicinity suggest preservation of a corpse along a waterlogged lake margin.

skull table, *i.e.* not *Diictodon* (Specimen is 7 cm long).

Figure 43: Post-crania, including limbs and rib cage, of a small-bodied dicynodont preserved inside a calcrete concretion embedded within cleaved Poortjie Member mudrocks (Loc. 687) (Scale = 15 cm).

7.3 Cultural landscape

The Koup 1 site can be divided into landscape character areas with cultural heritage resource types **(Figure 49**). These units were determined by taking the larger landscape context into consideration to understand the character and cultural heritage values that underpin the proposed development site.

7.3.1 Poorts and koppies

The vast terrain of the Koup lends significance to the low ridges and associated visually prominent koppies that create intermittent relief from the monotonous largely flat topography of the region. The small local ports (Platdorings Poort) and koppies create a sense of place and orientation in this landscape and are associated to points of continuous access and thoroughfare by humans and animals over time.

7.3.2 Riverine corridors – Bio-cultural heritage resources

The dry riverine corridors that spread over the Koup landscape create points of contact and cultivation in an otherwise dry and barren environment. Largely non-perrenial, these watercourses are also known for flooding after heavy rains, spreading much needed water over the surrounding land and, in so doing, supporting ecological and agricultural systems. Historic farmsteads and their associated structures and areas of crop cultivation are found in this landscape unit.

7.3.3 Historic farmsteads and associated crop gardens – Grade IIIA – IIIB cultural heritage resources

The farmsteads in this study are all located adjacent or near to riverine corridors in the lower elevations of the undulating plains, with associated grazing lands for livestock on the higher elevations and ridges. Areas of crop cultivation are found adjacent to the farmsteads, often along the dry riverbeds. The continued existence of these farmsteads in this historically and environmentally hostile environment lends significance to their place on the landscape and the determination of the people they represent. Here significant are the three farmsteads or the remains of farmsteads of Platdorings, Arbeid and Kareerivier within the WEF footprint.

7.3.4 Conservation areas –Bio-cultural heritage resources

Critical Biodiversity Areas and Ecological Support Areas, largely associated with the riverine environment of the study area supports biodiversity conservation. These areas recognise the ongoing relationship between man and the environment in the way they are managed to maintain a natural state, which in turn, has a benefit for human habitation.

7.3.5 Historic routes and gateways – Grade IIIA – II cultural heritage resources

The site is accessed via the national N12 road, a historic route link ing Beaufort West with the towns of De Rust and Outdshoorn via scenic Meiringspoort Pass, and the coastal town of George further south. The north-south orientated N12 intersects the characteristic east west ridges with shallow poorts, often the location of historic farmsteads, such as Amospoortjie, Trakaskuilen and Amandelhoogte, culminating in the Meiringspoort Pass that winds through the Groot Swartberg mountain range located within the Swartberg Nature Reserve. This road has carried inhabitants and travellers between historic towns, farmsteads and further regional destinations since at least the late C18th. The N12 has been recognised as a scenic route in the district and municipal SDFs for the area.

7.3.6 Viewsheds of significant mountain ranges

Views and vistas of the distant mountains and destinations give significance to the experience of the vast open landscape. The flat open expanses of the Koup Karoo are a central element to the experience and sense of place of the landscape; the mountain ranges of the Nuiweveld to the north and Swartberg to the south give scale and containment to this vastness.

7.3.7 Archaeological and palaeontological sites – Grade IIIA to NCW cultural heritage resources

All archaeological and palaeontological resources are protected by the NHRA and were investigated for grading by the AIA with the results included in the HIA (PGS, 2021). Stone age material built structures and informal graves and family cemeteries are included here.

7.3.8 Slopes and ridges

The vast terrain of the Koup lends significance to the low undulating ridges and associated visually prominent koppies that create intermittent relief from the monotonous largely flat topography of the region. Within this relatively flat expanse the steep slopes and ridges contained in the Koup 1 landscape are significant in their visual and environmental capacities.

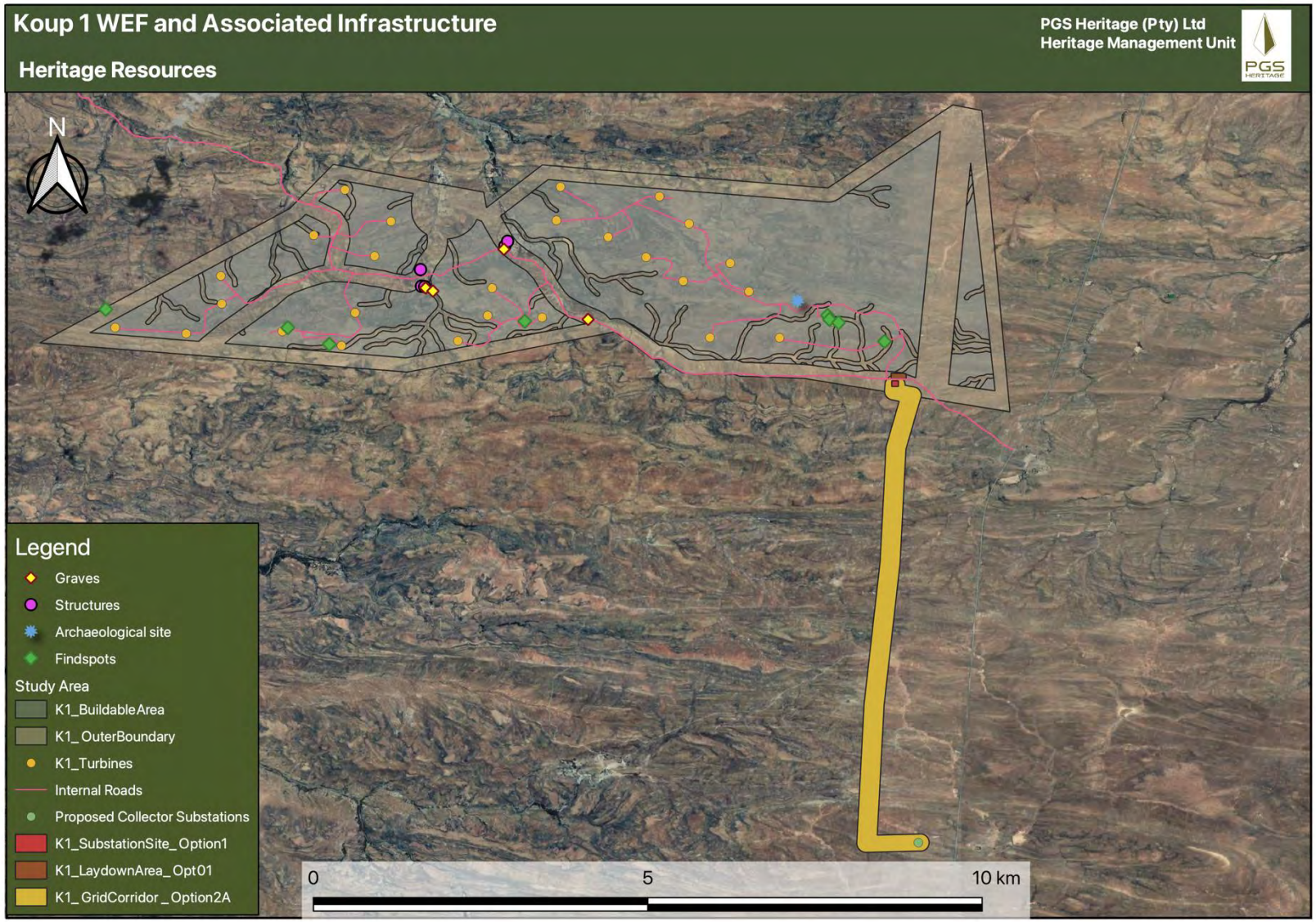


Figure 44: Locality of the heritage resources identified within the study area.

Figure 45: Locality of find spots identified within the western part of the study area.

Figure 46: Locality of structures, graves and find spots identified within the central section of the proposed WEF development area.

Figure 47: Locality of the archaeological site and find spots identified in the eastern part of the study area.

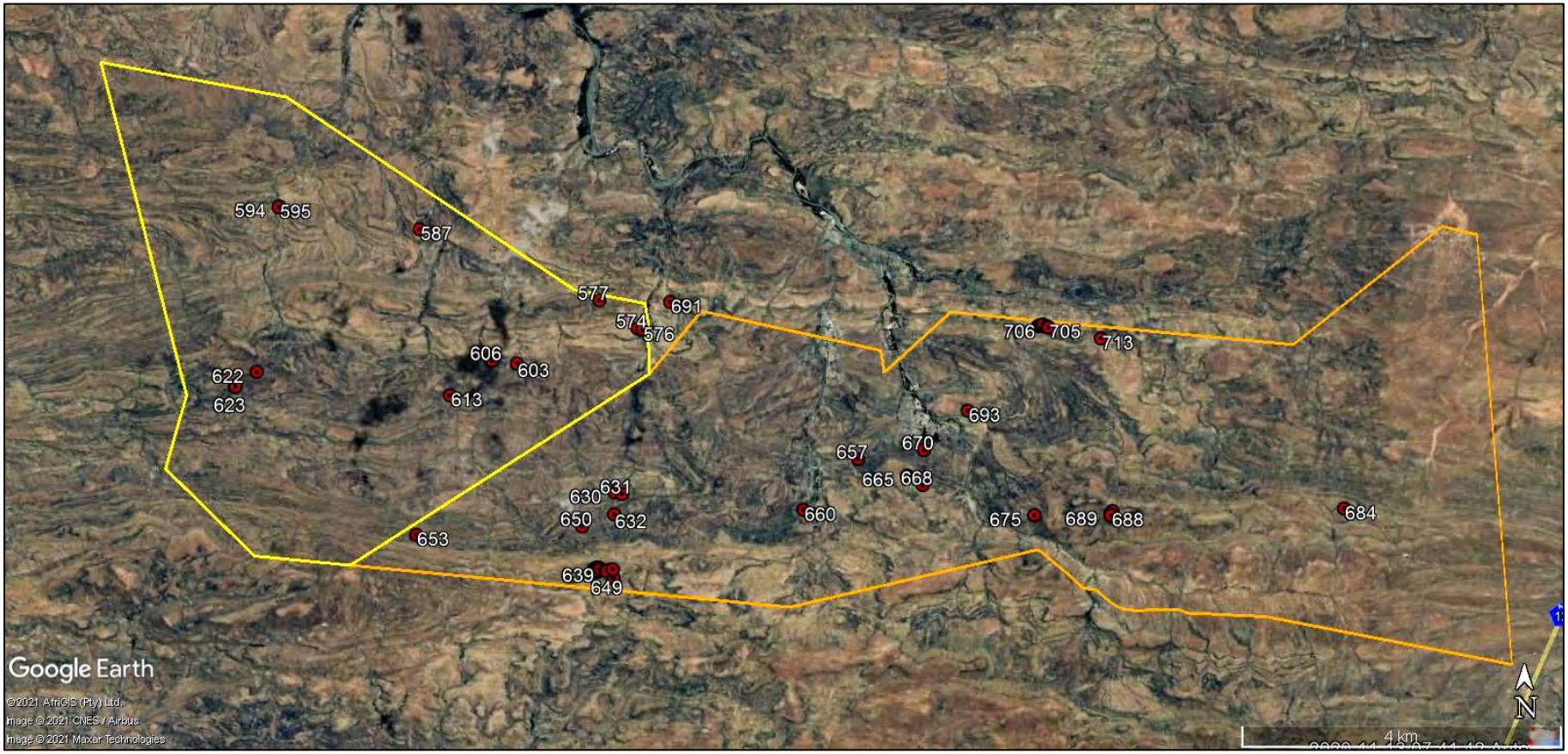


Figure 48: Google Earth© satellite image of the adjoining Koup 1 WEF (orange polygon) and Koup 2 WEF (yellow polygon) project areas to the south of Beaufort West showing the numbered new fossil sites recorded during the site visit. (Almond, 2021)

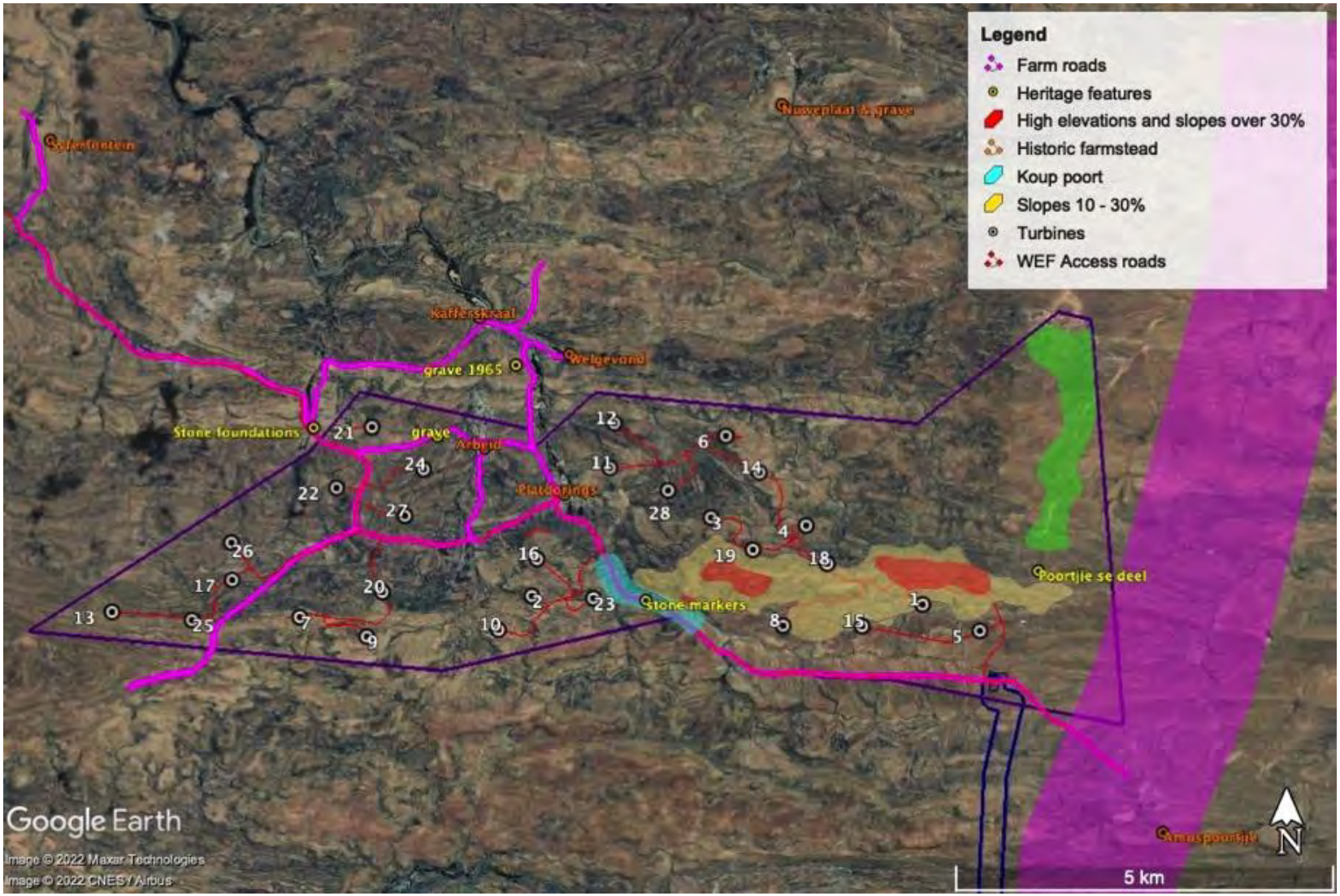


Figure 49: Koup 1 Cultural landscape features map with proposed WEF infrastructure overlay. (Slope classes and riverine corridors/ ESAs have not been included here but have been mitigated for in the recommendations) (Hearth Heritage, 2022)

8. IDENTIFICATION AND ASSESSMENT OF IMPACTS

The various heritage specialists that worked on the identification of heritage resources and assessed their significance based their findings on a set of guidelines developed by the HWC (2021) in line with the NHRA and international best practice. The CLA further expanded its assessment through the core values as developed by Roos (2007), which include ecologic, aesthetic, historic, social and economic parameters.

Tangible heritage resources are often preserved due to unusual circumstances and are non-renewable resources. When a development is proposed, and specialist studies are undertaken as part of the wider evaluation of heritage resources, it provides an opportunity into a depository that would not otherwise exist. In this sense the impact is POSITIVE for some heritage resources if efforts are made to preserve or mitigate heritage resources in the study footprint, prior to and during the construction phase of the development. For this reason, four development scenarios, informed by EIA constraints are considered in this study, including the no-development / no-go option.

The general nature of impacts from the proposed development will be visual regarding the cultural landscape and built heritage, and physical with regard to archaeological and palaeontological heritage resources. Mitigation measures for heritage resources will be recommended to mitigate impacts.

8.1 General Observations

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites, features and landscapes. The assessment of the impact of the proposed WEF and the associated grid infrastructure will be addressed separately. An overlay of all the heritage sites identified during the fieldwork over the proposed development footprint areas was made to assess the impact of the proposed development on these identified heritage sites. This overlay resulted in the following observations:

Heritage sites assessed to have a low heritage significance are not included in these impact risk assessment calculations. The reason for this is that sites of low significance will not require mitigation. These sites are the archaeological site (**KO_18)**, findspots (**KO_10 - KO_17**) and 3 structures (**KO-02; KO-01; KO-04**).

Two grave and burial grounds (**KO-07** and **KO-08)** and one structure (**KO-03**) are located more than 100m away from the proposed road area. As a result, no impact is expected from the proposed development on these sites. This means that no impact assessment will be undertaken for the sites.
Two grave and burial grounds (**KO-06 and KO-09**) and one structure (**KO-05**) of medium heritage significance, were located less than 100m from the proposed development areas.

Although the sites mentioned and described above are listed as points on a map, these resources are part of a larger cultural landscape (farmstead, vistas etc) and as such the impact on the cultural

landscape extends outside of the boundaries of these specific heritage resource. These impacts are multi-faceted and cannot always be seen as only a direct impact on tangible heritage resources.

It is also necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such. Significant from a cultural landscape perspective are the local poort at Platdorings kop and farmstead.

Three project phases have been identified by SiVEST namely the Pre-Construction Phase, Construction Phase and Operational Phase. As site clearing activities of all the development footprint areas are grouped under the Pre-Construction Phase, the highest level of impact on the identified heritage sites is expected during this phase. No impacts are expected during the Construction and Operational Phases. All the identified heritage sites are expected to be destroyed in terms of the pre-mitigation impact assessments undertaken below, whereas only those sites not mitigated by amendments to the proposed development footprints will also be destroyed in terms of the post-mitigation impact assessment calculations undertaken below.

The following impact rating tables are based on the proposed WEF and associated grid infrastructure development layout within the region.

8.2 Identification of impacts

The pre-construction and construction phase of the proposed WEF will entail extensive surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (*e.g.* for widened or new access roads, wind turbine foundations, hardstanding areas, on-site substation, underground cables, construction laydown area, O&M building and BESS). Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The possible pre-construction impacts calculated on the tangible cultural heritage resources is overall MODERATE NEGATIVE rating but with the implementation of the recommend buffers and management guidelines will be reduced to a LOW NEGATIVE impact.

The impact on the cultural landscape includes:

- Critical Biodiversity Areas and Ecological Support Areas, largely associated with the riverine environment of the study area supports biodiversity conservation. These areas recognise the ongoing relationship between man and the environment in the way they are managed to maintain a natural state, which in turn, has a benefit for human habitation. reflect the names of the local farmsteads, indicating a close relationship between inhabitants on the landscape and these rivers as well as the significant dependence on these resources;
- The impact on the sense of place as the vast open landscape with low shrubby vegetation, characteristic of the Koup Karoo and determining to a large extent its evolution in history,

creates a sense of place and landscape character intimately associated with this cultural landscape;

- The impact on the historicity of the landscape specifically on such features as, the national N12 road, a historic route linking Beaufort West with the towns of De Rust and Outdshoorn via scenic Meiringspoort Pass; history of the landscape and its intimate association with stock farming and waves of settlement throughout history stretching back to the Stone Age. While the utilisation of the landscape and the movement as embodied through farmsteads and farm roads adds to the layering of the cultural landscape up to present day; and
- The impact on the continued land use pattern and relationship to the land and its possible decline of the socio-economic position of the inhabitants, as they may not be able to maintain some level of subsistence with these resources. The ability for these residents to provide for themselves in this way must not be negatively impacted upon by the WEF development and must be supported, including financially, by the development. Their existence on the landscape, as the historic inhabitants of the area, previously disenfranchised and disempowered, is a fundamental element to the cultural landscape.

The impact on the cultural landscape through the development of the Koup1 WEF and grid infrastructure is calculated to have a VERY HIGH negative impact and specifically on the aesthetic and historical components of the cultural landscape.

It is further noted that the Koup region is not located within a SEA identified REDZ zone or in one of the SEA strategic transmission corridors. Currently there are no operational renewable energy projects in the Koup region, however there are applications for both wind and solar energy developments within a 35km radius from the Koup WEF application site. Various electric grid connections and transmission lines are currently in operation along the N1 and the N12. The cumulative impact on the cultural landscape is thus
further projected the stay VERY HIGH when incorporating the cumulative impacts projected with the other sic (6) project within 35k m of Koup 1. By implementing the recommended mitigation measures and design indicators this negative impact can potentially reduce to MODERATE.

The impact assessment rating is based on the rating scale as contained in **Appendix B**.

8.3 Impact Assessment ratings – WEF Infrastructure

Table 6: Assessment of the Impact of Proposed WEF on Heritage resources - Pre-Construction Phase

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
Damage to sites containing graves	The graves and burial grounds are mostly localised near farm roads within the proposed development area. The expansion of existing farm roads may impact these sites.	2	3	4	4	4	2	34	-	Medium	Demarcate sites as no-go areas (50m buffer) Demarcate and fence during construction if construction activities area to happened within 50 meters from a site. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation	2	1	4	4	4	1	15	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
											during construction and operations.									
Damage to one historical structures	One structure (KO-05) is located near farm roads within the proposed development area. The expansion of existing farm roads may impact the site.	2	2	4	4	4	2	32	-	Medium	Demarcate sites as no-go areas (30m buffer)Demarcate and fence during construction if construction activities area to happened within 30 meters from a site. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	2	1	4	4	4	1	15	-	Low
Unidentified heritage resources	Due to the size of the area assessed, there's a possibility	1	3	4	2	4	2	28	-	Medium	A management plan, after a walkdown of the	1	3	4	2	4	1	14	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
	of encountering heritage features in un-surveyed areas does exist.										final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.									
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	4	4	3	4	2	32	-	Medium	Pre-construction walkdown (with fossil recording / collection) of final footprint by specialist palaeontologist. Chance Fossil Finds Procedure during construction phase.	1	2	4	2	4	1	13	-	Low
Cultural landscape - Ecological	Inappropriate infrastructure layout planning degrades ecological	2	4	3	3	3	2	30	-	Negative High	Refer to **Table 15**	2	2	2	2	3	2	22	-	Negative Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
	elements of the cultural landscape.																			
Cultural landscape - Aesthetic	Inappropriate infrastructure layout planning negates aesthetic and sense of place requirements of the cultural landscape. *Relocation of turbines has been offset with grid corridor, laydown and substation locations.*	2	4	3	3	3	4	45		Negative High	Refer to **Table 15**	2	4	2	3	3	3	42		Negative medium
Cultural landscape - Historic	Inappropriate infrastructure layout planning degrades historic elements of the cultural landscape.	2	4	3	2	3	3	42		Negative Medium	Refer to **Table 15**	2	2	2	1	3	2	20		Negative Low
Cultural landscape - Socio-economic	Non-landowner residents' lack of representation in planning and public	2	4	4	3	4	4	68	-	Negative Very High	Refer to **Table 15**	2	2	1	2	4	2	22	-	Positive Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
	participation process leads to loss of local knowledge, socio-economic empowerment, and character of the cultural landscape.																			

Table 7: Rating of impacts for Construction phase - WEF on the cultural landscape element

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction/ Decommissioning Phase																				
Cultural landscape - Ecological	*Fragmentation and destruction of the landscape degrading the environment and thus continuous relationship*	2	4	3	3	3	3	45	-	Negative High	Please see page **Error! Bookmark not defined.**	2	2	2	1	3	2	20	-	Negative Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction/ Decommissioning Phase																				
	between man and environment - Relocation of turbines has been offset with grid corridor and collector substation locations.																			
Cultural landscape - Aesthetic	WEF infrastructure construction and decommissioning activity degrades the character of the cultural landscape and the sense of place – *Relocation of turbines has been offset with grid corridor, laydown and substation locations.*	2	4	3	3	3	4	60		Negative high	Please see page **Error! Bookmark not defined.**	2	4	2	2	2	2	24		Negative Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction/ Decommissioning Phase																				
Cultural landscape - Historic	Integrity of farmsteads and farm roads degraded by insensitive construction or decommissioning activities.	2	4	4	2	4	3	48		Negative high	Please see page **Error! Bookmark not defined.**	2	2	3	2	2	2	22		Negative low
Cultural landscape - Socio-economic	Integrity of local residents to continue their patterns of land use is degraded by the construction and decommissioning activities.	2	3	4	4	4	4	68		Negative very high	Please see page **Error! Bookmark not defined.**	1	3	3	1	3	2	22		Positive low

Table 8: Rating of impacts for Operational Phase - Proposed WEF

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Operation Phase																				
Cultural landscape - Ecological	Inappropriate operational activities degrade the significant ecological elements of the cultural landscape	1	4	4	2	3	4	56		Negative high	Refer to **Table 15**	1	1	4	2	3	2	22		Negative low
Cultural landscape - Aesthetic	Inappropriate operational activities degrade the significant aesthetic elements of the cultural landscape altering the character and sense of place	2	4	3	3	3	3	45		Negative high	Refer to **Table 15**	2	4	2	3	4	2	28		Negative medium
Cultural landscape - Historic	Inappropriate operational activities degrade the significant historic elements of the cultural landscape altering	2	4	4	4	4	4	72		Negative very high	Refer to **Table 15**	2	2	4	2	4	2	26		Negative medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Operation Phase																				
	the character and sense of place																			
Cultural landscape - Socio-economic	Inappropriate operational activities degrade the significant socio-economic opportunities of the cultural landscape	2	4	3	4	4	4	68		Negative very high	Refer to **Table 15**	2	2	4	2	3	2	24		Positive medium

8.4 Impact Assessment ratings – Grid Infrastructure

Table 9: Assessment of the Impact of Proposed Grid Infrastructure on Heritage resources

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Pre-Construction Phase																				
Unidentified heritage resources	Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	1	3	4	2	4	2	28	-	Medium	A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	1	3	4	2	4	1	14	-	Low
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground surface due to surface clearance and bedrock excavations	1	4	4	3	4	2	32	-	Medium	Pre-construction walkdown (with fossil recording / collection) of final footprint by specialist palaeontologist.	1	2	4	2	4	1	13	-	Low

											Chance Fossil Finds Procedure during construction phase.									

8.5 Cumulative Impacts

This section evaluates the possible cumulative impacts (CI) on heritage resources with the addition of the Koup 1 WEF and associated grid infrastructure. The CI on heritage resources evaluated a 35-kilometer radius (**Figure 50**). It must further be noted that the evaluation is based on available heritage studies. Although there are 6 WEF applications in process currently, none have yet been built and as a result the full impact of the development cannot be fully assessed.

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- Fixed datum or dataset: There is no comprehensive heritage data set for the Beaufort West region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;
- Defined thresholds: The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource;
- Threshold crossing: In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011)

With regards to the historical resources, in most cases given a low-medium heritage significance on a local scale and in most of the cases were recommended as being easily mitigated or avoidable.

While the graves sites in all cases given a high heritage significance on a local scale and in the majority of the cases were recommended as being no-go areas or extensive mitigation required.

Hearth Heritage (2022) notes that a review of the HIAs and EIAs it is notes that none of the reports for the area within 35kms include specialist CLA. Without a regional database of this information, it is impossible to offer a true cumulative impact of the proposed development. Cumulative impact assessment on cultural landscapes for the area is therefore based on minimal information and assumptions drawn from the general information of the area and the limited local cultural landscapes assessments that have been done for other proposed WEF facilities in the Karoo region where the cultural landscape is most similar.

A few specialist HIA and VIA reports in the area did consider cultural landscapes in their consideration of the developments being assessed for and they have been summarised here. It must be noted that these were not necessarily all assessed for WEFs and therefore the consideration of impacts would differ from this cultural landscape report. Notwithstanding, the findings of these reports in terms of the

significance of the landscape and potential mitigation **are in line with those of this cultural landscape assessment report for Koup 1 WEF**.

It must be noted that the focus of heritage studies in the area has been on the material and tangible aspects of the landscape as identified in the NHRA. Cultural landscape assessments would ideally include consideration of intangible heritage associated to the tangible resources identified and a public participation process dealing with issues regarding inter alia intangible heritage, indigenous knowledge systems, oral histories, language, and lifeways of the people who inhabit and use the landscape.

The Koup region is not located within a SEA identified REDZ zone or in one of the SEA strategic transmission corridors. Currently there are no operational renewable energy projects in the Koup region, however there are applications for both wind and solar energy developments within a 35km radius from the Koup WEF application site. Various electric grid connections and transmission lines are currently in operation along the N1 and the N12. Although their height surpasses any natural or cultural elements, the linear orientation of these lines, in most part adjacent to the road, do not cross the viewshed as one travels along the N12. Together with their light form and static nature, this reduces their visual impact. The associated infrastructure, such as substations, is more intrusive as the height, scale and angular form is more in conflict with the natural undulating horizontal lines of the surrounding landscape. These elements are currently relatively low scale and do not overwhelm the sense of place but should be considered as part of the cumulative impact of the new renewable energy developments in the region.

The numerous applications and proposed establishment of several wind energy facilities between Beaufort West and the Swartberg mountain range, as well as the adjacent regions in the Karoo have sparked a concern with regards to cumulative impacts that these projects may have on the heritage resources and the cultural landscape. The approval of an increased number of RE projects in the region may lead to the mass industrialisation of the landscape that changes the character of the landscape and hence impacts on the sense of place and aesthetic value negatively.

The Koup region has been considered as a wilderness landscape with a significant footprint of human habitation, cultural contact, and conflict, whereby the cumulative impact of increased WEFs will involve significant sterilisation of the aesthetic qualities of the landscape. The cumulative impacts on tangible heritage resources can be considered **low in general** due to the thin density in the area, except when considering the cultural landscape which is negatively impacted by the construction of renewable energy, wind turbines and associated electrical infrastructure on the ‘sense of place’, land use patterns and its scenic beauty. The cumulative impact on the cultural landscape is thus **unavoidably high without mitigation**, with losses to perceptual qualities and historic land use. Similarly, cumulative impacts to living heritage sites will be unavoidably **high without mitigation**, with losses including the physical expressions of cultural heritage as well as to sense of place and cultural landscapes. While mitigation in the form of avoidance and protection of these sites can go some way to reducing cumulative impacts, these are likely to remain **moderate**.

Table 11 provides an analysis of the projected cumulative impact this project will add to impact on heritage resources.

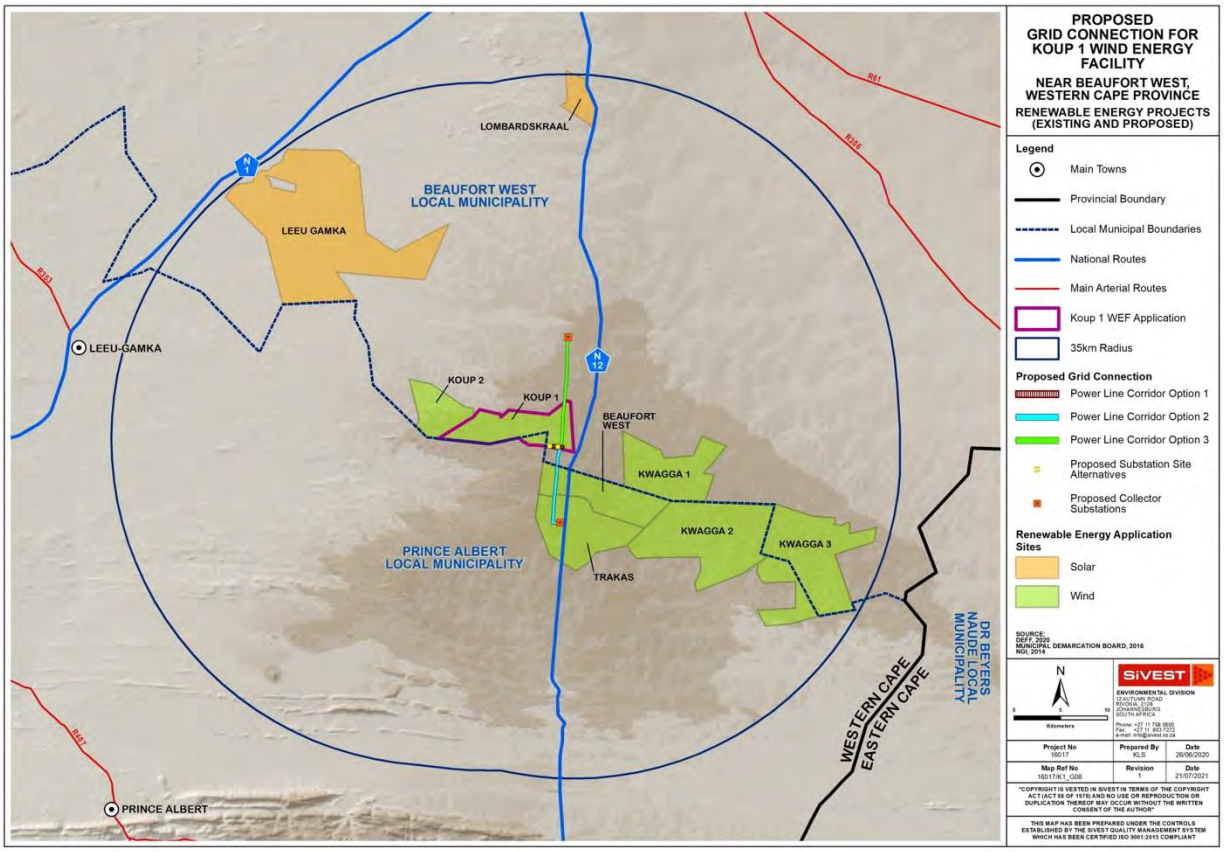


Figure 50: Renewable energy facilities proposed within a 35km radius of the proposed development (provided by SiVEST).

Table 10: Existing and Proposed Renewable Energy Projects within 35km of Site

Project	DEA Reference No	Technology	Capacity	Status of Application / Development
Proposed Beaufort West Wind Farm	12/12/20/1784/1	Wind	140 MW	Approved
Proposed Trakas Wind Farm	12/12/20/1784/2	Wind	140 MW	Approved
Proposed Wind and Solar Facility on the Farm Lombardskraal 330	14/12/16/3/3/2/406	Solar	20 MW	EIA in Process
Proposed Leeu Gamka Solar Power Plant	12/12/20/2296	Solar		Withdrawn/Lapsed
Kwagga Wind Energy Facility 1 (Pty) Ltd	TBA	Wind	279 MW	EIA in Process
Kwagga Wind Energy Facility 2 (Pty) Ltd	TBA	Wind	341 MW	EIA in Process
Kwagga Wind Energy Facility 3 (Pty) Ltd	TBA	Wind	204.6 MW	EIA in Process
Proposed Koup 2 WEF	TBA	Wind	140 MW	EIA in Process

Table 11: Impact rating - Cumulative

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cumulative Phase																				
Tangible Heritage Resources	The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	4	2	4	4	4	2	36	-	Medium	It can clearly be noted that the area in general is abundant with Stone Age and historical remains. However, until a regional detailed study is commissioned by HWC or SAHRA. No further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.	4	1	4	4	4	1	17	-	Low
Fossil heritage resources	Disturbance, damage or destruction of fossils at or beneath the ground	1	4	4	3	4	2	32	-	Medium	(*N.B.* Vary between projects) Pre-construction walkdown (with fossil recording / collection)	1	2	4	2	4	1	13	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cumulative Phase																				
	surface due to surface clearance and bedrock excavations										of final footprint by specialist palaeontologist. Chance Fossil Finds Procedure during construction phase.									
Cultural landscape - Ecological	Inappropriate cumulative development degrades the significant ecological elements of the cultural landscape	3	4	4	3	4	4	72		Negative very high	Please see page **Error! Bookmark not defined.** for mitigation recommendations for specifically cumulative impacts. NOTE: If the recommendations in this CLA are applied to most of the surrounding RE developments, impacts can be reduced to ratings given in this table. With no specialist CLA reports done on the surrounding	3	2	3	2	3	2	26		Negative medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cumulative Phase																				
											applications, cumulative impact on the cultural landscape of the region has not been considered and cannot be included in this rating.									
Cultural landscape - Aesthetic	Inappropriate cumulative development degrades the significant aesthetic elements of the cultural landscape altering the character and sense of place	3	4	4	3	3	4	68		Negative very high		3	4	2	2	3	3	42		Negative medium
Cultural landscape - Historic	Inappropriate cumulative development degrades the significant historic elements of the cultural landscape	3	4	4	4	4	4	76		Negative very high		3	2	3	2	3	2	26		Negative medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Cumulative Phase																				
	altering the character and sense of place																			
Socio-economic	Inappropriate cumulative development degrade the significant socio-economic opportunities of the cultural landscape	3	4	3	4	4	4	72		Negative very high		3	3	1	1	4	2	24		Positive medium

9. COMPARATIVE ASSESSMENT OF ALTERNATIVES

Two alternatives were provided for the laydown area, substation sites and 2 grid corridors.

An assessment of the options for the substation and laydown areas shows that there will not be an impact on heritage resources. Therefore, no preference for substation and laydown areas exists. The grid corridor options 1A, 1B, 2A and 2B will not impact on heritage resources, but the grid corridor option 3A and option 3B may impact on heritage resources.

Key

PREFERRED	The alternative will result in a low impact/reduce the impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact/increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Alternative	Preference	Reasons
SUBSTATION		
Koup 1 Substation site Option 1	Favourable on north side of the farm road with 300m buffer from farm road	The substation location should be located on the same side as other development infrastructure and to the north of the farm road so as to limit the visual impact to one viewshed. As there is a ridge behind this development area, for which turbine placement is proposed, location of the substation to the north of the farm road contains the impact to one side of the road and the infrastructure will not interrupt view lines of the mountain ranges in the distance. Must be moved as far away from the farm road as possible without impacting on a riverine corridor flood line or a slope over 3%.
Koup 1 Substation site Option 2	LEAST PREFERRED	Requires increased development footprint due to extended grid connector.
LAYDOWN AREA		
Construction Laydown Area Option 1	Favourable with 300m historic buffer from farm road	Alternatives Option 1 for the laydown area is preferred in terms of cultural landscape assessment as it limits the construction to a smaller footprint on the landscape and locates the infrastructure far enough from the N12 and out of the Koup 1 landscape as far

Alternative	Preference	Reasons
		possible. Must be moved as far away from the farm road as possible without impacting on a riverine corridor flood line or a slope over 3%.
Construction Laydown Area Option 2	LEAST PREFERRED	Further into the Koup landscape
GRID CORRIDOR		
Koup 1 Grid Corridor Option 1A	Favourable	Smaller footprint and visual impact of development. Distance from N12 far enough to limit negative impact. Must be moved as far away from the farm road as possible without impacting on a riverine corridor flood line or a slope over 3% Shortest grid line. Either option has similar impact significance due to similar geological context.
Koup 1 Grid Corridor Option 1B	Favourable	Smaller footprint and visual impact of development. Distance from N12 far enough to limit negative impact. Must be moved as far away from the farm road as possible without impacting on a riverine corridor flood line or a slope over 3% Shortest grid line. Either option has similar impact significance due to similar geological context.
Koup 1 Grid Corridor Option 2A	LEAST PREFERRED	Increased clutter and degradation of rural cultural landscape along the N12 scenic route. Longer grid line. All options have similar impact significance due to similar geological context.
Koup 1 Grid Corridor Option 2B	LEAST PREFERRED	Increased clutter and degradation of rural cultural landscape along the N12 scenic route. Longer grid line. All options have similar impact significance due to similar geological context.
Koup 1 Grid Corridor Option 3A	LEAST PREFERRED	Increased clutter and degradation of rural cultural landscape along the N12 scenic route. Low significance built heritage at Kh001b can be impacted

Alternative	Preference	Reasons
Koup 1 Grid Corridor Option 3B	LEAST PREFERRED	Increased clutter and degradation of rural cultural landscape along the N12 scenic route. Low significance built heritage at Kh001b can be impacted

9.1 The No-Go Alternative

Environmental and heritage legislation requires the consideration of the no-go option. This option would result in no development impact on the Koup 1 cultural landscape, and it should continue to operate in the similar way maintaining the current significance.

If the Koup 1 site is not developed, the WEF and associated infrastructure will not be built to the west of the N12 and the aesthetic and visual impact of new RE developments will be contained to the eastern viewshed.

The potential for socio-economic opportunities related to the construction and operation of the RE facility for residents in the area would be lost. The potential for increased RE energy capacity nationally would be lost in this instance but certainly gained elsewhere.

10. GENERAL RECOMMENDATIONS AND MITIGATION MEASURES

10.1 Construction phase

The project will encompass a range of activities during the construction phase, including vegetation clearance, excavations and infrastructure development associated with the project.

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

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

10.2 Chance finds procedure

A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.

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

10.3 Possible finds during construction

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

- High density concentrations of stone artefact
- unmarked graves

10.4 Timeframes

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

Table 12: Lead times for permitting and mobilisation

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

10.5 Heritage Management Plan for EMPr implementation for the WEF and grid infrastructure

Table 13: Heritage Management Plan for EMPr implementation – Archaeological, BGG and Built Environment structures

Aspect	Mitigation measures	Phase	Target
General project area	• Implement chance find procedures in case where possible heritage finds are uncovered.	Construction and operation	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA
Graves and Burial grounds	• The sites should be demarcated with a 50-meter no-go-buffer-zone and the graves should be avoided and left in situ. • A Grave Management Plan should be developed for the graves, to be implemented during the construction and operation phases (which needs approval by HWC. • If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the HWC under the NHRA and National Health Act regulations.	Construction	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA
Possible graves	• The site should be demarcated with a 50-meter buffer and the grave should be avoided if any construction is to happen close to it.	Construction through to Operational	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA
Historical Structures that were rated as NCW	• No mitigation required	Pre-construction	Ensure compliance with relevant legislation and recommendations from HWC under Section 34/35 and 38 of NHRA
Historical Structures that were rated as low	• As KO-02 and KO-03 are located more than 100m adjacent to an existing farm road, it is unlikely that it will be impacted.	Pre-construction	Ensure compliance with relevant legislation and recommendations from

Aspect	Mitigation measures	Phase	Target
and medium heritage significance but don't fall within proposed development area.			HWC under Section 34/35 and 38 of NHRA
Historical Farmsteads that were rated as medium heritage significance	• In terms of general conservation of the historical farmsteads, a 30m no-go buffer zone is recommended. • If development occurs within 30m of the farmsteads, the buildings will need to be satisfactorily studied and recorded before impact occurs. • Recording of the buildings i.e. (a) map indicating the position and footprint of all the buildings and structures (b) photographic recording of all the buildings and structures (c) measured drawings of the floor plans of the principal buildings.	Pre-construction	Ensure compliance with relevant legislation and recommendations from HWC under Section 34/35 and 38 of NHRA
Archaeological site that was rated as low heritage significance (**KO_018**)	• No mitigation required	Pre-construction	Ensure compliance with relevant legislation and recommendations from HWC under Section35 and 38 of NHRA

Table 14: Heritage Management Plan for EMPr implementation – Palaeontology

Aspect	Mitigation measures	Phase	Target
General project area	• A pre-construction palaeontological heritage walkdown of the final WEF and grid connection layout • Implement a Chance Fossil Finds Protocol as described in the PIA	Pre-Construction Construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of NHRA

Table 15: Heritage Management Plan for EMPr implementation – Cultural landscape

Aspect	Mitigation measures	Phase	Target
Ecological	• Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. • No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use and continued access to these resources be maintained. • Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site, it helps to sensitively keep to the character.	Planning/ pre-construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA
	• Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. • No wind turbines should be placed within the 1:100-year flood line of the watercourses. In the context of the sensitivity to soil erosion in the area, as well as potential archaeological resources, it would be a risk to include any structures close to these drainage lines • Remaining areas of endemic and endangered natural vegetation should be conserved. • Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected from development of the wind turbines or any associated development during all phases. • Areas of critical biodiversity should be protected from any damage during all phases, where indigenous and endemic vegetation should be preserved at all cost. • Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. • Careful planning should incorporate areas for stormwater runoff where the base of the structure disturbed the natural soil. Local rocks found on the site could be used to slow stormwater (instead of concrete, or standard edge treatments), and prevent erosion that would be an unfortunate consequence that would alter the character of the site. By using rocks from site, it helps to sensitively keep to the character.	Construction/ decommissioning	
	• Areas of endemic and endangered natural vegetation should be conserved. • Critical Biodiversity Areas, and Ecological Support Areas (along drainage lines), should be protected. • Areas of habitat are found among the rocky outcrops and contribute to the character, as well as biodiversity of the area. Care should be taken that habitats are not needlessly destroyed. • Identified medicinal plants used for healing or ritual purposes should be conserved during all phases if threatened for use. Access to these resources should be made available to those who have had historic access to them.	Operational	

Aspect	Mitigation measures	Phase	Target
Aesthetic	• Where additional infrastructure (i.e. roads) is needed, the upgrade of existing roads to accommodate the development should be the first consideration. • Avoid development of infrastructure (such as buildings, wind turbines and power lines), on crests or ridgelines due to the impact on the visual sensitivity of skylines. The visual impact of turbines can be reduced by distancing them from viewpoints such as roads and farmsteads, and placing them in lower lying plains to reduce their impact on the surrounding sensitive cultural landscape. • Significant and place-making viewsheds of surrounding ridgelines and distant mountain should be maintained by limiting the placement of turbines or associated infrastructure on opposing sides of any of the regional roads, so that at any time a turbine-free view can be found when travelling through the landscape or at the historic farmsteads. • Retain view-lines and vistas focused on prominent natural features such as mountain peaks or hills, such as Platdoring se Kop and the Koup 1 poort, as these are important place making and orientating elements for experiencing the cultural landscape. • Prevent the construction of new buildings/structures/ new roads on visually sensitive, steep, elevated or exposed slopes, ridgelines and hillcrests. • Turbine and new road placement to avoid slopes steeper than 10% with existing farm roads to be used for access to turbines as far possible. • Proposed turbines 4, 5 and 8 **are not feasible** in their current proposed locations due to steep slope gradients and high and visually prominent ridge lines in these locations which will have an overwhelming negative impact on the historic farm road. • Proposed turbine 9 is **not feasible** in the current proposed location due to a combination of factors that cumulatively overwhelm the cultural landscape: o Prominent location in relation to the Koup 1 landscape poort. o Location at the top of a steep slope classified as 10% and higher. o Location at one of the highest points in the Koup 1 landscape at close to 1050masl. • Due to the scenic and historic significance of the regional road, a buffer of 1000m to either side of the N12 should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. The visual impact of the turbines will be 50% less at 1km distance and therefore this distance will greatly reduce the negative visual impact of the turbines on the experience of the historic road and the values that give it significance. • Due to the nature of the landscape being largely devoid of high vertical elements such as the proposed turbines, and the introduction of these turbines fundamentally altering the sense of place and character of the landscape for those living there, location of majority of turbines should be limited to a 1km buffer around the farmsteads. The current turbine layout supports this recommendation in that there is nowhere more than a single turbine at the edge of these buffer zones. • Due to the historic and local experience of the landscape from the farm roads, which link the historically significant farmsteads across the region, a buffer of 300m from the farm roads should be maintained for no development associated with the WEF other than sensitive road upgrades which must not impact on the views from the road.	Planning/ pre-construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA

Aspect	Mitigation measures	Phase	Target
	• Alternatives Option 1(sub1) for the grid corridor and Option 1 for the laydown area, are preferred in terms of cultural landscape assessment as they limit the construction to a smaller footprint on the landscape and locate the infrastructure far enough from the N12 and out of the Koup 1 landscape as far possible. They should be moved as far away from the farm road as possible without impacting on a riverine corridor flood line or a slope over 3%. • The substation location should be located on the same side as other development infrastructure and to the north of the farm road so as to limit the visual impact to one viewshed. As there is a ridge behind this development area, for which turbine placement is proposed, location of the substation to the north of the farm road contains the impact to one side of the road and the infrastructure will not interrupt view lines of the mountain ranges in the distance. • The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.		
Aesthetic	• Encourage mitigation measures (for instance use of vegetation) to 'embed' or disguise the proposed structures within the surrounding tourism and agricultural landscape at ground level, road edges etc; • The continuation of the traditional use of material could be enhanced with the use of the rocks on the site as building material. This would also help to embed structures into the landscape and should not consist of shipping containers or highly reflective untreated corrugated sheeting that clutters the landscape and is exacerbates the foreign intrusion on the natural matte landscape. • Using material found on the site adds to the sense of place and reduces transportation costs of bringing materials to site. • The local material such as the rocks found within the area could be applied to address storm water runoff from the road to prevent erosion. • Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction/ decommissioning traffic must operate at speeds that reduce dust and noise as far possible.	Construction/ decommissioning	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA
Aesthetic	• Infrastructure improvement or maintenance work, including new roads and upgrades to the road network, should be appropriate to the rural context (scale, material etc.) and avoid steep slopes over 10% as well as ridges. • Prevent the construction of new buildings/structures on visually sensitive, steep (over 10%), elevated or exposed slopes, ridgelines and hillcrests or within 800m of the farmsteads and N12 and 300m of the farm roads.	Operational	Ensure compliance with relevant legislation and recommendations

Aspect	Mitigation measures	Phase	Target
	• Avoid visual clutter in the landscape by intrusive signage, and the intrusion of commercial, corporate development along roads. • Duration and magnitude of operational activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise as far possible. • The impact of WEF turbine night lighting on the wilderness landscape is intrusive and overwhelms the rural character of the landscape, giving it an industrial sense of place after dark. Reduce the impact of turbine night lighting by minimizing the number of turbines with lighting to only those necessary for aviation safety, such as a few identified turbines on the outer periphery, or use aircraft triggered night lighting. Due to the reduced receptors on the roads at night, the impact of the lighting at night is reserved mainly for farmsteads and other places of overnight habitation such as the surrounding tourist facilities, which would be heavily impacted by the light pollution on a long term and ongoing basis.		from SAHRA under Section 38 of NHRA
Historic	• Due to the scenic and historic significance of the regional road, a buffer of 1000m to either side of the N12 should be maintained for no development associated with the WEF other than sensitive road upgrades, which must not impact on the views from the road. The visual impact of the turbines will be 50% less at 1000m distance and therefore this distance will greatly reduce the negative visual impact of the turbines on the experience of the historic road and the values that give it significance. • The integrity of the historic farmsteads and their associated cultivated areas and relationship to the riverine corridors and other natural elements, such as Platdoring se Kop, should be maintained and protected. Due to the nature of the landscape being largely devoid of high vertical elements such as the proposed turbines, the introduction of turbines will fundamentally alter the sense of place and character of the landscape for those living there. Location of proposed turbines should be limited to a 800m buffer around the farmsteads as far possible to limit impact to the farmsteads. The current turbine layout supports this recommendation in that there is nowhere more than a single turbine at the edge of these buffer zones. • Any development that impacts the inherent character of the werf component should be discouraged and a development buffer of 50m around the outer boundary of farm werfs and 200m around any graded heritage structure, must be maintained, including the associated cultivated areas, cemeteries and unmarked graves, for all new infrastructure. • Due to the historic and local experience of the landscape from the farm roads, which link the historically significant farmsteads across the region, a buffer of 300m from the farm roads should be maintained for no development associated with the WEF other than sensitive road upgrades which must not impact on the views from the road. • The existing names of places, routes, watercourses and natural features in the landscape that are related to its use, history and natural character should be retained and used as heritage resources related to intangible heritage.	Planning/ pre-construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA

Aspect	Mitigation measures	Phase	Target
	• Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No development closer than 100m from the boundary of any burial grounds or unmarked graves. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. • Commonages and outspans were located at water points, and these places were likely gathering points before the arrival of colonists and continued to provide communal resources. In the mid-20th century, many old commonages came under the ownership of the Municipality, and have since been rented out to private individuals or organisations. The Municipality should facilitate the use of common land in a way that promotes the well-being and quality of life of the public. These sites can play a restorative role within the community, for instance for those who have limited alternative opportunities for recreation. • Respect existing patterns, typologies and traditions of settlement-making by promoting the continuity of heritage features. These include: (a) indigenous; (b) colonial; and (c) current living heritage in the form of tangible and intangible associations to place. • Alterations and additions to conservation-worthy structures should be sympathetic to their architectural character and period detailing.		
Historic	• Historic farmsteads must be protected from the impacts of heavy construction vehicles and increased numbers of people. No construction traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. • Duration and magnitude of construction/ decommissioning activity must be minimized as far possible to reduce the impact of heavy vehicles on the roads as well as the associated dust from the activity. Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Construction decommissioning traffic must operate at speeds that reduce dust and noise as far possible. • Accommodation of construction staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. • Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur. A buffer of 50m around such planting patters should be maintained. • Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction	Construction/ decommissioning	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA

Aspect	Mitigation measures	Phase	Target
	micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. • Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed. • Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not needlessly destroyed, as they add to the layering of the area. • Roads running through the area have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers. • Where the historic function of a building/site is still intact, the function has heritage value and should be protected. • Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Koup 1 should be maintained and integrity as a communal road for farm residents must be retained. •		
Historic	• Historic farmsteads must be protected from the impacts of operational facility vehicles and increased numbers of people. No WEF operations traffic should pass through or closer than 50m to the outer boundaries of a farm werf, or 200m from graded structures, which includes the associated historically cultivated lands, cemeteries, unmarked burials. The most appropriate use of existing farm roads must be found to avoid farm werfs as far as possible and reduce construction impact on these heritage features. • Traditional planting patterns should be protected by ensuring that existing trees are not needlessly destroyed, as these signify traces of cultural intervention in a harsh environment. These planting patterns include the trees planted around the werfs and along travel routes. Interpretation of these landscape features as historic remnants should occur. • Burial grounds and places of worship are automatically regarded as Grade IIIa or higher. Any development that threatens the inherent character of family burial grounds must be assessed and should be discouraged and a buffer of 100m around all burial ground or unmarked graves should be in place. No turbines have been proposed for placement near known unmarked burials or family cemeteries. A preconstruction micro-survey of each turbine footprint and any new access roads should be conducted to ensure no further unmarked graves are threatened. • Mountain slopes have been used for traditional practices for many years, and care should be taken that any significant cultural sites, such as burials and veldkos/medicinal plant resources, are not disturbed. • Farms in the area followed a system of stone markers to demarcate the farm boundaries in the area. Where these structures are found on the site, care should be taken that they are not needlessly destroyed, as they add to the layering of the area.	Operational	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA

Aspect	Mitigation measures	Phase	Target
	• Roads running through the area may have historic stone way markers. Where these are found care should be taken that they are left in tact and in place. Road upgrades must not move or threaten their position and they should be visible from the road they are related to by passing travellers. • Where the historic function of a building/site is still intact, the function has heritage value and should be protected. • Surviving examples (wagon routes, outspans, and commonage), where they are owned in some public or communal way (or by a body responsible for acting in the public interest) and where they are found to be actively operating in a communal way, will have cultural and heritage value and should be enhanced and retained. The historic route running through Koup 1 should be maintained and integrity as a communal road for farm residents must be retained. • Accommodation of WEF staff must not negatively impact on existing farm residents or degrade the integrity of the farmstead complexes and should, without negative impact to ecological or aesthetic resources, be located outside of the farmstead complexes or site. Farm residents should be consulted on the preferable location for construction staff accommodation. • Lightest vehicles possible should be used to reduce degradation to the farm roads and the need to upgrade roads to scale and extent that negatively impacts on the integrity of the historic farm roads. Operational traffic must operate at speeds that reduce dust and noise as far possible.		
Socio-economic	• The findings of this report must be shared with identified interested and affected parties, including non-landowner residents on the development properties, in the EIA public participation process in order to further ascertain any intangible cultural resources that may exist on the landscape that have not been identified. A specialist qualified in recognising and discussing significance of intangible heritage resources should be present during the public meetings. The findings should inform the recommendations for appropriate mitigation for impacts to the cultural landscape. • The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. • The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases.	Planning/ pre-construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA
	• An updated cultural landscapes impact assessment report must be completed should the WEF continue to be used after the term granted in this application. This report should include a detailed assessment of the socio-economic impacts to the cultural landscape and its outcomes and recommendations need to be considered in the decision for recommissioning and be implemented if recommissioning is approved.	Construction/ decommissioning	Ensure compliance with relevant legislation and

Aspect	Mitigation measures	Phase	Target
	• The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. • The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases. • Sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area.		recommendations from SAHRA under Section 38 of NHRA
	• The local community on and around the development should benefit from job opportunities created by the proposed development and the development should not cause reduction in economic viability of surrounding properties in excess of those offered by the development. Short-term job opportunities at the expense of long term economic benefit and local employment opportunities must be prevented. • The continued use of the landscape for human habitation and cultivation by historic residents of the area, should be retained and encouraged as far possible to sustain the continual use pattern and human-environment relationship which is the ultimate significance of this cultural landscape element. The WEF development must allow and support this, including financially, and not degrade this continued relationship. • Local residents must be offered employment on the construction/ decommissioning and operational phases before 'importing' staff from elsewhere. • Local residents must be offered employment training opportunities associated with WEF developments at all phases. • Crop cultivation, sheep, cattle or game farming should be allowed to continue below the wind turbines, or be rehabilitated to increase biodiversity in the area.	Operational	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 38 of NHRA

The implementation of the recommendations contained in the preceding **Table 15** are illustrated in (**Figure 51**). It must be noted that the smaller buffers and distances recommended for tangible heritage features are contained within the larger 800-meter buffer that indicates a no-go for turbine development turbines.

The following summary of design indicators informed the mapping and recommendations on infrastructure placement:

- A 1000m buffer to either side of the N12 for turbine and infrastructure placement (pink buffer);
- 300m buffer to either side of identified significant historic farm roads (pink) for turbine placement, substation and laydown area (buffer not shown in map, only roads identified);
- 800m buffer around historic farmsteads (red circles) for turbine placements; and
- 50m outer boundary buffer for roads and infrastructure around farmsteads including cultivated areas and graves – integrity of farmstead complex as a whole should be retained and no WEF roads running through farmstead complexes;
- 200m freestanding graded heritage structure buffer for new roads and infrastructure, including road upgrades;
- 100m buffer from cemetery or unmarked burial for all development;
- existing roads to be used with minimal upgrade as far as possible;
- no-go areas on mountain ridges and steep slopes (over 10%) for all infrastructure;
- riverine corridors 100yr flood line buffer (ecological) or 100m buffer (archaeological) whichever is further (buffers not indicated).
- CBA and ESA no-go areas for all development (green shading)
- Koup poort buffer (light blue shading) included in the 300m farm road buffer.
- A preconstruction micro-survey for turbines, access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained.

Further, the following change to the current proposed layout is recommended:

- Turbine 11 must be relocated outside of the historic farmstead buffer;
- the proposed substation should be located to the north of the farm entrance road;
- the laydown area and substation should be located outside the 300m farm road buffer without impacting on the riverine corridor flood line and slopes over 3%;
- new access roads must be relocated to avoid slopes over 10% and visually sensitive slopes impacting on the views from the historic farm roads.

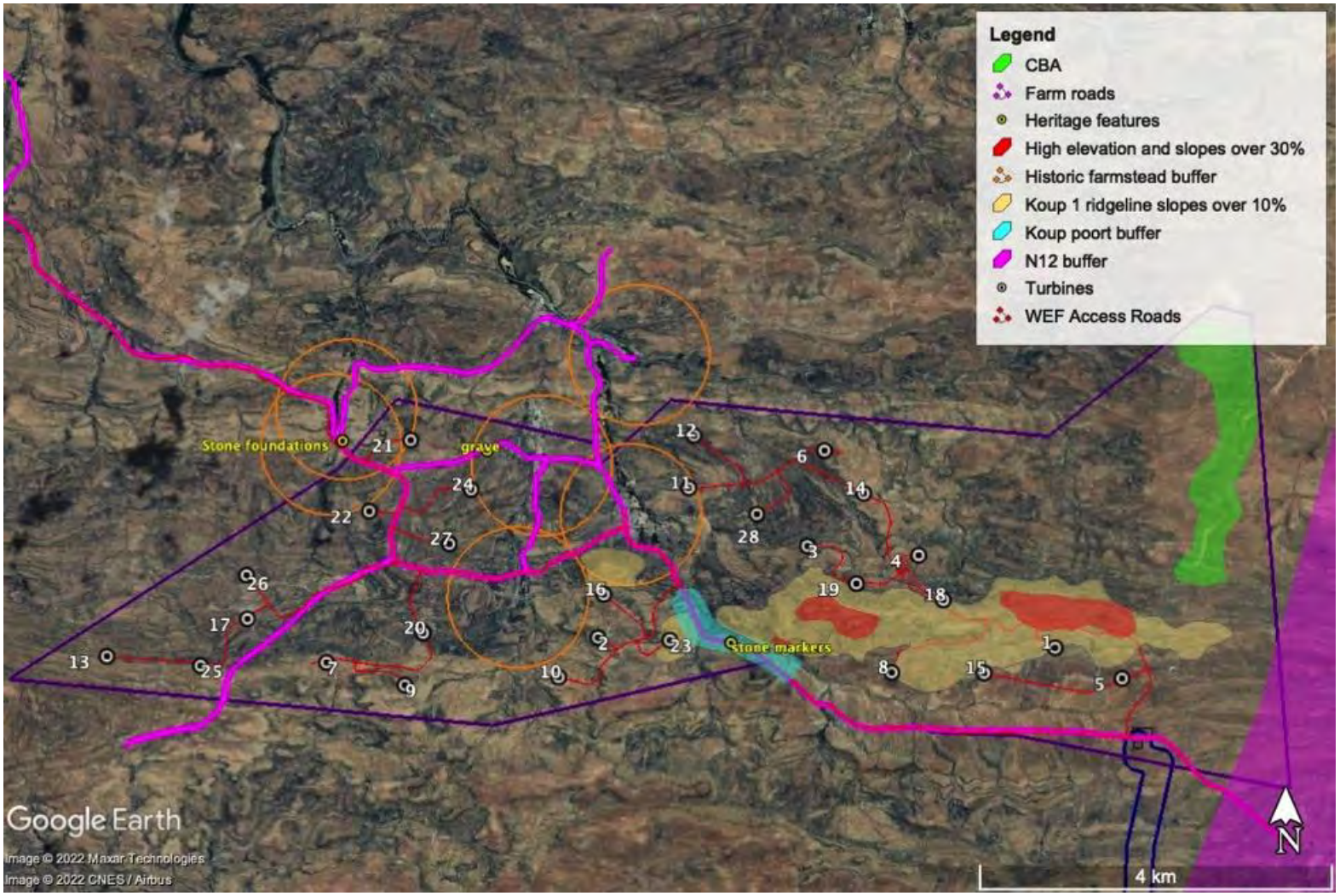


Figure 51: Cultural Landscapes Assessment heritage indicators and buffers map for proposed Koup 1 WEF development (Note: 300m buffer for pink farm roads not indicated; 100m/ flood line riverine corridor and ESA buffers not indicated).

11. CONCLUSIONS AND RECOMMENDATIONS

PGS has been appointed by SiVEST on behalf of Genesis ENETRAG, to undertake the assessment of the proposed construction of the Koup 1 WEF and associated grid connection infrastructure near Beaufort West in the Western Cape Province of South Africa.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. The studies comprising the full HIA identified various tangible cultural heritage resources while a significant cultural landscape component attributed as an intangible cultural heritage resource was described.

11.1 Archaeology, built environment and burial grounds and graves

The fieldwork conducted for the evaluation of the possible impact of the new Koup 1 WEF and associated grid connection infrastructure has revealed the presence of 18 tangible cultural heritage resources. One archaeological site (**KO_18**) was rated as having low heritage significance. Four graves, burial grounds and possible graves (**KO-06 – KO-09**) were rated as having high heritage significance. Two structures (**KO-03**, **KO-05**) were rated as having medium heritage significance, 1 structure (**KO-02**) was rated as having low heritage significance and 2 structures (**KO-01; KO-04**) were rated as having no heritage significance.

Three farmsteads or the remains of farmsteads were identified and constitutes the extent that of physical remains of current and historical adaptation to the challenging landscape. The farms of Platdorings (**KO-04-06**), Arbeid (**KO_19**) and Kareerivier (**KO_01-03** and **KO_07-08**) are located close to areas where historically water could be sources and, in most cases, these are dry riverbeds with cultivatable floodplains. Associated with all three farmsteads several burial grounds and graves (**KO-06 – KO-09**) were identified. Although the various heritage elements in each of these farmsteads do not all constitute having a high or medium significance. The combination of the build environment, burial grounds, and graves, as well as the utilisation off the landscape create a cultural landscape and all three cases a medium to high cultural significance.

Eight find spots (**KO_10 – KO_17**) comprise several low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the MSA, although both LSA and earlier ESA material was identified. All the artefact assemblages (**including KO-18**) occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.

11.2 Palaeontology

PIA determined that the study area is underlain by continental (fluvial / lacustrine) sediments of the Abrahamskraal and Teekloof Formations (Lower Beaufort Group, Karoo Supergroup) which are of Middle to Late Permian age. These bedrocks contain sparse, unpredictable to locally concentrated vertebrate fossils as well as rare trace fossils (*e.g.* tetrapod burrows) and plant material of scientific and conservation value. A substantial number of new fossil vertebrate sites (cranial and post-cranial material of large-bodied dinocephalians, small dicynodonts, rare tetrapod burrow casts) have been recorded during within the WEF project area during the short site visit, while several more sites have previously been mapped shortly outside its margins. These palaeontological sites, together with their sedimentological context, provide important data for on-going research into the pattern and causes of the Middle Permian Mass Extinction Event on land around 260 million years ago.

Scientifically valuable and legally protected fossil heritage resources preserved at or beneath the ground surface within the project footprint are potentially threated by clearance and bedrock excavations during the construction phase of the WEF and grid connection (*e.g.* for access roads, wind turbine foundations). The majority of the recorded fossil sites lie outside the project footprint but most of the WEF and grid connection footprint has yet to be palaeontologically surveyed on foot. A significant number of unrecorded sites almost undoubtedly lies within of very close to the project footprint.

No Very High Sensitivity or No-Go palaeontological sites or areas have been identified within the Koup 1 WEF or gruid connection project areas. Since all known fossil sites can be readily mitigated through professional recording and collection of fossil material in the pre-construction phase, no recommendations for micro-siting of infrastructure such as wind turbine, pylon positions or access roads are therefore made here.

11.3 Cultural Landscape

The Koup region is a significant cultural landscape that reflects the relationship between man and nature over a period. This relationship has generally been sustainable, where biodiversity and ecological systems have been maintained in the utilisation of the landscape expressed in specific land use patterns. The surrounding land use indicates a social appreciation of the natural environment with low impact stock farming with limited farmstead crop cultivation. The vastness and relative homogenous nature of the cultural landscape is, however, often undervalued. If careful contextual planning is not followed, it will rapidly result in a cluttered wasteland. This does not mean that development is discouraged, but rather that the implementation of wind and solar energy farms should be planned holistically.

The findings of the CLA report, coupled with the proposed layout for development of wind turbines, which considers appropriate placement in terms of wind energy capacity, concludes that the development can be permitted within the site if the report's recommendations are followed. The mitigating recommendations in the CLA report consider the ecological, aesthetic, historic and socio-economic value lines that underpin the layers of significance that combine to create the character of the place and the cultural landscape of the

Koup. These recommendations include road and farmstead complex buffers which incorporate cultivated areas and graves, steep slope and ridgeline no-go areas as well as consideration of the unique landform of the site, CBA and ESA no-go areas, as well as mechanisms to support the non-landowner residents that live on the site in being able to continue their indigenous land use patterns, knowledge and social systems.

11.4 Impact statement

The pre-construction and construction phase of the proposed WEF will entail extensive surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (*e.g.* for widened or new access roads, wind turbine foundations, hardstanding areas, on-site substation, underground cables, construction laydown area, O&M building and BESS). Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The finalised layout has considered the sensitivities identified during the field assessment. By selecting the Grid Option 2, the possible pre-construction impacts calculated on the tangible cultural heritage resources is overall MODERATE NEGATIVE rating but with the implementation of the recommend buffers and management guidelines will be reduced to a LOW NEGATIVE impact.

The impact on the cultural landscape includes:

- Critical Biodiversity Areas and Ecological Support Areas, largely associated with the riverine environment of the study area supports biodiversity conservation. These areas recognise the ongoing relationship between man and the environment in the way they are managed to maintain a natural state, which in turn, has a benefit for human habitation. reflect the names of the local farmsteads, indicating a close relationship between inhabitants on the landscape and these rivers as well as the significant dependence on these resources.
- The impact on the sense of place as the vast open landscape with low shrubby vegetation, characteristic of the Koup Karoo and determining to a large extent its evolution in history, creates a sense of place and landscape character intimately associated with this cultural landscape.
- The impact on the historicity of the landscape specifically on such features as, the national N12 road, a historic route linking Beaufort West with the towns of De Rust and Outdshoorn via scenic Meiringspoort Pass; history of the landscape and its intimate association with stock farming and waves of settlement throughout history stretching back to the Stone Age. While the utilisation of the landscape and the movement as embodied through farmsteads and farm roads adds to the layering of the cultural landscape up to present day, and
- The impact on the continued land use pattern and relationship to the land and its possible decline of the socio-economic position of the inhabitants, as they may not be able to maintain some level of subsistence with these resources. The ability for these residents to provide for themselves in this way must not be negatively impacted upon by the WEF development and must be supported, including financially, by the development. Their existence on the landscape, as the historic inhabitants of the area, previously disenfranchised and disempowered, is a fundamental element to the cultural landscape.

The impact on the cultural landscape through the development of the Koup1 WEF and grid infrastructure is calculated to have a VERY HIGH negative impact and specifically on the aesthetic and historical components of the cultural landscape. This impact is further projected the stay VERY HIGH when incorporating the cumulative impacts projected with the other sic (6) project within 35k m of Koup 1. By implementing the recommended mitigation measures and design indicators this negative impact can potentially reduce to MODERATE.

11.5 Conclusion

The calculated impact as summarised in **Section 8** of this report confirms the impact of the new Koup 1 WEF and associated grid connection infrastructure will be reduced with the implementation of the mitigation measures (Section **10.5)** for the cultural heritage resources. This finding in addition to the implementation of a chance finds procedure, as part of the EMPr, will mitigate possible impacts on unidentified heritage resources.

The conclusion of the combined specialist studies has culminated in the following heritage indicators and development buffers:

- A 1000m buffer to either side of the N12 for turbine and infrastructure placement (pink buffer);
- 300m buffer to either side of identified significant historic farm roads (pink) for turbine placement, substation and laydown area (buffer not shown in map, only roads identified);
- 800m buffer around historic farmsteads (red circles) for turbine placements; and
- 50m outer boundary buffer for roads and infrastructure around farmsteads including cultivated areas and graves – integrity of farmstead complex as a whole should be retained and no WEF roads running through farmstead complexes;
- 200m freestanding graded heritage structure buffer for new roads and infrastructure, including road upgrades;
- 100m buffer from cemetery or unmarked burial for all development;
- existing roads to be used with minimal upgrade as far as possible;
- no-go areas on mountain ridges and steep slopes (over 10%) for all infrastructure;
- riverine corridors 100yr flood line buffer (ecological) or 100m buffer (archaeological) whichever is further (buffers not indicated).
- CBA and ESA no-go areas for all development (green shading)
- Koup poort buffer (light blue shading) included in the 300m farm road buffer.
- A preconstruction micro-survey for turbines, access roads, substations, laydown areas and gridlines should be completed with CLA specialist to ensure appropriate buffers are maintained.

Further, the following change to the current proposed layout is recommended:

- Turbine 11 must be relocated outside of the historic farmstead buffer;
- the proposed substation should be located to the north of the farm entrance road;
- the laydown area and substation should be located outside the 300m farm road buffer without impacting on the riverine corridor flood line and slopes over 3%;
- new access roads must be relocated to avoid slopes over 10% and visually sensitive slopes impacting on the views from the historic farm roads.

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APPENDIX A – CV

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

SUMMARY OF EXPERIENCE

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

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

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

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

KEY QUALIFICATIONS

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

BA - Archaeology, Geography and Anthropology - 1996

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

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

CRM Accreditation (ASAPA) -

Principal Investigator - Grave Relocations

Field Director – Iron Age

Field Supervisor – Colonial Period and Stone Age

Accredited with Amafa KZN

KEY WORK EXPERIENCE

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

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

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

2000-2004 - CEO– Matakoma Consultants

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

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

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

APPENDIX B – IMPACT ASSESSMENT METHODOLOGY

1 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.