Proposed construction of a 132 kV above ground cable and internal access roads for the authorised Mooi Plaats Solar Energy Facility (SEF) and its associated infrastructure, near Noupoort in the Northern Cape Province.

Palaeontological Impact Assessment

Reference: TBA
Report Prepared by: Banzai Environmental
Issue Date: March 2023
Version No.: 00

EXECUTIVE SUMMARY

Banzai Environmental has been appointed to conduct the Palaeontological Impact Assessment for the proposed construction of a 132 kV aboveground cable, 33 kV above ground cables and internal access roads for the authorised 400 MW Mooi Plaats Solar PV Energy Facility (SEF) and its associated infrastructure, near Noupoort in the Northern Cape Province.

The proposed grid and road infrastructure development of the EDF Mooiplaats Solar Energy Facility (SEF) is underlain by Cenozoic superficial alluvium deposits, the Karoo Dolerite Suite of the Karoo Igneous Province as well as sandstone and shale of the Adelaide and Tarkastad Subgroups of the Beaufort Group, Karoo Supergroup. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary alluvium is Moderate, that of the Jurassic dolerite is Zero as it is igneous in origin and the Palaeontological Sensitivity of the Adelaide and Tarkastad Subgroups (Beaufort Group) is Very High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014). Recent updated geology produced by the Council of Geosciences indicates that the proposed development is mainly underlain by the Balfour Formation (Adelaide Subgroup) and Tarkastad Subgroup (Beaufort Group, Karoo Supergroup), while an extremely small portion in the south is underlain by the Karoo Dolerite Suite.

A one day-comprehensive site-specific field survey of the development footprint was conducted on foot and motor vehicle in March 2023. Only one loos down washed fragment with plant stems were recovered from the development footprint. The site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value. Data indicates that fossil sites are generally rare, sporadic and unpredictable. A low significance has thus been allocated to the development footprint.

In the last few decades extensive research and fossil collecting have been conducted by palaeontologists in this part of the basin and the National Palaeontological databases indicate that the Noupoort area is fossiliferous. A day site-specific field survey of the development footprint for the project was conducted on foot and motor vehicle in March 2023. Only one fragmented, loose plant fossil imprint was documented in the development footprint during the site investigation. However, the site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value.

This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeontological Sensitivity Map and DFFE Screening Tool. **A low Palaeontological Significance has been allocated for the construction phase of the grid and road infrastructure development pre-mitigation and a very low significance post mitigation**. The construction phase will be the only

development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the infrastructure development near Noupoort is considered to be High pre- mitigation and Low post mitigation and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the infrastructure may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

Recommendations:

- The ECO for this project must be informed that the Adelaide Subgroup and Tarkastad Subgroups, (Beaufort Group, Karoo Supergroup) has a **Very High Palaeontological Sensitivity**.
- If Palaeontological Heritage is uncovered during surface clearing and excavations, the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: Heritage Western Cape, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. 3rd floor Protea Assurance Building, 142 Longmarket St, Cape Town City Centre, Cape Town, 8000; Private Bag X9067, Cape Town, 8000 Tel: 021 483 9598. Fax: +27 (0) 21 483 9845. Web: www.hwc.org.za) so that mitigation (recording and collection) can be carried out.
- Before any fossil material can be collected from the development site, the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).
- These recommendations should be incorporated into the Environmental Management Plan for the Mooiplaats SEF grid and road infrastructure development.

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 vi
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page vi
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5&8
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
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 5
g) an identification of any areas to be avoided, including buffers;	Section 5&8
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 5
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 5&8
k) any mitigation measures for inclusion in the EMPr;	Section 7
l) any conditions for inclusion in the environmental authorisation;	Section 7
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7

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;	Section 5&8
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A
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.	Section 3

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed construction of a 132 kV aboveground cable and internal roads for the authorised Mooi Plaats Solar Energy Facility (SEF) and its associated infrastructure, near Noupoort in the Northern Cape Province.

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations

Environment House 473 Steve Biko Road Arcadia Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at: Email: EIAAdmin@environment.gov.za

SPECIALIST INFORMATION

Specialist Company Name:	Banzai Environmental Pty Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Level 4	Percentage Procurement recognition	51%
Specialist name:	Elize Butler			
Specialist Qualifications:	MSc			
Professional affiliation/registration:				
Physical address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein, 9301			
Postal address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein, 9301			
Postal code:	9301	Cell:	084 4478759	
Telephone:		Fax:		
E-mail:	info@banzai-group.com			

DECLARATION BY THE SPECIALIST

I, Elize Butler, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

- all the particulars furnished by me in this form are true and correct; and
- I realize that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Banzai Environmental

Name of Company:

11 February 2023

Date

3. **UNDERTAKING UNDER OATH/ AFFIRMATION**

I, E. Butler, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Banzai Environmental.

Name of Company

2023/02/11.

Date

Signature of the Commissioner of Oaths

SUID-AFRIKAANSE POLISIEDIENS
HUMAN RESOURCE MANAGEMENT
2023 -02- 11
SOUTH AFRICAN POLICE SERVICE

2023/02/11

Date

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GLOSSARY OF TERMS

Fossil

Mineralized bones of vertebrate and invertebrate animals, as well as plants. A trace fossil is the traces of animals/plants preserved in stone.

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.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past (other than fossil fuels or fossiliferous rock intended for industrial use) and any site which comprises of fossilised remains or traces of past life.

LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
CA	National Competent Authority
ECO	Environmental Control Officer
S&EIA	Scoping and Environmental Impact Assessment
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
Ma	Millions of years ago
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
SAHRA	South African Heritage Resources Agency
SEF	Solar Energy Facility
SAHRIS	South African Heritage Resources Information System
ToR	Terms of Reference

1. INTRODUCTION

Elize Butler has been appointed by SLR South Africa Consulting (Pty) Ltd, on behalf of Mooi Plaats Solar Power (Pty) Ltd, hereafter referred to as “Mooi Plaats”, to undertake a Palaeontological Impact Assessment for the proposed construction of a 132 kV aboveground cable, 33 kV above ground cables and internal access roads for the authorised 400 MW Mooi Plaats Solar PV Energy Facility (SEF) and its associated infrastructure, near Noupoort in the Northern Cape Province.

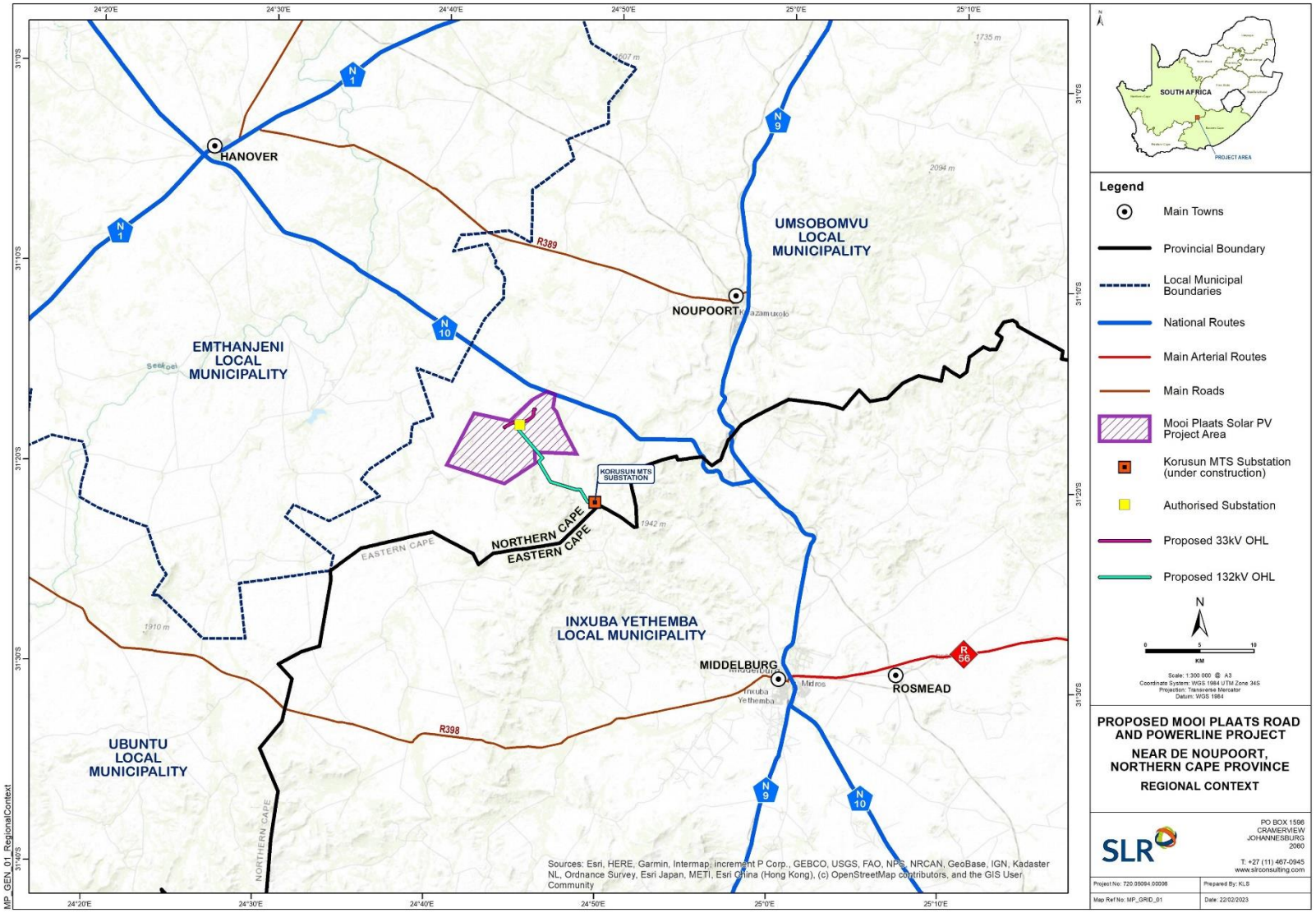


***Table 1-1**:Regional Context*

2. ASSESSMENT METHODOLOGY

2.1 Specialist Credentials

Please see Appendix 3 (Specialist CVs)

2.1 Terms of Reference

The proposed project is required for the authorised 400 Megawatts (MW) Mooi Plaats Photovoltaic (PV) Solar Energy Facility (SEF) and its associated infrastructure, (authorised by way of EA dated 8 June 2022 with reference number: 14/12/16/3/3/2/1134 and 14/12/16/3/3/2/1132 respectively) in order to be bid in the Renewable Independent Power Producer Programme (REIPPP) / private opportunities which are aimed at bringing additional megawatts onto the country's electricity system through private sector investment in renewable energy.

In order to optimise the layout of the authorised 400 MW Mooi Plaats SEF and Grid infrastructure and ensure that the project remains suitable for development opportunities in the REIPPPP or for private agreements. Mooi Plaats proposes the addition of supporting infrastructure for the Mooi Plaats SEF (14/12/16/3/3/2/1134) and Grid Connection (14/12/16/3/3/2/1132).

The proposed 33kV above ground cables, 132 kV aboveground cable and internal access roads, hereafter referred to as "the proposed project", which forms this application and Basic Assessment (BA) process.

2.2 Approach

The present field-based PIA for the construction of a 132 kV aboveground cable, 33 kV above ground cables and internal access roads for the authorised 400 MW Mooi Plaats SEF and its associated infrastructure, near Noupoort in the Northern Cape Province assesses the potential impacts on Fossil Heritage on the development. This study forms part of the Heritage Impact Assessment Report. According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the **impact** on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

All possible information is consulted to compile a scoping report, and this includes the following: Provisional DFFE Screening Tool, SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical and geological maps as well as scientific articles of specimens from the development area and Assemblage Zones.

When the development footprint has a moderate to high palaeontological sensitivity a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact significance of the planned development and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

During a site investigation the palaeontologist does not only survey the development but also tries to determine the density and diversity of fossils in the development area. This is confirmed by examining representative exposures of fossiliferous rocks (sedimentary rocks contain fossil heritage whereas igneous and metamorphic rocks are mostly unfossiliferous). Rock exposures that are investigated usually contains a large portion of the stratigraphic unit, can be accessed easily and comprise of unweathered (fresh) exposed rock. These exposures may be natural (rocky outcrops in stream or river banks, cliffs, dongas) but could also be artificial (quarries, open building excavations and even railway and road cuttings). It is common practice for palaeontologist to log well-preserved fossils (GPS, and stratigraphic data) during field assessment studies.
Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils, a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible as knowledge of local palaeontological heritage may be increased.

The fossil potential of the development area was determined by criss-crossing the development footprint and by physically investigating the bedrock outcrops to determine the lithology and fossil content of the outcrops. Selected potentially fossiliferous sites (e.g., along drainage lines, hillslopes and erosion gullies) were specifically investigated as this region of the Great Karoo has a limited bedrock exposure. Representative investigations of crevasse splay and channel sandstones as well as Cenozoic alluvial deposits were also conducted. Fossils occurring at the surface is very unpredictable and as the area is very large and a representative sample size of the area has been investigated. The outcome of a site investigation is limited due to the time and cost of a detailed investigation. Fossil sites are usually discovered by chance and a representative subsample is all that can be hoped for. However, it is important to note that the absence of fossils in a development footprint does not necessarily mean that palaeontological significant material is not present on site (on or beneath ground surface).
A site sensitivity verification report is required to be undertaken to comply with “Part A - General Protocol for the Site Sensitivity Verification and Minimum Report Content Requirements where a Specialist Assessment is required but no specific Environmental Theme Protocol has been prescribed” (GG 43110 / GNR 320, 20 March 2020).

A one day-comprehensive site-specific field survey of the development footprint for the project was conducted in March 2023 to verify the site sensitivity assigned to the Mooiplaats SEF grid and road development and to validate the sensitivity and land use as prescribed by the DFFE Screening Tool

(see Appendix 2). The Screening Tool indicates that the proposed development has a Very High Palaeontological Sensitivity. This provisional assessment is contested here although a few new fossiliferous sites were recovered during the site investigation. Based on the site investigation as well as desktop research it is concluded that fossil heritage of conservational and scientific interest in the development footprint is relatively rare. It is concluded that the study area generally has a low palaeontological sensitivity. If Palaeontological Heritage is uncovered during surface clearing and excavations, the Chance find Protocol attached should be implemented immediately. These recommendations should be incorporated into the EMPr and fully implemented during the construction phase of the development. The construction of the development may thus be permitted in its whole extent, and no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

2.3 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented

Areas with similar Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment was conducted to improve the accuracy of the desktop assessment.

Access to the relevant farms was freely available and it was possible to investigate all areas deemed necessary for the satisfactory completion of the study.

3.2 General Requirements of a PIA:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.
- Adherence to all applicable best practice recommendations, appropriate legislation, and authority requirements.
- Submit a comprehensive overview of all appropriate legislation, guidelines.
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study.
- Description and location of the proposed development and provide geological and topographical maps.
- Provide Palaeontological and geological history of the affected area.
- Identification sensitive areas to be avoided (providing shapefiles/kml's) in the proposed development.

- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect, and cumulative:
    a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
    b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
    c. Cumulative impacts result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

3. LEAL REQUIREMENT AND GUIDELINES

In terms of the Environmental Impact Assessment (EIA) Regulations, 2014, promulgated under the National Environmental Management Act (No 107 of 1998) (NEMA) and published in Government Notice (GN) No. R982 (and associated amendments), various aspects of the proposed project may have an impact on the environment and are considered to trigger certain listed activities. These activities are prohibited from being undertaken until an Environmental Authorisation (EA) has been obtained from the Competent Authority (CA), namely the Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development.

It should be noted that a Basic Assessment (BA) process will be undertaken for the proposed project.

To inform the environmental assessments, each appointed Specialist is required to meet the conditions of Section 13 of GN R982 of NEMA (as amended) (namely the General requirements for EAPs and Specialists) and/or GN. 320 of 20 March 2020 and GN. 1150 of 30 October 2020 (if applicable / required), which prescribes specialists protocols. Similarly, the appointed Specialist's scope of services shall meet the requirements of Appendix 6 of GN. R982 (as amended) of NEMA (namely Specialist Report Content), as well as any additional requirements associated with the other permitting and licensing processes in terms of other environmental legislation relevant to the specialist's field of interest.

Where a specialist assessment is required and no specific environmental theme protocol has been prescribed (in terms of GN. 320 of 20 March 2020 & GN. 1150 of 30 October 2020), the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations, 2014 (as amended), and any relevant legislation and guidelines deemed necessary.

3.1 National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "…*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

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

3.2 Legislative and Permit Requirements

It is required to submit a Palaeontological Impact assessment as part of a Heritage Impact assessment to the SAHRA. The costs for submitting a Review of an impact assessment report related to an application for Environmental Authorisation made in terms of legislation other than NHRA will be R2000 as of 1 January 2023.

4. PROJECT DESCRIPTION

4.1 Project Location

The proposed site is located approximately 23km south-west of the town of Noupoort, which falls within the Umsobomvu Local Municipality in the Pixley ka Seme District Municipality of the Northern Cape Province as shown in

Table 1-1*:Regional Context*

.

The proposed project is required for the authorised 400 Megawatts (MW) Mooi Plaats Photovoltaic (PV) Solar Energy Facility (SEF) and its associated infrastructure, (authorised by way of EA dated 8 June 2022 with reference number: 14/12/16/3/3/2/1134 and 14/12/16/3/3/2/1132 respectively) in order to be bid in the Renewable Independent Power Producer Programme (REIPPP) / private opportunities which are aimed at bringing additional megawatts onto the country's electricity system through private sector investment in renewable energy.

In order to optimise the layout of the authorised 400 MW Mooi Plaats SEF and Grid infrastructure and ensure that the project remains suitable for development opportunities in the REIPPPP or for private agreements. Mooi Plaats proposes the **addition of supporting infrastructure for the Mooi Plaats SEF (14/12/16/3/3/2/1134) and Grid Connection (14/12/16/3/3/2/1132).**

The proposed 33kV above ground cables, 132 kV aboveground cable and internal access roads, hereafter referred to as "the proposed project", which forms this application and Basic Assessment (BA) process.

The proposed project requires several key components to facilitate the transmission and distribution of electricity at a large scale. This includes:

- Two (2) 33 kV above ground cables;
- One (1) 132kV overhead powerline;
- Three (3) Internal Access Roads.

In terms of the EIA Regulations various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require authorisation from the Provincial Competent Authority (CA), namely the Northern Cape Department of Agriculture, Environmental Affairs, Land Reform and Rural Development, prior to the commencement thereof. Specialist studies have been commissioned to verify the sensitivity and assess the impacts of the Solar PV under the Gazetted specialist protocols (GN R 320 and GN R 1150 of 2020).

The scope of this report is the 33kV above ground cables, 132 kV aboveground cable, and internal access roads

The proposed project will be located on the following properties / farm portions:

Project Name	**EDF Mooi Plaats Powerline & Road BA**	
Project Component	**Affected Properties**	**SG Codes**
	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001

Project Name	EDF Mooi Plaats Powerline & Road BA	
132 kV aboveground cable	• Portion 6 of the Farm Uitzicht No. 3	C04800000000000300006
	• Portion 7 of the Farm Uitzicht No. 3	C04800000000000300007
	• Portion 8 of the Farm Uitzicht No. 3	C04800000000000300008
33 kV above ground cables	• Remainder of Farm Mooi Plaats No. 121	C03000000000012100000
	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001
Internal Access Roads	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001
	• Remainder of Farm Mooi Plaats No. 121	C03000000000012100000

4.2 Project components

As mentioned above, the proposed project will service the Mooi Plaats 400MW Solar PV Energy Facility (including associated grid electrical infrastructure). The proposed project requires several key components to facilitate the transmission and distribution of electricity at a large scale. This includes:

- Two (2) 33 kV above ground cables;
- One (1) 132kV overhead powerline;
- Three (3) Internal Access Roads.

The two (2) proposed 33kV above ground cables (approximately 2.3km and 1.7km in length respectively) are required to connect the authorized Mooi Plaats Solar PV to the authorized 33kV/132kV onsite collector substation. The 33kV above ground cables will be supported by monopole double circuit built to 88/132kV dimensions and will be up to a maximum of 28m in height. The corridor buffer width to be assessed is 100m- 50m on either side of the 33kV alignment.

Approximately 6.7km of the proposed 11.3km 132kV aboveground cable is situated within the approved 132kV corridor (14/12/16/3/3/2/1132). This 132kV aboveground cable will deviate approximately 4.6km south-east out of the approved powerline corridor to connect to the approved 132kV/400kV Korusun[1] Main Transmission Substation (MTS) (14/12/16/3/3/2/730/2 as amended and currently under construction). The design of the 132kV pylon towers to be used for this project will be a combination of single and double circuit Monopole pylons and Lattice pylons as required and will range between 24m-40m in height. The corridor buffer width to be assessed for the proposed 4.6km aboveground cable is 300m- 150m on either side of the 132kV alignment.

The corridors proposed to be assessed are to allow flexibility when routing the powerlines and roads within the corridor.

[1] Formerly referred to as the Hydra D MTS.

Three (3) Internal access roads (approximately 1.3km, 1.2km and 0.09km in length respectively) are required to access the Solar PV arrays. Each road will be approx. between 4m and 12m wide. The corridor buffer width to be assessed for the proposed roads is 300m- 150m on either side of the road alignment.

Error! Reference source not found. below represents these various project components and their specifications, as well as a detailed breakdown of their impact footprints. Temporary areas necessary for construction are also included. The location of these components in relation to the approved Solar PV is shown on **Error! Reference source not found.** respectively.

Table 4-1:Summary of the key project components

Component	**Details**		
Powerlines			
Connection from the approved Solar PV to the approved onsite substation			
Powerline capacity:	Two (2) 33kV powerlines		
Powerline length:	One (1) approximately 1.7km and One (1) approximately 2.3km		
Powerline corridors width	100 m (50 m on either side of centre line)		
Powerline servitude	32m		
Powerline co-ordinates	**33kV Powerline 1 (1.7km)**		
		Latitude	**Longitude**
	Start	S31° 17' 39.933"	E24° 43' 52.113"
	Middle	S31° 17' 26.517"	E24° 44' 19.675"
	End	S31° 17' 32.309"	E24° 44' 46.126"
	33kV Powerline 2 (2.3km)		
		Latitude	**Longitude**
	Start	S31° 16' 43.404"	E24° 45' 37.149"
	Middle	S31° 17' 13.282"	E24° 45' 17.968"
	End	S31° 17' 32.243"	E24° 44' 47.006"
Powerline pylons:	Monopole double circuit built to 88/132kV dimensions		
Powerline pylon height:	Maximum 28 m		
Powerlines			
Connection from the approved onsite substation to the approved Korusun MTS			
Powerline capacity:	One (1) 132kV powerline		

Table 4-1:Summary of the key project components			
Powerline length:	Approximately 11.3km (4.6 km new and 6.7km within an approved corridor)		
Powerline corridors width	300 m (150 m on either side of centre line)		
Powerline servitude	32m		
Powerline co-ordinates	**132kV Powerline (11.3km)**		
		Latitude	**Longitude**
	Start	S31° 17' 32.571"	E24° 44' 43.027"
	Middle	S31° 19' 54.655"	E24° 46' 21.662"
	End	S31° 21' 21.246"	E24° 49' 9.274"
Powerline pylons:	Combination of single and double circuit Monopole pylons and Lattice pylons as required		
Powerline pylon height:	Maximum 40 m		
Roads			
Provide access to the approved solar PV			
Road Length	Approximately 1.3km, 1.2km and 0.09km in length respectively		
Road corridors width	300 m (150 m on either side of centre line)		
Road co-ordinates	**Road 1 (1.3km)**		
		Latitude	**Longitude**
	Start	S31° 18' 20.582"	E24° 43' 40.232"
	Middle	S31° 18' 36.778"	E24° 43' 45.381"
	End	S31° 18' 58.410"	E24° 43' 44.862"
	Road 2 (1.2km)		
		Latitude	**Longitude**
	Start	S31° 17' 24.692"	E24° 44' 28.587"
	Middle	S31° 17' 30.970"	E24° 44' 8.613"
	End	S31° 17' 40.211"	E24° 43' 48.797"
	Road 3 (0.09km)		
		Latitude	**Longitude**
	Start	S31° 18' 8.741"	E24° 45' 20.578"
	Middle	S31° 18' 9.641"	E24° 45' 21.865"
	End	S31° 18' 10.541"	E24° 45' 23.152"

4.3 Site Layout

The proposed project layout shows the 33kV above ground cables, 132 kV aboveground cable and internal access roads (as detailed in Table 4-1 above) and is related to the approved Mooi Plaats Solar PV and grid connections. The project components are shown in **Error! Reference source not found.** below.

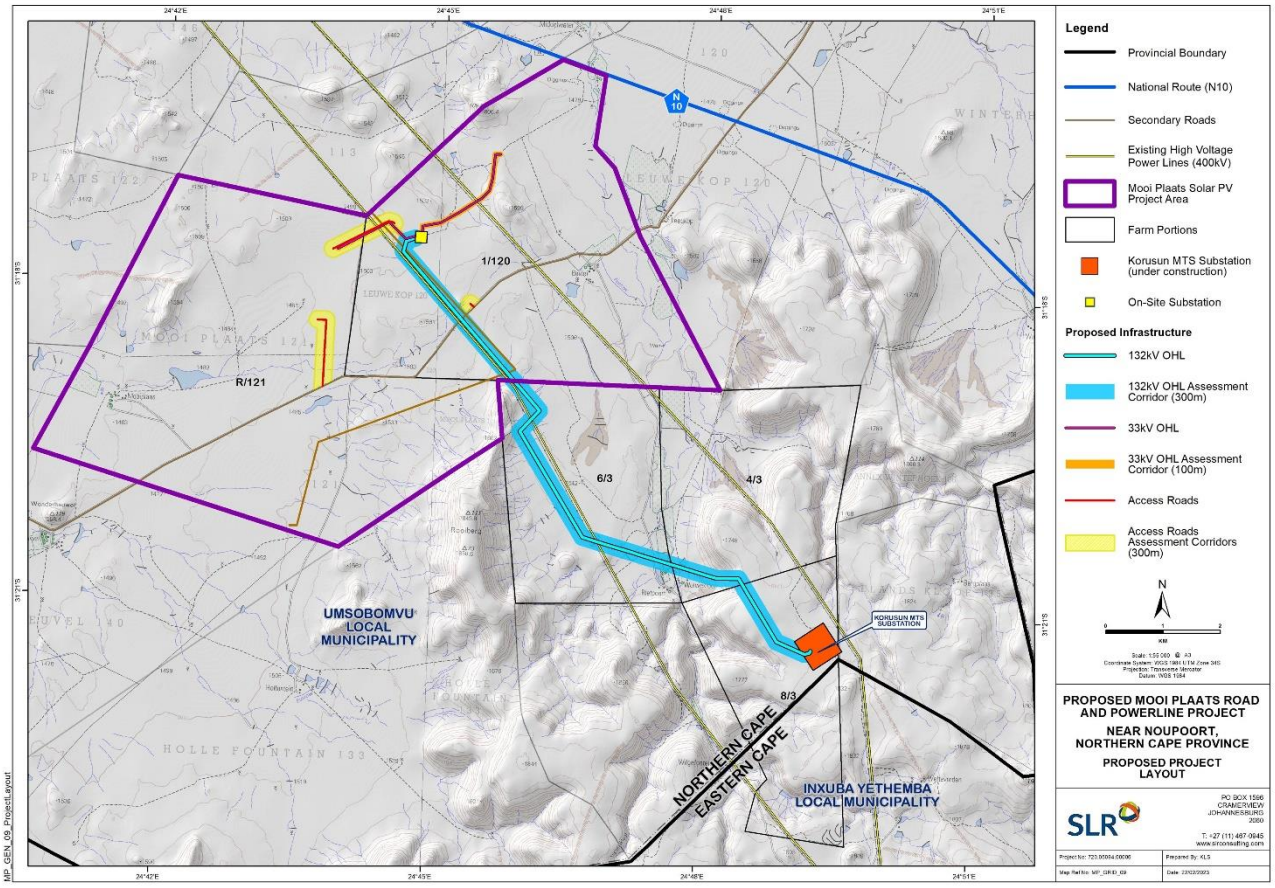


Table 4-2:Proposed Project components.

4.4 Alternatives

The location of the 33kV above ground cables, 132 kV OHL and internal access roads will be determined based on identified sensitive and/or no-go areas. The findings of the respective specialist studies will be used to inform the location of the 33kV above ground cables, 132 kV aboveground cable and internal roads. All identified sensitive and/or no-go areas (including their respective buffers) will be avoided accordingly, as required.

In addition, the road and powerline corridors will be assessed against the '**no-go' alternative**. The 'no-go' alternative is the option of not constructing the project, where the *status quo* of the current activities on the project site would prevail.

4.5 Routing of Corridor

To allow efficient transmission, the electricity generated by the authorised Solar PV Energy undergoes a voltage "step-up" process that occurs at solar panel where power is stepped up to a maximum of 33 kV (either in the solar panel or in a small transformer container next to the solar PV), and again at the Solar PV onsite substation where power is stepped up to 132 kV. This grid connection infrastructure will connect to the authorised 400 MW Mooi Plaats Solar PV infrastructure (14/12/16/3/3/2/1134).

5. BASELINE DESCRIPTION OF THE RECEIVING ENVIRONMENT

The proposed EDF Mooiplaats Project near Noupoort in the Northern Cape Province is depicted on the 1:250 000 Middelburg 3124 (1996) Geological Map (Council of Geoscience, Pretoria) (**Figure 5-1; Table 5-1**). The development is underlain by Cenozoic superficial alluvium deposits (yellow, single bird figure), the Karoo Dolerite Suite of the Karoo Igneous Province (Jd, red), as well as sandstone and shale of the Adelaide (Pa, light green) and Tarkastad Subgroups (TRk, yellow with red dots) of the Beaufort Group, Karoo Supergroup. In this map the Adelaide Subgroup is undifferentiated while the Tarkastad Subgroup is represented by the Katberg Formation.

The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary alluvium is Moderate, that of the Jurassic dolerite is Zero as it is igneous in origin and the Palaeontological Sensitivity of the Adelaide and Tarkastad Subgroups (Beaufort Group) is Very High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014) (**Figure 5-2; Table 5-2)**.

Recent updated geology produced by the Council of Geosciences (Pretoria; **Figure 5-3. Table 5-3**) indicates that the proposed development is mainly underlain by the Balfour Formation (Adelaide Subgroup) and Tarkastad Subgroup (Beaufort Group, Karoo Supergroup), while an extremely small portion in the south is underlain by the Karoo Dolerite Suite.

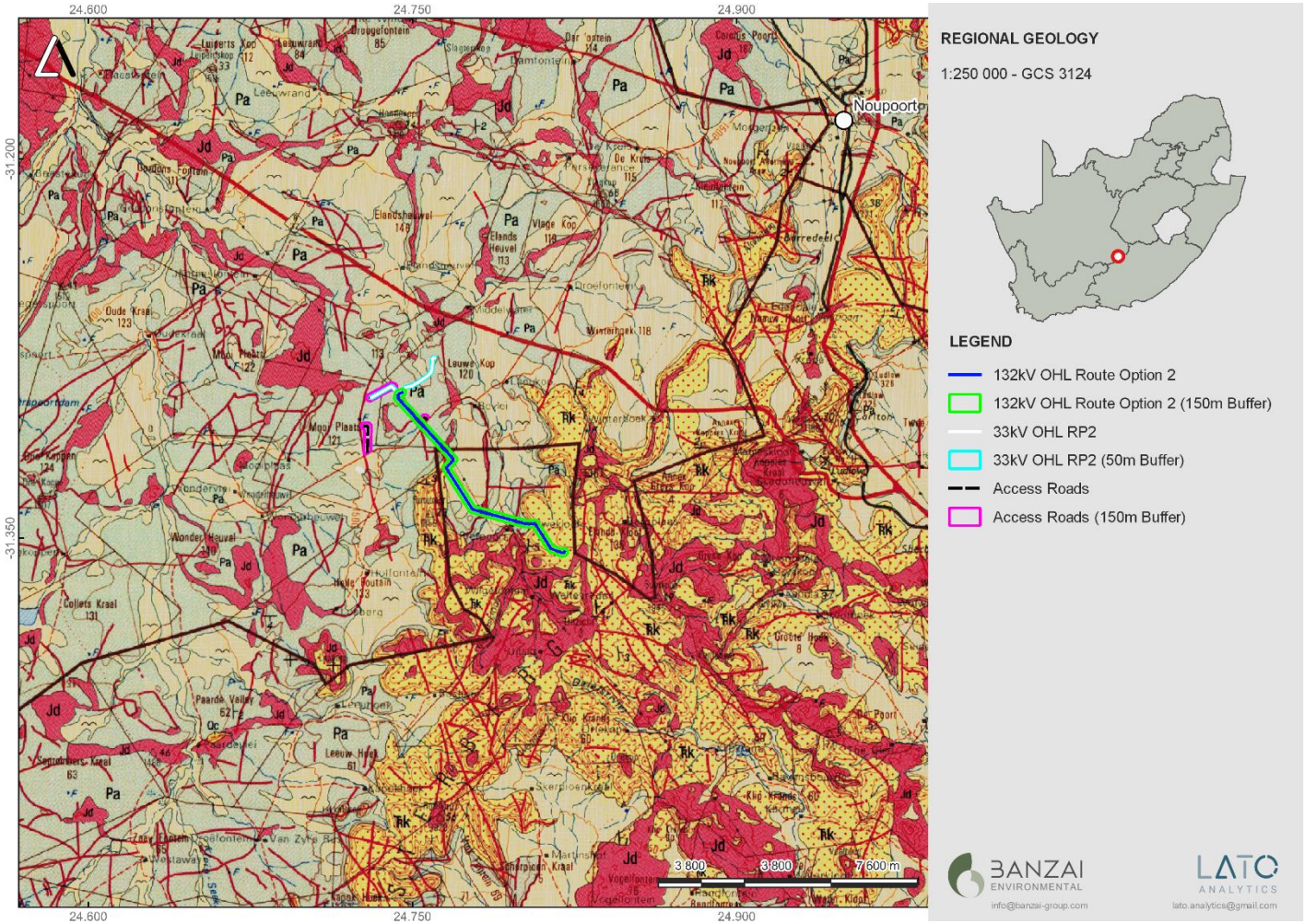
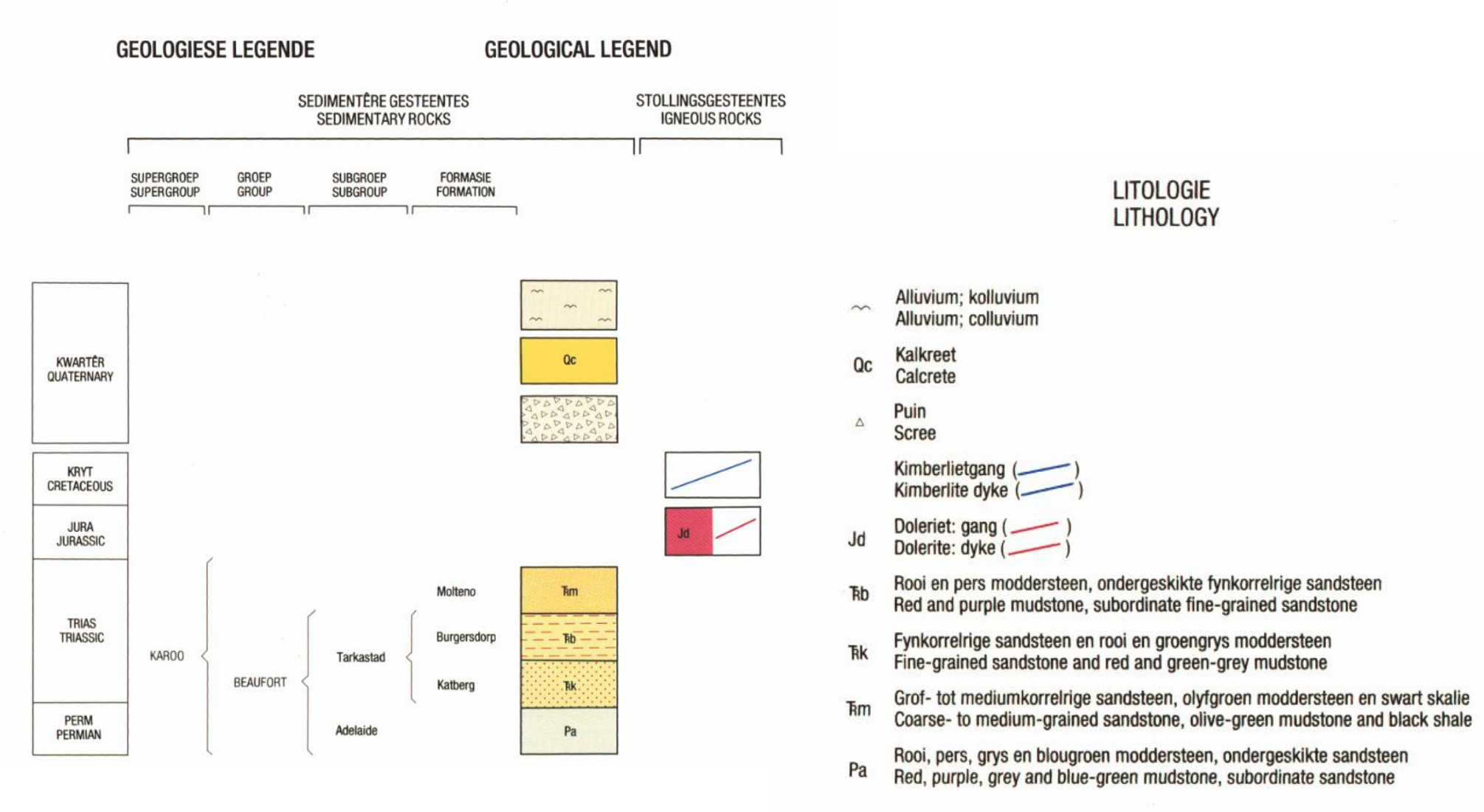


Table 5-1:*Extract of the 1:250 000 Middelburg 3124 (1996) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the Mooiplaats SEF infrastructure near Noupoort in the Northern Cape. The development is underlain by alluvium superficial deposits (yellow, single bird figure), Karoo dolerite Suite (Jd, red), the Adelaide Subgroup (pa; green) as well as the Katberg Formation of the Tarkastad Subgroup (Trk, yellow with red dots) of the Beaufort Group, Karoo Supergroup.*

Table 5-2: *Table 5-1. Legend to the 1:250 000 Middelburg 3124 (1996) Geological Map (Council for Geosciences, Pretoria).*



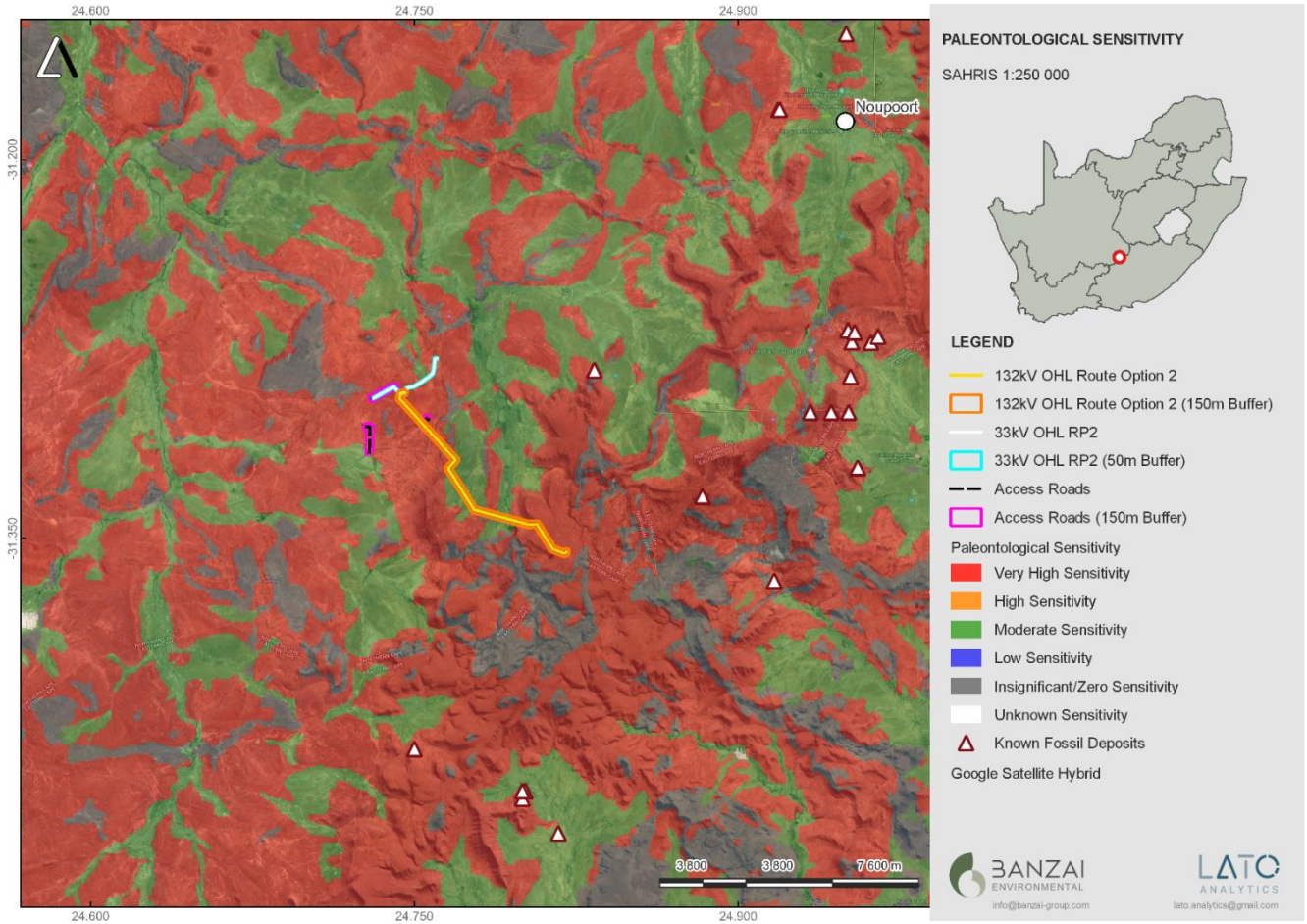


***Table 5-3**:Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed EDF Mooiplaats SEF Grid and Road infrastructure. Fossils finds recorded on the National Palaeontological Database is indicated in white triangles with red outlines.*

According to the SAHRIS Palaeosensitivity map (**Figure 5-2, Table 5-2**) the development is underlain by sediments with predominantly a Very High (red), moderate (green) and Zero (grey) Palaeontological Sensitivity.

Table 5-2: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

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

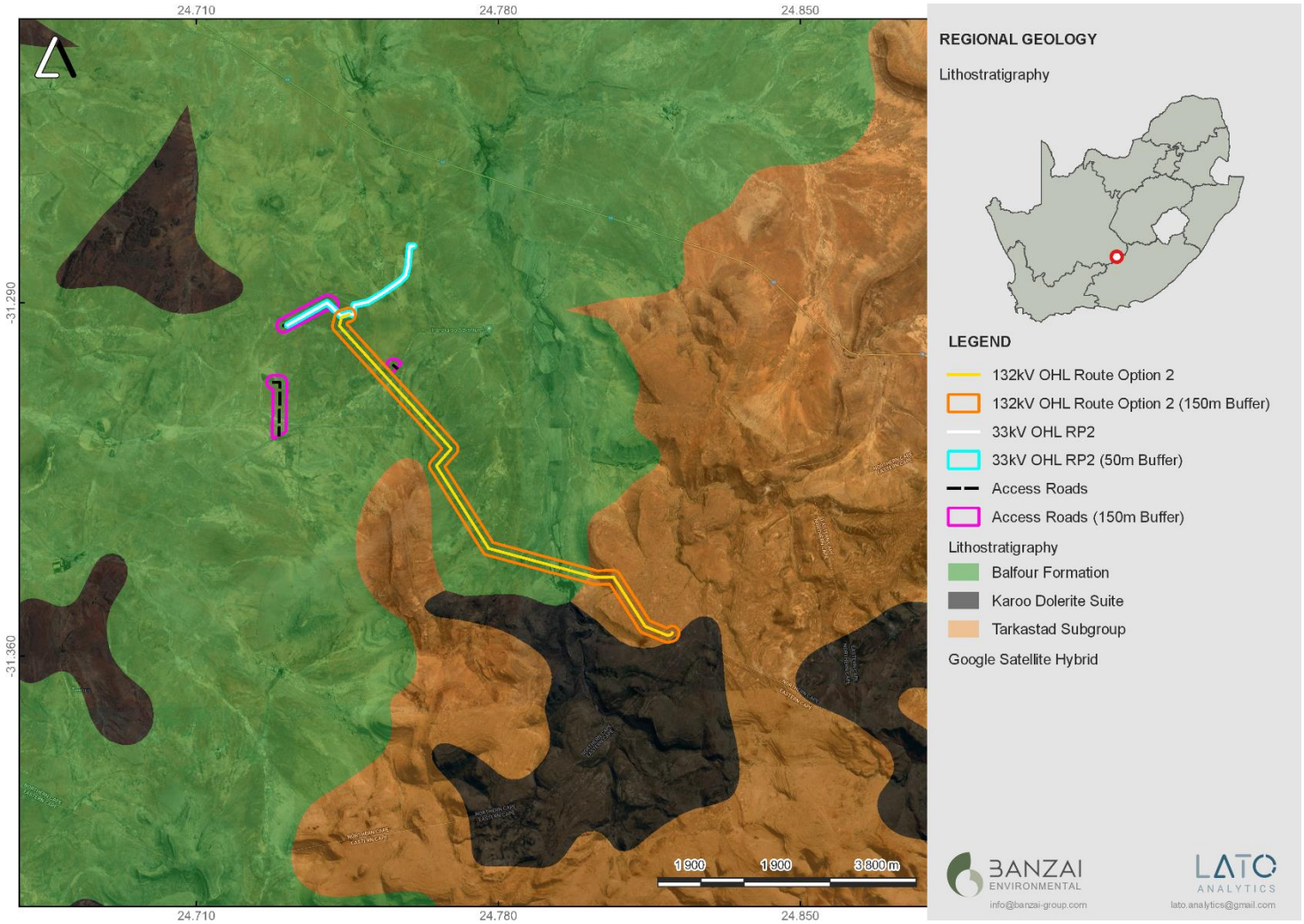
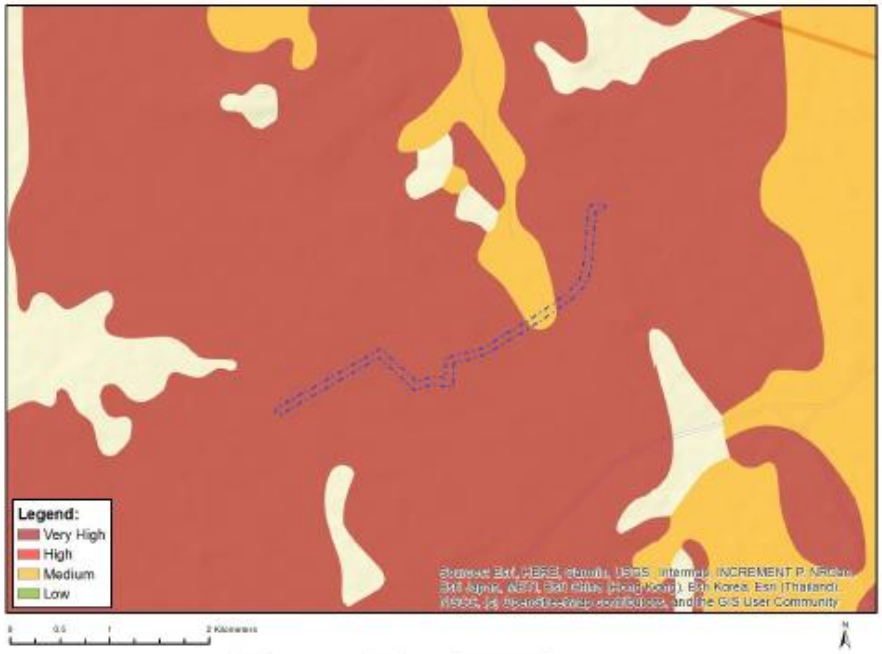


***Table 5-4**.Updated geology (compiled by the Council of Geosciences, Pretoria) indicates that the grid and road infrastructure is underlain by the Balfour Formation, Tarkastad Subgroups as well as Dolerite**.*

The Web based DFFE Screening tool also indicates the Very High Palaeontological Sensitivity of the development area. Thus, the Palaeontological Sensitivity of the SAHRIS Palaeosensitivity map and the DFEE National Environmental Web-bases Screening Tool (**Figure 5-4 to Figure 5-7)** indicates that the proposed development is rated as Very High. The Very High rating can be attributed to the rich Permian fossil assemblages known from the lower Beaufort in the Karoo Basin. The Palaeontological Sensitivity of Jurassic dolerite is rated as Zero as it is igneous in origin and unfossiliferous (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014).

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



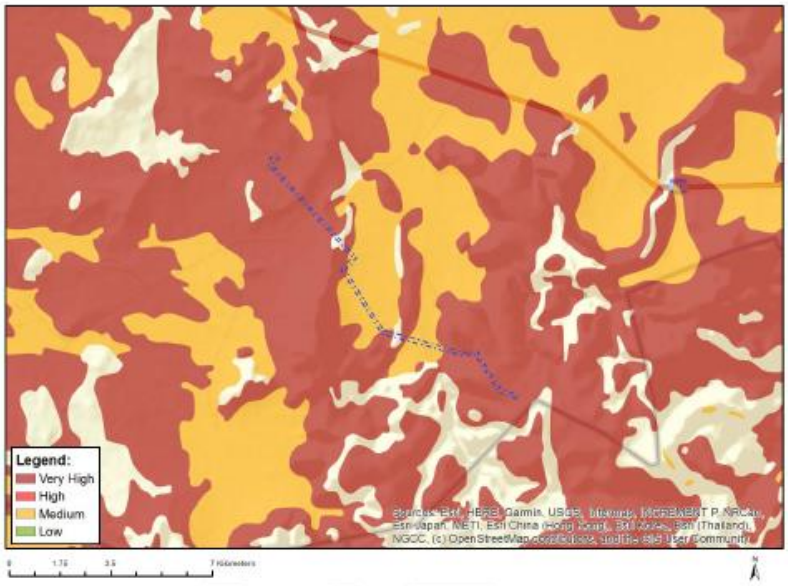
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table 5-5:Palaeontological Sensitivity of the 33kV OHPL generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



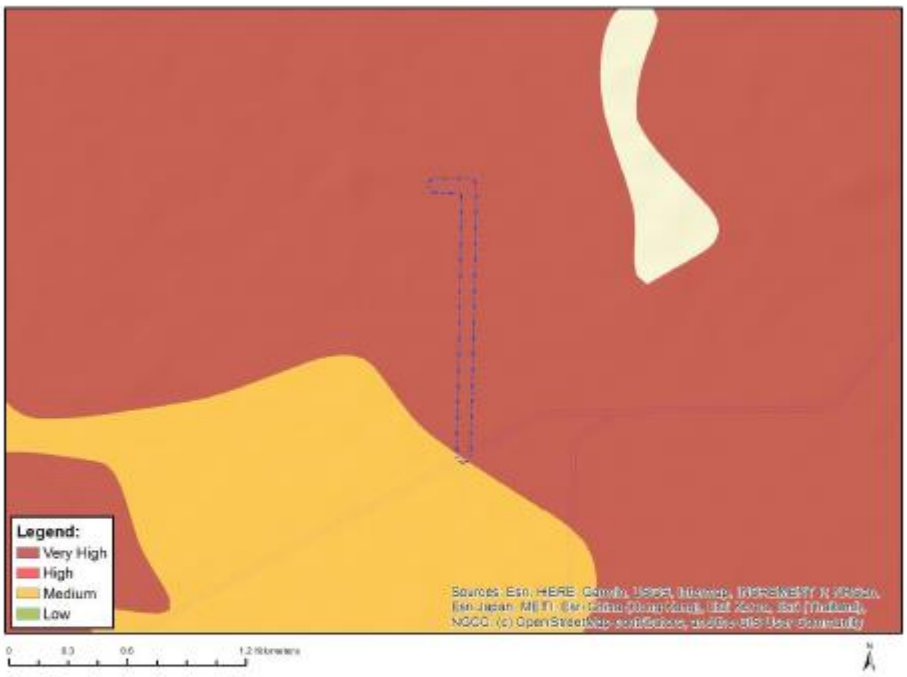
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
x			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table 5-6: Palaeontological Sensitivity of the 132 kV OHPL generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



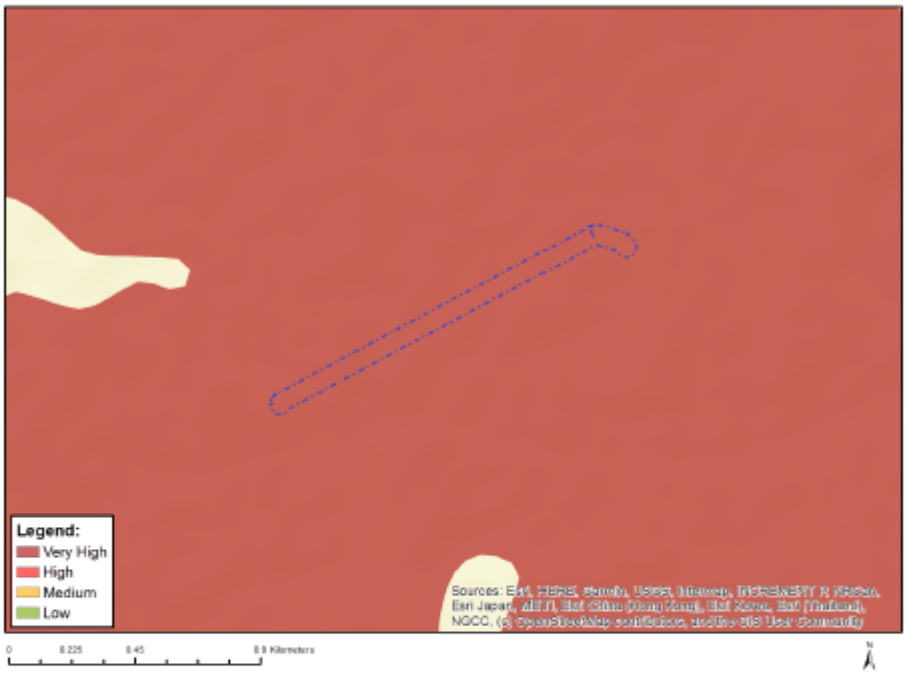
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table 5-7: Palaeontological Sensitivity of Access Road 1 (1.3 km) generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Features with a Very High paleontological sensitivity

Table 5-8: Palaeontological Sensitivity of Access Road 2 (1.2 km) generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Features with a Very High paleontological sensitivity

Table 5-9: Palaeontological Sensitivity of Access Road Access 3 (0,9 km) generated by the National Environmental Web-bases Screening Tool.

5.1 Geology and Palaeontology

The Cenozoic superficial deposits are the youngest geological deposits formed during the most recent geological period (approximately 2.6 million years ago to present). Most of the superficial deposits are unconsolidated sediments and consist of clay, gravel, sand, silt, that form relatively thin, discontinuous patches of sediments. These sediments comprise of channel, floodplain, and stream deposits.

Palaeoclimatic changes are reflected in the different geological formations (Hunter *et al*., 2006). In southern Africa, most geomorphologic features were formed during climate fluctuations in the Cenozoic Era (Maud, 2012). Barnosky (2005) indicated that various warming and cooling events occurred in the Cenozoic but states that climatic changes during the Quaternary Period, specifically the last 1.8 Ma,

were the most drastic climate changes relative to all climate variations in the past. Climate variations that occurred in the Quaternary Period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth *et al*., 2004).

Cenozoic fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. These fossil assemblages may in some cases occur in extensive alluvial and colluvial deposits. In the past palaeontologists did not focus on Caenozoic superficial deposits although they sometimes comprise of significant fossil deposits. These fossil assemblages resemble modern animals and may comprise of mammalian teeth, bones and horn corns, reptile skeletons and fragments of ostrich eggs. Microfossils, non-marine mollusc shells are also known from Quaternary deposits. Plant material such as foliage, wood, pollens, and peats are recovered as well as trace fossils like vertebrate tracks, burrows, termitaria (termite heaps/ mounds) and rhizoliths (root casts).

Dolerite koppies is present in the development area. The dolerite intrusions have baked the surrounding potentially fossiliferous bedrock through thermal metamorphism thus influencing the quality of fossil preservation. The Karoo Igneous Province in southern Africa is a classic continental flood basalt province that was formed during the Early Jurassic Period. This province occurs over a comprehensive area in southern Africa and comprises a widespread system well developed igneous bodies (dykes, sills) that invaded the sediments of the Main Karoo Basin. Flood basalts do not typically form any visible volcanic structures, but with a series of outbursts form a suite of fissures of sub-horizontal lava flows that may vary in thickness. The Karoo is an old flood basalt province and is preserved today as erosional remnants of a more extensive lava cap that covered much of southern Africa in the geological past. This Suite is entirely unfossiliferous.

The development area is largely underlain by a series of Karoo sandstones, mudstones, and shales, of the Adelaide and Tarkastad Subgroups forming the Beaufort Group of the Karoo Supergroup (**Figure 5-9**). The Beaufort Group is the third of the main subdivisions of the Karoo Supergroup. The Beaufort group overlays the Ecca Group and consists essentially of sandstones and shales, deposited in the Karoo Basin from the Middle Permian to the early part of the Middle Triassic periods and was deposited on land through alluvial processes. The Beaufort Group covers a total land surface area of approximately 200 000 km^2 in South Africa and is the first fully continental sequence in the Karoo Supergroup and is divided into the Adelaide subgroup and the overlying Tarkastad subgroup. The Adelaide subgroup rocks are deposited under a humid climate that allowed for the establishment of wet floodplains with high water tables and are interpreted to be fluvio-lacustrine sediments. The Adelaide Subgroup is approximately 5 000m thick in the southeast, but this decreases to about 800m in the centre of the basin which decreases to about 100 to 200m in the north. This Subgroup contains alternating greyish-red, bluish-grey, or greenish grey mudrocks in the southern and central parts of the Karoo Basin with very fine to medium-grained, grey lithofeldspathic sandstones. Thicker sandstones of the Adelaide are usually multi-storey and usually have cut-and-fill features. The sandstones are characterized internally by horizontal lamination together with parting lineation and less frequent trough crossbedding as well as current ripple lamination. The bases of the sandstone units are extensive beds,

while ripple lamination is usually confined to thin sandstones towards the top of the thicker units. The mudrocks of the Adelaide Subgroup usually have massive and blocky weathering. Sometimes desiccation cracks and impressions of raindrops are present. In the mudstones of the Beaufort Group calcareous nodules and concretions occur throughout.

The flood plains of the Beaufort Group (Karoo Supergroup) are internationally renowned for the early diversification of land vertebrates and provide the worlds' most complete transition from early "reptiles" to mammals. The Beaufort Group is subdivided into a series of biostratigraphic units based on its faunal content (**Figure 5-9**; Kitching1977, 1978; Keyser *et al*, 1977, Rubidge 1995, Smith *et al,* 2020; Viglietti 2020). The updated Geology (**Figure 5-3**) indicates that the Adelaide Subgroup is represented by the Balfour Formation in the development area. The Balfour Formation is divided in the *Daptocephalus* (DAZ) which in turn is divided in the upper (younger) *Lystrosaurus maccaigi - Moschorhinus* and lower (older) *Dicynodon-Theriognathus* Subzones (**Figure 5-9**; Viglietti, 2020).

The dicynodont, *Daptocephalus leoniceps* is the main biozone defining fossil of the Daptocephalus *Assemblage Zone* **(Figure 5-10).** The *Daptocephalus* Assemblage Zone (DaAZ) is characterized by the co-occurrence of the dicynodontoid *Daptocephalus leoniceps*, the therocephalian *Theriognathus microps*, and the cynodont *Procynosuchus delaharpeae* (**Figure 5-11***)*. The DaAZ comprise of two subzones representing the two distinct faunal assemblages in this assemblage zone. The Dicynodon - Theriognathus Subzone (in co-occurrence with *Daptocephalus*) is present in the lower Daptocephalus Assemblage Zone while the *Lystrosaurus maccaigi – Moschorhinus kitchingi* Subzone (**Figure 5-12**) is present in the upper DaAZ. The defining taxa of the latter subzone is *L. maccaigi, Daptocephalus* and *Moschorhinus*. This Zone is characterized by the co-occurrence of the two therapsids namely *Dicynodon* and *Theriognathus*. The *Daptocephalus* Assemblage Zone of the Beaufort Group shows the greatest vertebrate diversity and includes numerous well-preserved genera and species of dicynodonts, biarmosuchians, gorgonopsian, therocephalian and cynodont therapsid Synapsida. Captorhinid Reptilia are also present while eosuchian Reptilia, Amphibia and Pisces are rarer in occurrence. Trace fossils of vertebrates and invertebrates as well as *Glossopteris* flora plants have also been described.

The *Daptocephalus* Assemblage Zone (AZ) expands into the lower Palingkloof of the Upper Balfour Formation (**Figure 5-13**). The lower Palingkloof Member is of special importance as it precedes the Permo-Triassic Extinction Event which destroyed the vertebrate fauna and extinguished the diverse glossopterid plants. The lower *Lystrosaurus* declivis AZ forms part of the Katberg Formation (**Figure 5-9**). Fauna and flora from this assemblage zone is rare as few genera survived the Permo-Triassic Extinction Event. The *Lystrosaurus* declivis AZ is characterized by the dicynodont, *Lystrosaurus*, and captorhinid reptile, *Procolophon,* biarmosuchian and gorgonopsian Therapsida that did not survive into the *Lystrosaurus* Assemblage Zone although the therocephalian and cynodont Therapsida are present in moderate quantities. Captorhinid Reptilia is reduced, but this interval is characterized by a unique diversity of oversize amphibians while fossil fish, millipedes and diverse trace fossils have also been recorded.

The Triassic Katberg Formation of the Tarkastad Subgroup comprises of a lower Katberg (sandstone-rich) and upper Burgersdorp Formation (mudstone-rich). The Katberg Formation is an arenaceous unit which comprise of 90-95% of sandstone and 5 to 10% of mudstone. In the southern parts of the basin the Tarkastad Subgroup is 2000m thick and reduces to 800m in the centre of the basin thinning to 150m in the northern part of the basin (Groenewald, 1989). The sandstones of this Subgroup are moderately sorted, fine to medium grained, crossbedded, horizontally laminated and ripple cross laminated varying in colour from pale olive or greenish grey tabular subarkose sandstones. The mudstones are horizontally laminated or structureless horizontally laminated, and thick to medium bedded. Mudstones are minor green to red in colour. Thin mudstone beds occur, with red mudstone beds growing in abundance towards the upper border of the formation as it grades into the Burgersdorp Formation (Johnson, 1976; Johnson et al. 2006). The Burgersdorp Formation is mostly argillaceous and can be interpreted as a meandering fluvial to lacustrine deposit (Johnson et al, 2006; Groenewald, 1996).

The Vertebrate Assemblage Zone present in the Katberg Formation is the *Lystrosaurus declivis* Assemblage Zone (AZ) (Botha & Smith, 2020). In the western part of the basin this biozone spans the upper Palingkloof Member (Balfour Formation) as well as the overlying Katberg Formation. This Assemblage Zone (AZ) is of particular importance as it records the survival and recovery from the end-Permian mass extinction. The argillaceous Palingkloof Member (Balfour Formation) is found in the lower *Lystrosaurus declivis Assemblage Zone*. Olive-grey and massive maroon-bedded siltstone interbedded with minor sandstones with sharp flat basal and upper contacts characterizes the Palingkloof Member. Gastaldo et al., (2020) found that the upper Palingkloof Member is not older than 252.24 +/-0.1 while Botha et al (2020) found that it may be as young as 251.7+/-0.3.
Two species dominate the *Lystrosaurus declivis AZ* namely the small to medium-sized herbivorous dicynodonts *Lystrosaurus murrayi* and *Lystrosaurus declivis* (**Figure 5-13, Figure 14***)*. These species are small to medium-sized herbivores. Similarly abundant in this biozone is smaller, less common insectivores and faunivorous taxa. Insectivores include *Galesaurus, Platycraniellus* and *Thrinaxodon* while therocephalians are represented by *Olivierosuchus, Promoschorhynchus* and *Regisaurus*. Small parareptiles include *Colleta, Saurodektes, Sauropareion, Phonodus* and *Procolophon* while eureptilia are represented by migrant taxa for example *Heleosuchus, Noteosuchus*, and *Prolacerta*. The large carnivores include the saber-toothed *Moschorhinus* as well as the long-snouted archosauromorph *Proterosuchus*. After the end-Permian mass extinction, small temnospondyl taxa like *Broomistega*, *Lydekkerina*, and *Micropholis* is abundantly found (Botha et al, 2020). This terrestrial biozone is well-known in the west of Gondwana with closely related species present in Antarctica and India.

Vertebrate fossils are mostly found in the mudrock units between channel sandstones in the *Lystrosaurus declivis Assemblage Zone*. Specimens are well preserved and articulated skull and skeleton specimens have been abundantly found. Several bonebeds have been recorded. A common contributor to the floodplain bonebeds is juvenile *Lystrosaurus declivis* that most probably died due to severe drought conditions (Smith and Botha, 2005, Viglietti et al., 2013, Smith and Botha-Brink, 2014).

Numerous positively identified skeletons have been identified in burrows in this Assemblage Zone (Bordy et al., 2011; Botha-Brink, 2017, Damiani et al., 2003, Kitching, 1977; Modesto and Botha-Brink, 2010; Smith and Botha-Brink, 2014). Synchrotron scanning made it possible for Fernandez, et al., 2013 to describe a burrow cast from the Early Triassic of the Karoo (**Figure 5-15**). This scan depicts a unique mixed-species association of an injured temnospondyl amphibian (*Broomistega*) sheltering in a burrow inhabited by an aestivating *Thrinaxodon*.

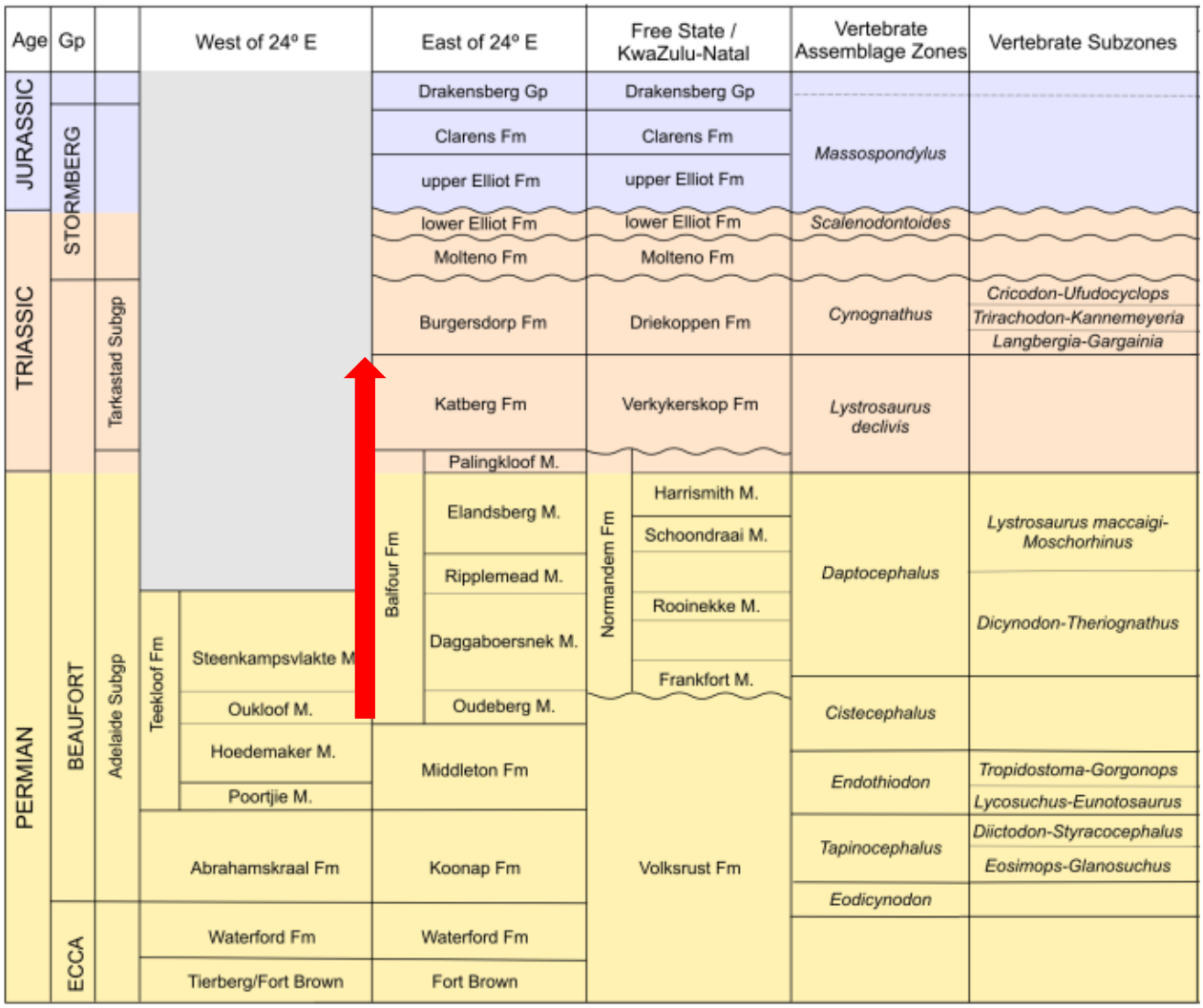


Table 5-10: Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.

Solid lines indicate known ranges, dotted lines indicate suspected but not confirmed ranges, single dot represents the stratigraphic position of the taxa that have only been recovered from a single bed. Wavy lines indicate unconformities. (PLYCSR=Pelycosauria and MAMMFMES+Mammaliaformes. Gp=group, Subgp-Supbroup, Fm=Formation, M=Member. The proposed cemetery development is indication by the red arrow

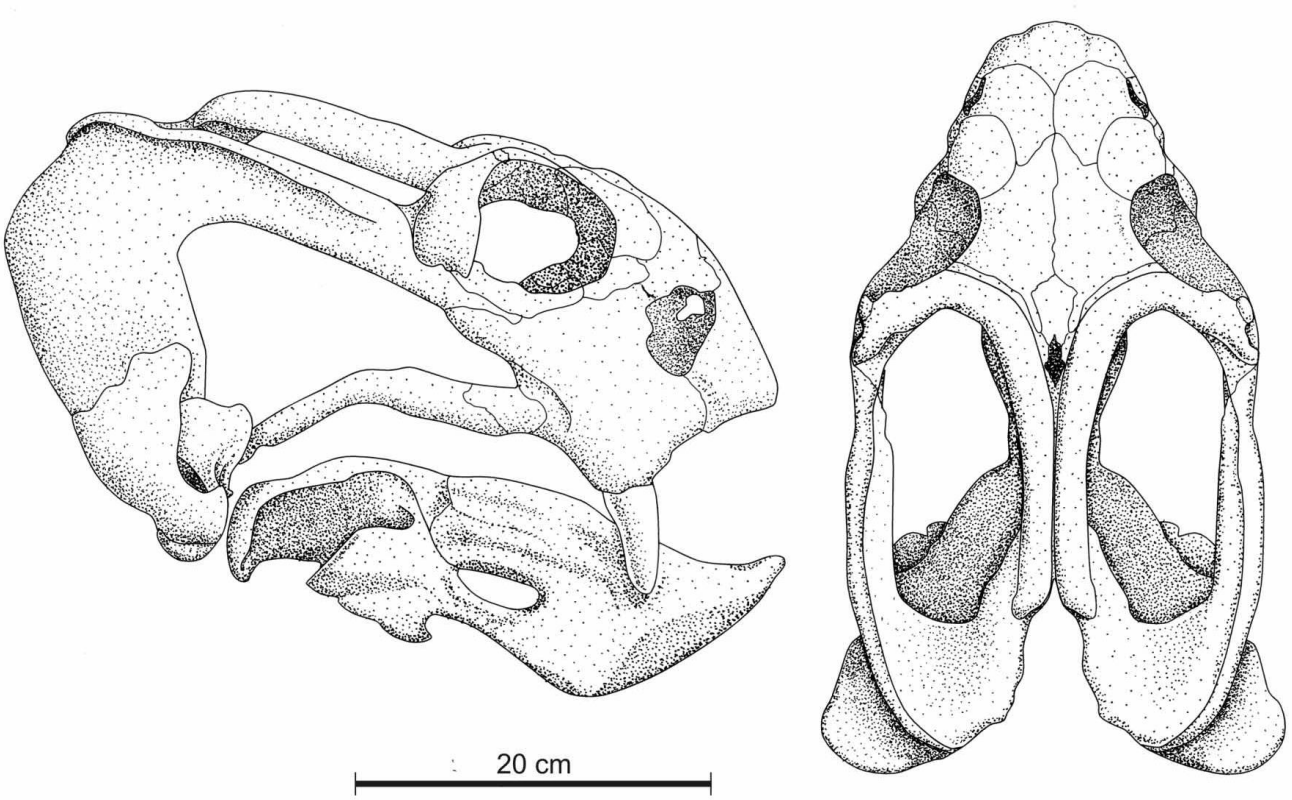


Table 5-11: Lateral and dorsal views of skull of the dicynodont Daptocephalus leoniceps, the main biozone defining fossil and dorsal views (Image taken from Viglietti, 2020).

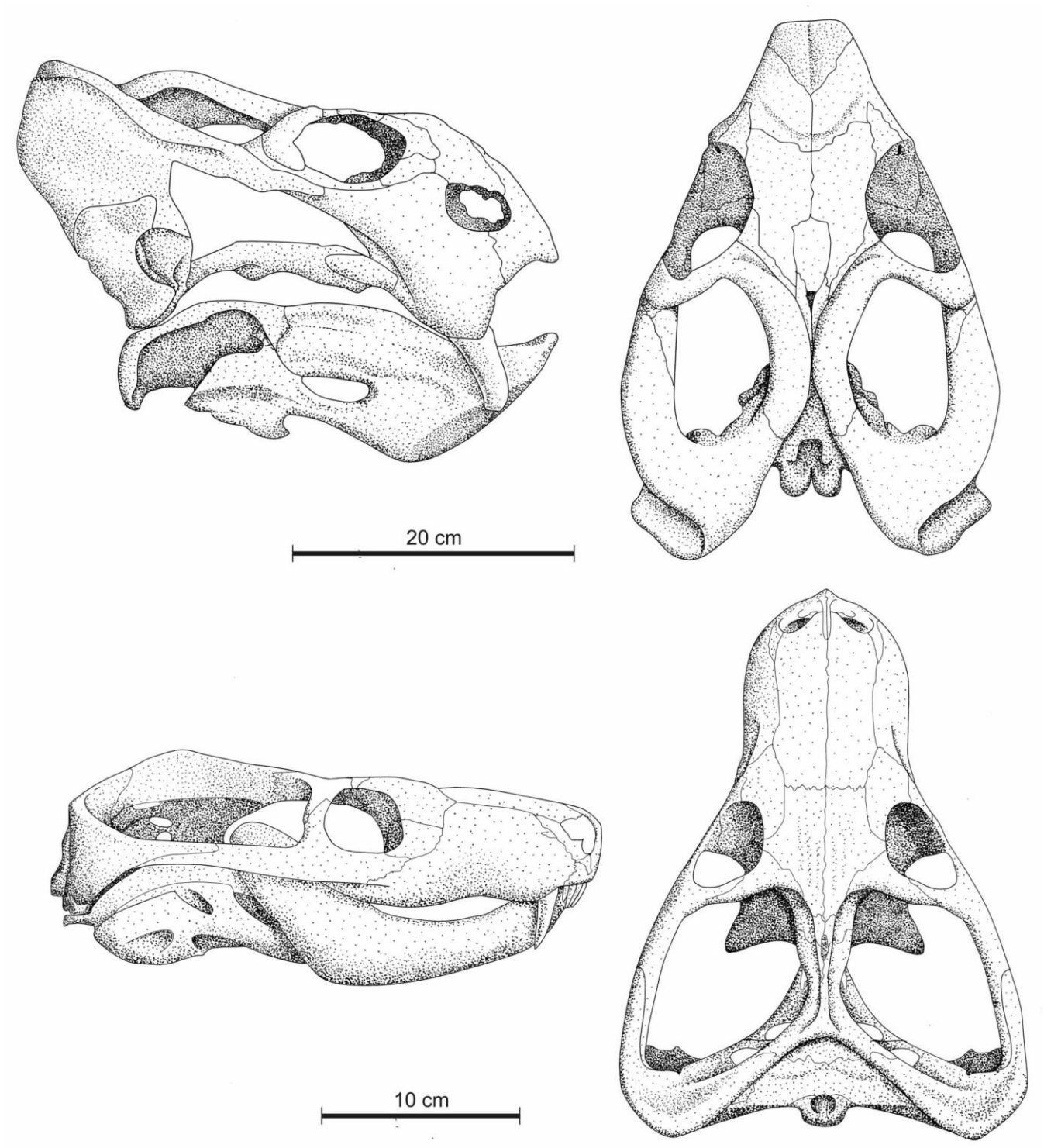


Table 5-12: Skulls of the biozone defining fossils of the Dicynodon-Theriognathus Subzone in lateral and dorsal views. Dicynodon lacerticeps (top), Theriognathus microps (bottom) (Image taken from Viglietti, 2020).

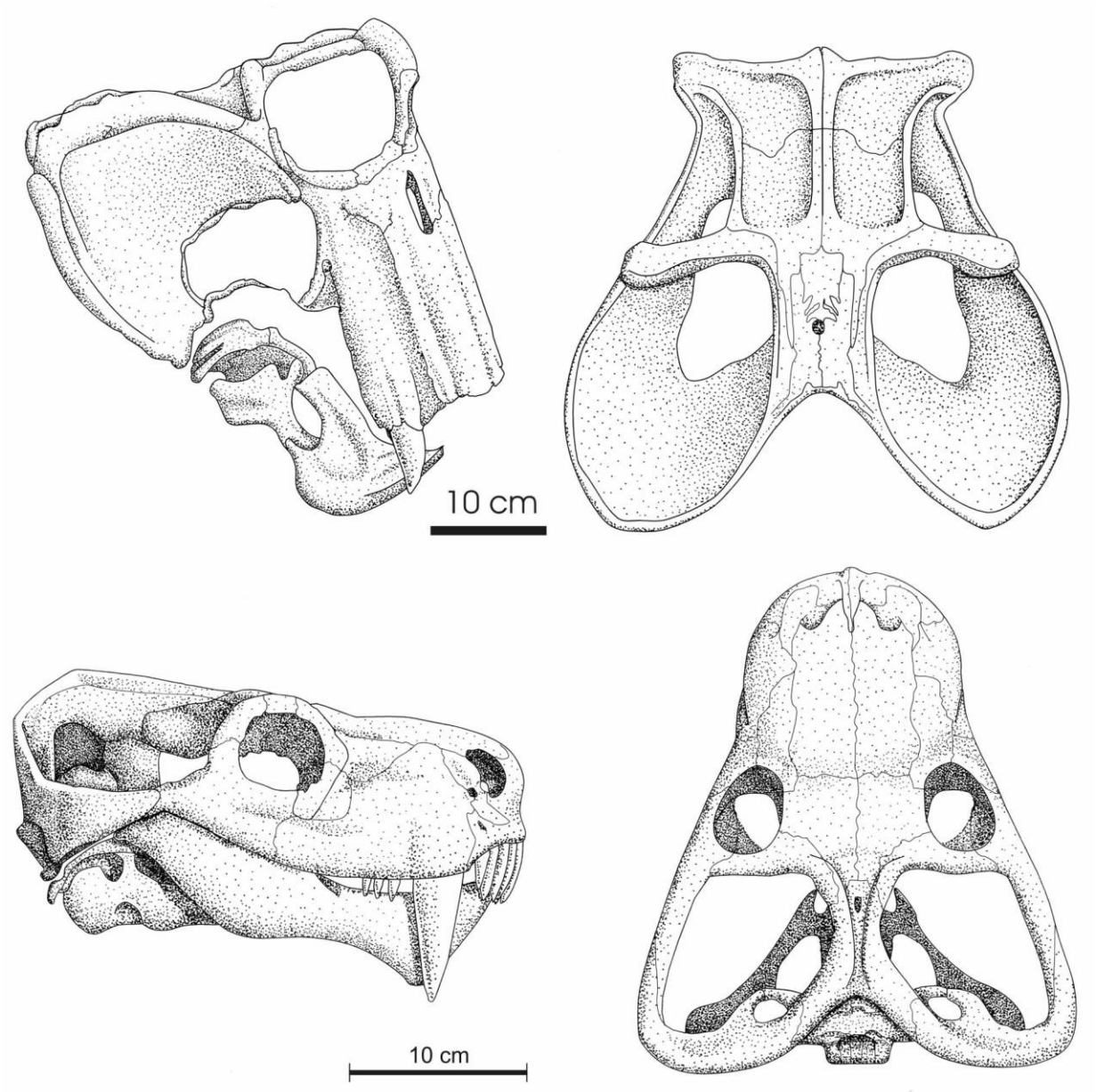


Table 5-13: Biozone defining fossils of the Lystrosaurus maccaigi- Moschorhinus Subzone. The skulls of the Lystrosaurus maccaigi (top) and Moschorhinus kitchingi (bottom) in lateral.

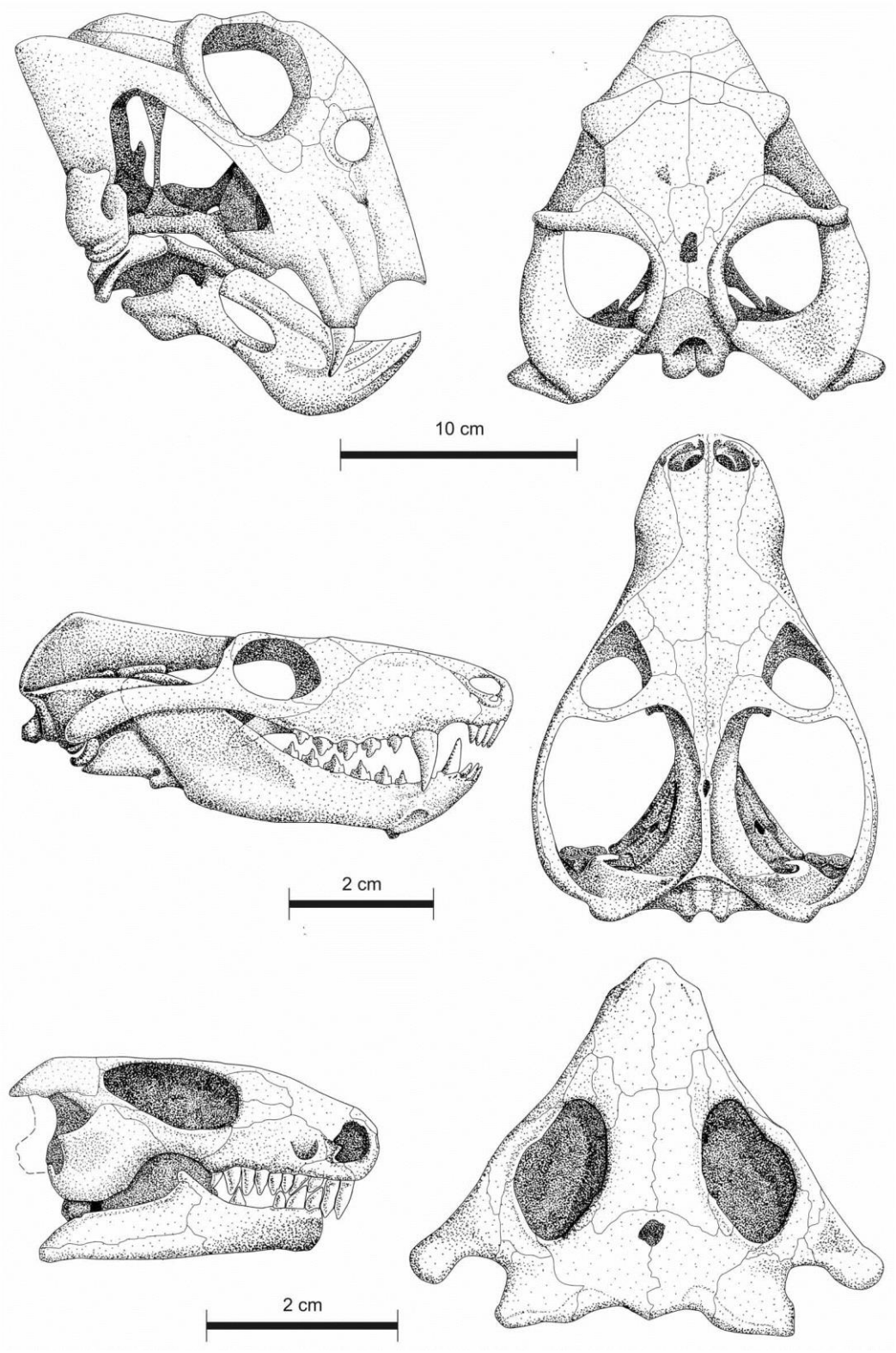
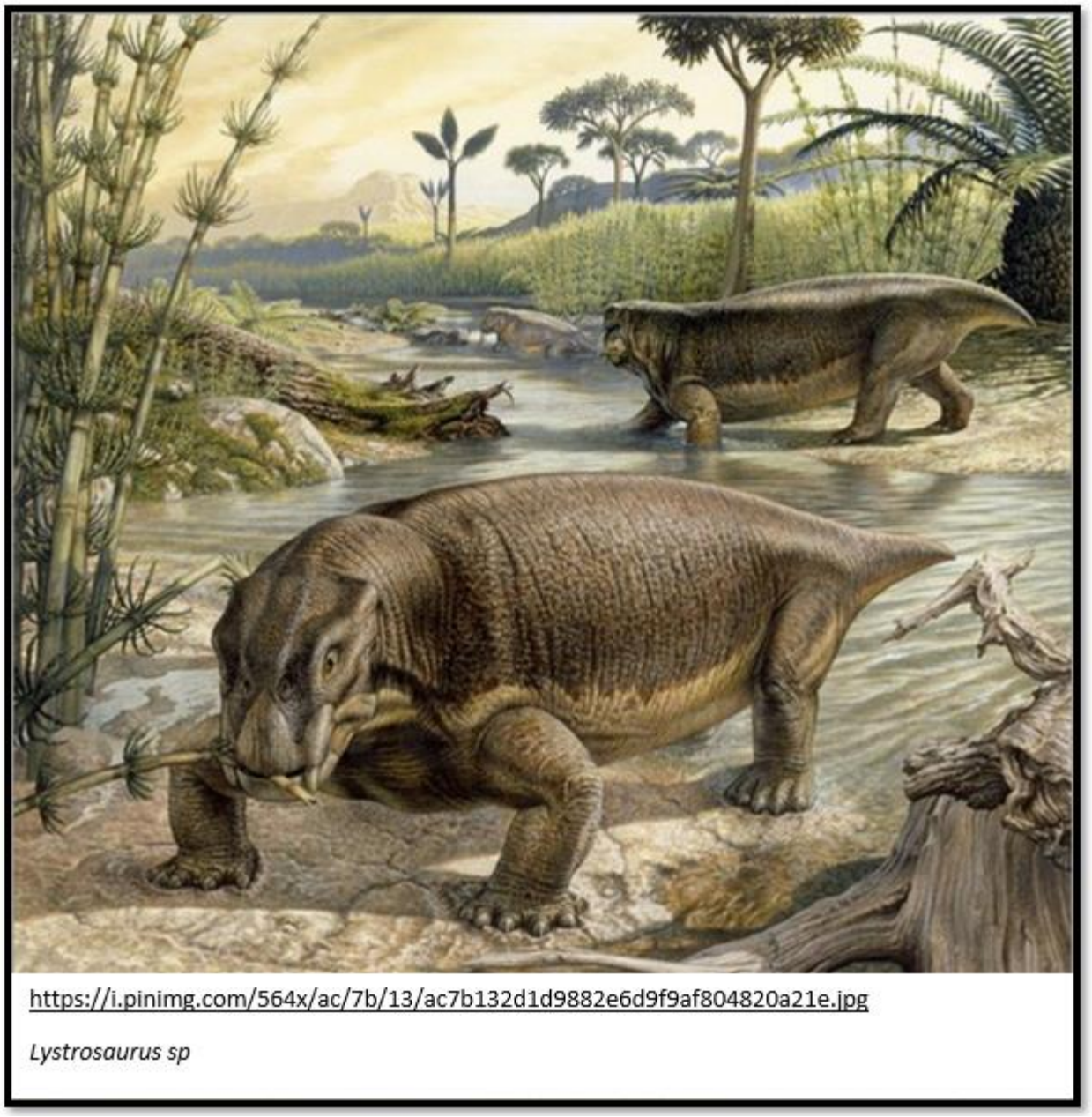


Table 5-14: Lateral and dorsal views of the index taxa defining the Lystrosaurus declivis Assemblage Zone. (top) Lystrosaurus declivis, (centre) Thrinaxodon liorhinus, (bottom) Procolophon trigoniceps (Image taken from Botha and Smith, 2020).



https://i.pinimg.com/564x/ac/7b/13/ac7b132d1d9882e6d9f9af804820a21e.jpg

Lystrosaurus sp

Table 5-15: Reconstruction of Lystrosaurus

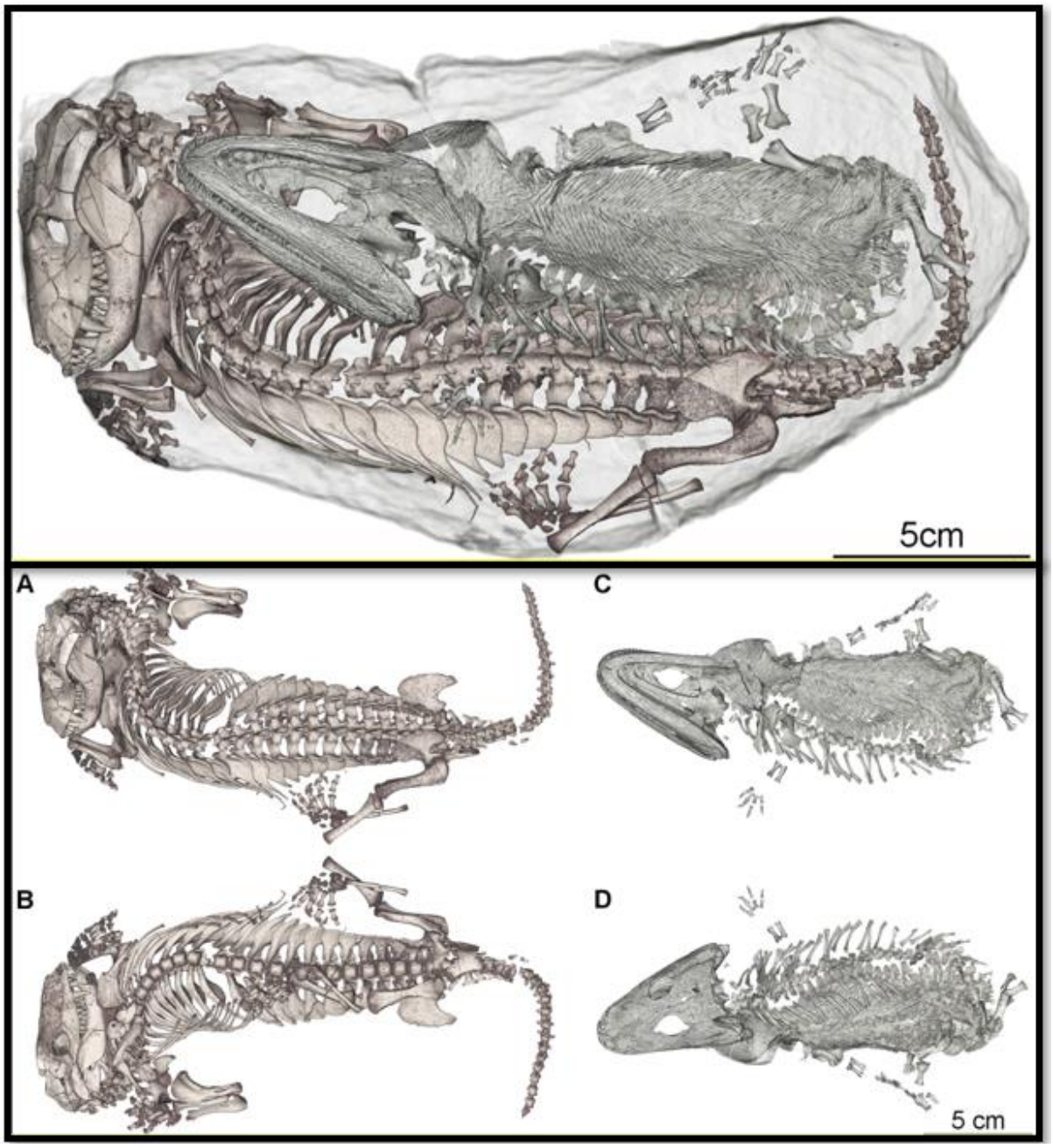


Table 5-16: Synchrotron scan of a burrow cast from the Early Triassic indicates an injured temnospondyl amphibian (Broomistega) that sheltered in a burrow occupied by an aestivating therapsid (Thrinaxodon) Image taken from Fernandez, et al., 2013.

5.1 Additional Information Consulted

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- A Google Earth map with polygons of the proposed development was obtained from
- 1:250 000 Middelburg 3124 (1996) Geological map (Council of Geoscience, Pretoria).

- 1: 50 000 scale topographic maps.
- Palaeosensitivity map on SAHRIS (South African Heritage Resources Information System) website
- A Google Earth kmz files, background information as well as screening report of the proposed development was obtained from SRL Consultants.
- Google Earth© satellite imagery.
- Published geological and palaeontological literature as well as
- Relevant PIAs in the area that includes that of (Almond 2020a-c, 2021)
- A one day-comprehensive site-specific field survey of the development footprint for the projects was conducted on foot and motor vehicle in March 2023.

5.2 Site Investigation

A one day-comprehensive site-specific field survey of the development footprint was conducted on foot and motor vehicle in March 2023. Only one loos down washed fragment with plant stems were recovered from the development footprint. The site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value. Data indicates that fossil sites are generally rare, sporadic and unpredictable.

Table 5-17: General view over the development indicates a general flat topography with low bossie-veld.

Table 5-18:General view over the development indicates a flat topography with low vegetation.

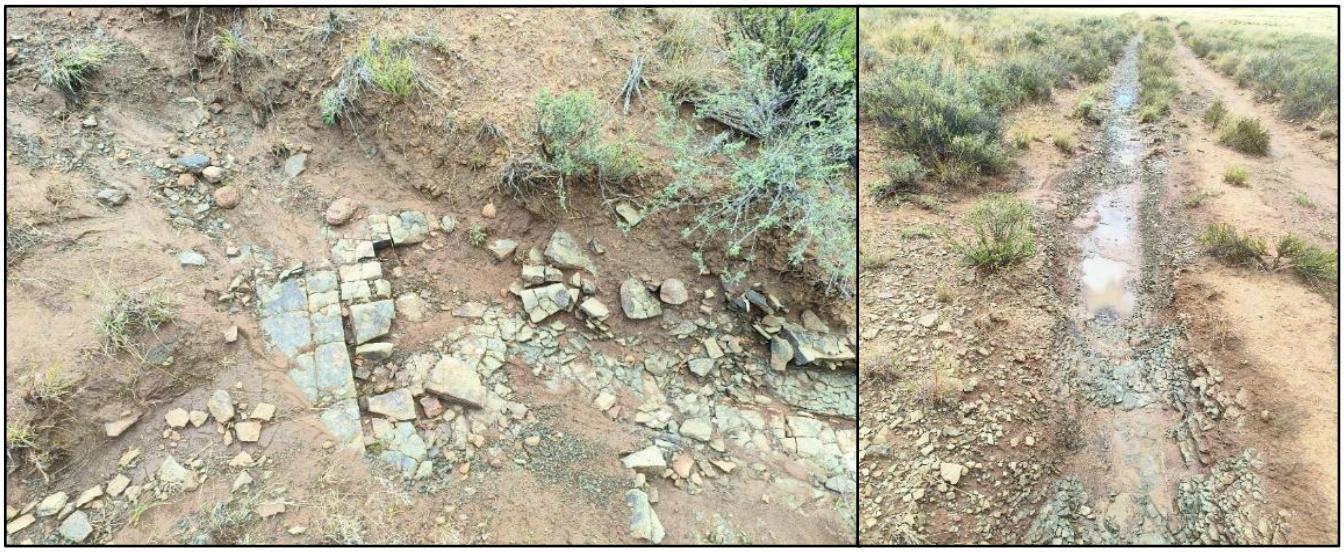


Table 5-19:Mudstone in drainage line is mantled by a thin layer of superficial sediments.

Table 5-20: Superficial dolerite outcrops.

Table 5-21:Dolerite outcrop in the background.

***Table 5-22**:Sorted down washed dolerite and sandstone scree.*

Table 5-23: Calcrete with small stem imprints found in a loose mudstone fragment.

6. SPECIALIST FINDINGS ASSESSMENT OF IMPACTS

Legislative and Permit Requirements

It is required to submit a Palaeontological Impact assessment as part of a Heritage Impact assessment to the SAHRA. The costs for submitting a Review of an impact assessment report related to an application for Environmental Authorisation made in terms of legislation other than NHRA will be R2000 as of 1 January 2023.

6.1 Impact assessment

The identification and assessment of impacts must be described in this section. Direct and indirect impacts for the various project phases must be assessed and rated according to the methodology developed by SLR which aligns with the requirements of the EIA Regulations. This methodology is described in the ToR and can be attached to the specialist report as an Appendix if needed. Specialists will be required to make use of the impact rating matrix provided (in Excel format) for this purpose (see example in **Error! Reference source not found.** below). Project stages are as follows and can be included in their own sub-sections:

- Design;
- Construction;
- Operation; and
- Decommissioning.

Rating of Palaeontological impacts of Proposed EDM Mooiplaats Powerlines and road development during Planning and Pre-construction Phases

Impact Assessment Ratings

Power Lines

- **33kV Powerline 1 (1.7km)**
- **132kV Powerline (11.3km)**

Roads

- **Road 1 (1.3km)**
- **Road 2 (1.2km)**
- **Road 3 (0.09km)**

Impact 1	Planning and pre-construction

Issue	Destruction of fossil heritage	
Description of Impact		
No Impacts		
Type of Impact	No Impacts	
Nature of Impact	No Impacts	
Phases	Planning and pre-construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	No Impacts	No Impacts
Duration	No Impacts	No Impacts
Extent	No Impacts	No Impacts
Consequence	No Impacts	No Impacts
Probability	No Impacts	No Impacts
Significance	No Impacts	No Impacts
Degree to which impact can be reversed	No Impacts	
Degree to which impact may cause irreplaceable loss of resources	No Impacts	
Degree to which impact can be mitigated	No Impacts	
Mitigation actions		
The following measures are recommended:	No Impacts	
Monitoring		
The following monitoring is recommended:	No Impacts	
Cumulative impacts		
Nature of cumulative impacts	No Impacts	
Rating of cumulative impacts	No Impacts	No Impacts
	No Impacts	No Impacts

Rating of Palaeontological impacts of Proposed EDM Mooiplaats Powerlines and road development during Construction Phase

Impact Assessment Ratings

Power Lines

- **33kV Powerline 1 (1.7km)**
- **132kV Powerline (11.3km)**

Roads

- **Road 1 (1.3km)**
- **Road 2 (1.2km)**
- **Road 3 (0.09km)**

Impact 1 **Construction Phase**

Issue	Destruction of fossil heritage	
Description of Impact		
The excavations and site clearance of the powerline will involve extensive excavations into the superficial sediment cover as well as into the underlying bedrock. These excavations will change the existing topography and may destroy and seal-in fossils at or below the ground surface. These fossils will then no longer be available for research. According to the Geology of the project site there is a Very High possibility of finding fossils during construction.		
Type of Impact	Indirect	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	High	Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	High	Very Low
Probability	Probable	Unlikely / improbable
Significance	High -	Low -
Degree to which impact can be reversed	Irreversible	

Degree to which impact may cause irreplaceable loss of resources	Irreplicable loss of fossil heritage	
Degree to which impact can be mitigated	Mitigation of the damage and destruction of fossil heritage within the planned footprint would entail the collection and describing of fossils. See Chance find Protocol	
Mitigation actions		
The following measures are recommended:	Chance Find Procedure	
Monitoring		
The following monitoring is recommended:	N/A	
Cumulative impacts		
Nature of cumulative impacts	Loss of Fossil Heritage	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	High -	Medium -

Rating of Palaeontological impacts of Proposed EDM Mooiplaats Powerlines and road development during Operational Phase

Impact Assessment Ratings

Power Lines

- **33kV Powerline 1 (1.7km)**
- **132kV Powerline (11.3km)**

Roads

- **Road 1 (1.3km)**
- **Road 2 (1.2km)**
- **Road 3 (0.09km)**

Impact 1 Operational Phase

Issue	Destruction of fossil heritage	
Description of Impact		
No Impacts		
Type of Impact	Operational Phase	
Nature of Impact	Negative	
Phases	Operational Phase	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	No Impacts	No Impacts
Duration	No Impacts	No Impacts
Extent	No Impacts	No Impacts
Consequence	No Impacts	No Impacts
Probability	No Impacts	No Impacts
Significance	No Impacts	No Impacts
Degree to which impact can be reversed	No Impacts	
Degree to which impact may cause irreplaceable loss of resources	No Impacts	

Degree to which impact can be mitigated	No Impacts	
Mitigation actions		
The following measures are recommended:	No Impacts	
Monitoring		
The following monitoring is recommended:	No Impacts	
Cumulative impacts		
Nature of cumulative impacts	No Impacts	
Rating of cumulative impacts	No Impacts	No Impacts
	No Impacts	No Impacts

Rating of Palaeontological *impacts of Proposed* EDM Mooiplaats Powerlines and road development *during No-Go*

Impact Assessment Ratings

Power Lines

- **33kV Powerline 1 (1.7km)**
- **132kV Powerline (11.3km)**

Roads

- **Road 1 (1.3km)**
- **Road 2 (1.2km)**
- **Road 3 (0.09km)**

Impact 1 No-Go

Issue	Destruction of fossil heritage	
Description of Impact		
No Impacts		
Type of Impact	Operational Phase	
Nature of Impact	Negative	
Phases	Operational Phase	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	No Impacts	No Impacts
Duration	No Impacts	No Impacts
Extent	No Impacts	No Impacts
Consequence	No Impacts	No Impacts
Probability	No Impacts	No Impacts
Significance	No Impacts	No Impacts
Degree to which impact can be reversed	No Impacts	
Degree to which impact may cause irreplaceable loss of resources	No Impacts	

Degree to which impact can be mitigated	No Impacts	
Mitigation actions		
The following measures are recommended:	No Impacts	
Monitoring		
The following monitoring is recommended:	No Impacts	
Cumulative impacts		
Nature of cumulative impacts	No Impacts	
Rating of cumulative impacts	No Impacts	No Impacts
	No Impacts	No Impacts

The expected duration of the impact is assessed as potentially permanent too long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be **permanent**. Impacts on palaeontological heritage during the construction phase could potentially occur but are regarded as having a high possibility. The significance of the impact occurring will be low as no fossiliferous outcrops have been identified during the field visit.

The significance of the impact occurring will be negative very high before mitigation and negative medium after mitigation. Post mitigation the overall significance will be Low.

A one-day site-specific field survey of the development footprint was conducted on foot and motor vehicle in March 2023. Although one fossil sites have been identified in the proposed development footprint during the site investigation as well as desktop research (National Database and published data) it is concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare. However, the presence of well-preserved fossils cannot be ruled out. It is important to note that taxons have been described from a single well-preserved specimen. Data indicates that fossil sites are generally rare, sporadic and of low scientific and conservational value.

This could be attributed to the following

- Poor bedrock exposure and
- Low relief of the central development area as well as
- Relative unfossiliferous superficial sediments and
- Dolerite intrusions that metamorphized potentially fossiliferous Beaufort sediments,

A low Palaeontological Significance has been allocated for the construction phase of the proposed development pre-mitigation and a very low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. **The Cumulative impacts of the development near Noupoort is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project.** It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

The proposed grid and road infrastructure Project are thus not fatally flawed from a palaeontological perspective. However, the recommended mitigation measures have to be included within the EMPr and must be implemented in full during the construction phase. Mitigation measures include training of accountable supervisory personnel by a qualified palaeontologist in the recognition of fossil heritage as well as the Chance Find Protocol.

Rating of Palaeontological impacts of Proposed EDM Mooiplaats Powerlines and road development during Construction

Issue:	• **Potential loss of Fossil Heritage**	
Description of Impact		
• construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area. • Surface clearing during construction would expose bedrock and damage possible fossiliferous outcrops		
Type of Impact	**Direct**	
Nature of Impact	**Negative**	
Phases	**Construction**	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	High	Low
Duration	Long-term	Long-term
Extent	Site	Site
Consequence	Low	Very Low
Probability	Probable	Probable
Significance	**Low -**	**Low -**
Degree to which impact can be reversed	Impacts are completely reversible with cessation of construction activity.	
Degree to which impact may cause	Marginal loss of visual resources without mitigation measures.	

irreplaceable loss of resources	
Degree to which impact can be mitigated	There is significant scope for mitigation as per the recommended mitigation measures below.
The following measures are recommended:	• Carefully plan to mimimise the construction period and avoid construction delays. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Maintain a neat construction site by removing rubble and waste materials regularly. • Position storage / stockpile areas in unobtrusive positions in the landscape, where possible. • Make use of existing gravel access roads where possible. • Limit the number of vehicles and trucks travelling to and from the construction site, where possible. • Unless there are water shortages, ensure that dust suppression techniques are implemented: o on all access roads; o in all areas where vegetation clearing has taken place; o on all soil stockpiles.
The following monitoring is recommended:	• Ensure that visual management measures are monitored by an ECO. This will include monitoring activities associated with visual impacts such as the siting and management of soil stockpiles, screening and dust suppression. • Regular reporting to an environmental management team must also take place during the construction phase.

6.2 No-Go Impact Assessment

Due to the comprehensive design process that has been undertaken to inform the 33kV above ground cables, 132 kV aboveground cable line and roads, no site or layout alternatives will be assessed. It must be noted that this is supporting approved infrastructure, so the alternatives are limited and not assessed.

However, the preferred layouts of the respective powerline and road corridors, will each be assessed against the '**no-go' alternative**. The 'no-go' alternative is the option of not constructing the Project where the status quo of the current farming activities on the site would prevail.

The project has been assessed against the 'no-go' alternative. The 'no-go' alternative is the option of not constructing the project, where the status quo of the current farming activities on the site would prevail.

6.3 Cumulative Impact assessment

In relation to an activity, cumulative impact "means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may be significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities" (NEMA EIA Reg GN R982 of 2014).

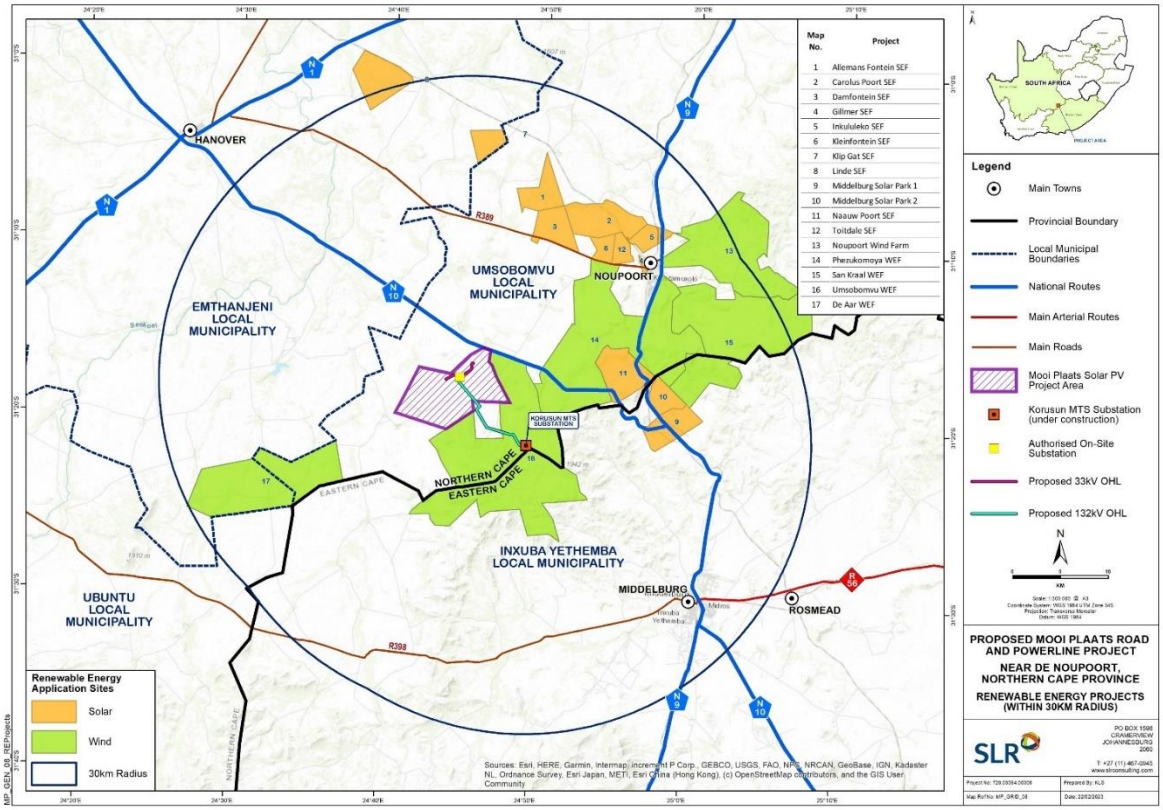


Figure 6-1: Cumulative impact map showing other renewable energy developments within a 30 km radius from the Mooi Plaats SEF

Solar Facilities surrounding the proposed development will have a Zero to High Palaeontological Sensitivity. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is therefore difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil heritage will vary between Low and Medium.

Cumulative impact ratings

Issue:	• **Loss of Fossil Heritage**	
Description of Impact		
• The excavations and site clearance of the powerline will involve extensive excavations into the superficial sediment cover as well as into the underlying bedrock. These excavations will change the existing topography and may destroy and seal-in fossils at or below the ground surface. These fossils will then no longer be available for research. According to the Geology of the project site there is a Very High possibility of finding fossils during construction.		
Nature of cumulative impacts	•	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Medium -	Low -

7. MITIGATION AND EMPR REQUIREMENTS

A following procedure will only be followed if fossils are uncovered during excavation.

7.1 Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

7.2 Background

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past millions of years ago. Fossils are extremely rare and

irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

7.3 Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Resources Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS coordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

8. CONCLUSION AND SUMMARY

8.1 Summary of Findings

The proposed grid and road infrastructure development of the EDF Mooiplaats Solar Energy Facility (SEF) is underlain by Cenozoic superficial alluvium deposits, the Karoo Dolerite Suite of the Karoo Igneous Province as well as sandstone and shale of the Adelaide and Tarkastad Subgroups of the Beaufort Group, Karoo Supergroup. The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary alluvium is Moderate, that of the Jurassic dolerite is Zero as it is igneous in origin and the Palaeontological Sensitivity of the Adelaide and Tarkastad Subgroups (Beaufort Group) is Very High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014). Recent updated geology produced by the Council of Geosciences indicates that the proposed development is mainly underlain by the Balfour Formation (Adelaide Subgroup) and Tarkastad Subgroup (Beaufort Group, Karoo Supergroup), while an extremely small portion in the south is underlain by the Karoo Dolerite Suite.

A one day-comprehensive site-specific field survey of the development footprint was conducted on foot and motor vehicle in March 2023. Only one loos down washed fragment with plant stems were recovered from the development footprint. The site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value. Data indicates that fossil sites are generally rare, sporadic and unpredictable. A low significance has thus been allocated to the development footprint.

In the last few decades extensive research and fossil collecting have been conducted by palaeontologists in this part of the basin and the National Palaeontological databases indicate that the Noupoort area is fossiliferous. A day site-specific field survey of the development footprint for the project was conducted on foot and motor vehicle in March 2023. Only one fragmented, loose plant fossil imprint was documented in the development footprint during the site investigation. However, the site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value.

This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeontological Sensitivity Map and DFFE Screening Tool. **A low Palaeontological Significance has been allocated for the construction phase of the grid and road infrastructure development pre-mitigation and a very low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of ‘do nothing’ and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the infrastructure development near Noupoort is considered to be High pre- mitigation and Low post mitigation**

and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the infrastructure may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

Recommendations:

- The ECO for this project must be informed that the Adelaide Subgroup and Tarkastad Subgroups, (Beaufort Group, Karoo Supergroup) has a **Very High Palaeontological Sensitivity**.
- If Palaeontological Heritage is uncovered during surface clearing and excavations, the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: Heritage Western Cape, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. 3rd floor Protea Assurance Building, 142 Longmarket St, Cape Town City Centre, Cape Town, 8000; Private Bag X9067, Cape Town, 8000 Tel: 021 483 9598. Fax: +27 (0) 21 483 9845. Web: www.hwc.org.za) so that mitigation (recording and collection) can be carried out.
- Before any fossil material can be collected from the development site, the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).
- These recommendations should be incorporated into the Environmental Management Plan for the Mooiplaats SEF grid and road infrastructure development.

8.2 Conclusion and Impact Statement

The site investigation as well as desktop research (National Database and published data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low conservational and scientific value. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the infrastructure may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.**

The significance of the impact occurring will be negative very high before mitigation. The post mitigation the Significance of the Impact will be low.

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Appendix 1: Impact Rating Methodology

The impacts of the proposed development (during the Construction, Operation and Decommissioning phases) are to be assessed and rated according to the methodology described below and which was developed by SLR (the appointed EAP) to align with the requirements of the EIA Regulations. Specialists will be required to make use of the impact rating matrix provided (in Excel format) for this purpose.

The criteria used to assess both the impacts and the method of determining the significance of the impacts is outlined in Table 3-3. This method complies with the method provided in the EIA guideline document (GN 654 of 2010). Part A provides the definitions of the criteria and the approach for determining impact consequence (combining intensity, extent and duration). In Part B, a matrix is applied to determine this impact consequence. In Part C, the consequence rating is considered together with the probability of occurrence in order to determine the overall significance of each impact. Lastly, the interpretation of the impact significance is provided in Part D.

The specialists are also required to include a comment on the following, the degree to which the impact:

- Can be reversed;
- May cause irreplaceable loss of resources; and
- Can be avoided, managed or mitigated.

Part A provides the definition for determining impact consequence (combining intensity, extent, and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D. This methodology is utilised to assess both the incremental and cumulative project related impacts.

Impact Rating Methodology

PART A: DEFINITIONS AND CRITERIA		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of intensity, extent, and duration**
Criteria for ranking of the INTENSITY of environmental impacts	**VH**	Severe change, disturbance, or degradation. Associated with severe consequences. May result in severe illness, injury, or death. Targets, limits, and thresholds of concern continually exceeded. Habitats or ecosystems of high importance for maintaining the persistence of species or habitats that meet critical habitat thresholds. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance, or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits, and thresholds of concern regularly exceeded. Habitats or ecosystems which are important for meeting national/provincial conservation targets. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.

	M	Moderate change, disturbance, or discomfort. Associated with real but not substantial consequences. Targets, limits, and thresholds of concern may occasionally be exceeded. Habitats or ecosystems with important functional value in maintaining biotic integrity. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance, or nuisance. Associated with minor consequences or deterioration. Targets, limits, and thresholds of concern rarely exceeded. Habitats and ecosystems which are degraded and modified. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance, or nuisance. Associated with very minor consequences or deterioration. Targets, limits, and thresholds of concern never exceeded. Species or habitats with negligible importance. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	**Very Short term**	Very short, always less than a year or may be intermittent (less than 1 year). Quickly reversible.
	Short term	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	Medium term	Medium-term, 5 to 10 years.
	Long term	Long term, between 10 and 20 years. Likely to cease at the end of the operational life of the activity or because of natural processes or by human intervention.
	Very long term/ permanent	Very long, permanent, +20 years. Irreversible. Beyond closure or where recovery is not possible either by natural processes or by human intervention.
Criteria for ranking the EXTENT of impacts	**Site**	A part of the site/property. Impact is limited to the immediate footprint of the activity and within a confined area.
	Whole site	Whole site. Impact is confined to within the project area and its nearby surroundings.
	Beyond site	Beyond the site boundary, affecting immediate neighbours.
	Local	Local area, extending far beyond site boundary.
	Regional/ national	Regional/National. Impact may extend beyond district or regional boundaries with national implications.

PART B: DETERMINING CONSEQUENCE – APPLIES TO POSITIVE OR ADVERSE IMPACTS

		EXTENT				
		Site	Whole site	Beyond the site, affecting neighbours	Local area, extending far beyond site	Regional / National
INTENSITY = VL						
DURATION	Very long term /permanent	Low	Low	Medium	Medium	Medium
	Long term	Very Low	Low	Low	Medium	Medium
	Medium term	Very Low	Low	Low	Low	Medium
	Short term	Very low	Very Low	Low	Low	Low
	Very short term	Very low	Very Low	Very Low	Very Low	Low
INTENSITY = L						
DURATION	Very long term /permanent	Low	Medium	Medium	High	High
	Long term	Low	Medium	Medium	Medium	High
	Medium term	Low	Low	Medium	Medium	Medium
	Short term	Very low	Low	Low	Medium	Medium
	Very short term	Very low	Very low	Low	Low	Low
INTENSITY = M						
DURATION	Very long term /permanent	Medium	Medium	High	High	Very High
	Long term	Low	Medium	Medium	High	High
	Medium term	Low	Medium	Medium	Medium	High
	Short term	Low	Low	Medium	Medium	Medium
	Very short term	Very low	Low	Low	Low	Medium
INTENSITY = H						
DURATION	Very long term /permanent	Medium	High	High	Very High	Very High
	Long term	Medium	Medium	High	High	Very High
	Medium term	Low	Medium	Medium	High	High
	Short term	Low	Medium	Medium	Medium	High
	Very short term	Very low	Low	Low	Medium	Medium
INTENSITY = VH						
DURATION	Very long term /permanent	Medium	High	Very High	Very High	Very High
	Long term	Medium	High	High	Very High	Very High
	Medium term	Medium	Medium	High	High	Very High
	Short term	Low	Medium	Medium	High	High
	Very short term	Low	Low	Medium	Medium	Medium

PART C: DETERMINING SIGNIFICANCE - APPLIES TO POSITIVE OR ADVERSE IMPACTS							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High

	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VH
			CONSEQUENCE				

PART D: INTERPRETATION OF SIGNIFICANCE		
Significance		Decision guideline
Very High	Very High +	Represents a key factor in decision-making. Adverse impact would be considered a potential fatal flaw unless mitigated to lower significance.
High	High +	These beneficial or adverse impacts are considered to be very important considerations and must have an influence on the decision. In the case of adverse impacts, substantial mitigation will be required.
Medium	Medium +	These beneficial or adverse impacts may be important but are not likely to be key decision-making factors. In the case of adverse impacts, mitigation will be required.
Low	Low +	These beneficial or adverse impacts are unlikely to have a real influence on the decision. In the case of adverse impacts, limited mitigation is likely to be required.
Very Low	Very Low +	These beneficial or adverse impacts will not have an influence on the decision. In the case of adverse impacts, mitigation is not required.
Insignificant		Inconsequential, not requiring any consideration.

Additional criteria that are taken into consideration in the impact assessment process to further describe the impact and support the interpretation of significance in the impact assessment process include:

- the degree to which impacts may cause irreplaceable loss of resources;
- the degree to which impacts can be avoided;
- the degree to which impacts can be reversed;
- the degree to which the impacts can be mitigated; and
- the extent to which cumulative impacts may arise from interaction or combination from other planned activities or projects is tabulated below.

ADDITIONAL ASSESSMENT CRITERIA		
Criteria for DEGREE TO WHICH AN IMPACT CAN BE REVERSED	IRREVERSIBLE	Where the impact cannot be reversed and is permanent.
	PARTIALLY REVERSIBLE	Where the impact can be partially reversed and is temporary.
	FULLY REVERSIBLE	Where the impact can be completely reversed.
Criteria for DEGREE OF IRREPLACEABLE RESOURCE LOSS	NONE	Will not cause irreplaceable loss.
	LOW	Where the activity results in a marginal effect on an irreplaceable resource.
	MEDIUM	Where an impact results in a moderate loss, fragmentation or damage to an irreplaceable receptor or resource.
	HIGH	Where the activity results in an extensive or high proportion of loss, fragmentation or damage to an irreplaceable receptor or resource.
Criteria for DEGREE TO	NONE	Impact cannot be avoided and consideration should be given to compensation and offsets.

WHICH IMPACT CAN BE AVOIDED	**LOW**	Impact cannot be avoided but can be mitigated to acceptable levels through rehabilitation and restoration.
	MEDIUM	Impact cannot be avoided, but the significance can be reduced through mitigation measures.
	HIGH	Impact can be avoided through the implementation of preventative mitigation measures.
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED	**NONE**	No mitigation is possible or mitigation even if applied would not change the impact.
	LOW	Some mitigation is possible but will have marginal effect in reducing the impact significance rating.
	MEDIUM	Mitigation is feasible and will may reduce the impact significance rating.
	HIGH	Mitigation can be easily applied or is considered standard operating practice for the activity and will reduce the impact significance rating.
Criteria for POTENTIAL FOR CUMULATIVE IMPACTS	**UNLIKELY**	Low likelihood of cumulative impacts arising.
	POSSIBLE	Cumulative impacts with other activities or projects may arise.
	LIKELY	Cumulative impacts with other activities or projects either through interaction or in combination can be expected.

Appendix 2: Site Sensitivity Verification Report

CONTENTS

Part A of the Assessment Protocols published in GN 320 on 20 March 2020 (i.e., Site sensitivity verification is required where a specialist assessment is required but no specific assessment protocol has been prescribed) is applicable where the DEFF Screening Tool has the relevant themes to verify.

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration (as identified by the screening tool) must be confirmed by undertaking a site sensitivity verification.

Accordingly, Specialists must please provide a site sensitivity verification report containing the information outlined below:

1. INTRODUCTION

Mooi Plaats is proposing to undertake a Basic Assessment (BA) process for the construction of one (1) a 132 kV above ground cable, up to two (2) 33 kV above ground cables and 3 (three) internal access roads. The proposed site is located approximately 23 km south-west of the town of Noupoort, which falls within the Umsobomvu Local Municipality in the Pixley ka Seme District Municipality of the Northern Cape Province.

Project Name	**EDF Mooi Plaats Powerline & Road BA**	
Project Component	**Affected Properties**	**SG Codes**
132 kV above ground cable	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001
	• Portion 6 of the Farm Uitzicht No. 3	C04800000000000300006
	• Portion 7 of the Farm Uitzicht No. 3	C04800000000000300007
	• Portion 8 of the Farm Uitzicht No. 3	C04800000000000300008
33 kV above ground cables	• Remainder of Farm Mooi Plaats No. 121	C03000000000012100000
	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001
Internal Access Roads	• Portion 1 of Leuwe Kop No. 120	C03000000000012000001
	• Remainder of Farm Mooi Plaats No. 121	C03000000000012100000

The proposed development is required in order to optimise the layout for the authorised 400 MW Mooi Plaats SEF and its associated infrastructure and ensure that the project remains suitable for development opportunities in the REIPPPP, to bid in the Renewable Independent Power Producer Programme (REIPPP) or private sector.

In order to optimise the layout of the authorised Mooi Plaats SEF and Grid infrastructure and ensure that the project remains suitable for development opportunities in the REIPPPP. Mooi Plaats Solar Power (Pty) Ltd proposes the **addition of supporting infrastructure** for the Mooi Plaats SEF (14/12/16/3/3/2/1134) and Grid Connection (14/12/16/3/3/2/1132).

The proposed internal access roads and 132 kV above ground cable, hereafter referred to as "the proposed project", which forms this application and Basic Assessment (BA) process, will service the authorised Mooi Plaats solar PV project and associated electrical infrastructure which form part of the Mooi Plaats SEF, owned by the Independent Power Producer (IPP) Mooi Plaats Solar Power (Pty) Ltd. It must be noted that the proposed 33kV above ground cables do not require Environmental Authorisation as it is below the legislated thresholds ad within the previously assessed footprint however has been included in the assessment for information purposes.

It should be noted that a portion of the proposed powerlines and internal roads, being proposed as part of this new application/ BA process, extend from the already assessed and approved SEF development site (14/12/16/3/3/2/1134). During the SEF EIA in 2019/2020, screening and full

impact assessments (including site visits, where required) were undertaken to inform the buildable area.

Taking the above into consideration, a screening process and full site investigation for majority of the site in question has recently been undertaken as part of an approved EA.

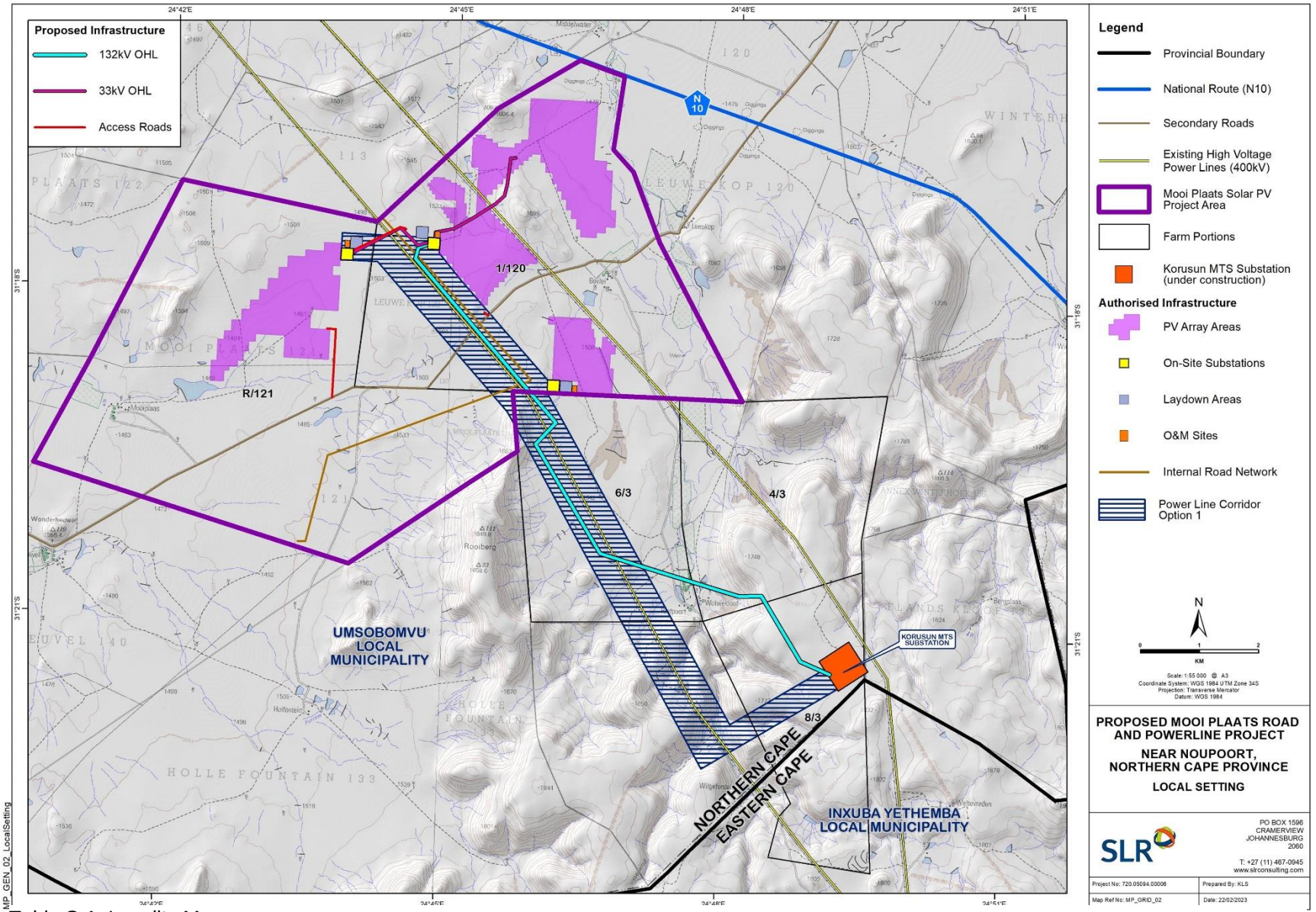


Table S-1: Locality Map

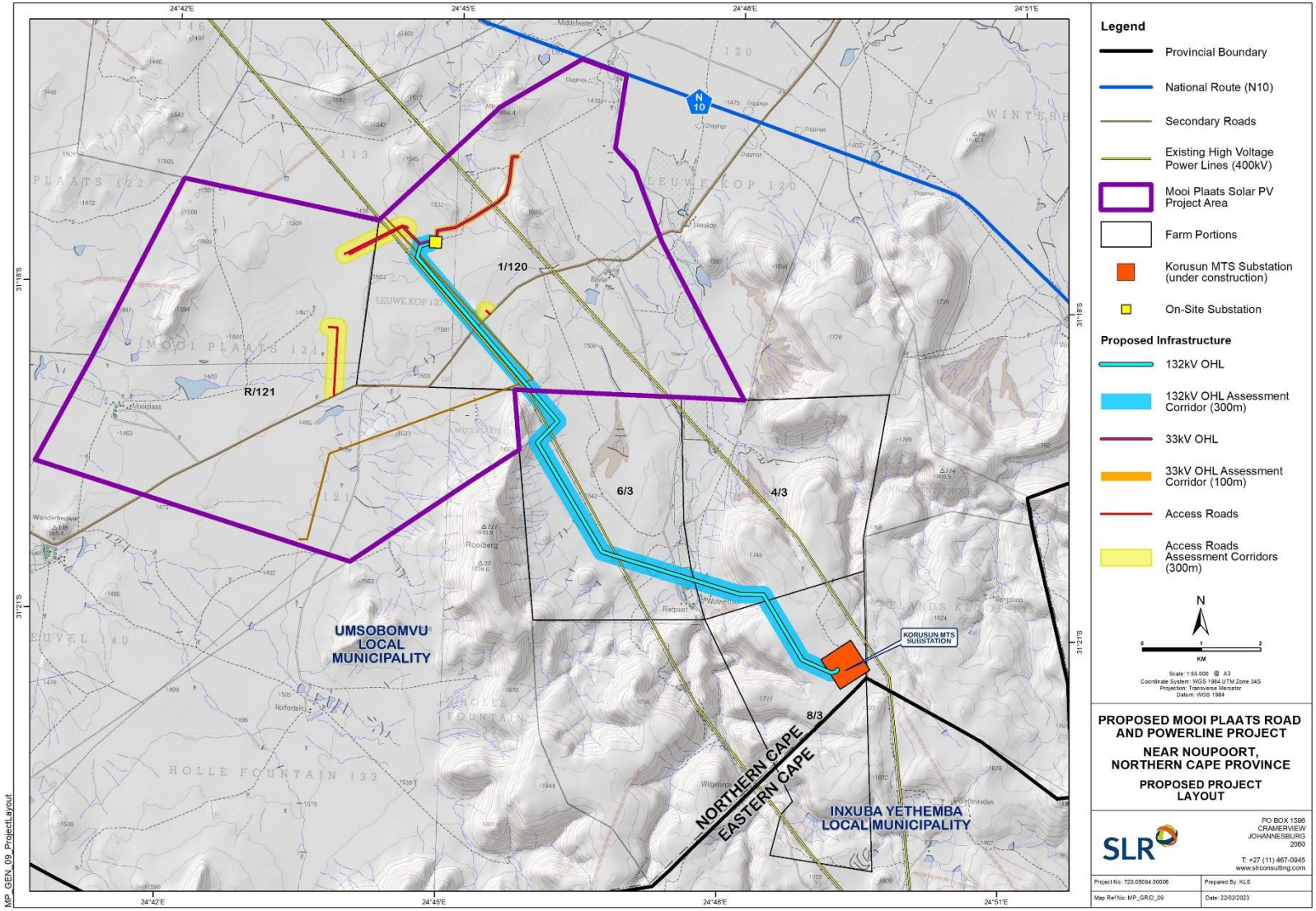


Table S2: Proposed Access Roads

2. TECHNICAL DETAILS FOR THE PROPOSED DEVELOPMENT

Table S-3: Summary of the key project components

Component	Details		
Powerlines			
Connection from the approved Solar PV to the approved onsite substation			
Powerline capacity:	Two (2) 33kV powerlines		
Powerline length:	One (1) approximately 1.7km and One (1) approximately 2.3km		
Powerline corridors width	100 m (50 m on either side of centre line)		
Powerline servitude	32m		
Powerline co-ordinates	**33kV Powerline 1 (1.7km)**		
		Latitude	**Longitude**
	Start	S31° 17' 39.933"	E24° 43' 52.113"
	Middle	S31° 17' 26.517"	E24° 44' 19.675"
	End	S31° 17' 32.309"	E24° 44' 46.126"
	33kV Powerline 2 (2.3km)		
		Latitude	**Longitude**
	Start	S31° 16' 43.404"	E24° 45' 37.149"
	Middle	S31° 17' 13.282"	E24° 45' 17.968"
	End	S31° 17' 32.243"	E24° 44' 47.006"
Powerline pylons:	Monopole double circuit built to 88/132kV dimensions		
Powerline pylon height:	Maximum 28 m		
Powerlines			
Connection from the approved onsite substation to the approved Korusun MTS			
Powerline capacity:	One (1) 132kV powerline		
Powerline length:	Approximately 11.3km (4.6 km new and 6.7km within an approved corridor)		
Powerline corridors width	300 m (150 m on either side of centre line)		
Powerline servitude	32m		
Powerline co-ordinates	**132kV Powerline (11.3km)**		
		Latitude	**Longitude**
	Start	S31° 17' 32.571"	E24° 44' 43.027"
	Middle	S31° 19' 54.655"	E24° 46' 21.662"
	End	S31° 21' 21.246"	E24° 49' 9.274"
Powerline pylons:	Combination of single and double circuit Monopole pylons and Lattice pylons as required		
Powerline pylon height:	Maximum 40 m		
Roads			
Provide access to the approved solar PV			
Road Length	Approximately 1.3km, 1.2km and 0.09km in length respectively		
Road corridors width	300 m (150 m on either side of centre line)		
Road co-ordinates	**Road 1 (1.3km)**		
		Latitude	**Longitude**

Component	Details		
	Start	S31° 18' 20.582"	E24° 43' 40.232"
	Middle	S31° 18' 36.778"	E24° 43' 45.381"
	End	S31° 18' 58.410"	E24° 43' 44.862"
	Road 2 (1.2km)		
		Latitude	**Longitude**
	Start	S31° 17' 24.692"	E24° 44' 28.587"
	Middle	S31° 17' 30.970"	E24° 44' 8.613"
	End	S31° 17' 40.211"	E24° 43' 48.797"
	Road 3 (0.09km)		
		Latitude	**Longitude**
	Start	S31° 18' 8.741"	E24° 45' 20.578"
	Middle	S31° 18' 9.641"	E24° 45' 21.865"
	End	S31° 18' 10.541"	E24° 45' 23.152"

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R. 326, R386/387, R325 and R324, as amended], various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require environmental authorisation (EA) from the Northern Cape Agriculture, Environmental Affairs, Land Reform and Rural Development, prior to the commencement thereof. One (1) application for EA for the proposed development will be submitted, in the form of a Basic Assessment (BA) process in terms of the NEMA EIA Regulations of 2014 (as amended) is applicable.

In accordance with GN 320 and GN 1150 (20 March 2020)[2] of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Elize Butler (Palaeontology specialist) have been commissioned to verify the sensitivity of the EDF Mooi Plaats Powerline & Road BA under these specialist protocols.

The findings of the respective specialist studies will be used to inform the location of the internal access roads and 132 kV above ground cable. All identified sensitive and/or no-go areas (including their respective buffers) will be avoided accordingly, as required.

[2] GN 320 (20 March 2020): Procedures for The Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation

The site areas / location alternatives for the associated infrastructure such as the internal access roads and 132 kV above ground cables will be assessed against the 'no-go' alternative. The 'no-go' alternative is the option of not constructing the respective projects, where the status quo of the current status and/or activities on the site would prevail.

3. SITE SENSITIVITY VERIFICATION METHODOLOGY

The following information sources were consulted to compile this report:
The Palaeontology Sensitivity Verification was undertaken by the following methodology:

- The site sensitivity is established through the National Environmental Web-Based Screening Tool
- The Site is mapped on the relevant Geological Map to determine the underlying geology of the development
- Then the site is mapped on the South African Heritage Resources Information System (SAHRIS) PalaeoMap, and the Sensitivity of the proposed development established.
- Other information is obtained by using satellite imagery and
- Palaeontological Impact Assessments and Desktop Assessments of projects in the same area are studied.
- A ten day-comprehensive site-specific field survey of the development footprint for the combined projects was conducted on foot and motor vehicle by the author and Dr Hennie Butler in March 2023.

4. OUTCOME OF SITE SENSITIVITY VERIFICATION

The proposed EDF Mooiplaats Project near Noupoort in the Northern Cape Province is depicted on the 1:250 000 Middelburg 3124 (1996) Geological Map (Council of Geoscience, Pretoria) (**Figure S4-1; Table S4-1**). The development is underlain by Cenozoic superficial alluvium deposits (yellow, single bird figure), the Karoo Dolerite Suite of the Karoo Igneous Province (Jd, red), as well as sandstone and shale of the Adelaide (Pa, light green) and Tarkastad Subgroups (TRk, yellow with red dots) of the Beaufort Group, Karoo Supergroup. In this map the Adelaide Subgroup is undifferentiated while the Tarkastad Subgroup is represented by the Katberg Formation.

The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary alluvium is Moderate, that of the Jurassic dolerite is Zero as it is igneous in origin and the Palaeontological Sensitivity of the Adelaide and Tarkastad Subgroups (Beaufort Group) is Very High (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014) (**Figure S-2; Table S-2)**.

Recent updated geology produced by the Council of Geosciences (Pretoria; **Figure S-3. Table S-3**) indicates that the proposed development is mainly underlain by the Balfour Formation (Adelaide

Subgroup) and Tarkastad Subgroup (Beaufort Group, Karoo Supergroup), while an extremely small portion in the south is underlain by the Karoo Dolerite Suite.

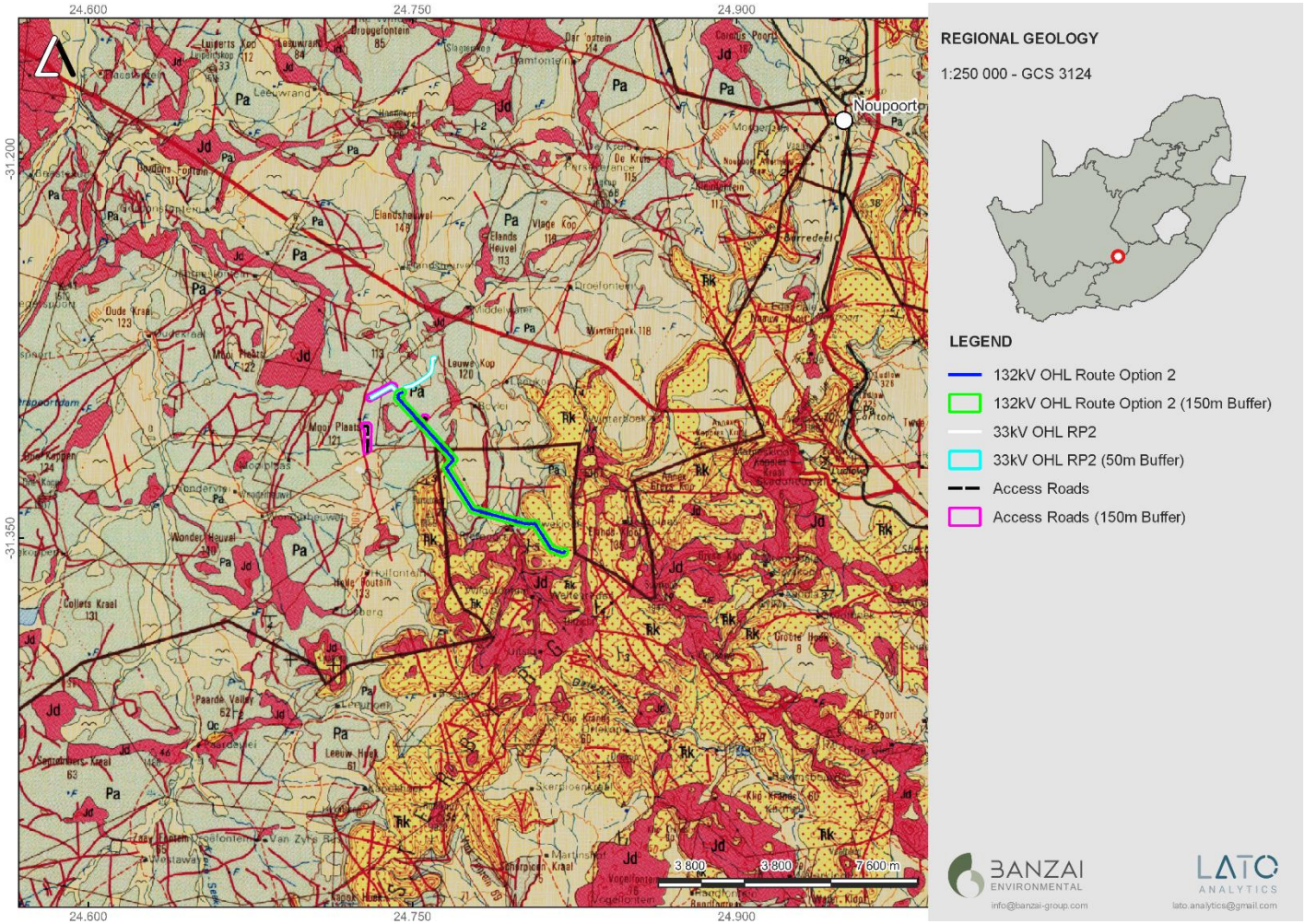
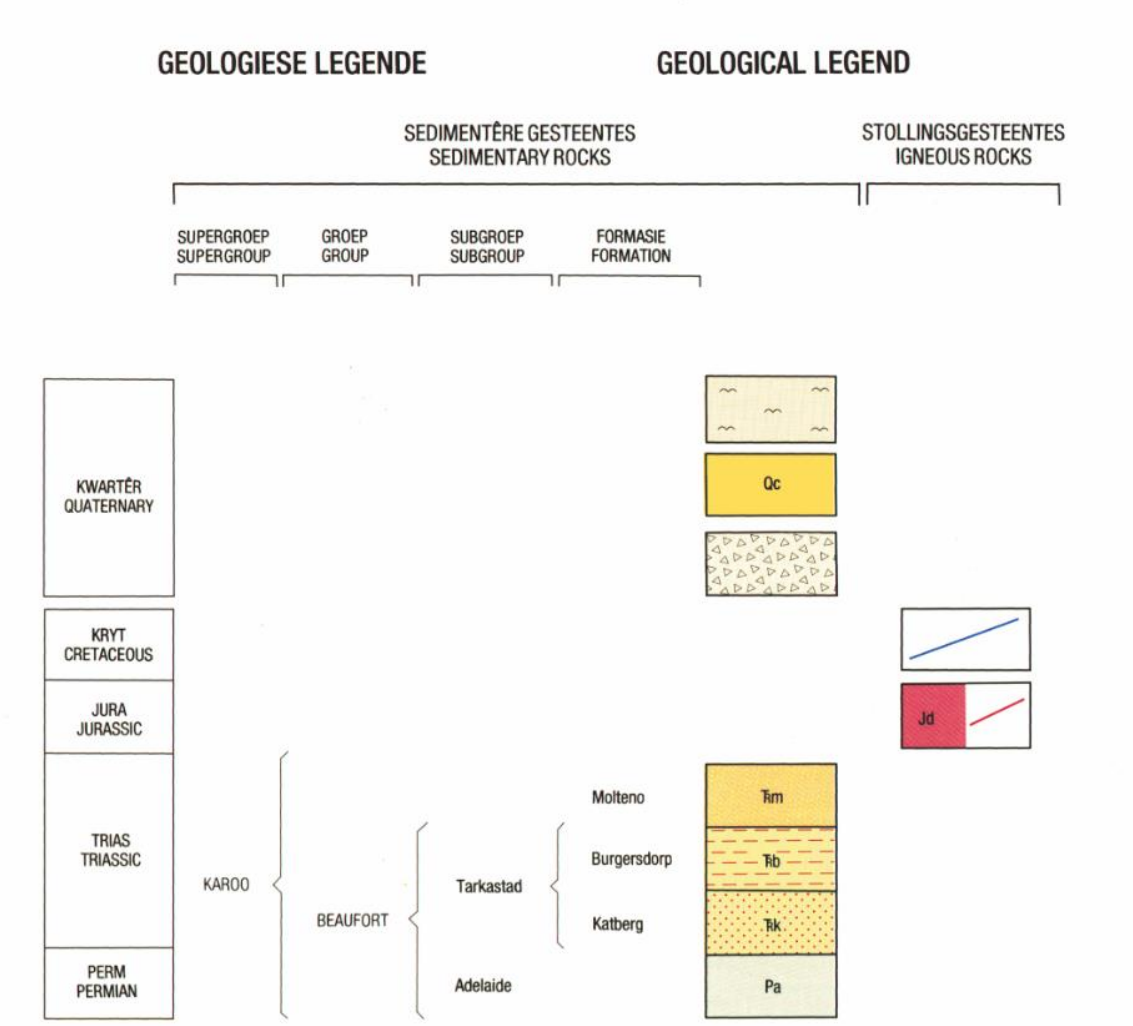
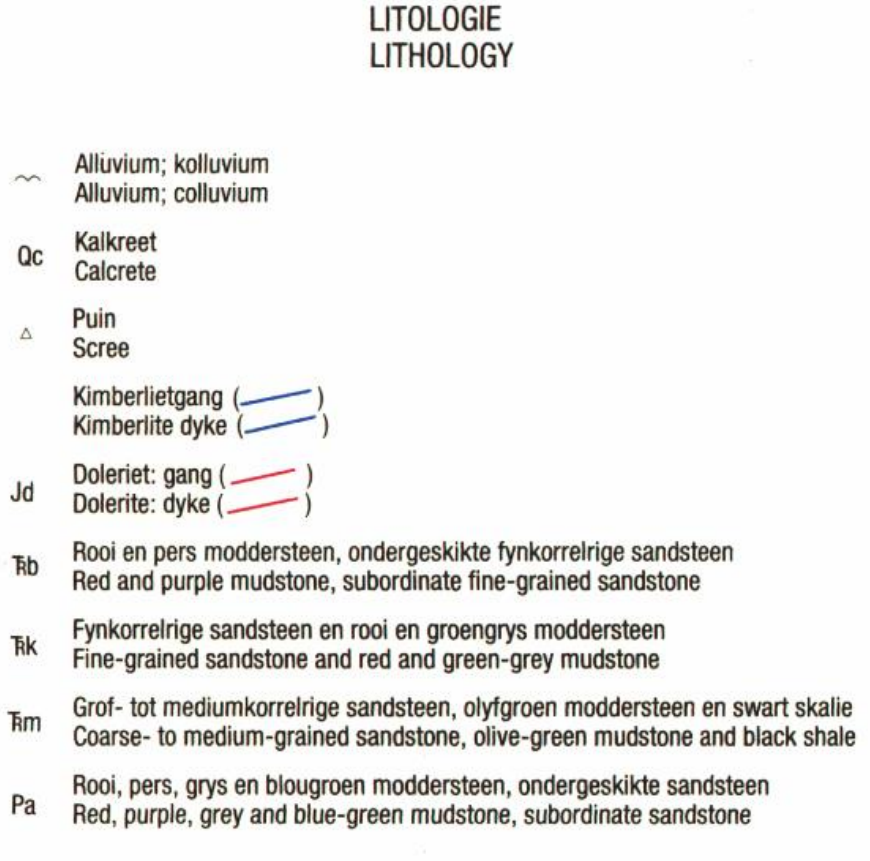


Figure S4: Extract of the 1:250 000 Middelburg 3124 (1996) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the Mooiplaats SEF infrastructure near Noupoort in the Northern Cape. The development is underlain by alluvium superficial deposits (yellow, single bird figure), Karoo dolerite Suite (Jd, red), the Adelaide Subgroup (pa; green) as well as the Katberg Formation of the Tarkastad Subgroup (Trk, yellow with red dots) of the Beaufort Group, Karoo Supergroup.

Table S-1. Legend to the 1:250 000 Middelburg 3124 (1996) Geological Map (Council for Geosciences, Pretoria).





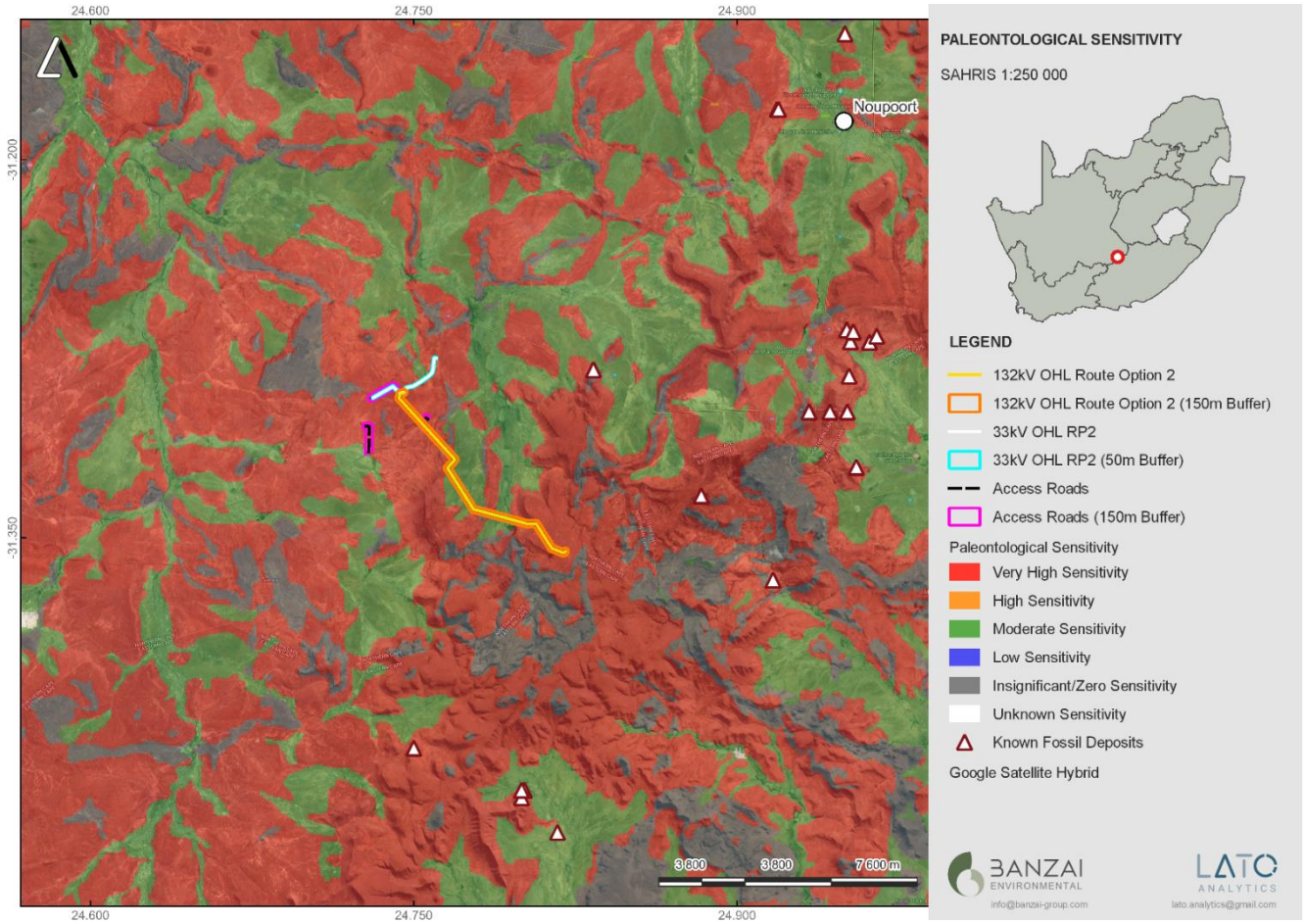


Table S-0-4: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed EDF Mooiplaats SEF Grid and Road infrastructure. Fossils finds recorded on the National Palaeontological Database is indicated in white triangles with red outlines.

According to the SAHRIS Palaeosensitivity map (**Figure S4-2, Table S4-2**) the development is underlain by sediments with predominantly a Very High (red), moderate (green) and Zero (grey) Palaeontological Sensitivity.

Table S-2: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).		
Colour	**Sensitivity**	**Required Action**
RED	**VERY HIGH**	**Field assessment and protocol for finds is required**
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	**INSIGNIFICANT/ZERO**	**No palaeontological studies are required**
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

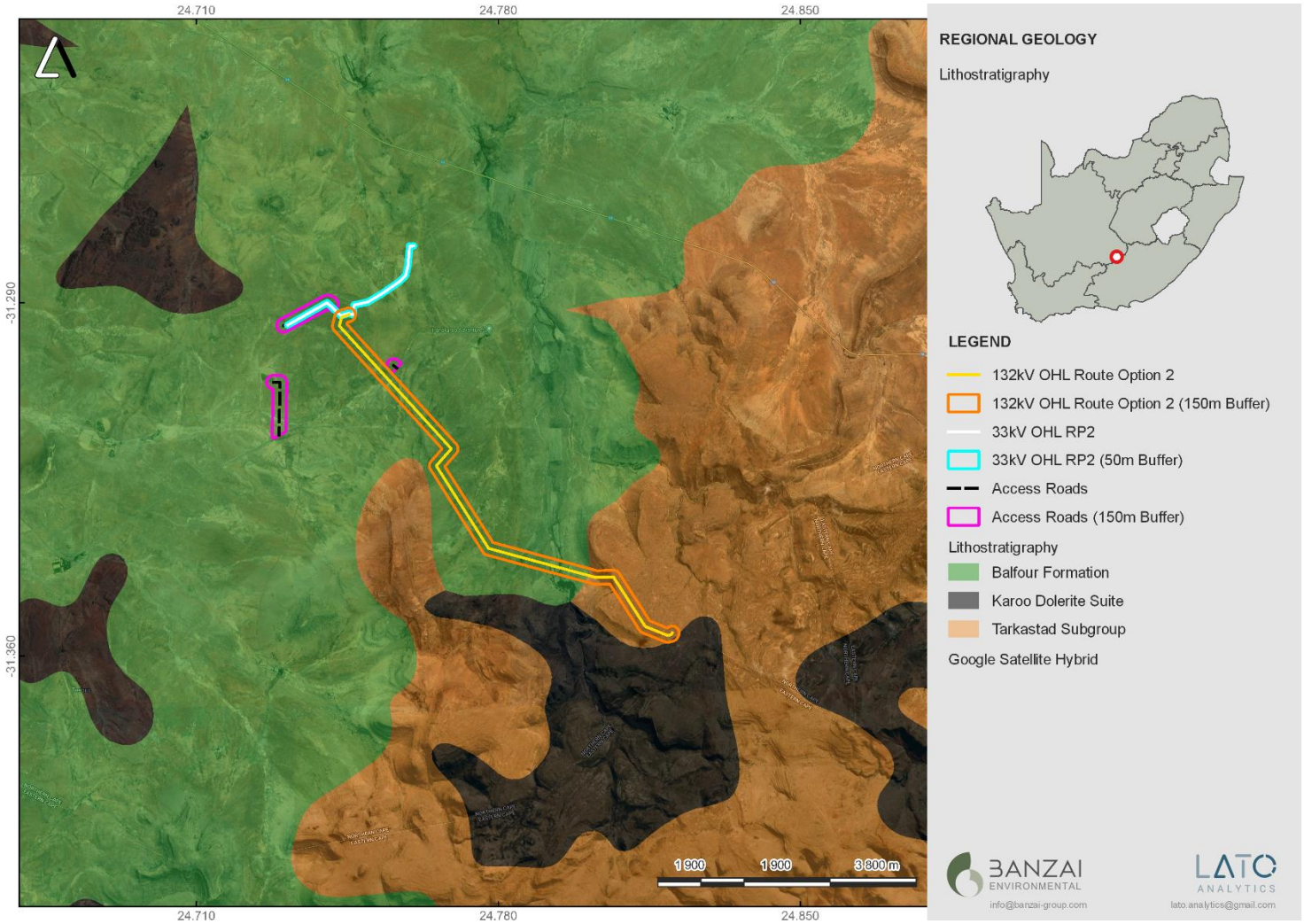
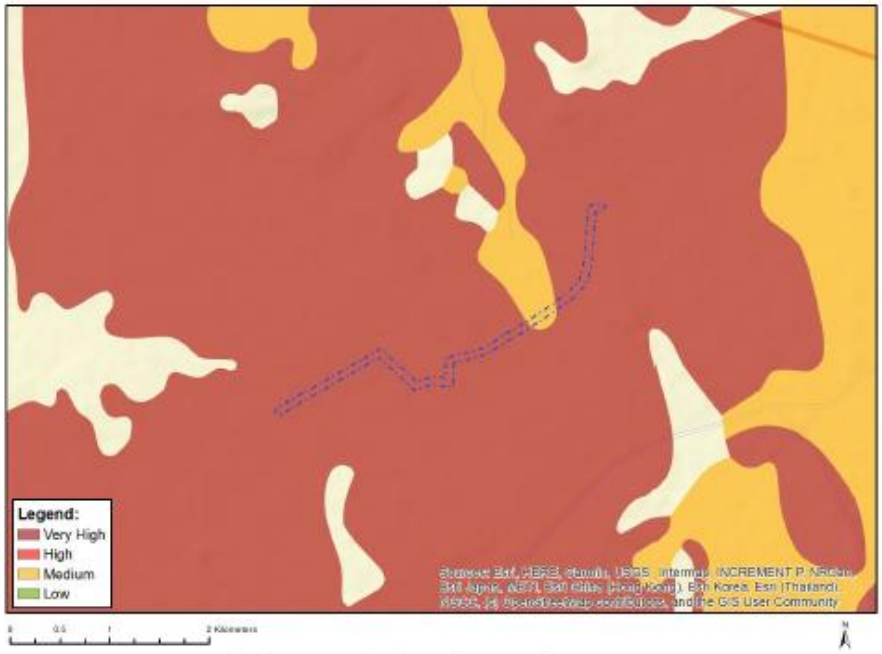


Table S0-5. Updated geology (compiled by the Council of Geosciences, Pretoria) indicates that the grid and road infrastructure is underlain by the Balfour Formation, Tarkastad Subgroups as well as Dolerite.

The Web based DFFE Screening tool also indicates the Very High Palaeontological Sensitivity of the development area. Thus, the Palaeontological Sensitivity of the SAHRIS Palaeosensitivity map and the DFEE National Environmental Web-bases Screening Tool (**Figure 5-4 to Figure 5-7)** indicates that the proposed development is rated as Very High. The Very High rating can be attributed to the rich Permian fossil assemblages known from the lower Beaufort in the Karoo Basin. The Palaeontological Sensitivity of Jurassic dolerite is rated as Zero as it is igneous in origin and unfossiliferous (Almond and Pether, 2009; Almond *et al*., 2013, Groenewald et al 2014).

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



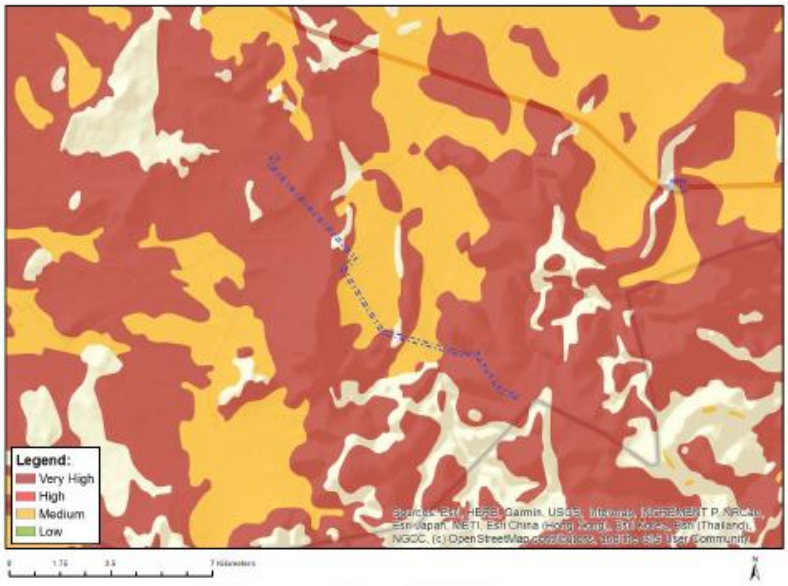
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table S-0-6:Palaeontological Sensitivity of the 33kV OHPL generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



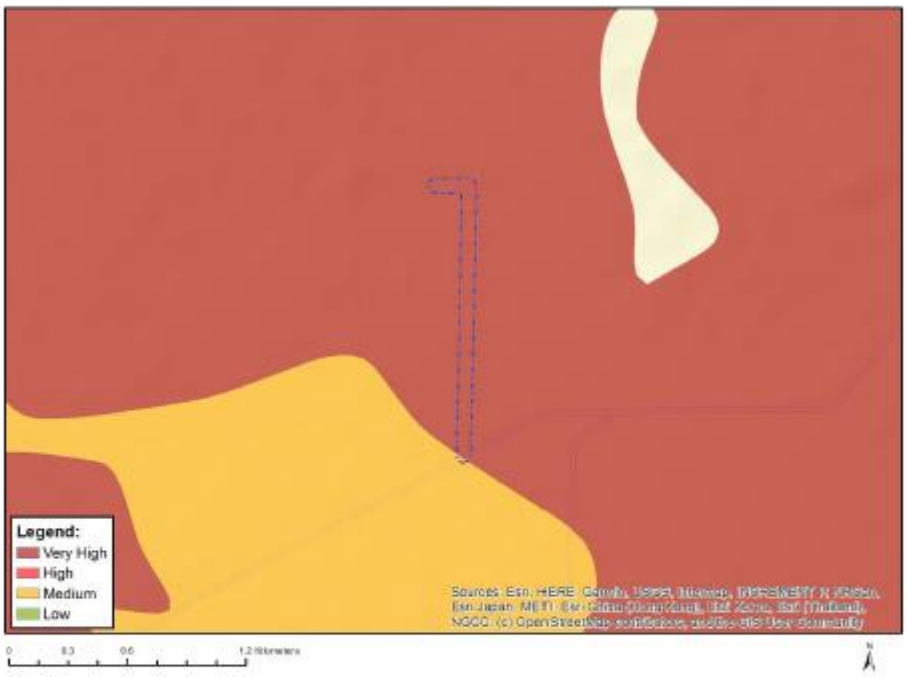
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
x			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table S-0-7: Palaeontological Sensitivity of the 132 kV OHPL generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



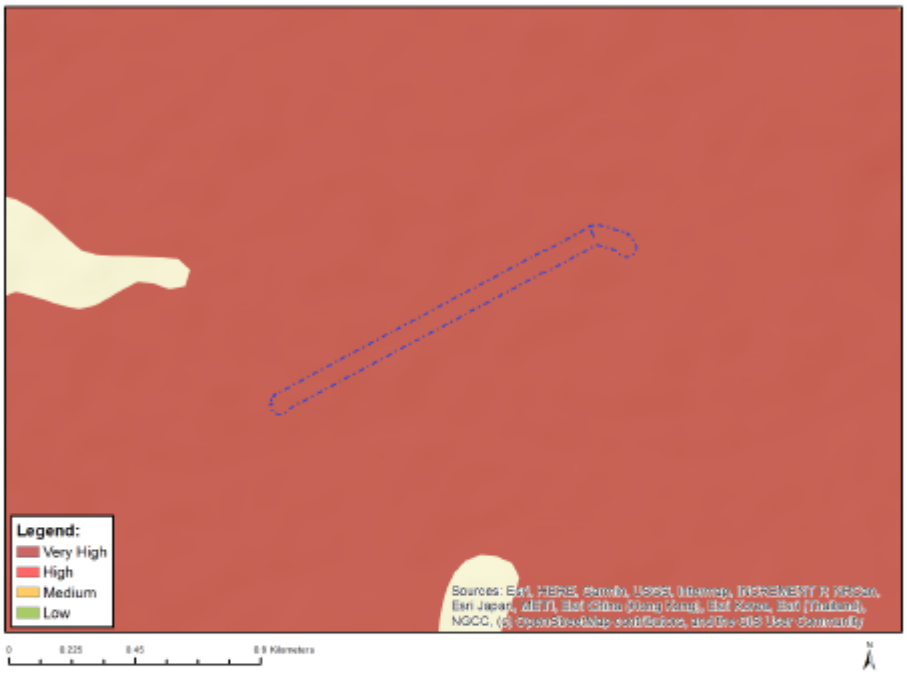
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Table S-0-8: Palaeontological Sensitivity of Access Road 1 (1.3 km) generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Features with a Very High paleontological sensitivity

Table S0-9: Palaeontological Sensitivity of Access Road 2 (1.2 km) generated by the National Environmental Web-bases Screening Tool.

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Features with a Very High paleontological sensitivity

Table S0-10: Palaeontological Sensitivity of Access Road Access 3 (0,9 km) generated by the National Environmental Web-bases Screening Tool.

5. CONCLUSION

The Site Sensitivities of the proposed Mooiplaats SEF road and grid infrastructure has been verified and it was found that:

The SAHRIS Palaeosensitivity map indicates that the Palaeontological Sensitivity of the development is Very High.

And

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

These maps indicate that the proposed development is highly Sensitive from a Palaeontological point of view. One loos isolated fossil were identified in the proposed footprint during the 1-day site investigation, but the site investigation as well as desktop research (National Database and published

data) concluded that fossil heritage of scientific and conservational interest in the development area is relatively rare and of low scientific and conservational value. This classification is thus contested (National Environmental Web-bases Screening Tool and SAHRIS) as far as the impact of the development infrastructure is concerned, based on actual conditions recorded on the ground during the site visit in March 2023.

Appendix 3 Curriculum Vitae

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988 University of the Orange Free State
	B. Sc (Hons) Zoology, 1991 University of the Orange Free State
	Management Course, 1991 University of the Orange Free State
	M. Sc. *Cum laude* (Zoology), 2009 University of the Free State

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

MEMBERSHIP

Palaeontological Society of South Africa (PSSA)	2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–2022

TECHNICAL REPORTS

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Butler, E. 2015.Palaeontological Impact Assessment of the proposed Orkney solar energy farm and associated infrastructure on the remaining extent of Portions 7 and 21 of the farm Wolvehuis 114, near Orkney, North West Province. Bloemfontein.
Butler, E. 2015. Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.
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Butler, E. 2016. Palaeontological Impact Assessment of the proposed upgrading of the main road MR450 (R335) from Motherwell to Addo within the Nelson Mandela Bay Municipality and Sunday's River valley Local Municipality, Eastern Cape Province. Bloemfontein.

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