APPENDIX A –

SITE AND ROUTE PLAN

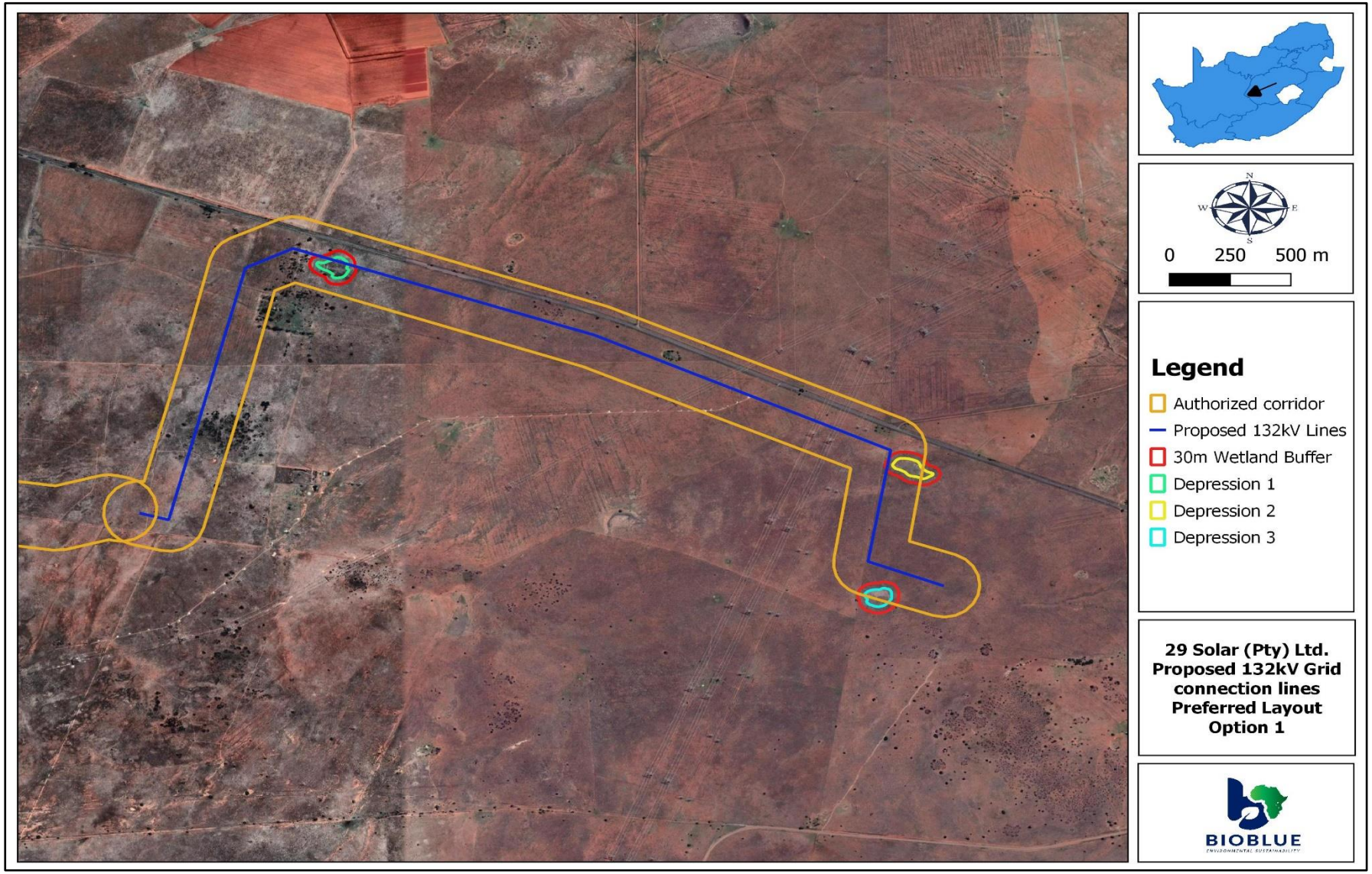


Figure 1: Preferred Route and Layout Option 1

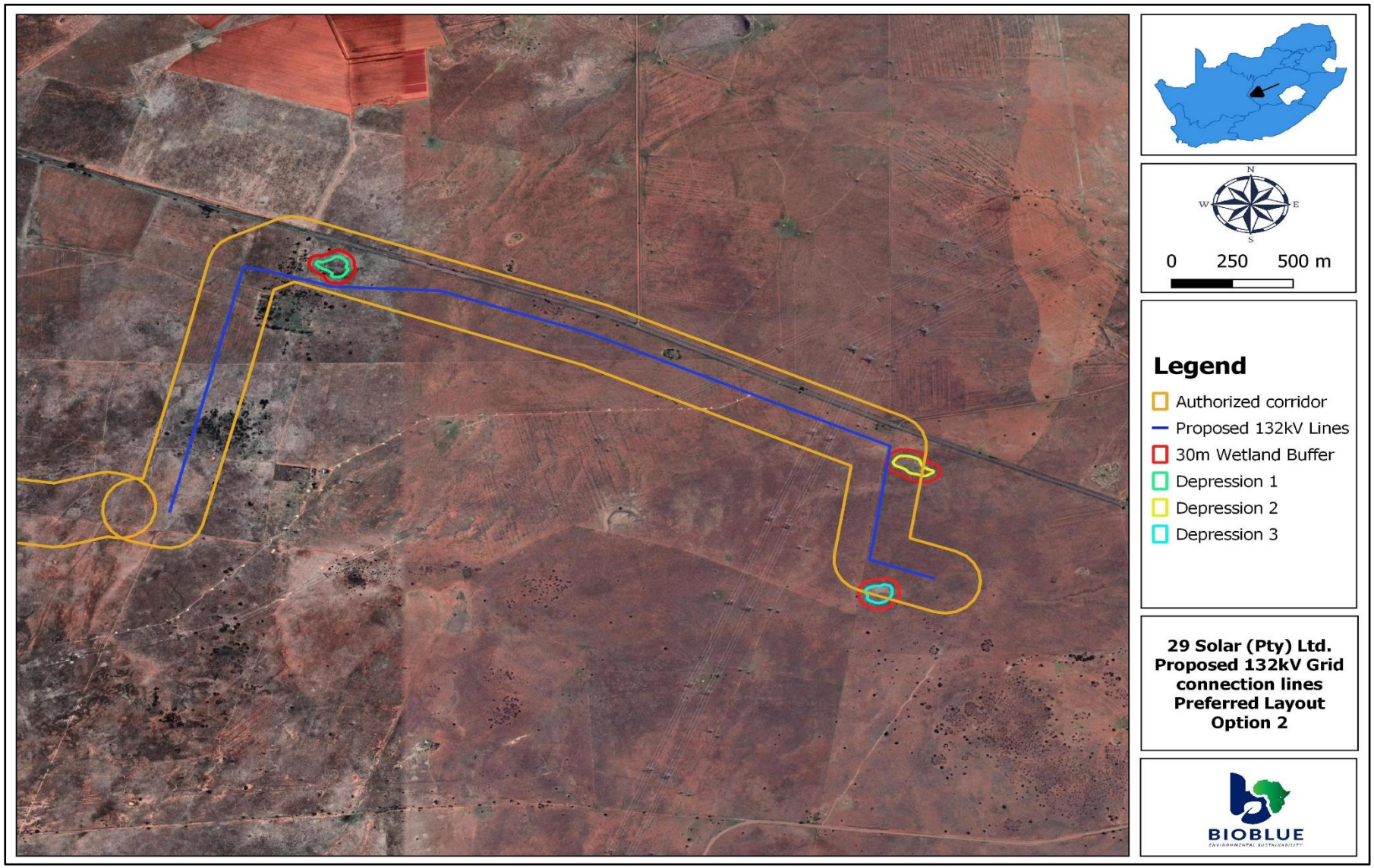


Figure 2: Preferred Route and Layout Option 2

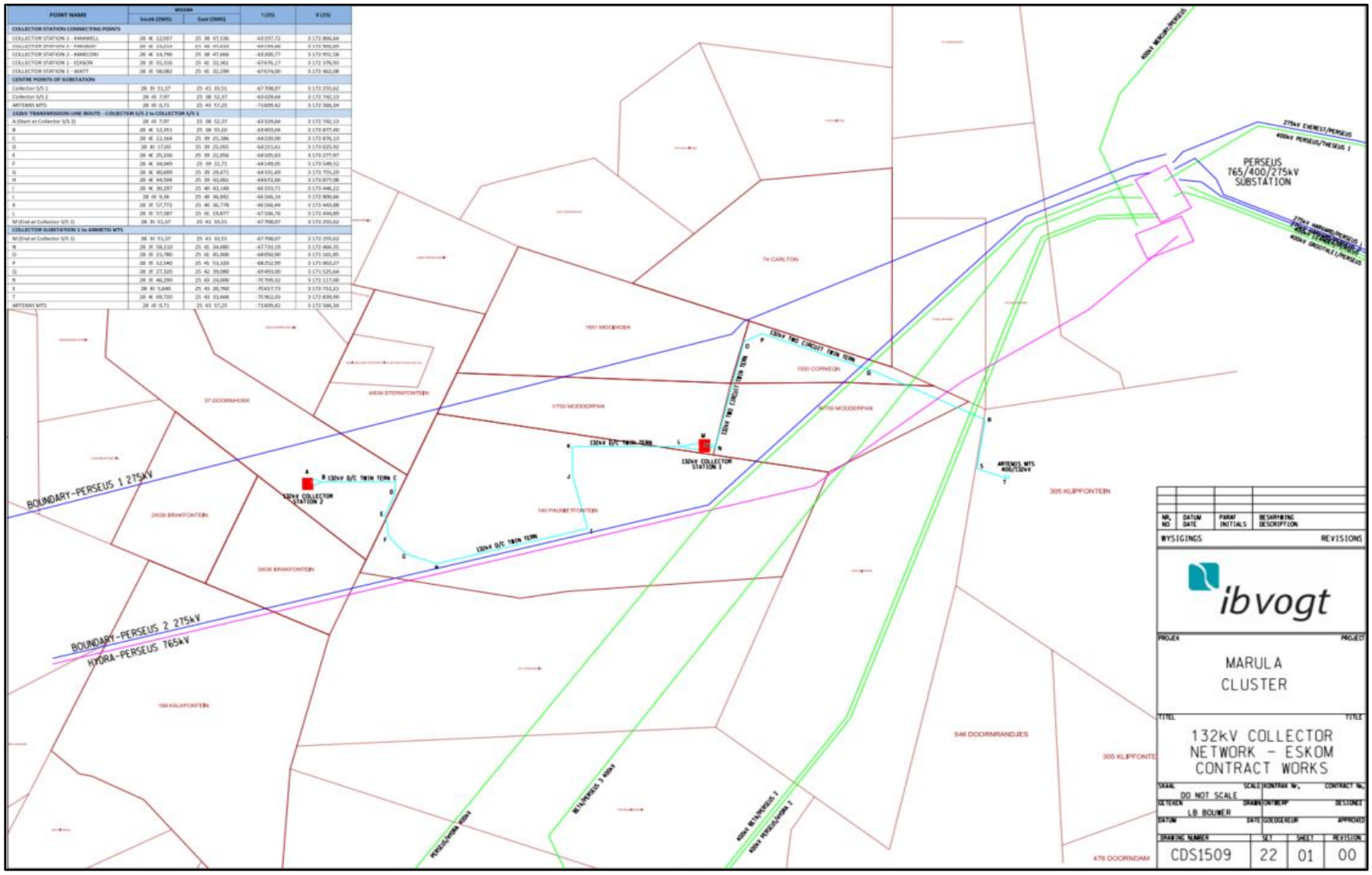


Figure 3: Strategic Transmission Corridor – Central Corridor

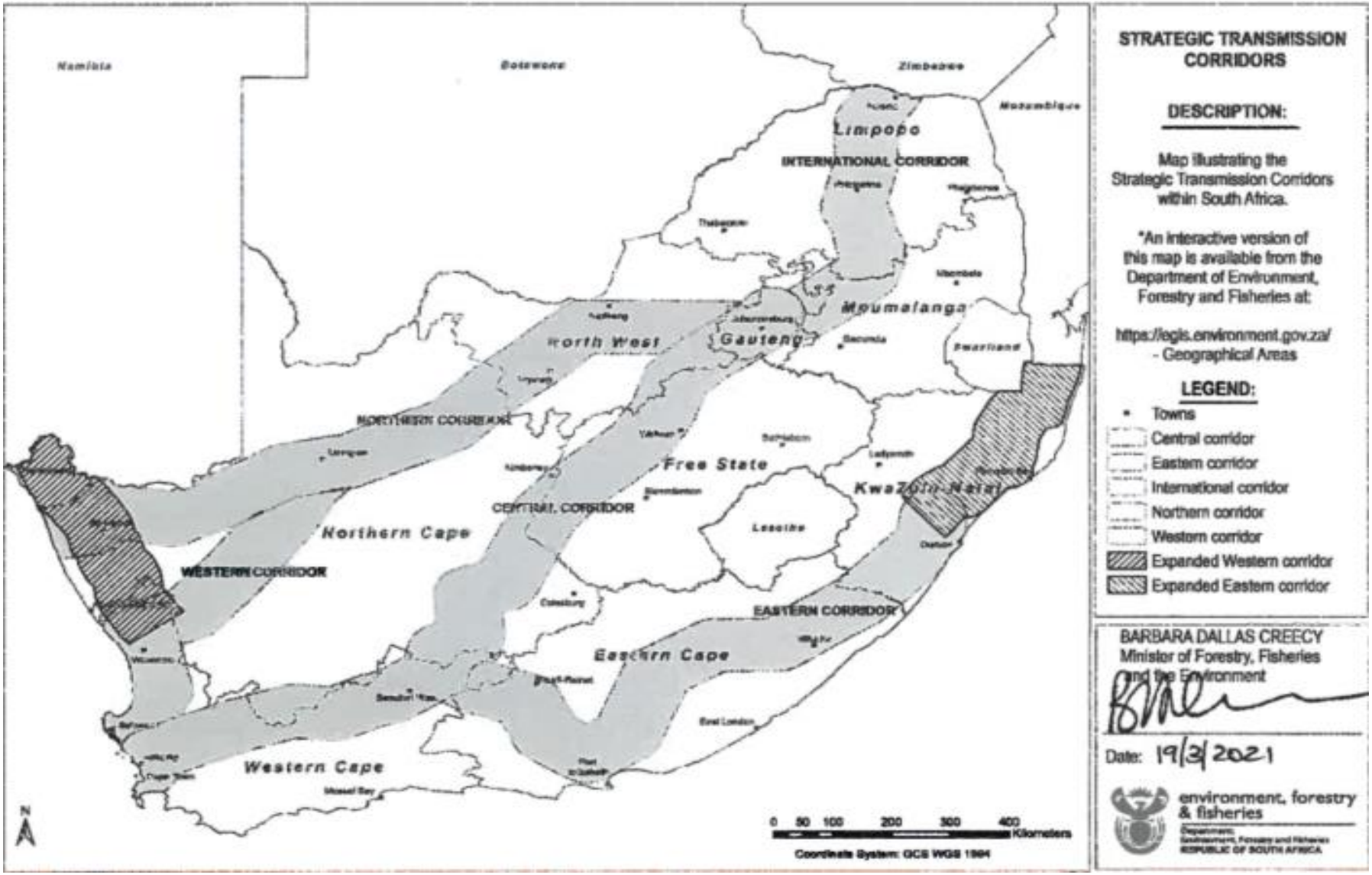


Figure 4: Strategic Transmission Corridor – Central Corridor

APPENDIX B –

SITE PHOTOGRAPHS

Note that these site photographs are not all from the middle of the site as this is a linear project.



Figure 1: Photograph of the grid line route in a easternly direction with the R54 road to the left side of the photograph



Figure 2: Photograph taken on the western corner point of the site on the Farm Cornelia (28°39'12.66"S, 25°41'53.22"E)



Figure 3: Photograph indicating the Eskom powerlines that cross the proposed site area



Figure 4: Man-made depression located near the centre half of the route



Figure 5: Photograph of the site taken in a westerly direction



Figure 6: Photograph of Depression Wetland 1



Figure 7: Photograph taken within Depression Wetland 1 and showing the proposed grid line route in an easternly direction



Figure 8: Photograph taken on the second corner point of the proposed grid line route after it crossed under the existing Eskom power lines – (28°39'44"S, 25°43'22"E)

APPENDIX C –

FACILITY ILLUSTRATIONS

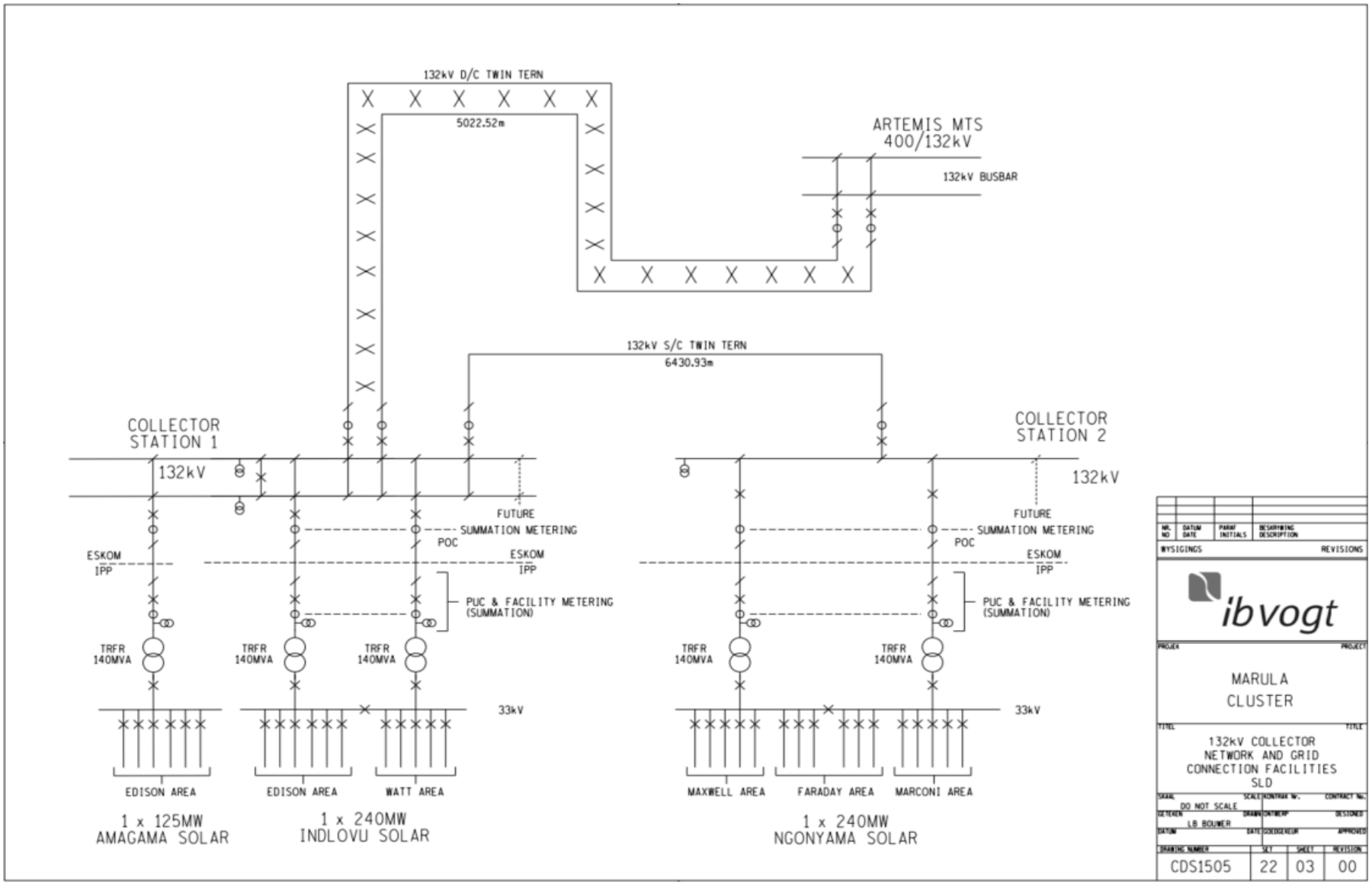


Figure 1: Detailed illustration of how the Marula Cluster Solar PV developments will be connected through the 132kV D/C Twin Tern to the Artemis MTS



Figure 2: Example of 132kV Lines – Lattice-type pylons



Figure 3: Typical 132kV monopole type

APPENDIX D – SPECIALIST ASSESSMENTS

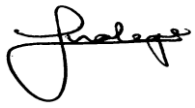


FAUNA SPECIALIST STUDY FOR PROPOSED 132KV ARTEMIS COLLECTOR PROJECT IN FREE STATE PROVINCE

Prepared for: 29 Solar (Pty) Ltd
Prepared by: MORA Ecological Services (Pty) Ltd
350 Johan Street, Arcadia, Pretoria, 0007
Contact person: Mokgatla Molepo
Cell: (081) 410 3763
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October 2022

DOCUMENT CONTROL

Project title	Fauna Specialist Study for Proposed 132KV Artemis Collector in the Free State Province
Report reference	ART/FIA/1022
Document prepared for	29 Solar (Pty) Ltd
Document prepared by	MORA Ecological Services (Pty) Ltd
Physical address	350 Johan Street Arcadia Pretoria 0007
Primary author	Mokgatla Molepo (MSc. Zoology) *Pr. Nat. Sci*. (009509) 
Contact details	Email: mokgatla@moraecological.co.za Contact: (081) 410 3763

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SPECIALIST INFORMATION AND LEGAL REQUIREMENTS

National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Regulations 2014 (as amended) Requirements for Specialist Reports (Appendix 6):

The details of -	
○ the specialist who prepared the report; and	Page 7
○ the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 7
A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 9
An indication of the scope of, and the purpose for which, the report was prepared;	
○ An indication of the quality and age of base data used for the specialist report;	Page 20
○ A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Page 27
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Page 20
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Page 20
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;	Page 13
An identification of any areas to be avoided, including buffers;	Page 13
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;	Page 13
A description of any assumptions made and any uncertainties or gaps in knowledge;	Page 5
A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Page 27
Any mitigation measures for inclusion in the EMPr;	Page 27
Any conditions for inclusion in the environmental authorisation;	Page 18
Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Page 33
A reasoned opinion-	
○ whether the proposed activity, activities or portions thereof should be authorised;	Page 33
○ regarding the acceptability of the proposed activity or activities; and	Page 33
○ 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;	Page 33

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A description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable
A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable
Any other information requested by the competent authority.	Not applicable
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.	Not applicable

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EXECUTIVE SUMMARY

Project background

29 Solar (Pty) Ltd plans to construct new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction is located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

The proposed line will cross the following properties:

- Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD
- Portion 0/RE of the farm Modderpan no. 750 Boshof RD
- Portion 0/RE of the farm Leliehoek no 748 Boshof RD
- Portion 0/RE of the farm Klipfontein n0 305 Boshof RD

The fauna specialist study provides details of the animal species composition occurring on site and provides an assessment of the possible ecological impacts associated with the development of the 132kV powerline and associated grid connection. Several site visits with associated field assessments and a desktop review of the available historical species list for the area was conducted in order to identify and characterise the faunal biodiversity of the proposed area for development. The faunal biodiversity information from the desktop study and that collected as part of our investigations will be used to inform the Government's review during the application process of the proposed development in the Tokologo Local Municipality within the Lejweleputswa District Municipality.

No no-go areas are applicable to the project site from a fauna perspective. Should the proposed construction not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for agricultural purposes.

No other approved corridors were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic Assessment process to enable the appropriate placement of the infrastructure within the construction footprint.

TERMS OF REFERENCE

MORA Ecological Services (Pty) Ltd was requested by 29 Solar (Pty) Ltd, hereafter referred to as "29 Solar" to conduct a fauna specialist study towards their pursuit of obtaining the requisite environmental

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authorisations for the proposed construction of a 132 kV Artemis powerline. For this study, MORA Ecological Services (Pty) Ltd was specifically tasked to verify the presence of faunal species, and more importantly, the presence of species of conservation concern within the proposed development area.
The critical objective of this specialist of the faunal assessment was to include every species with the slightest chance of occurring within the site in the species list. The faunal assessment was done mainly on a desktop level, supported by on-site observations. No faunal trapping or any other quantitative field species data capturing was, however, conducted. Furthermore a cross reference with available habitats of the study area was also conducted in order to establish the faunal potential.

The following tasks were undertaken by MORA Ecological Services (Pty) Ltd to achieve the assessment objective:

- Use of the Animal Demographic Unit (ADU) and the Second South African Bird Atlas Project 2 (SABAP2) database to identify fauna possibly occurring on site.
- Determine the faunal species present within the site extent.
- Determine the presence of species of conservation concern.
- Determine the ecological state of the faunal diversity within the site extent.
- Compile a report with all findings, including mapping of sensitive ecological areas for fauna species.

ASSUMPTIONS, LIMITATIONS, UNCERTAINITIES AND GAP ANALYSIS

- The findings, results, observations, conclusions and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the potential impacts of substations and powerlines on fauna species.
- Only daytime surveys were conducted due to budgetary and time constraints.
- The assessment of impacts was based on the current state of the primary environment currently .
- MORA Ecological Services (Pty) Ltd relied on BioBlue Environmental Sustainability, as the EAP, to supply correct information on the site locality and extent, as well as project details which were assumed to be correct.
- It was assumed that the information contained in existing databases, reports and publications is correct.
- MORA reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- Due to the natural high mobility characteristic of fauna species, the absence of species during field surveys does not necessarily mean that the species does not occur there. Hence, the use of available databases to assist the specialist in establishing species occurrence.

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SPECIALIST DETAILS, CURRICULUM VITAE AND DECLARTION

The surveys and assessment were undertaken by Mokgatla Jerry Molepo, a competent **Environmental Specialist** and Director of MORA Ecological Services (Pty) Ltd.

Curriculum vitae

EDUCATION:

- MSc Zoology, Nelson Mandela University (Percy FitzPatrick Institute of African Ornithology Centre of Excellence)

Research Project Topic: Foraging behaviour and thermal physiology in Cape Sugarbirds: sex-specific responses to temperature.

- BSc Honours in Zoology, University of Limpopo

Research Project Topic: Morphometrics and plumage variation in the South African Fiscal flycatcher *Sigelus silens* Shaw 1809.

- BSc Botany & Zoology, University of Venda
- Grade 12, Marobathota High School

CERTIFICATES:

- SASS5 Aquatic Biomonitoring, GroundTruth
- Hydropedology and Wetland Functioning, Terra Soil Science & Water Business Academy
- Section 21 (c) & (i) Water Use Authorisation Training, Department of Water and Sanitation
- Basic Project Management, Hudisa Business School

PROFESSIONAL MEMBERSHIP:

- South African Council for Natural Scientific Professions (SACNASP) – Professionally registered as Professional Natural Scientist. **Registration number:** 009509
- British Ecological Society (BES). **Membership number**: 1010709
- Zoological Society of Southern Africa (ZSSA). **Membership number**: 691

WORK EXPERIENCE:

- MORA Ecological Services (Pty) Ltd: April 2018 – Current, I am an Environmental Specialist, and my duties include; (i) Conducting Biodiversity, Aquatic Impact Assessments, Rehabilitation (ii) Compilation of specialist reports.
- Arcus Consulting: May - November 2017, I was a subcontracted avifaunal surveyor for the proposed Highlands Wind Energy Farm, Somerset East, Eastern Cape.
- Centre for African Conservation Ecology (ACE), Nelson Mandela University: 2015 - 2016, I was a field guide/ environmental educator. Responsibilities: taking school learners on trial walks inside the Nelson Mandela University Nature Reserve.
- South African National Biodiversity Institute (SANBI): May – December 2014, I was a Zoological Systematics Technician. Responsibilities: (i) Insect identification and curation, and (ii) compiling

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the animal checklist of South Africa, (iii) Sourcing wildlife crime reports on endangered animals and plants for Barcode of Wildlife Project, (iv) Monitoring the bird population in the Botanical Garden.

- Department of Zoology, University of Venda: 2009 – 2013, I was a Research Assistant under Dr. T.C Munyai who was conducting a long-term research project which monitored the effects of climate change on biota and processes influencing ecosystem functioning and species diversity patterns.
- Percy FitzPatrick Institute of African Ornithology: March – April 2014, I was a Research Assistant under Dr. Rita Covas' Sociable Weaver Research Project. This is a long-term study which looks at the reproductive success of Sociable weavers at Benfontein Nature Reserve in Kimberley.

Key experience in specialist projects

Year	Project	Location:	Role(s)
2022	Avifaunal Impact Assessment for the proposed 132kV for Musina-Makhado Special Economic Zone North Site	Musina, Limpopo	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed Khauta PV Solar including 44kV and 132kV Powerline	Welkom, Free State	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed NAOS PV Solar including 132kV Powerline	Free State	Avifaunal Specialist/Ornithologist
2022	Preconstruction Avifaunal Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Avifaunal Specialist/Ornithologist
2022	Preconstruction Botanical Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Ecologist
2022	Biodiversity Assessment, Land Capability and Veld Condition Assessment for PPC Cement SA Slurry	Slurry, North West	Ecologist
2021	Avifaunal Impact Assessment for the proposed Upington-Aries 2x 400kV	Upington, Northern Cape	Avifaunal Specialist/Ornithologist
2021	Habitat Assessment Post Rehabilitation for PPC Cement SA Dwaalboom Factory	Dwaalboom, Limpopo	Ecologist
2021	Habitat Assessment Post Rehabilitation for Gibson Bay Wind Energy Farm	Humansdorp, Eastern Cape	Ecologist
2021	Wetland Rehabilitation for the sewer pipeline construction in Daveyton	Ekurhuleni East College Campus, Daveyton, Gauteng	Wetland Ecologist
2021	12 Months Wetland Rehabilitation Supervision for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist

DECLARATION BY THE SPECIALIST

I, Mokgatla Jerry Molepo , 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;

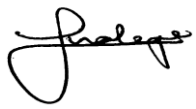
• I will comply with the Act, Regulations and all other applicable legislation;

• 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 realise 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

MORA Ecological Services (Pty) Ltd

Name of Company

08/10/2022

Date

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INTRODUCTION

Proposed Development

MORA Ecological Services (Pty) Ltd was appointed by 29 Solar (Pty) Ltd (hereafter referred to the Developer) and BioBlue Environmental Sustainability (hereafter referred to as the EAP) to conduct a fauna specialist study required for a full Scoping and Environmental Impact Assessment for the proposed construction of new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction will be located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

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- Portion 0/RE of the farm Leliehoek no. 748 Boshof RD
- Portion 0/RE of the farm Klipfontein no. 305 Boshof RD

SITE DESCRITION OF AFFECTED ENVIRONMENT

The proposed development falls within within the Tokologo Local Municipality that forms part of the Lejweleputswa District Municipality. Tokologo Local Municipality is situated on the western region of the Free State Province (Figure 1). The local municipality area measures 9 326.24km^2 and comprises of three small rural towns namely Dealesville, Boshof, and Hertzogville. As shown in Figure 1, the exact extent of the proposed geographic area for the 132kV conductor lines runs across the Doornhoek No. 37, Palmietfontein No. 140, Mooihoek No. 1551, Modderpan No. 750, Cornella No. 1550, Leliehoek No. 745 and Klipfontein No. 305 farms. This indicates that several properties will potentially be impacted upon the construction of the corridor. Fauna specialist surveys were conducted to evaluate potential impacts arising from the proposed power line infrastructure.

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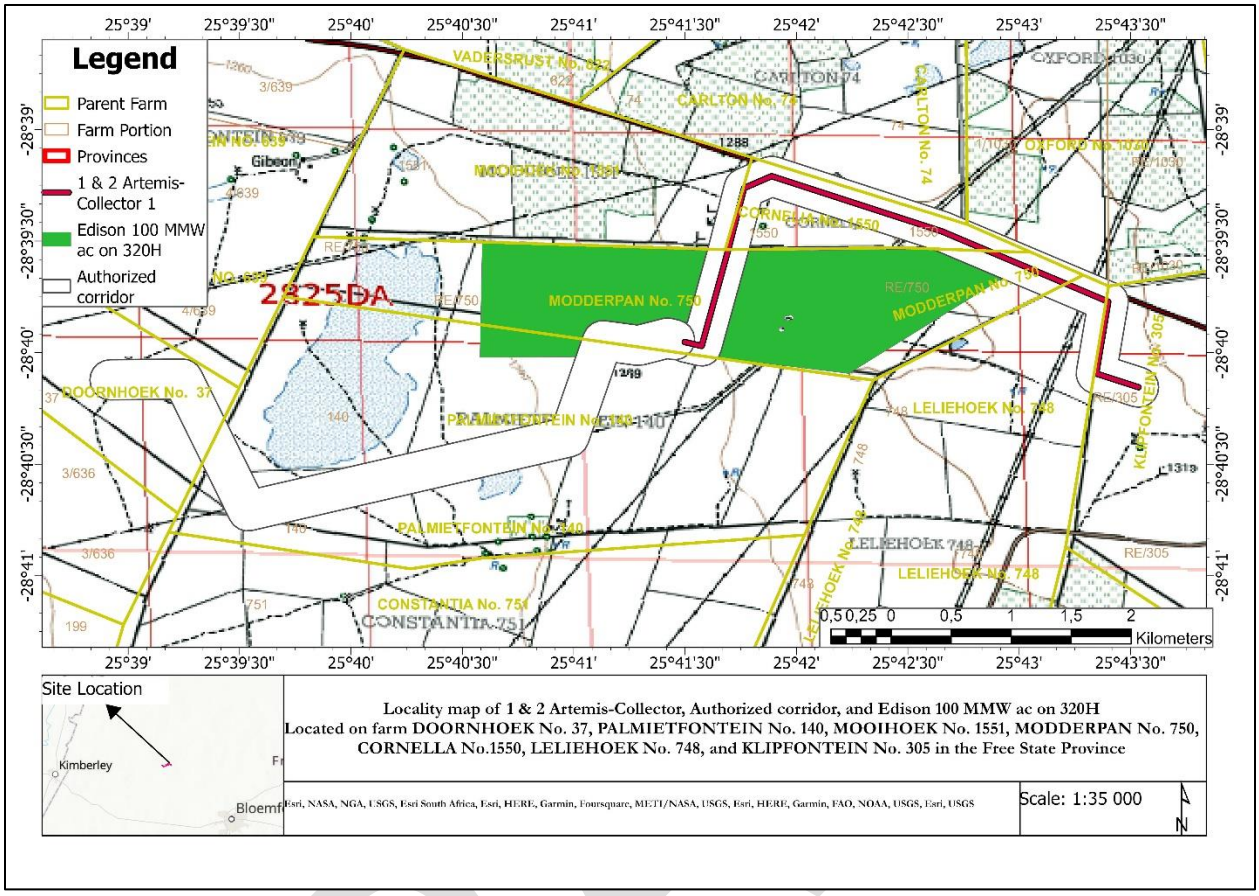


Figure 1. Locality map of the proposed development area.

Vegetation Type

The geographic region of the proposed development falls on the Grassland Biome. Of the nine biomes in southern Africa, the Grassland biome is the second largest and it comprises 28% of the terrestrial surface. Mucina and Rutherford (2006) classified the approved site for the 132kV powerline corridor to lie on the Dry Highveld Grassland Bioregion of the broader Grassland biome (Figure 2). The estimated total area of the Dry Highveld Grassland Bioregion is 117,753 km^2, where only 1,52% is protected and 31,51% has already been transformed (Carbutt et al., 2011).

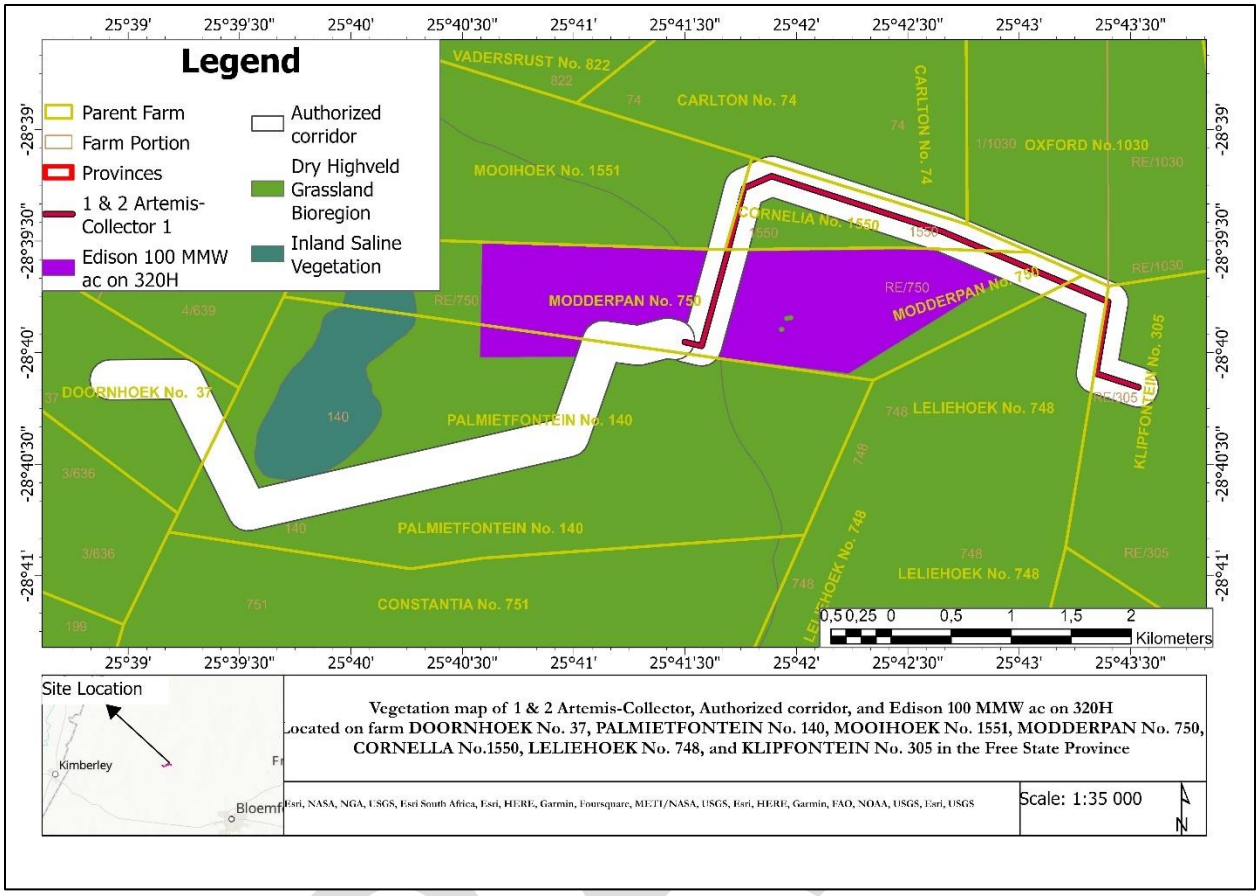


Figure 2. Vegetation map relative to the proposed development area.

Geology

The noted presence of dolerite sheets on the Dry Highveld Grassland Bioregion has given rise to the present of ecologically sensitive plant communities that proffer abundant levels of species richness and endemism. Dolerite-derived soils are composed of essential physical and chemical properties that are highly suitable for a variety of purposes including optimal plant growth.

Climate

When compared to all other grassland bioregions, the Dry Highveld Grassland Bioregion is fundamentally different. This is largely due to their distinct climate. The winter season is characterized by being very cold and frosty, whereas the summer season has low and highly variable precipitation. Figure 3 shows that the Bioregion has an average rainfall of 496mm and the mean annual evaporation is 2327mm. When the measured annual rainfall is less than the mean annual evaporation, soils could potentially be water stressed.

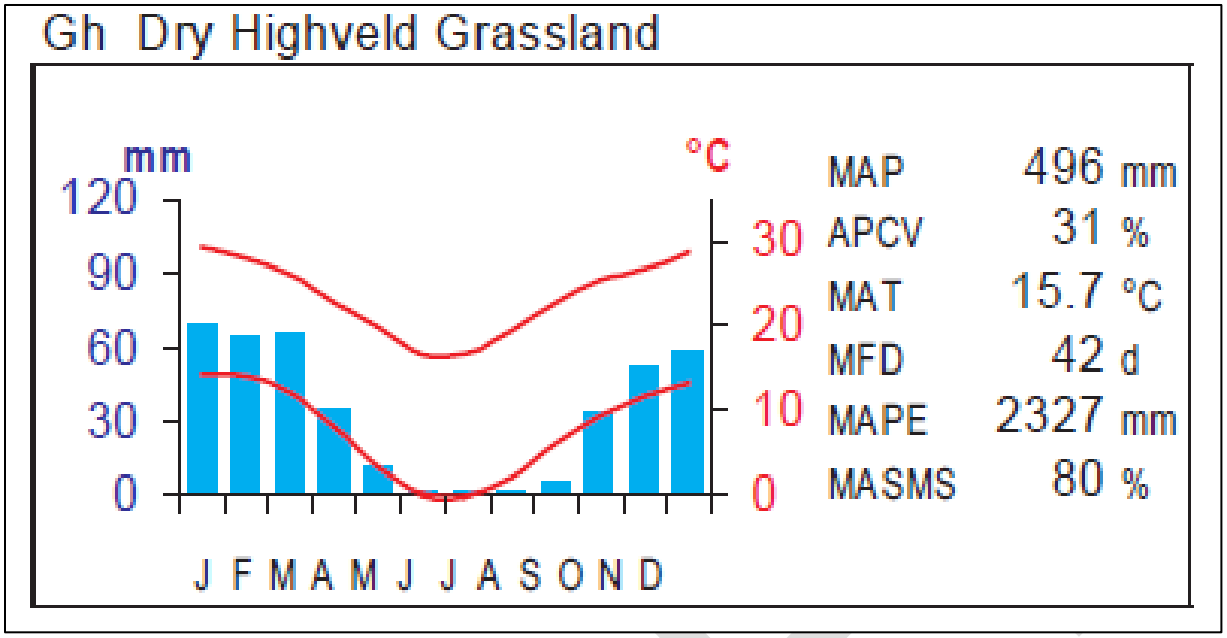


Figure 3. Climatic diagram representative of the proposed powerline corridor for the new Artemis MTS (Mucina and Rutherford, 2006).

Land-use

The Lejweleputswa District Municipality is largely a region for the mining sector. The district is notably rich in mineral resources with gold mine reserves being more dominant. However, the Tokologo Local Municipality is mainly characterised by the presence of commercial farms. Crops are being produced on large-scales in ensuring a sustainable livelihood for the farmers.

Site Sensitivity Assessment

The DEFE screening tool was consulted using the feasibility region shown in Figure 4 which covers the proposed 132kV powerline development area. The DFFE screening tool outputs (Figure 5 and 6) provided an animal species and relative aquatic biodiversity sensitivity ranking for the site as having Low to Very High Environmental Sensitivity. Table 1 gives a detailed description of the site sensitivity ratings used in the screening total. The Low to Very High Sensitivity is attributed to the presence of a critical habitat within an area of 10 km^2 from the construction site. There is a presence of waterbodies in the broader area as represented on the feasibility map (Figure 4). The environmental sensitivity rating is high where the authorised corridor is in proximity to the wetland However, under the current scope (Collector 1 & 2), the sensitivity is medium. Faunal surveys were thoroughly conducted for this study and there were no observations of species of concern. From a fauna specialist perspective, the site has a low species diversity and there are no objections for the proposed powerline development to continue.

However, it is important to delineate sensitive fauna habitats within the project site in order to ensure the development does not have a long-term negative impact on these habitats. It is also recommended that the sensitive habitats are used as a guide for sensitive areas during the construction and operational phase.

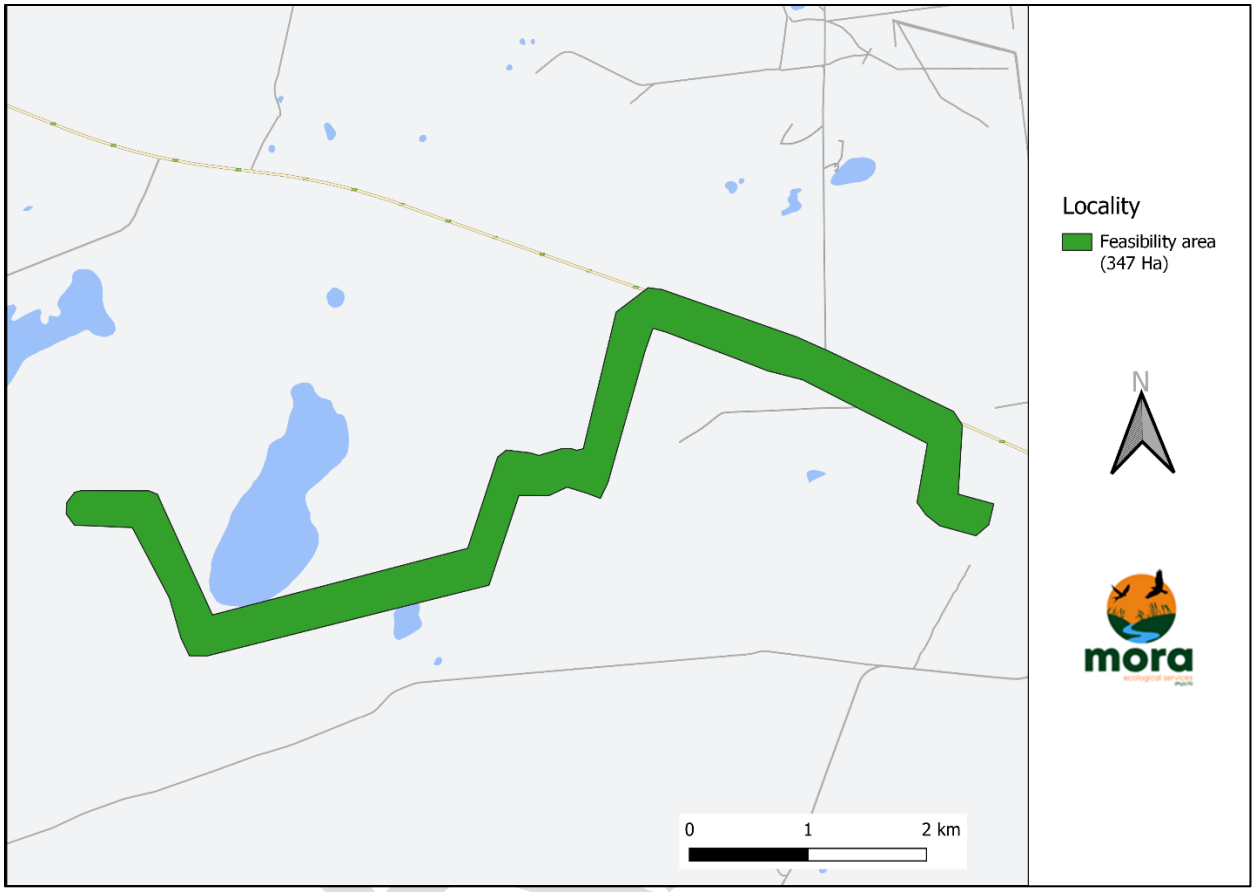


Figure 4. Feasibility area assessed to determine area sensitivity.

The ecological sensitivity of the feasibility area was classified accordingly using the sensitivity rating criteria as shown in Table 1 below.

Table 1. Site sensitivity ratings to species data in the screening tool.

Sensitivity Rating	Description of Sensitivity Rating
Very high	Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 is considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under the CR, EN, or VU criteria of the IUCN or species listed as Critically/Extremely Rare

	under South Africa's National Red List Criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.
High	Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat. For birds, species distribution models (SDMs) and SABAP2 data (http://sabap2.birdmap.africa/) were combined to delineate the 'high' sensitivity areas
Medium	Medium Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
Low	Low Areas where no species of conservation concern (SCC) are known or expected to occur.

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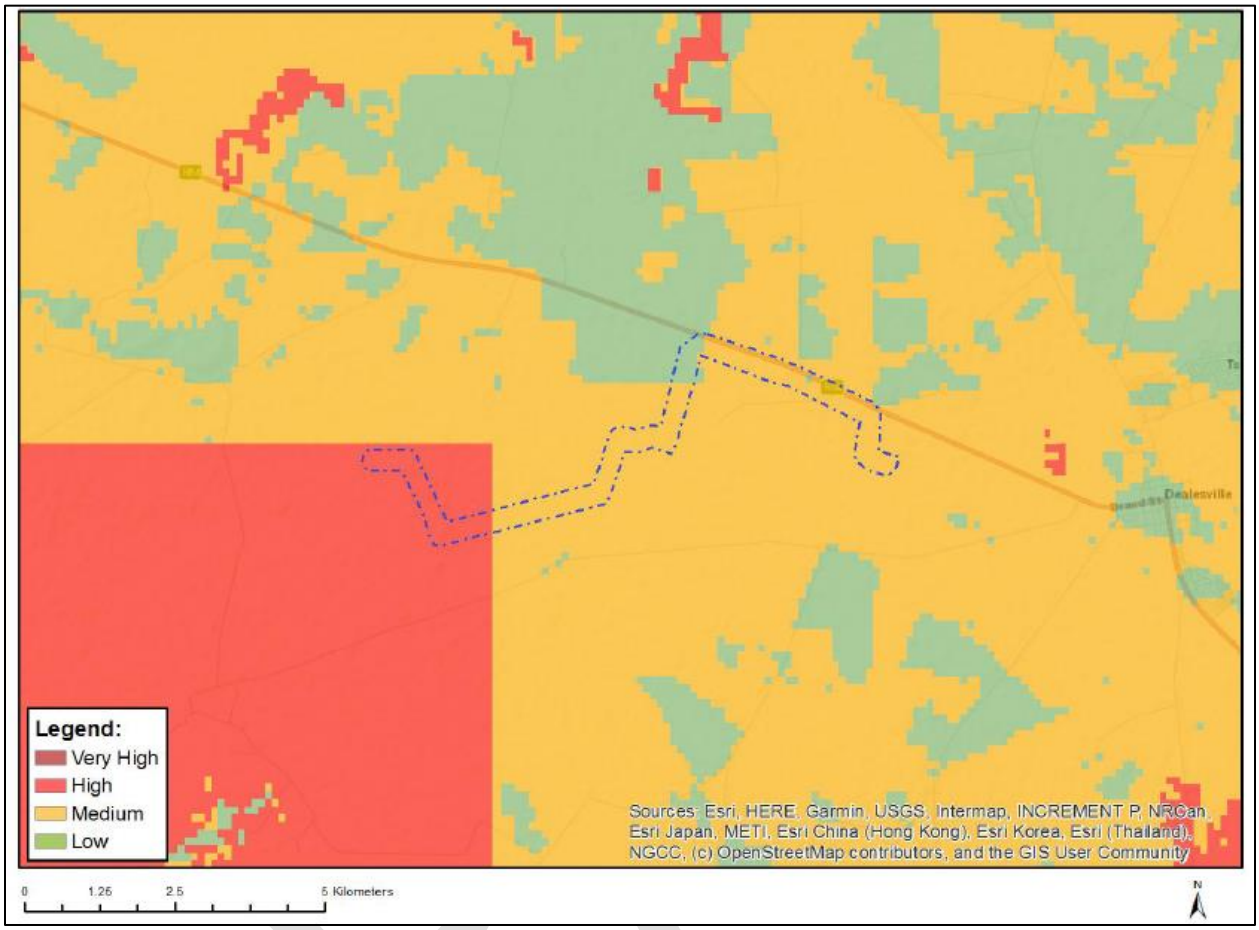


Figure 5. DFFE screening tool outputs for relative animal species sensitivity for the proposed 132kV powerline

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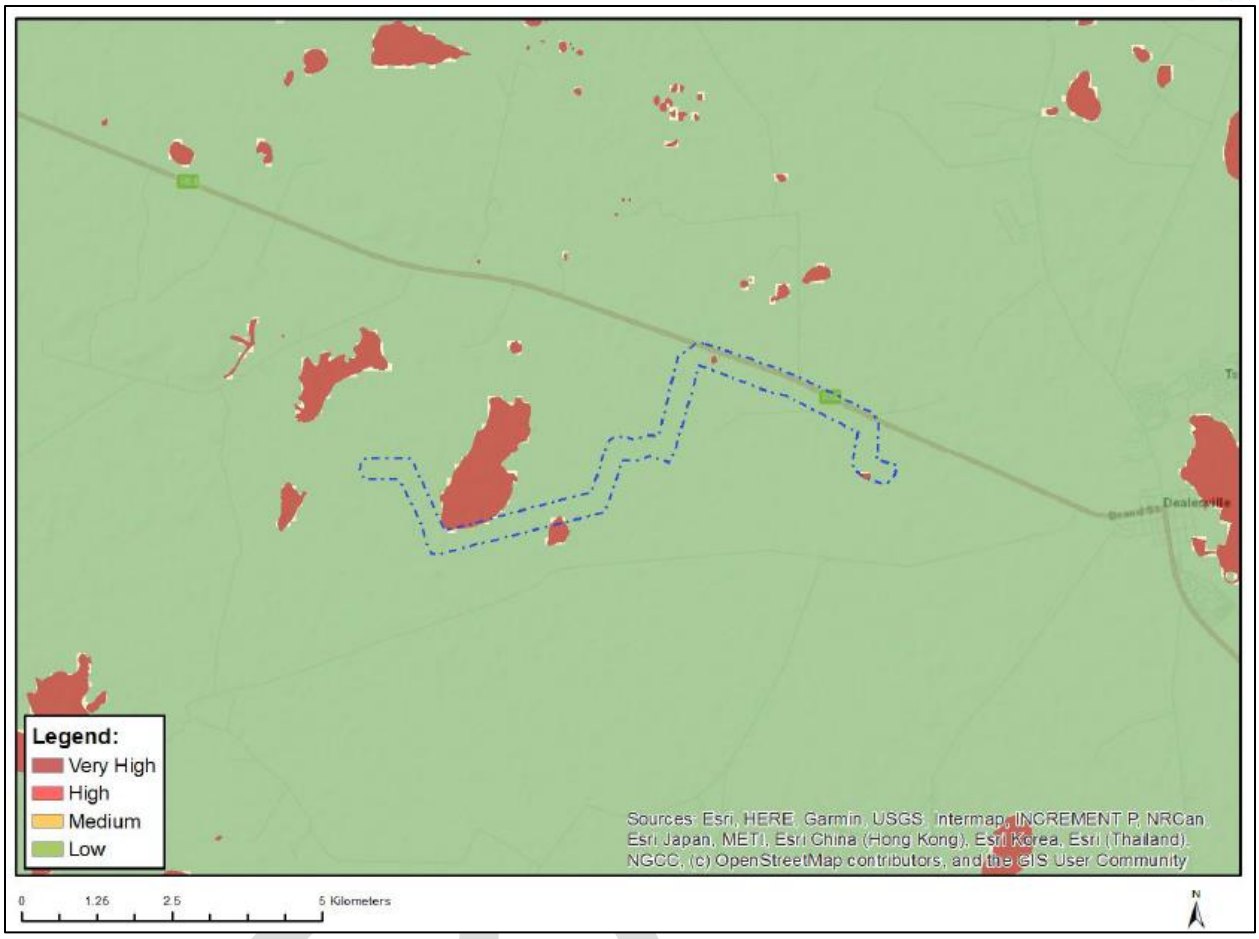


Figure 6. DFFE screening tool outputs for relative aquatic biodiversity sensitivity for the proposed 132kV powerline

All the ecological features of the study area were considered, and sensitive areas were assessed. Based on the area sensitivity conducted during the specialist assessment, 60 ha of land provide an important habitat for medium to large, bodied birds. Other animal species potentially occurring in the area have Medium to Low sensitivity. Based on the desktop study and specialist surveys conducted, a majority of the species occurring in the area are of Least Concern according to the IUCN red-list conservation criteria (Appendix D).

LEGAL FRAMEWORK RELATING TO FAUNA SPECIES AND PROPOSED DEVELOPMENT

International law and conventions

The importance of sustainable development and the protection of environmental resources have globally become a driving factor in the construction of new legislation governing industrial practices and their impact on the environment. South Africa has signed and ratified a number of global treaties, protocols and conventions, agreeing to implement the policies, which endorse sustainable development and promote a positive environmental legacy for future generations. A considerable international convention to which South Africa is in agreement with in signatory is namely the Convention on Biological Diversity (CBD). The CBD is notably the key international convention for sustainable development. The CBD has three main objectives which lead and encourage a sustainable future. These are:

- The conservation of biological diversity;
- The sustainable use of its components; and
- The fair and equitable sharing of the benefits from the use of genetic resources.

The convention covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, politics and education to agriculture, business and culture.

South African Constitution

The foundation of South Africans Environmental law is set in the Constitution of the Republic of South Africa (1996), specifically “Chapter 2- The Bill of Rights: section 24”. This has allowed for the rapid development of environmentally based legislations which guard, enforce and guide all parties to maintain the human rights granted in the Constitution. These rights include:

- The right to an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management Act (NEMA)

The National Environmental Management Act (NEMA), Act 107 of 1998 is the fundamental environmental legislation which aims to strengthen the rights granted in the South African Constitution. The NEMA Act is the foundation of environmental law in South Africa and has set the framework for additional legislation to build on. The Act establishes principles for decision-making on environmental matters, as well as providing motive for institutions which promote cooperative governance, and which can coordinate environmental action plans. Section 2(4) specifies that sustainable development requires the consideration of all relevant factors. In the regard to biodiversity and South Africa’s ecological integrity, development should not result

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in the disturbance of ecosystems and loss of biological diversity, if not possible, these effects must be minimised and remedied. A low-risk, cautious approach should always be applied, considering limits of current knowledge concerning consequences and actions. Always anticipate possible negative impacts on the environment and people's environmental rights, identified impacts should be prevented and where they cannot be altogether prevented, are minimised and mitigated. Outlined NEMA principles with regard to biodiversity are to:

- Prevent pollution and ecological degradation
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management of Biodiversity Act (NEMBA)

The National Environmental Management of Biodiversity Act (NEMBA) Act 10 of 2004 was designed to provide a management and conservation outline for biological diversity, as drafted under the NEMA. NEMBA focuses on the management and conservation of biodiversity, with its relevant components, which includes the use of indigenous biological resources in a sustainable manner, the fair and equitable sharing of benefits arising from bio-prospecting, cooperative governance in biodiversity management and conservation within the structures of NEMA. The Act, in protecting biodiversity, deals with the protection of threatened ecosystems and species, the control of alien invasive species, genetically modified organisms and regulates bio-prospecting. As with NEMA, NEMBA incorporates and gives effect to international agreements relating to biodiversity. The Act gives the Minister of Environmental Affairs, Forestry and Fisheries the power to categorise any process or activity in a listed ecosystem, as a threatening process, thereafter, be regarded as an activity contemplated in Section 24(2) (b) of NEMA which states that: Specified activities may not be commenced without prior authorisation from the Minister or MEC and specify such activities. NEMBA is the most prominent statute containing provisions directly aimed at the conservation of birds with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). The NEMBA Regulations on Threatened or Protected Species (TOPS, 2007) lists all of the species (including avian) that are threatened with extinction and therefore, nationally protected under an approach to sustainable use and development. Periodically, Red Data books are published, and the data used to update these lists of protected species.

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METHODS

Methodology

Prior to conducting field assessments, a comprehensive literature review of available published and unpublished literature pertaining to a representative spread of sampling localities and survey effort that reflected overall habitat composition. The faunal assessment was done mainly on a desktop level, supported by on-site observations. No faunal trapping or any other quantitative field species data capturing was, however, conducted due to time and budgetary constraints. A cross reference with available habitats of the study area was also conducted in order to establish the faunal potential. In assessing species occurrence, their approximate distribution and habitat requirements were firstly considered. Therefore, only animal groups for which distribution data are available have been considered in this assessment. Selected survey sites were searched for fauna and habitats were identified (as shown in Appendix B) so to establish the faunal potential of the development area.

The site visit was conducted on the 06th to 09th September 2022 to conduct necessary in-field procedures in verifying the presence of fauna within the study area. The survey was conducted by two senior fieldworkers, and the survey time daily was from 06h00 am until 18h00 pm. Data collection involved fixed point observations at the transformed and wetland sites as shown in Appendix B. Drive and walk transects were carried out to sample the grassland habitat (Appendix B).

Desktop study

The Animal Demographic Units (ADU) Virtual Museum tool was used to identify presence of the following animal groups:

- Mammals
- Reptiles
- Amphibians
- Butterflies
- Spiders
- Scorpions

The ADU is a research unit of the University of Cape Town in the Biological Sciences Department. The ADU was initiated with the mission to understand animal populations, especially population dynamics, and therefore provide inputs to their conservation. The ADU Virtual Museum is designed to allow Citizen Science inputs for effectively achieving mass participation projects, long-term ecological monitoring, innovative statistical modelling and population-level interpretation of results. Currently, it has achieved approximately 16 million dated and georeferenced records of fauna species.

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The Second South African Bird Atlas Project 2 (SABAP2) was used to identify the presence of the following animal groups:

- Birds

SABAP2, a continuous initiative of the Animal Demography Unit of the University of Cape Town, was consulted for data collected on the pentads in which the site is situated. SABAP2 is the second bird atlas project that was initiated in July 2007. SABAP2 was designed to run indefinitely with the aim to create valuable long-term dataset for southern Africa. The objective of the SABAP2 project is to accurately provide specified information on bird distributions, taken over a period of years. The site of the proposed site for the 132kV conductor lines is located in three pentads, namely, 2840_2540, 2840_2535 and 2845_2540 (Figure 7). Each pentad occupies approximately 7,700 Ha. The total area of the pentads is 23 100 Ha, whereas the total EIA footprint for the proposed construction is approximately 347 Ha as previously shown in Figure 4. The pentads cover a greater avian diversity and comprises priority habitats including waterbodies. The inclusion of aquatic habitats in the pentads will substantially increase the species counts. These species counts should not be expected for the proposed construction site.

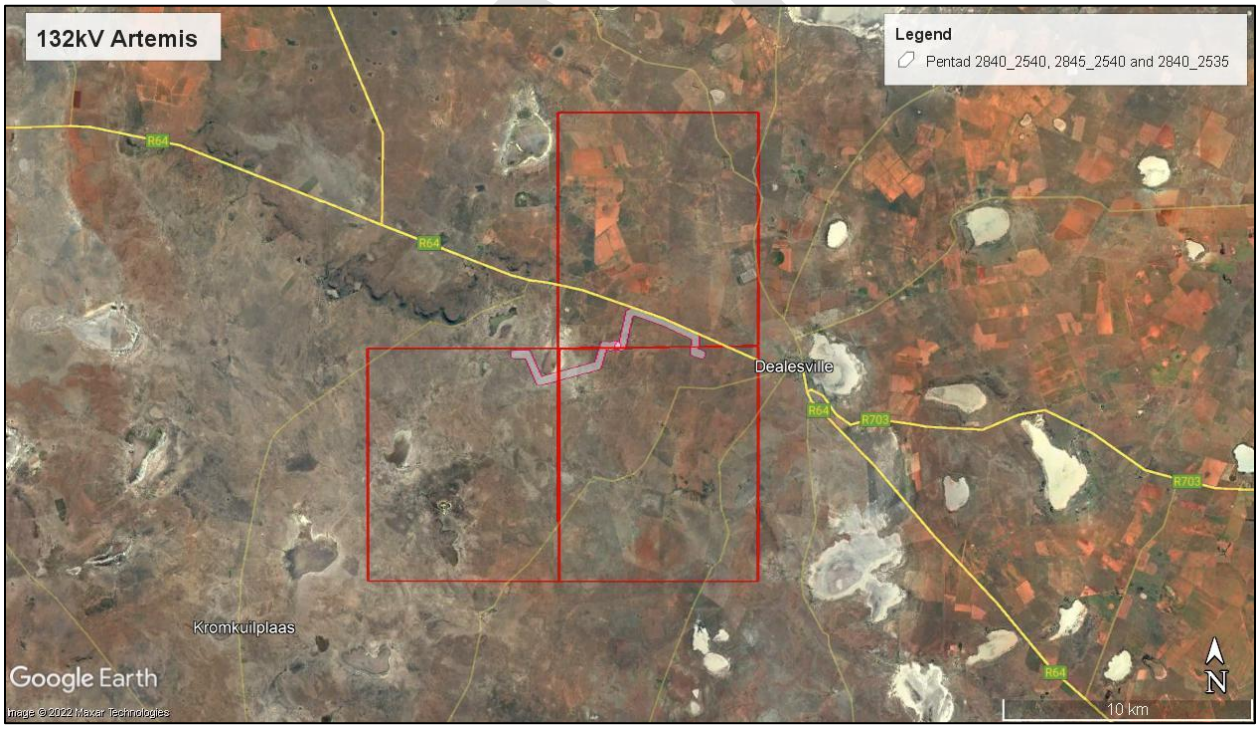


Figure 7. Location and extent of SABAP2 2840_2540, 2840_2535 and 2845_2540 pentads relative to the 132kV conductor lines construction site.

RESULTS FROM THE FAUNA ASSESSMENT

Of the pre-defined animal groups during the desktop study (i.e. mammals, reptiles, amphibians, butterflies, dragonflies/ damselflies, spiders, and scorpions), no fauna species were observed onsite during surveys. The faunal community results are historical species lists from the Animal Demographic Units (ADU) Virtual Museum and the Second South African Bird Atlas Project 2.

Faunal communities

Mammals

A record of 26 mammal species have been previously observed on site. Most of the species (23 of 26) were categorized as of Least Concern. Only 2 (two) species i.e., *Hippotragus niger* (Vulnerable) and *Kobus leche (*Near Threatened) are of conservation concern. According to the IUCN red-list conservation criteria, Vulnerable species is a taxon considered to be facing a high risk of extinction in the wild and Near Threatened species are referred to as a taxon that is qualify for critically endangered, endangered or vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. The occurrence of the *Hippotragus niger* and the *Kobus leche* in the proposed development site have contributed to the sensitivity outputs. Photographic images of the species of concern are shown in Figure 8.

Table 2. List of mammal species from ADU Virtual Museum records using the 2825DA Quarter Degree Square.

No.	Scientific name	Common name	Red list category
1	*Aepyceros melampus*	Impala	Least Concern
2	*Alcelaphus buselaphus*	Hartebeest	-
3	*Antidorcas marsupialis*	Springbok	Least Concern
4	*Connochaetes gnou*	Black Wildebeest	Least Concern
5	*Connochaetes taurinus taurinus*	-	Least Concern
6	*Damaliscus pygargus phillipsi*	Blesbok	Least Concern
7	*Hippotragus niger*	-	Vulnerable
8	*Kobus ellipsiprymnus ellipsiprymnus*	-	Least Concern
9	*Kobus leche*	Lechwe	Near Threatened
10	*Oryx gazella*	Gemsbok	Least Concern
11	*Raphicerus campestris*	Steenbok	Least Concern
12	*Redunca arundinum*	Southern Reedbuck	Least Concern
13	*Redunca fulvorufula*	Mountain Reedbuck	Least Concern
14	*Sylvicapra grimmia*	Bush Duiker	Least Concern
15	*Taurotragus oryx*	Common Eland	Least Concern

No.	Scientific name	Common name	Red list category
16	*Tragelaphus angasii*	Nyala	Least Concern
17	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern
18	*Canis mesomelas*	Black-backed Jackal	Least Concern
19	*Vulpes chama*	Cape Fox	Least Concern
20	*Giraffa giraffa giraffa*	South African Giraffe	Least Concern
21	*Cynictis penicillata*	Yellow Mongoose	Least Concern
22	*Herpestes sanguineus*	Slender Mongoose	Least Concern
23	*Suricata suricatta*	Meerkat	Least Concern
24	*Mus (Nannomys) minutoides*	Southern African Pygmy Mouse	Least Concern
25	*Phacochoerus africanus*	Common Warthog	Least Concern
26	*Genetta genetta*	Common Genet	Least Concern



Figure 8. Photographic examples of mammals of concern, *Hippotragus niger* (left) and the *Kobus leche* (right) occurring at a broader scale of the proposed area of development.

Reptiles

The Animal Demographic Units (ADU) Virtual Museum only had 4 (four) records of reptile species previously observed within the 2825DA Quarter Degree Square. These species are, namely, *Naja nivea*, *Agama aculeata distanti* , *Trachylepis capensis* and *Psammophylax tritaeniatus*. According to the data, there is an apparent low species diversity for observed reptiles in the proposed development area. Figure 9 below are photographic examples of each reptile species.

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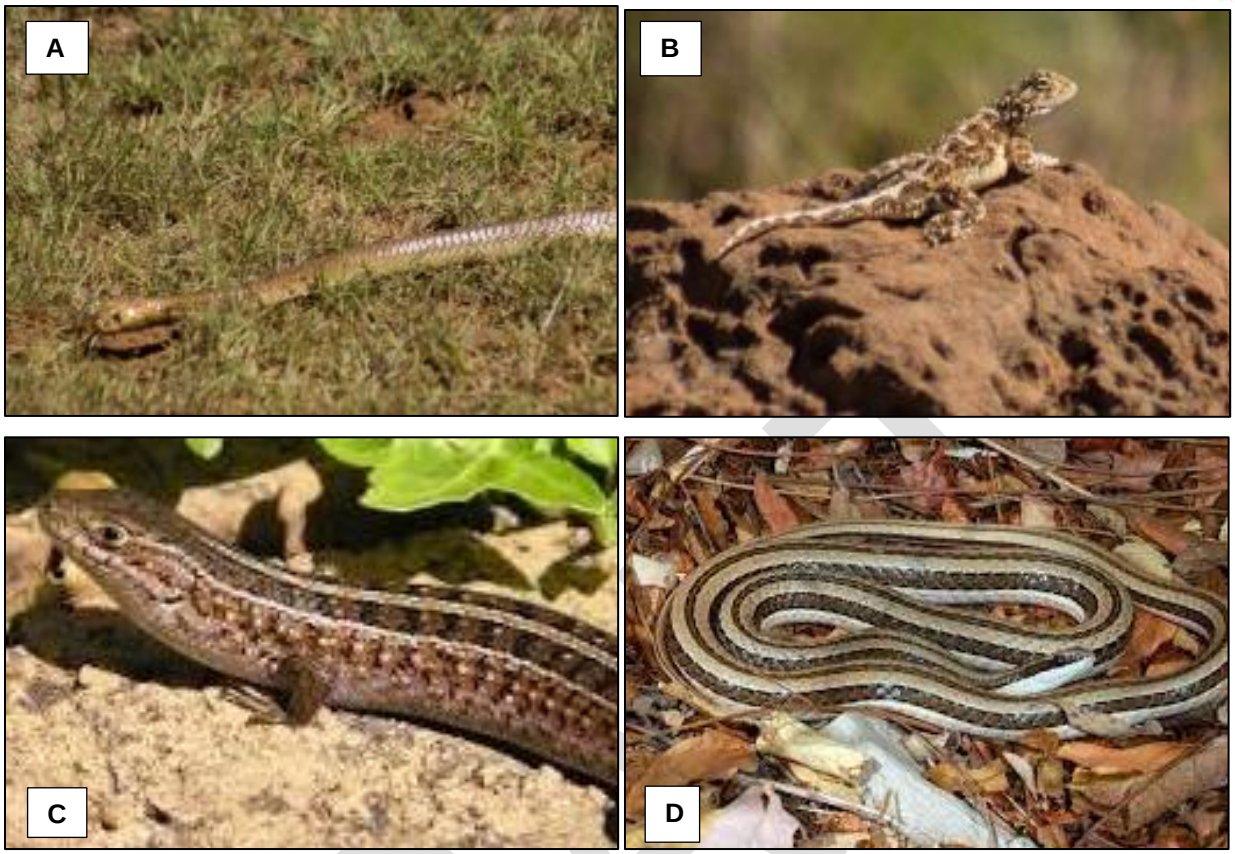


Figure 9. Photographic examples of *Naja nivea* (A), *Agama aculeata distanti* (B) , *Trachylepis capensis* (C) and *Psammophylax tritaeniatus* (D).

Amphibians, Spiders and Scorpions

The animal groups with no species records were amphibians, spiders and scorpions.

Butterflies

The *Belenois aurota,* a butterfly species of Least Concern has been previously observed in the area according to the ADU Virtual Museum. The *Belenois aurota* commonly known as the brown veined white butterfly is widespread in South Africa and is a pioneer species.

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Birds

Avifauna species recorded during fixed-point and transect surveys are represented together with the SABAP2 species list in Appendix D. A list of the avifauna species observed during surveys is represented in Table 3 below.

Table 3. Species composition of encountered avifaunal community during assessments.

Species	Latitude	Longitude	Count
Ant-eating Chat	-28.65904	25.71685	5
Black-winged Kite	-28.66183	25.72364	1
Cape Weaver	-28.65806	25.7143	16
Dark-capped Bulbul	-28.65819	25.71439	7
Eastern Clapper Lark	-28.65804	25.71373	3
Laughing Dove	-28.65806	25.7143	2
Namaqua Dove	-28.65852	25.71433	1
Northern Black Korhaan	-28.66375	25.7231	1
Red-knobbed Coot	-28.6581	25.71432	4
Ring-necked Dove	-28.65292	25.6992	9
Scaly-feathered Weaver	-28.65166	25.69513	10
Southern Masked Weaver	-28.65265	25.69842	4
White-browed Sparrow-Weaver	-28.65454	25.69803	5
Yellow-billed Duck	-28.65854	25.71451	2

According to the SABAP2 species list in Appendix C, it is estimated that a total of 123 birds species occur in the broader area of the proposed area of development. Of the 123 bird species 11 out of 14 bird species were observed during the transect surveys. The endemic Northern Black Korhaan (*Afrotis afraoides*) was encountered during the transect surveys (Table 3). The Northern Black Korhaan is also known as the white-quilled bustard and it is widely distributed across Southern Africa. It is, therefore, listed as a species of Least Concern under the IUCN red-list conservation criteria. The endemic Northern Black Korhaan was only encountered once during surveys.

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Figure 10. Photographic example of avifauna species (White-browed Sparrow-Weaver) observed on site.

Based on the conducted field surveys; the overall fauna species composition and diversity for this site in all three habitat is low i.e. transformed, grassland, and wetland (Appendix B).

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IMPACT ASSESSMENT RATINGS AND MITIGATION REQUIREMENTS

The methodology is included as Appendix A: Method of Environmental Assessment at the end of this report. The rating rankings for assessing impacts significance are as shown in Table 4 below. The findings of the impact assessment ratings are shown in the tables below. Table 5 is the impacts matrix used for scoring environmental significance and Table 6 is a summary of impacts ratings for the proposed Artemis MTS 132kV Powerline development using Appendix A.

Table 4. Impact rating scoring used for the fauna impact assessment at the proposed Artemis MTS 132kV Powerline development site.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

An impact assessment of all potential pre-construction, construction, operational and maintenance phase impacts associated with the activities pertaining to the proposed infrastructure developments are provided in Table 5.

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Table 5. Animal species composition impact ratings for the powerline and associated infrastructure at the proposed development site.

Construction Phase	Preferred Alternative (Alternative 1)	
	Before Mitigation	After Mitigation
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of priority fauna species from important habitats	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	1
Total SP:	42	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident fauna through increased disturbance	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats	Use designated roads to access the site. Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control noise pollution. Rehabilitate area with indigenous flora

Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
Operation Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats for fauna species	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident fauna through increased disturbance	Minimise construction footprint and reserve indigenous vegetation wherever possible. Avoid development expansion and constructing during the avoid breeding season (summer). Construct development in shortest timeframe, control noise pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact

POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Collisions with powerline infrastructure and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	Demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. Conduct quarterly fatality monitoring assessments
Magnitude:	4	3
Duration:	3	3
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	4	3
Total SP:	52	33
Significance rating:	Negative high impact	Negative medium impact
Decommissioning Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Displacement of resident fauna species through increased disturbance	Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
Post Decommissioning Phase	**Preferred Alternative (Alternative 1)**	

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	Before Mitigation	After Mitigation
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats for all animal groups	Minimise development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with native vegetation and retain indigenous vegetation throughout as far as possible, limit roadways and vehicle speeds; rehabilitate thoroughly post-decommissioning with locally native species
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Cumulative displacement of resident fauna species	Minimise development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation, control noise pollution, rehabilitate with indigenous flora and reserve indigenous vegetation throughout as far as possible, limit roadways and vehicle speeds
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats for fauna species	Minimise development footprint and habitat transformation, rehabilitate with indigenous flora and reserve indigenous vegetation throughout as far as possible

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Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Cumulative collisions with powerline infrastructure and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	Demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. Conduct quarterly fatality monitoring assessments
Magnitude:	4	3
Duration:	3	3
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	4	3
Total SP:	52	33
Significance rating:	Negative high impact	Negative medium impact

Table 6. Summary of the fauna species impact ratings for the proposed Artemis MTS 132kV Powerline development.

	Average impact rating	**Significance class**	**Average mitigated impact**	**Significance class**
Overall avifaunal impacts of the powerline and associated infrastructure	42.92	Negative medium impact	20.50	Negative low impact

NO-GO AREAS, BUFFERS AND ALTERNATIVES

No no-go areas are applicable to the project site from a fauna perspective. Should the proposed activity not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for agricultural purposes.

No other possible sites were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic

Assessment process to enable the appropriate placement of the infrastructure within the development footprint.

CONCLUSION AND RECOMMENDATIONS

The proposed Artemis MTS 132kV Powerline is situated in an area of Medium animal species sensitivity and a Low aquatic biodiversity sensitivity but become very high where there are critical habitats (wetlands). Assessments for the present waterbodies were conducted where only species of Least Concern were encountered. As a result, from a fauna perspective, there is no objection to the development of the proposed Artemis MTS 132kV Powerline development and associated infrastructure, provided to the recommended mitigation measures are strictly followed.

Important recommendations for conservation of fauna species

- The proponent must be committed to a conservation approach of practice and the actual footprint of disturbance must be kept to a minimum.
- Relocation of important species, identification and demarcation of specimens and sub habitats not to be disturbed will have to be done beforehand by a specialist.
- Important species (fauna) that will be threatened by the development must be relocated to safer habitats by suitable specialists.
- Preventative erosion control measures to be put in place.

Specific conditions recommended for the EA from a fauna perspective

1. Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness.
2. Implement mitigation controls during the operational phase as specified in the mitigation. Monitor and report on their effectiveness.
3. Monitoring of implementation of mitigation controls, along with reporting, should be undertaken at least quarterly throughout the construction phase, and bi-annually during the operational phase. Monitoring, at the minimum, should consist of a quarterly monitoring of the powerline area for evidence of PV collisions;
4. As much of the natural habitat as possible should be preserved during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts.

5. Effective restoration of the natural habitats that were intact before the development should be implemented and reported on after decommissioning.

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APPENDICES

Appendix A: Method of Environmental Assessment

1.1 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 4.

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

1.1.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 7. The rating system

NATURE
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted by a particular action or activity.
GEOGRAPHICAL EXTENT
This is defined as the area over which the impact will be experienced.

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1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		

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Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.

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3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.

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74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

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Appendix B: Photographs of sampled habitat types



Figure 11. Transformed habitat where fixed point fauna surveys were conducted to confirm animal species sensitivity.

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Figure 12. Wetland habitat where fixed point fauna surveys were conducted to confirm animal species sensitivity.

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Figure 13. Grassland habitat where walked and vehicle drive transects were conducted to define fauna species composition.

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Appendix C: IUCN red-list conservation criteria

Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild	A taxon is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered	A taxon is critically endangered when the best available evidence indicates that it meets any of the criteria for critically endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered	A taxon is endangered when the best available evidence indicates that it meets any of the criteria for endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable	A taxon is vulnerable when the best available evidence indicates that it meets any of the criteria for vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened	A taxon is near threatened when it has been evaluated against the criteria but does not qualify for critically endangered, endangered or vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern	A taxon is least concern when it has been evaluated against the criteria and does not qualify for critically endangered, endangered, vulnerable or near threatened. Widespread and abundant taxa are included in this category.
Data Deficient	A taxon is data deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

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Not Evaluated	A taxon is not evaluated when it is has not yet been evaluated against the criteria.

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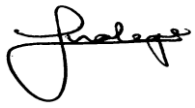


FLORA SPECIALIST STUDY FOR PROPOSED 132KV ARTEMIS COLLECTOR PROJECT IN FREE STATE PROVINCE

Prepared for: 29 Solar (Pty) Ltd
Prepared by: MORA Ecological Services (Pty) Ltd
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Cell: (081) 410 3763
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October 2022

DOCUMENT CONTROL

Project title	Flora Specialist Study for Proposed 132KV Artemis Collector in the Free State Province
Report reference	ART/VIA/1022
Document prepared for	29 Solar (Pty) Ltd
Document prepared by	MORA Ecological Services (Pty) Ltd
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SPECIALIST INFORMATION AND LEGAL REQUIREMENTS

National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Regulations 2014 (as amended) Requirements for Specialist Reports (Appendix 6):

The details of -	
○ the specialist who prepared the report; and	Page 6
○ the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 6
A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 9
An indication of the scope of, and the purpose for which, the report was prepared;	
○ An indication of the quality and age of base data used for the specialist report;	Page 20
○ A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Page 24
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Page 20
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Page 20
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;	Page 15
An identification of any areas to be avoided, including buffers;	Page 15
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;	Page 15
A description of any assumptions made and any uncertainties or gaps in knowledge;	Page 5
A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Page 25
Any mitigation measures for inclusion in the EMPr;	Page 25
Any conditions for inclusion in the environmental authorisation;	Page 25
Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Page 25
A reasoned opinion-	
○ whether the proposed activity, activities or portions thereof should be authorised;	Page 20
○ regarding the acceptability of the proposed activity or activities; and	Page 30
○ 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;	Page 30

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A description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable
A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable
Any other information requested by the competent authority.	Not applicable
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.	Not applicable

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EXECUTIVE SUMMARY

Project background

29 Solar (Pty) Ltd plans to construct new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction is located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

The proposed line will cross the following properties:

- Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD
- Portion 0/RE of the farm Modderpan no. 750 Boshof RD
- Portion 0/RE of the farm Leliehoek no 748 Boshof RD
- Portion 0/RE of the farm Klipfontein n0 305 Boshof RD

The plant diversity information from the desktop study and that was collected as part of our investigations will be used to inform the Government's review during the application process of the proposed development in the Tokologo Local Municipality within the Lejweleputswa District Municipality.

No no-go areas are applicable to the project site from a flora perspective. Should the proposed construction not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for farming purposes.

No other approved corridors were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic Assessment process to enable the appropriate placement of the infrastructure within the construction footprint.

TERMS OF REFERENCE

MORA Ecological Services (Pty) Ltd was requested by 29 Solar (Pty) Ltd, hereafter referred to as "29 Solar" to conduct a flora specialist study towards their pursuit of obtaining the requisite environmental authorisations for the proposed construction of a 132 kV Artemis powerline. The critical objective of this flora specialist study is to determine the site sensitivity of the flora and vegetation of the site based on a desktop and field assessment, as well as mapping using the national vegetation classification system.

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The main objective of the flora assessment was to include every plant species with the slightest chance of occurring within the site in the species list. The following tasks were undertaken by MORA Ecological Services (Pty) Ltd to achieve the assessment objective:

- A visual inspection of the study area was done before surveys were conducted.
- During the process different homogenous vegetation units were identified and subsequently surveyed on foot and by vehicle in order to determine the floristic composition of each unit.
- A plotless sampling method was used to record data.
- Species identification was done following reputable checklists and field guides.
- Where necessary, plant material was collected and/or photographs taken of specimens for identification purposes.

ASSUMPTIONS, LIMITATIONS, UNCERTAINITIES AND GAP ANALYSIS

- The findings, results, observations, conclusions and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the potential impacts of substations and powerlines on the vegetation composition.
- The assessment of impacts was based on the current state of the primary environment currently .
- MORA Ecological Services (Pty) Ltd relied on BioBlue Environmental Sustainability, as the EAP, to supply correct information on the site locality and extent, as well as project details which were assumed to be correct.
- It was assumed that the information contained in existing databases, reports and publications is correct.
- MORA reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

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SPECIALIST DETAILS, CURRICULUM VITAE AND DECLARTION

The surveys and assessment were undertaken by Mokgatla Jerry Molepo, a competent Environmental Specialist and Director of MORA Ecological Services (Pty) Ltd.

Curriculum vitae

EDUCATION:

- MSc Zoology, Nelson Mandela University (Percy FitzPatrick Institute of African Ornithology Centre of Excellence)

Research Project Topic: Foraging behaviour and thermal physiology in Cape Sugarbirds: sex-specific responses to temperature.

- BSc Honours in Zoology, University of Limpopo

Research Project Topic: Morphometrics and plumage variation in the South African Fiscal flycatcher *Sigelus silens* Shaw 1809.

- BSc Botany & Zoology, University of Venda
- Grade 12, Marobathota High School

CERTIFICATES:

- SASS5 Aquatic Biomonitoring, GroundTruth
- Hydropedology and Wetland Functioning, Terra Soil Science & Water Business Academy
- Section 21 (c) & (i) Water Use Authorisation Training, Department of Water and Sanitation
- Basic Project Management, Hudisa Business School

PROFESSIONAL MEMBERSHIP:

- South African Council for Natural Scientific Professions (SACNASP) – Professionally registered as Professional Natural Scientist. **Registration number:** 009509
- British Ecological Society (BES). **Membership number**: 1010709
- Zoological Society of Southern Africa (ZSSA). **Membership number**: 691

WORK EXPERIENCE:

- MORA Ecological Services (Pty) Ltd: April 2018 – Current, I am an Environmental Specialist, and my duties include; (i) Conducting Biodiversity, Aquatic Impact Assessments, Rehabilitation (ii) Compilation of specialist reports.
- Arcus Consulting: May - November 2017, I was a subcontracted avifaunal surveyor for the proposed Highlands Wind Energy Farm, Somerset East, Eastern Cape.
- Centre for African Conservation Ecology (ACE), Nelson Mandela University: 2015 - 2016, I was a field guide/ environmental educator. Responsibilities: taking school learners on trial walks inside the Nelson Mandela University Nature Reserve.

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- South African National Biodiversity Institute (SANBI): May – December 2014, I was a Zoological Systematics Technician. Responsibilities: (i) Insect identification and curation, and (ii) compiling the animal checklist of South Africa, (iii) Sourcing wildlife crime reports on endangered animals and plants for Barcode of Wildlife Project, (iv) Monitoring the bird population in the Botanical Garden.
- Department of Zoology, University of Venda: 2009 – 2013, I was a Research Assistant under Dr. T.C Munyai who was conducting a long-term research project which monitored the effects of climate change on biota and processes influencing ecosystem functioning and species diversity patterns.
- Percy FitzPatrick Institute of African Ornithology: March – April 2014, I was a Research Assistant under Dr. Rita Covas' Sociable Weaver Research Project. This is a long-term study which looks at the reproductive success of Sociable weavers at Benfontein Nature Reserve in Kimberley.

Key experience in specialist projects

Year	Project	Location:	Role(s)
2022	Avifaunal Impact Assessment for the proposed 132kV for Musina-Makhado Special Economic Zone North Site	Musina, Limpopo	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed Khauta PV Solar including 44kV and 132kV Powerline	Welkom, Free State	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed NAOS PV Solar including 132kV Powerline	Free State	Avifaunal Specialist/Ornithologist
2022	Preconstruction Avifaunal Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Avifaunal Specialist/Ornithologist
2022	Preconstruction Botanical Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Ecologist
2022	Biodiversity Assessment, Land Capability and Veld Condition Assessment for PPC Cement SA Slurry	Slurry, North West	Ecologist
2021	Avifaunal Impact Assessment for the proposed Upington-Aries 2x 400kV	Upington, Northern Cape	Avifaunal Specialist/Ornithologist
2021	Habitat Assessment Post Rehabilitation for PPC Cement SA Dwaalboom Factory	Dwaalboom, Limpopo	Ecologist
2021	Habitat Assessment Post Rehabilitation for Gibson Bay Wind Energy Farm	Humansdorp, Eastern Cape	Ecologist
2021	Wetland Rehabilitation for the sewer pipeline construction in Daveyton	Ekurhuleni East College Campus, Daveyton, Gauteng	Wetland Ecologist

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2021	12 Months Wetland Rehabilitation Supervision for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist

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DECLARATION BY THE SPECIALIST

I, Mokgatla Jerry Molepo , 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 realise 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

MORA Ecological Services (Pty) Ltd

Name of Company

08/10/2022

Date

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INTRODUCTION

Proposed development

MORA Ecological Services (Pty) Ltd was appointed by29 Solar (Pty) Ltd(hereafter referred to the Developer) and BioBlue Environmental Sustainability (hereafter referred to as the EAP) to conduct a flora specialist study required for a full Scoping and Environmental Impact Assessment for the proposed construction of new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction will be located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

The proposed line will cross the following properties:

- Portion 0/RE of the farm Cornellia no. 1550 Boshof RD
- Portion 0/RE of the farm Modderpan no. 750 Boshof RD
- Portion 0/RE of the farm Leliehoek no. 748 Boshof RD
- Portion 0/RE of the farm Klipfontein no. 305 Boshof RD

SITE DESCRITION OF AFFECTED ENVIRONMENT

The proposed development falls within within the Tokologo Local Municipality that forms part of the Lejweleputswa District Municipality. Tokologo Local Municipality is situated on the western region of the Free State Province (Figure **1**). The local municipality area measures 9 326.24km^2 and comprises of three small rural towns namely Dealesville, Boshof, and Hertzogville. As shown in Figure 1, the exact extent of the proposed geographic area for the 132kV conductor lines runs across the Doornhoek No. 37, Palmietfontein No. 140, Mooihoek No. 1551, Modderpan No. 750, Cornella No. 1550, Leliehoek No. 745 and Klipfontein No. 305 farms. This indicates that several properties will potentially be impacted upon the construction of the corridor. Vegetation surveys were conducted to evaluate potential impacts arising from the proposed power line infrastructure.

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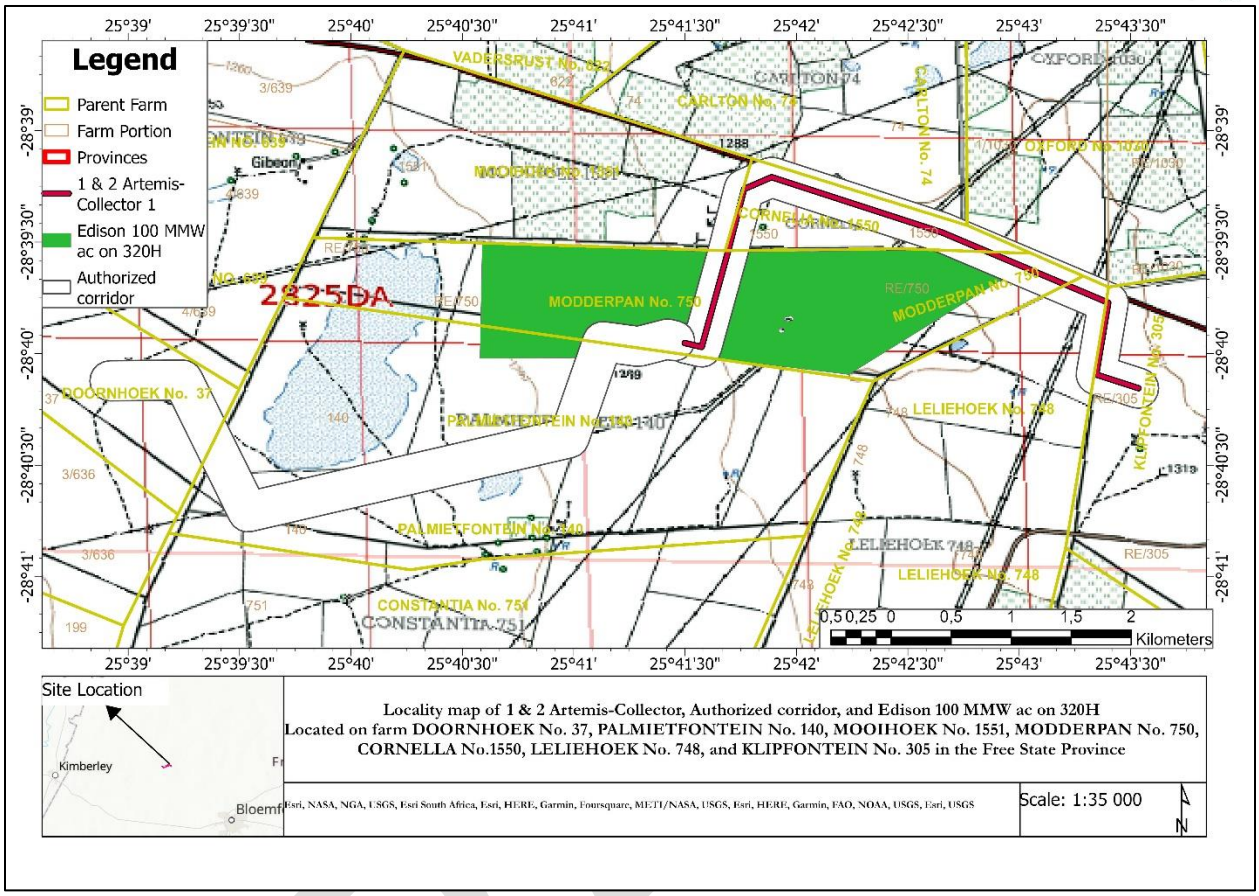


Figure 1. Locality map of the proposed development area.

Biome and bioregion

The geographic region of the proposed development falls on the Grassland Biome. Of the nine biomes in southern Africa, the Grassland biome is the second largest and it comprises 28% of the terrestrial surface. Mucina and Rutherford (2006) classified the approved site for the 132kV powerline corridor to lie on the Dry Highveld Grassland Bioregion of the broader Grassland biome. The estimated total area of the Dry Highveld Grassland Bioregion is 117,753 km^2, where only 1,52% is protected and 31,51% has already been transformed (Carbutt et al., 2011).

Dry Highveld Grassland

Distribution

The Dry Highveld Grassland bioregion is located on the central plateau of South Africa as shown in Figure **2** below. The bioregion extends much over the Free State and the North West Province, including smaller sections of Gauteng, Eastern Cape, and Northern Cape. Of the 14 vegetation types found in the Dry Highveld Grassland bioregion, most of the bioregion is spatially dominated by two vegetation types, namely, the Central Free State Grassland and the Vaal-Vet Sandy Grassland. The altitude range is 1300 – 1600 m.

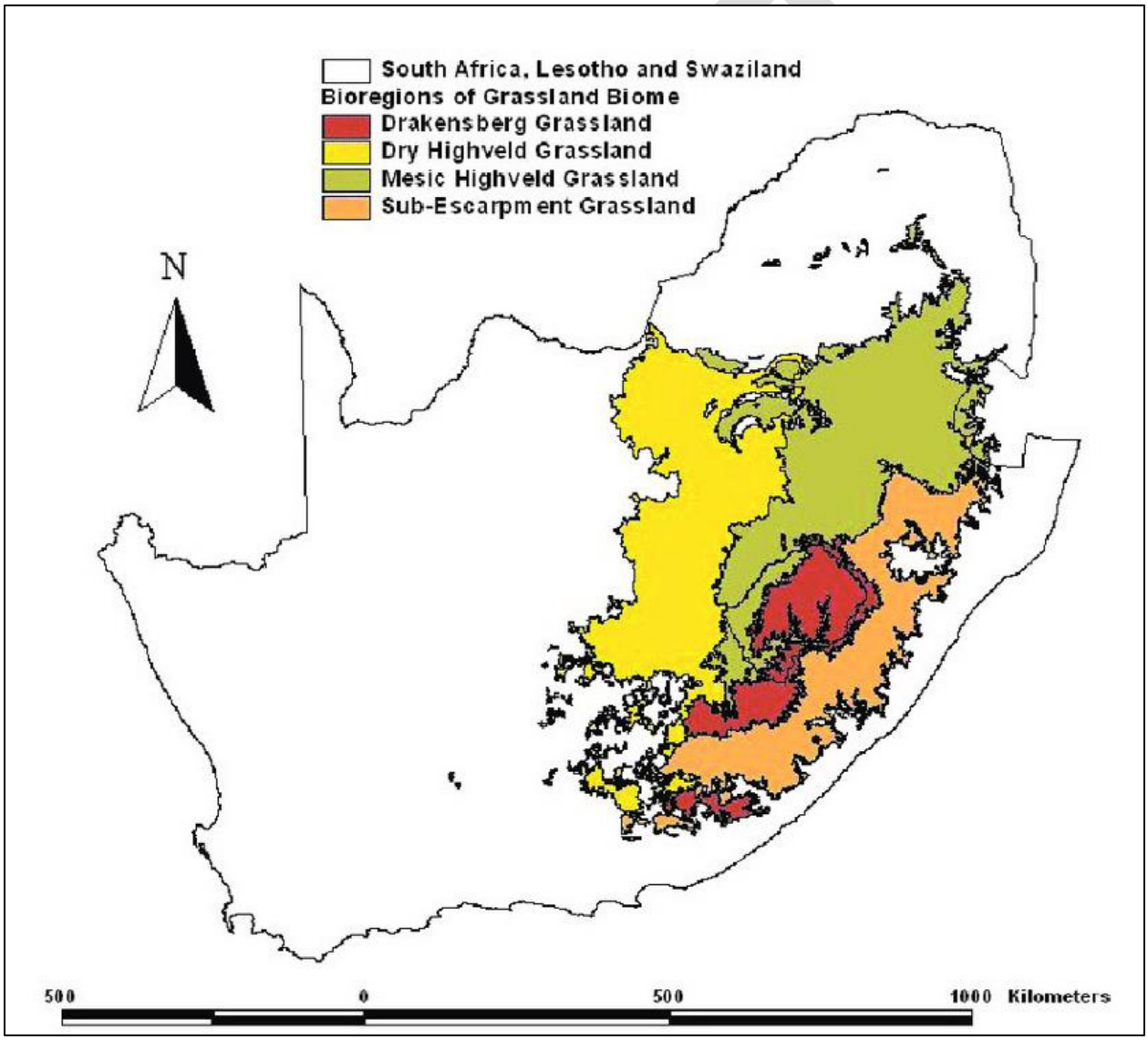


Figure 2. Location map of the Dry Highveld Grassland within South Africa (Carbutt et al., 2011).

Vegetation

Vegetation on the Dry Highveld Grassland (Figure **3**) largely consists of a semi-arid sweetveld due to low water supply and parent material giving rise to soils with a high base status. According to Mucina and Rutherford (2006), the local vegetation types are Western Free State Clay Grassland and Vaal-Vet Sandy Grassland. Plant species in this bioregion are mostly adapted to droughts and have proven to significantly reproduce by seeds even after droughts.

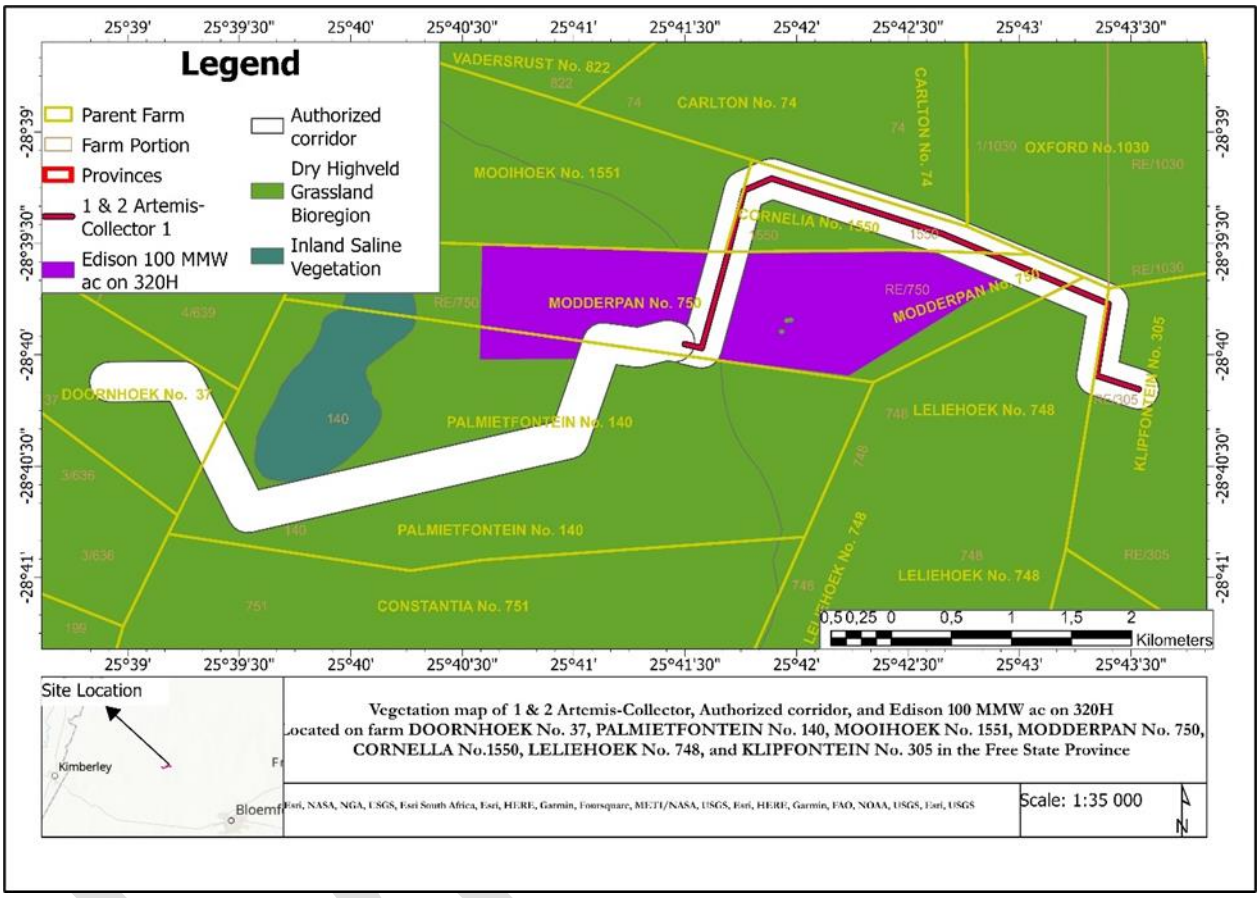


Figure 3. Bioregion map relative to the proposed development area.

Geology and soils

The noted presence of dolerite sheets on the Dry Highveld Grassland Bioregion has given rise to the present of ecologically sensitive plant communities that proffer abundant levels of species richness and endemism. Dolerite-derived soils are composed of essential physical and chemical properties that are highly suitable for a variety of purposes including optimal plant growth.

Climate

When compared to all other grassland bioregions, the Dry Highveld Grassland Bioregion is fundamentally different. This is largely due to their distinct climate. The winter season is characterized by being very cold and frosty, whereas the summer season has low and highly variable precipitation. Figure 4 shows that the Bioregion has an average rainfall of 496mm, and the mean annual evaporation is 2327mm. When the measured annual rainfall is less than the mean annual evaporation, soils could potentially be water stressed.

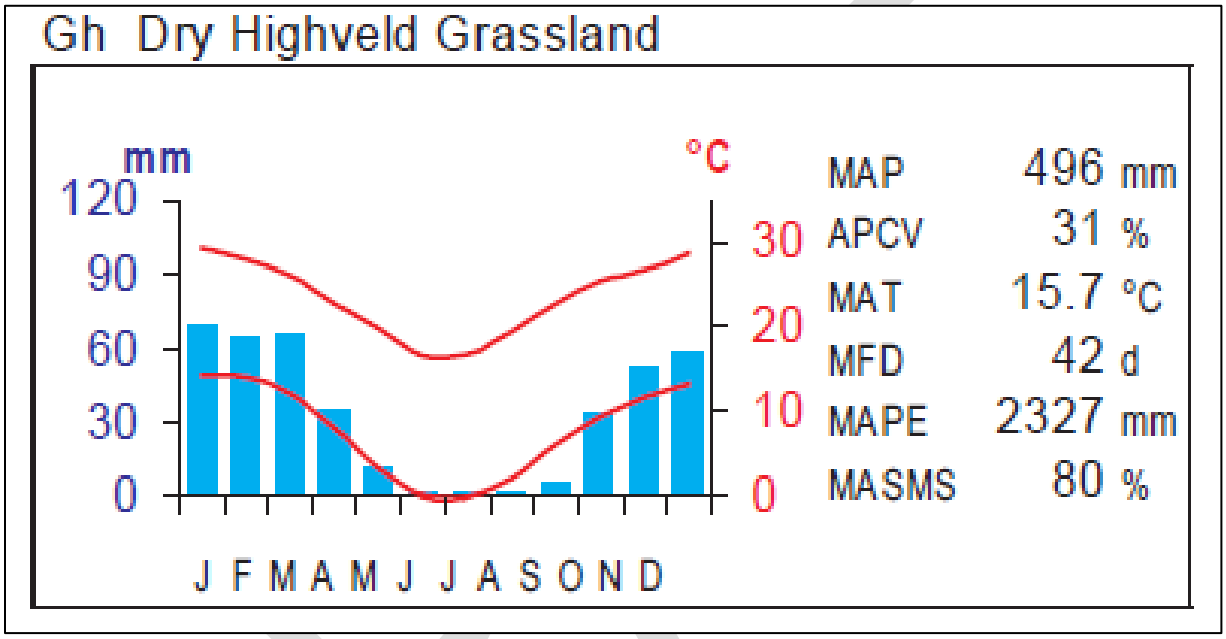


Figure 4. Climatic diagram representative of the proposed powerline corridor for the new Artemis MTS (Mucina and Rutherford, 2006).

Land-use

The Lejweleputswa District Municipality is largely a region for the mining sector. The district is notably rich in mineral resources with gold mine reserves being more dominant. However, the Tokologo Local Municipality is mainly characterised by the presence of commercial farms. Crops are being produced on large-scales in ensuring a sustainable livelihood for the farmers.

Conservation status

A small portion of the Dry Highveld Grassland is under protection as most of the area has already been irreversibly modified by mining and agricultural practices.

Site Sensitivity Assessment

The DEFE screening tool was consulted for the proposed area of the 132kV powerline development. The DFFE screening tool outputs (Figure 5) highlighted the grid connection as having Low sensitivity. Even on a broader scale of the region, the overall majority of the site is considered to be low sensitivity from a botanical perspective.

Table 1. Site sensitivity ratings to species data in the screening tool

Sensitivity Rating	Description of Sensitivity Rating
Very high	Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 is considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under the CR, EN, or VU criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.
High	Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat. For birds, species distribution models (SDMs) and SABAP2 data (http://sabap2.birdmap.africa/) were combined to delineate the 'high' sensitivity areas
Medium	Medium Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
Low	Low Areas where no species of conservation concern (SCC) are known or expected to occur.

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The Dry Highveld Grassland has a well-established vegetation cover of mostly perennial plant species. An important feature of the vegetation is the dominance of *Themeda triandra*, a widespread grass species across the African continent , and *Digitaria eriantha* in higher rainfall areas of the bioregion. However, the previously mentioned Vaal-Vet Sandy Grassland is a threatened vegetation type, therefore, the development footprint should not be expanded to avoid further habitat loss.

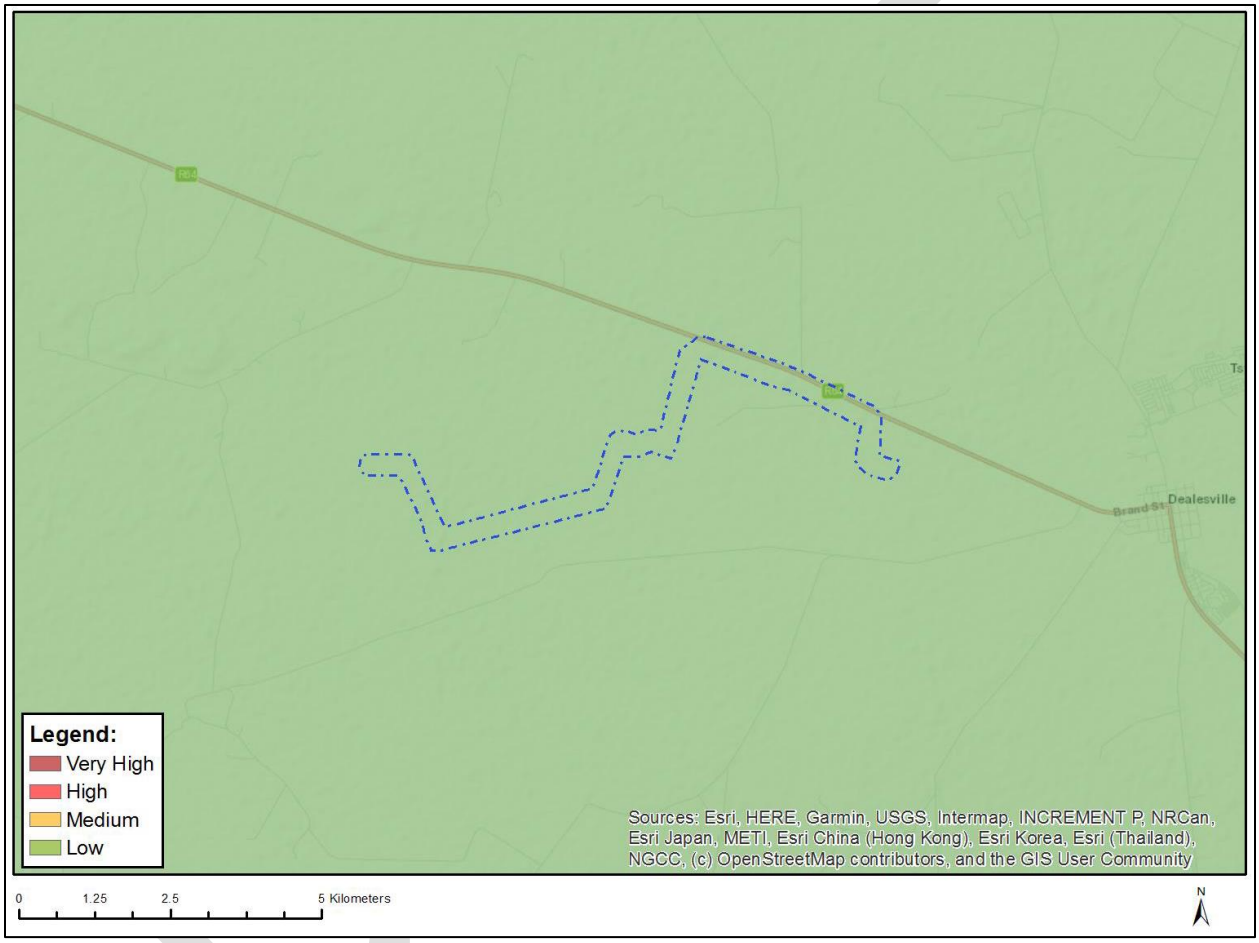


Figure 5. DFFE screening tool outputs for relative plant species sensitivity for the proposed 132kV powerline.

LEGAL FRAMEWORK RELATING TO FLORA SPECIES AND PROPOSED DEVELOPMENT

International law and conventions

The importance of sustainable development and the protection of environmental resources have globally become a driving factor in the construction of new legislation governing industrial practices and their impact on the environment. South Africa has signed and ratified a number of global treaties, protocols and conventions, agreeing to implement the policies, which endorse sustainable development and promote a positive environmental legacy for future generations. A considerable international convention to which South Africa is in agreement with in signatory is namely the Convention on Biological Diversity (CBD). The CBD is notably the key international convention for sustainable development. The CBD has three main objectives which lead and encourage a sustainable future. These are:

- The conservation of biological diversity;
- The sustainable use of its components; and
- The fair and equitable sharing of the benefits from the use of genetic resources.

The convention covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, politics and education to agriculture, business and culture.

South African Constitution

The foundation of South Africans Environmental law is set in the Constitution of the Republic of South Africa (1996), specifically “Chapter 2- The Bill of Rights: section 24”. This has allowed for the rapid development of environmentally based legislations which guard, enforce and guide all parties to maintain the human rights granted in the Constitution. These rights include:

- The right to an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management Act (NEMA)

The National Environmental Management Act (NEMA), Act 107 of 1998 is the fundamental environmental legislation which aims to strengthen the rights granted in the South African Constitution. The NEMA Act is the foundation of environmental law in South Africa and has set the framework for additional legislation to build on. The Act establishes principles for decision-making on environmental matters, as well as providing motive for institutions which promote cooperative governance, and which can coordinate environmental action plans. Section 2(4) specifies that sustainable development requires the consideration of all relevant factors. In the regard to biodiversity and South Africa’s ecological integrity, development should not result

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in the disturbance of ecosystems and loss of biological diversity, if not possible, these effects must be minimised and remedied. A low-risk, cautious approach should always be applied, considering limits of current knowledge concerning consequences and actions. Always anticipate possible negative impacts on the environment and people's environmental rights, identified impacts should be prevented and where they cannot be altogether prevented, are minimised and mitigated. Outlined NEMA principles with regard to biodiversity are to:

- Prevent pollution and ecological degradation
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management of Biodiversity Act (NEMBA)

The National Environmental Management of Biodiversity Act (NEMBA) Act 10 of 2004 was designed to provide a management and conservation outline for biological diversity, as drafted under the NEMA. NEMBA focuses on the management and conservation of biodiversity, with its relevant components, which includes the use of indigenous biological resources in a sustainable manner, the fair and equitable sharing of benefits arising from bio-prospecting, cooperative governance in biodiversity management and conservation within the structures of NEMA. The Act, in protecting biodiversity, deals with the protection of threatened ecosystems and species, the control of alien invasive species, genetically modified organisms and regulates bio-prospecting. As with NEMA, NEMBA incorporates and gives effect to international agreements relating to biodiversity. The Act gives the Minister of Environmental Affairs, Forestry and Fisheries the power to categorise any process or activity in a listed ecosystem, as a threatening process, thereafter, be regarded as an activity contemplated in Section 24(2) (b) of NEMA which states that: Specified activities may not be commenced without prior authorisation from the Minister or MEC and specify such activities. NEMBA is the most prominent statute containing provisions directly aimed at the conservation of b with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). The NEMBA Regulations on Threatened or Protected Species (TOPS, 2007) lists all of the species that are threatened with extinction and therefore, nationally protected under an approach to sustainable use and development. Periodically, Red Data books are published, and the data used to update these lists of protected species.

Additionally, NEMBA regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Chapter 5 of the Act relates to species and organisms posing a potential threat to biodiversity. The purpose of Chapter 5 is:

- To prevent the unauthorized introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur;

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- To manage and control alien species and invasive species to prevent or minimize harm to the environment and to biodiversity in particular;
- To eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats;

According to Section 65 of the Act, "Restricted activities involving alien species":

- A person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7.

Restricted activities include the following:

- Importing into the Republic, including introducing from the sea, any specimen of a listed invasive species.
- Having in possession or exercising physical control over any specimen of a listed invasive species.
- Growing, breeding or in any other way propagating any specimen of a listed invasive species, or causing it to multiply.
- Conveying, moving, or otherwise translocating any specimen of a listed invasive species.
- Selling or otherwise trading in, buying, receiving, giving, donating, or accepting as a gift, or in any other way acquiring or disposing of any specimen of a listed invasive species.
- Spreading or allowing the spread of any specimen of a listed invasive species.
- Releasing any specimen of a listed invasive species.

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

In terms of the amendments to the regulations under this Act, landowners are legally responsible for the control of invasive alien plants on their properties. The schedules provide a list of declared weeds and invaders, which have been divided into three categories, as follows:

- Category 1 plants are prohibited and must be controlled.
- Category 2 plants (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- Category 3 plants (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading there of, except within the flood line of watercourses and wetlands.

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METHODS

Methodology

Prior to conducting field assessments, a comprehensive literature review of available published and unpublished literature pertaining to the current use of the land and the potential environmental sensitivity of the site. Part of desktop included the retrieval of previously recorded plants in the area. This data was obtained from BRAHMS Online (SANBI). The species are listed under appendix C.

The main objective of the flora assessment was to include every plant species with the slightest chance of occurring within the site in the species list. The following tasks were undertaken by MORA Ecological Services (Pty) Ltd to achieve the assessment objective:

- A visual inspection of the study area was done before surveys were conducted.
- During the process different homogenous vegetation units were identified and subsequently surveyed on foot and by vehicle in order to determine the floristic composition of each unit.
- A plotless sampling method was used to record data.
- Species identification was done following reputable checklists and field guides.
- Where necessary, plant material was collected and/or photographs taken of specimens for identification purposes.

The site visit was conducted on the 06th to 09th September 2022 to conduct necessary in-field procedures in assessing the vegetation composition within the study area. The survey was conducted by two senior fieldworkers, and the survey time daily was from 06h00 am until 18h00 pm. Surveys involved recording vegetation species encountered within the 3 identified vegetation types of the affected environment and percentage cover was noted to estimate species dominance.

RESULTS OF THE VEGETATION ASSESSMENT

The area was established of 3 vegetation types on a local scale, i.e. transformed, wetland and a homogenous unit of vegetation as shown in the images below (Figure 6, 7 and 8). On a broader scale, the majority of the study area has undergone vegetation transformation as a result of current and historic gold mining and agricultural activities. The Dry Highveld Grassland has been modified through cultivation of crops and only a small, disconnected fragments of natural grassland remain. Also, mining and its associated infrastructure have resulted in irreversible modification of large areas of the Dry Highveld Grassland.

Plant species recorded in the proposed development area are represented in Appendix B. All of the recorded species are of low sensitivity as they are mostly widespread species. There are no objections from a flora perspective for the powerline development to continue.

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Figure 6. Photographic representation of the transformed habitat (Vegetation Type 1).

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Figure 7. Photographic representation of the homogenous grassland habitat (Vegetation Type 2).

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Figure 8. Photographic representation of the wetland habitat (Vegetation Type 3).

Alien and Invasive flora species

Invasive alien species are establishing and expanding in growing number world, and these s in many parts of the invasions are often followed by major negative effects on ecosystems, the environment, and human health. An alien and invasive species was encountered on site, this species is listed and Table 2 below gives a detailed description of the species.

Table 2. Listed invasive alien plant observed on site.

Scientific name	Common name	Category (NEMBA)	Category (CARA)
Opuntia ficus-indica	Sweet prickly pear	1b	1



Figure 9. The Sweet prickly pear invasive species observed on site.

IMPACT ASSESSMENT RATINGS AND MITIGATION REQUIREMENTS

The methodology is included as Appendix A: Method of Environmental Assessment at the end of this report. The rating rankings for assessing impacts significance are as shown in Table 3 below. The findings of the impact assessment ratings are shown in the tables below. Table 4 is the impacts matrix used for scoring environmental significance and Table 5 is a summary of impacts ratings for the proposed development using Appendix A.

Table 3. Impact rating scoring used for the impact assessment at the proposed powerline construction site.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.

29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

An impact assessment of all potential pre-construction, construction, operational and maintenance phase impacts associated with the activities pertaining to the proposed infrastructure developments are provided in Table **4**.

Table 4. Impact rating scoring used for the flora impact assessment at the proposed Artemis MTS 132kV Powerline development site.

Construction Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Vehicle movement and compaction of soil minimising plant growth of indigenous flora	Vehicles should only use designated roadways to access the site
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	1
Total SP:	42	16
Significance rating:	Negative medium impact	Negative low impact

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POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Alteration of natural environment and habitat loss	Have a biodiversity protocol and rehabilitation plan in place that will be implemented upon closure.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Spreading of invasive alien plants. The altered environment will also favour species that are better adapted to disturbed/transformed areas.	Invasive plant material should be disposed by incineration, or alternatively, composting to break down seeds. If seedbank persists, invasive alien plant management and eradication measures should be implemented
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
Operation Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Vehicle movement and compaction of soil minimising plant growth of indigenous flora	Vehicles should only use designated roadways to access the site
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2

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Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Alteration of natural environment and loss of habitat	The ecological footprint of the proposed development should be restricted to the approved (less sensitive) area. Areas outside the area of the proposed development should not be cleared.
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Spreading of invasive alien plants. The altered environment will also favour species that are better adapted to disturbed/transformed areas.	Invasive plant material should be disposed by incineration, or alternatively, composting to break down seeds. If seedbank persists, invasive alien plant management and eradication measures should be implemented
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	3	2
Total SP:	36	18
Significance rating:	Negative medium impact	Negative low impact
Decommissioning Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Continuous proliferation of invasive alien plants	Effective alien invasive plant management and eradication measures should be implemented on an ongoing basis
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1

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Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Exposed disturbed area with no indigenous vegetation	Implement effective rehabilitation measures upon closure
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
Post Decommissioning Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Continuous proliferation of invasive alien plants	Effective alien invasive plant management and eradication measures should be implemented on an ongoing basis
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact

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POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Exposed disturbed area with no indigenous vegetation	Implement effective rehabilitation measures upon closure
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important habitats	Minimise development footprint and habitat transformation, rehabilitate with indigenous flora and reserve indigenous vegetation throughout as far as possible
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact

Table 5. Summary of flora impact ratings for the proposed 132kV powerline development.

	Average impact rating	Significance class	Average mitigated impact	Significance class
Potential impact on the current vegetation structure before and after mitigation	40.64	Negative medium impact	18.00	Negative low impact

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NO-GO AREAS, BUFFERS AND ALTERNATIVES

No no-go areas are applicable to the project site from a flora perspective. Should the proposed activity not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for agricultural purposes.

No other possible sites were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic Assessment process to enable the appropriate placement of the infrastructure within the development footprint.

CONCLUSION AND RECOMMENDATIONS

The proposed powerline development is situated in an area of low plant species sensitivity and very high terrestrial biodiversity sensitivity.

Important recommendations for the conservation of the current vegetation structure

- The proponent must be committed to a conservation approach of practice and the actual footprint of disturbance must be kept to a minimum.
- As much of the natural environment must be conserved, there should be minimal vegetation clearing.
- Relocation of important species, identification and demarcation of specimens and sub habitats not to be disturbed will have to be done beforehand by a specialist.
- Important species (flora) that will be threatened by the development must be relocated to safer habitats by suitable specialists.
- Preventative erosion control measures to be put in place.
- Conduct alien invasive species monitoring on an annual basis.

Important recommendations for the invasive alien plant

The Sweet Prickly pear is a perennial succulent requiring control using the following method:

- Direct injection with MSMA (Monosodium methane arsonate) between September and April.

Specific conditions recommended for the EA from a flora and vegetation perspective

1. Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness.

2. Implement mitigation controls during the operational phase as specified in the mitigation. Monitor and report on their effectiveness.

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3. Monitoring of implementation of mitigation controls, especially of invasive alien plants.

4. As much of the natural habitat as possible should be preserved during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts.

5. Effective restoration of the natural habitats that were intact before the development should be implemented and reported on after decommissioning.

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Mucina, L. & Rutherford, M.C. (Eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

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APPENDICES

Appendix A: Method of Environmental Assessment

1.1 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 3.

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

1.1.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6. The rating system

NATURE		
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.

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2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		

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1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.

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4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.

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74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

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Appendix B: Species list of plant species identified on site

No.	Scientific name	Growth form (grass/forb/tree/shrub)
1	*Searsia lancea*	Tree
2	*Asparagus laricinus*	Shrub
3	*Gomphocarpus fruticosus*	Shrub
4	*Aloe greatheadii subsp. davyana*	Succulent
5	*Aristida congesta*	Grass
6	*Cynodon dactylon*	Grass
7	*Eragrostis curvula*	Grass
8	*Themeda triandra*	Grass
9	*Digitaria eriantha*	Grass
10	*Lycium cinereum*	Shrub
10	**Opuntia ficus*	Succulent
11	**Eucalyptus camaldulensis*	Tree
12	**Solanum sisymbriifolium*	Herb

*Alien species

Appendix C: Historical plant species list of the broader area (BRAHMS Online, SANBI)

Family	Genus	Sp1	Author1	Rank1	Sp2	Author2	TaxStat	Ecology
Cucurbitaceae	*Kedrostis*	*africana*	(L.) Cogn.				Accepted	Indigenous
Hydrocharitaceae	*Lagarosiphon*	*major*	(Ridl.) Moss ex Wager				Accepted	Indigenous
Lobeliaceae	*Lobelia*	*sonderiana*	(Kuntze) Lammers				Accepted	Indigenous
Juncaceae	*Juncus*	*rigidus*	Desf.				Accepted	Indigenous
Amaranthaceae	*Atriplex*	*lindleyi*	Moq.	subsp.	*inflata*	(F.Muell.) Paul G.Wilson	Accepted	Not indigenous; Naturalised; Invasive
Ruppiaceae	*Ruppia*	*maritima*	L.				Accepted	Indigenous
Ebenaceae	*Diospyros*	*lycioides*	Desf.	subsp.	*lycioides*		Accepted	Indigenous

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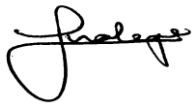


PROPOSED ARTEMIS MTS 132KV POWERLINE OUTSIDE DEALESVILLE, IN THE FREE STATE PROVINCE

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SPECIALIST INFORMATION AND LEGAL REQUIREMENTS

National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Regulations 2014 (as amended) Requirements for Specialist Reports (Appendix 6):

The details of -	
○ the specialist who prepared the report; and	Page 11
○ the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 11
A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 12
An indication of the scope of, and the purpose for which, the report was prepared;	
○ An indication of the quality and age of base data used for the specialist report;	Page 21
○ A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Page 30
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Page 28
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Page 28
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;	Page 17
An identification of any areas to be avoided, including buffers;	Page 17
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;	Page 18
A description of any assumptions made and any uncertainties or gaps in knowledge;	Page 9
A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Page 31
Any mitigation measures for inclusion in the EMPr;	Page 36
Any conditions for inclusion in the environmental authorisation;	Page 36
Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Page 36
A reasoned opinion-	
○ whether the proposed activity, activities or portions thereof should be authorised;	Page 36
○ regarding the acceptability of the proposed activity or activities; and	Page 36
○ 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;	Page 36

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A description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable
A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable
Any other information requested by the competent authority.	Not applicable
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.	Not applicable

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EXECUTIVE SUMMARY

Project background

29 Solar (Pty) Ltd plans to construct new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction is located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

The proposed line will cross the following properties:

- Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD
- Portion 0/RE of the farm Modderpan no. 750 Boshof RD
- Portion 0/RE of the farm Leliehoek no 748 Boshof RD
- Portion 0/RE of the farm Klipfontein n0 305 Boshof RD

No no-go areas are applicable to the project site from an avifaunal perspective. Should the proposed construction not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for farming purposes.

No other approved corridors were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic Assessment process to enable the appropriate placement of the infrastructure within the construction footprint.

Avifaunal community

The overall avifaunal species occurring at the proposed powerline of the Artemis MTS mostly indicates a medium sensitivity. The area has a low diversity of avifaunal species and there is an availability of similar habitats in the broader area to reduce potential impacts on the current avifaunal species community.

Impacts and mitigations for the 132 kV powerline

<u>Loss of priority avian species from important habitats</u>

Scored a Negative medium impact but can be reduced to Negative low impact with effective implementation and ongoing monitoring of required mitigations as specified.

<u>Loss of resident avifauna through increased disturbance</u>

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Scored a Negative medium impact but can be reduced to Negative low impact with effective implementation and ongoing monitoring of required mitigations as specified.

Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats

Scored a Negative medium impact but can be reduced to Negative low impact with effective implementation and ongoing monitoring of required mitigations as specified.

Collisions with powerline infrastructure and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity

Scored a Negative high impact but can be reduced to Negative medium impact with effective implementation and ongoing monitoring of required mitigations as specified.

Cumulative impacts of the above.

The cumulative and residual impacts should be prioritised. With the effective implementation and ongoing monitoring of required mitigations as specified, all potential impacts for the 132 kV powerline will remain on a Negative low impact rating. However, there exists an exception of cumulative impacts of powerline collisions and electrocution risks for birds when flying. The effective implementation and ongoing monitoring of required mitigations as suggested in the report will only reduce the impact scoring to a Negative medium impact. This is because powerline collisions and electrocution risks are residual impacts and cannot be fully mitigated.

Impact statement

Despite some residual and cumulative impacts, there is no objection for the proposed 132 kV powerline development from an avifaunal perspective. The overall impact of the project on avifauna can be effectively mitigated, should the controls prescribed in this report be adequately followed, with sufficient monitoring of mitigation effectiveness.

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TERMS OF REFERENCE

MORA Ecological Services (Pty) Ltd was requested by 29 Solar (Pty) Ltd, hereafter referred to as “29 Solar” to conduct a specialist avifaunal assessment towards their pursuit of obtaining the requisite environmental authorisations for the proposed construction of a 132 kV Artemis MTS powerline. The critical objective of this specialist avifaunal assessment is to determine the bird species community and the potential impacts the proposed construction may have on avifauna species. The following tasks were undertaken by MORA Ecological Services (Pty) Ltd to achieve the assessment objective:

- Site visits to identify the avian habitats associated with the proposed construction;
- Field data collection to define the current avifauna community within the construction site and the identification of Red Data and/or endemic species which could potentially be affected by the proposed construction and associated electrical infrastructure;
- Integration of the site data collected (species counts) and the Southern African Bird Atlas Project 2 avian atlases to develop a comprehensive avifaunal database likely to be present within the construction footprint;
- Identify potential negative impacts on the avifaunal diversity and species composition at the site of the proposed construction and assess the significance of these impacts;
- To provide recommendations and mitigation measures for the potential impacts in order to avert or lower their significance on the avifaunal diversity and species composition.

The site details provided were that the EIA footprint is approximately 347 Ha on Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD, Portion 0/RE of the farm Modderpan no. 750 Boshof RD, Portion 0/RE of the farm Leliehoek no. 748 Boshof RD and Portion 0/RE of the farm Klipfontein no. 305 Boshof. The survey was conducted throughout all identified habitats using various methods i.e. walked transects, vehicle drive transects, powerline inspection and the fixed point survey.

ASSUMPTIONS, LIMITATIONS, UNCERTAINITIES AND GAP ANALYSIS

- The findings, results, observations, conclusions and recommendations provided in this report are based on the author’s best scientific and professional knowledge as well as available information regarding the potential impacts of substations and powerlines on avifauna species.
- The assessment of impacts was based on the current state of the primary environment currently .
- MORA Ecological Services (Pty) Ltd relied on BioBlue Environmental Sustainability, as the EAP, to supply correct information on the site locality and extent, as well as project details which were assumed to be correct.
- It was assumed that the information contained in existing databases, reports and publications is correct.

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- MORA reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- Bird behaviour is not completely understood in South Africa and is hampered by good monitoring data to evaluate the effectiveness of proposed mitigations.

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SPECIALIST DETAILS, CURRICULUM VITAE AND DECLARTION

The surveys and assessment were undertaken by Mokgatla Jerry Molepo, a competent avifaunal specialist and Director of MORA Ecological Services (Pty) Ltd.

Curriculum vitae

EDUCATION:

- MSc Zoology, Nelson Mandela University (Percy FitzPatrick Institute of African Ornithology Centre of Excellence)

Research Project Topic: Foraging behaviour and thermal physiology in Cape Sugarbirds: sex-specific responses to temperature.

- BSc Honours in Zoology, University of Limpopo

Research Project Topic: Morphometrics and plumage variation in the South African Fiscal flycatcher *Sigelus silens* Shaw 1809.

- BSc Botany & Zoology, University of Venda
- Grade 12, Marobathota High School

CERTIFICATES:

- SASS5 Aquatic Biomonitoring, GroundTruth
- Hydropedology and Wetland Functioning, Terra Soil Science & Water Business Academy
- Section 21 (c) & (i) Water Use Authorisation Training, Department of Water and Sanitation
- Basic Project Management, Hudisa Business School

PROFESSIONAL MEMBERSHIP:

- South African Council for Natural Scientific Professions (SACNASP) – Professionally registered as Professional Natural Scientist. **Registration number:** 009509
- British Ecological Society (BES). **Membership number**: 1010709
- Zoological Society of Southern Africa (ZSSA). **Membership number**: 691

WORK EXPERIENCE:

- MORA Ecological Services (Pty) Ltd: April 2018 – Current, I am an Environmental Specialist, and my duties include; (i) Conducting Biodiversity, Aquatic Impact Assessments, Rehabilitation (ii) Compilation of specialist reports.
- Arcus Consulting: May - November 2017, I was a subcontracted avifaunal surveyor for the proposed Highlands Wind Energy Farm, Somerset East, Eastern Cape.
- Centre for African Conservation Ecology (ACE), Nelson Mandela University: 2015 - 2016, I was a field guide/ environmental educator. Responsibilities: taking school learners on trial walks inside the Nelson Mandela University Nature Reserve.
- South African National Biodiversity Institute (SANBI): May – December 2014, I was a Zoological Systematics Technician. Responsibilities: (i) Insect identification and curation, and (ii) compiling

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the animal checklist of South Africa, (iii) Sourcing wildlife crime reports on endangered animals and plants for Barcode of Wildlife Project, (iv) Monitoring the bird population in the Botanical Garden.

- Department of Zoology, University of Venda: 2009 – 2013, I was a Research Assistant under Dr. T.C Munyai who was conducting a long-term research project which monitored the effects of climate change on biota and processes influencing ecosystem functioning and species diversity patterns.
- Percy FitzPatrick Institute of African Ornithology: March – April 2014, I was a Research Assistant under Dr. Rita Covas' Sociable Weaver Research Project. This is a long-term study which looks at the reproductive success of Sociable weavers at Benfontein Nature Reserve in Kimberley.

Key experience in specialist projects

Year	Project	Location:	Role(s)
2022	Avifaunal Impact Assessment for the proposed 132kV for Musina-Makhado Special Economic Zone North Site	Musina, Limpopo	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed Khauta PV Solar including 44kV and 132kV Powerline	Welkom, Free State	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed NAOS PV Solar including 132kV Powerline	Free State	Avifaunal Specialist/Ornithologist
2022	Preconstruction Avifaunal Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Avifaunal Specialist/Ornithologist
2022	Preconstruction Botanical Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Ecologist
2022	Biodiversity Assessment, Land Capability and Veld Condition Assessment for PPC Cement SA Slurry	Slurry, North West	Ecologist
2021	Avifaunal Impact Assessment for the proposed Upington-Aries 2x 400kV	Upington, Northern Cape	Avifaunal Specialist/Ornithologist
2021	Habitat Assessment Post Rehabilitation for PPC Cement SA Dwaalboom Factory	Dwaalboom, Limpopo	Ecologist
2021	Habitat Assessment Post Rehabilitation for Gibson Bay Wind Energy Farm	Humansdorp, Eastern Cape	Ecologist
2021	Wetland Rehabilitation for the sewer pipeline construction in Daveyton	Ekurhuleni East College Campus, Daveyton, Gauteng	Wetland Ecologist
2021	12 Months Wetland Rehabilitation Supervision for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist

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DECLARATION BY THE SPECIALIST

I, Mokgatla Jerry Molepo , 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;

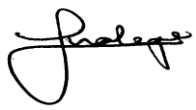
• I will comply with the Act, Regulations and all other applicable legislation;

• 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 realise 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

MORA Ecological Services (Pty) Ltd

Name of Company

30/09/2022

Date

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INTRODUCTION

Proposed Development

MORA Ecological Services (Pty) Ltd was appointed by 29 Solar (Pty) Ltd (hereafter referred to the Developer) and BioBlue Environmental Sustainability (hereafter referred to as the EAP) to conduct an avifaunal specialist assessment required for a full Scoping and Environmental Impact Assessment for the proposed construction of new 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS. The proposed construction will be located approximately 3.8 km North-west of the town of Dealesville in the Free State province. Access to the construction site can be gained via the R64 road when driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality within the Lejweleputswa District Municipality.

The proposed line will cross the following properties:

- Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD
- Portion 0/RE of the farm Modderpan no. 750 Boshof RD
- Portion 0/RE of the farm Leliehoek no 748 Boshof RD
- Portion 0/RE of the farm Klipfontein n0 305 Boshof

SITE DESCRITION

The proposed development falls within within the Tokologo Local Municipality that forms part of the Lejweleputswa District Municipality. Tokologo Local Municipality is situated on the western region of the Free State Province (Figure 1). The local municipality area measures 9 326.24km^2 and comprises of three small rural towns namely Dealesville, Boshof, and Hertzogville. As shown in Figure 1, the exact extent of the proposed geographic area for the 132kV conductor lines runs across the Doornhoek No. 37, Palmietfontein No. 140, Mooihoek No. 1551, Modderpan No. 750, Cornella No. 1550, Leliehoek No. 745 and Klipfontein No. 305 farms. This indicates that several properties will potentially be impacted upon the construction of the corridor. Specialist avifauna surveys were conducted to evaluate potential impacts arising from the proposed power line infrastructure.

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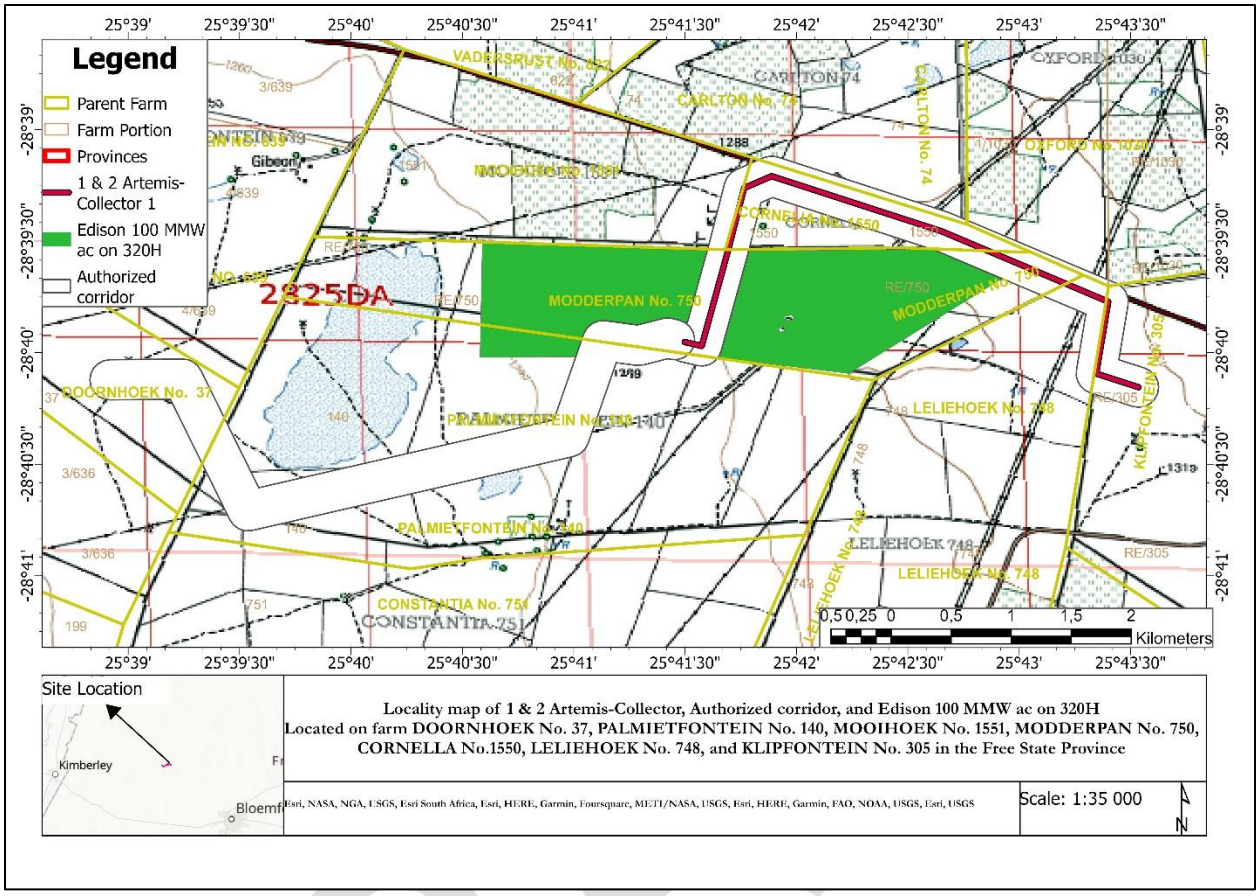


Figure 1. Locality map of the proposed development area.

Vegetation

The geographic region of the proposed development falls on the Grassland Biome. Of the nine biomes in southern Africa, the Grassland biome is the second largest and it comprises 28% of the terrestrial surface. Mucina and Rutherford (2006) classified the approved site for the 132kV powerline corridor to lie on the Dry Highveld Grassland Bioregion of the broader Grassland biome (Figure 2). The estimated total area of the Dry Highveld Grassland Bioregion is 117,753 km^2, where only 1,52% is protected and 31,51% has already been transformed (Carbutt et al., 2011).

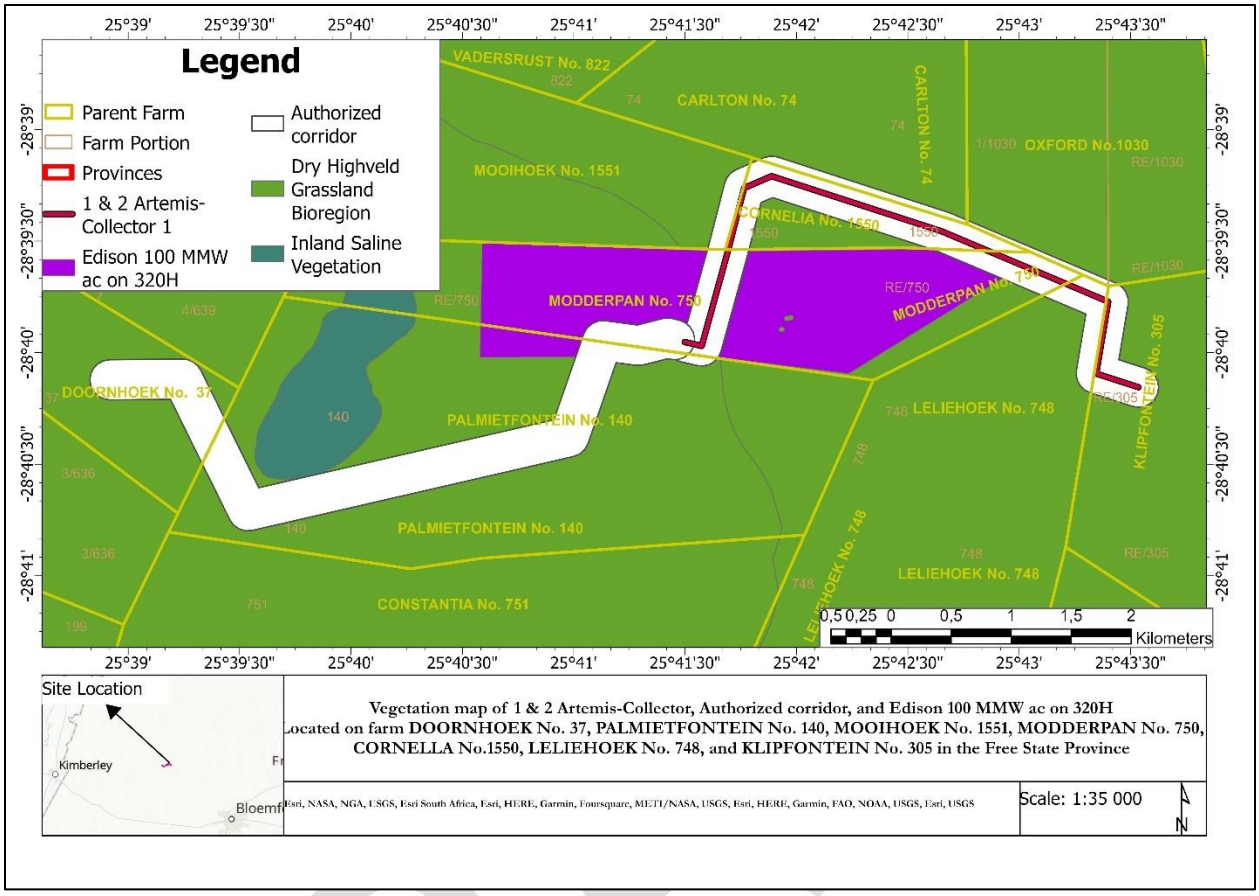


Figure 2. Vegetation map relative to the proposed development area.

Geology

The noted presence of dolerite sheets on the Dry Highveld Grassland Bioregion has given rise to the present of ecologically sensitive plant communities that proffer abundant levels of species richness and endemism. Dolerite-derived soils are composed of essential physical and chemical properties that are highly suitable for a variety of purposes including optimal plant growth.

Climate

When compared to all other grassland bioregions, the Dry Highveld Grassland Bioregion is fundamentally different. This is largely due to their distinct climate. The winter season is characterized by being very cold and frosty, whereas the summer season has low and highly variable precipitation. Figure 3 shows that the Bioregion has an average rainfall of 496 mm, and the mean annual evaporation is 2327 mm. When the measured annual rainfall is less than the mean annual evaporation, soils could potentially be water stressed.

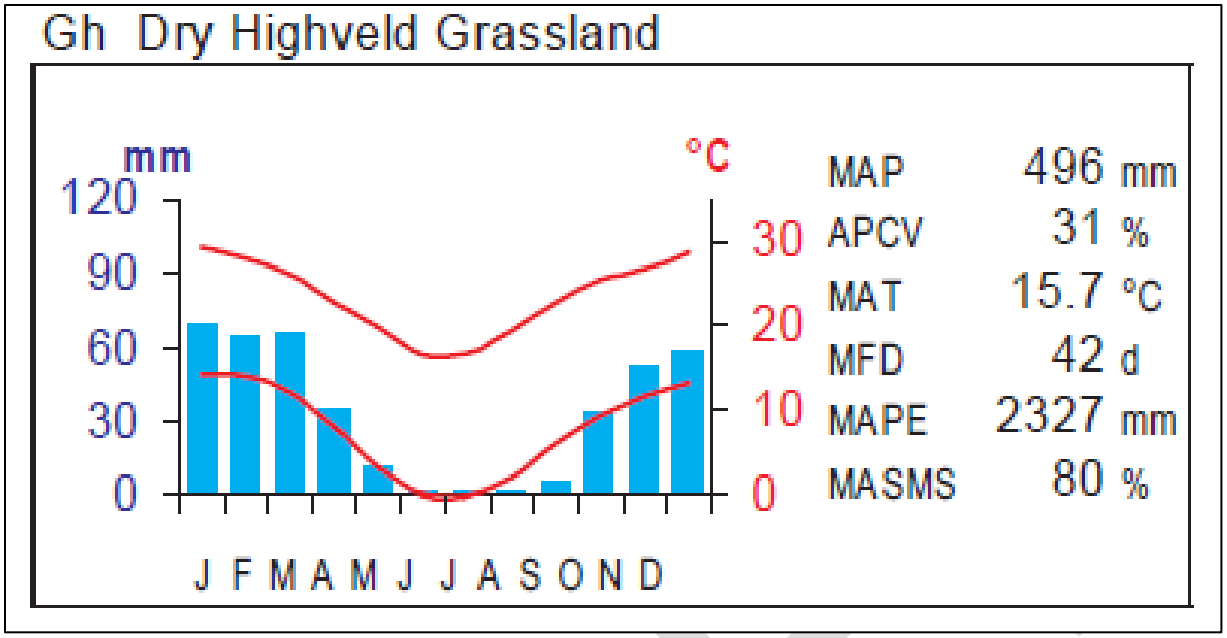


Figure 3. Climatic diagram representative of the proposed powerline corridor for the new Artemis MTS (Mucina and Rutherford, 2006).

Land-use

The Lejweleputswa District Municipality is largely a region for the mining sector. The district is notably rich in mineral resources with gold mine reserves being more dominant. However, the Tokologo Local Municipality is mainly characterised by the presence of commercial farms. Crops are being produced on large-scales in ensuring a sustainable livelihood for the farmers.

Significance of avifauna population

The DEFE screening tool was consulted using the feasibility region shown in Figure 4 which covers the proposed 132kV powerline development area. The DFFE screening tool outputs (Figure 5) provided an avifaunal risk ranking for the site as having Medium to High Environmental Sensitivity. Appendix D gives a detailed description of the site sensitivity ratings used in the screening total. The Medium to High Sensitivity is attributed to the presence of a critical habitat within an area of 10 km^2 from the construction site. There is a presence of waterbodies in the broader area as represented on the feasibility map (Figure 4). The environmental sensitivity rating is high where the authorised corridor is in proximity to the wetland. Wetland surveys were thoroughly conducted for this study and there were no observations of species of concern. From an avifaunal perspective, the site has a low species diversity and there are no objections for the proposed powerline development to continue.

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However, it is important to delineate sensitive avian habitats within the project site in order to ensure the development does not have a long-term negative impact on these habitats. Important avian habitats play an integral role in their persistence within a landscape providing nesting, foraging and reproductive benefits. It is also recommended that the sensitive habitats are used as a guide for sensitive areas during the construction and operational phase.

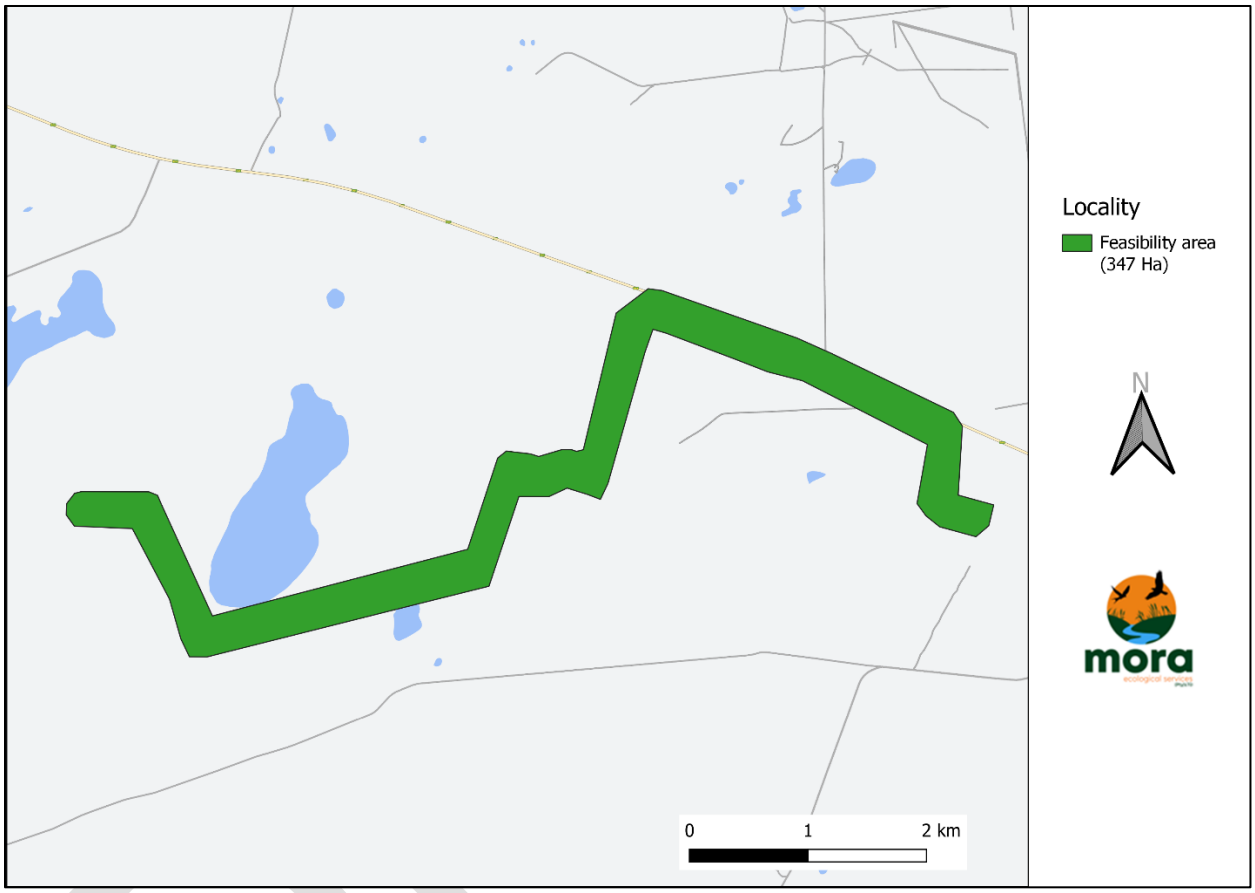


Figure 4. Feasibility area assessed to determine area sensitivity.

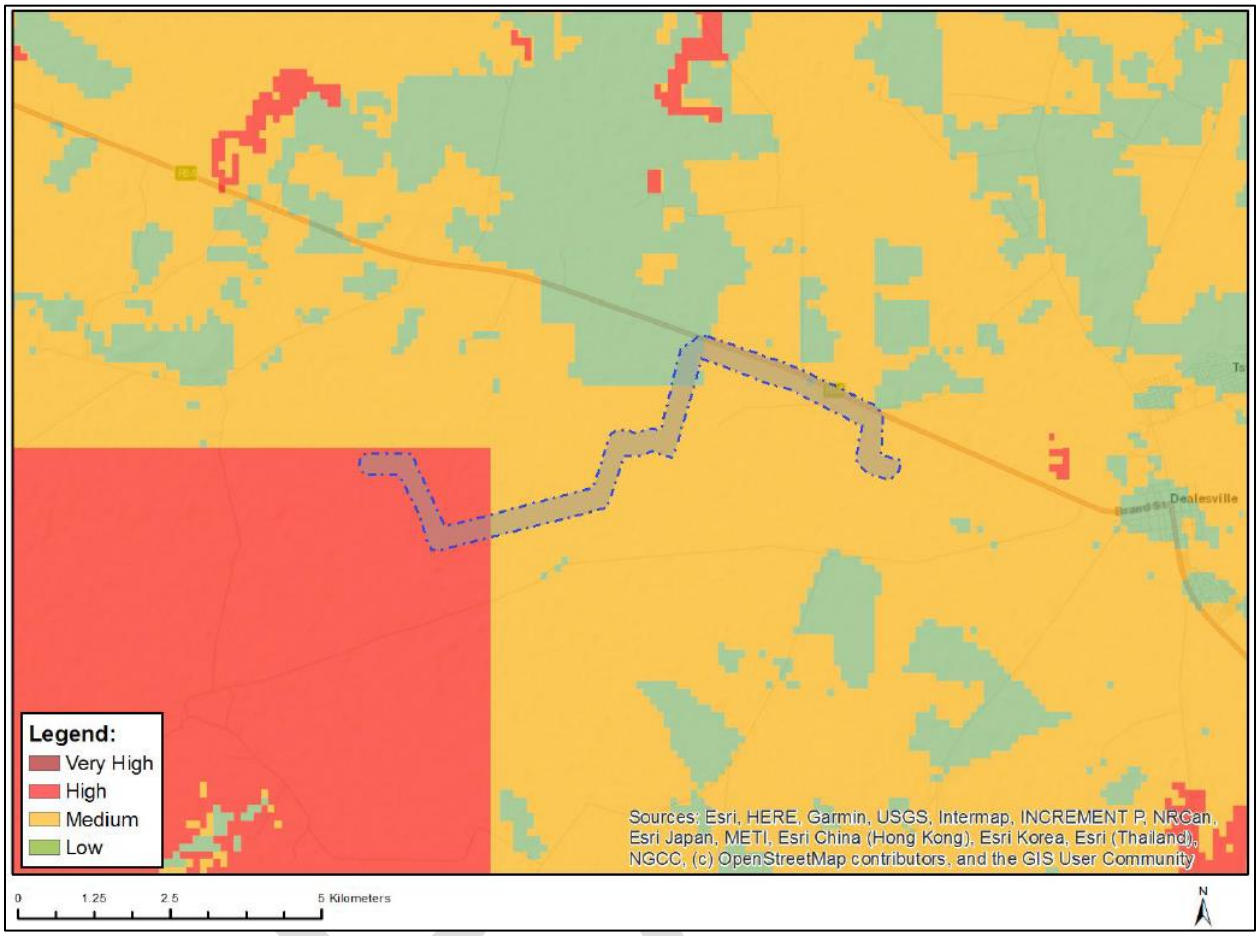


Figure 5. DFFE screening tool outputs of avifaunal sensitivity for the proposed 132kV powerline

All the ecological features of the study area were considered, and sensitive areas were assessed. Based on the area sensitivity conducted during the specialist assessment, 60 ha of land provide an important habitat for medium to large, bodied birds.

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LEGAL FRAMEWORK RELATING TO AVIFAUNA AND PROPOSED DEVELOPMENT

International law and conventions

The importance of sustainable development and the protection of environmental resources have globally become a driving factor in the construction of new legislation governing industrial practices and their impact on the environment. South Africa has signed and ratified a number of global treaties, protocols and conventions, agreeing to implement the policies, which endorse sustainable development and promote a positive environmental legacy for future generations. A considerable international convention to which South Africa is in agreement with in signatory is namely the Convention on Biological Diversity (CBD). The CBD is notably the key international convention for sustainable development. The CBD has three main objectives which lead and encourage a sustainable future. These are:

- The conservation of biological diversity;
- The sustainable use of its components; and
- The fair and equitable sharing of the benefits from the use of genetic resources.

Although the convention does not include specific recommendations or guidelines pertaining to birds and solar infrastructure interactions and impacts, it does make provisions for sustaining and restoring biodiversity. The convention covers all possible domains that are directly or indirectly related to biodiversity and its role in development, ranging from science, politics and education to agriculture, business and culture.

South African Constitution

The foundation of South Africans Environmental law is set in the Constitution of the Republic of South Africa (1996), specifically “Chapter 2- The Bill of Rights: section 24”. This has allowed for the rapid development of environmentally based legislations which guard, enforce and guide all parties to maintain the human rights granted in the Constitution. These rights include:

- The right to an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management Act (NEMA)

The National Environmental Management Act (NEMA), Act 107 of 1998 is the fundamental environmental legislation which aims to strengthen the rights granted in the South African Constitution. The NEMA Act is the foundation of environmental law in South Africa and has set the framework for additional legislation to build on. The Act establishes principles for decision-making on environmental matters, as well as providing motive for institutions which promote cooperative governance, and which can coordinate environmental

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action plans. Section 2(4) specifies that sustainable development requires the consideration of all relevant factors. In the regard to biodiversity and South Africa's ecological integrity, development should not result in the disturbance of ecosystems and loss of biological diversity, if not possible, these effects must be minimised and remedied. A low-risk, cautious approach should always be applied, considering limits of current knowledge concerning consequences and actions. Always anticipate possible negative impacts on the environment and people's environmental rights, identified impacts should be prevented and where they cannot be altogether prevented, are minimised and mitigated. Outlined NEMA principles with regard to biodiversity are to:

- Prevent pollution and ecological degradation
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

National Environmental Management of Biodiversity Act (NEMBA)

The National Environmental Management of Biodiversity Act (NEMBA) Act 10 of 2004 was designed to provide a management and conservation outline for biological diversity, as drafted under the NEMA. NEMBA focuses on the management and conservation of biodiversity, with its relevant components, which includes the use of indigenous biological resources in a sustainable manner, the fair and equitable sharing of benefits arising from bio-prospecting, cooperative governance in biodiversity management and conservation within the structures of NEMA. The Act, in protecting biodiversity, deals with the protection of threatened ecosystems and species, the control of alien invasive species, genetically modified organisms and regulates bio-prospecting. As with NEMA, NEMBA incorporates and gives effect to international agreements relating to biodiversity. The Act gives the Minister of Environmental Affairs, Forestry and Fisheries the power to categorise any process or activity in a listed ecosystem, as a threatening process, thereafter, be regarded as an activity contemplated in Section 24(2) (b) of NEMA which states that: Specified activities may not be commenced without prior authorisation from the Minister or MEC and specify such activities. NEMBA is the most prominent statute containing provisions directly aimed at the conservation of birds with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). The NEMBA Regulations on Threatened or Protected Species (TOPS, 2007) lists all of the species (including avian) that are threatened with extinction and therefore, nationally protected under an approach to sustainable use and development. Periodically, Red Data books are published, and the data used to update these lists of protected species.

Norms, Guidelines and Standards

BirdLife South Africa compiled the Best Practice Guidelines on Birds and Solar Energy to guide the assessment and monitoring of the impact of solar generating facilities on birds in South Africa. This guideline has been followed as far as possible in the compilation of this report.

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BASELINE DESCRIPTION OF THE AVIFAUNAL COMMUNITY

SABAP2 data

The Second South African Bird Atlas Project 2 (SABAP2), a continuous initiative of the Animal Demography Unit of the University of Cape Town, was consulted for data collected on the pentads in which the site is situated. SABAP2 is the second bird atlas project that was initiated in July 2007. SABAP2 was designed to run indefinitely with the aim to create valuable long-term dataset for southern Africa. The objective of the SABAP2 project is to accurately provide specified information on bird distributions, taken over a period of years. The site of the proposed site for the 132kV conductor lines is located in three pentads, namely, 2840_2540, 2840_2535 and 2845_2540 (Figure 6). Each pentad occupies approximately 7,700 Ha. The total area of the pentads is 23 100 Ha, whereas the total EIA footprint for the proposed construction is approximately 347 Ha as previously shown in Figure 4. The pentads cover a greater avian diversity and comprises priority habitats including waterbodies. The inclusion of aquatic habitats in the pentads will substantially increase the species counts. These species counts should not be expected for the proposed construction site.

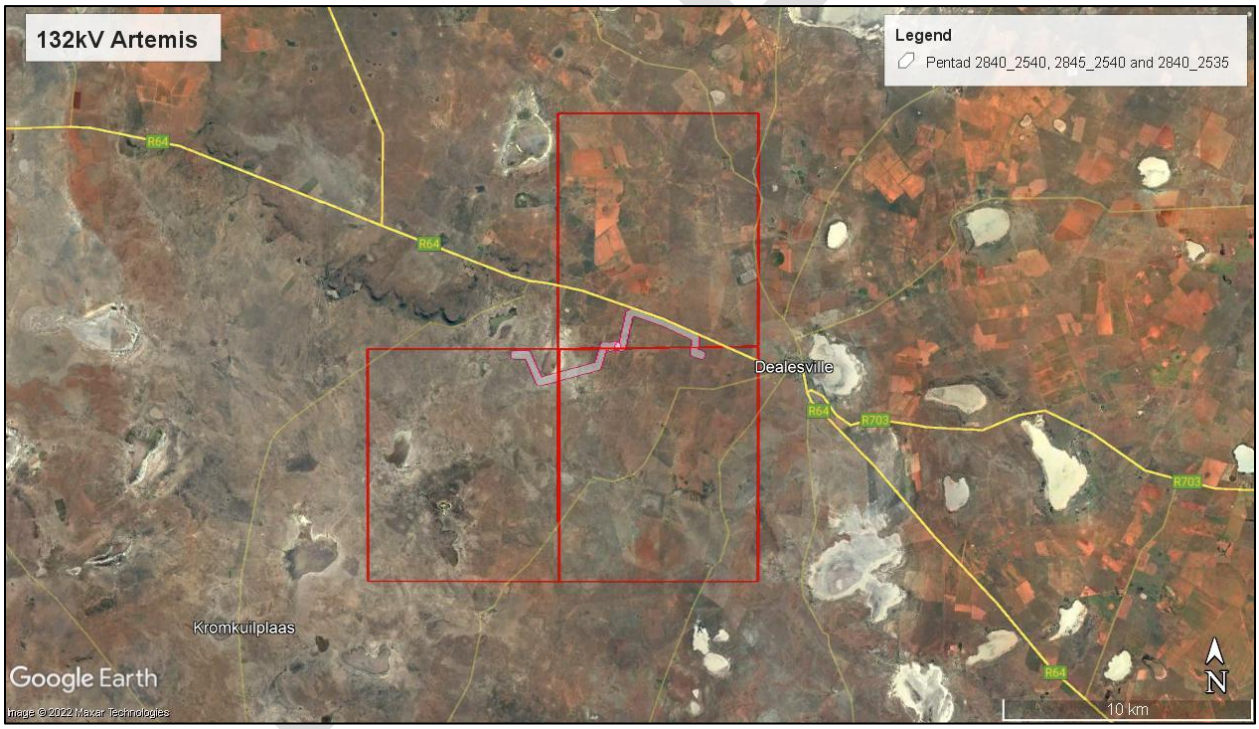


Figure 6. Location and extent of SABAP2 2840_2540, 2840_2535 and 2845_2540 pentads relative to the 132kV conductor lines construction site.

According to the SABAP2 species list in Table 1, it is estimated that a total of 123 birds species occur in the broader area of the proposed area of development. Of the 123 bird species 11 out of 14 bird species were observed during the transect surveys. Of the observed species, three species, the Cape Weaver,

Dark-capped Bulbul, and the Red-knobbed Coot, were not previously recorded on site according to the SABAP2 species list for pentads 2840_2540, 2840_2535 and 2845_2540 (Figure 6). This may be attributed the seasonal movement patterns of birds. There are many long-distance migrant species that will only be recorded during early to mid-summer and also some regional migrants and nomadic species that are more likely to occur in winter. Alternatively, this can be attributed to shorter survey timeframes and a vastly smaller assessment area (approximately 347 Ha) with a lower habitat diversity.

Table 1. List of avifaunal species encountered on site during structured surveys or recorded during SABAP2 assessments for the wider pentads.

No.	Species	Observed during assessments
1	Acacia Pied Barbet	No
2	African Pipit	No
3	African Red-eyed Bulbul	No
4	African Stonechat	No
5	Alpine Swift	No
6	Amur Falcon	No
7	Ant-eating Chat	Yes
8	Ashy Tit	No
9	Barn Swallow	No
10	Black Harrier	No
11	Black Stork	No
12	Black-chested Prinia	No
13	Black-faced Waxbill	No
14	Blacksmith Lapwing	No
15	Black-throated Canary	No
16	Black-winged Kite	Yes
17	Blue Korhaan	No
18	Bokmakierie	No
19	Brown-crowned Tchagra	No
20	Buffy Pipit	No
21	Burchell's Courser	No
22	Cape Longclaw	No
23	Cape Penduline Tit	No
24	Cape Robin-Chat	No
25	Cape Sparrow	No
26	Cape Starling	No
27	Cape Turtle Dove	Yes
28	Cape Wagtail	No
29	Capped Wheatear	No

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No.	Species	Observed during assessments
30	Chestnut-backed Sparrow-Lark	No
31	Chestnut-vented Warbler	No
32	Cinnamon-breasted Bunting	No
33	Cloud Cisticola	No
34	Common Buttonquail	No
35	Common Buzzard	No
36	Common Ostrich	No
37	Common Quail	No
38	Common Scimitarbill	No
39	Common Swift	No
40	Crested Barbet	No
41	Crowned Lapwing	No
42	Desert Cisticola	No
43	Diederik Cuckoo	No
44	Double-banded Courser	No
45	Eastern Clapper Lark	Yes
46	Egyptian Goose	No
47	Familiar Chat	No
48	Fiscal Flycatcher	No
49	Greater Kestrel	No
50	Greater Striped Swallow	No
51	Green-winged Pytilia	No
52	Grey-backed Sparrow-Lark	No
53	Hadada Ibis	No
54	Helmeted Guineafowl	No
55	House Sparrow	No
56	Jacobin Cuckoo	No
57	Jameson's Firefinch	No
58	Kalahari Scrub Robin	No
59	Karoo Chat	No
60	Karoo Thrush	No
61	Large-billed Lark	No
62	Laughing Dove	Yes
63	Lesser Grey Shrike	No
64	Lesser Kestrel	No
65	Levaillant's Cisticola	No
66	Lilac-breasted Roller	No
67	Little Grebe	No
68	Little Swift	No
69	Long-billed Crombec	No

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No.	Species	Observed during assessments
70	Long-tailed Widowbird	No
71	Ludwig's Bustard	No
72	Melodious Lark	No
73	Monotonous Lark	No
74	Mountain Wheatear	No
75	Namaqua Dove	Yes
76	Neddicky	No
77	Northern Black Korhaan	Yes
78	Orange River Francolin	No
79	Orange River White-eye	No
80	Pale Chanting Goshawk	No
81	Pied Crow	No
82	Plain-backed Pipit	No
83	Pririt Batis	No
84	Quailfinch	No
85	Red-backed Shrike	No
86	Red-billed Quelea	No
87	Red-billed Teal	No
88	Red-capped Lark	No
89	Red-eyed Dove	No
90	Red-faced Mousebird	No
91	Red-headed Finch	No
92	Rock Kestrel	No
93	Rufous-eared Warbler	No
94	Rufous-naped Lark	No
95	Sabota Lark	No
96	Scaly-feathered Weaver	Yes
97	Secretarybird	No
98	Sickle-winged Chat	No
99	South African Cliff Swallow	No
100	Southern Fiscal	No
101	Southern Grey-headed Sparrow	No
102	Southern Masked Weaver	Yes
103	Southern Red Bishop	No
104	Speckled Pigeon	No
105	Spike-heeled Lark	No
106	Spotted Flycatcher	No
107	Spur-winged Goose	No
108	Swainson's Spurfowl	No
109	Wattled Starling	No

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No.	Species	Observed during assessments
110	Western Barn Owl	No
111	Western Cattle Egret	No
112	White Stork	No
113	White-backed Mousebird	No
114	White-backed Vulture	No
115	White-bellied Sunbird	No
116	White-browed Sparrow-Weaver	Yes
117	White-rumped Swift	No
118	Willow Warbler	No
119	Yellow Canary	No
120	Yellow-bellied Eremomela	No
121	Yellow-billed Duck	Yes
122	Yellow-crowned Bishop	No
123	Zitting Cisticola	No

General species description

According to the results from the surveys, the overall avifaunal species occurring at the proposed development site are dominantly represented by species of Least Concern. As shown in Figure 7 and Table 3, species of Least Concern have been evaluated and classified as a widespread and abundant taxa. No Red Data species were encountered during surveys on all sampled habitats. On a broader scale, the SABAP2 species list indicates the likelihood of the following Red Data species to occur on site (Table 2):

Table 2: Red Data Species occurring in the broader area of the proposed area of development.

No.	Species	IUCN red-list conservation criteria
1	Secretarybird	Vulnerable
2	Black Harrier	Endangered
4	Blue Korhaan	Near-threatened

Species of conservation importance

Nine (9) categories are used by the International Union for Conservation of Nature (IUCN) in distinguishing the conservation status of species across all taxa (IUCN, 2001). Figure 7 is a diagram showing the structure of the 9 categories and Table 3 gives a summary of the 9 categories which were all considered for this study. The categories are important for classifying species at high risk of global extinction to further inform

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specialist recommendations. The assessment of Red Data status follows Taylor (2015) and the ESKOM Red Data Book of Birds of South Africa, Lesotho and Swaziland.

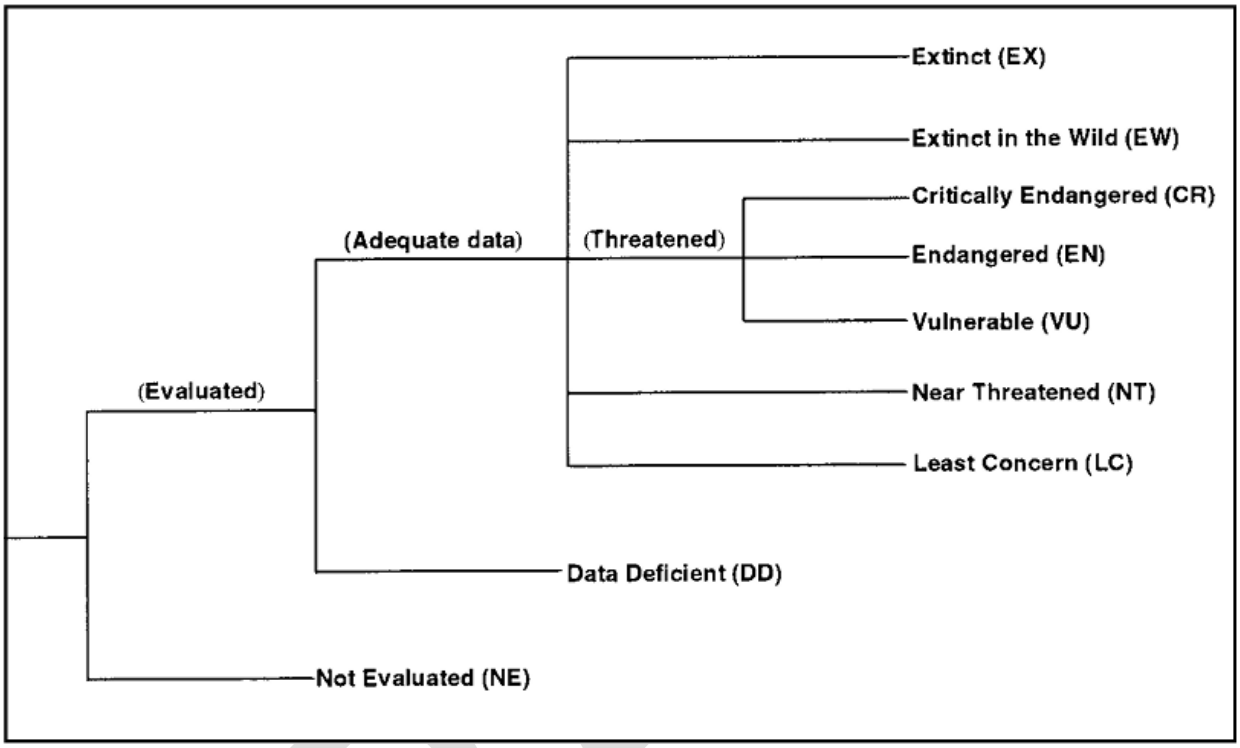


Figure 7. A representation of the relationships between the 9 categories (IUCN, 2001).

Table 3. IUCN red-list conservation criteria

Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild	A taxon is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

Critically Endangered	A taxon is critically endangered when the best available evidence indicates that it meets any of the criteria for critically endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered	A taxon is endangered when the best available evidence indicates that it meets any of the criteria for endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable	A taxon is vulnerable when the best available evidence indicates that it meets any of the criteria for vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened	A taxon is near threatened when it has been evaluated against the criteria but does not qualify for critically endangered, endangered or vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern	A taxon is least concern when it has been evaluated against the criteria and does not qualify for critically endangered, endangered, vulnerable or near threatened. Widespread and abundant taxa are included in this category.
Data Deficient	A taxon is data deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
Not Evaluated	A taxon is not evaluated when it is has not yet been evaluated against the criteria.

Endemic species

South Africa has a rich diversity of nationally and regionally endemic species that are found nowhere else on earth and, therefore, warrant consideration for assessment of sensitivity to potential developments. The endemic Northern Black Korhaan (*Afrotis afraoides*) was encountered during the transect surveys as shown in Appendix C. The Northern Black Korhaan is also known as the white-quilled bustard and it is widely distributed across Southern Africa. It is, therefore, listed as a species of Least Concern under the IUCN red-list conservation criteria. The endemic Northern Black Korhaan was only encountered once during surveys.

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METHODS

Methodology

Prior to conducting field assessments, a comprehensive literature review of available published and unpublished literature pertaining to bird interactions with powerlines, linking station and onsite substation infrastructure was undertaken. The aim of the desktop study was to summarise various issues involved specifically for the new proposed 132kV conductor lines to connect the Marula Cluster PV Development to the new Artemis MTS development in the Free State Province. Additionally, a list of previously recorded birds was obtained from Southern African Bird Atlas Project 2 (SABAP 2), and Google Earth was also used to determine potential habitats for birds. The field methodology was thereafter conducted for assessing the impact of the proposed development on the extant avifaunal population. All habitat types were covered during assessments, and all attempts were made to ensure a representative spread of sampling localities and survey effort that reflected overall habitat composition.



Figure 8. Photographic representation of a portion of the sampled site

Resident avifaunal population assessment

In determining the *in situ* local avifauna and avian habitats present on the proposed development area, site visits were from the 05th to the 07th of September 2022. The survey was conducted by two senior fieldworkers, and the survey time daily was from 06h00 am until 18h00 pm. Birds were observed using 8 x 42 Bushnell binoculars and photographic records were taken where possible.

Data collection methods included the following:

- Vehicle drive surveys: Vehicle surveys were predominantly done along the farm dirt roads and twin tracks as well as the service road of the existing power line infrastructure
- Walked-transects: Walking a fixed-length transect within a given time and recording all bird species seen or heard within a specified transect width.
- For large tree-nesting birds, tall trees were walked through in order to check for raptor nests.
- Lastly, waterbodies were inspected for waterfowl and other species that frequent waterbodies.

All data was recorded on BasicAirData GPS logger and BirdLasser. The entire project area was sampled to achieve the objectives of the assessment.

RESULTS OF AVIFAUNAL POPULATION ASSESSMENT

Species richness, species evenness, and species abundance

The overall species richness of the site is considered low (3,06) as indicated in Table 4. Species evenness reflected that the site was highly even as a value of 0 indicates complete unevenness and a value of 1 indicates complete evenness. A diversity index score of below 1.5 is considered poor, between 1.5 and 2.5 is moderate, between 2.5 and 3.5 is high, and greater than 3.5 is extreme. The site can be concluded to have a moderately low diversity according to Shannon's and Simpson's Diversity indices.

Table 4. Avifaunal species richness, evenness and diversity recorded during transect surveys

Total Species	Total No. of Individuals	Margalef's richness	Evenness	Shannon D	Simpson D
S	N	d	J'	H'(loge)	1-Lambda'
14	70	3,06	0,8843	2,334	0,8928

The species diversity results on Table 4 are specifically for the sampled farm areas. These are namely Portion 0/RE 0 of the farm Cornellia no. 1550 Boshof RD, Portion 0/RE of the farm Modderpan no. 750 Boshof RD, Portion 0/RE of the farm Leliehoek no. 748 Boshof RD and Portion 0/RE of the farm Klipfontein no. 305 Boshof.

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IMPACTS OF POWERLINES ON AVIFAUNAL POPULATION

BirdLife, a dedicated bird-conservation organisation in South Africa takes a strong position on the impact of solar energy generation and distribution/transmission on birds, but not withstanding the countries technological advancements and developments. BirdLife's primary concern is the movement and removal of globally or nationally threatened birds, endemic or range-restricted species, or rare species from critical habitats. They are mostly concerned with the following impacts imposed by the development of powerlines:

1. The displacement of threatened species from important habitats;
2. Loss of habitat for resident species, especially where cumulative impacts exist;
3. The disturbance of resident species throughout construction, operation and maintenance;
4. Collisions with photovoltaic panels;
5. Reflective surfaces of panels creating a mirror affect and possibly attracting waterbirds;
6. Electrocution and collision at power line infrastructure;
7. New power line construction.

BirdLife suggests the following actions in terms of mitigating the impacts on birds:

- Undertaking sufficient pre-construction monitoring to determine the presence of threatened, rare, endemic or range-restricted species. SABAP2 data is recommended to supplement adequate field surveys.
- Constructing PV plants close to existing power lines and, if new lines are required, motivate the need for lines to be adequately marked with anti-collision devices and bird-friendly designs to prevent electrocution.
- Not constructing PV plants in formally or informally protected areas or Important Bird Areas (IBAs), but in areas of low relevance for nature conservation.
- Constructing PV plants in already degraded areas.
- Avoiding construction near drainage lines with trees where birds will be concentrated (e.g., in Karoo where most PV plant are likely to be constructed).
- Avoiding construction near large trees (e.g., in the Karoo) which serve as nesting and roosting sites for raptors and vultures.
- Building solar arrays outside known waterbird flight paths.
- Not using chemicals/pesticides for the maintenance of land/vegetation and rather use mowing or grazing to retard vegetation growth.
- Constructing new power lines in such a way that they have minimal impact on birds (i.e., bird-friendly designs, appropriate wire marking devices).
- Deconstruction of the plant after the expected economic life span.

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The impacts that were considered relevant to the proposed power lines for the Artemis MTS and that have been included in the impact assessment ratings are shown in Table 6.

IMPACT ASSESSMENT RATINGS

The methodology for assessing the impact ratings is included as Appendix A: Method of Environmental Assessment at the end of this report. The rating rankings for assessing impacts significance are as shown in Table 5 below. The findings of the impact assessment ratings are shown in the tables below. Table 6 is the impacts matrix used for scoring environmental significance and Table 7 is a summary of impacts ratings for the proposed 132kV Artemis MTS Powerline development using Appendix A.

Table 5. Impact rating scoring used for the avifaunal impact assessment at the proposed powerline construction.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

An impact assessment of all potential pre-construction, construction, operational and maintenance phase impacts associated with the activities pertaining to the proposed infrastructure developments are provided in Table 6.

Table 6. Avifaunal impact ratings for the authorised corridor and associated powerline infrastructure.

Construction Phase	Preferred Alternative (Alternative 1)	
	Before Mitigation	After Mitigation
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of priority avian species from important habitats	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	1
Total SP:	42	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident avifauna through increased disturbance	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Use designated roads to access the site. Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control noise pollution. Rehabilitate area with indigenous flora

Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
Operation Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Minimise the construction footprint and reserve indigenous vegetation wherever possible. Avoid constructing during the breeding season (summer). Construct development in shortest timeframe and control pollution
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Loss of resident avifauna through increased disturbance	Minimise construction footprint and reserve indigenous vegetation wherever possible. Avoid development expansion and constructing during the avoid breeding season (summer). Construct development in shortest timeframe, control noise pollution
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact

POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Collisions with powerline infrastructure and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	Demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. Conduct quarterly fatality monitoring assessments
Magnitude:	4	3
Duration:	3	3
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	4	3
Total SP:	52	33
Significance rating:	Negative high impact	Negative medium impact
Decommissioning Phase	**Preferred Alternative (Alternative 1)**	
	Before Mitigation	**After Mitigation**
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Displacement of resident avifauna through increased disturbance	Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
Post Decommissioning Phase	**Preferred Alternative (Alternative 1)**	

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	Before Mitigation	After Mitigation
POTENTIAL IMPACTS ASPECTS		
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Minimise development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with native vegetation and retain indigenous vegetation throughout as far as possible, limit roadways and vehicle speeds; rehabilitate thoroughly post-decommissioning with locally native species
Magnitude:	3	2
Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Cumulative displacement of resident avifauna	Minimise development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation, control noise pollution, rehabilitate with indigenous flora and reserve indigenous vegetation throughout as far as possible, limit roadways and vehicle speeds
Magnitude:	3	2
Duration:	2	1
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	2	1
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	36	16
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats	Minimise development footprint and habitat transformation, rehabilitate with indigenous flora and reserve indigenous vegetation throughout as far as possible
Magnitude:	3	2

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Duration:	3	2
Geographical Extent:	1	1
Loss of Resources:	3	2
Reversibility:	3	2
Cumulative Effect:	2	1
Probability:	3	2
Total SP:	45	20
Significance rating:	Negative medium impact	Negative low impact
POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT:	Cumulative collisions with powerline infrastructure and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	Demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. Conduct quarterly fatality monitoring assessments
Magnitude:	4	3
Duration:	3	3
Geographical Extent:	1	1
Loss of Resources:	2	2
Reversibility:	3	2
Probability:	4	3
Total SP:	52	33
Significance rating:	Negative high impact	Negative medium impact

Table 7. Summary of avifaunal impact ratings for the proposed powerline.

	Average impact rating	**Significance class**	**Average mitigated impact**	**Significance class**
Overall avifaunal impacts of the powerline and associated infrastructure	42.92	Negative medium impact	20.50	Negative low impact

MITIGATION REQUIREMENTS

Loss of priority avian species from important habitats

The area has been identified as ' Medium to High Avian Sensitivity' by DFFE's screening tool. No priority species was recorded on the site and three have been confirmed for the wider SABAP2 pentads. The construction footprint must be minimised and indigenous vegetation should be reserved as much as possible. Constructing during breeding seasons (summer) must be avoided and construction should run for a shortest possible timeframe. Pollution should be controlled.

Loss of resident avifauna through increased disturbance

The resident avifaunal community has a moderately low diversity and only one individual of the endemic Northern Black Korhaan was recorded on site which is of Least Concern (IUCN 3.1). A biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase should be in place.

Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats

Designated roads must be used to access the proposed development site. The construction footprint must be minimised and indigenous vegetation should be reserved as much as possible. Constructing during breeding seasons (summer) must be avoided and construction should run for a shortest possible timeframe. Pollution should be controlled and the area should preferably be rehabilitated using indigenous vegetation.

Collisions with the powerline and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity

To avoid the impacts associated with powerline collisions, demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. Additionally, quarterly fatality monitoring assessments should be conducted. Implementing these mitigations should reduce the significance by 63% and results in Negative medium impact ratings.

In summary, the majority of the mitigations listed in Table 6 above for the powerline development involve minimising impact footprints during construction, limiting site access beyond direct disturbance zones, reducing noise pollution, constructing in winter (to avoid the breeding season), and using designated roads as much as possible. Implementing these mitigations reduces the significance by 50% which results in acceptable Negative low impact ratings.

NO-GO AREAS, BUFFERS AND ALTERNATIVES

No no-go areas are applicable to the project site from an avifaunal perspective. Should the proposed activity not proceed, due to other specialist studies, the site will remain unchanged and will continue to be used for agricultural purposes.

No other possible sites were identified or authorised on the affected property(ies) for the powerline development. This site is referred to as the authorised corridor. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the Basic Assessment process to enable the appropriate placement of the infrastructure within the development footprint.

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CONCLUSION AND RECOMMENDATIONS

The proposed 132kV powerline is situated in an area of Medium to High sensitivity. Assessments for the present waterbodies were conducted and only species of Least Concern were encountered. As a result, from an avifaunal perspective, there is no objection to the development of the proposed powerline development and associated infrastructure, provided to the recommended mitigation measures are strictly followed. The overall impacts (including cumulative) for the project are considered to be Negative low should the mitigation recommendations be effectively implemented.

Specific conditions recommended for the EA from an avifaunal perspective

1. Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness.
2. Implement mitigation controls during the operational phase as specified in the mitigation. Monitor and report on their effectiveness.
3. Monitoring of implementation of mitigation controls, along with reporting, should be undertaken at least quarterly throughout the construction phase, and bi-annually during the operational phase. Monitoring, at the minimum, should consist of a quarterly monitoring of the powerline area for evidence of collisions and electrocution risks.
4. Preserve as much of the natural habitat as possible during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts.
5. Effective restoration of the natural habitats that were intact before the development should be implemented and reported on after decommissioning.

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APPENDICES

Appendix A: Method of Environmental Assessment

1.1 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 5.

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

1.1.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 8. The rating system

NATURE		
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).

3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		

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This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.

DRAFT

51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

DRAFT

Appendix B: Photographs of sampled habitat types



Figure 9. Avifaunal surveys were conducted on the existing powerline in the development area to understand potential impacts of the proposed construction on the avifaunal community.

DRAFT



Figure 10. Wetland habitat where fixed point avifaunal surveys were conducted to confirm avian sensitivity.

DRAFT



Figure 11. Grassland habitat where walked and vehicle drive transects were conducted .

DRAFT

Appendix C: Species composition of encountered avifaunal community during assessments and photographs of selected bird species from the site

Species	Latitude	Longitude	Count
Ant-eating Chat	-28.65904	25.71685	5
Black-winged Kite	-28.66183	25.72364	1
Cape Weaver	-28.65806	25.7143	16
Dark-capped Bulbul	-28.65819	25.71439	7
Eastern Clapper Lark	-28.65804	25.71373	3
Laughing Dove	-28.65806	25.7143	2
Namaqua Dove	-28.65852	25.71433	1
Northern Black Korhaan	-28.66375	25.7231	1
Red-knobbed Coot	-28.6581	25.71432	4
Ring-necked Dove	-28.65292	25.6992	9
Scaly-feathered Weaver	-28.65166	25.69513	10
Southern Masked Weaver	-28.65265	25.69842	4
White-browed Sparrow-Weaver	-28.65454	25.69803	5
Yellow-billed Duck	-28.65854	25.71451	2

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Figure 12. Photographic representation of the observed White-browed Sparrow-Weaver during surveys.

DRAFT



Figure 13. Photographic representation of the observed Dark-capped Bulbul during surveys.

DRAFT

Appendix D: Site sensitivity ratings to species data in the screening tool

Sensitivity Rating	Description of Sensitivity Rating
Very high	Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 is considered critical habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under the CR, EN, or VU criteria of the IUCN or species listed as Critically/Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a critical habitat, all remaining suitable habitat has been manually mapped at a fine scale.
High	Recent occurrence records for all threatened (CR, EN, VU) and/or Rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2002) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat. For birds, species distribution models (SDMs) and SABAP2 data (http://sabap2.birdmap.africa/) were combined to delineate the 'high' sensitivity areas
Medium	Medium Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
Low	Low Areas where no species of conservation concern (SCC) are known or expected to occur.

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COMPLIANCE STATEMENT FOR THE PROPOSED MARULA CLUSTER – GRID LINE CONNECTION

PREPARED FOR

BIOBLUE ENVIRONMENTAL SUSTAINABILITY

SEPTEMBER 2022

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BACKGROUND

The project is a Basic Environmental Impact Assessment Application for a twin 132kV Conductor line. The 132kV conductor line will be connected to a small collector substation and then connected to the new Artemis Main Transmission Substation (MTS). This line will service the approved Marula Cluster Solar PV developments situated to the south of the proposed line.

Digital Soils Africa (Pty) LTD (DSA) were tasked by Bioblue Environmental Sustainability to undertake an Agricultural Compliance Statement for the Application of an Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment ("EIA") Regulations, 2014. The Compliance Statement Assessment is reported according to the protocol for the specialist assessment and minimum report content requirements for the environmental impacts on agricultural resources (GN320 of 2020).



FIGURE 1: LOCATION OF THE STUDY AREA IN THE FREE STATE PROVICE.

TERMS OF REFERENCE

As per the protocol, Terms of Reference applicable to an "Agricultural Compliance Statement" is as follows:

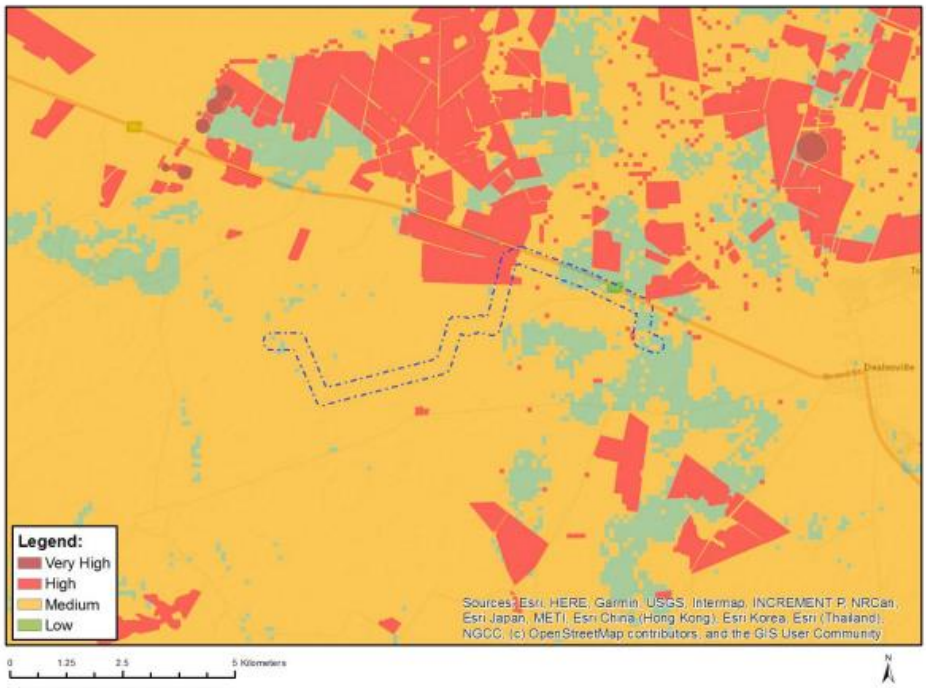
1. The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP. (**pg37**)
2. The compliance statement must:
    - be applicable to the preferred site and proposed development footprint **(pg1)**;
    - confirm that the site is of "low" or "medium" sensitivity for agriculture**(pg34)**;
    - indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site **(pg34)**.
3. The compliance statement must contain, as a minimum, the following information:
    - contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae **(pg37)**;
    - a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool **(pg3)**;
    - confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities **(pg34)**;
    - a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development **(pg34)**;
    - any conditions to which the statement is subjected **(pg34)**;

    in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase **(pg34).**

ENVIRONMENTAL SCREENING TOOL

As per GN960 of 2019, read with Section 24(5)(a) of the NEMA, an Environmental Screening Report (ESR) was generated for the application using the National Web-based Screening Tool (Figure 2). The ESR classifies the area as being high sensitivity for the *Agricultural* theme, although only a small portion of the study area has a high sensitivity (northern side of the study area). Most of the area has moderate sensitivity.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 2: RESULTS OF THE SCREENING TOOL INDICATING THAT THE AREA IS CLASSIFIED AS HAVING A HIGH SENSITIVITY.

DATA LIMITATIONS, ASSUMPTIONS AND STUDY gaps

1. No Socio-Economic report was conducted for the study to determine loss of employment.
2. It was also assumed that the desktop grazing capacity (DAFF, 2016) (Schulze, 2007) data is correct for the site.

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METHODOLOGY

DESKTOP STUDY

A desktop study was being conducted to determine the climate, agricultural potential, soil erosion sensitivity, topography, vegetation, and land-use from the best available sources.

- Climate and soil erosivity from (Climate-data.org, 2021)
- Agricultural potential from the Land Type Survey Staff (1972-2006).
- Topography from the SRTM 30m DEM.
- Land-use from South African National Land Cover (Geo Terra Image, 2018).
- Natural vegetation will be determined from the Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2006- 2018).
- Long Term Grazing Capacity for South Africa from Department of Agriculture, Forestry and Fisheries (2016)

FIELD VISIT

The field survey was conducted on the 2nd of September 2022. During the field survey visual observations and soil observations made with a hand auger were all logged using a GPS.

- The soils were described and classified according to the Soil Classification Working Group (2018).
- Visual observations of land degradation, crops and land-use were made. The data will be compared to the soils data from the land type survey and the agricultural capability, as well as the land-use map, will be refined.

IMPACT ASSESSMENT

The purpose of the impact assessment is to determine the Significance of potential impacts, so that those activities that are expected to result in high impacts can be altered, or management measures imposed to lessen the impact significance. Impact Significance is calculated by the following formula:

Impact Significance = Consequence x Likelihood

Likelihood refers to the probability that an impact will occur at some time throughout the project. The Matrix which is proposed to determine Likelihood is as follows (Table 1):

TABLE 1: MATRIX USED TO DETERMINE LIKELIHOOD

Likelihood	Unlikely: Impact Could occur in extreme events. Less than 15% chance of the impact ever occurring.	1
	Possible: possibility of impact occurring is very low. 16% - 30% chance of the impact occurring.	2

	Probable There is a distinct possibility of the impact occurring. 31% to 60% chance.	3
	Highly Probable: The impact is expected to occur. Between 61% and 85 % chance.	4
	Definite: There are sound scientific reasons to expect that the impact will occur	5

Consequence is calculated by considering the **duration**, spatial **scale** and **intensity** of an impact.

Duration relates to the time-frame that an aspect will be impacted upon. For example, any impact to a heritage resource is considered permanent, while the impact of increased traffic related to a construction activity will only last as long as the construction phase. Duration is rated according to the following criteria (Table 2):

TABLE 2: MATRIX USED TO RATE DURATION

Duration	Short term: Less than 1 year and is reversible.	1
	Short to medium term: 2 - 3 years	2
	Medium term - 3 to 10 years	3
	Long term: 11-20 years	4
	Permanent: in excess of 20 years	5

Spatial **Scale** relates to the physical extent of the zone of influence of an impact. Where groundwater or air quality impacts, for example, can extend far beyond the footprint of the activity, it is not expected that the impact of vegetation removal should extend beyond the footprint of the activity of vegetation removal.

Scale is rated according to the following criteria (Table 3):

TABLE 3: MATRIX USED TO RATE SCALE

Scale / Extent	Isolated: Limited footprint within the site will be affected (less than 50% of the site)	1
	Site Specific: The Entire Site will be affected	2
	Local: Will affect the site and surrounding areas	3
	Regional: Will affect the entire region / catchment / province	4
	National: Will affect the country, and possibly beyond the borders of the country	5

The **Intensity** of an impact is calculated by considering the **severity of the impact** (how it will change the aspect, will it be destroyed completely, or altered slightly?) and the **sensitivity of the aspect** (is the aspect sensitive to change, and is the aspect important to ecosystem processes or social dynamics?). For example, if the impact is anticipated to completely destroy a local plant population, but the plant population is commonly found and protected in nearby surroundings, the over-all intensity is lowered. If, however, the plant population in question is unique or protected, the intensity increases proportionately.

The Matrix which is proposed to determine Intensity is as follows (Table 4):

TABLE 4: MATRIX USED TO RATE INTENSITY

Intensity	2	Not significant	**Magnitude**	Slight: Little effect, negligible disturbance / benefit	1
				Slight to Moderate: Effects are observable but natural process continue	2
	3	Slight		Moderate: ecosystem processes / social dynamics are permanently altered, but functioning.	3
	4	Slight - Moderate		Moderate - High: natural / social processes are altered to the point where function is limited	4
	5	Moderate		High: The aspect is affected so that its functioning is compromised and this effect is irreversible	5
	6	Moderate - High	**Sensitivity**	Not sensitive: The aspect is not sensitive to change (No irreplaceable loss of resource)	1
	7	High		Somewhat sensitive: The affected aspect is of not of significant value but is sensitive to change	2
	8	Very High		Sensitive: The affected aspect is of moderate value and is slightly resilient to change	3
	9	Extremely High		Very Sensitive: The affected aspect is of significant value and only slightly resilient to change	4
	10	Fatal Flaw		Irreplaceable: The affected aspect is valued and sensitive to change. Irreplaceable loss of significant resource	5

Therefore, considering the formula:

Significance = Consequence x Likelihood
Where Consequence = Duration + Scale + Intensity
And Intensity = Severity of the Impact + Sensitivity of the Aspect
The over-all Significance rating can be calculated as a value between 4 and 100. The score is then categorised as follows:

- 4 to 19 = Insignificant Impact, no mitigation is required beyond standard best practice;
- From 20 to 39 = Low Impact, specific mitigation should be included in the EMP and monitoring should be undertaken;
- From 40 to 59 = Moderate Impact, specific mitigation with strict monitoring is required;
- From 60 to 79 = High Impact, mitigation should consider alteration of the design or process to reduce the impact significance;
- >Higher than 80 (100 max) = The Impact is so Significant that the project design must be reconsidered to avoid the impact.

Impacts will be rated as per the abovementioned methodology without consideration of mitigation measures first, however there may be some mitigation already inherent in the design of the Project.

Those impacts that are rated as having a moderate impact or above will be investigated further and management measures identified to attempt to reduce the Consequence or Likelihood of the impact. These impacts will then be rated again, while considering the mitigation measures that have been imposed.

DESKTOP RESULTS

ELEVATION AND SLOPE

The site is found at the crest leading down to the midslope (Figure 3). The general direction of water flow is from the east to west. Most of the survey area has a slope of less than 1.2%. There are steeper slopes in the northwest with increased elevation. In soil types prone to erosion, slopes above 8% can increase the risk of erosion dramatically. Therefore, the risks of erosion are low due to the gentle slopes. The terrain capability (Figure 5) was high (7) for most of the site (Department of Agriculture, 2017).

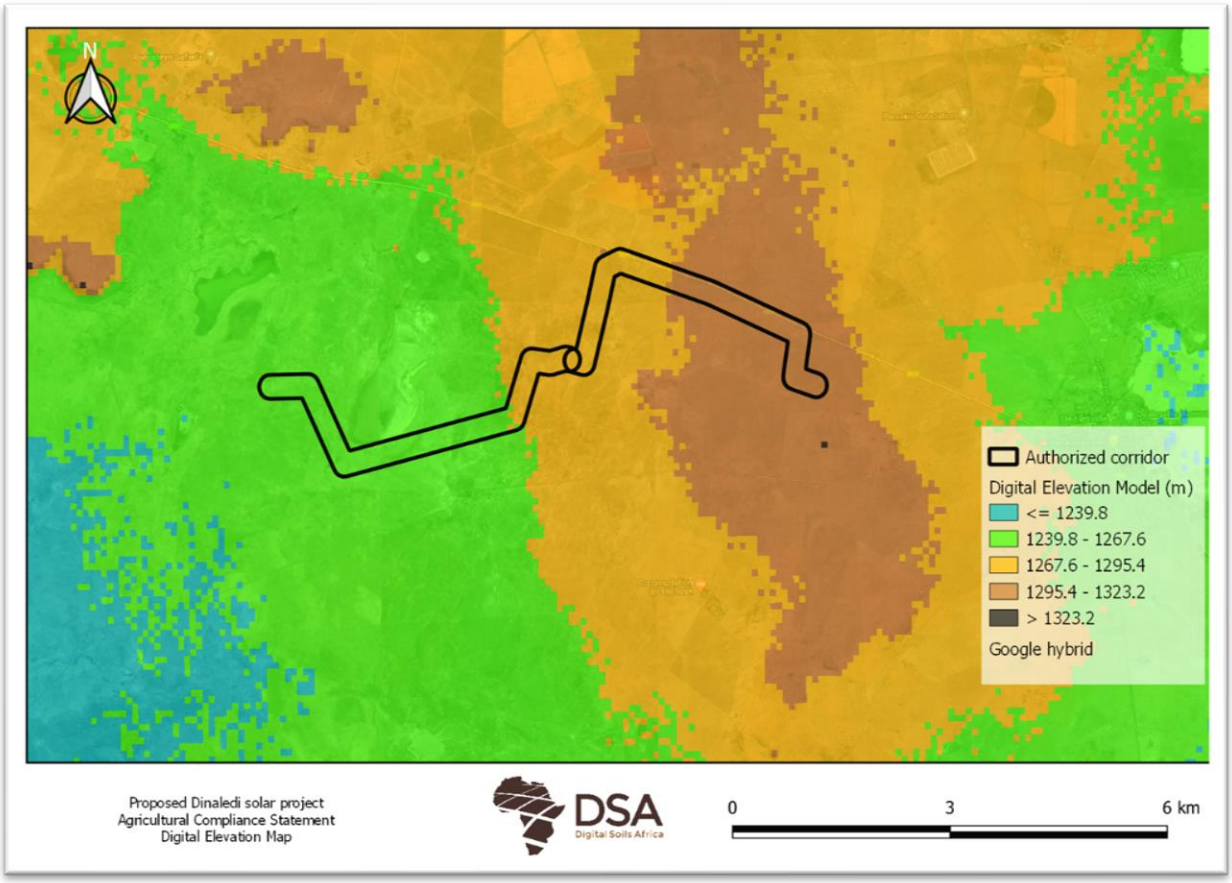


FIGURE 3: ELEVATION OF THE STUDY AREA.

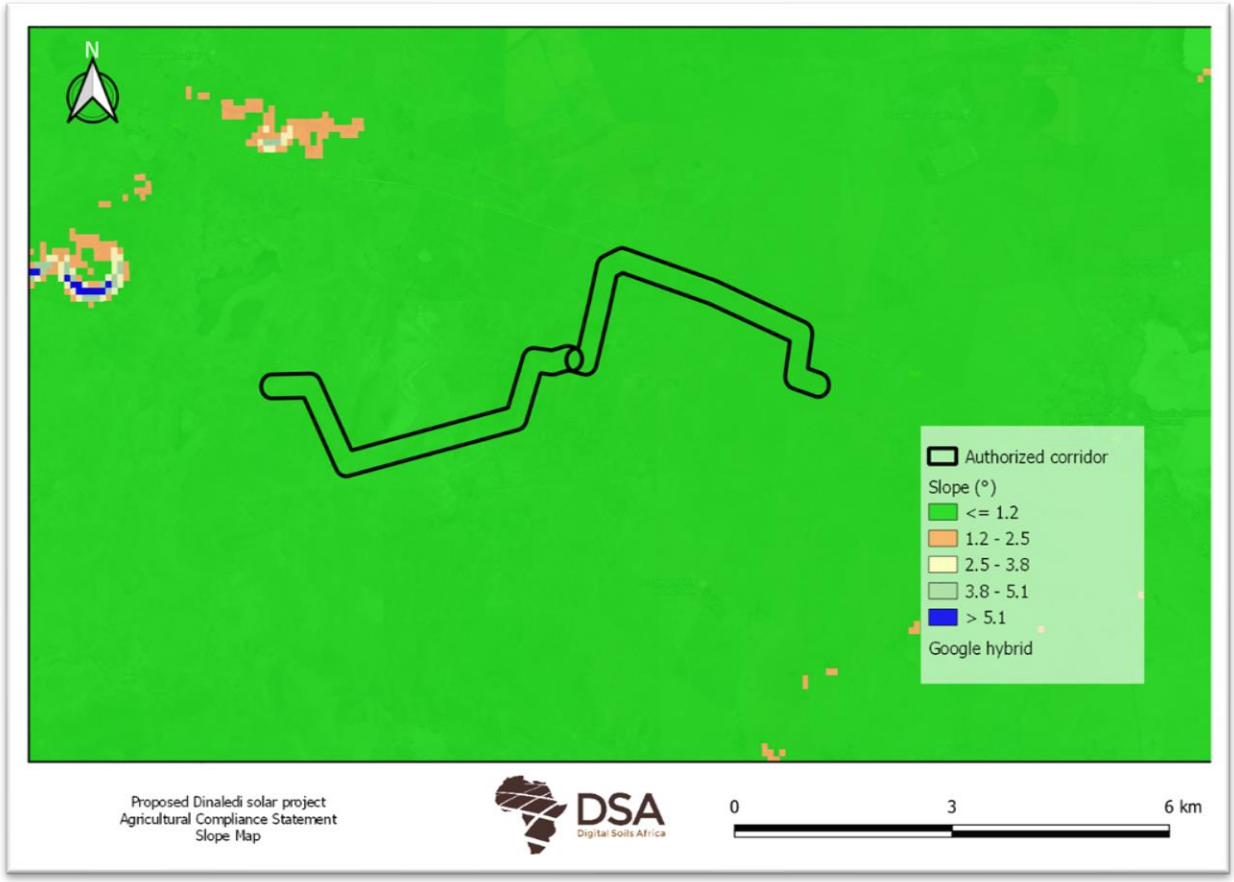


FIGURE 4: SLOPE OF THE SURVEY AREA AS DEGREES.

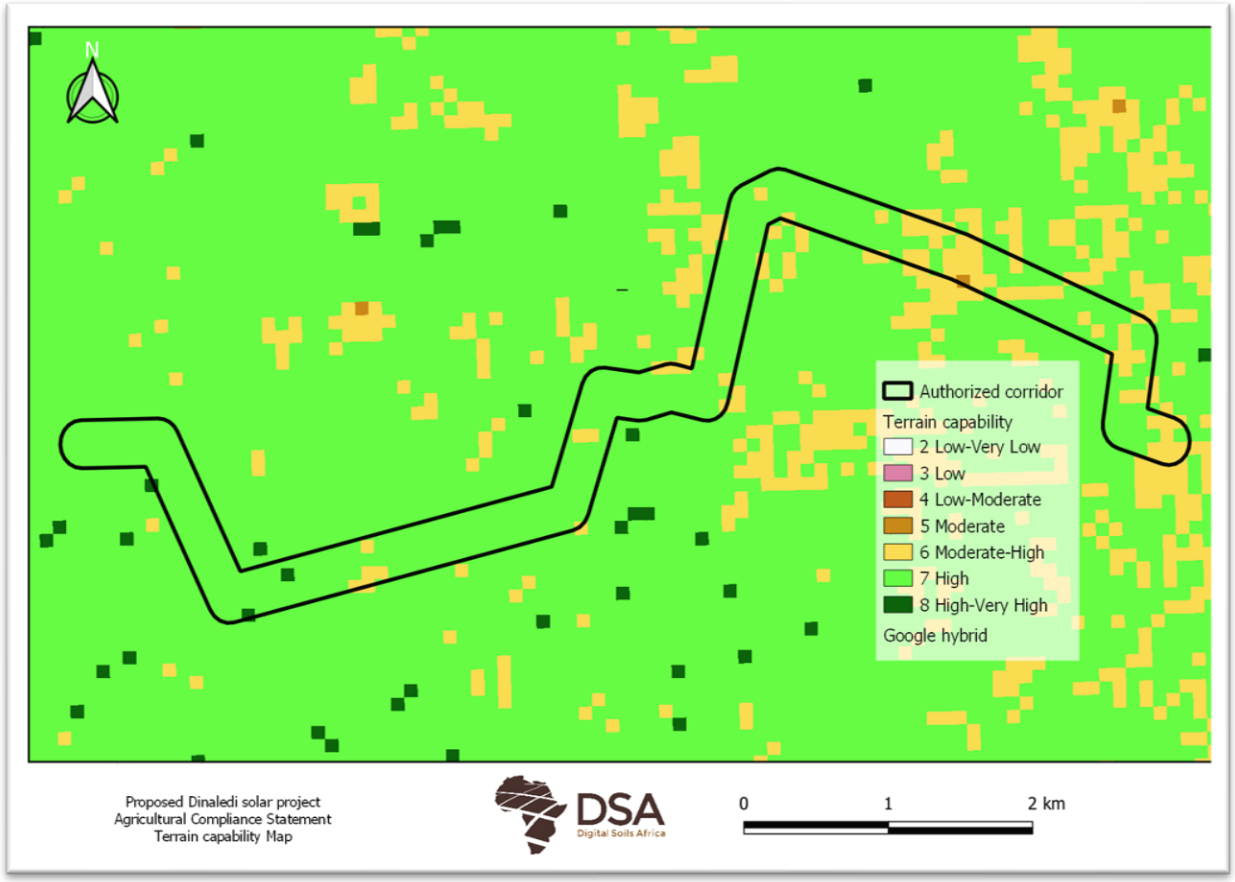


FIGURE 5: TERRAIN CAPABILITY (DEPARTMENT OF AGRICULTURE, 2017).

LAND TYPE INFORMATION

There are two land types occurring in the study area, namely, Ae46 and Db3 (Figure 6). The criteria for an area to qualify for inclusion in the land types is given in Table 5. The Db land type dominates the study area. The soil capabilities of the area varied between low-moderate (4) to moderate-high (6) (Department of Agriculture, 2017).

TABLE 5: BRIEF DESCRIPTION OF BCONDUCTOR LINE LAND TYPES FOUND IN THE STUDY AREA.

Land type	Description
Ae	The Ae Land Type refers to red, high-base status soil, of which the depth varies from 0.1 to > 0.3 m. The soil forms found are usually Hutton and Nkonkoni.
Db	Duplex soils (sandier topsoil abruptly overlying more clayey subsoil) comprise >50% of land type; <50% of duplex soils have non-red B horizons.

.

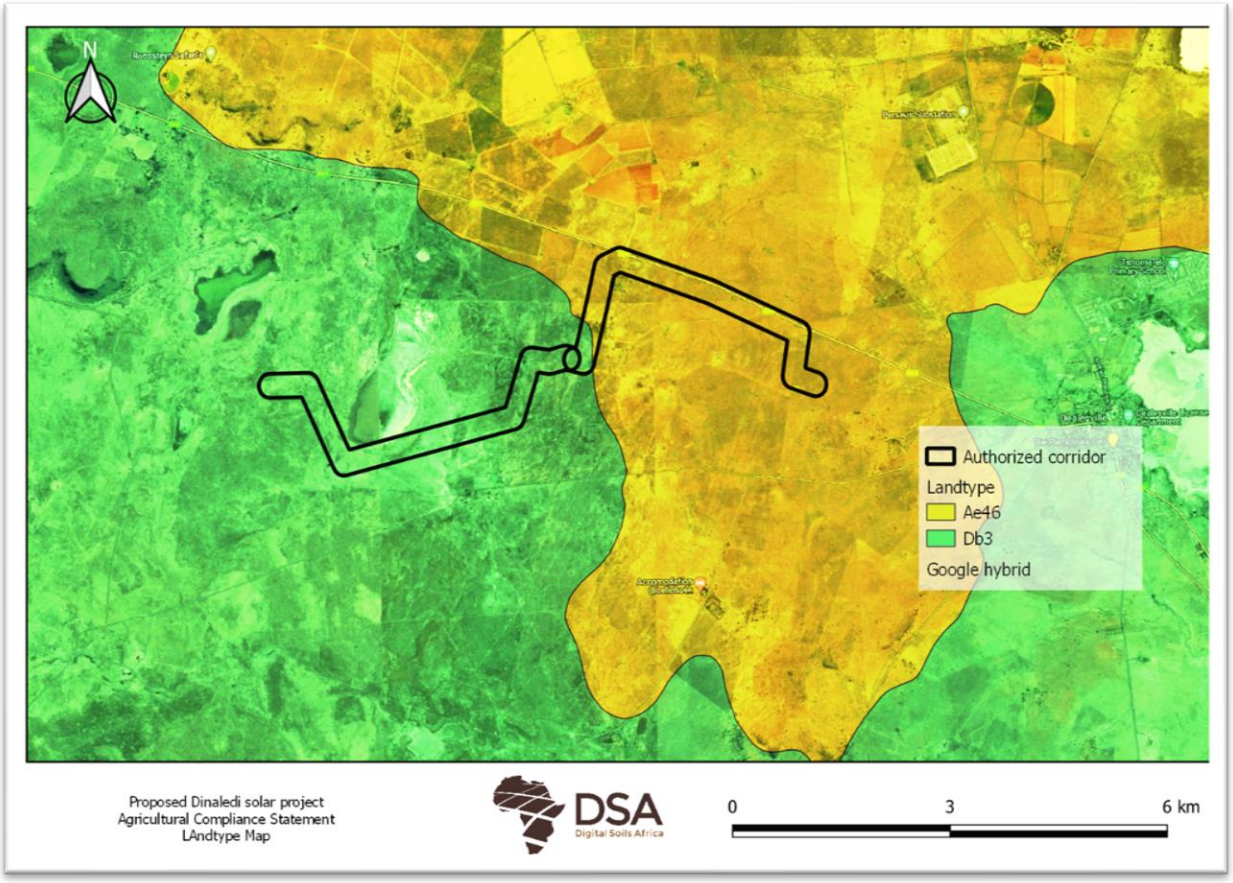


FIGURE 6: LAND TYPES OCCURRING IN THE STUDY AREA (LAND TYPE SURVEY STAFF, 1972 – 2002).

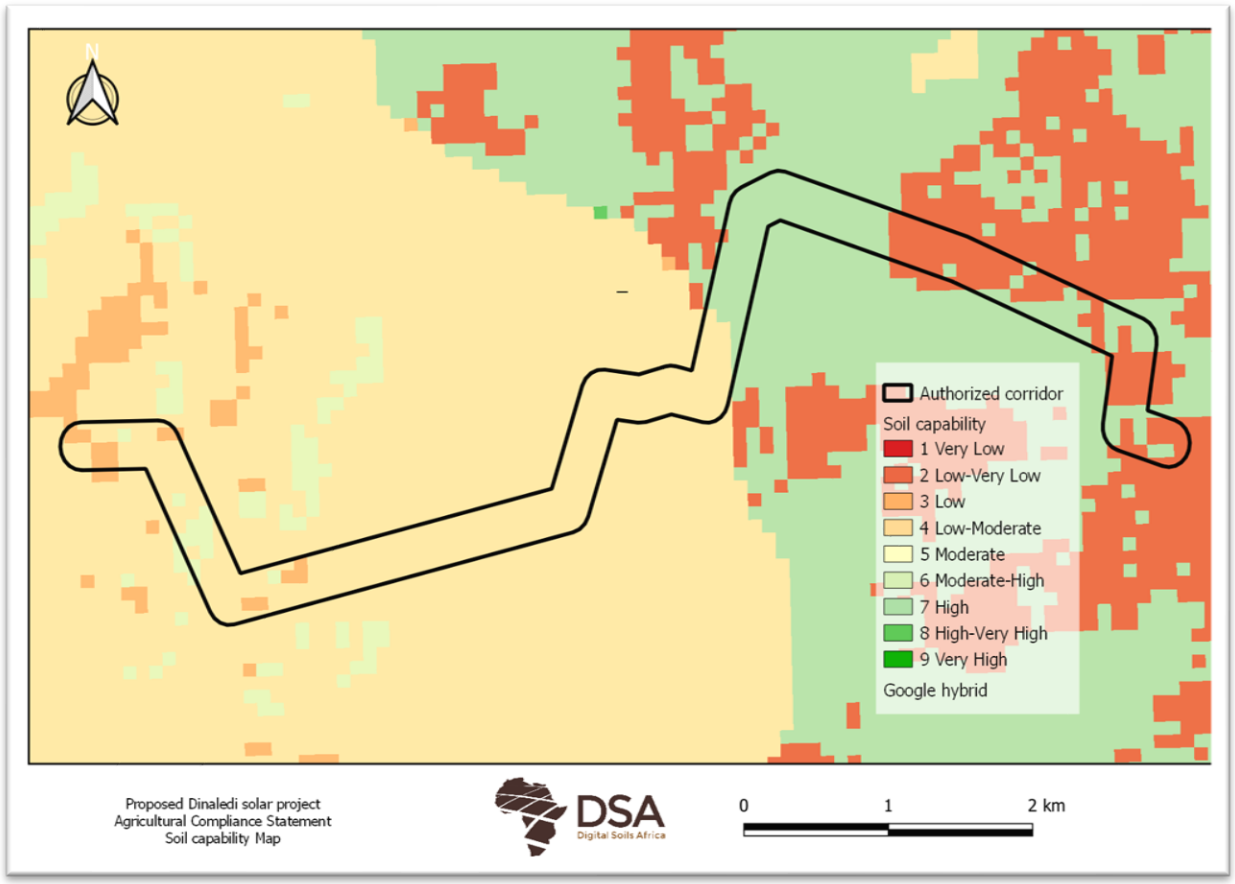


FIGURE 7: SOIL CAPABILITY CLASS MAP (DEPARTMENT OF AGRICULTURE, 2017).

GEOLOGY

The geology consists of the Karoo Dolerite and Volksrust Family (Fm), Ecca Group (Figure 8). Sandstone, mudstone and shale from the Volksrust Formation, Ecca Group lie beneath extensive areas of flat to undulating plains, interrupted by dolerite sills. Streams and river are prevented to flow away from plains, causing water to drain into the numerous pans which is a unique feature of this landscape (Mucina, 2006).

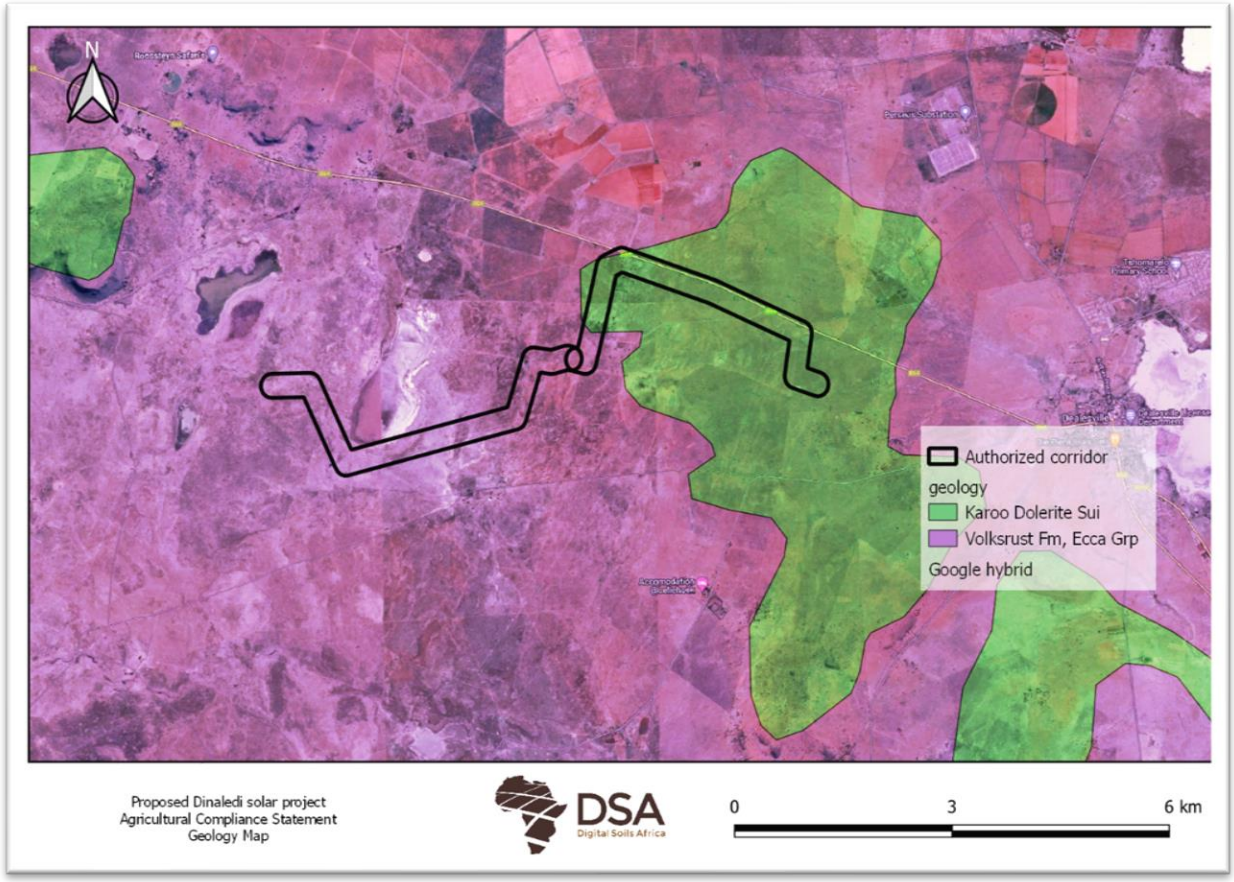


Figure 8: Geological map of the survey area (Council for Geoscience, 2007).

CLIMATE

Climatic information for the site was obtained from the South African Atlas of Climatology and Agrohydrology as seen in Figure 9 and Figure 10 (Schulze, 2007). Selected climatic parameters are presented in Table 6 (Climate-data.org). The Köppen-Geiger climate classification is BSh. The Koppen description states that when compared with winter, the summers have much more rainfall. Precipitation is about 506 mm, indicating that it falls within the semi-arid region (Figure 9). The average temperature in Dealesville is 24.4 °C. The climate capability (Figure 11) was low-moderate(4) (Department of Agriculture, 2017).

TABLE 6: SELECTED CLIMATOLOGICAL ATTRIBUTES FOR THE STUDY SITE (CLIMATE-DATA.ORG)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Temperature (°C)	24.4	23.5	21.6	17.3	13.6	10	9.9	13	17.2	20.5	22.3	23.9
Min. Temperature (°C)	17.8	17.3	15.5	11	7	3.3	2.7	5	8.8	12.4	14.5	16.7
Max. Temperature (°C)	31	30	28.2	24	20.9	17.7	18	21.3	25.5	28.4	29.8	31
Precipitation / Rainfall mm	78	71	68	47	21	12	8	14	16	42	61	68
Humidity(%)	44	49	51	54	52	52	44	36	29	32	34	40
Rainy days (d)	8	8	7	5	3	2	1	2	2	5	6	7

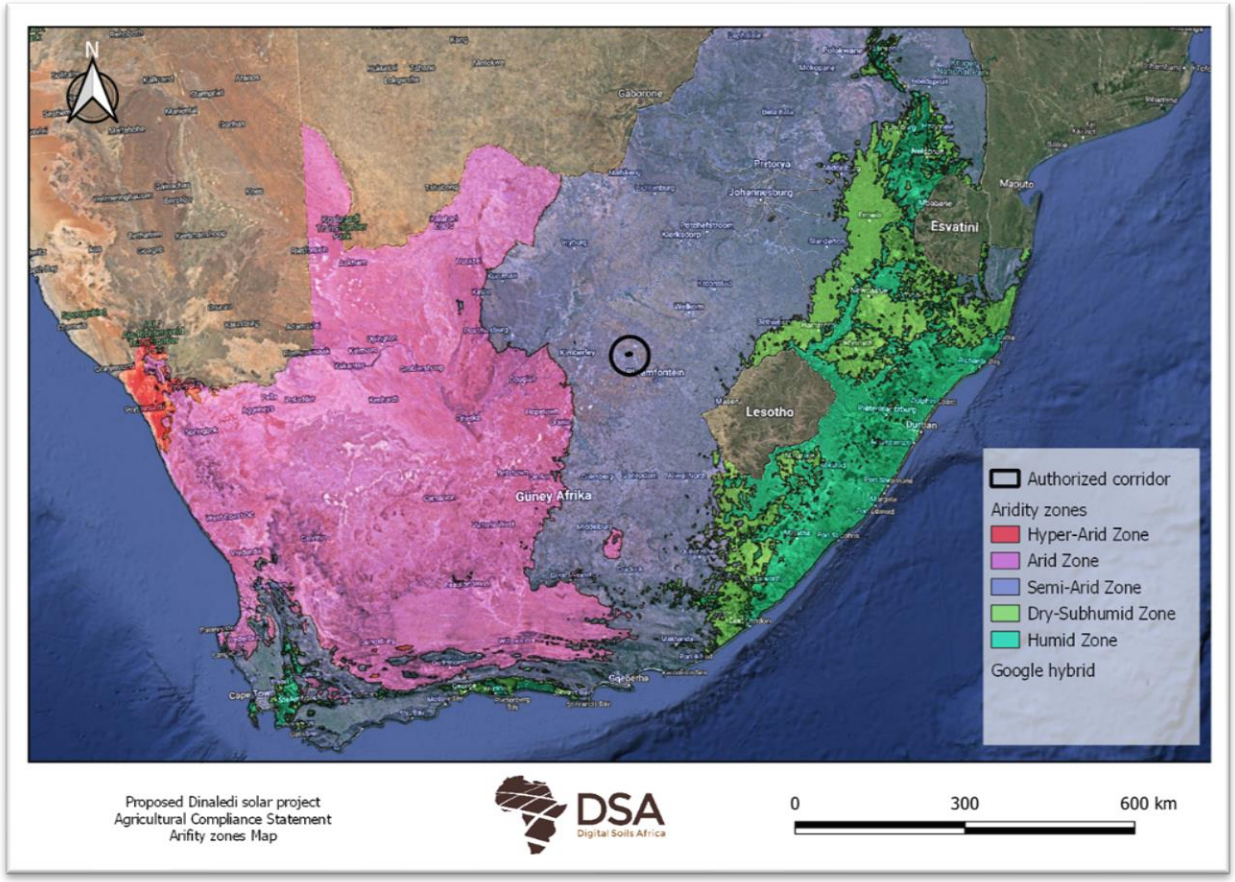


FIGURE 9: ARIDITY ZONES OF THE SITE AND SURROUNDING AREA (SCHULZE, 2007).

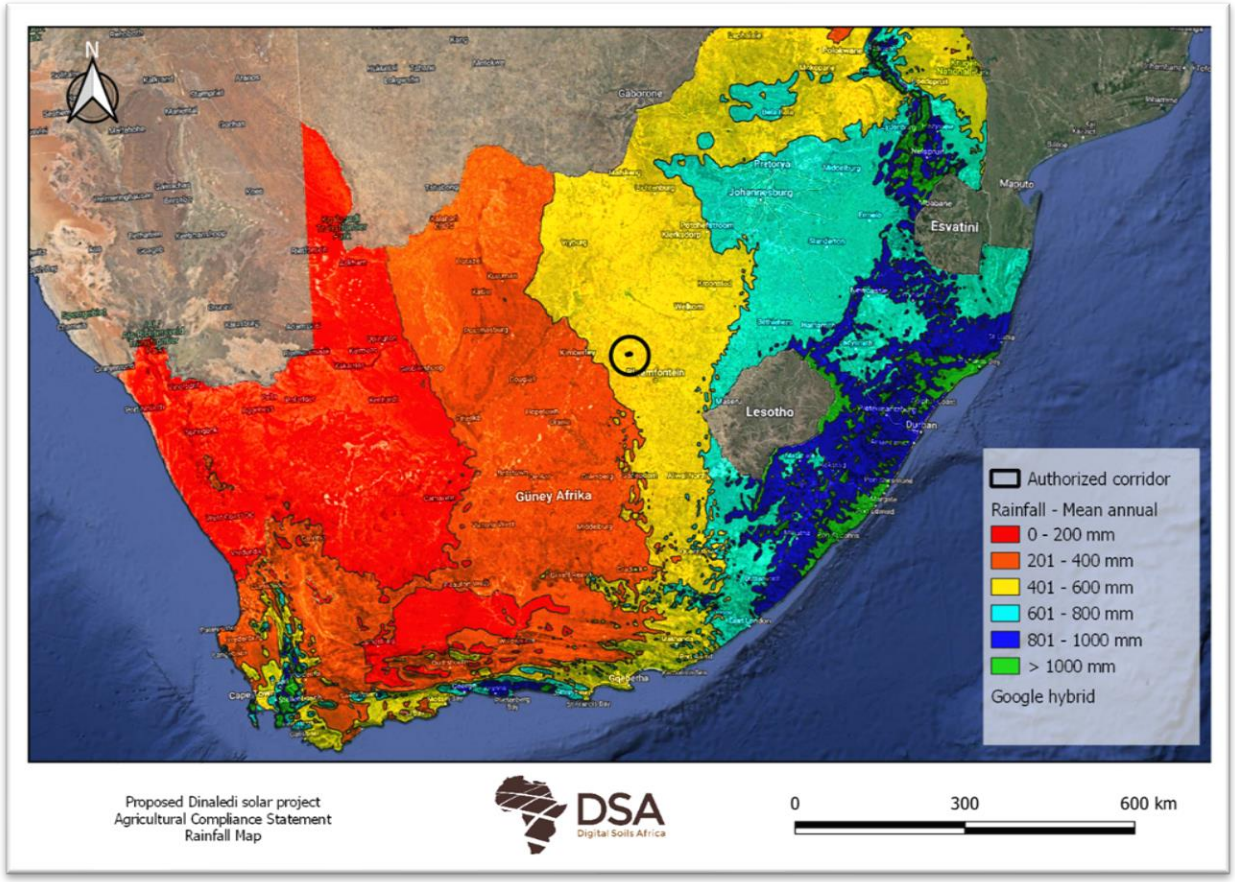


FIGURE 10: RAINFALL OF THE SITE AND SURROUNDING AREA (SCHULZE, 2007).

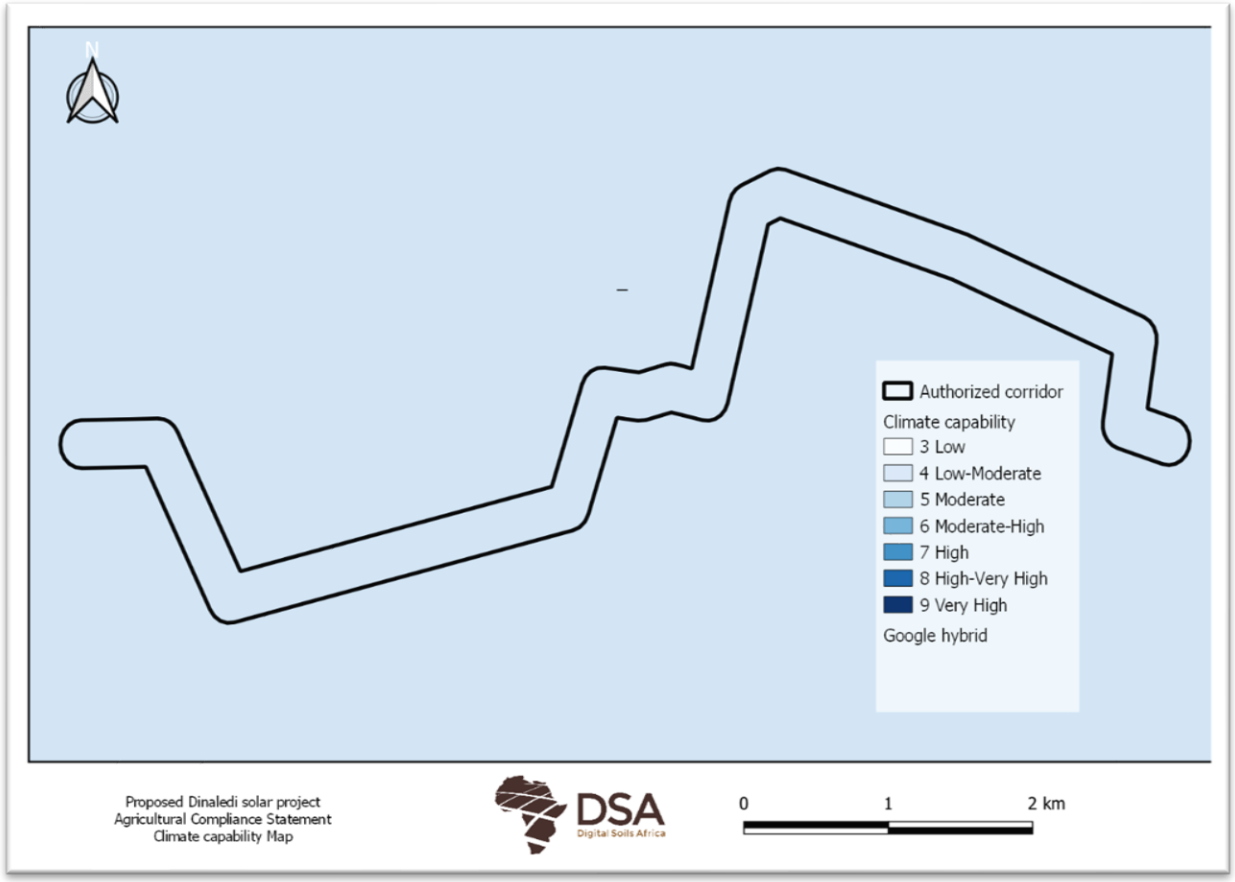


FIGURE 11:CLIMATE CAPABILITY (DEPARTMENT OF AGRICULTURE, 2017).

VEGETATION, CURRENT LAND-USE, AND AGRICULTURAL ACTIVITIES

The study area consists of the Vaal Vet Sandy Grassland and the Western Free State Clay Grassland (Figure 12). The area is dominated by the Western Free State Clay Grassland which consists of vegetation and landscape features restricted to flat bottomlands which support dry species and poor grassland with a high number of salt pans embedded. The grazing capacity of the area varies with the western side having a grazing capacity of 10 LSU/ha and the eastern parts 8 LSU/ha (Figure 13). The unit ha/LSU is a homogeneous unit of vegetation expressed as the area of land required (in hectares) to maintain a single animal unit (LSU) over an extended number of years without deterioration to vegetation or soil. Where an LSU = An animal with a mass of 450 kg and which gains 0,5 kg per day on forage with a digestible energy of 55% (Trollope et. Al., 1990).

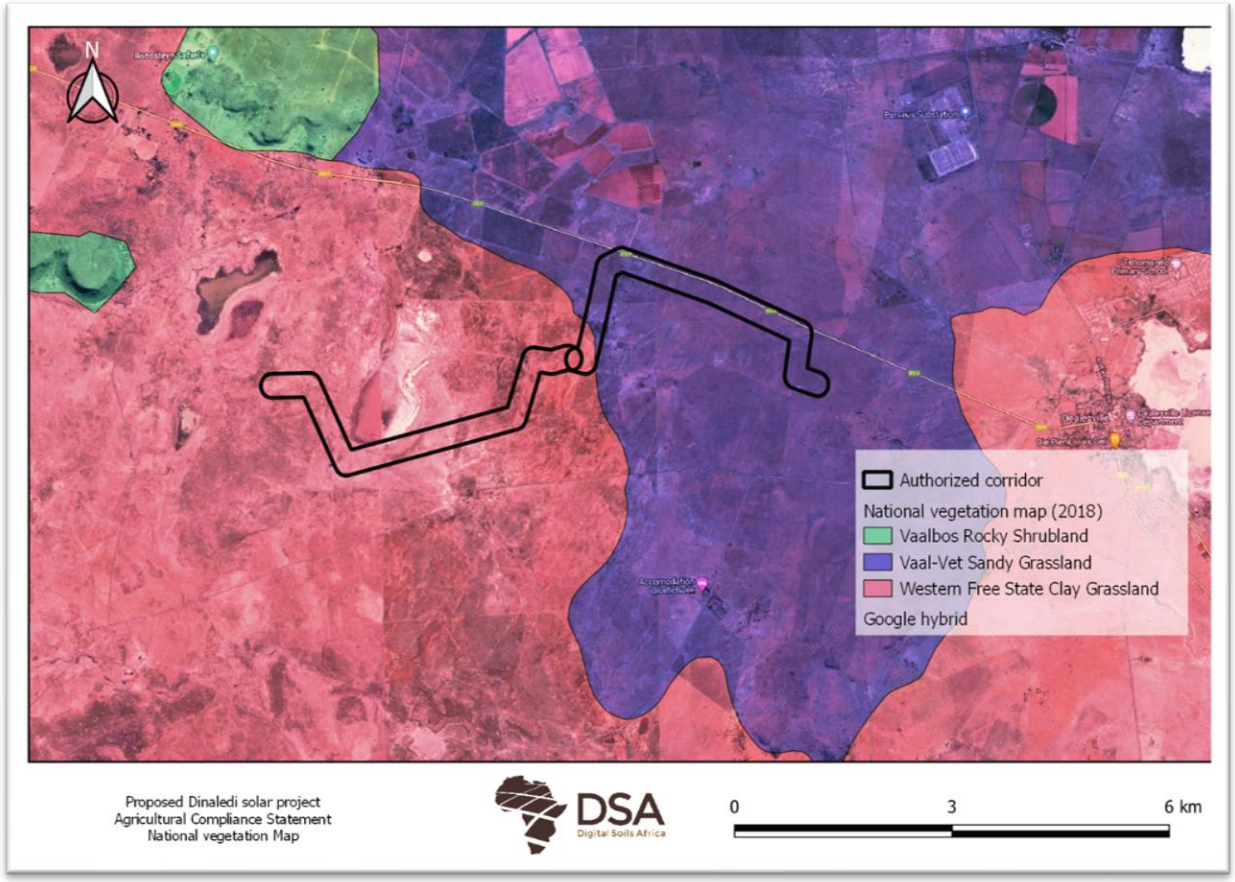


FIGURE 12: VEGETATION MAP OF THE SITE (SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE, 2018).

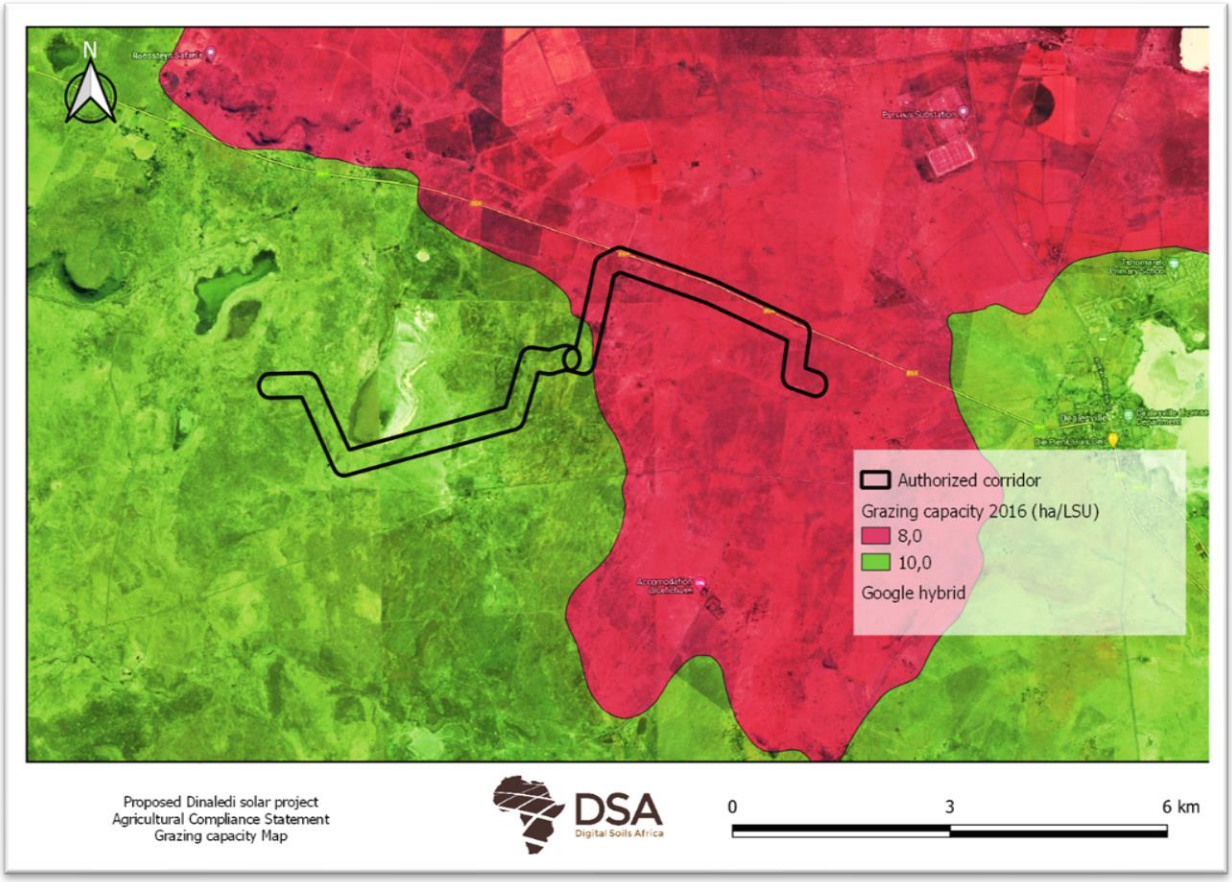


FIGURE 13: LONG TERM GRAZING CAPACITY IN HA/LSU (DAFF, 2016) OF THE SITE AND SURROUNDING AREA.

South African National Land-Cover 2020 (SANLC 2020) (GeoTerraImage, 2020) was used as a guide and verified with field observations. The main land-use is natural grassland (13) (Figure 14). Cultivated Commercial Annuals Non-Pivot / Non-Irrigated (40) occurred in the northern corner of the study area. Google Earth Pro was used to determine if any cultivated areas currently occur on the area were Cultivated Commercial Annuals Non-Pivot / Non-Irrigated (40) was shown (Figure 14). The map showed that no cultivation occurred from 2015-2022 and that the last known date of cultivation was 1985 (See Figure 15,Figure 16 Figure 17).

TABLE 7: LEGEND TO FIGURE 14

No.	Class Name	Class Definition
4	Open Woodland	Natural tall woody vegetation communities, with canopy cover ranging between 10 - 35%, and canopy heights exceeding 2.5 metres. Typically represented by open bush and woodland communities.
6	Open & Sparse Planted Forest	Open to sparse cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover ranging between 5 - 35%, and canopy heights exceeding 2.5 metres. Typically represented by young or recently planted commercial plantation tree stands. This class also include smaller woodlots and windbreaks, as per class 5 above.
8	Low Shrubland (other regions)	Natural, low woody shrubland communities, where the total plant canopy cover is typically both dominant over any adjacent bare ground exposure, and the canopy height ranges between 0.2 – 2 metres. Note: this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 10 - 100%) in order to provide a more comparable

		content to the 1990 and 2013-14 SANLC datasets. If a tree or tall bush woody cover is evident it is typically < 0.1 % of total canopy cover. Typically representative of low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Note this this definition differs slightly from the equivalent gazetted class definition (i.e. total plant canopy cover ranges between 4 - 100%) in order to provide a more comparable content to the 1990 and 2013-14 SANLC datasets. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
26	Dry Pans	Naturally occurring areas of non-vegetated, consolidated substrate, associated with permanent or long-term dry pans. Typically associated with the Northern Cape regions. Note that the full spatial extent of any pan landscape feature is often represented by a combination of both flooded pans, dry pans, and/or herbaceous wetland vegetation classes; although this may not still represent the full extent of the physical pan depression, especially if the pan depression has been grass covered for a long time without flooding.
40	Cultivated Commercial Annuals Non-Pivot / Non-Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual crops, The plants only remain in the field for one growing seasons and one harvest, and are grown non-irrigated, rainfed fields.

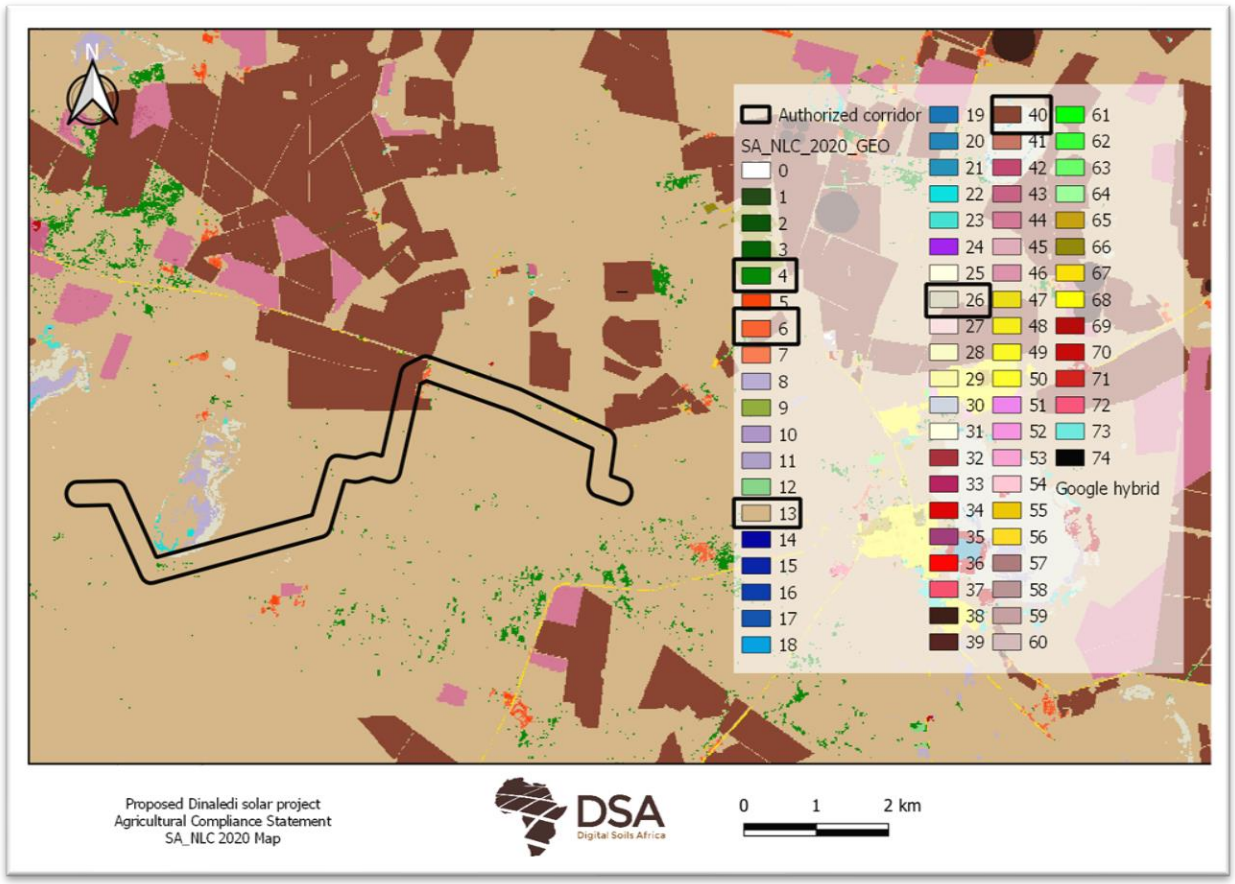


FIGURE 14: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

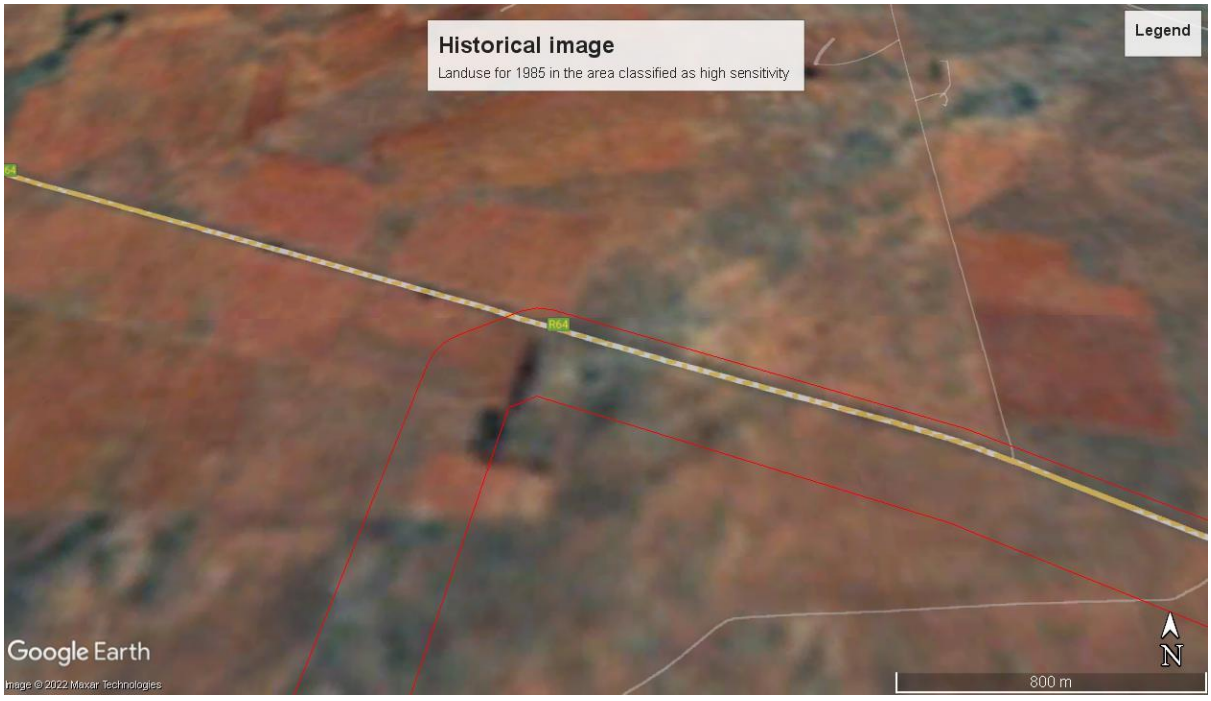


FIGURE 15: HISTORICAL IMAGERY OF THE AREA CLASSIFIED WITH HIGH SENSITIVITY 1985.

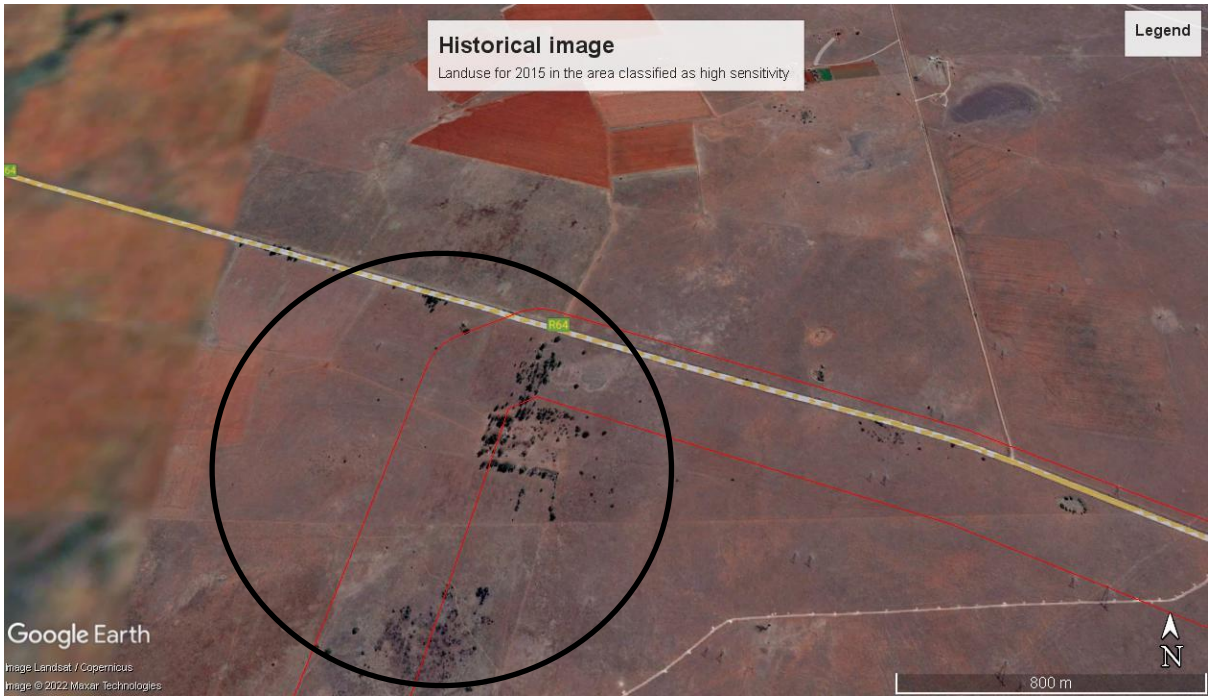


FIGURE 16:HISTORICAL IMAGERY OF THE AREA CLASSIFIED WITH HIGH SENSITIVITY (2015).

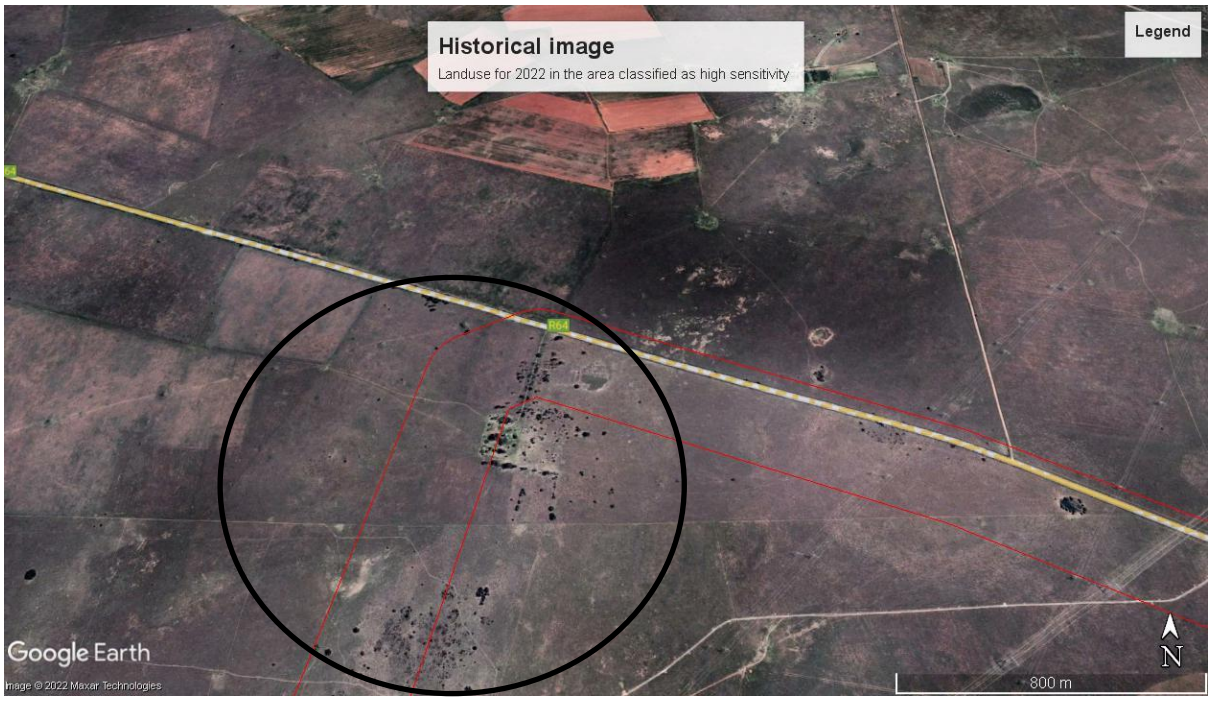


FIGURE 17: HISTORICAL IMAGERY OF THE AREA CLASSIFIED WITH HIGH SENSITIVITY (2022). CIRCLE SHOWS AREA CLASSIFIED AS HIGH SENSITIVITY.

LAND CAPABILITY

As a first step, the land capability used to determine the agricultural sensitivity in the screening was analysed. The land capability of the area ranges from low (Land class 2) to high (Land class 10) (DAFF, 2016). This was a nationwide classification and will be refined using the soil map created for the study area. The expected land capability according to the screening tool is moderate (7).

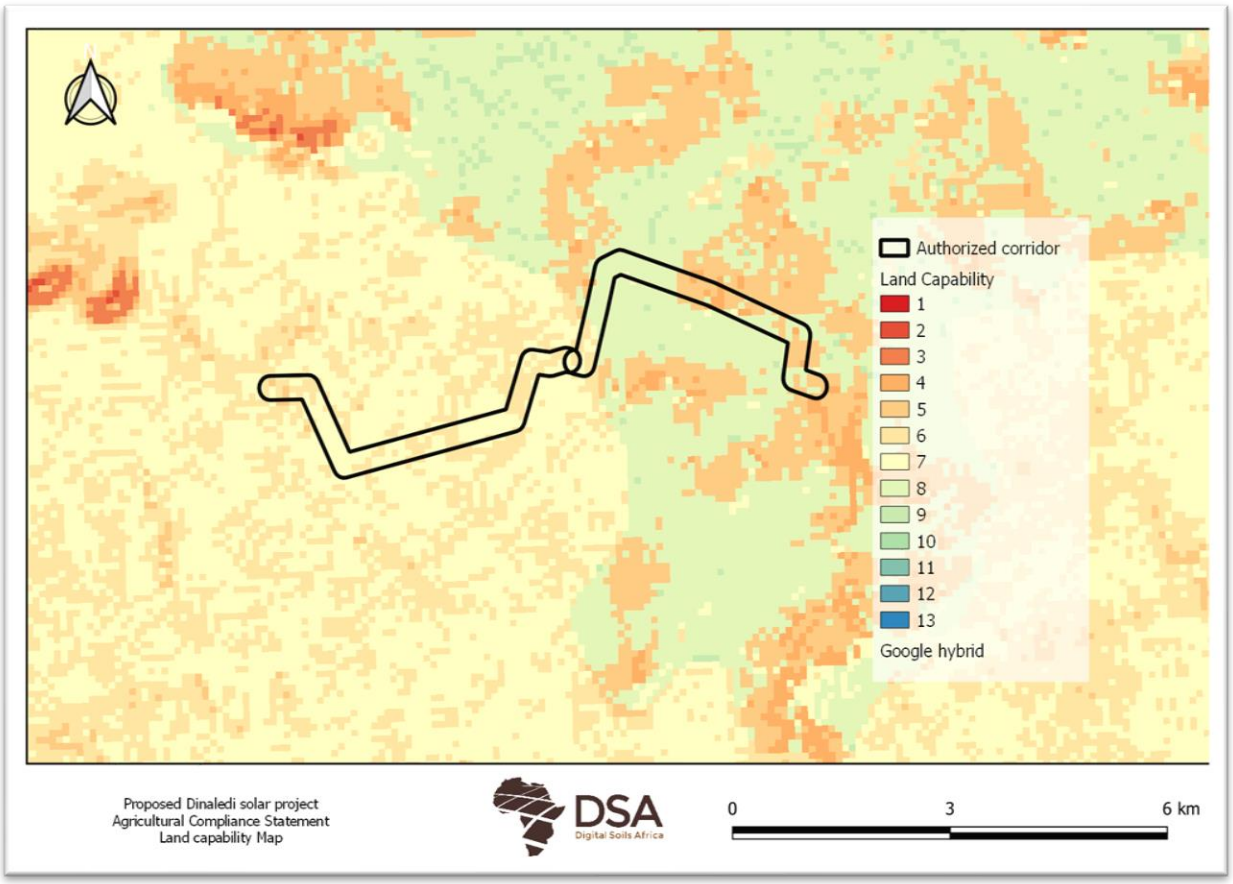


FIGURE 18: THE LAND CAPABILITY FOR THE SURROUNDING AREA (DAFF, 2016).

SITE ASSESSMENT RESULTS

SOIL SURVEY

The soil transect was created using soil observations (Figure 19) and continuous soil covariate data, including terrain derivatives from the 30 m SRTM Digital Elevation Model (DEM) and satellite imagery. The descriptions of the soil characteristics are found in Table 8 and a description of the observations are found in Appendix 2.

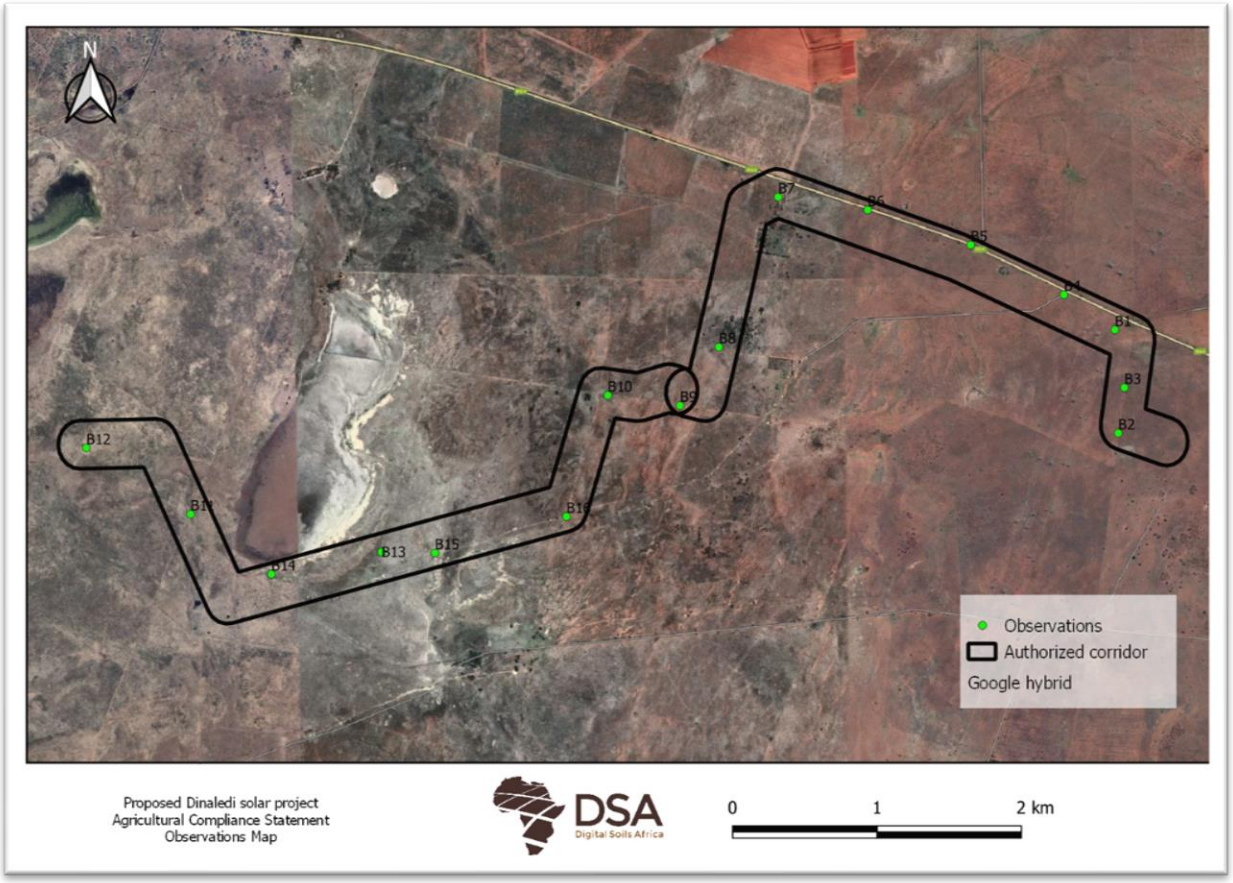


FIGURE 19: SOIL OBSERVATIONS MADE DURING THE STUDY.

The study area consists of the Glenrosa, Mispah, Coega, Nkonkoni, Tukulu and Addo soil forms (Figure 21). The area consisted of low (3) to moderate (6) land capabilities, with low land (3) capability dominating the area (Figure 22). The calculated land capability (40% climate and 30% terrain and soil capability) is lower than that of that of the land capability (Daff, 2016). During the site visit it was noted that the vegetation of the area consisted mainly of *Eragrostis curvula* and *Themeda triandra* which is similar to that of the national vegetation map (Figure 12).

TABLE 8: SOIL FORMS OF THE STUDY AREA

SOIL FORMS	SOIL FAMILY	SOIL CHARACTERISTICS	DRYLAND POTENTIAL	LAND CAPABILITY CLASS	SOIL CAPABILITY	CLIMATE CAPABILITY	TERRAIN CAPABILITY
Glenrosa (Gs)	**2110**	Shallow soils with high stone content.	Low-Moderate	5	4	4	7
Nkonkoni (Nk)	**2221**	Deep soils with a Munsell colour of 5YR 4/6.	Moderate	6	6	4	7
Mispah (Ms)	**2120**	Shallow soils with solid rock.	Low	3	4	4	7
Addo (Ad)	2110	Deep soils with soft carbonate easily broken.	Low-Moderate	5	4	4	7
Coega (Cg)	2100	Shallow soil, sepiolite absent.	Low	3	3	4	7
Tukulu (Tu)	2110	Moderately depth, weak to moderate structure.	Low-Moderate	5	4	4	7

The Nkonkoni has a weak structure and was aluvic, indicating that there is no increase in clay as depth increases. The lithic horizon was saprolithic, with iron contents being the main contributor. The Nkonkoni had a moderate land capability due to the climate and soil capability (Figure 11 and Error! Reference source not found.)

Glenrosa had saprolitic character. The limited soil depth was the most significant property decreasing agricultural potential of the soils. These soils have a low risk to erosion as the high iron contents acts as a flocculant. The Glenrosa also has a low land capability due to soil depth.

The Coega was shallow and was easily identified as calcrete was present on the surface. The soil has a low land capability due to the shallow depths.

Mispah soil form was shallow and large boulders were found on the surface. The land capability is low due to soil depth.

The Tukulu soil form was found near the pan and had a moderate to weak structure. The neocutanic was reached a depth of 600 mm whereafter the gleyic horizon was found. The gleyic had colours as defined for the albic horizon, while grey colours were found on the outside peds.

The Addo was found also found near the pan. The soft carbonate horizon was found at 700 mm. The soft carbonate could easily be broken as the profile had a total soil depth of 1200 mm. The Addo had a low-moderate (5) land capability.

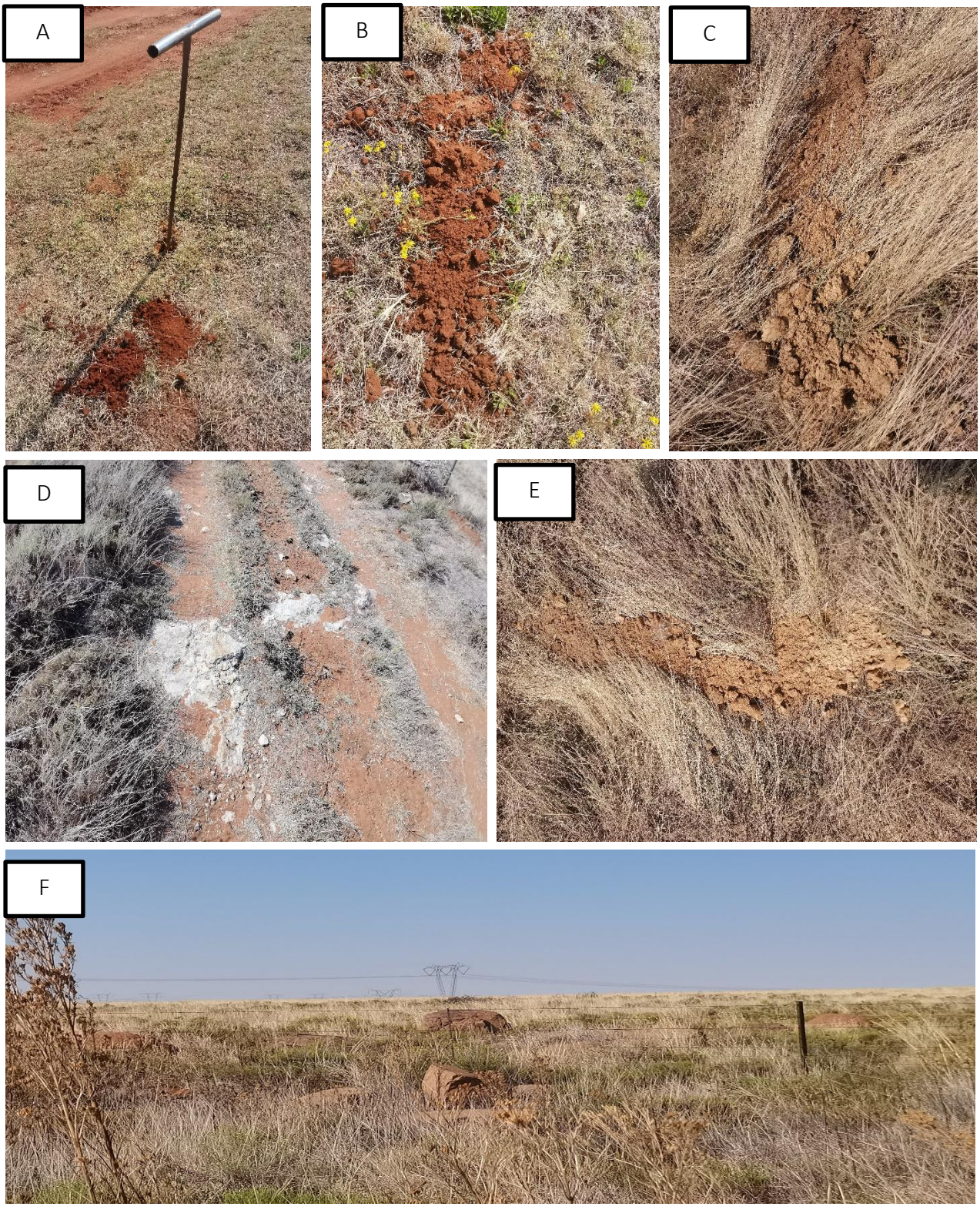


FIGURE 20: PHOTOGRAPHS OF SELECTED SOILS AND SOIL PROPERTIES FOUND IN THE STUDY AREA- A) GLENROSA WITH SAPROLITHIC CHARACTER, B) NKONKONI, C) TUKULU WITH A GLEYIC HORIZON, D) COEGA, E) ADDO, F) MISPAH.

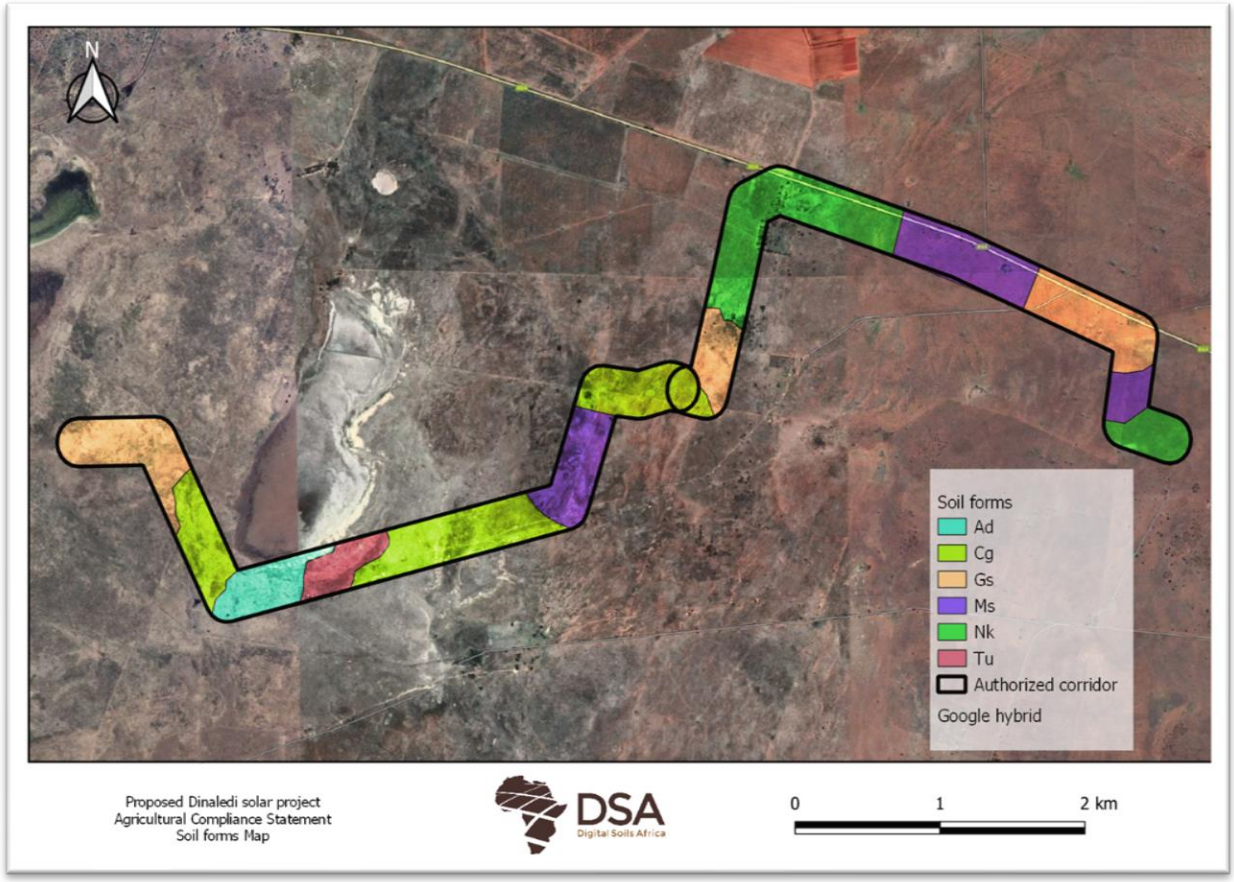


FIGURE 21: SOIL FORMS FOUND IN THE STUDY AREA.

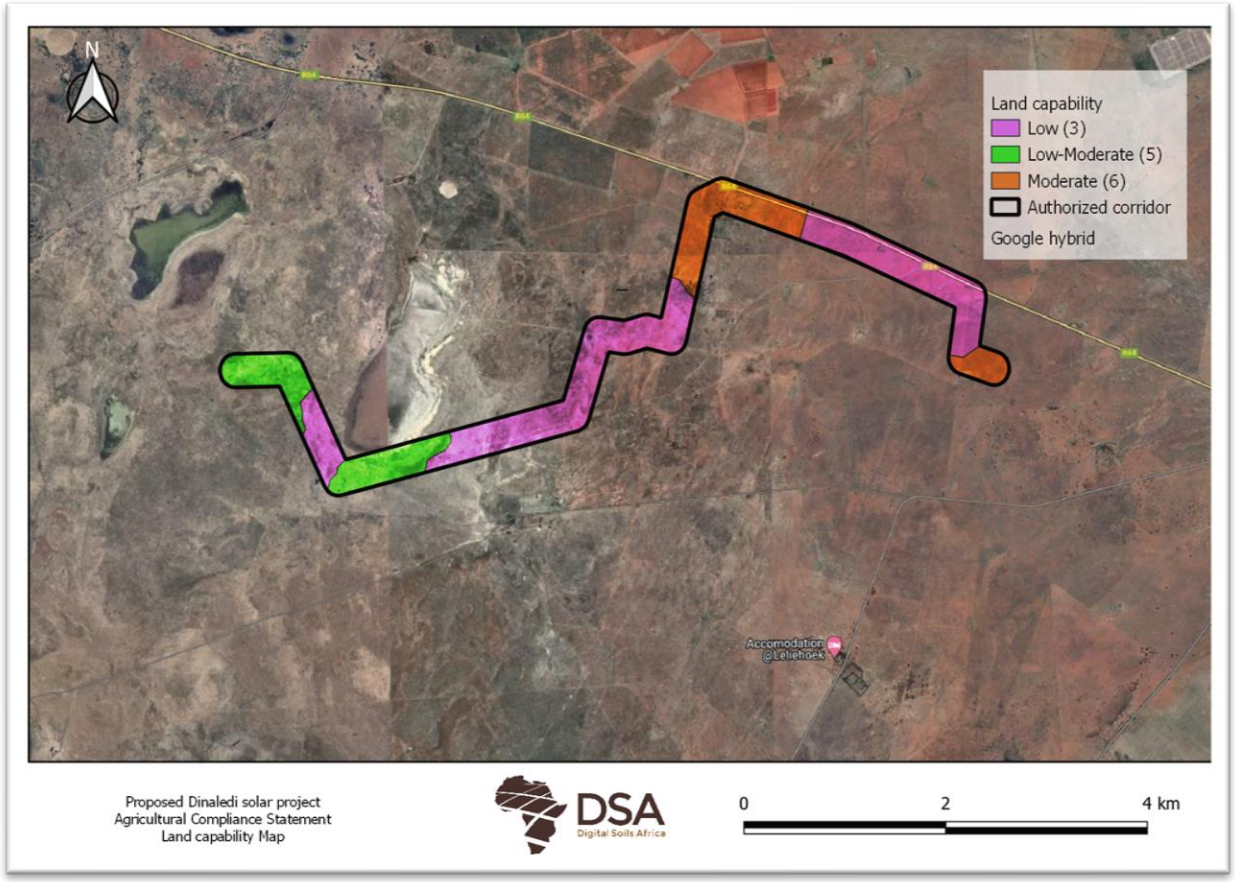


FIGURE 22:LAND CAPABILITY.

IMPACT ASSESSMENT

The impact which will be assessed is that of the conductor lines and a substation on the land capability of agricultural land. These impacts, the responsible activities and the phase in which activities will create the impacts are shown in Table 9.

TABLE 9: IMPACTS OF OPERATIONS ON AGRICULTURAL LAND

Impact	Causing Activity	Construction Phase	Operational Phase
Soil Erosion	Surface activities	X	X
Chemical Soil Pollution	Diesel and hydrocarbon spills from machinery	X	X
Loss of Agricultural Land	Infrastructure development	X	X

All areas where vegetation is removed from the soil surface in preparation for the power line construction, will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk. Once the soil particles are removed, vegetation will have difficulty establishing itself on the rock, lithic and hard carbonate material in the area.

During the construction phase, construction workers will access the different farm portions for the preparation of the terrain and the installation of the pylons. Both potential spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution.

Loss of agricultural land can unfortunately not be avoided during the lifetime of the corridor. The agricultural land lost in low as livestock grazing is the primary agricultural use.

Both the activity and the agricultural sensitivity are considered when allocating the score.

TABLE 10: IMPACT SIGNIFICANCE FOR UNMITIGATED ACTIONS

Impact	Causing Activity	Severity	Sensitivity	Intensity	Duration	Scale	Consequence	Likelihood	Significance
Soil Erosion	Surface Activities	2	1	2	1	1	4	4	16
Chemical Soil Pollution	Diesel and hydrocarbon spills from machinery	2	1	2	1	1	4	3	16
Loss of Agricultural Land	Infrastructure development	2	1	1	2	1	4	1	4

TABLE 11: IMPACT SIGNIFICANCE FOR MITIGATED ACTIONS

Impact	Causing Activity	Severity	Sensitivity	Intensity	Duration	Scale	Consequence	Likelihood	Significance
Soil Erosion	Surface Activities	2	1	1	1	1	3	2	6
Chemical Soil Pollution	Diesel and hydrocarbon spills from machinery	2	1	1	1	1	3	2	6
Loss of Agricultural Land	Infrastructure development	2	1	1	2	1	4	1	4

ENVIRONMENTAL MANAGEMENT PLAN

A draft management plan regarding soil erosion and chemical soil pollution are presented in Tables 12 and 13, respectively. Since the impacts are low, these are not required, but rather best practice principles.

TABLE 12: EMP TO RESTRICT THE IMPACT OF SOIL EROSION

Objective	**Erosion control**	
Project components	Erosion control measures	
Potential impact	Erosion, exposure of subsoil, reducing physical and chemical properties, runoff	
Activity risk/source	Soil erosion due to bare soil	
Mitigation objectives	Prevent soil erosion	
Action/control	**Responsibility**	**Phase**
Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint/servitude. Unnecessary land clearance must be avoided. Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface. Where possible, conduct the construction activities outside of the rainy season	Environmental officer	Construction, operational and decommissioning.
Performance indicator	No exposure of subsoils No bare patches No reduction in chemical and physical properties	
Monitoring	Measure chemical and physical properties, visual observations bare patches and subsoil exposure. To be checked yearly.	

TABLE 13: EMP TO RESTRICT CHEMICAL POLLUTION

Objective	**Minimize chemical pollution on the soil**	
Project components	Limit soil contamination by hydrocarbon spills from vehicles	
Potential impact	Soil pollution, reducing land capability and potentially leading to water pollution.	
Activity risk/source	Vehicle breakdown or accidents leading to hydrocarbon spills	
Mitigation objectives	Prevent vehicle breakdown and accidents.	
Action/control	**Responsibility**	**Phase**
Keep vehicles well maintained. Ensure drivers follow required safety precautions and conductor line rules Clean-up of hydrocarbon spills if it occurs. Test soils for contamination and perform best clean up method	Safety Officer Mechanical Officer Vehicle Drivers Environmental Officer	Construction, Operational and Rehabilitation Phase.
Performance indicator	Log of vehicle breakdowns and traffic violations Soils test clean of pollutants	
Monitoring	Vehicle breakdown log (Yearly) Vehicle accident log (Yearly Soil chemical analysis after clean-up effort (after incident)	

FINDINGS AND RECOMMENDATIONS

The soil survey of the Dinaledi solar project found the site to be consisting of two groups of soils. Firstly, deep, moderate potential agricultural soils with a moderate land capability. Secondly, shallow soils with a low land capability.

The agricultural sensitivity was calculated using the land capability and the land-use of the project area. The screening tool as well as the land-use shows the northern corner to be of high sensitivity due to the cultivated area shown in Figure 14. It was however observed that no cultivation occurred in the area for 2015-2022 (Figure 16). This lowers the sensitivity to moderate due to the current land use being grazing. Additionally, the land capability (Nkonkoni-6) for the high sensitivity area was also moderate, contributing to the moderate sensitivity (Figure 23). The low land capability (3) and sensitivity consists of the soils- Glenrosa, Coega and Mispah, while the low-moderate land capability (5) consists of the Tukulu and Addo soil forms. Only the Nkonkoni had a moderate land capability. These soils had a moderate agricultural sensitivity.

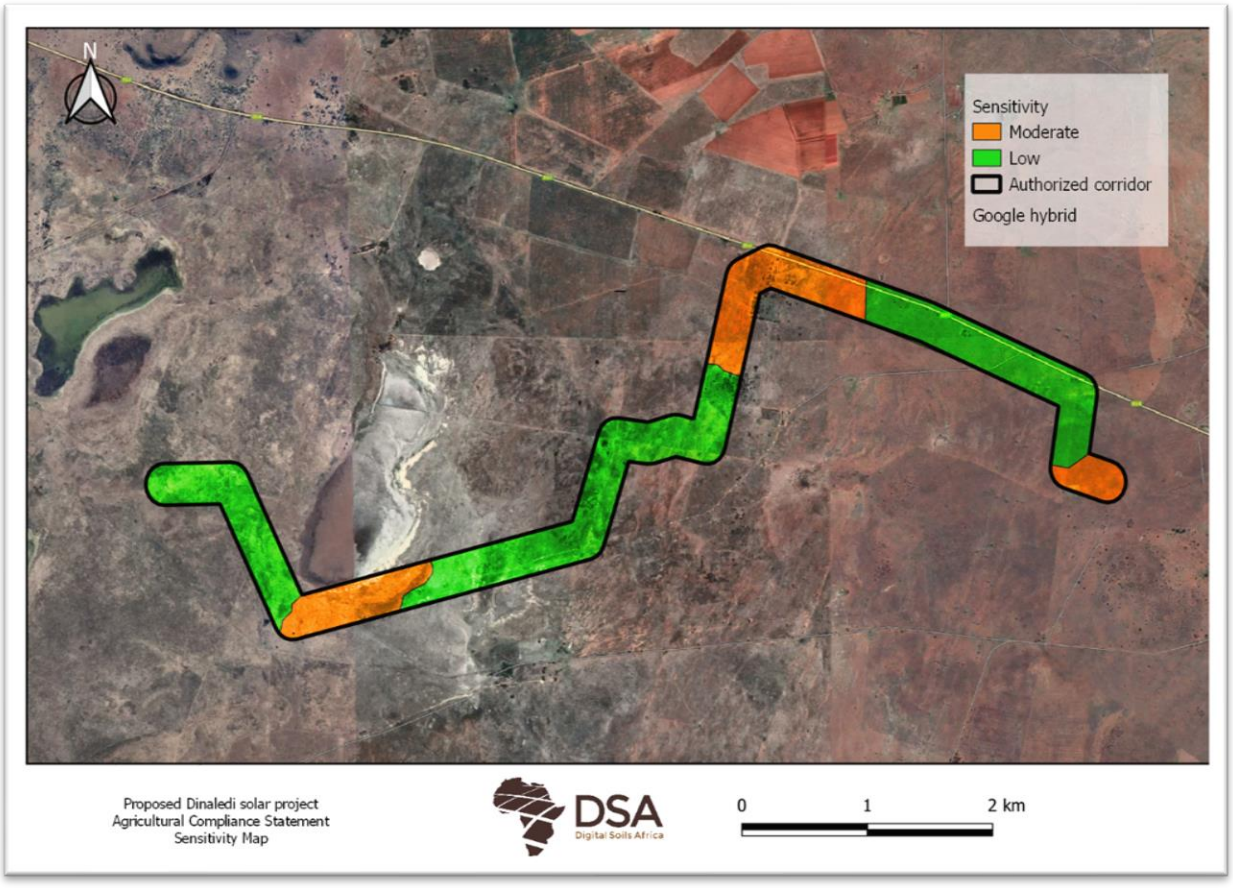


FIGURE 23: LAND SENSTIVITY MAP OF THE SURVEY AREA.

Recommendations during construction:

1. Restrict the proposed development to the smallest footprint possible and do not disturb/alter areas outside the development.

2. Ensure that access conductor lines are kept clear, and that construction and operational activities do not interfere with agricultural activities.

It is the specialist's opinion that the proposed development site is generally of a low to moderate agricultural sensitivity, and that the development at the proposed site will not significantly impact agricultural activities.

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APPENDIX 1: SPECIALIST CV

DR DARREN BOUWER

EDUCATION

PhD Soil Science	University of the Free State	2018
M.Sc. Soil Science	University of the Free State	2013
B.Sc. Soil Science (Hon)	University of the Free State	2009
B.Sc. Soil Science	University of the Free State	2008
Matric certificate	Queens College	2005

PROFESSIONAL AFFILIATIONS

- SACNASP- Pri Nat Sci 400081/16
- Member of the Soil Science Society of South Africa
- Member of the Soil Classification Work Group
- Member of South African Soil Surveyors Organisation

WORK EXPERIENCE

- Digital Soils Africa / Soil Scientist - May 2012 – Present
- Ghent University / Researcher- January 2016 - December 2016
- University of the Free State/ Assistant Researcher- January 2011- December 2015

PUBLICATIONS

Total Consultancy reports: >110
Total peer reviewed publications: 5

Most relevant:

Bouwer, D. & van Tol, J. J., 2020. Identification of hydropedological flowpaths in Stevenson-Hamilton catena from soil morphological, chemical, and hydraulic properties. Koedoe, Vol 62 No 2.

Bouwer, D., Le Roux, P. A., van Tol, J. J., & van Huyssteen, C. W., 2015. Using ancient and recent soil properties to design a conceptual hydrological response model. Geoderma, 241, 1–11.

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JAN-DIRK MARX

EDUCATION

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B.Sc. Soil Science	University of the Free State	2019
Matric certificate	Secunda High School	2015

WORK EXPERIENCE

- Digital Soils Africa / Soil Scientist -January 2020– Present

SPECIALIST DECLARATION

I, Darren Bouwer, declare that –

- I act as the independent specialist in this application;
- I regard the information contained in this report to be true and correct;
- I do not have a conflict of interest in this project;
- I will conduct the work relating to the project in an objective manner.



Dr Darren Bouwer
PhD Soil Science
Pri Nat Sci 400081/16

PhD Soil Science
Pri Nat Sci 400274/13

I, Jan-Dirk Marx, declare that –

- I act as the independent specialist in this application;
- I regard the information contained in this report to be true and correct;
- I do not have a conflict of interest in this project;
- I will conduct the work relating to the project in an objective manner.



Jan-Dirk Marx

Candidate SACNASP- 132344

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APPENDIX 2: OBSERVATIONS

Name	Soil form	x	y	Land capability
B1	Glenrosa	-28.6622480427	25.7220044724	5
B2	Nkonkoni	-28.6686924184	25.7221669857	6
B3	Mispah	-28.6658558897	25.7226366839	3
B4	Glenrosa	-28.6600218070	25.7184166331	5
B5	Mispah	-28.6568581226	25.7118359256	2
B6	Nkonkoni	-28.6546062040	25.7045584763	6
B7	Nkonkoni	-28.6537414655	25.6982198815	6
B8	Glenrosa	-28.6630522370	25.6939146473	5
B9	Glenrosa	-28.6666737944	25.6911275007	5
B10	Coega	-28.6659820530	25.6860266062	3
B11	Coega	-28.6731117961	25.6564366351	3
B12	Glenrosa	-28.6689018353	25.6491178182	5
B13	Glenrosa	-28.6756147335	25.6699064313	5
B13	Tukulu	-28.6756147335	25.6699064313	5
B14	Addo	-28.6769183335	25.6620990486	5
B15	Coega	-28.6757080472	25.6736822685	3
B16	Mispah	-28.6735242621	25.6830093960	3

WETLAND ASSESSMENT REPORT: MARULA CLUSTER GRID INFRASTRUCTURE EXTENSION

October 2022

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ENVIRONMENTAL SUSTAINABILITY

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Review	Prof. Leslie Brown	SACNASP No: - 400075/98	2022/10/17

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EXECUTIVE SUMMARY

29 Solar (Pty) Ltd. aims to establish a proposed 132kV powerline as part of a grid infrastructure extension. The area identified for the establishment of the grid infrastructure is located approximately 6km to the west of the town of Dealesville in the Free State Province. BioBlue Environmental Sustainability (Pty) Ltd. was appointed by 29 Solar (Pty) Ltd. as independent specialist to conduct a wetland assessment of the study site. Three wetlands belonging to the HGM classification of depressions were identified during the field survey. One of the depressions were identified by the NFEPA database and two of these depressions were flagged by the National Screening Tool.

There were very few degrading influences upon the wetlands recorded. With only Depression 1 having alien invasive Eucalyptus trees present within its catchment but not the wetland itself. There was evidence of trampling or grazing evident but not to the degree that it exerted a detrimental influence on the habitat integrity and functionality of the depressions. Consequently, the PES scores of three depressions were rated as a B. This means that the depressions on the study site are largely natural with only few modifications undergone by the wetlands. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. All of the depressions had EIS scores which placed them in in an EIS category of moderate. This implies that these wetlands are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications.

It is strongly advised that the current grid infrastructure trajectory be changed to an alternative trajectory so that the depressions are not impacted at all. This alternative trajectory will still be located within the grid infrastructure corridor. This can be achieved by moving the grid infrastructure trajectory to the South of Depression 1 and further West of Depression 3. This would be the ideal solution in regard to wetland health and functionality. The spanning of the powerlines across the depression wetlands of the study site should be prioritised if the alternative trajectory of the grid infrastructure is not decided upon. A 30m wide buffer zone is to be implemented around all three the depressions to protect the ecological integrity of the wetlands from detrimental edge effects associated with the proposed development during the construction and operational phases.

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Abbreviations	
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
HGM	Hydrogeomorphic
PES	Present Ecological State
NEMA	The National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act 36 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
SANBI	South African National Biodiversity Institute
WMA	Water Management Area

DECLARATION OF INDEPENDENCE

The independent Practitioner

I, **Albert van Eeden** declare that I –

- act as the independent Aquatic ecologist for the Wetland Assessment Report.
- this report covers wetland related aspects only and no other scope of work was requested for this study and the information should be interpreted with caution.
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2010.
- have no and will have any vested interest in the proposed activity proceeding.
- undertake to disclose, to the competent authority any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2010.
- accepts no responsibility for the accuracy of any third-party data used in the production of this report.



Signature of Author – Albert van Eeden

1 INTRODUCTION

29 Solar (Pty) Ltd. aims to establish a proposed 132kV powerline as part of a grid infrastructure extension. In addition to the 132kV powerline, the grid infrastructure extension will consist of supporting infrastructure as well as a servitude which will be used for maintenance purposes. The grid infrastructure extension is located within a grid infrastructure corridor, which is approximately 322m wide. The grid infrastructure extension will form part of the Marula cluster. The electricity which will course through the proposed grid infrastructure extension will be generated from a nearby solar farm. The solar farm will connect to the proposed Artemis substation through the grid infrastructure. The area identified for the establishment of the aforementioned grid infrastructure is located approximately 6km to the west of the town of Dealesville in the Free State Province. The grid infrastructure corridor runs through various privately owned farms as well as municipal land predominantly next to the R64 road. BioBlue Environmental Sustainability (Pty) Ltd. was appointed by 29 Solar (Pty) Ltd. as independent specialists to compile a wetland assessment report as per the relevant environmental legislation in light of the above-mentioned renewable energy project.

It is important to note that wetland related problems such as pollution, siltation, erosion, and inadequate volumes of water is a symptom of the condition of the whole catchment. Therefore, to address the functioning and the health of a wetland, the activities and land uses in the catchment should ideally be addressed. Many rural communities depend more heavily on the resources and functions that wetlands provide them with, as opposed to communities in an urban setting. This makes the health and integrity of wetlands in rural areas a priority (Kotze et al., 1994). Currently and historically many wetlands have become degraded, destroyed, and poorly managed due to the lack of knowledge from communities as to the value and benefits they provide. Wetlands provide ecosystem goods and services that can either supply direct or indirect benefits to communities (Collins, 2005).

Wetlands play an important role in water security through the recharge of groundwater, which in turn leads to the replenishment of aquifers, as well as by augmenting stream and river flow. This in many instances has the effect of sustaining flow throughout the year. The soils together with the vegetation within a wetland act as a sponge, which retain water long after precipitation events. The water within the wetland zones then slowly release water into rivers and streams during the dry periods, providing streamflow regulation throughout the year. Wetland vegetation prevents erosion by binding and stabilising the soil, dissipating energy from stream flow and storm events. Some wetland plant species possess the capacity to rapidly

recover after storm events. Wetland systems provide a variety of ecosystem goods and services either directly or indirectly.

The direct benefits include:

- Valuable source of water supply.
- Provision of harvestable resources.
- Socio and cultural significance.
- Tourism and recreation.
- Education and research.
- Livestock grazing.
- Valuable land for fishing and cultivation.

The indirect benefits include:

- Water purification.
- Sustained stream flow.
- Flood reduction/attenuation.
- Ground water recharge.
- Erosion control.
- Chemical cycling.
- Biodiversity conservation.

1.1 LEGISLATIVE REQUIREMENTS

1.1.1 NATIONAL WATER ACT, 1998 (Act No. 36 OF 1998) [NWA]

The National Water Act, Act 36 of 1998 aims to manage the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources be protected and also requires integration of the management of water resources with the delegation of powers to institutions at the regional or catchment level.

The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways, which take into account:

- Promoting equitable access to water.
- Promoting the efficient, sustainable, and beneficial use of water in the public interest.
- Providing for the growing demand of water use.
- That the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved.
- Protecting aquatic and associated ecosystems and their biological diversity.

- Reducing and preventing pollution and degradation of water resources.

1.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (Act No. 107 OF 1998) [NEMA]

NEMA and the associated Regulations (Listing No R. 327, No R. 325 and R. 324) as amended, states that prior to any development taking place within a wetland or riparian area, an Environmental Authorisation process needs to be followed. This could follow either the Basic Assessment process or the Scoping and Environmental Impact Reporting (S&EIR) process depending on the nature of the activity and scale of the impact.

1.2 WETLAND DEFINITION

According to the National Water Act, 1998 (Act 36 of 1998) a wetland is defined as "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*".

Wetlands can be found in landscapes where water is slowed down because of the topography (i.e., very flat). Wetlands are also found where groundwater discharges or is very close to the surface. Generally, wetlands have permanent, seasonal, and temporary zones. Wetlands are habitats that act as a transition from the terrestrial ecosystem to the aquatic ecosystem. Plants that are specifically adapted to wetland soils can be found in wetlands. These plants are called hydrophytes and even further slows down the movement of water through the landscape (Collins, 2005).

Wetlands play important roles in water security through the recharge of groundwater, which in turn leads to the replenishment of aquifers, as well as by augmenting stream and river flow. This in many instances has the effect of sustaining flow throughout the year. The soils together with the vegetation within a wetland act as a sponge, which retains water long after precipitation events. The water within the wetland zones then slowly release water into rivers and streams during the dry periods, providing streamflow regulation throughout the year. Wetland vegetation prevents erosion by binding and stabilising the soil, dissipating energy from stream flow and storm events. Wetland vegetation possess the capacity to rapidly recover after storm events (Kotze et al., 1994).

The following characteristics can be ascribed to wetlands:

- *Hydrology*: The soil is covered by water on the surface or close to it to create saturated conditions which leads to reduction occurring.
- *Saturated soil:* The soil is hydric which means that reduction has occurred in other words the soil is depleted of oxygen; and
- *Hydrophytic vegetation:* These hydrophytes are adapted to grow in anaerobic conditions of hydric soils (Collins, 2005).

1.3 WETLAND DEGRADATION

There are various anthropogenic factors which contribute to a greater or lesser degree to wetland degradation and destruction. Some of these degrading influences are confined to the wetland itself and its surrounding environment but some degrading influences originates from the broader catchment which feeds the wetland. The creation of drainage channels, which changes flow patterns and can drain water away from a wetland, can lead to degradation and loss of wetland functions. These drainage channels disrupt the natural flow of water and concentrates the once natural diffuse flow into only a few channels. This has the effect of drying up a large part of a wetland. Drainage channels are mostly caused by anthropogenic activities such as agriculture. Overgrazing coinciding with trampling taking place within a wetland can lead to erosion which will deteriorate over time.

When a wetland's vegetation cover is reduced it also reduces the surface roughness of the wetland. This in turn leads to water moving faster through a wetland and surrounding area with less resistance than previously. This compromises the ability of a wetland to filter and purify water as well as an increased vulnerability to erosion. Another degradation factor is when alien invasive plants replace the natural indigenous vegetation of the wetland, thus altering the wetland functions, water regime, as well as the habitat suitability for fauna and flora (Kotze et al., 1994).

1.4 THE IMPORTANCE OF WETLANDS

Wetland systems provide a variety of ecosystem goods and services either directly or indirectly.

The direct benefits include:

- Valuable source of water supply;
- Provision of harvestable resources;
- Socio and cultural significance;
- Tourism and recreation;

- Education and research;
- Livestock grazing; and
- Valuable land for fishing and cultivation

The indirect benefits include:

- Water purification;
- Sustained stream flow;
- Flood reduction/attenuation;
- Ground water recharge;
- Erosion control;
- Chemical cycling;
- Biodiversity conservation

The economic value of the goods and services which society derive from rivers and wetlands has been estimated at trillions of US Dollars (Schuyt & Brander 2004). For direct benefits, some wetlands serve as important breeding ground for fish, and many wetlands, due to the prolonged presence of water, wetlands can be used as dry season grazing areas, if undertaken on a sustainable basis. Wetlands also contain a wide variety of plant and animal species, some totally reliant on wetland habitats for their survival. Many of these species are used for food, craft manufacture, medicines, building material and fuel. There are also many indirect hydrological functional benefits which wetlands provide. For instance, some wetlands act like giant sponges, holding back water during floods and releasing it during low flow periods. In an arid country like South Africa, these sensitive ecosystems are important for local terrestrial and aquatic ecosystems. By regulating water flows during floods, wetlands can reduce downstream erosion and flood damage. Some wetlands are also able to trap pollutants such as sediment, heavy metals, and disease-causing organisms, thereby improving water quality.

South Africa is a water scarce country. Without sufficient water food security is compromised, industrial growth is capped, and the tourism industry cannot expand. Our economy is therefore dependent on a continual supply of water of sufficient quality and quantity. Wetlands help to regulate our water supply, and aid in preventing erosion and siltation (and loss of storage capacity) of rivers and dams. These water resources can thus make direct and indirect contributions to the well-being of humans, the environment, and the economy. Wetlands are able to improve water quality and contribute to water security, trap sediment and/or regulate runoff. Yet despite these benefits, wetlands are amongst the most impacted and degraded of all ecological systems, and global assessments indicate that the majority of remaining

wetlands are degraded or under threat of degradation. The main culprits of wetland degradation and destruction are:

- Agricultural sector: The drainage of wetlands for crops and pastures, poorly managed burning and grazing practises that has resulted in erosion,
- Forestry sector: The planting of alien trees in wetlands,
- Mining sector: Destruction of wetlands through mining activities as well as polluting those which have not been destroyed yet,
- Construction sector: unchecked urban development, urban sprawl and the pollution that goes hand in hand with urban environments (Kotze et al., 1994).

Continued wetland destruction will result in deteriorating water quality, less reliable water supplies, increased erosion and flooding, lower agricultural productivity, a decrease in biodiversity and an increase in the number of endangered species.

1.5 ASSUMPTIONS AND LIMITATIONS APPLICABLE TO THE STUDY SITE

It is assumed that the details related to the study site as provided by the client and the client's team is correct. There were no limiting factors present on the study site that restricted the wetland delineation and assessment. The site visit occurred on the 17th of August 2022, which falls within South Africa's late winter season, thus the vegetation was dry, and dormant. Because the vegetation growth was stunted there was relied more heavily on the terrain unit indicator as well as the soil wetness and soil form for the identification and delineation of the wetlands. During the time of the site visit all the relevant procedures were carried out whilst performing the wetland delineation and assessment.

2 PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

29 Solar (Pty) Ltd. wants to establish a proposed grid infrastructure in close proximity to the town of Dealesville in the Free State Province as part of a renewable energy project. The grid infrastructure will be the linkage between the proposed renewable energy solar farm and a substation. BioBlue Environmental Sustainability (Pty) Ltd. was appointed by 29 Solar (Pty) Ltd. as independent specialists to compile a wetland assessment report for the wetlands which potentially could be impacted upon by the proposed grid infrastructure. The study site is located approximately 6km to West of the town of Dealesville. The centre of the study area is located around 28°39'27.52" S 25°42'41.24" E. The site is located at an altitude of 1312m above sea level in the Grassland biome of South Africa with the topography consisting of flat plains. Refer to Figure 1 for the location of the study site and Figure 2 for a more detailed view. Refer to Table 1 for the wetlands present on the study site including their HGM classification.

Table 1: The three wetlands along with their HGM classification.

Wetland number & HGM classification
(1) Depression 1
(2) Depression 2
(3) Depression 3

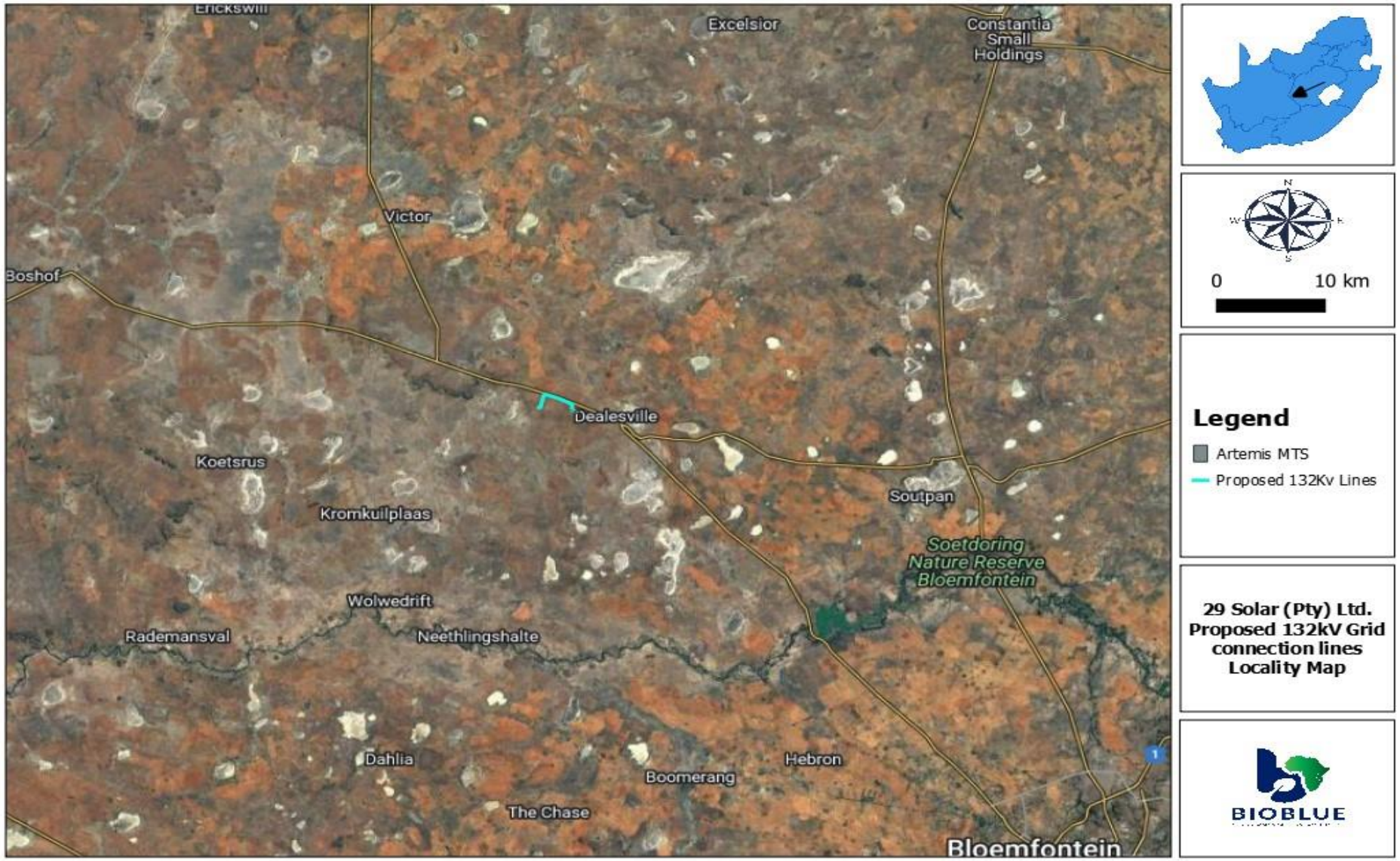


Figure 1: Locality map indicating the study site.



Figure 2: Locality map indicating the study site with the identified wetlands.

3 METHODOLOGY

The methodology consisted of a two-pronged approach. Firstly, a desktop study was undertaken for the study site which was followed up by a field survey to verify the findings from the desktop study and to gain a deeper insight into the health, impacts and functioning of the wetland systems so as to perform a wetland assessment. The field survey was also necessary to delineate the boundaries of the wetland systems. The field survey was conducted in the month of August 2022. A wetland assessment was undertaken for the corridor wherein the grid infrastructure is planned.

3.1 DESKTOP STUDY

To obtain an understanding of the area and to identify potential wetlands in the study area a desktop study was undertaken by using aerial images obtained from Google Earth Pro, the South African National Biodiversity Institute's (SANBI) BGIS database and the web based National Screening Tool. Historical images were examined for the study site and the catchment during wet and dry cycles to determine if any "wetness signatures" on the study site could be identified. The desktop study also determined if there were any NFEPA wetlands present on the study site (Refer to the section below).

3.1.1 THE NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS (NFEPA)

The National Freshwater Ecosystem Priority Areas (NFEPA) project represents a multi-partner project between the Council for Scientific and Industrial Research (CSIR), South African National Biodiversity Institute (SANBI), Water Research Commission (WRC), Department of Water Affairs (DWA), Department of Environmental Affairs (DEA), Worldwide Fund for Nature (WWF), South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). More specifically, the NFEPA project aims to:

- Identify Freshwater Ecosystem Priority Areas to meet national biodiversity goals for freshwater ecosystems; and
- Develop a basis for enabling effective implementation of measures to protect FEPA's, including free-flowing rivers.

The first aim uses systematic biodiversity planning to identify priorities for conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development. The second aim comprises a national and sub-national component: The national component aims to align DWA and DEA policy mechanisms and tools for managing and conserving freshwater ecosystems. The sub-national component aims to use three case

study areas to demonstrate how NFEPA products should be implemented to influence land and water resource decision-making processes at a sub-national level. The project further aims to maximise synergies and alignment with other national level initiatives such as the National Biodiversity Assessment (NBA) and the Cross-Sector Policy Objectives for Inland Water Conservation.

3.2 FIELD SURVEY: WETLAND ASSESSMENT

A wetland assessment which consisted of a wetland delineation, classification of wetland according to Hydrogeomorphic (HGM) type (Figure 3 and Figure 4), data gathering to be used in calculation of the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) were carried out. Vegetation structure and species diversity were noted along with soil characteristics and ecological degrading features such as erosion, pollution inputs, and alien invasive vegetation. The catchment condition was also taken into consideration. The wetland delineation and assessment were conducted on foot.

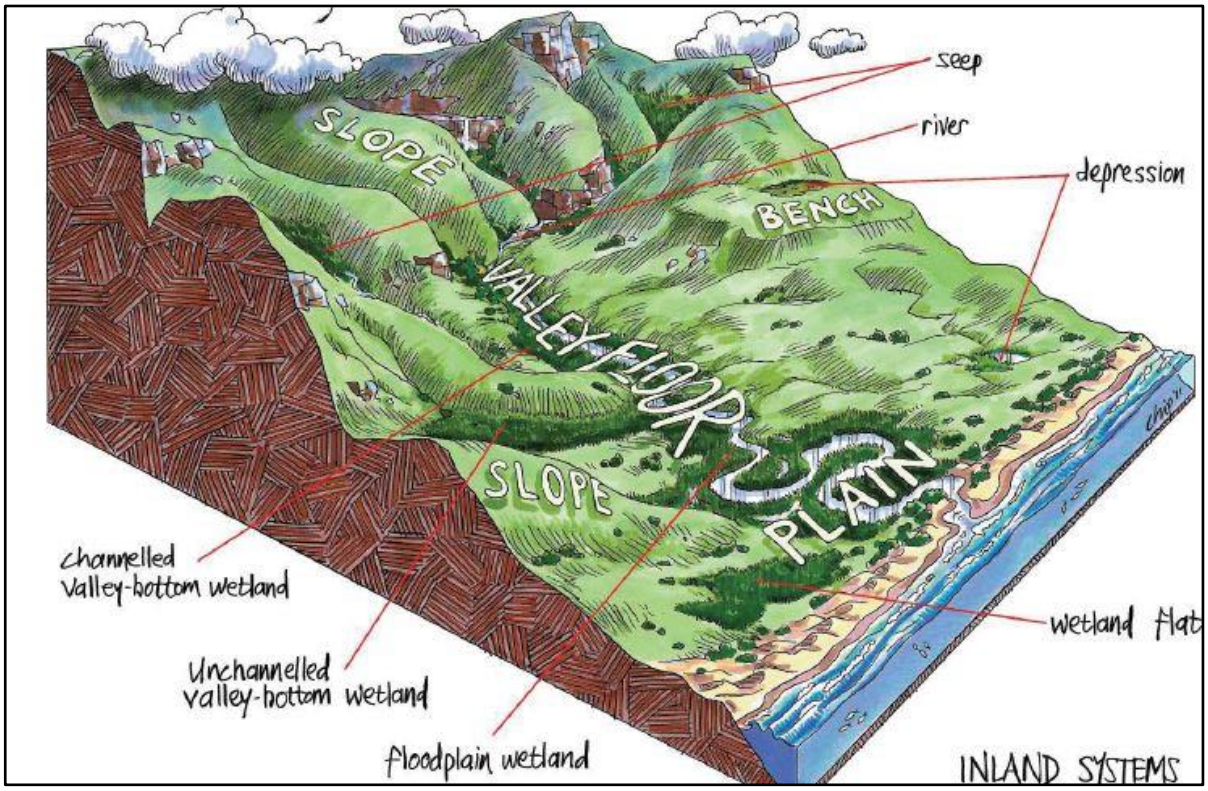


Figure 3: Location of different HGM types within a landscape (Ollis et al; 2013)

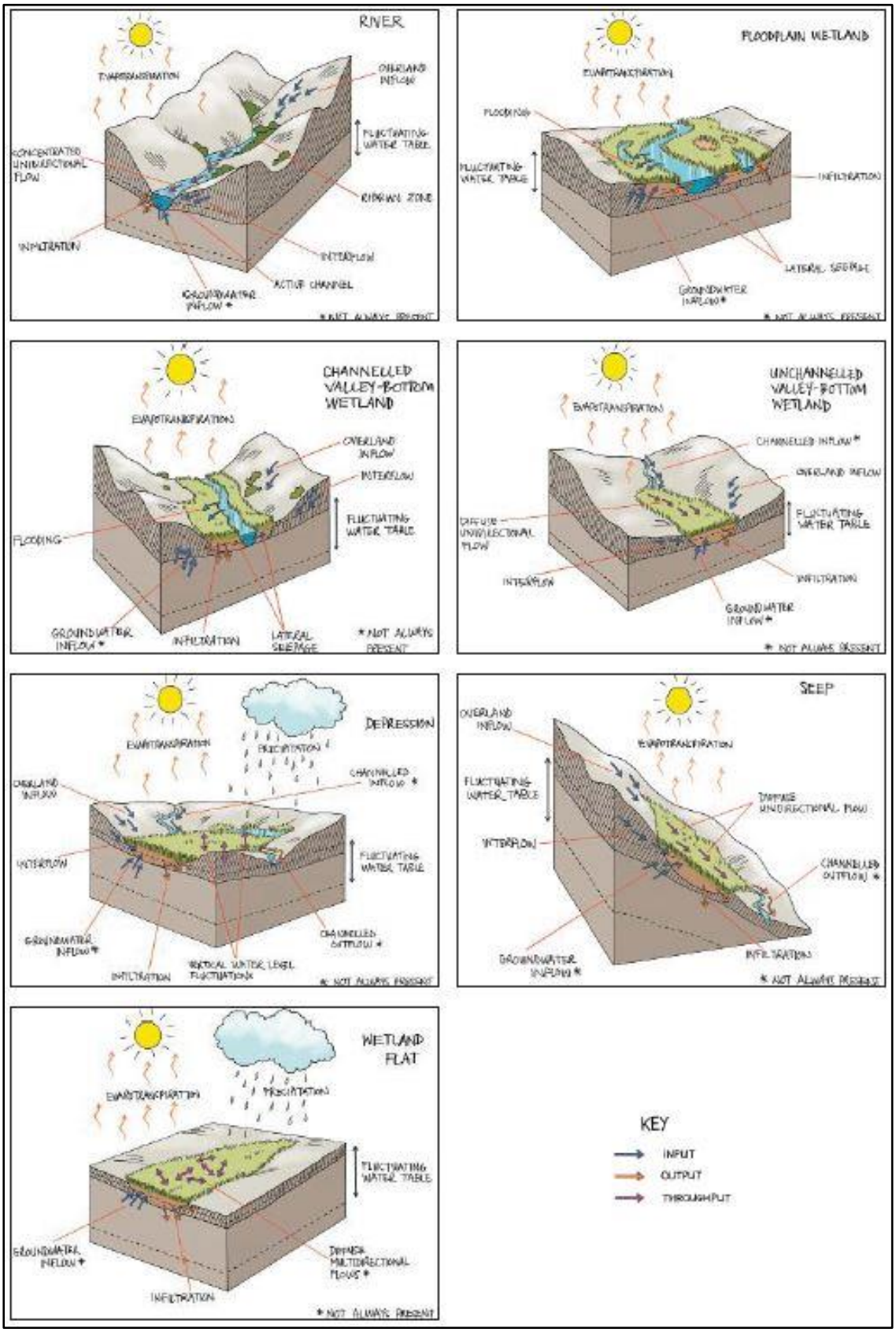


Figure 4: Detailed view of each HGM type (Ollis et al; 2013)

3.2.1 WETLAND DELINEATION

The wetland delineation was based on the legislatively required methodology as described by DWAF (2005), now known as the Department of Water Affairs and Sanitation (DWS). The wetland delineation procedure is aimed at identifying the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas.

The guidelines also state that locating the outer edge of the temporary zone, four specific indicators need to be employed namely:

- **Terrain Unit Indicator** (location in the landscape with highest likelihood of occurrence).
- **Soil form Indicator** (wetland soil forms which are associated with frequent and prolonged saturation).
- **Vegetation Indicator** (presence of hydrophytes); &
- **Soil wetness Indicator** (evidence of hydric conditions indicated by a wetness signature in the soil profile).

The wetland boundary is determined as the edge of the temporary zone of the wetland where the hydric indicators are encountered within the top 50cm of the soil surface. A Dutch soil auger was used to extract the soil samples to a depth of 50cm. All soil samples were evaluated in hand for soil composition, colour, number, and size of mottles as well as wetness. The soil wetness indicator and the vegetation indicator were the main indicators used with the other indicators fulfilling a confirmatory role. Soil samples were taken at regular intervals for the different wetlands of the study site. This was done by walking transects from the central part of the wetlands in an outward direction away from the wetland. Figure 5 gives a schematic presentation of a cross section through a wetland with the different wetland zones and their characteristics. In general soils change in texture and colour as one moves from one position in a landscape to another, this strongly correlates with elevations in the hillslope catena. In general terms the soils change along a gradient from red in the highest point in the landscape through to yellow soils in midslope positions to bleached (grey & yellow) soils in footslopes and valley bottom positions of the landscape. The change in soil colour is the result of an increasing degree of wetness, clay, and nutrients as one moves down the slope. Reduction under anaerobic soil conditions happens in the following sequence: N – Nitrogen, Fe – Iron, Mn – Manganese, S – Sulphur, C – Carbon. The strong sulphuric smell associated with wetland soils are confined to the permanent wet zone of wetlands. The soil in and around a wetland also shows signs of wetness which aids in the establishment of wetlands and their boundaries. These indicators are gleying (signs of wetness in a sandy matrix and gleyic lithic properties). In many

instances soil samples are extracted from the soft plinthic B-horizon. It is characterised by a distinct degree of mottling indicating a fluctuating water table and a more permanent water table at depth. On slopes the semi-permanent to permanent occurrence of water in the soil profile can in many instances be ascribed to a layer of bedrock which stops the water from leaching into the deeper layers of the soil.

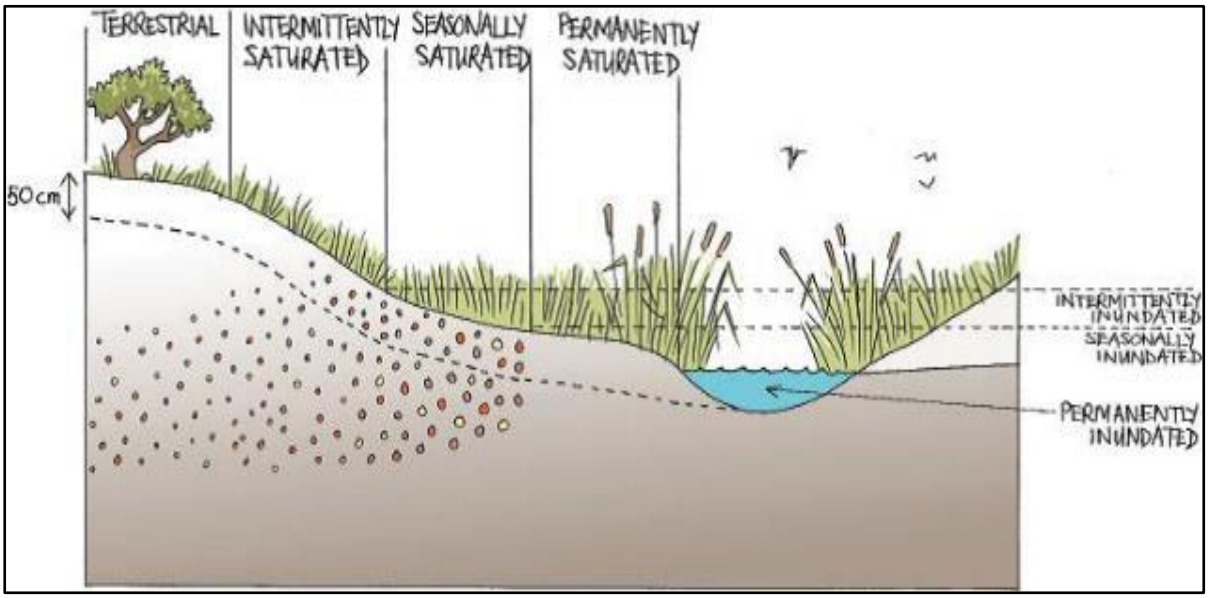


Figure 5: Cross section trough a wetland indicating the different zones as it relates to soil, wetness regime and vegetation (Ollis et al; 2013)

3.2.2 PRESENT ECOLOGICAL SCORE (PES)

Wet-Health is the technique used for assessing the ecological health of a wetland. It uses the following indicators: **geomorphology, hydrology,** and **vegetation** to devise an overall score which indicates the ecological health of a wetland or part of a wetland. To get an overall health score for the wetland an overall PES health score was calculated which takes into account the Hydrology, Geomorphology, & Vegetation scores using the following formula:

Overall PES Health = ((Hydrology score) x3 + (Geomorphology score) x2 + (Vegetation score) x2)) ÷ 7 (Macfarlane et al., 2009)

This score which represents the overall health of the wetland is expressed as a Present Ecological Score or PES. A level 2 Wet-Health assessment was performed on the wetlands. Wet-Health is useful when making decisions regarding wetland rehabilitation, as it identifies whether the wetland is beyond saving, whether rehabilitation would be beneficial, or whether intervention is unnecessary, as the wetland's functionality is still intact. Through this method, the

cause of any wetland degradation is also identified, and this facilitates effective remediation of wetland damage (Macfarlane et al., 2009).

3.2.3 ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The Ecological Importance and Sensitivity was determined by utilising a rapid scoring system. The system has been developed to provide a scoring approach for assessing the Ecological, Importance and Sensitivity of wetlands. These scoring assessments for these three aspects of wetland importance and sensitivity have been based on the requirements of the NWA, the original Ecological Importance and Sensitivity assessments developed for riverine assessments (DWAF, 1999). Ecological importance refers to the diversity, rarity or uniqueness of the habitats and biota. Consequently, it reflects the importance of protecting these ecological attributes, from a local, national, and even international perspective. Ecological sensitivity refers to the ability of the ecosystem to tolerate disturbances and to recover from certain impacts. Therefore, the more sensitive the system, the lower its tolerance will be to various forms of alteration and disturbance. This serves as a valuable indication of the degree to which a water resource (river, wetland) can be utilized without putting its ecological sustainability at risk. A series of determinants for EIS are assessed on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance. The median of the determinants is used to assign the EIS category as listed.

4 RESULTS AND DISCUSSION

4.1 THE GRID INFRASTRUCTURE STUDY SITE

4.1.1 THE NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREAS (NFEPA) & THE NATIONAL SCREENING TOOL

Based on current outputs of the NFEPA database, a NFEPA wetland were identified on the study site (Table 2). It is the same wetland as which was identified during field survey as depression 1. The NFEPA database also identifies the wetland as a depression of natural origin. The wetlands on the study site are designated in the RietModder Water Management Area (WMA).

Table 2: The wetlands present on the study site with their corresponding NFEPA status.

Wetlands on study site	***NFEPA wetland status***
Depression 1	Yes
Depression 2	No

Depression 3	No

The results from the National Screening Tool indicates that the study site has a Very High sensitivity with regards to wetlands. Two out of the three depressions are flagged by the National Screening Tool and both these wetlands have a Very High sensitivity rating. The other depression wasn't flagged or indicated by the National Screening Tool (Table 3).

Table 3: The wetlands on the study site with the corresponding Screening Tool status.

Wetlands on study site	***Screening tool sensitivity status***
Depression 1	Very High
Depression 2	Not flagged
Depression 3	Very High

4.1.2 WETLAND'S BIO-PHYSICAL STATE & DELINEATIONS

The study site consists of a corridor wherein the grid infrastructure is planned. This corridor runs roughly from west to east. The study site sprawls over grassland plains and has a very flat topographical nature (Figure 6). *Searsia* and *Vachellia* tree species are only present in a few isolated pockets within the grassland habitat. There are no rivers, streams or drainage lines in the immediate vicinity of the site. Three wetlands are present on the study site, these wetlands are classified as depressions. The wetlands are small with all three being under 1 ha in size. There is also a borrow-pit present on the study site (Figure 7) close to the tar road which from aerial photographs had the appearance of a wetland but when "groundtruthed" during the field survey it was evident that it was a man-made borrow-pit. This borrow-pit was probably created as part of the road construction process. The three depressions present within the study area create habitat for various fauna and flora within the grassland habitat and thus increases the habitat heterogeneity of the landscape. The depressions also act as a water source for long periods of the year for birds, rodents, reptiles and small game such as steenbok and scrub hare. The depressions also play a role in groundwater recharge within the landscape.



Figure 6: Grassland habitat which is characteristic of the study site.



Figure 7: Man-made borrow-pit fringed with Searsia lancea trees.

Depression 1:

This wetland is classified as a depression HGM type (Figure 9). Depression 1 covers a land area of 0.85 ha. Although this depression stores water for long periods throughout the year due to its high clay content it is of an ephemeral nature. The hydrological inputs which the depression receives are in the form of rainstorms and runoff from the surrounding area. The depression is located at the lowest point in the immediate landscape. There isn't any signs of erosion or pollution present within the depression or its catchment. No alien invasive vegetation is present within the confines of the depression although there is a stand of *Eucalyptus* trees to the west of the depression within its catchment (Figure 10). These trees absorbs large amounts of water from the soil and could influence the amount of subsurface hydrological inputs received by the depression. The depression is utilised by livestock and game during the wet season but no signs of overgrazing or excessive trampling were observed. The vegetation component of the wetland is in a good condition, with a high vegetation cover which also implies a high degree of surface roughness. The vegetation species are mainly represented by Poaceae (grasses) and a few scattered Cyperaceae (sedges). Obligate wetland species as well as facultative wetland species were recorded within the wetland. Moving from the wetland habitat to the terrestrial habitat the elevation increases, even if it is very slightly (Figure 11) and the species composition changes from wetland vegetation species to terrestrial grassland species (Figure 11). The soil samples that were extracted from a depth of 50cm showed signs of wetness with reddish-brown mottles in a greyish soil matrix in the seasonal and temporary wetland zones, while gradually becoming more "gleyed" as one moves closer to the permanent zone (Figure 12). This indicates the presence of hydromorphic soils. By implementing the methodology as discussed in this report it was found that all the wetland indicators were found to be in place. Refer to Figure 13 for the wetland delineation map.



Figure 8: Different visual angles of depression 1.



Figure 9: Eucalyptus trees to the west of the depression and within its catchment.



Figure 10: Elevation increase as there is moved from the depression to the terrestrial grassland (From left to right). Note the presence of termite mounds outside of the depression in the terrestrial zone.



Figure 11: Change in species composition as there transitioned to terrestrial species such as Themeda triandra in the foreground on the right.



Figure 12: Dark gleyed soils extracted within the first 50cm of the depression.

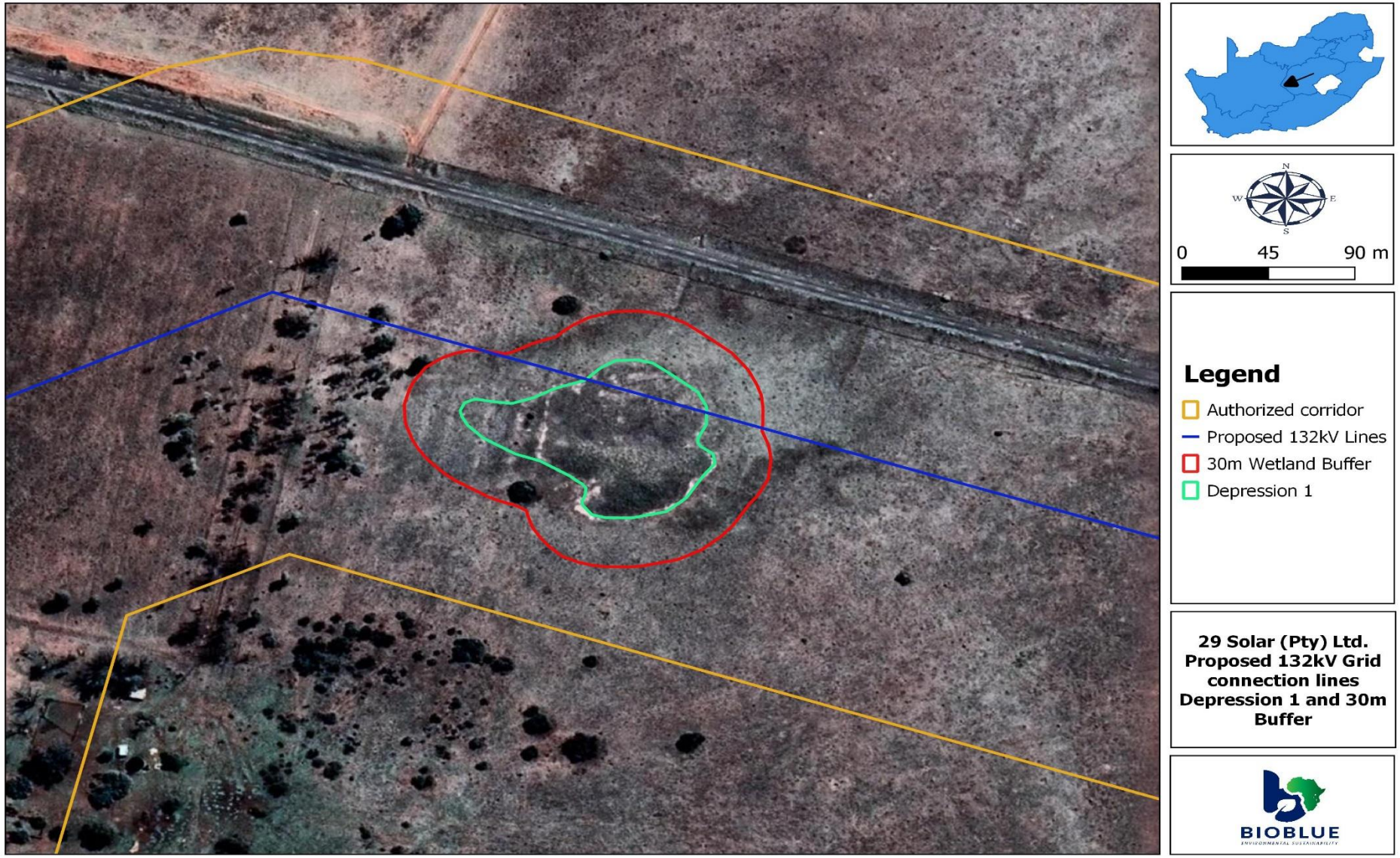


Figure 13: Depression 1 delineation map.

Depression 2:

This wetland is classified as a depression HGM type. It is located approximately 100m south of the R64 road and partially within the grid infrastructure corridor, with the largest part of the wetland located within the boundaries of the grid infrastructure corridor (Figure 17). Depression 2 covers a land area of 0.95 ha. This wetland is the least distinct of the three depressions but is more easily discernible when employing aerial photography. Although this depression stores water for long periods throughout the year due to its high clay content it is of an ephemeral nature. The hydrological inputs which the depression receives are in the form of rainstorms and runoff from the surrounding area. The depression is located at the lowest point in the adjacent landscape. There isn't any signs of erosion or pollution present within the depression or its catchment. No alien invasive vegetation is present within the confines of the depression and its catchment. The depression is utilised by livestock and game and although no signs of overgrazing were observed, trampling has taken place in sections, with bare soil patches present where water pools in the rainy season which is then trampled by cattle (Figure 14). The vegetation component of the wetland is in a moderate to good condition. The vegetation species is mainly represented by Poaceae (grasses) and a few scattered Cyperaceae (sedges) (Figure 15). Obligate wetland species as well as facultative wetland species were recorded within the wetland. Moving from the wetland habitat to the terrestrial habitat the elevation increases slightly with a resultant change in plant species composition from wetland vegetation species to terrestrial grassland species. The soil samples that were extracted from a depth of 50cm showed signs of wetness. The soil samples showed reddish-brown mottles in a greyish soil matrix in the seasonal and temporary wetland zones, with soils gradually becoming more "gleyed" as one moves closer to the permanent zone (Figure 16). This indicates the presence of hydromorphic soils. By implementing the methodology as discussed in this report it was found that all the wetland indicators were found to be in place. Refer to Figure 17 for the wetland delineation map.



Figure 14: Bare areas within the depression were water pools and trampling occur.



Figure 15: Sedges occurring in a patchy distribution pattern throughout depression.



Figure 16: Soil samples extracted from the depression showing clear signs of wetness.



Figure 17: Depression 2 delineation map.

Depression 3:

This wetland is classified as a depression HGM type (Figure 18). It is located approximately 800m south of the R64 road and partially within the grid infrastructure corridor, with the largest section of the wetland located within the boundaries of the grid infrastructure corridor. Depression 3 covers a land area of 0.82 ha. Although this depression stores water for long periods throughout the year due to its high clay content it is of an ephemeral nature. The hydrological inputs which the depression receives are in the form of rainstorms and runoff from the surrounding landscape and grassland habitat. The depression is located at the lowest point in relation to the adjacent landscape. There isn't any signs of erosion or pollution present within the depression or its catchment. No alien invasive vegetation is present within the confines of the depression and its catchment. Although the depression is utilised by livestock and game, no signs of overgrazing, were observed although some trampling of the vegetation was present. The vegetation component of the wetland has good cover with a high degree of surface roughness. The vegetation species are mainly represented by Poaceae (grasses) and a few scattered Cyperaceae (sedges) throughout the depression (Figure 19). Obligate wetland species as well as facultative wetland species were recorded within the wetland. Moving from the wetland habitat to the terrestrial habitat there is a slight increase in elevation as well as change in species composition from wetland species to terrestrial species. The soil samples that were extracted from a depth of 50cm showed signs of wetness. The soil samples showed reddish-brown mottles in a greyish soil matrix in the seasonal and temporary wetland zones, with soils gradually becoming more "gleyed" as one moves closer to the permanent zone (Figure 20). This indicates the presence of hydromorphic soils. By implementing the methodology as discussed in this report it was found that all the wetland indicators were found to be in place. Refer to Figure 21 for the wetland delineation map.



Figure 18: Different angles of Depression 3.



Figure 19: Moist grassland species interspersed with sedges in the wetland.



Figure 20: Clay soils with distinct mottling present within the soil matrix.

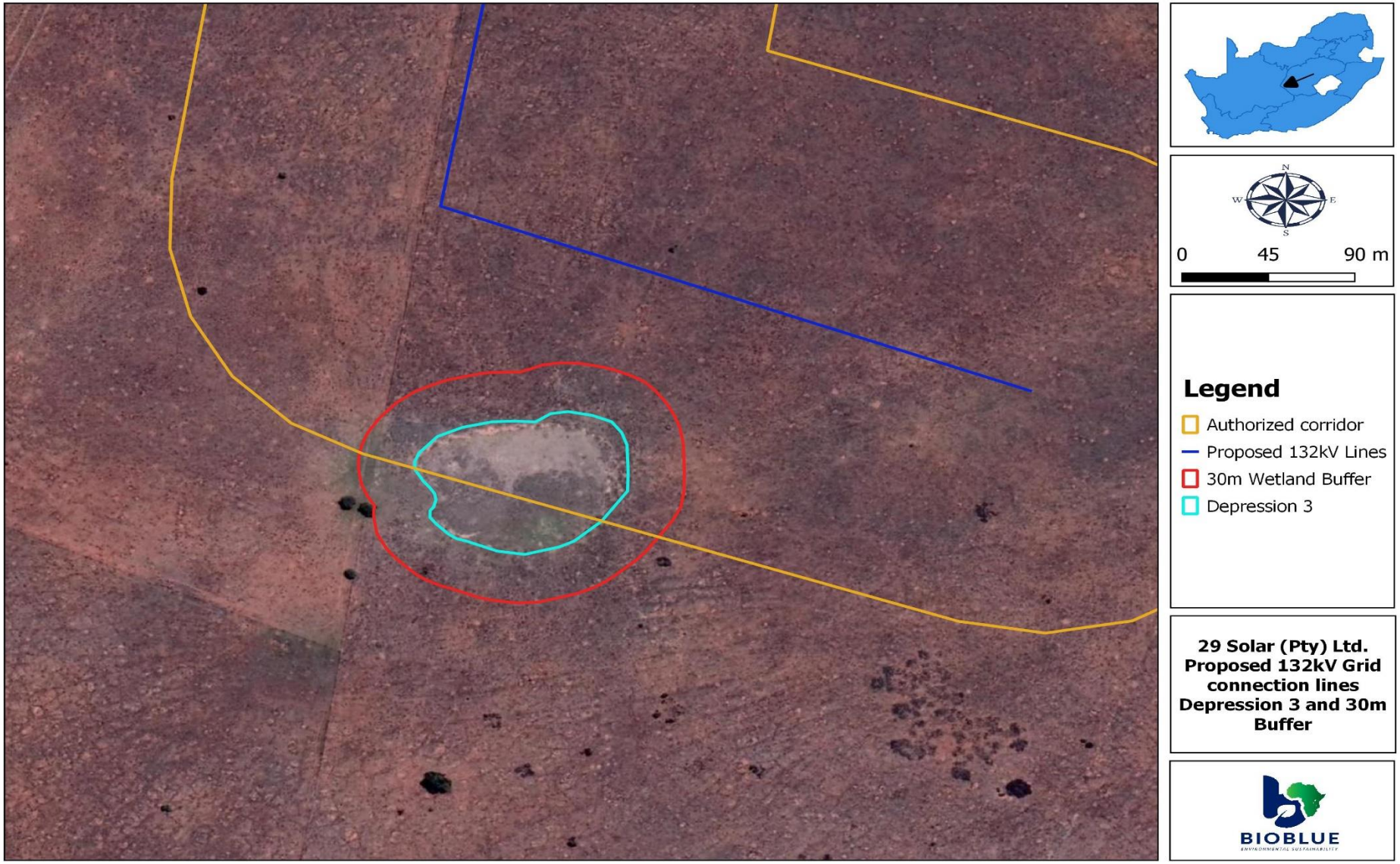


Figure 21: Depression 3 delineation map.

4.1.3 PRESENT ECOLOGICAL STATE

This section deals with the Present Ecological State (PES) of each of the wetlands within the study area.

Table 4: Present Ecological State (PES)employed by Wet-Health to categorise the health and integrity of wetlands.

Impact Category	Description	Combined impact score	PES Category
None	Unmodified, natural.	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Critical	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F

Table 5: Classes of trajectory change, and scores used to evaluate likely future changes to the health of the wetlands.

Change Class	Description	HGM Score	Class Range	Symbol
Improve	Condition is likely to improve over the over the next 5 years	1	0.3 to 1.0	(↑)
Remain stable	Condition is likely to remain stable over the next 5 years	0	-0.2 to +0.2	(→)

Slowly deteriorate	Condition is likely to deteriorate slightly over the next 5 years	-1	-0.3 to -1.0	(↓)
Rapidly deteriorate	Substantial deterioration of condition is expected over the next 5 years	-2	-1.1 to -2.0	(↓↓)

Depression 1:

Table 6: Impact scores and PES rating for Depression 1.

HGM Unit	ha	Extent (%)	Hydrology		Geomorphology		Vegetation		Overall Score
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
1	0.85	100	1.7	0.1	1.5	0.1	1.4	0.2	1.5
Area weighted impact scores			**1.7**	**0.1**	**1.5**	**0.1**	**1.4**	**0.2**	
PES Category			**B**	→	**B**	→	**B**	→	**B**

The wetland achieved an overall PES health score of 1.5 which places it in a **PES category of B** (Table 4). This implies that the wetland has undergone very little anthropogenic modification. The wetland is largely natural with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place, but it has an overall natural ecosystem functioning.

Depression 2:

Table 7: Impact scores and PES rating for Depression 2.

HGM Unit	ha	Extent (%)	Hydrology		Geomorphology		Vegetation		Overall Score
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
1	0.95	100	1.8	0.1	1.6	0	1.9	0	1.8
Area weighted impact scores			**1.8**	**0.1**	**1.6**	**0**	**1.9**	**0**	
PES Category			**B**	→	**B**	→	**B**	→	**B**

The wetland achieved an overall PES health score of 1.8 which places it in a **PES category of B** (Table 4). This is an indication that the depression is in a largely natural condition with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place, but its ecosystem functioning remain intact.

Depression 3:

Table 8: Impact scores and PES rating for Depression 3.

HGM Unit	Ha	Extent (%)	Hydrology		Geomorphology		Vegetation		Overall Score
			Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
1	0.82	100	1.6	0.1	1.6	-0.1	1.4	0	**1.5**
Area weighted impact scores			**1.6**	**0.1**	**1.6**	**-0.1**	**1.4**	**0**	
PES Category			**B**	→	**B**	→	**B**	→	**B**

The wetland achieved an overall PES health score of 1,5 which places it in a **PES category of B** (Table 4). This is an indication that the depression is in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place, but it is ecologically functioning.

4.1.4 ECOLOGICAL IMPORTANCE AND SESNITIVITY (EIS)

This section states the Ecological Importance and Sensitivity (EIS) scores of each of the wetlands on the study site.

Table 9: Ecological Importance and Sensitivity (EIS) categories

Ecological Importance and Sensitivity Categories	General Description	Range of Median

Very high	Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is very significant.	>3 and ≤4
High	Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is significant.	>2 and ≤3
Moderate	Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is very small.	>1 and ≤2
Low/marginal	Wetlands that are not unique. They are not sensitive at any scale in terms of habitat modifications or changes in water flow. These wetlands have a low biodiversity. The value of the contribution of their water quality and quantity to a river is almost nothing.	>0 and ≤1

Table 10: Confidence rating related to the EIS scoring system

Confidence Rating	Confidence Score
Very high confidence	5
High confidence	4
Moderate confidence	3
Marginal confidence	2
Low confidence	1

Depression 1:

Table 11: Depression 1 ecological Importance and sensitivity (EIS) scores

Ecological Importance and Sensitivity (EIS)		
	Score (0-4)	**Confidence (1-5)**
Biodiversity support	1.9	4.00
Landscape scale	2.1	4.20
Sensitivity of the wetland	1.8	4.33
Ecological Importance and Sensitivity (EIS)	1.9	4.18

The EIS score for Depression 1 was 1.9. This means that the wetland is classified as moderate according to the EIS categories. These wetlands are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is very small.

Depression 2:

Table 12: Depression 2 ecological Importance and sensitivity (EIS) scores

Ecological Importance and Sensitivity (EIS)		
	Score (0-4)	**Confidence (1-5)**
Biodiversity support	1.8	4.50
Landscape scale	1.5	4.20
Sensitivity of the wetland	1.3	4.00
Ecological Importance and Sensitivity (EIS)	1.5	4.23

The EIS score for Depression 2 was 1.5. This means that the wetland is classified as moderate according to the EIS categories. These wetlands are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is very small.

Depression 3:

Table 13: Depression 3 ecological Importance and sensitivity (EIS) scores

Ecological Importance and Sensitivity (EIS)		
	Score (0-4)	**Confidence (1-5)**
Biodiversity support	1.8	4.1
Landscape scale	1.6	4.2
Sensitivity of the wetland	1.5	4.0
Ecological Importance and Sensitivity (EIS)	1.6	4.1

The EIS score for Depression 3 was 1.6. This means that the wetland is classified as moderate according to the EIS categories. These wetlands are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. The value of the contribution of their water quality and quantity to a river is very small.

5 IMPACT STATEMENT

Any developmental activities in a natural system will have an impact on the surrounding environment and in most cases in a negative way. The Environmental Impact Assessment (EIA) process is not for a blanket ban on any development as it realises the need for sustainable development and economic growth. If there is not a fatal flaw or flaws in terms of a development's impact upon the environment, then the development can proceed. The purpose of this phase of the study was to identify and assess the significance of the potential impacts that the proposed grid infrastructure extension could exert upon the wetlands.

It is clear from the current proposed grid infrastructure layout (including adjacent servitude) that it will bisect the northern part of Depression 1. The proposed grid infrastructure will not cut through Depression 2, although it will cut through the buffer zone of Depression 2. Depression 3 including its buffer zone will not be impacted by the proposed gird infrastructure in its current layout. The impact of the current grid infrastructure layout will have a moderate to high impact on two out of the three depressions on the study site. The impacts can be lessened with the implementation of adequate mitigation measures. The impacts can also be completely eliminated if an alternative trajectory is planned for the grid infrastructure. This would be the ideal scenario. An alternative route trajectory can be followed by the grid infrastructure still within the grid infrastructure corridor. A possible alternative route for the grid infrastructure to the one currently proposed, is that the route is moved south of Depression 1 and further to the West of Depression 2. This will eliminate the impacts that the proposed grid infrastructure could directly have upon the depressions. Even if this alternative route would be adopted, proper mitigation measures will still be required for the different phases of the project.

6 MITIGATION MEASURES

This section prescribes and discusses the mitigation measures that must be implemented during the different phases of the proposed project so as to avoid and limit ecological degrading influences upon the wetlands identified within the boundaries of the study site. One of the main ways to ensure that wetland functioning on the study site is protected is through the implementation of an appropriate buffer zone. The buffer zone protects the wetlands from negative edge effects associated with the development and agricultural activities. A wetland buffer zone is an area of vegetation, preferably indigenous which usually begins from the boundary of a wetland's temporary zone (the wetland edge) and extends outward. The

importance of buffer zones where natural vegetation is present not only assists in maintaining hydrological functioning, but also ensures a high level of habitat connectivity and biological preservation. An appropriate buffer zone comprising intact indigenous vegetation will help to slow down water runoff and soil erosion from the adjacent land uses such as agricultural fields and roads, while simultaneously filtrating and facilitating pollutant removal. The most common buffer zone width ranges from between 20m to 60m. All buffer zone areas should be managed by implementing an appropriate vegetation management plan (e.g. burning buffer zone sections in an alternating fashion once every three years depending on the fuel load; alien plant removal, correct grazing regime etc.). An appropriate buffer zone around the wetland would ensure a large enough open surface area for infiltration and to protect the wetland from edge effects originating from the proposed development.

A 30 m wide buffer zone is advised to protect the wetlands from the negative effects of the proposed development. The buffer zone will help to ensure a sufficiently wet wetland hydrology to support its functions, as well as protect the wetlands' habitat and an adjacent portion of terrestrial habitat, in order to support indigenous biodiversity. Buffer zones create habitat and areas for foraging, breeding and dispersal for various faunal species.

The following mitigation measures should be employed during the **planning phase**:

- Ensure that the alternative route for the proposed grid infrastructure is strongly considered, which will not impact on the sensitive aquatic habitat.
- Ensure that the infrastructure associated with the 132 kV powerline is taken into account during the planning phase, such as servitudes.
- Consider the delineated wetland boundaries and the 30m buffer zone in the planning process to ensure that no pylon or any road is planned within the wetland and its associated buffer zone.

The construction phase of any project is critical in the sense that this is where major environmental damage can be caused to ecosystems. Hydrocarbons such as fuels or lubricants spilled from construction vehicles, construction materials that are not properly stockpiled, and litter deposited by construction workers may be washed or blown into wetlands and other aquatic habitats. Stripping of topsoil will result in increased runoff of sediment from the site into the wetlands. Should appropriate toilet facilities not be provided for construction workers at the construction crew camps, the potential exists for surface water resources and the surrounding environment to be contaminated by raw sewage. Every effort should still be taken to limit additional contributions.

The following mitigation measures must be employed during the **construction phase** of the proposed Grid infrastructure:

- The construction of the proposed infrastructure must preferably occur during the dry season in the months of May, June, July, and August when the rainfall is minimal.
- The spanning of the powerlines across the depression wetlands on the study site should be prioritised if the alternative trajectory of the grid infrastructure is not feasible.
- During the construction phase the natural flow of water (hydrological inputs), which will be in the form of runoff from rainfall events to the depressions on the study site should not be hampered or obstructed in any way or form.
- The wetland areas and their associated buffer zones must be fenced off and zoned as no-go areas. No person should be allowed into the area unless approved by the ECO for official purposes.
- Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.
- Vegetation clearance should be restricted to the approved development areas.
- Runoff from roads must be managed to avoid erosion and pollution problems. Where excessive loose sediment is created, attenuation swales and / or soils screens should be installed.
- Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.
- Vegetation and soil must be retained in position for as long as possible and only removed immediately before construction/earthworks commences.
- A walled concrete platform, dedicated store with adequate flooring or bermed area must be used to accommodate chemicals such as fuel, oil, paint, herbicide, and insecticides, as appropriate, in well-ventilated areas.
- Storage of potentially hazardous materials must be above any 100-year flood line, or as agreed with the Environmental Control Officer (ECO). These materials include fuel, oil, cement, bitumen etc.
- Sufficient care must be taken when handling these materials to prevent pollution.
- Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.
- Oil residue must be treated with oil absorbent materials/equipment such as Drizit or similar, and this material removed to an approved waste site.
- Concrete and cement are to be mixed only on an impermeable surface such as a batching tray with raised sides and not on exposed soil.
- Concrete and tar must only be mixed on mixing trays and in areas which have been specially demarcated for this purpose.

- All concrete and tar that is spilled outside these areas must be promptly removed by the Contractor and taken to an approved landfill.
- After all the concrete/tar mixing is complete all waste concrete / tar must be removed from the batching area and disposed of at an approved dumpsite.
- Storm water must not be allowed to flow through the batching area.
- Cement sediment must be removed from time to time and disposed of in a manner as instructed by the ECO.
- All construction materials liable to spillage must be stored in appropriate structures with impermeable flooring.
- Portable septic toilets must be provided and maintained for construction crews.
- Maintenance must include their removal without sewage spillage.
- Portable septic toilets must be located outside of the 1:100-year flood line and the delineated wetland boundaries.
- Under no circumstances may ablutions occur outside of the provided facilities.
- No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs and Sanitation (DWS) must be informed immediately.
- Store all litter carefully so it cannot be washed or blown into any of the aquatic habitats within the boundaries of the study area.
- Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed.
- The construction site must be cleaned daily, and litter removed.
- Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.
- Backfill must be compacted to form a stabilised and durable blanket.
- Re-vegetation of disturbed areas must be undertaken with site indigenous species and in accordance with the instructions issued by the Environmental Control Officer (ECO). Areas where soil compaction or ruts developed must be rehabilitated.
- An environmental awareness training programme must be implemented by contractor to educate the staff and construction crews.
- Any proclaimed weed or alien species that germinates during the contract period must be cleared by hand before flowering.
- Imported fill material must be monitored during and after construction for the presence of any alien species. Any such species must be removed immediately.
- Infilling, excavation, drainage, dumping of building material must not occur in the wetlands whether they are in close proximity to the study site or not.

- Avoid construction activities in the wetlands through proper demarcation of the construction site. The Contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on wetlands and other aquatic habitats which occur on site as well as off site. This information shall form part of the Environmental Education Programme to be affected by the Contractor.
- Emergency plans must be in place in case of pollutant spillages into aquatic habitats such as wetlands.
- All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. It should also only be stored for the minimum amount of time necessary.
- Silt traps and culverts must be regularly maintained and cleared so as to ensure effective drainage.
- Littering and contamination of water sources during construction must be mitigated by effective construction camp management.
- All construction materials including fuels and oil must be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination. The storage areas must be constructed as far away as practically possible outside of the wetland boundaries.
- Washing and cleaning of equipment must also be done within a bermed area, in order to trap any cement or plaster and avoid excessive soil erosion.
- These sites must be rehabilitated prior to commencing the operational phase.
- No washing, rinsing and cleaning of equipment in or near the depressions.
- The disturbance of any fauna and flora must be avoided at all costs.

The following mitigation measures must be employed during the **operational phase**:

- Regular inspection of the grid infrastructure and associated servitudes to ensure no erosion occurs.
- It is critical that an alien vegetation control and monitoring programme is implemented. Encroachment of alien vegetation could in all likelihood increase as a result of the construction process disturbances. Rehabilitation of disturbed areas, utilising indigenous vegetation species, will assist in reducing the impact of construction.
- The alien vegetation control and monitoring programme must be implemented for the whole grid infrastructure corridor including the terrestrial and aquatic habitats.
- The removal of alien invasives will improve habitat. This in turn will lead to an increase in biodiversity. More water be available on the study site for indigenous species as well as the hydrological functioning of the wetlands. The removal of alien invasives will also eliminate the source from which alien invasives spread further afield and infesting the

broader landscape. Habitat will be reclaimed that is used by various species for foraging and breeding.

- Rehabilitation of areas cleared from alien invasives with indigenous site-specific species.
- During the operational phase vehicles must remain on designated roads and must not drive in the wetland areas.
- Monitor all roads to ensure no erosion and the accompanying sediment loads ends up in the wetlands. The sediment would be transported as runoff from these newly created tracks or roads.
- Ensure that proper grazing management practices are implemented and that there is adhered to the prescribed carrying capacity for livestock and game in accordance with the grassland biome and the climatic conditions of the region.
- Ensure farm workers are aware of the importance of water security and aquatic habitats as well as what to do to avoid their degradation through regular awareness and educational programs.
- Farm vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.

7 CONCLUSION

The study site is earmarked for a proposed grid infrastructure extension which is located within a grid infrastructure corridor. The corridor is approximately 322m wide. The grid infrastructure consists of 132kV powerline, associated supporting infrastructure as well as servitudes to access and service the powerline. There are three wetlands present on the study site. All three of the wetlands are classified according to the HGM criteria as Depressions.

According to the NFEPA database, only Depression 1 is classified as a NFEPA wetland out of the three depressions identified on the study site. NFEPA states that Depression 1 is of natural origin. The field survey confirmed the NFEPA result. The National Screening Tool flagged Depression 1 and 3 as possessing a Very High sensitivity. There were very few degrading influences upon the wetlands recorded. With only Depression 1 having alien invasive *Eucalyptus* trees present within its catchment but not the wetland itself. There was evidence of trampling or grazing but not to the degree that it exerted a detrimental influence on the habitat integrity and functionality of the depressions. Consequently, the PES scores of the three depressions were rated as a category B. This means that the depressions on the study site are largely natural with only few modifications undergone by the wetlands. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. All of the depressions had EIS scores which placed them in in an EIS category of moderate. This implies that these wetlands are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. It is strongly advised that the current grid infrastructure trajectory (Figure 22) be changed to an alternative trajectory (Figure 23) to ensure that the depressions are not impacted at all. This alternative trajectory will still be located within the grid infrastructure corridor. This can be achieved by moving the grid infrastructure trajectory to the South of Depression 1 and further West of Depression 2. This would be the ideal solution with regards to wetland health and functionality. The spanning of the powerlines across the depression wetlands of the study site should be prioritised if the alternative trajectory of the grid infrastructure is not decided upon. A 30m wide buffer zone is to be implemented around all three the depressions to protect the ecological integrity of the wetlands from detrimental edge effects associated with the proposed development during the construction and operational phases.

It is imperative that the mitigation measures and recommendations contained in this report must be adhered to and strictly implemented during the different phases of the project. If the

mitigation measures and recommendations as prescribed in this report are followed the negative impacts of the proposed development on the aquatic ecosystems will be minimised or avoided all together depending on the final trajectory of the grid infrastructure decided upon.

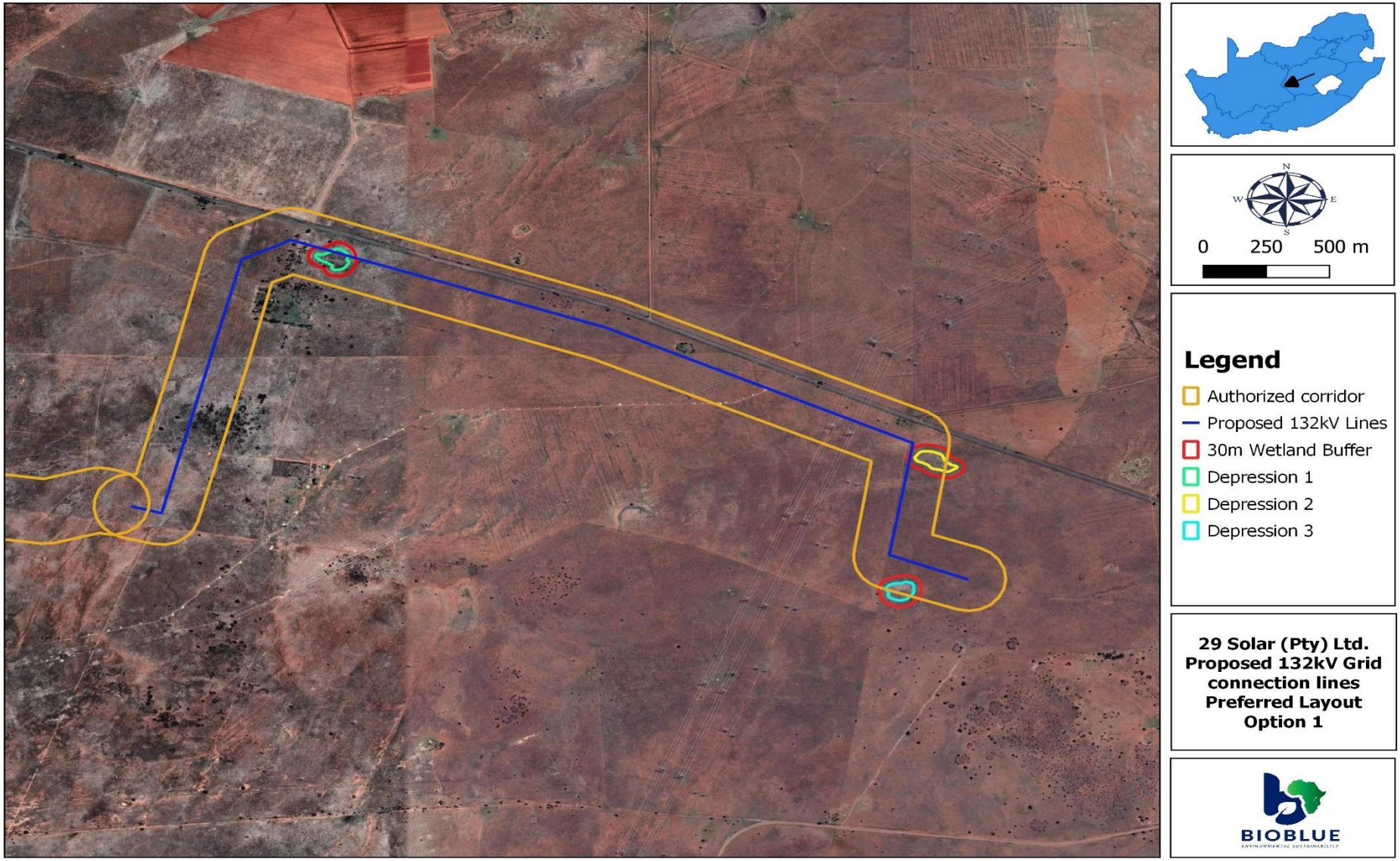


Figure 22: Current grid infrastructure layout map.

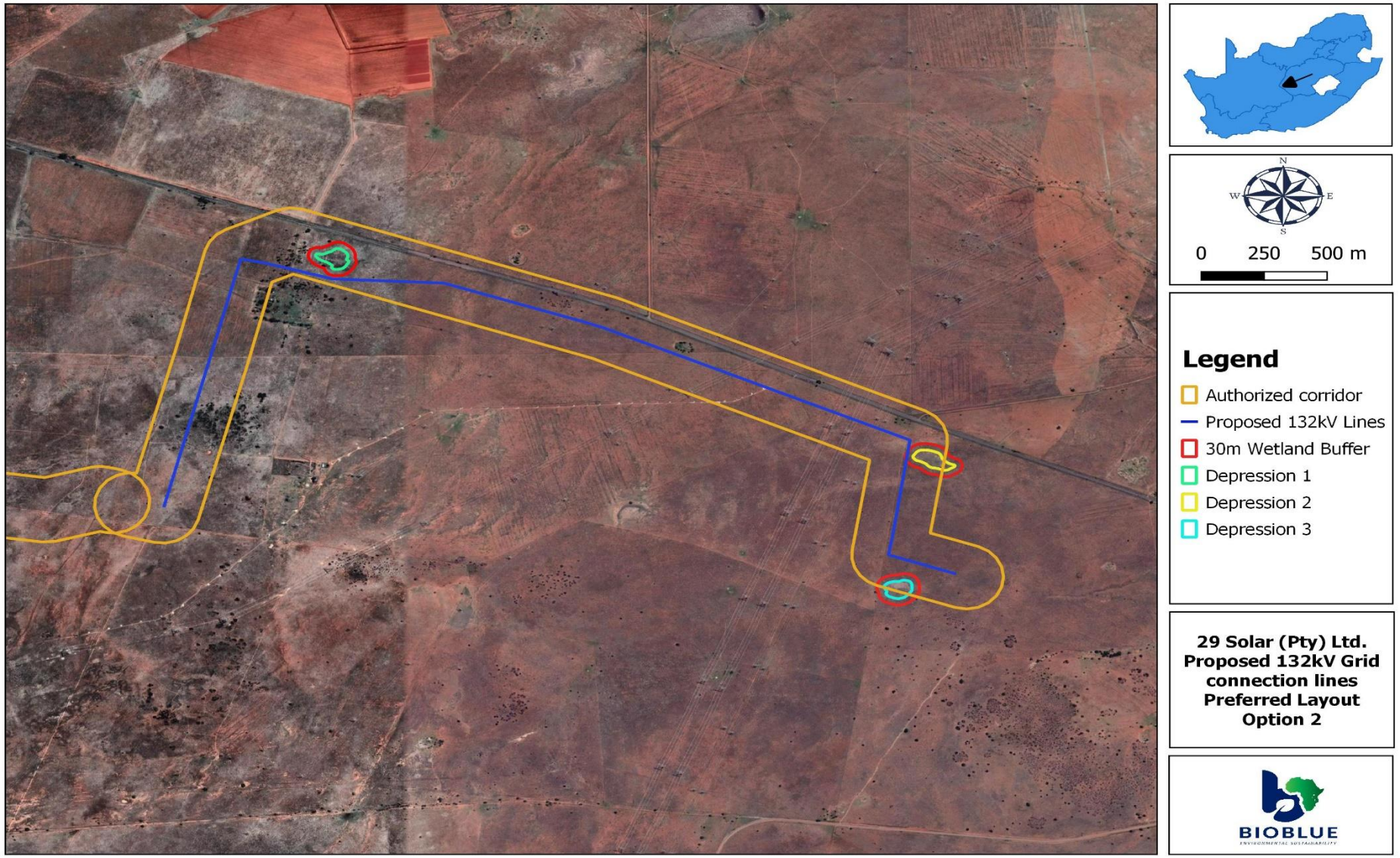


Figure 23: Alternative grid infrastructure layout map.

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GRIDLINE FOR PROPOSED MARULA CLUSTER PROJECT FOR 1B VOGT, DEALSVILLE: DESK-TOP PALEONTOLOGICAL ASSESSMENT FOR A POWER LINE NEAR DEALSVILLE, TOKOLOGO DISTRICT MUNICIPALITY, FREESTATE PROVINCE

FOR

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28 August 2022

Declaration of Independence

This report has been compiled by Dr Alan Smith (Pr. Sc. Nat.) of Alan Smith Consulting, Durban. The views expressed in this report are entirely those of the author, if not then the source has been duly acknowledged. No other interest was displayed during the decision making process for the Project.

Specialist: Dr Alan Smith

Signature: 

EXECUTIVE SUMMARY

Alan Smith Consulting was appointed by **Zander Liebenberg of BIOBLUE ENVIRONMENTAL SUSTAINABILITY** to conduct a Desk-Top field assessment of the potential impacts to **Palaeontology Resources** that might occur through the activities of a gridline for the proposed Marula Cluster Project for 1B Vogt, Dealsville, Tokologo District Municipality, Freestate Province.

Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), requires a Palaeontological Impact Assessment (PIA) to assess any potential impacts to palaeontological heritage.

The chances of encountering fossils are **Low,** but N**ot Zero**; consequently a ***"Chance Find Protocol"*** has been included.

No further Palaeontological work will be required unless the "Chance Find Protocol" is triggered. Should this happen then a suitably qualified palaeontologist will be required to visit and inspect the finding and site.

ACRONYMS

BA:	Basic Assessment
EDTEA:	(Department of) Economic Development, Tourism and Environmental Affairs
HIA:	Heritage Impact Assessment
PIA;	Palaeontological Impact Assessment

SAHRA: South African Heritage Resource Agency
SAHRIS: South African Heritage Resources Information System

1. TERMS OF REFERENCE

Alan Smith Consulting was requested by **Zander Liebenberg of BIOBLUE ENVIRONMENTAL SUSTAINABILITY** –to provide a Desk-Top Palaeo Impact Assessment for a gridline for the proposed Marula Cluster Project for 1B Vogt, Dealsville, Tokologo District Municipality, Freestate Province (Figure 1). This report is to meet the requirements of the National Environmental Management Act (Act 107 of 1998) [as amended] Environmental Impact Assessment (EIA) regulations, Appendix 6.

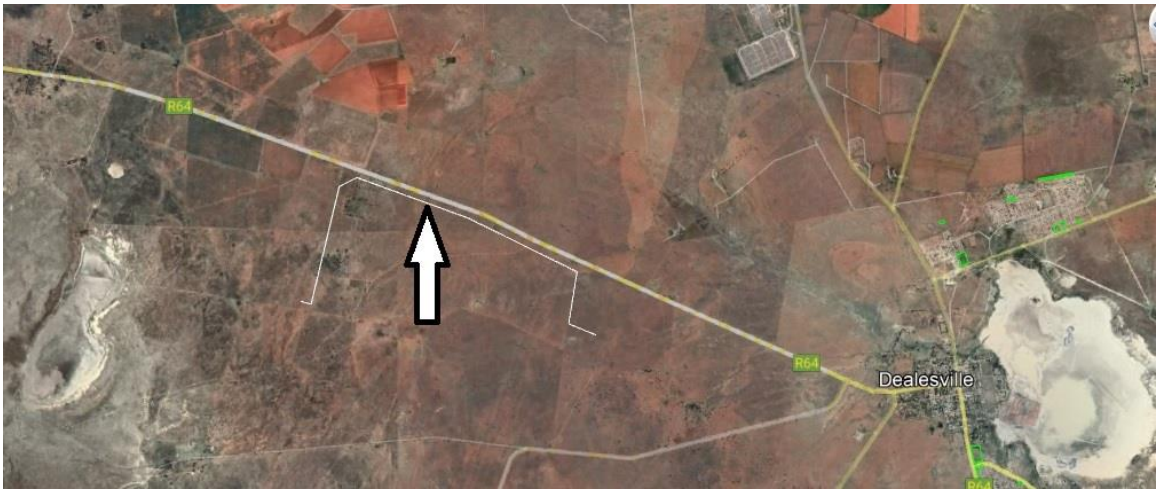


Figure 1: Location of the gridline (arrowed) for the proposed Marula Cluster Project 1B Vogt, Dealsville, Tokologo District Municipality, Freestate Province. Note that much of it follows the R64 roadway Source Google Earth.

2. SCOPE AND PURPOSE OF REPORT

A Palaeontological Impact Assessment (PIA) is a means of identifying any significant palaeontological material before development begins, so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This Desk-Top investigation fulfills the requirements of the heritage authorities (SAHRA), such that a comment can be issued by them for consideration by the competent authority (EDTEA), who will review the Basic Assessment (BA) and grant or refuse authorisation. The PIA report will outline any management and/or mitigation requirements that will need to be complied with from a

heritage point of view and that should be included in the conditions of authorisation, should this be granted.

3. METHODOLOGY

Geological maps, a literature review and personal experience (see Section 9) were used in this research.

4. GEOLOGY

According to the Kimberley 2824 1: 250 000 geological map, the proposed gridline will overlie two lithologies. ~~Thse~~These are the Tierberg Formation and Karoo Dolerite (Figure 2).

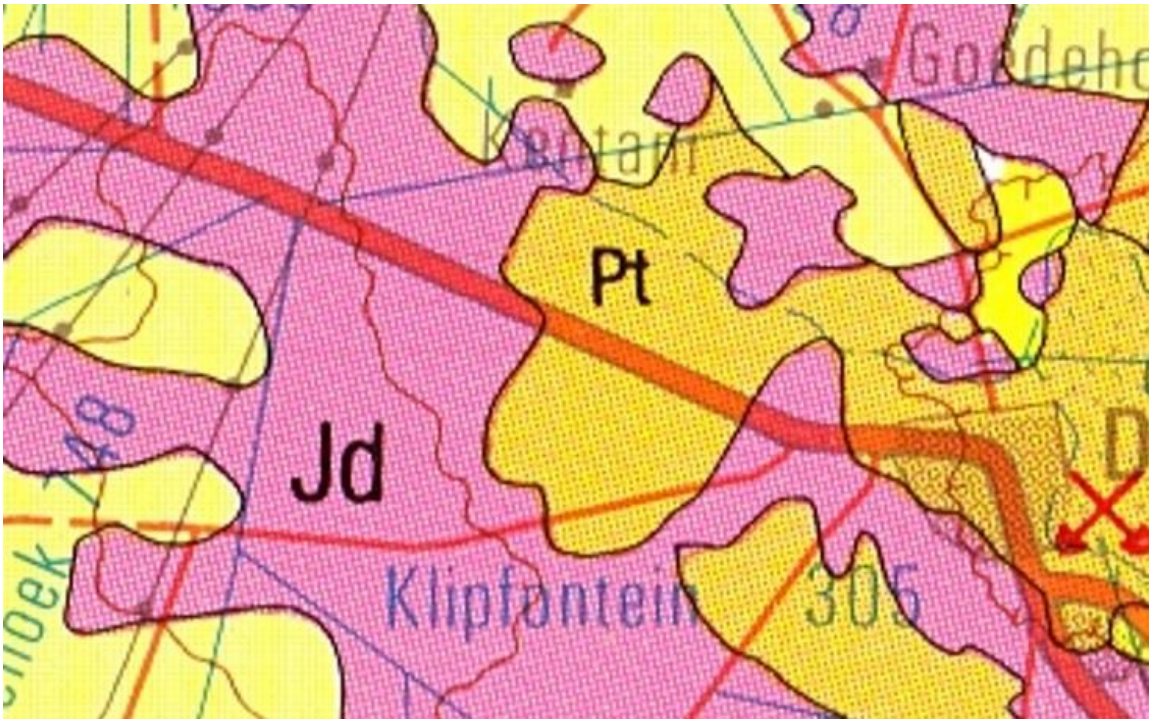


Figure 2: Approximate area of the proposed Marula Cluster Project 1B Vogt gridline. According to this map, this pylon line will intersect Karoo Dolerite (J - ~~pinkd~~pink) and The Karoo-aged Tierberg Formation (Pt- yellow). Extract from the Kimberly (2824) 125 000 Geological Map.

Tierberg Formation

The Tierberg Formation is part of the Karoo Supergroup and forms the upper part of the Ecca Group (Figure 3). This lithology is Early to Middle Permian in age. The Tierberg Formation formed from sediment deposited below wave-base within a basin occupied by the Karoo Sea, located in the centre of the Gondwana Supercontinent. Tierberg Formation environments of deposition include basin plain, distal turbidite fans and distal prodelta setting (Viljoen 2005). Thin coarsening-upwards cycles (~~vidence~~evidence of shoaling) are present near the top of the Tierberg Formation are associated with soft-sediment deformation, wave ripples (common) and calcareous concretions (common). The Karoo Sea is believed to have been brackish, as opposed to fully marine, at this time.

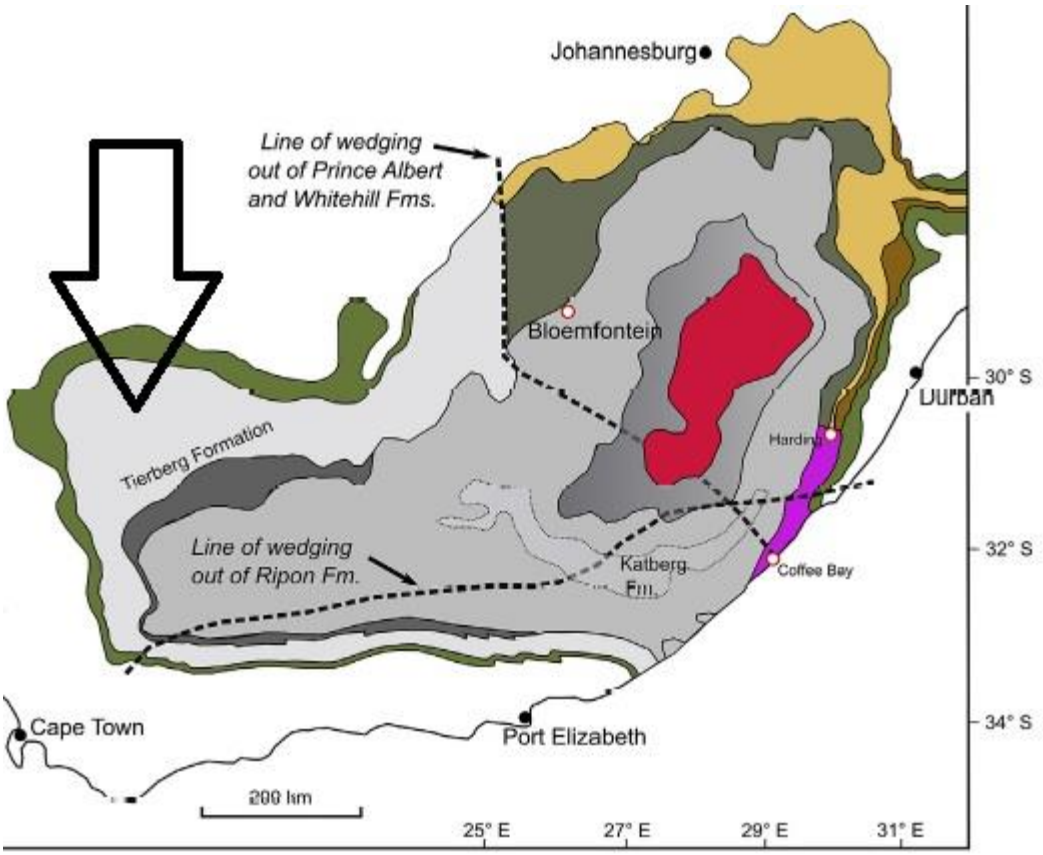


Figure 3: Simplified geological map of South Africa showing the rocks of the Karoo Supergroup, the Tierberg Formation is arrowed. Figure is modified after Hastie et al. (2019).

The Tierberg Formation lithology is often very weathered and generally forms flat plains except where it forms steep hill slopes preserved below dolerite sill caps. Fresh Tierberg Formation exposure is rare due to it being readily weathered. It is usually covered by calcrete, alluvium, thin soils or sheetwash gravel. The Tierberg Formation is dark-coloured, usually grey or brown and, when fresh, laminated. It is carbonaceous with subordinate thin, fine-grained sandstones (Prinsloo 1989, Le Roux 1993, Viljoen 2005, Johnson et al., 2006).

The Tierberg Formation is usually associated with Karoo Dolerite sills and dykes (Prinsloo 1989). Bedding planes, on which fossils are usually found are very rare.

Karoo Dolerite

Karoo Dolerite is represented by dykes and sills. This lithology is part of the Karoo Large Igneous Province (LIP). The Karoo LIP is a sequence of lavas up to 4.5 km thick which was deposited about 184 Ma (million years ago). This igneous deposit was extruded via fissures as a “Continental Flood Basalt” during , a process that has never been witnessed by mankind. This event took place in a relatively short geological (>1Ma) time span and triggered the break-up of the Gondwana Supercontinent (Hastie et al., 2014).

5. PALAEONTOLOGY

The colour coding used in the Sahris Palaeosensitivity Map is shown in Table 1.

Table 1: Summary of SAHRIS categories

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



Figure 4: Palaeosensitivity of the Marula Pylon gridline. Extract from Sahris Palaeosensitivity Map). Tierberg Formation is yellow and the Karoo dolerite grey.

The Tierberg Formation is colour coded yellow (Table 1; Figure 4) and hence requires this desk-top study. The Karoo Dolerite is coded grey (Table 1; Figure 4) and requires no palaeontological assessment.

Tierberg Formation

Rare body fossils are recorded from the Tierb~~erb~~erg Formation. These comprise disarticulated microvertebrates (such as fish teeth and scales) from calcareous concretions in the Koffiefontein, Freestate Province (Zawada 1992). Allochthonous plant remains (leaves and petrified wood) are known, especially from the upper parts of the Tierberg Formation (Wickens 1984). Prinsloo (1989) states that numerous plant impressions and unspecified "fragmentary vertebrate fossils" are found within fine-grained sandstones (top of the Tierberg) near Britstown, Northern Cape Province. The Tierberg Formation may contain microfossil pollens, spores and acritarchs (palynomorphs). Generally trace fossils are sparse but may be locally common, especially in successions which contain thin sandstone units (Abel 1935, Anderson 1974, Wickens 1984, 1994, Prinsloo 1989). Trace fossils are mainly bedding plane parallel, ~~penetrative~~ vertical burrows are present but rare.

Most Tierberg Formation ichno-assemblages have a low diversity and a low to moderate density. Trace fossils include Planolites, and Palaeophycus. Arthropod trackways (such as Umfolozia) and resting impressions (Gluckstadtella) are present. Sinuous fish swimming trails (Undichna) that may have been generated by bottom-feeding palaeoniscoids. Are present. These form sinuous furrows on bedding planes. Arcuate, finely striated feeding excavations of an unknown arthropod (Vadoscavichnia), beaded traces (~~"~~Hormosiroidea" or "Neonereites~~"~~), small sinusoidal surface traces (Cochlichnus), small star-shaped feeding burrows (Stelloglyphus) and zigzag horizontal burrows (Beloraphe), as well as ~~narrow (< 1cm)~~ Cruziana carbonaria scratch burrows are known. The symmetrical, four-pronged trace Broomichnium (Quadrispinichna of Anderson 1974) (van Dijk et al. , 2002), often occur in groups of identical size (c. 3.5cm wide) and similar orientation on the bedding plane. Braddy and Briggs (2002) suggest that this trace was formed by a current-orientated arthropod resting trace.

Karoo Dolerite

This is an intrusive igneous rock and by definition is not fossiliferous.

Palaeontological Significance

Tierberg Formation trace fossils are relatively common and not palaeontologically significant. The overall palaeontological sensitivity of the Tierberg Formation is low.

Although this unit is coded yellow, no further palaeontological work is required unless the "Chance Find Protocol" (section 8) is triggered. The Karoo Dolerite contains no fossils.

6. SUMMARY

The chance of fossils being found on this site is **Low,** but not **Zero. A field trip at this stage will not show anything as the surface rock is very weathered. Only when excavation begins will fresh rock be visible and even then will probably not be waranted.**

No further palaeontological work is required, unless triggered by the "**Chance Find Protocol"** in which a suitably qualified palaeontologist must be consulted. The "**Chance Find Protocol**" must form part of the Environmental Management Programme (EMPr) for the site.

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8. CHANCE FIND PROTOCOL

This Chance Find Protocol must be included in the site EMPr.

If any fossils are found, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.

- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer

1. At full cost to the project, and guided by the appointed Palaeontological Specialist, ensure that a representative archive of palaeontological samples and other records is assembled to characterize the palaeontological occurrences affected by the excavation operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas.

3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by described and measured geological sections, and by providing aid in the surveying of positions where significant fossils are found.

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.

5. Provide covered, dry storage for samples and facilities for a work area for sorting, labeling and boxing/bagging samples.

6. Costs of basic curation and storage until collected. Documentary record of palaeontological occurrences must be done.

7. The contractor will, in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which appropriate information regarding plans for excavations and work schedules must be indicated on the plan of the excavation sites. This must be done in conjunction with the appointed specialist.

8. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.

9. Locations of samples and measured sections are to be pegged, and routinely and accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any “significant fossils” are recorded during the time of excavation.

9. DETAILS OF SPECIALIST

Dr Alan Smith
Private Consultant: ***Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091***

&

Honorary Research Fellow: ***Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban***.

Role: Specialist Palaeontological Report production

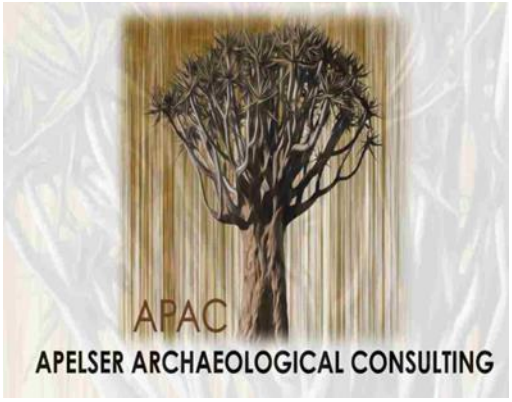
Expertise of the specialist:

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published + 50 journal articles with 582 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Fieldwork PIA: Mpungoze water supply scheme, Empangeni. Client: Enviropro.
- Fieldwork PIA: Helpmekaar Dam. Client: Afzelia environmental consultants.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.

- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Rooilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.



Comprehensive and Professional Solutions for all Heritage Related Matters

CK 2006/014630/23 **VAT NO.: 4360226270**

PHASE 1 HIA REPORT FOR THE POWERLINE ASSESSMENT RELATED TO THE MARULA SOLAR DEVELOPMENT ON PORTIONS OF VARIOUS FARMS NEAR DEALESVILLE IN THE FREE STATE PROVINCE

For:

BioBlue Environmental Sustainability (Pty) Ltd.
829 Cronstedt Street
Moreleta Park, Pretoria
0181

REPORT: **APAC022/100**

by:

A.J. Pelser

Accredited member of ASAPA

October 2022

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DISCLAIMER:

Although all efforts are made to identify all sites of cultural heritage (archaeological and historical) significance during an assessment of study areas, the nature of archaeological and historical sites are as such that it is always possible that hidden or subterranean sites, features or objects could be overlooked during the study. APELSER Archaeological Consulting can't be held liable for such oversights or for costs incurred as a result thereof.

Clients & Developers should not continue with any development actions until SAHRA or one of its subsidiary bodies has provided final comments on this report. Submitting the report to SAHRA is the responsibility of the Client unless required of the Heritage Specialist as part of their appointment and Terms of Reference.



SUMMARY

APelser Archaeological Consulting (APAC) was appointed by BioBlue Environmental Sustainability (Pty) Ltd to conduct a Phase 1 HIA for a new powerline related to the proposed Marula Solar Project (Marula Cluster Project). The study and proposed development area is located near Dealesville in the Free State Province and on portions of the farms Leliehoek, Cornelia, Klipfontein & Modderdam.

Background research indicated that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. There are no known cultural heritage resources (archaeological and/or historical) in the specific study and proposed development area. During the field based assessment some sites, features and material of cultural heritage origin & significance was identified and recorded in the area. The results of the assessment are discussed in this report, with recommendations regarding the way forward provided at the end.

From a Cultural Heritage perspective it is recommended that the new powerline related to the Marula Solar Project be allowed to continue taking into consideration the recommendations put forward at the end of the report.

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1. INTRODUCTION

APelser Archaeological Consulting (APAC) was appointed by BioBlue Environmental Sustainability (Pty) Ltd to conduct a Phase 1 HIA for a new powerline related to the proposed Marula Solar Project (Marula Cluster Project). The study and proposed development area is located near Dealesville in the Free State Province and on portions of the farms Leliehoek, Cornelia, Klipfontein & Modderdam.

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The client indicated the location and footprint of the study & and development areas and the assessment focused on these.

2. TERMS OF REFERENCE

The Terms of Reference for the study was to:

1. Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the portion of land that will be impacted upon by the proposed development;

2. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value;

3. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions;

4. Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources;

5. Review applicable legislative requirements;

3. LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two Acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

3.1. The National Heritage Resources Act

According to the Act the following is protected as cultural heritage resources:

a. Archaeological artifacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography

c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Grave yards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites of scientific or technological value.

The National Estate includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage
c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Sites of Archaeological and paleontological importance
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources. An HIA must be done under the following circumstances:

a. The construction of a linear development (road, wall, power line, canal etc.) exceeding 300m in length
b. The construction of a bridge or similar structure exceeding 50m in length
c. Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
d. Re-zoning of a site exceeding 10 000 m^2
e. Any other category provided for in the regulations of SAHRA or a provincial heritage authority

Structures

Section 34 (1) of the Act states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of the Act deals with archaeology, palaeontology and meteorites. The Act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial)

a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;
c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite; or
d. bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites.
e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

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

c. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations** (**Ordinance no. 12 of 1980**) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated to) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the **Human Tissues Act** (**Act 65 of 1983 as amended**).

3.2. The National Environmental Management Act

This Act states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

4. METHODOLOGY

4.1. Survey of literature

A survey of available literature was undertaken in order to place the development area in an archaeological and historical context. The sources utilized in this regard are indicated in the bibliography.

4.2. Field survey

The field assessment section of the study is conducted according to generally accepted HIA practices and aimed at locating all possible objects, sites and features of heritage significance in the area of the proposed development. The location/position of all sites, features and objects is determined by means of a Global Positioning System (GPS) where possible, while detail photographs are also taken where needed.

4.3. Oral histories

People from local communities are sometimes interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information is included in the text and referred to in the bibliography.

4.4. Documentation

All sites, objects, features and structures identified are documented according to a general set of minimum standards. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS). The information is added to the description in order to facilitate the identification of each locality.

5. DESCRIPTION OF THE AREA

The study & development area is situated on portions of the farms Leliehoek, Cornelia, Klipfontein and Modderdam, a few kilometers east of the town of Dealesville in the Free State Province. A new powerline related to the proposed development of the Marula Solar facility formed the focus of the assessment.

The topography of the study area is fairly flat and open, with only a few small rocky ridges and outcrops present. The vegetation cover (mainly grass) during the assessment was relatively dense, hampering visibility on the ground. Although there are some clumps of trees in the area, a lack of large trees are characteristic of the general landscape. The area would have been used in the historical & recent past for agricultural purposes (crop growing and livestock grazing) and these activities would have impacted on the original historical and natural landscape. Other impacts include existing Eskom Powerlines and servitudes. The proposed new line runs for a large part parallel to R54 road (just south of it) and will link with the existing Eskom lines and then feed into the new Solar Facility located in the same area.



Figure 1: General location of the study & proposed development area (Google Earth 2022).

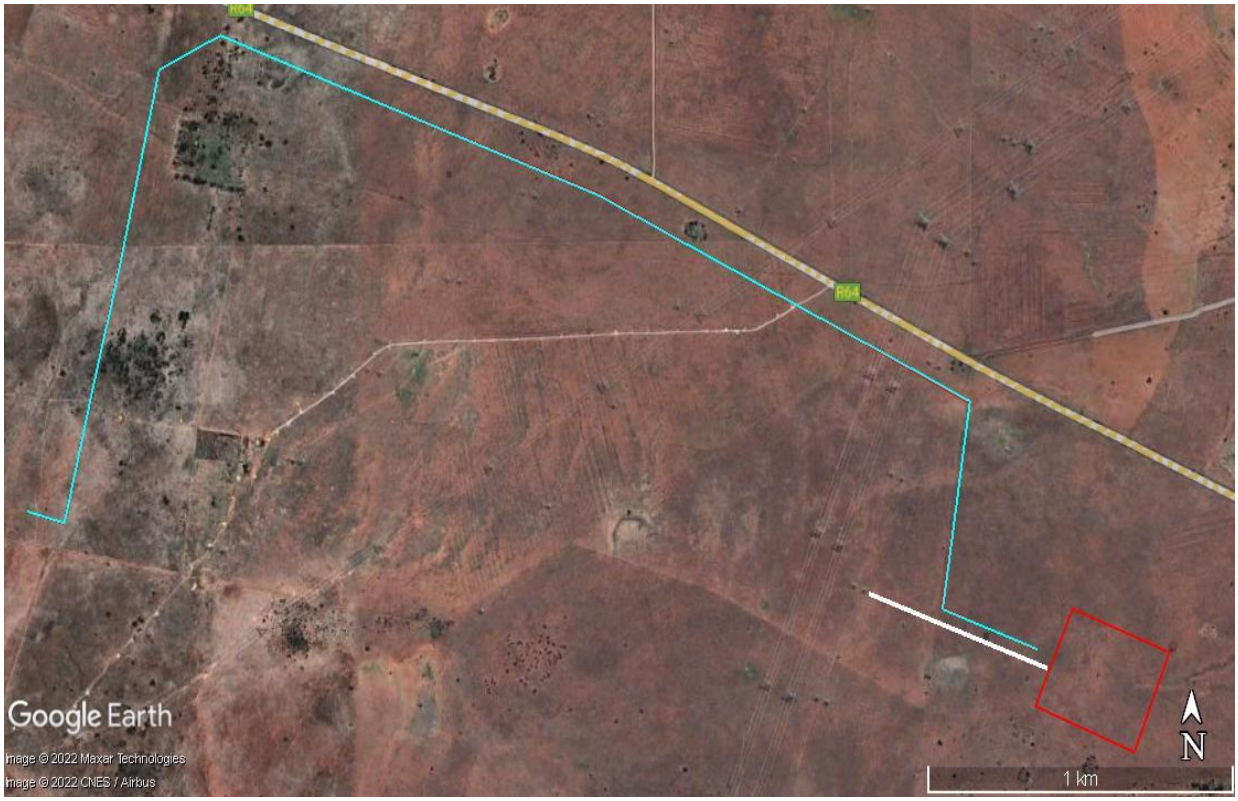


Figure 2: Closer view of the study & development area (Google Earth 2022). The blue line is the new powerline section, with the Solar facility location indicated by the red polygon.



Figure 3: A view of a section of the study area. Note the fairly open nature of the area with little tree cover.



Figure 4: Another view of a part of the area. Clumps of trees occur in sections.



Figure 5: A rocky ridge close to the study area. Note the existing Eskom Line.



Figure 6: Another general view. Note the generally flat and open nature and Eskom Line.



Figure 7: General view of a section. The open, tree-less and flat nature of the area is evident again.

6. DISCUSSION

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

Several Stone Age sites are known from the larger geographical area, including those at the well-known Florisbad and Erfkroon. The Later Stone Age is also associated with rock engravings and rock paintings. Rock engravings are known from the direct and wider vicinity of the study area (Bergh, 1999). The two closest rock art sites in the general area include Spitskop and Stowlands. Spitskop is located 12 km west of Verkeerdevlei on the link road to the N1 in the Brandfort District (PGS Heritage 2018: 23).

The Stowlands site is located 4 km from Christiana, to the east on the R708, in the direction of Boshof. Over 320 Bushman and Khoe rock engravings are scattered on the summit of a hill overlooking the Vaal River. Stowlands is one of South Africa's Rock Art Provincial Heritage sites (PGS Heritage 2018: 23).

No Stone Age sites or material was identified in the study & development area during the field assessment.

The Iron Age is the name given to the period of human history when metal was mainly used to produce artifacts. In South Africa it can be divided in two separate phases (Bergh 1999: 96-98), namely:

Early Iron Age (EIA) 200 – 1000 A.D.
Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) indicates that a Middle Iron Age should be included. His dates, which are widely accepted in archaeological circles, are:

Early Iron Age (EIA) 250 – 900 A.D.
Middle Iron Age (MIA) 900 – 1300 A.D.
Late Iron Age (LIA) 1300 – 1840 A.D.

The archaeological footprint in the region is primarily dominated by Late Iron Age stone wall complexes. Stone enclosures found on and around dolerite koppies along the river valley between Winburg and Bethlehem, exhibit telltale signs of basic structural units including huts, large enclosures, pieces of walling and stone circles related to Late Iron Age settlements in the area. These sites were occupied from as early as the sixteenth and seventeenth centuries and represent a system that can be broadly attributed to groups ancestral to the Sotho-speaking people of today. Extensive Iron Age settlements have been recorded previously between Paul Roux and Winburg at Three Sisters, Palmietfontein, Monte Carlo, La Rochelle, Leeukop, Vaalbank, Petra, Erfstuk, Allemanskraaldam, Fraai Uitzicht and the Allemanskraal Dam at the Willem Pretorius Nature Reserve (Palaeo Field Services 2019: p.5).

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. This resulted from the fact that 16th century the climate become warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the Witwatersrand and the treeless, windswept plains of the Free State and the Mpumalanga Highveld. A large number of Late Iron Age sites have previously been identified in the Vredefort Dome area, which lies to the north-west of the surveyed area (Pelser 2005). Huffman (2007) indicates that Late Iron Age people lived here between AD 1450 and 1650 and again between AD 1700 and 1840. Late Iron Ages sites are also known from Winburg and Platberg to the north-west of the surveyed area. During a survey done by Maggs (1976) many Late Iron Age sites were also identified in the broader geographical area (Van Vollenhoven 2016: 23).

No Iron Age sites are known to be present in the area, and none was identified during the current assessment as well.

The historical period started with the first people that were able to read and write moving into the larger area (Europeans) including the Voortrekkers during the Great Trek, farmers, hunters & travellers and missionary groups. The first Europeans to move into the area were two explorers named Hodgson and Archbell in 1826, followed by Krebs in 1838 (Berg: 1999).

Dealesville is a mixed farming town in the Free State Province and is surrounded by numerous salt pans. There are many natural springs in the vicinity, most notably Florisbad some 35 km from the town. It was laid out on the farm Klipfontein and named after the owner, John Henry Deale. It was proclaimed a township in 1899 and achieved municipal status in 1914 (www.wikipedia.org).

Some recent historical period sites, features and material were recorded in the area during the October 2022 field assessment.

Results of the October 2022 field assessment

Four (4) sites or areas with recent historical remains/features were identified in the general area during the October 2022 assessment. None of these sites will be directly impacted by the proposed Powerline development. However, these sites does carry some Cultural Heritage Significance and care should be taken to not impact on them during any possible future (other) developments. Recommendations regarding their in situ preservation will be provided below.

Site 1 consists of a stone-packed kraal (livestock enclosure), various structures (including a shed), corrugated iron farm dam and windmill ("windpomp"). These form part of the existing farming activities on Cornelia. It is uncertain what the age is of some of the structures, but it is possibly older than 60 years of age. It is however not of High Significance, and as it is located away from the proposed development it will not be negatively impacted. No further mitigation measures will be required, but the site and related features should be avoided during any possible future developments if possible.



Figure 8: Stone kraal (livestock enclosure) at Site 1.



Figure 9: A view of the other structures at Site 1.



Figure 10: View of one of the structures as well as farm dam and windmill at Site 1.

Sites 2 – 4 is more than likely part of a single site, containing the remains of various small structures such as homesteads and others related to a farmworkers settlement on the farm here. Metal objects such as corrugated iron sheeting, tins/cans, pieces of glass and porcelain is also scattered around the area. Site 3 is related to this settlement, and consists of two areas (rocks) with evidence of grinding activities taking place here. These 3 sites are located on and around a low rocky outcrop in the area. The age of these sites and features could not be determined, but it is likely to be older than 60 years of age. A Medium Cultural Heritage significance rating is also given to these features and the settlement site. Although they are located outside of the area of impact from the proposed development, it is however recommended that the sites be avoided by any possible future development. It needs to be remembered that the possibility of unmarked graves and burials being present in and close to these settlements are very possible, and impacting on these sites (even accidentally) should be avoided at all costs. Putting a buffer zone around the area should be considered for this purpose.



Figure 11: A view of the remains of a homestead at Site 1.



Figure 11: One of the grinding stones at Site 3.



Figure 12: The 2nd grinding stone at Site 3.



Figure 13: Remnants of stone-packed structures at Site 4.



Figure 14: Remnants of another structure at Site 4.

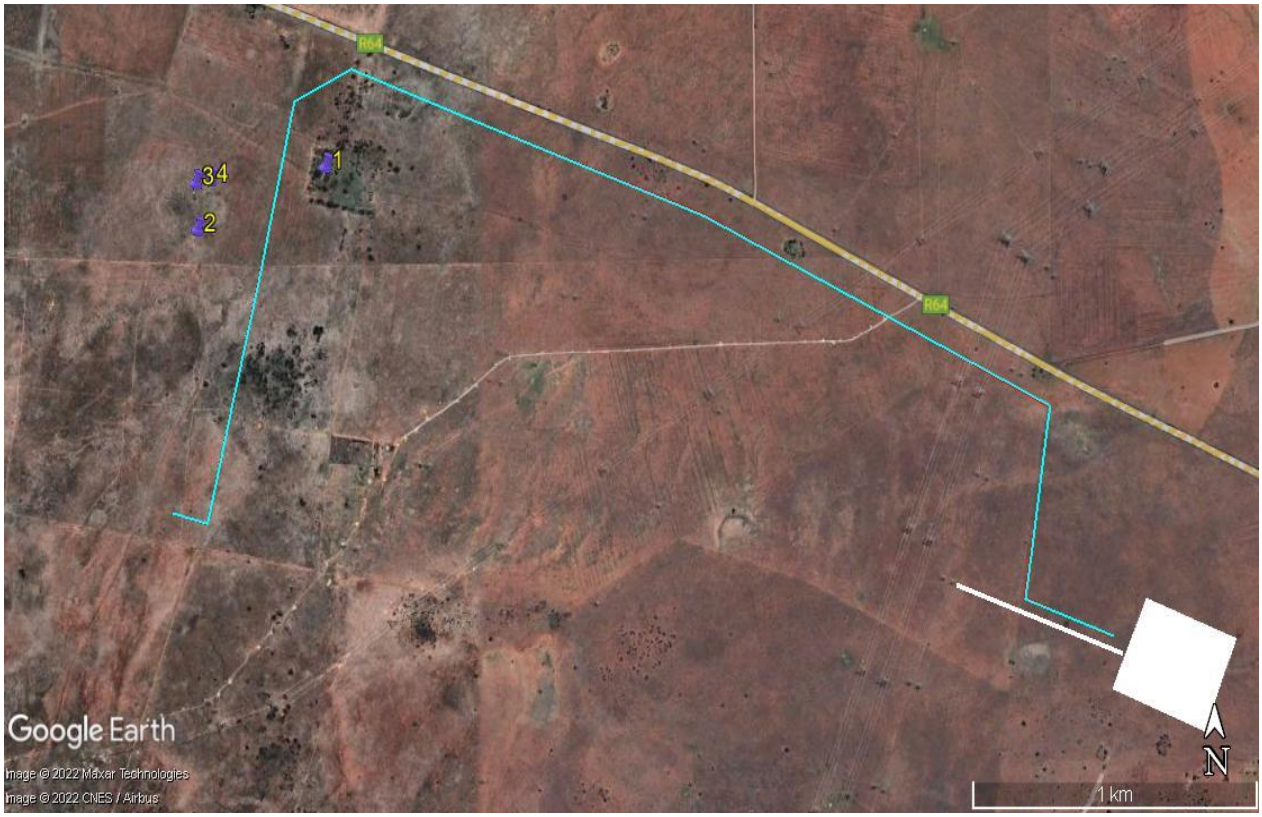


Figure 15: Map showing the location of the sites recorded in relation to the proposed powerline & solar development (Google Earth 2022).

GPS Location of Sites: S28 39 23.70 E25 41 49.50 (Site 1); S28 39 30.00 E25 41 32.80 (Site 2) S28 39 25.30 E25 41 32.60 (3) and S28 39 25.00 E25 41 34.50 (Site 4)
Cultural Significance: Medium
Heritage Significance: Grade III: Other heritage resources of local importance and therefore worthy of conservation.
Field Ratings: General protection B (IV B): site should be recorded before destruction (Medium significance)
Mitigation: See Above

Based on the desktop research, as well as the physical field assessment the proposed powerline development related to the Marula Solar Facility Project (from a Cultural Heritage perspective) can therefore be allowed to continue taking into consideration the recommendations provided above.

7. CONCLUSIONS AND RECOMMENDATIONS

APelser Archaeological Consulting (APAC) was appointed by BioBlue Environmental Sustainability (Pty) Ltd to conduct a Phase 1 HIA for a new powerline related to the proposed Marula Solar Project (Marula Cluster Project). The study and proposed development area is located near Dealesville in the Free State Province and on portions of the farms Leliehoek, Cornelia, Klipfontein & Modderdam.

Background research indicated that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. There are no known cultural heritage resources (archaeological and/or historical) in the specific study and proposed development area. Four sites or areas with recent historical remains/features were identified in the general area during the October 2022 assessment. None of the sites will be directly impacted by the proposed Powerline development. However, these sites do carry some Cultural Heritage Significance and care should be taken to not impact on them during any possible future developments. It is recommended that these sites be avoided by nay development activities, with a buffer zone being placed around the area that contains Sites 2-4 specifically to be considered to avoid any negative impacts.

It should be noted that although all efforts are made to cover a total area during any assessment and therefore to identify all possible sites or features of cultural (archaeological and/or historical) heritage origin and significance, that there is always the possibility of something being missed. This will include low stone-packed or unmarked graves. The subterranean nature of archaeological and/or historical resources should also always be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.

Finally, it can be concluded that the field assessment for the proposed new powerline related to the Marula Solar Facility Project was conducted successfully. From a Cultural Heritage perspective there should be no objection to approve the proposed development, taking into consideration the recommendations made in the report.

8. REFERENCES

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Van Vollenhoven, A.C. 2016. **A REPORT ON A CULTURAL HERITAGE IMPACT ASSESSMENT DONE FOR THE PROPOSED BOTSHABELO WEST TOWNSHIP ESTABLISHMENT, MANGAUNG METRO, FREE STATE PROVINCE.** Unpublished Report Archaetnos Culture & Cultural Resource Consultants AE01647V. For: Mashalaba & Associates Consultants. September 2016.

www.wikipedia.org

APPENDIX A: DEFINITION OF TERMS:

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: A permanent building found in isolation or which forms a site in conjunction with other structures.

Feature: A coincidental find of movable cultural objects.

Object: Artifact (cultural object).

(Also see Knudson 1978: 20).

APPENDIX B: DEFINITION/ STATEMENT OF HERITAGE SIGNIFICANCE

Historic value: Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history.

Aesthetic value: Important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

Scientific value: Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period

Social value: Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.

Rarity: Does it possess uncommon, rare or endangered aspects of natural or cultural heritage.

Representivity: Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province region or locality.

APPENDIX C: SIGNIFICANCE AND FIELD RATING:

Cultural significance:

- Low: A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.

- Medium: Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also any important object found out of context.

- High: Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Also any important object found within a specific context.

Heritage significance:

- Grade I: Heritage resources with exceptional qualities to the extent that they are of national significance

- Grade II: Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate

- Grade III: Other heritage resources of local importance and therefore worthy of conservation

Field ratings:

i. National Grade I significance: should be managed as part of the national estate

ii. Provincial Grade II significance: should be managed as part of the provincial estate

iii. Local Grade IIIA: should be included in the heritage register and not be mitigated (high significance)

iv. Local Grade IIIB: should be included in the heritage register and may be mitigated (high/ medium significance)

v. General protection A (IV A): site should be mitigated before destruction (high/medium significance)

vi. General protection B (IV B): site should be recorded before destruction (medium significance)

vii. General protection C (IV C): phase 1 is seen as sufficient recording and it may be demolished (low significance)

APPENDIX D: PROTECTION OF HERITAGE RESOURCES:

Formal protection:

National heritage sites and Provincial heritage sites – Grade I and II
Protected areas - An area surrounding a heritage site
Provisional protection – For a maximum period of two years
Heritage registers – Listing Grades II and III
Heritage areas – Areas with more than one heritage site included
Heritage objects – e.g. Archaeological, palaeontological, meteorites, geological specimens, visual art, military, numismatic, books, etc.

General protection:

Objects protected by the laws of foreign states
Structures – Older than 60 years
Archaeology, paleontology and meteorites
Burial grounds and graves
Public monuments and memorials

APPENDIX E: HERITAGE IMPACT ASSESSMENT PHASES

1. Pre-assessment or Scoping Phase – Establishment of the scope of the project and terms of reference.

2. Baseline Assessment – Establishment of a broad framework of the potential heritage of an area.

3. Phase I Impact Assessment – Identifying sites, assess their significance, make comments on the impact of the development and makes recommendations for mitigation or conservation.

4. Letter of recommendation for exemption – If there is no likelihood that any sites will be impacted.

5. Phase II Mitigation or Rescue – Planning for the protection of significant sites or sampling through excavation or collection (after receiving a permit) of sites that may be lost.

6. Phase III Management Plan – For rare cases where sites are so important that development cannot be allowed.

APPENDIX E1 –

COMMENTS AND RESPONSE REPORT

COMMENTS AND RESPONSE REPORT

Entity / Name	Contact Details	Comments Received	Response
Vrystaat Landbou – Free State Agriculture	[redacted]	Good morning, seeing media Notice on behalf of your client 29 Solar, kindly send all EIA notices that may affect agricultural land in the Free State to this number or email	Noted. Please receive a copy of the Background Information Document and we will also submit the Draft Basic Assessment Report as soon as it is available.

APPENDIX E2 –

PROOF OF EMAILS SENT

Emails sent to Interested and Affected Parties / Adjacent landowners:

BACKGROUND INFORMATION DOCUMENT - 29 SOLAR (PTY) LTD

Reply | Reply All | Forward

zander@biobluenviro.com
To [redacted]
Cc 'info@biobluenviro.com'; 'marinus@biobluenviro.com'
Tue 20/09/2022 14:49

29 Solar (Pty) Ltd. - BID - BA.pdf
414 KB

Good day

I hope that you are doing well.

We are re-sending this email to ensure that all relevant Departments and Interested and Affected Parties have received the Background Information document for the following project application:

- 29 Solar (Pty) Ltd. – Marula Cluster – Proposed Grid Extension
  - Basic Environmental Impact Assessment Application Process to be followed

We will also submit the Draft Basic Assessment Report via email link and it will be available on our website.

Please feel free to contact us at any time with regards to this project.

Zander Liebenberg

PIEMA / Pri.Sci.Nat (Reg.No 117291) / EAPASA
B.Sc. (Hons) Environmental Management
Cell: 082 562 1404

BACKGROUND INFORMATION DOCUMENT - 29 SOLAR (PTY) LTD.

Reply | Reply All | Forward

zander@biobluenviro.com
To [redacted]
Cc 'info@biobluenviro.com'; 'marinus@biobluenviro.com'
Tue 20/09/2022 14:53

29 Solar (Pty) Ltd. - BID - BA.pdf
414 KB

Good day

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Please feel free to contact us at any time with regards to this project.

Zander Liebenberg

PIEMA / Pri.Sci.Nat (Reg.No 117291) / EAPASA
B.Sc. (Hons) Environmental Management
Cell: 082 562 1404

Emails sent to Relevant Departments and State Entities:

BACKGROUND INFORMATION DOCUMENT - 29 SOLAR (PTY) LTD.

Reply | Reply All | Forward

zander@biobluenviro.com
To 'Seiphemo Daniel (KBY)'
Cc 'info@biobluenviro.com'; 'marinus@biobluenviro.com'
Tue 20/09/2022 14:52

29 Solar (Pty) Ltd. - BID - BA.pdf
414 KB

Good day

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Zander Liebenberg

PIEMA / Pri.Sci.Nat (Reg.No 117291) / EAPASA
B.Sc. (Hons) Environmental Management
Cell: 082 562 1404

BACKGROUND INFORMATION DOCUMENT - 29 SOLAR (PTY) LTD.

Reply | Reply All | Forward

zander@biobluenviro.com
To 'Dimakatso Mokoena'; 'mkhosana@destea.gov.za'
Cc 'info@biobluenviro.com'; 'marinus@biobluenviro.com'
Tue 20/09/2022 14:51

29 Solar (Pty) Ltd. - BID - BA.pdf
414 KB

Good day

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PIEMA / Pri.Sci.Nat (Reg.No 117291) / EAPASA
B.Sc. (Hons) Environmental Management
Cell: 082 562 1404

BACKGROUND INFORMATION DOCUMENT - 29 SOLAR (PTY) LTD.

Reply | Reply All | Forward

Z zander@biobluenviro.com
To 'info@tokologo-municipality.co.za'; 'kmogoasi@yahoo.com'; 'kelehilem@gmail.com'
Cc 'info@biobluenviro.com'; 'marinus@biobluenviro.com'
Tue 20/09/2022 14:48

29 Solar (Pty) Ltd. - BID - BA.pdf
414 KB

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Zander Liebenberg

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B.Sc. (Hons) Environmental Management
Cell: 082 562 1404

APPENDIX E3 –

PROOF OF ADVERTISMENT AND SITE NOTICES

During the Initial Public Participation Phase of the project, Site Notices were placed near one of the entrances of the project site and on the R54 road at the entrance of Dealesville Town driving from Boshof RD. An advertisment was placed within the Bloemnuus on the 8th of September 2022.

Hard Copies of the Background Information Documents were left at the Police Station at Dealesville town and also sent to Interested and Affected Parties that requested it.



Figure 1: Proof of site Notice on the road into Dealesville driving from Boshof



Figure 2: Proof of Xhosa Site Notice on the road from Boshof to Dealesville



Figure 3: Site Notices near a T-Junction and entrance to the site area



Bloem NUUS NEWS Donderdag 8 September 2022 11

WELKOM YIZANI

VOORMALIGE AANDEELHOUERS VAN WELKOM YIZANI BELEGGINGS (RF) EIENDOMS BEPERK (IN LIKWIDASIE)

KOM KRY JOU GELD

Sommige voormalige aandeelhouers in Welkom Yizani het nog nie hul dividende opgeëis nie. Media24 Beherend (Edms) Bpk, in samewerking met die likwidateur van Welkom Yizani, sien om na die belange van hierdie voormalige aandeelhouers en hou die onopgevraagde dividende namens hulle in veilige bewaring.

"Die geld behoort aan die voormalige aandeelhouers van Welkom Yizani. Ons doen 'n beroep op hulle om ons te kontak sodat hulle hul geld kan kry. Ons wil in hierdie moeilike ekonomiese tye alles in ons vermoë doen om te verseker hulle kry die geld wat hul wetlik toekom."

Prof. Rachel Jafta, Voorsitter van Media24 Beherend (Edms) Bpk

As jy, of iemand wat jy ken, tussen 2006 en 2021 Welkom Yizani-aandele besit het, en nog nie al jou dividende ontvang het nie, kontak ons asseblief by:

welkomyizani@singularservices.co.za

MANGAUNG
AT THE HEART OF IT ALL

MANGAUNG METROPOLITAN MUNISIPALITEIT WET OP RUIMTELIKE BEPLANNING EN GRONDGEBRUIKBESTUUR, 2013 (WET NO. 16 VAN 2013)

Die aansoek tesame met die betrokke planne, dokumente en inligting lê gedurende kantoorure (08h00-15h00) ter insae in die kantoor van die Stad en Streek Beplanning Sub-direktoraat van die Mangaung Metro Munisipaliteit, Kamer 802, 8ste Vloer, Bram Fischer Gebou, H/v Nelson Mandela en Markgraafstraat, Bloemfontein vir 'n tydperk van 30 dae vanaf die datum van publikasie hiervan, naamlik Thursday 8 September 2022.

Enige persoon wat 'n belang by die saak het, en wat teen die toestaan van die aansoek beswaar wil maak of wat verlang om in die saak gehoor te word, of vertoë in verband daarmee wil indien, moet binne 30 dae na die datum van plasing hiervan sy beswaar / vertoë skriftelik indien by die Stad en Streek Beplanning Sub-direktoraat van die Mangaung Metro Munisipaliteit by bogemelde adres of e-pos: patricia.maasdorp@mangaung.co.za of pos aan Posbus 3704, Bloemfontein, 9300 binne die tydperk van 30 dae vanaf die datum van publikasie hiervan, naamlik 8 September 2022 – 10 Oktober 2022, tesame met jou naam, adres, kontakbesonderhede, belangstelling in die aansoek en redes vir jou kommentaar. Die Munisipaliteit mag weier om kommentare te aanvaar na die sluitingsdatum. Enige persoon wat nie kan skryf nie, sal deur 'n munisipale amptenaar bygestaan word om hul kommentaar op skrif te stel.

KENNISGEWING

Bloemfontein: Plot 5, Spitskop Kleinhoewes, Bloemfontein

Hiermee word die algemene publiek in kennis gestel ingevolge die bepalings van Artikel 50 (1) van die Mangaung Metro Munisipaliteit Munisipale Grondgebruik Beplanning Bywette (2021) dat 'n aansoek ingedien is vir dorpstigting [kansellasie van die Algemene Plan(ne), opheffing van beperkende Titel Akte voorwaardes A. (a) en (b) op bladsy 2 en (c), (d) en (e) op bladsy 3, (die laaasgenoemde (e) sal slegs gekanselleer word soos die area ontwikkel oor tyd en die toekomstige padnetwerk in plek val) in Titel Akte T9083/2018, dorpstigting, hersonering na die sonerings soos aangetoon op die

NOTICE OF APPLICATION OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS AND REVIEW OF DRAFT BASIC ASSESSMENT REPORT

Notice is hereby given in terms of Regulation 41 of the Regulations published in Listing Notice 1 of 4 December 2014 (as amended) and Chapter 6 of the National Environmental Management Act, 1998 (Act no. 107 of 1998), for a Basic Environmental Impact Assessment application for the following activities:
GN R. 327: Listing Notice 1: Activity 11 (i)

This advertisement also serves as notice that the Draft Basic Assessment Report will be made available for review and comments on the BioBlue Environmental website and via email link to all I&APs. To obtain the direct link, please register as an Interested and Affected Party. A hard copy of the reports will also be left at the Dealesville Police Station.

Project Description: 29 Solar (Pty) Ltd. propose to establish a twin 132kV Conductor line to be able to connect the Marula Cluster Solar PV developments to the new Artemis MTS. The line will extend from an authorised collector sub to the new Artemis Main Transmission Substation.

Location: The proposed 132kV Line will be located on the Farms Cornelia, Modderpan, Leliehoek and Klipfontein situated approximately 3.8 km North-west of the town of Dealesville. Access can be gained via the R64 road driving from Dealesville to Boshof. The proposed site is located within the Tokologo Local Municipality, Free State Province.

Proponent: 29 Solar (Pty) Ltd.

Any comments in this regard can be forwarded to the details below.

Environmental Consultant: Mr. Zander Liebenberg
829 Cronstedt Street; Moreleta Park, Pretoria, 0181. **Tel:** 082 562 1404 / 083 662 2606
E-mail: info@biobluenviro.com / www.biobluenviro.com

In order to register as an interested and/or affected party, please submit details within 30 days to the address given above. Closing of Initial registration will be on the 10th of October 2022.

bloem organic COMPOST
• ORGANIC COMPOST • BARK SEEDLING MIX •
• LAWN DRESSING • SUCCULENT MIX •
• GARDEN & POTTING SOIL • VERMICULITE •
AVAILABLE IN BAGS AND IN /M³ BULK

Figure 4: Proof of Advertisement placed within the Bloemnuus

APPENDIX E4 –

LIST OF REGISTERED I&APs

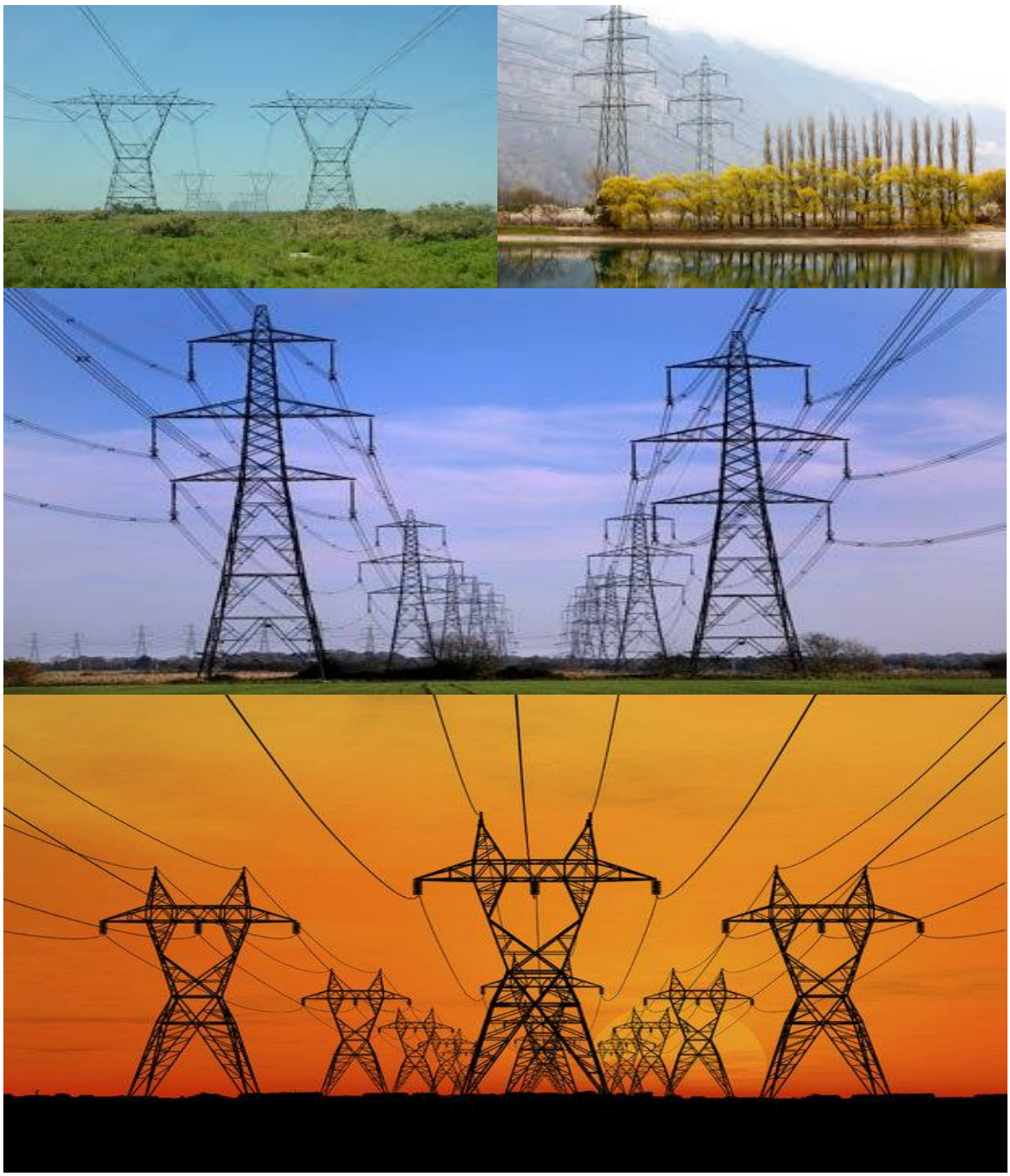
Table 1: List of Registered I&APs

29 Solar (Pty) Ltd. – Basic Assessment Process **Registered I&APs and other Role Players**		
Name and Surname	**Contact Details**	**Company / Organisation**
Mr. Jack	[redacted]	Vrystaat Landbou
Mr. Fred Euvrard	[redacted]	Adjacent Landowner
	[redacted]	Gini Keyser Familie Trust
John McGregor Fouche	[redacted]	Adjacent Landowner
	[redacted]	Harmike Properties (Pty) Ltd.

APPENDIX F – ENVIRONMENTAL MANAGEMENT PROGRAMME

APPENDIX 1

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION FOR OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of overhead electricity transmission and distribution infrastructure requiring EA in terms of NEMA, i.e. with a capacity of 33 kilovolts or more. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realisation of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure, which are presented in the form of a template that has been pre-approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA will comply with the pre-approved generic EMPr

Part	Section	Heading	Content
			template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP, and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding.

Part	Section	Heading	Content
			This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the corridor in which the proposed overhead electricity transmission and distribution infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps must identify features both within the planned working area and any known sensitive features in the surrounding landscape within 50m from the development footprint. The overhead transmission and distribution profile must be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions must be used.

Sub-section 3 is the declaration that the applicant/proponent or holder of the EA in the case of a change of ownership must complete, which confirms that the applicant/EA holder will comply with the pre-approved generic EMPr template in Section 1 and understands that the impact management outcomes and actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"hazardous substance" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

"slope" means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil; and

"works" means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP's	Registered interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person (s)	**Role and Responsibilities**
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	<u>Role</u> The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS

Responsible Person (s)	Role and Responsibilities
	is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non- compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. Responsibilities

Responsible Person (s)	Role and Responsibilities
	The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer	Role

Responsible Person (s)	Role and Responsibilities
(dEO)	The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where

Responsible Person (s)	Role and Responsibilities
	specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: Responsibilities - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA,

Responsible Person (s)	Role and Responsibilities
	EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all overhead electricity transmission and distribution infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. At a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints

received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions , as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes must be included in the EMPr file and be submitted to the CA at intervals as indicated in the EA.

An Environmental Audit Report must be prepared monthly. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of overhead electricity transmission and distribution infrastructure. There is a list of aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required;	**ECO/DSS/ cEO/dEO**	**Contact sessions and Environmental awareness training sessions**	**Pre-Construction and refresher during the Construction phase**	**ECO/dEO**	**Monthly monitoring** **Training as required**	**Attendance register**
– All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr;	**cEO/dEO**	**The EA and EMPr must be available to all staff** **Hold workshops and "toolbox" talks**	**During the Construction Phase**	**ECO/dEO**	**Monthly monitoring** **Training as required**	**Attendance Register and minutes of workshops**
– The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering.	**Contractor**	**Develop and place the required posters strategically**	**Pre-Construction**	**ECO/dEO/ cEO**	**Monthly**	**Photographi c record**
– Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities;	**ECO assisting cEO and dEO**	**Compile environmental awareness training material**	**Pre-construction**	**ECO/dEO**	**Prior to commenc ement of training**	**Documents available on-site**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j)Fire prevention; and k) Disease prevention.		**which covers the stipulated requirements**			**sessions**	
– A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.	**ECO/dEO/ cEO**	**Compile training material and documents must be kept on-site at all times**	**Pre-construction and throughout the Construction phase**	**ECO/dEO**	**Prior to commenc ement of constructi on and then monthly as required**	**Documents to be kept on site for inspection**

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;	**Contractor**	**Compile appropriate method statements**	**Pre-Construction**	**ECO/dEO**	**Once, prior to construction**	**Method statements must be available on-site**
– Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***;	**DSS, Contractor, cEO**	**Utilize sensitivity maps to place camps and other infrastructure outside of these areas and peg**	**Pre-Construction and throughout the Construction phase**	**ECO/dEO**	**Planning Prior to construction** **Adherence to demarcated**	**Availability of sensitivity maps** **Site inspection and**

		approved camp site – strict boundaries must be implemented			**areas – continually**	**photographic record**

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and	**DSS, Contractor, dEO in consultation with ECO**	**Peg / demarcate the approved camp site as well as restricted areas such as wetland buffer zones**	**Pre-construction**	**ECO**	**Prior to construction**	**Site inspection and photographic record in report**
– Unauthorised access and development related activity inside access restricted areas is prohibited.	**Contractor/ dEO**	**Peg / demarcate the restricted areas and implement strict boundary rules**	**During the construction phase**	**ECO**	**Monthly and as when required**	**Site Inspection and photographic record**

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorised area; – An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;	**DPM**	**The relevant landowners must be consulted, and agreements formalized**	**Pre-construction and throughout the lifetime of the project**	**dEO**	**Continually throughout the project phases**	**Proof of consultation and signed agreements**
– The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition	**Contractor**	**Install signs to indicate access to the project site** **Continuous maintenance must be done**	**Signs must be installed before commencement of construction** **Maintenance to be done throughout the construction phase**	**ECO, cEO**	**Monthly**	**Site inspection and photographic record**
– All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense;	**dEO/cEO and Contractor**	**Map must be available that illustrates approved access routes** **Deviations must be rehabilitated immediately**	**Develop a map – Pre-construction** **Deviations must be rehabilitated as soon as possible**	**ECO**	**Monthly**	**Maps available on site** **Site inspection and Photographic record of rehabilitatio**

						n process
– Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads;	**Contractor and maintenance crews**	**Development of new roads must be avoided as far as possible** **Existing routes must form part of project planning**	**Construction and operational phases**	**cEO and maintenance team**	**Monthly**	**Approved layout available to employees**
– In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on pre-planned and approved roads.	**DPM, dEO and Contractor**	**Photographic record must be kept of all private roads to be used** **Design access roads as stipulated**	**Pre-construction and throughout the construction phase**	**ECO**	**Prior to commencement of activities** **And then monthly during construction**	**Site inspection and Photographic record and implementation of the approved layout**

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified;	**cEO/ dEO/** **Contractor**	**Identify and inform personnel of existing gates to be used** **Install gates as stipulated and ensure that tension remains in fence wire**	**Pre-Construction and throughout Construction phase**	**dEO**	**Monthly**	**Visual Inspection of gates and access routes**
– All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora;	**dEO / Contractor**	**Fixed semi-permanent notifications and erection of barriers to restrict movement of unauthorized**	**Construction Phase**	**ECO**	**Monthly**	**Visual Inspection and Photographic record of maintained fences and**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		persons				**notices**
– Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the landowner. – All fencing must be developed of high-quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided;	**cEO / dEO** **Contractor**	**Written approval must be obtained from the landowner** **Make use of high-quality materials**	**Construction Phase**	**ECO / cEO**	**During establishment and continually throughout the construction phase**	**Written approval documents on site.** **Visual inspection and photographic record**
– Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.	**DSS / Contractor**	**Appropriate removal of fences and associated infrastructure**	**Completion of Construction Phase**	**ECO, dEO**	**After Completion of the construction phase**	**Visual inspection and photographic record**

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage**.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis;	**DPM / Contractor in consultation with ECO**	**Registration / Application with DWS**	**Prior to commencement and abstraction measurements during construction and operational phases**	**ECO / dEO**	**Monthly monitoring of records kept**	**Proof of registration documents and records of abstraction kept on site**
– Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	**Contractor / dEO**	**Adherence to water protection protocols**	**Construction Phase**	**ECO**	**Monthly**	**Environmental Awareness Training Sessions**

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	Implementation	Monitoring

	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager;	**dEO and Contractor**	**Measures for the control and management of runoff must be implemented**	**Construction Phase**	**ECO**	**Monthly**	**Visual inspections and incident registers**
– All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	**dEO and Contractor**	**Spill Kits and approved absorbent material must be available on site** **Release of water can only be done after consultation between DPM and ECO**	**Construction Phase**	**ECO**	**Monthly and as the need arises for dischargin g**	**Visual Inspections and consultation meetings**

5.8 Solid and hazardous waste management

Impact management outcome: Waste is appropriately stored, handled and safely disposed of at a recognised waste facility**.**

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly;	**DPM and Contractor**	**Compile a waste management plan for implementation** **Place waste collection bins strategically throughout the site** **Provide separate bins for different waste types**	**Pre-Construction and during the Construction phase**	**cEO and ECO**	**Monthly**	**Visual Inspections and environmental awareness training registers**
– General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	**cEO and Contractor**	**Disposal of General and Hazardous wastes at registered facilities**	**Construction Phase**	**ECO**	**Monthly**	**Disposal Certificates to be available for inspection**

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – Where possible, no development equipment must traverse any seasonal or permanent wetland – There must not be any impact on the long-term morphological dynamics of watercourses or estuaries;	**dEO / cEO and Contractor**	**No activities must occur within the delineated wetlands and buffer zones** **Clearly demarcate these sensitive areas**	**Construction Phase**	**ECO**	**Monthly**	**Visual Inspections, photographic record and incident registers**
– In the event of a spill, prompt action must be taken to clear the polluted or affected areas;	**cEO / Contractor**	**Environmental Awareness Training should include spill clean-up procedures** **Spill Kits to be available on site**	**Pre-construction and construction phases**	**ECO**	**Monthly and when incident occurs**	**Visual Inspection, photographic record and incident registers**
– When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a	**Contractor**	**Adhere to proposed mitigation measures within the specialist**	**Construction Phase**	**ECO**	**Monthly and when an incident**	**Visual inspection and photographi**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.		**reports and this EMPr**			**occurs**	**c record**

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General:	**cEO and**	**Demarcate the**	**Pre-construction**	**ECO and**	**Monthly**	**Photographi**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the Department of Agriculture, Forestry and Fisheries prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;	**Contractor in consultation with the ECO**	**project footprint and sensitive areas** **Adhere to stipulations and identified areas within the wetland and vegetation assessment reports**	**and throughout the construction phase**	**Maintenance teams**	**and when required**	**c record and reports**
– Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage;	**DPM and Contractor**	**Avoid the use of chemicals as far as possible** **Restricted access to adjacent natural**	**Pre-construction and throughout the construction phase**	**ECO**	**Monthly an when required**	**Registration certificates and registers**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***.		**areas**				
Servitude: – Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager; – Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder	**Contractor, cEO in consultation with DPM and Maintenance teams**	**Proper planning and maintenance throughout the project phases** **Keep the project footprint of disturbance as small as possible**	**Construction and Operation**	**ECO / Operation and Maintenance team**	**Monthly**	**Consultation reports**
– Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility; – Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; – Debris resulting from clearing and pruning must be disposed of at a recognised waste disposal facility, unless the landowners wish to retain the cut vegetation;	**Contractor, cEO**	**Alien and Invasive management plan to be compiled and continuous monitoring and implementation is needed**	**Construction and Operation**	**ECO / Operation and Maintenance team**	**Monthly and as required**	**Alien invasive management plan available on site and certificates of disposal**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– In the case of the development of new overhead transmission and distribution infrastructures, a one metre "trace-line" must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered.						

5.11 Protection of fauna

Impact management outcome: Minimise disturbance to fauna.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;	**cEO and Contractor**	**Consultation with landowners with regards to livestock management during the construction phase**	**Pre-construction and Construction phases**	**ECO**	**Prior to construction and monthly during the construction phase**	**Written consent from landowners**
– The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the	**dEO / cEO in**	**Avoid disturbance of**	**Pre-construction and throughout**	**ECO / Operation**	**Prior to commenc**	**The Planning**

development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Nesting sites on existing parallel lines must documented; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – Bird guards and diverters must be installed on the new line as per the recommendations of the specialist; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages;	**consultation with the Contractor and Maintenance Staff**	**Avi-Fauna and Fauna species by implementing the mitigation measures stipulated within the Specialist assessments and this report** **Environmental Awareness Training must include these stipulations**	**Construction and Operational Phases**	**and Maintenance team**	**ement and as required**	**and development programme must include these stipulations and considerations** **Photographic record**
– No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.	**DPM in consultation with dEO**	**Acquire the necessary permits before any activities commence**	**Pre-Construction and if required during the Construction phase**	**ECO**	**Once and then as required**	**Permits to be available for inspection**

5.12 Protection of heritage resources

Impact management outcome: Minimise impact to heritage resources.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance;	**DPM and suitably qualified specialist** **Contractor**	**Map with identified Heritage areas must be available**	**Pre-construction and Construction Phase**	**ECO**	**Once prior to construction and then throughout the construction phase**	**Map and Photographic record to be available on site**
– All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**dEO in consultation with Contractor and ECO**	**If any Archeological or Paleontological material or bones are found during the construction phase a specialist must be contacted and construction paused**	**Construction Phase**	**ECO**	**Monthly and when required**	**Proof of consultation with construction workers, specialist and procedures followed**

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Health and Safety Officer** **cEO in consultation with Contractor**	**Develop an Emergency, Preparedness and Response plan specific to the project** **Ensure that Health and Safety Plan is available on site**	**Pre-construction and Construction phase**	**ECO, cEO**	**Once prior to construction and monthly thereafter**	**Checking training manuals and induction files.**

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other	**DMP /**	**Mobile chemical**	**Construction**	**ECO**	**Monthly**	**Visual**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.	**Contractor in consultation with cEO**	**toilers must be placed appropriately and in areas that avoid environmental sensitivities** **Chemical toilets must be serviced on a regular basis by a registered contractor**	**phase**		**and as required**	**inspection and availability of certificates**

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally friendly pest control in the camp area; – Ensure that the workforce is sensitized to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.	**dEO / cEO and Contractor**	**Only environmentally friendly pest control to be utilized** **Provide training and awareness sessions on all the stipulated aspects** **Medical support must be available**	**Pre-constriction and during the Construction phase**	**ECO**	**Monthly**	**Environmental awareness training documents and Visual observation**

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).	**Contractor**	**Provide the required training sessions to employees** **Develop Emergency, Preparedness and Response Plans**	**Pre-Construction and Construction phases**	**ECO**	**Prior to construction and Construction phase**	**Documents available on site for review**

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);	**dEO / cEO and Contractor**	**Storage of hazardous substances must be done as stipulated in order to minimize the risk of soil and water pollution**	**Pre-construction and Construction phases**	**ECO**	**Once prior to construction and monthly thereafter**	**Visual observation and documents available for inspection**
– All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;	**cEO / Contractor**	**This aspect must be included in the Environmental Training material**	**Pre-construction and Construction Phases**	**ECO**	**Once prior to construction and monthly thereafter**	**Documentation must be available on site for inspection**
– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks	**cEO /**	**Appropriate storage and re-**	**Pre-Construction**	**ECO**	**Monthly and as**	**Visual observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used;	**Contractor**	**fueling facilities must be established prior to construction commencing** **Adequate fire-fighting equipment must be available on site and employees must be trained to for these situations**	**and Construction phases**		**required**	**and photographic record**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***	**cEO and Contractor**	**Spill Kits must be available on site and employees must be trained to effectively use the kits and also know the correct procedures that have to be followed**	**Construction Phase**	**ECO**	**Monthly and as required**	**Visual Inspections, Photographic record and proof of training**

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance ***Section 5.7: storm and waste water management***.	**cEO and Contractor**	**The workshop and re-fueling areas must be demarcated and no maintenance must be conducted outside of these areas if at all avoidable** **Maintenance of vehicles and equipment must be done on a weekly basis**	**Construction Phase**	**ECO**	**Monthly**	**Visual Inspections and photographic record** **Incident report register to be located on site**

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible	Method of	Timeframe for	Responsible	Frequency	Evidence of

	person	implementation	implementation	person		compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with ***Section 5.5: Fencing and gate installation***.	**cEO and Contractor**	**Concrete mixing areas must be established as stipulated.** **Where concrete is mixed outside of these areas, mixing trays must be used** **Contaminated water must not be allowed to leave the batching plant site**	**Construction phase**	**ECO**	**Monthly and as required**	**Visual inspection, photographic record and incident reports on site**

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;	**cEO and Contractor**	**Provide dust suppression vehicles / equipment and undertake regular dust suppression as required** **All drivers should be made aware of the speed limits on site**	**Construction Phase**	**ECO**	**Monthly**	**Visual inspections and documents available on site**

– Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	**N/A**					

5.22 Noise

Impact Management outcome: Unnecessary noise is prevented by ensuring that noise from construction activities is mitigated.		
Impact Management Actions	**Implementation**	**Monitoring**

	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained. – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.	**cEO and Contractor**	**The contractor must ensure that noise levels remain as low as possible and that work is done only within permitted hours** **Vehicles and machinery must be properly maintained**	**Construction phase**	**ECO**	**Monthly and as required**	**Visual inspections and complaints register**

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two way swop of contact details between ECO and FPA.	**cEO / dEO and Contractor** **ECO must obtain contacts of FPA**	**Demarcate designated areas and make employees aware of these areas during the training sessions** **Undertake formal consultation with the FPA**	**Pre-Construction and Construction**	**ECO**	**Monthly**	**Proof of Consultation** **Visual inspections and photographic record**

5.24 Stockpiling and stockpile areas

Impact management outcome: Erosion and sedimentation as a result of stockpiling are reduced.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	**Contractor**	**Stockpile areas must be demarcated, and the area must be maintained. These areas must be planned outside of any sensitive features**	**Pre-construction and Construction phases**	**ECO**	**Monthly**	**Visual inspections and photographic record**

5.25 Finalising tower positions

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.

Impact Management Actions	Implementation			Monitoring		
	Responsible	Method of	Timeframe for	Responsible	Frequency	Evidence of

	person	implementation	implementation	person		compliance
– No vegetation clearing must occur during survey and pegging operations; – No new access roads must be developed to facilitate access for survey and pegging purposes; – Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; – The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.	**Contractor, specialist and surveyor in consultation with ECO**	**Demarcate no-go areas and peg out the proposed project footprint** **Specialist must be consulted on final layout**	**Pre-construction**	**ECO**	**Bi-Weekly**	**Visual inspections and Photographic evidence**

5.26 Excavation and Installation of foundations

Impact management outcome: No environmental degradation occurs as a result of excavation or installation of foundations.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a recognised disposal site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop equipment maintenance and storage***; and – Hazardous substances spills from equipment must be	**cEO and Contractor**	**A licensed waste disposal facility must be utilised** **Equipment and vehicles must be regularly serviced**	**Construction phase**	**ECO**	**Monthly**	**Certificates of disposal must be available for inspection** **Photographic record**

managed in accordance with ***Section 5.17: Hazardous substances***. – Batching of cement to be undertaken in accordance with **Section *5.19 : Batching plants***; – Residual cement must be disposed of in accordance with **Section *5.8: Solid and hazardous waste management***.						**must be kept**

5.27 Assembly and erecting towers

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation; – In sensitive areas, tower assembly must take place off-site or away from sensitive positions; – The crane used for tower assembly must be operated in a manner which minimises impact to the environment; – The number of crane trips to each site must be minimised; – Wheeled cranes must be utilised in preference to tracked cranes; – Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent	**Contractor in consultation with cEO**	**Provide the necessary materials for the elevated surfaces** **Contractors must be made aware of the stipulations within this document**	**Pre-construction and Construction phases**	**ECO**	**Monthly**	**Visual observation and photographic record**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
of environmental impact; – Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads;						
– Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing; – No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; – Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites; – Topsoil must be stored in heaps not higher than 1m to prevent destruction of the seed bank within the topsoil; – Excavated slopes must be no greater that 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes; – Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed; – Only existing disturbed areas are utilised as spoil areas; – Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; – Surface water runoff is appropriately channeled through or	**Contractor / DPM**	**Keep the vegetation clearance area as small as possible** **Written permission for the levelling at tower sites, must be obtained from DPM and DSS** **Rehabilitation monitoring must continue until the ECO signs off**	**Construction Phase**	**ECO**	**Monthly and as required**	**Written permission letter** **Visual observation and photographic record**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
around spoil areas; – During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that; – The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation; – The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.						

5.28 Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.

Impact Management Actions	Implementation			Monitoring		
	Responsible	Method of	Timeframe for	Responsible	Frequency	Evidence of

	person	implementation	implementation	person		compliance
– Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas; – The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks; – Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances; – In the case of the development of overhead transmission and distribution infrastructure, a one metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used; – Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; – Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing; – No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption	**Contractor**	**Identify and demarcate areas appropriate for the siting of winch and tensioner stations which does not infringe access restricted areas or environmentally sensitive areas** **During construction phase all the stipulations must be adhered to by the construction crew**	**Pre-construction and Construction Phases**	**ECO**	**Monthly / Weekly**	**Method statement must be made available to ECO before commence ment**

to services is unavoidable, persons affected must be given reasonable notice, in writing; – Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner; – Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.						

5.29 Socio-economic

Impact management outcome: Socio-economic development is enhanced.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site.	**dEO / cEO**	**Identify and implement appropriate strategies for communication with communities** **Open line of communication**	**Pre-Construction and Construction phases**	**ECO**	**Prior to construction and monthly during construction**	**Documents and minutes of meetings**

This would reduce the risk to local farmers.		**throughout the construction phase**				

5.30 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: management of hazardous substances*** and ***5.18 workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have	**Contractor**	**Ensure Fire extinguishers are serviced and available to employees** **Workshops must be held with all security personnel** **Identify any potential fire hazards and notify the relevant local**	**Construction Phase**	**ECO**	**Prior to site closure for more than 5 days**	**Visual inspections, Appropriate signage and photographic records**

been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.		**authority** **Follow stipulations within this document**				

5.31 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed to a registered waste site and certificates of disposal provided; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and	**Contractor and cEO**	**Rehabilitation must be done according to the stipulations within this document and recommendations from specialists** **Rehabilitation must be**	**Pre-construction and rehabilitation**	**ECO**	**Monthly and as required**	**Visual Inspections and photographic record**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of tower sites and access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to Section ***5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled ; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly;		**monitored continuously to ensure that re-vegetation is successful** **Bi-weekly rehabilitation reports to be compiled by cEO or as required**				

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

7.1 Sub-section 1: contact details and description of the project

7.1.1 Details of the applicant:

Name of applicant: **29 Solar (Pty) Ltd.**

Tel No: **083 500 1123**

Fax No:

Postal Address: **Unit 34, Network Office Space, Woodmead north office park, 54 Maxwell Drive, Woodmead, Johannesburg, 2191**

Physical Address: **Unit 34, Network Office Space, Woodmead north office park, 54 Maxwell Drive, Woodmead, Johannesburg, 2191**

7.1.2 Details and expertise of the EAP:

Name of applicant: **Zander Liebenberg (SACNASP / EAPASA)**

Tel No: **082 562 1404**

Fax No:

E-mail address: zander@biobluenviro.com

Expertise of the EAP (Curriculum Vitae included): **Appendix 4**

7.1.3 Project name: **Marula Cluster – Proposed Grid Connection Extension**

7.1.4 Description of the project:

The application for the proposed establishment of twin Tern 132kV conductor lines is being applied for to ensure that the Marula Cluster Solar PV developments can be connected to the newly authorised Artemis MTS.

The Marula Cluster Solar PV developments that is comprised of Indlovu, Ngonyama and Amagama. The proposed conductor line will be located within one of the Strategic Transmission Corridors as gazetted within Government Gazette 41445, Notice Number 113 of 16 February 2018, and will ultimately be constructed for Eskom. The line is approximately 5.28 km in extent and crosses five different farm portions and the exact route of the line will be determined by the inputs from specialists.

The area is characterised by agricultural activities such as stock and game farming. There are numerous Eskom powerlines that are establishment within the area and also within certain areas on the farm portions that comprise this application. The numerous powerlines are due to the location of the Perseus and Beta substations.

7.1.5 Project location:

NO	FARM NAME(if applicable)	FARM NUMBER(if applicable)	S21 Digit Code	PORTION NUMBER	LATITUDE	LONGITUDE
1	Portion 0 of the Farm Cornelia 1550 Boshof RD	1550	F00400000000155000000	0	28°39'12.66"S	25°41'53.22"E
2	Portion 0 of Farm Modderpan, 750 Boshof RD	750	F00400000000075000000	0	28°39'34.82"S	25°42'56.30"E
3	Portion 0 of Farm Leliehoek 748 Boshof RD	748	F00400000000074800000	0	28°39'46.41"S	25°43'23.96"E
4	Portion 0 of Farm Klipfontein 305 Boshof RD	305	F00400000000030500000	0	28°40'9.39"S	25°43'32.60"E

7.16 Preliminary technical specification of the overhead transmission and distribution:

- 5.28 km in Length

****Please refer to Appendix 2 of the EMPr for the Development footprint site maps as required under sub-section 2:**

**** The declaration under Sub-section 3 will be signed by the holder of the EA once the contractor is appointed and has provided inputs to this Generic EMPr as per the requirements of this template**

****Please refer to Appendix 3 of the EMPr for Part C – Site Specific Environmental Attributes**

7.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features in the surrounding landscape. The overhead transmission and distribution profile shall be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions shall be used.

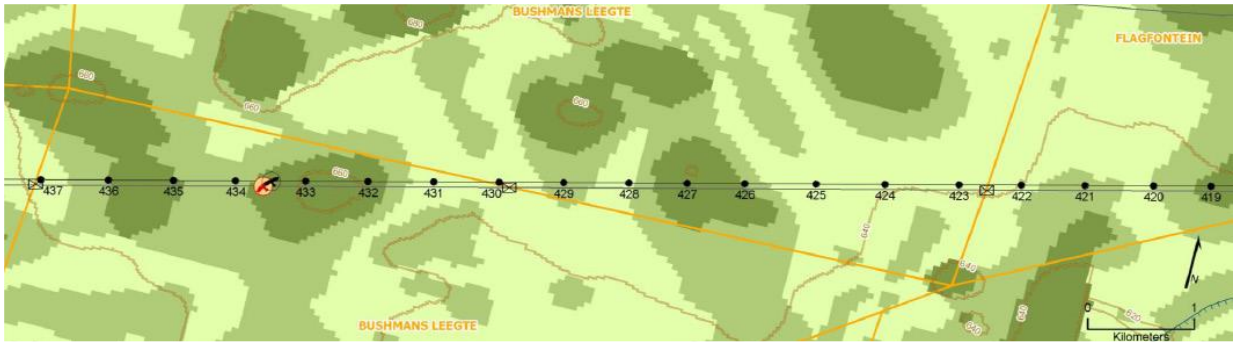


Figure 1: Example of an environmental sensitivity map in the context of a final overhead transmission and distribution profile

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA Date:

7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART C

8 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

APPENDIX 2 –

EMPr SUB-SECTION 2

SITE MAPS

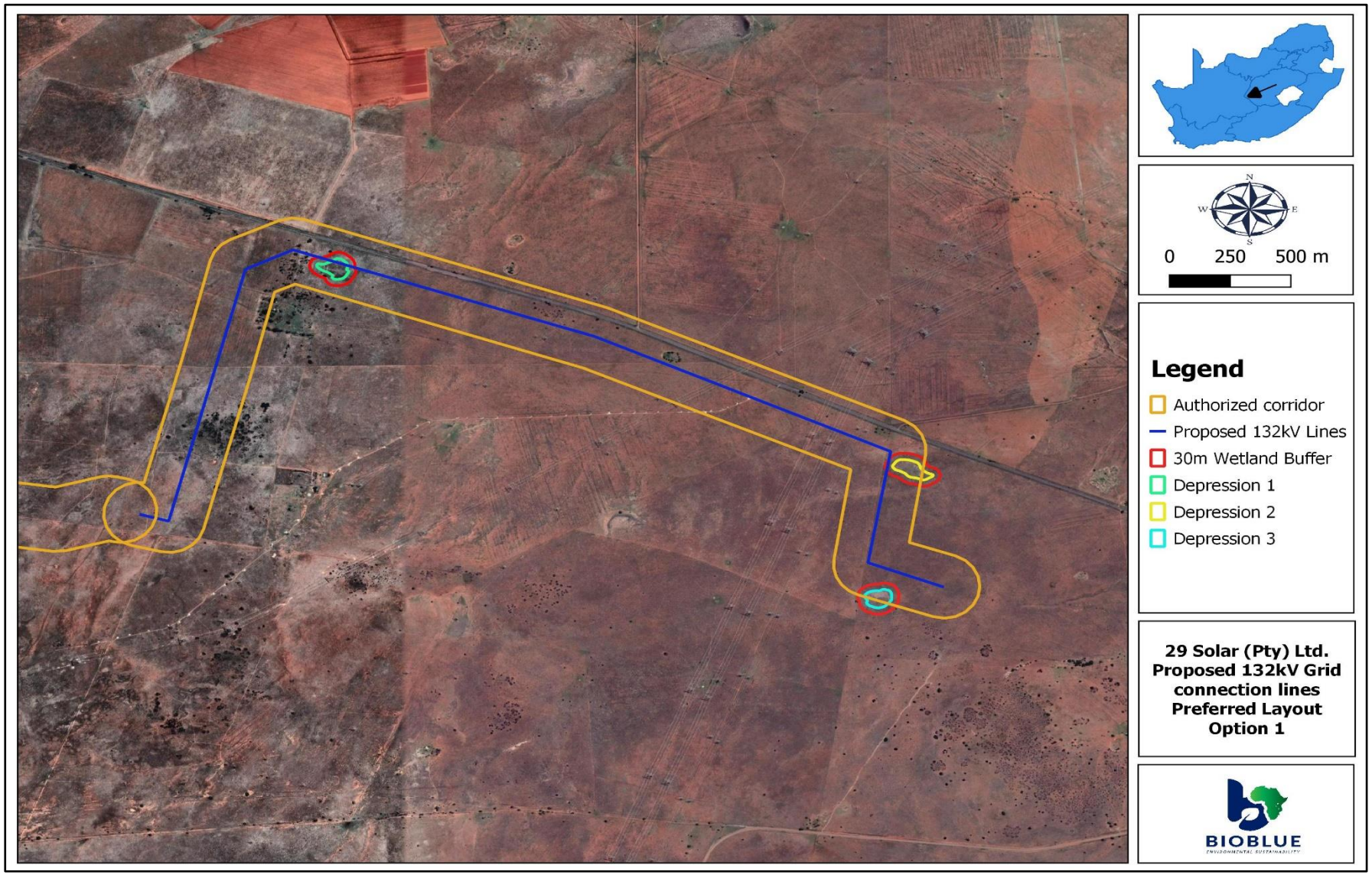


Figure 1: Preferred Route and Layout Option 1 with Aquatic sensitivities - wetland delineations and 30m buffer zones

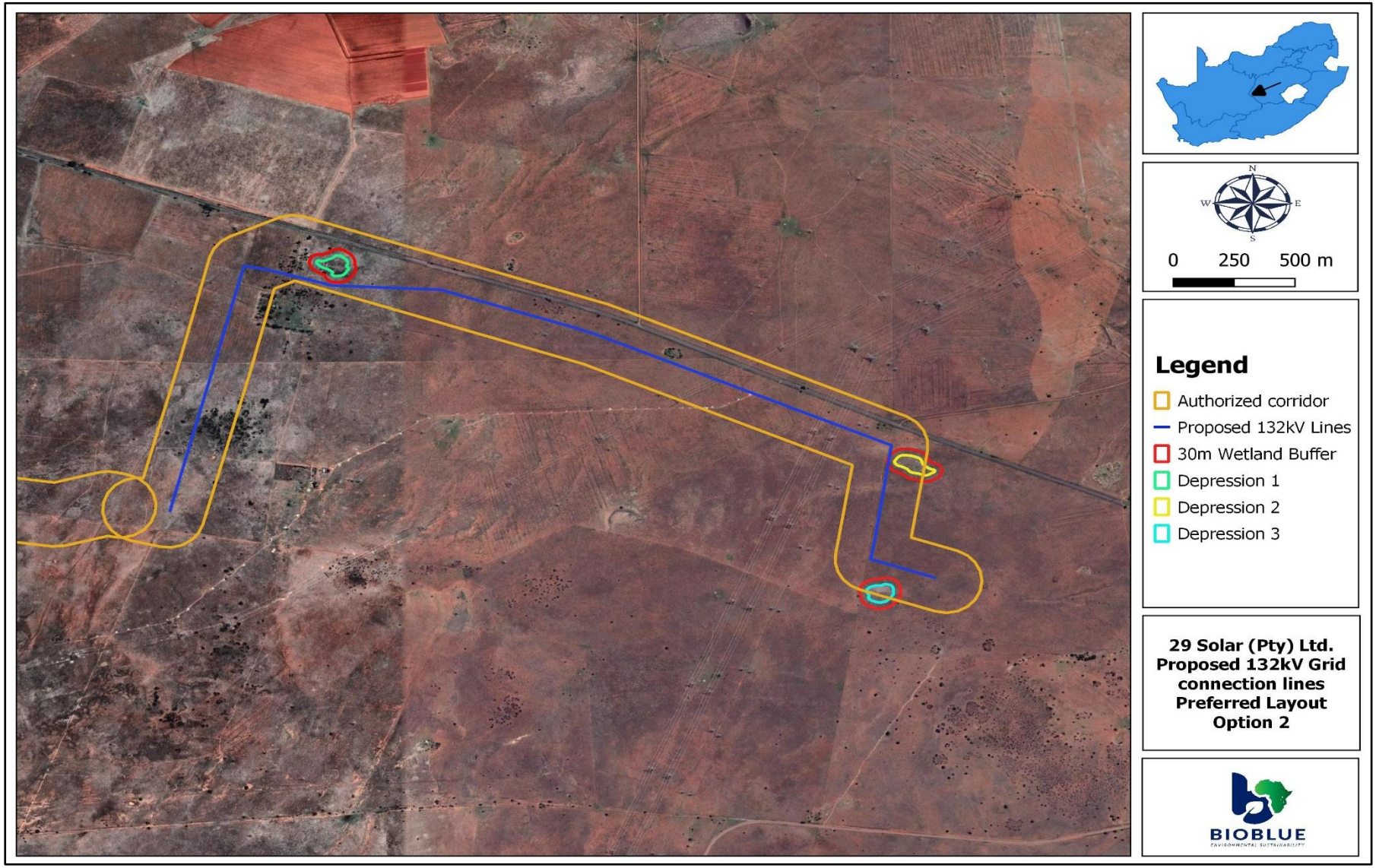


Figure 2: Preferred Route and Layout Option 2 with Aquatic sensitivities - wetland delineations and 30m buffer zones

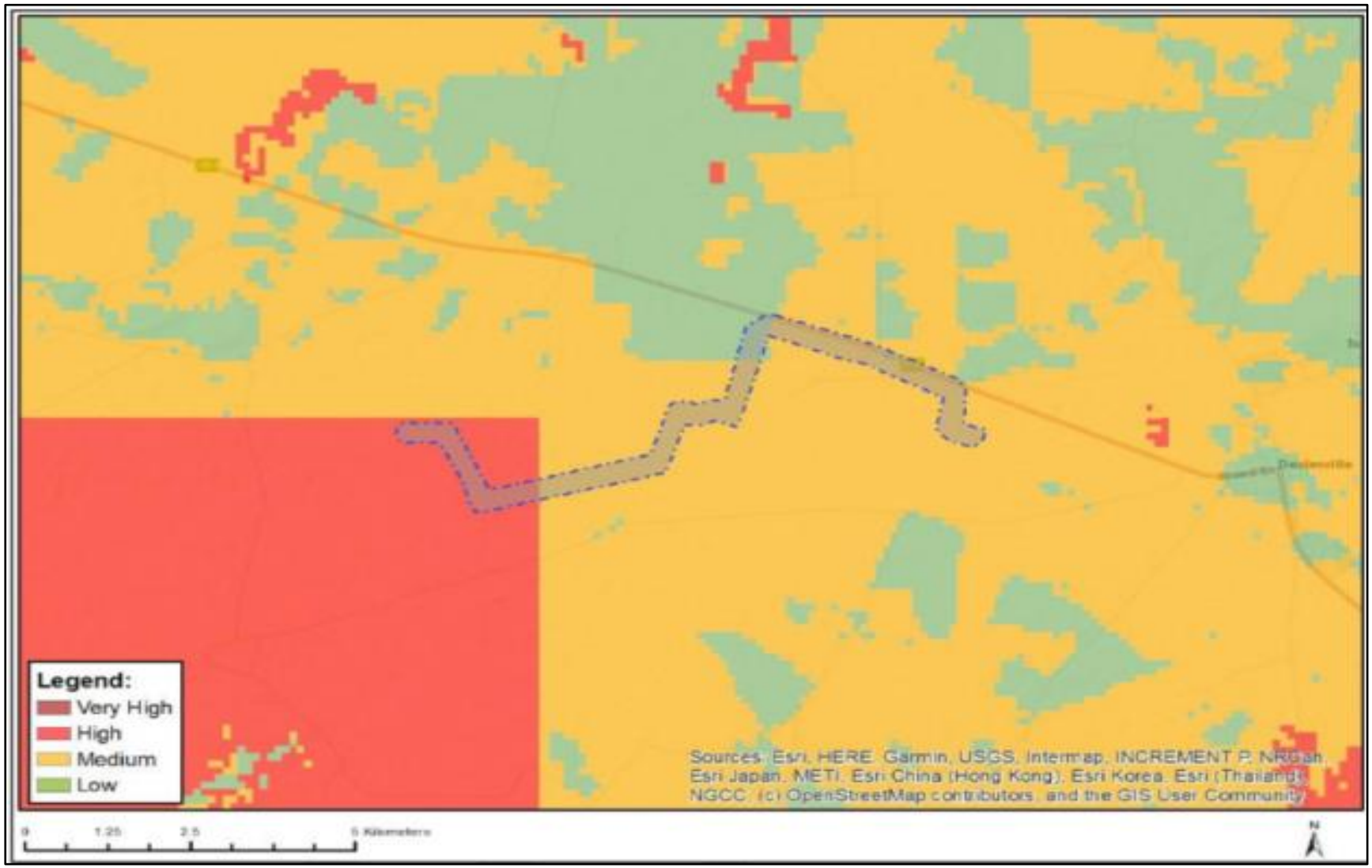


Figure 3: DFFE Screening Tool indicating the Avi-faunal sensitivities for the entire Marula Cluster Grid line infrastructure

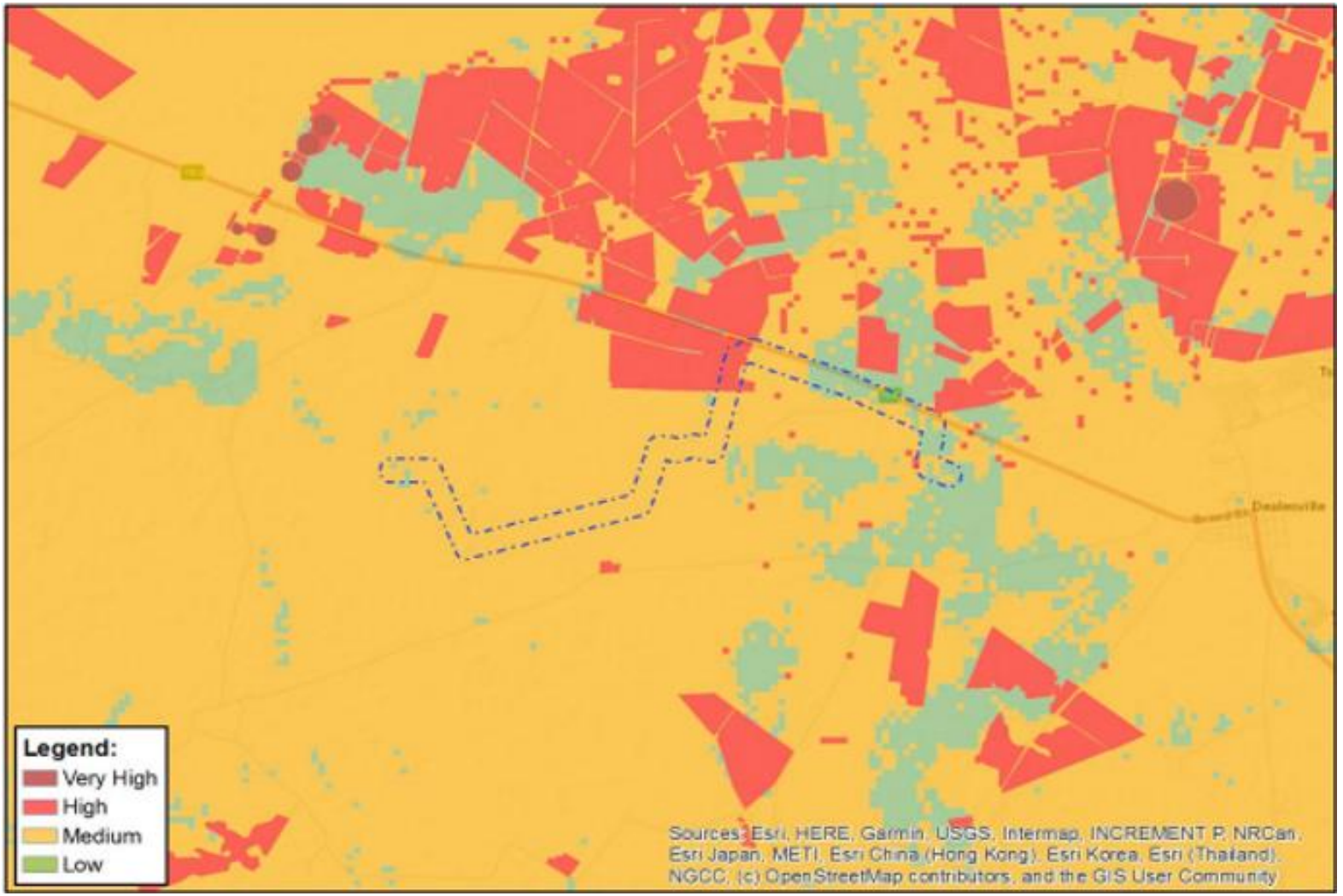


Figure 4: DFFE Screening Tool indicating Agricultural sensitivities

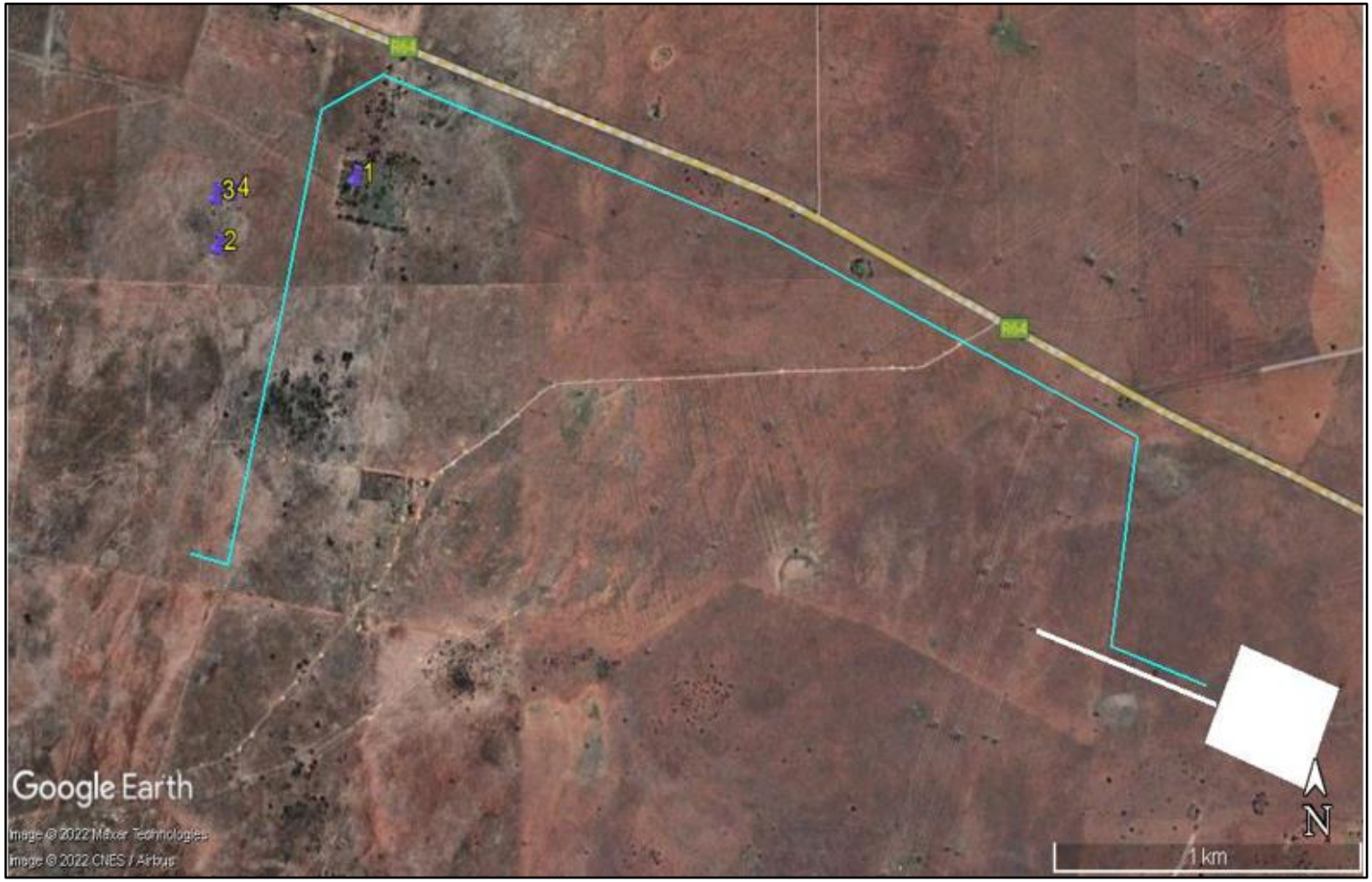


Figure 5: Map indicating locations of Heritage value

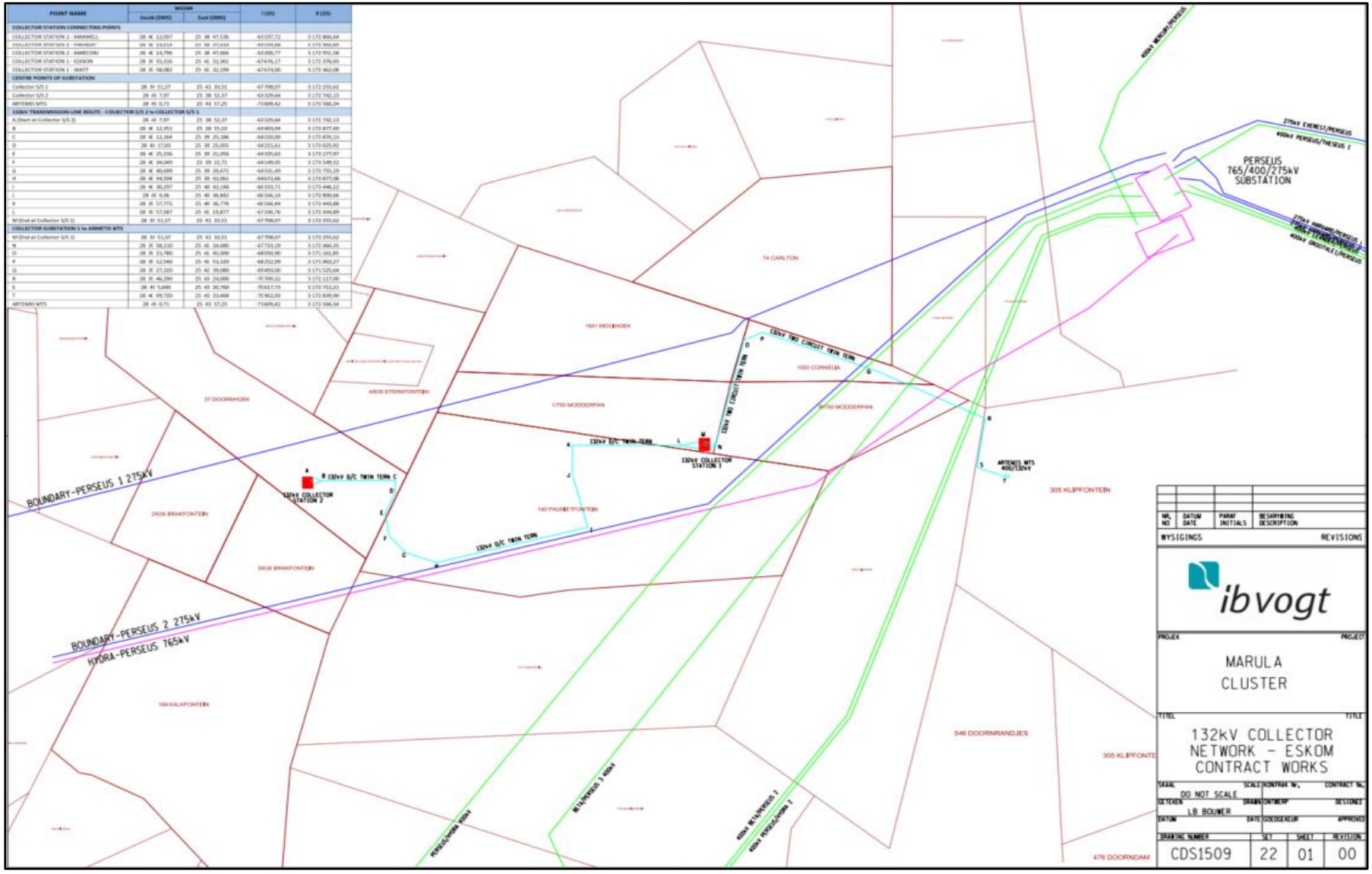


Figure 6: 132kV Collector Network

APPENDIX 3 –

EMPr PART C

SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

Table 1: Paleontological, Cultural and Heritage

Impact management outcomes: Restoration and protection of Paleontological, cultural and heritage findings						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– If any sites or artifacts of cultural, heritage or paleontological significance is found stop all activities immediately. – Inform a specialist and follow instructions from specialist. – All artifacts or significant areas should be protected and stored according to instructions from specialist.	**cEO and Contractor in consultation with ECO**	**Cease work at the site were the artifacts or bones were found and demarcate the area until the specialist arrives**	**During Construction Phase**	**ECO**	**As required**	**Minutes of meetings and procedures followed**

Table 2: Faunal and Vegetation

Impact management outcomes: Mitigate terrestrial habitat, and faunal impacts during the project lifecycle						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– Construction vehicles should only use designated roadways to access the site – Invasive plant material should be disposed by incineration, or alternatively, composting to break down seeds. If seedbank persists, invasive alien plant management and eradication measures should be implemented – Areas outside the area of the proposed development should not be encroached upon and development footprint should be kept as small as possible – Conduct alien invasive species monitoring on a regular basis – Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness. – As much of the natural habitat as possible should be preserved during	**cEO, Contractor Maintenance Crews**	**Environmental Awareness Training Sessions must be held** **Continuous monitoring and management of alien and invasive species** **Compile a biodiversity protocol and rehabilitation plan before closure** **Keep disturbance footprint as**	**Pre-construction Construction and Operational Phases**	**ECO**	**Once before construction and then throughout the construction phase**	**Training documents and attendance registers** **Visual inspections and photographic record**

construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts. – Effective restoration of the natural habitats that were intact before the development should be implemented and reported on after decommissioning. – Before maintenance activities are scheduled, proper planning needs to be done to ensure that the duration of the maintenance and disturbance is kept to a minimum. – Have a biodiversity protocol and rehabilitation plan in place that will be implemented upon closure.		**small as possible**				
– Avoid constructing during the breeding season (summer). Construct development in shortest timeframe – Minimize development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation	**cEO and Contractor Maintenance Crews**	**Environmental Awareness training sessions must be held**	**Pre-construction Construction and Operational Phases**	**ECO**	**Ongoing**	**Training documents and attendance registers**

– Relocation of important species, identification and demarcation of specimens and sub habitats not to be disturbed will have to be done beforehand by a specialist. – Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness. – As much of the natural habitat as possible should be preserved during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts. – Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase		**Contractor crews must not wander and disturb fauna species in adjacent natural habitats**				**Visual inspections and photographic record**

Table 3: Avi-Faunal Conservation Measures

Impact management outcomes: Protection and conservation of floral species and vegetation biomes.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Avoid constructing during the breeding season (summer). Construct development in shortest timeframe – Have a biodiversity protocol and rehabilitation plan that will be implemented following the decommissioning phase – Minimize development footprint and habitat transformation, limit ongoing human activity to the minimum required for ongoing operation – Relocation of important species, identification and demarcation of specimens and sub habitats not to be disturbed will have to be done beforehand by a specialist.	**DPM, DSS, cEO and contractor in consultation with the ECO**	**Planning sessions before commencement of construction**	**First week before construction commences with induction** **Other aspects throughout the construction phase**	**ECO** **Project manager**	**Once prior to construction and then ongoing**	**Minutes of meetings** **Visual inspections and photographic record**

– Important species (Avifauna) that will be threatened by the development must be relocated to safer habitats by suitable specialists – Implement mitigation controls during the construction phase as specified in the mitigation requirements. Monitor and report on their effectiveness. – As much of the natural habitat as possible should be preserved during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts. – Motivate the need for lines to be adequately marked with anti-collision devices and bird-friendly designs to prevent electrocution. Install deterrents/flappers on all required sections – It is recommended that the standard Eskom Bird Perch to be fitted to all pole tops to further provide safe						

perching space well above dangerous infrastructure. – Constructing new power lines in such a way that they have minimal impact on birds – Demarcate sections requiring the installation of deterrents/flappers on all required sections of power line or directly adjacent to site. – Conduct quarterly fatality monitoring assessments.						

Table 4: Agricultural Aspects

Impact management outcomes: Minimizing impacts on agricultural land						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Keep the project and footprint of disturbance as small as possible – Land clearance must only be undertaken immediately prior to	**DSS / cEO and contractor in consultation**	**Planning sessions before commencement of construction**	**First week before construction**	**ECO Project manager**	**Once prior to construction**	**Minutes of meetings**

construction activities and only within the development footprint – Clean-up hydrocarbon spills if it occurs and test the soil for contamination after clean-up has been finalized – Vegetation and soil must be retained in position for as long as possible and only removed immediately before construction activities commences – Re-vegetation of disturbed areas must be undertaken with site indigenous species and in accordance with instructions issued by the ECO.	**with the ECO**	**Continuous monitoring of management activities**	**commences with induction** **Other aspects throughout the construction phase**		**and then ongoing**	**Visual inspections and photographic record**

Table 5: Depression Wetlands

Impact management outcomes: Minimizing or avoiding impacts on depression wetland systems						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Avoid construction activities in the wetlands and their associated buffer zones by proper demarcation of the buffer zones before construction commencement. – Inform employees to be vigilant against any activity that will have a harmful effect on wetlands on and off the site. – No vehicles or persons may enter the wetland areas unless approved by the ECO for official purposes – The natural flow of water, which will be in the form of runoff from rainfall events to the depressions on site should not be hampered or obstructed in any way	**DSS / cEO and Contractor**	**Planning sessions before commencement of construction** **Clear demarcation of no-go areas**	**First week before construction commences with induction** **Other aspects throughout the construction phase**	**ECO** **Project manager**	**Once prior to construction and then ongoing**	**Minutes of meetings** **Visual inspections and photographic record**

APPENDIX G2 –

SCREENING TOOL

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number: 1

Project name: Marula Cluster - Grid Connection Extension

Project title: Marula Cluster - Grid Connection Extension

Date screening report generated: 31/08/2022 08:32:47

Applicant: 29 Solar (Pty) Ltd.

Compiler: BioBlue Environmental

Compiler signature:

.....

Application Category: Utilities Infrastructure|Electricity|Distribution and Transmission|Powerline

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY 14

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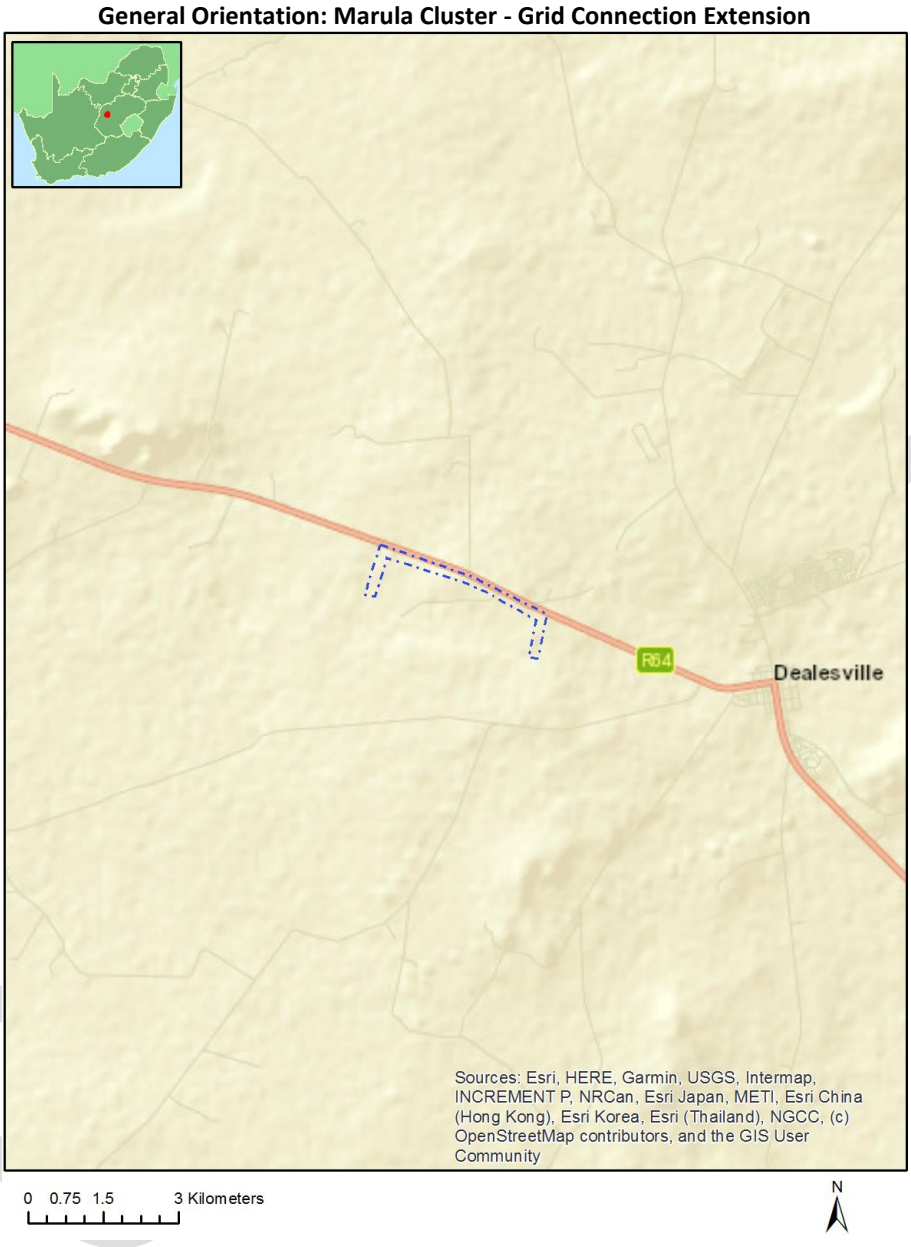
MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY 16

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 17

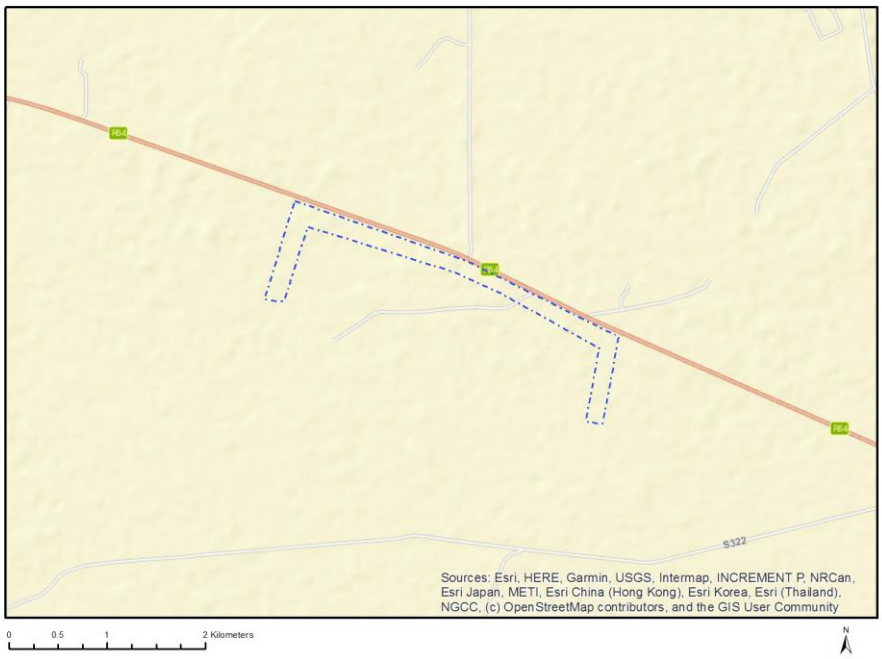
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Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	KLIPFONTEIN	305	0	28°40'37.08S	25°45'13.01E	Farm
2	MODDERPAN	750	0	28°39'50.4S	25°41'26.75E	Farm
3	CORNELIA	1550	0	28°39'26.39S	25°42'4.99E	Farm
4	LELIEHOEK	748	0	28°41'14.29S	25°42'28.63E	Farm
5	MOOIHOEK	1551	0	28°39'8.87S	25°40'39.84E	Farm
6	LELIEHOEK	748	0	28°41'12.45S	25°42'33.2E	Farm Portion
7	MODDERPAN	750	0	28°39'48.94S	25°41'31.51E	Farm Portion
8	CORNELIA	1550	0	28°39'25.09S	25°42'9.54E	Farm Portion
9	KLIPFONTEIN	305	0	28°40'38.64S	25°45'17.33E	Farm Portion
10	MOOIHOEK	1551	0	28°39'11.03S	25°40'47.13E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Disclaimer applies

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/719	Solar PV	Approved	0
2	14/12/16/3/3/2/854	Solar PV	Approved	0
3	14/12/16/3/3/2/855	Solar PV	Approved	0
4	14/12/16/3/3/2/728	Solar PV	Approved	0
5	14/12/16/3/3/1/2155	Solar PV	Approved	5.8
6	14/12/16/3/3/2/755	Solar PV	Approved	0.1
7	14/12/16/3/3/2/851	Solar PV	Approved	0
8	14/12/16/3/3/2/720	Solar PV	Approved	1.4
9	14/12/16/3/3/2/727	Solar PV	Approved	0
10	14/12/16/3/3/2/853	Solar PV	Approved	0
11	14/12/16/3/3/2/726	Solar PV	Approved	0
12	14/12/16/3/3/1/2156	Solar PV	Approved	5.8
13	14/12/16/3/3/2/723	Solar PV	Approved	4.3
14	14/12/16/3/3/1/2154	Solar PV	Approved	5.8
15	14/12/16/3/3/2/852	Solar PV	Approved	0
16	14/12/16/3/3/2/724	Solar PV	Approved	6.4
17	14/12/16/3/3/2/718	Solar PV	Approved	0
18	14/12/16/3/3/2/722	Solar PV	Approved	6.3
19	14/12/16/3/3/2/717	Solar PV	Approved	2.5
20	14/12/16/3/3/2/721	Solar PV	Approved	0.1

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Electricity|Distribution and Transmission|Powerline**.

Relevant development incentives, restrictions, exclusions or prohibitions

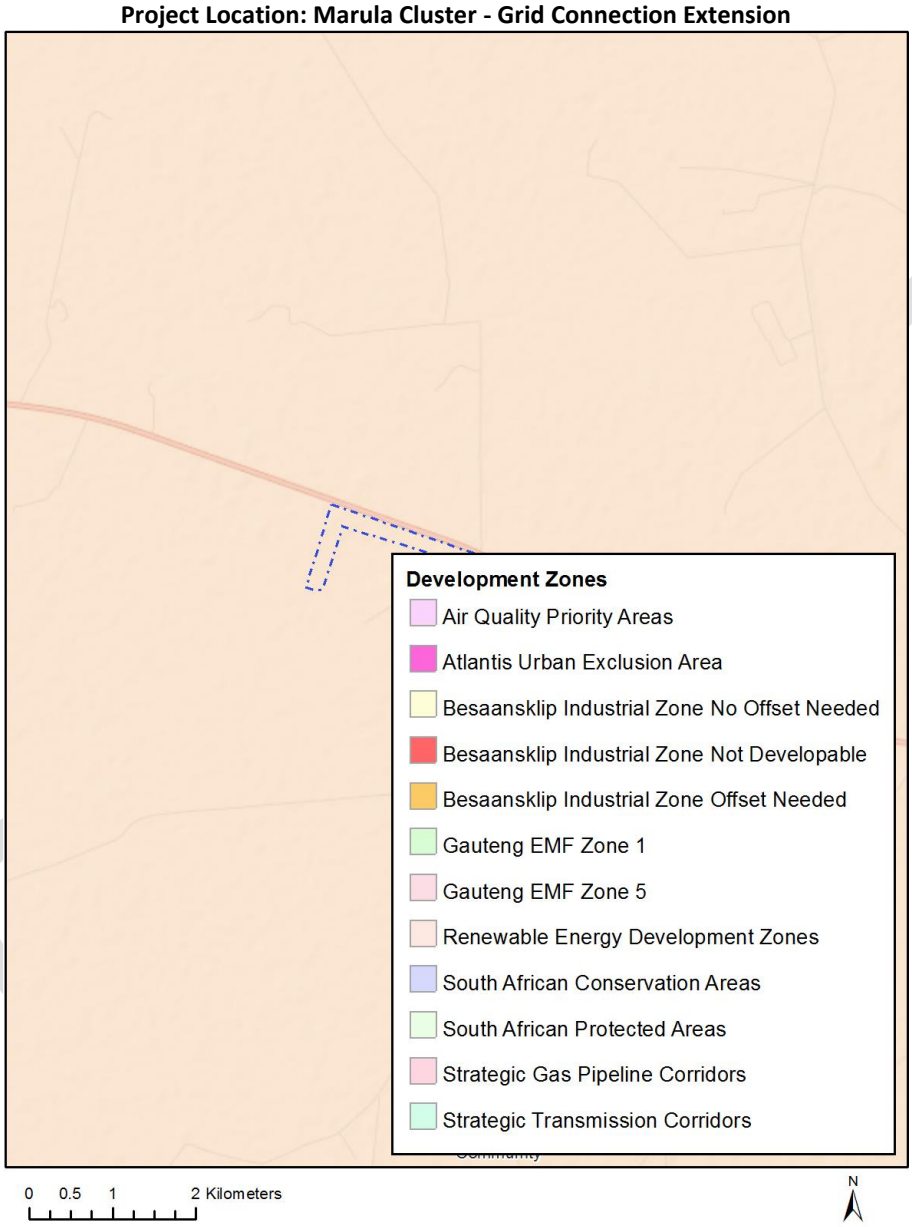
The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Central corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf

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Renewable energy development zones 5-Kimberley	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_REDZ.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme				X
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf

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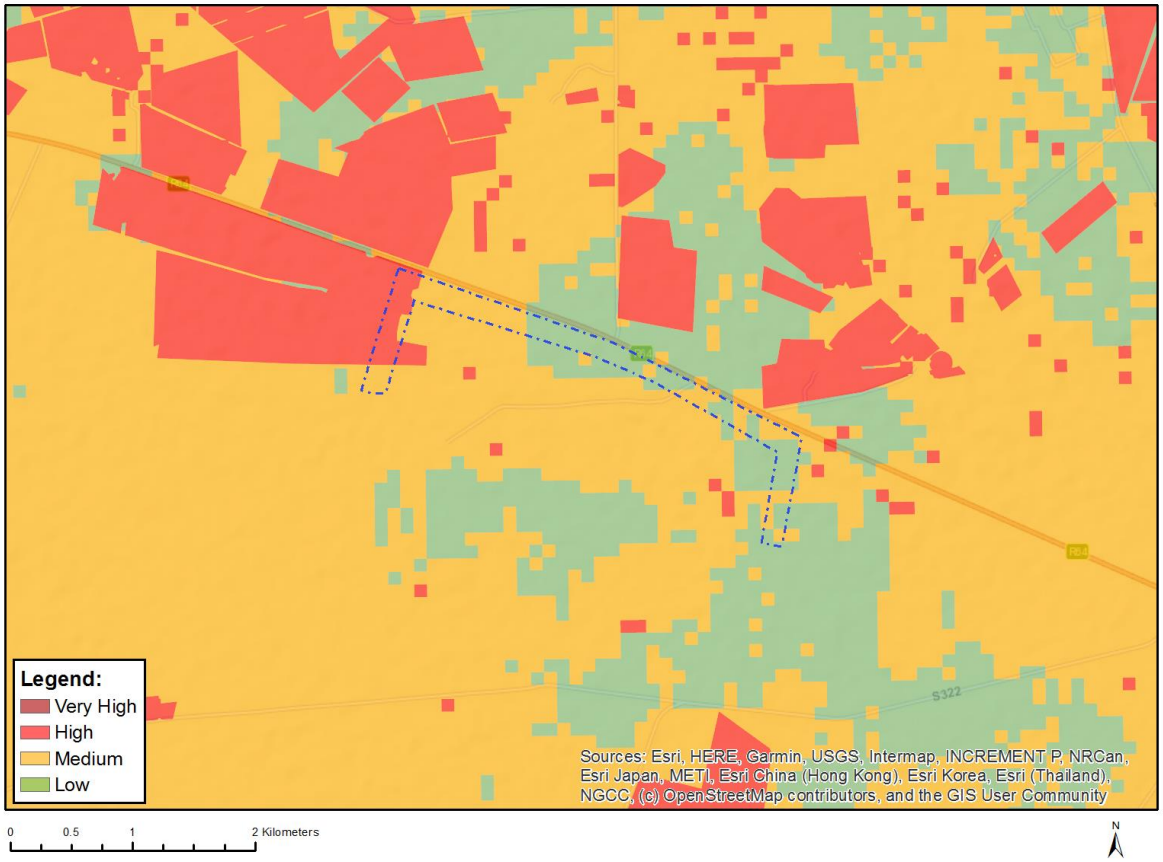
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Avian Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Avifauna_Assessment_Protocols.pdf
8	Civil Aviation Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Civil_Aviation_Installations_Assessment_Protocols.pdf
9	RFI Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
12	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

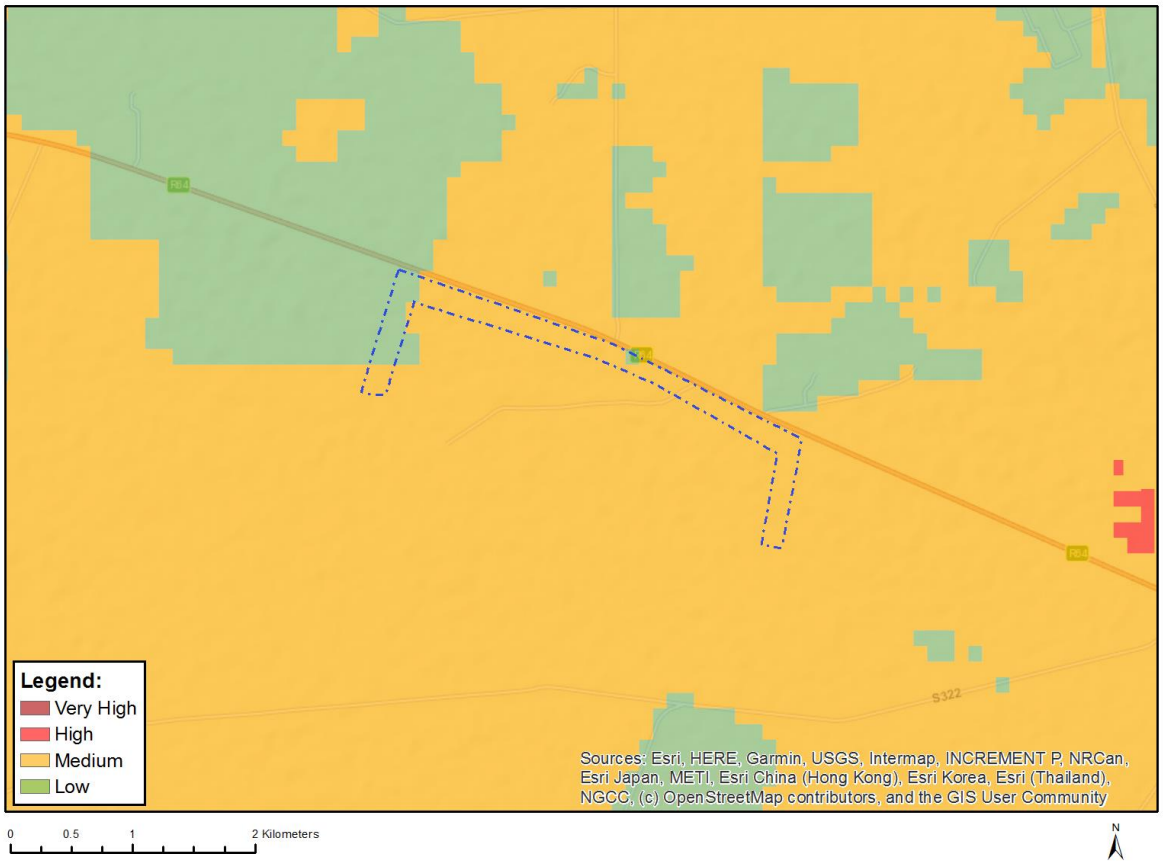


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



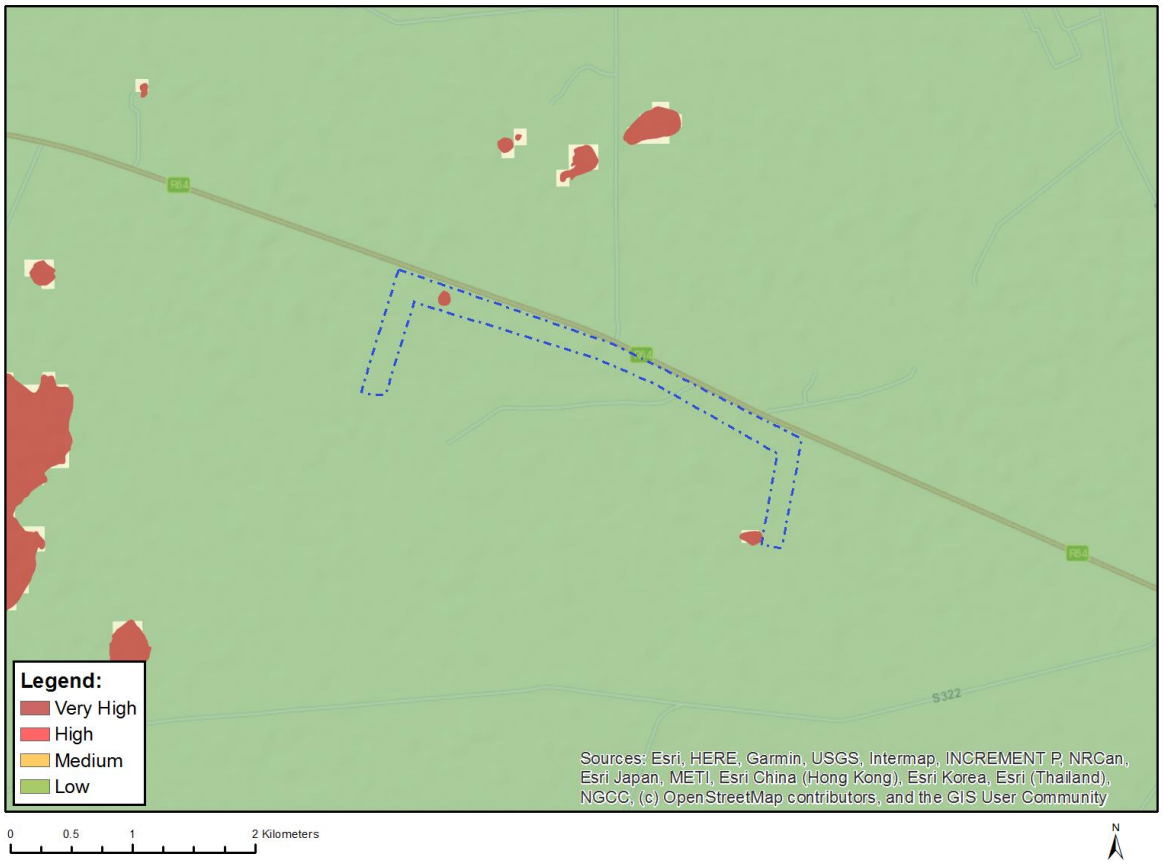
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Neotis ludwigii

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



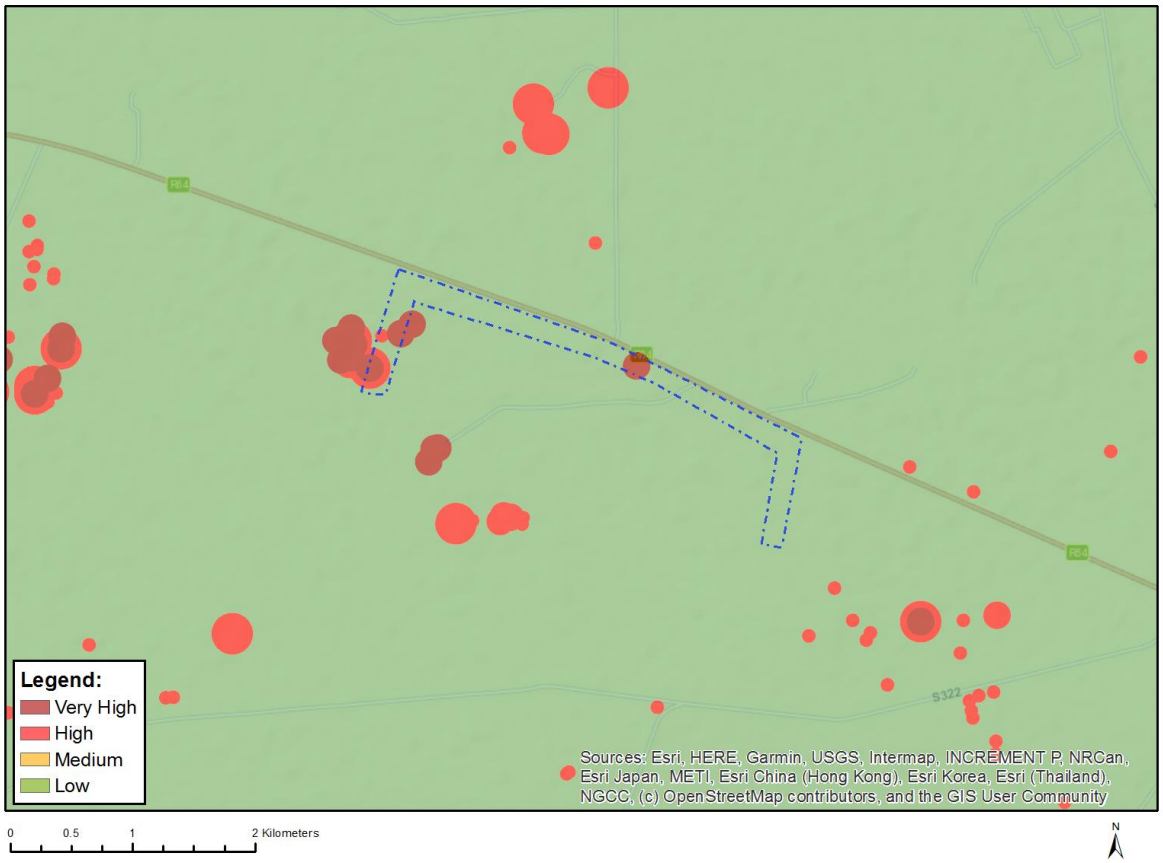
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Wetlands and Estuaries

Disclaimer applies
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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



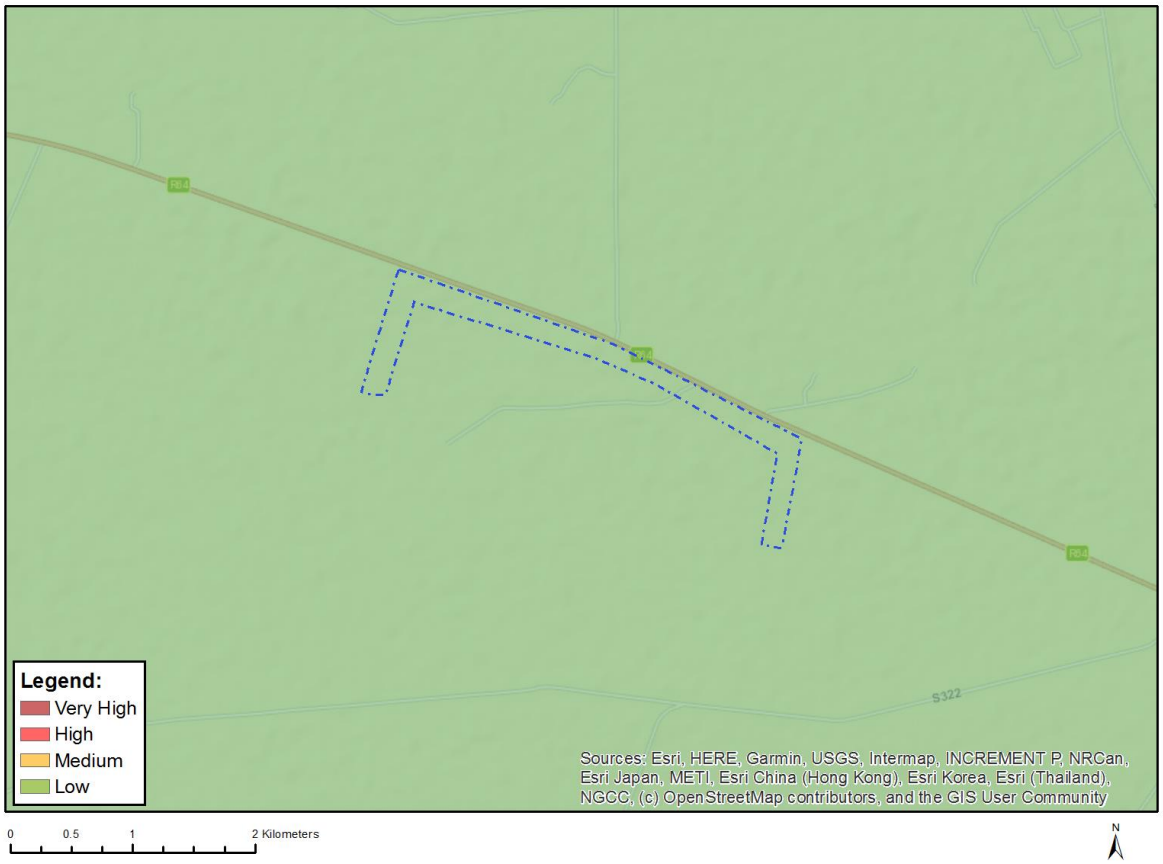
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 150m of a Grade IIIa Heritage site
High	Within 100m of a Grade IIIb Heritage site
High	Within 50m of a Grade IIIc Heritage site
Low	Low sensitivity
Very High	Within 100m of an Ungraded Heritage site

Disclaimer applies

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



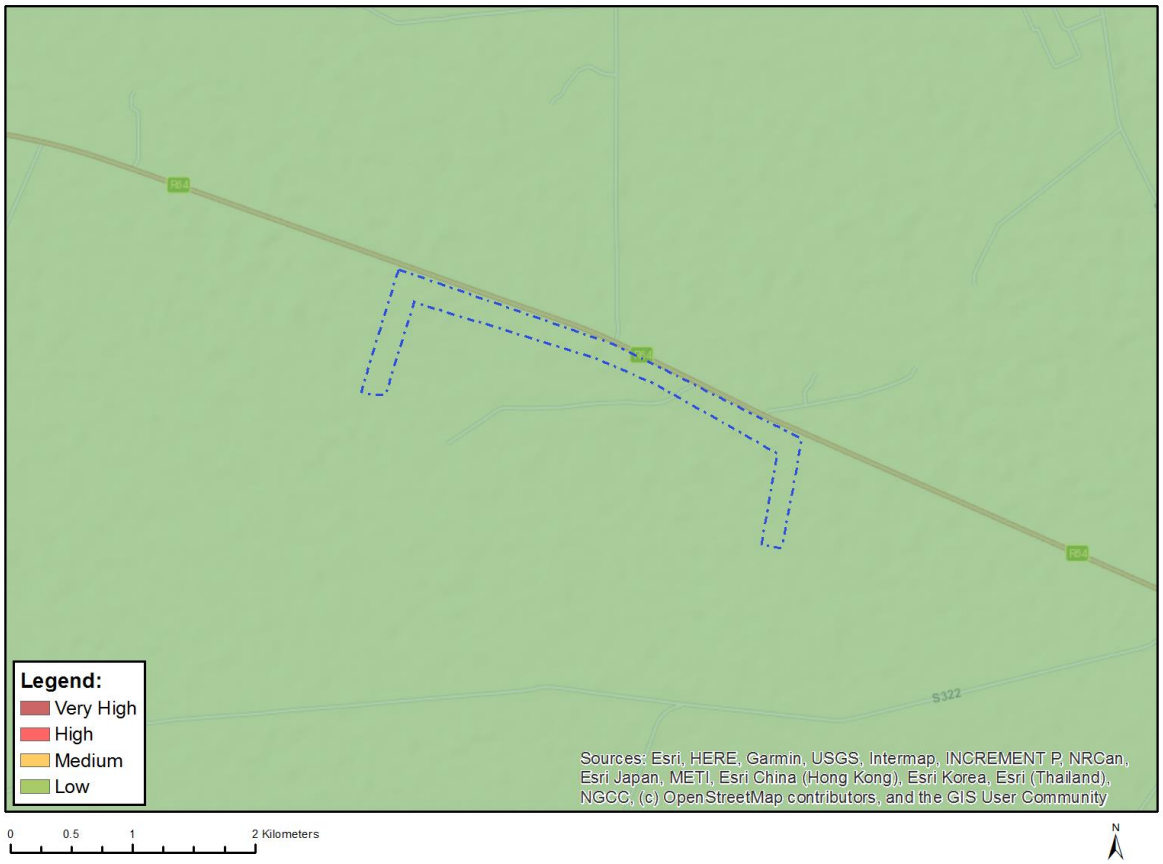
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY



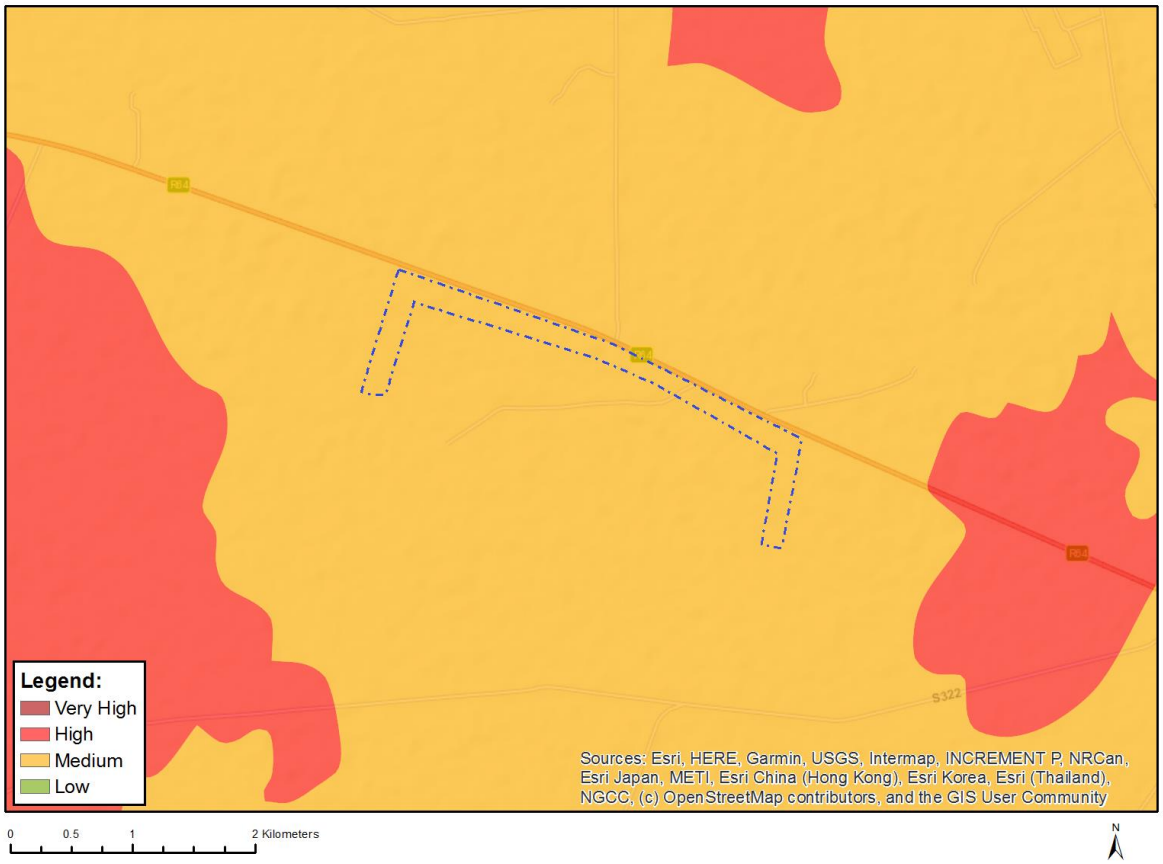
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



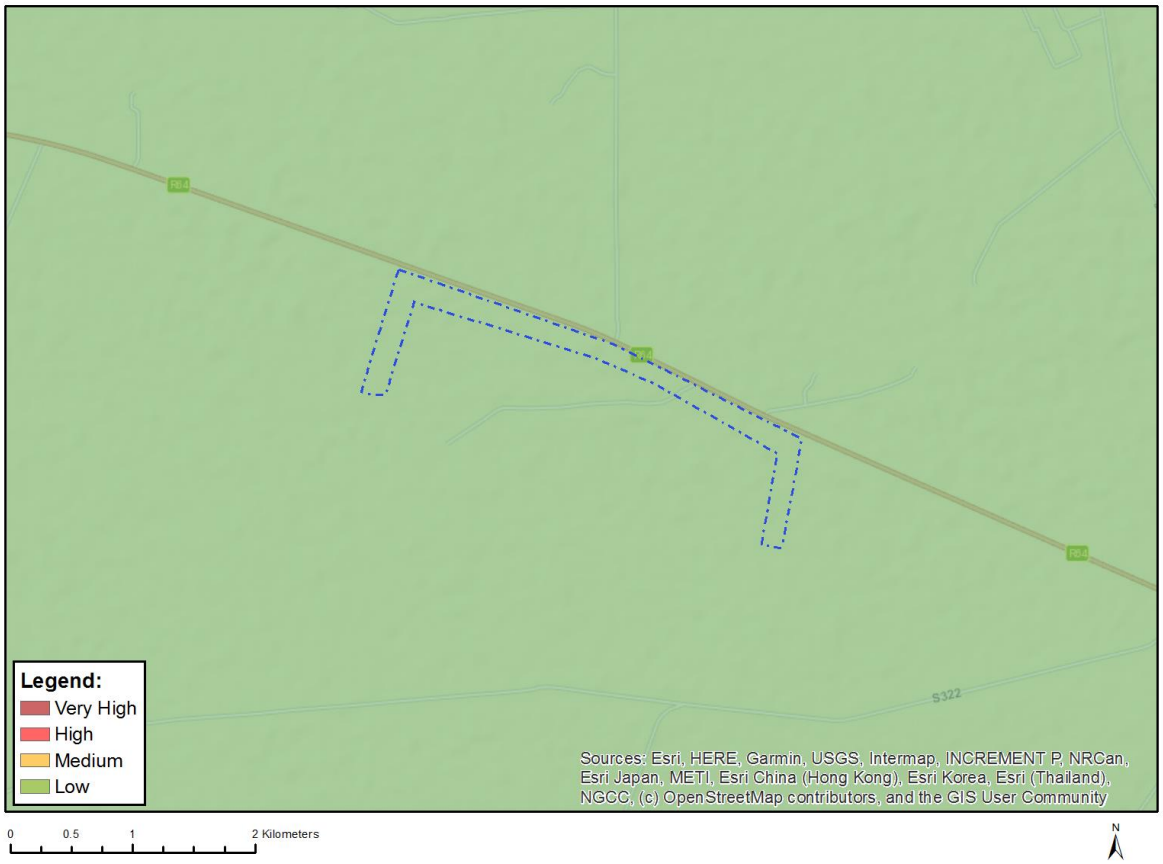
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

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

Disclaimer applies
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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

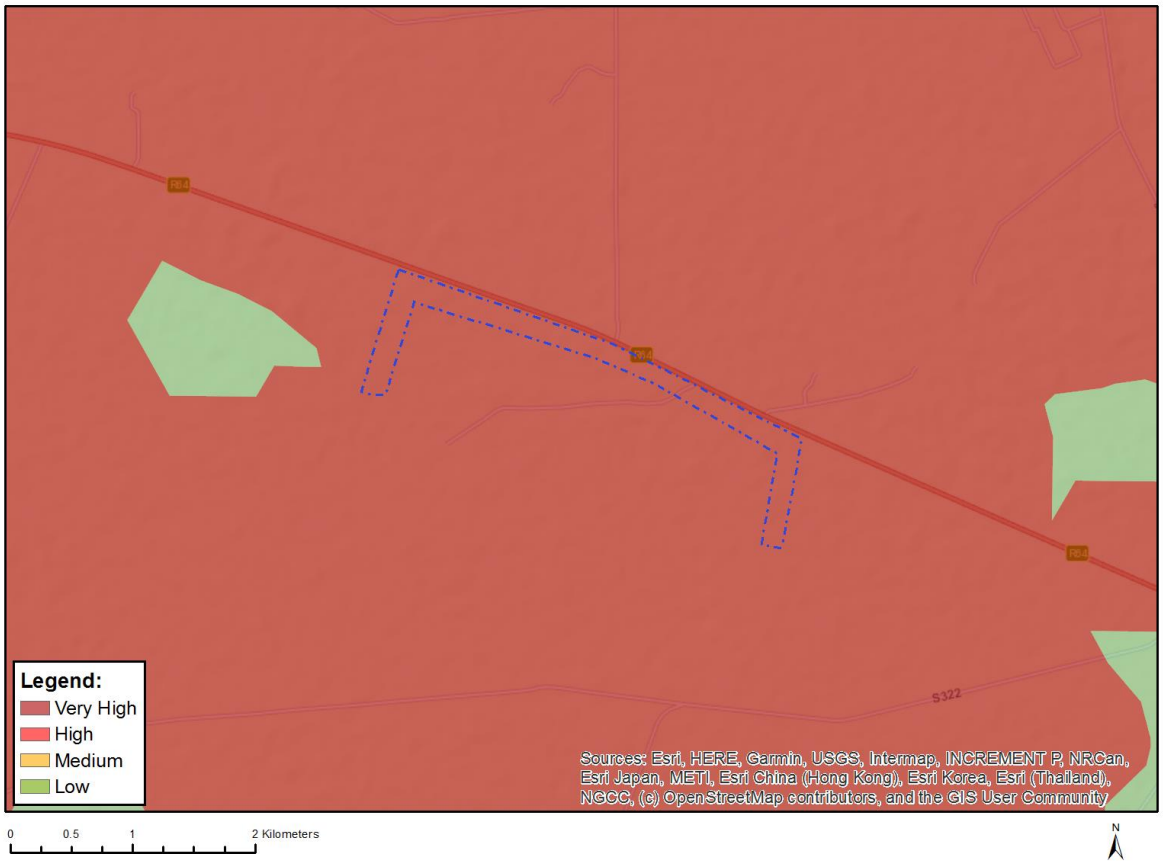
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	Endangered ecosystem

Disclaimer applies