Machadodorp PV Solar Facility

Ehlanzeni District, Mpumalanga Province

Site Verification Report:

Terrestrial Biodiversity Specialist Assessment and Terrestrial Plant and Animal Species Specialist Assessment

Field Survey: 25th May 2023
Draft Report V1.0: 6th June 2023

Prepared for:

Jo-Anne Thomas
Savannah Environmental (Pty) Ltd
1st Floor, Block 2
5 Woodlands Drive Office Park
Cnr Woodlands Drive & Western Service Road
WOODMEAD, 2191

Tel: +27 11 656 3237
Email: joanne@savannahsa.com

Prepared by:

Duncan McKenzie (SACNASP Reg. No. 122647)
Digital Earth (Pty) Ltd
P.O. Box 19787
The Village
MBOMBELA, 1218
1218

Tel: +27 79 530 7873
Email: duncan@digitalearth.co.za

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DIGITAL EARTH (Pty) Ltd. P.O. Box 19787 The Village Mbombela 1218
Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

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Abbreviations

CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries & the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EN	Endangered
ESA	Ecological Support Area
EST	Environmental Screening Tool
ha	Hectare
IBA	Important Bird & Biodiversity Area
IUCN	International Union for Conservation of Nature
mamsl	Metres above mean sea level
MBCP	Mpumalanga Biodiversity Conservation Plan
MBSP	Mpumalanga Biodiversity Sector Plan
MNCA	Mpumalanga Nature Conservation Act (No. 10 of 1998)
NEMA	National Environmental: Management Act (No. 107 of 1998)
NT	Near Threatened
PAOI	Project Area of Influence
POSA	Plants of Southern Africa
QDGS	Quarter-Degree Grid Square, for example 2531 AB

SABAP2	Southern African Bird Atlas Project 2
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern

Terminology

Alien	Introduced from elsewhere: neither endemic nor indigenous.
Biodiversity	The diversity of living organisms, including the terrestrial and aquatic ecosystems they inhabit; this can be measured at gene, species or ecosystem level.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire.
Modified	Modified ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.

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Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

1. INTRODUCTION

1.1 Background and Project Description

Solar to Benefit Africa (Pty) Ltd is planning a Photovoltaic Solar Energy Facility near Machadodorp in Mpumalanga Province (Figure 1). The project, which will be known as the Machadodorp PV 1 Solar Energy Facility, will comprise the following infrastructure:

- Photovoltaic (PV) Panel with capacity of up to 10 MW that will cover an area of *c*. 20 ha;
- A substation and overhead power line/s connecting to the existing Machadodorp Substation;
- Mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels);
- Cabling between the project components, to be lain underground where practical;
- Internal access roads;
- Fencing; and
- Workshop area for maintenance, storage and offices[1].

A baseline terrestrial ecology survey was performed by ECOREX Consulting Ecologists CC in November 2012. As the authorisation of this project lapses after ten years, a proposal for an Environmental Authorisation (EA) amendment to extend the validity of the EA for the Machadodorp PV facility is being applied for. As the EA validity will be extended beyond ten years, the Department of Forestry, Fisheries & the Environment (DFFE) requires additional information to confirm that the environment has not changed.

This verification report is based on a review of available information and a brief field survey conducted in May 2023. Savannah Environmental (Pty) Ltd contracted Digital Earth (Pty) Ltd to perform the verification for terrestrial ecosystems (flora, mammals, birds, reptiles and frogs) for the proposed application. The key deliverables for this project were a verification/ motivation report of the current status of the terrestrial ecosystems and a review of the baseline integrated ecological importance assessment, including the Impact Assessment on the receiving environment.

[1] ECOREX, 2012b

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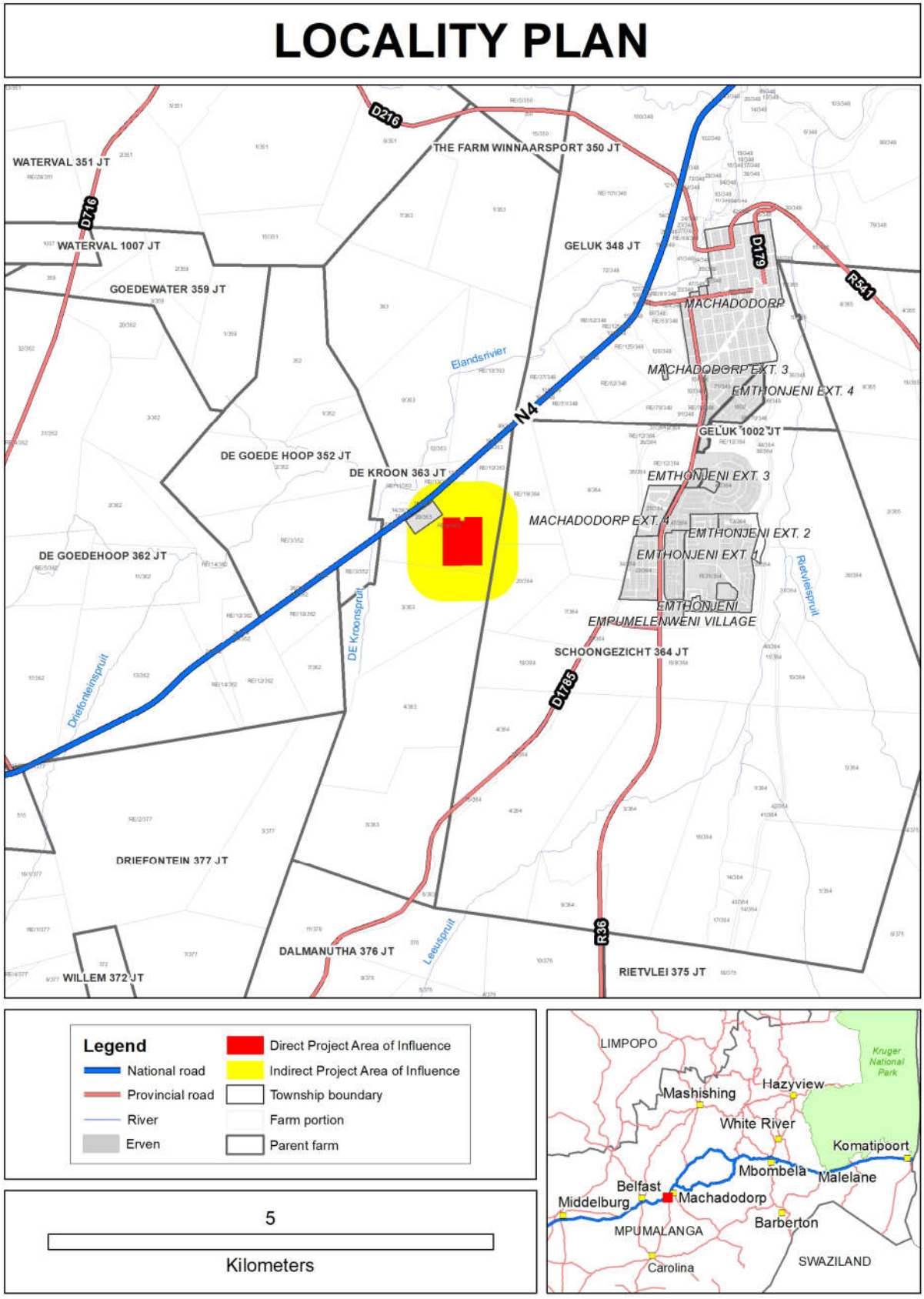

Figure 1. Location of the proposed Machadodorp PV facility

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Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

1.2 Study Team

The study team for this report was as follows:

Duncan McKenzie (Director - Digital Earth, Terrestrial Ecologist). Duncan has been involved in biodiversity assessments for various developments for 15 years. Countries of work experience include Lesotho, Swaziland, Mali, Mozambique, Sierra Leone, Morocco, Guinea, South Africa, Tanzania and the Democratic Republic of the Congo. Duncan previously worked as a Regional Coordinator for the Mondi Wetlands Project and has lectured on many aspects of conservation across South Africa. He is currently the Mpumalanga Regional Co-ordinator for the South African Bird Atlas Project, the Mpumalanga Regional Reviewer for eBird, formerly served on the KZN Bird Rarities Committee, is lead author of The Birds of Mbombela and is lead author on the Wildflowers of the Kruger National Park and the Roberts Birds of the Kruger National Park projects. Duncan is a Certificated Natural Scientist (SACNASP Reg. No.122647). His CV is presented in Appendix 5.

Linda McKenzie (Director - Digital Earth, GIS Specialist). Linda is a Geomatics Professional Practitioner with over 21 years' experience in the industry. She has extensive experience in both the private and public sector and has worked on a wide variety of projects and GIS applications. These include, most recently, vegetation and sensitivity mapping, landcover data capture, municipal roads master planning, hydroelectric scheme and wind farm feasibility mapping as well as town planning, land surveyor and engineering support services. Linda formerly served as Vice Chairperson and Treasurer for GISSA Mpumalanga and is a registered Professional GISc Practitioner (GPr. GISc 0170).

1.3 Acknowledgements

- Michael Morreira of Savannah Environmental is thanked for his technical support.
- Rob Palmer of Nepid is thanked for reviewing the report.

2. SCOPE OF WORK

The application for amendment of the environmental authorisation falls within the ambit of amendments to be applied for in terms of Part 1 of Chapter 5 of the Environmental Impact Assessment Regulations, 2014, as amended. Specialists are therefore referred to Regulation 30 of the EIA Regulations, 2014 as amended. The following additional information is required in terms of Regulation 30(1)(a) of the EIA Regulations, 2014 as amended, for the Department to be able to process the application:

A draft amendment motivation report that must be subjected to a 30-day public review and comment, including the competent authority. The report must include the following information, as supplied by the DFFE:

- The status (baseline) of the environment (social and biophysical) that was assessed during the initial assessment (by the relevant specialist, if applicable);
- The current status of the assessed environment (social and biophysical) (by the relevant specialist, if applicable);
- A review of all specialist studies undertaken, and a detailed assessment, including a site verification report providing an indication of the status of the receiving environment;
- The terms of reference for the specialist reports and declaration of interest of each specialist must be provided;
- The report mentioned above, must indicate if the impact rating as provided in the initial assessment remains valid; if the mitigation measures provided in the initial assessment are still applicable; or if there are any new mitigation measures which need to be included into the EA, should the request to extend the commencement period be granted by the Department;
- An indication if there are any new assessments/guidelines which are now relevant to the authorised development which were not undertaken as part of the initial assessment, must be taken into consideration and addressed in the report;
- A description and an assessment of any changes to the environment (social and biophysical) that have occurred since the initial EA was issued;

- A description and an assessment of the surrounding environment, in relation to new developments or changes in land use which might impact on the authorised project, the assessment must consider the following:
  i) similar developments within a 30km radius.
  ii) Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land.
  iii) Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
  iv) The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
  v) A cumulative impact environmental statement on whether the proposed development must proceed.
- Consent from all affected landowners (where applicable);
- The Public Participation Process must be conducted in terms of Chapter 6 of the EIA Regulations, 2014 as amended;
- A comments and response report.

3. PROJECT AREA OF INFLUENCE

3.1 General

The project area of influence (PAOI) is situated on Portion 8 of the farm De Kroon 363 JT, *c.* 3 km south-west of eNtokozweni (Machadodorp), Nkangala District, Mpumalanga (Figure 1). An area of approximately 40 ha was surveyed in 2012[2], although less than 20 ha would be required for the development footprint. The N4 highway and a large retail and filling station centre, known as Milly's, is located on the northern side of the PAOI. The PAOI lies within a seasonally arid temperate region with hot summers and cool and dry winters. Frost is common during the winter months. Mist is infrequent during summer. Mean annual precipitation is ~800 mm[3]. It is situated within the quarter-degree grid square (QDGS) 2530 CA at an elevation of ~1620 mamsl. The general topography of the area is flat to gently undulating, with shallow to moderately deeply incised drainage lines. Photographs of the PAOI taken in May 2023 are presented in Figure 2.

3.2 Alternatives

The application renewal does not contain any alternatives, and the original project area is still applicable.

3.3 Changes to the Surrounding Environment

The only known changes in the surrounding environment are as follows:

- The construction of a small intersection at the adjacent Milly's retail/ filling station centre;
- The upgrade of the adjacent N4 highway to a dual carriageway[4].

There are no known PV solar projects within 30 km of the Machadodorp PV PAOI. Therefore, the cumulative impact of solar arrays in the area will remain low.

[2] ECOREX, 2012b
[3] Mucina & Rutherford, 2006
[4] ECOREX, 2012a

Figure 2. Photographs of the current state of the PAOI and surrounding area (May 2023)

c. 2012

c. 2022

Figure 3. Comparison of aerial imagery from 2012 and 2022 (source: Google Earth)

4. APPROACH AND METHODOLOGY

4.1 New National and Provincial Assessments/ Guidelines

Subsequent to the November 2012 baseline biodiversity report, the Environmental Screening Tool (EST) of the Department of Forestry, Fisheries & the Environment (DFFE) was developed and is now a requirement for all specialist assessment reports. The results of a site-specific query triggered a required specialist assessment and a set of reporting requirements according to the following Government Notices:

- **Terrestrial Biodiversity Theme** – "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on Terrestrial Biodiversity" (Government Notice No. 320, published in Government Gazette 43110, 20 March 2020)
- **Plant, Avian & Animal Themes** – "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on Terrestrial Plant, Avian and Animal Species" (Government Notice No. 1150, published in Government Gazette 43855, 30 October 2020)

These requirements provided guidelines to ensure protocol compliance within the report. Four EST Themes were relevant to this study, namely Animal, Avian, Plant and Terrestrial Biodiversity. The specific drivers for each Theme are discussed in Section 5.2. Some of the modelled or confirmed species have been identified as sensitive species by the South African National Biodiversity Institute (SANBI) and have been assigned a unique number in the screening report produced by the EST. These names have been withheld as the species may be prone to illegal harvesting and must be protected.

Additionally, the 2020 guidelines provided by the South African "Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa" (SANBI, 2020) were referenced with regard to fieldwork methodology.

The Mpumalanga Biodiversity Conservation Plan (MBCP) (Ferrar & Lötter, 2007) was used in the 2012 report to determine the provincial conservation status of the PAOI. This has been replaced by the Mpumalanga Biodiversity Sector Plan (MBSP, 2014) which was adopted into provincial legislation in April 2023.

Lastly, the National List of Threatened Ecosystems (Notice 1002 of Government Gazette 34809, DEAT, 2011) was referenced to determine the national status of the vegetation type present within the PAOI.

4.2 Site-specific Desktop Assessment

Classification of national vegetation types were compiled using the current National Vegetation Map (SANBI, 2018). Various sources then were referenced to obtain a list of plant and species potentially occurring within the general area, from which a list of the most likely Species of Conservation Concern (SCC)[5] were compiled:

1. The Plants of Southern Africa (POSA)[6], which is curated by the South African National Biodiversity Institute (SANBI), was queried for a list of plant species that have been recorded from a 20 km radius of the PAOI. The BODATSA contains records from the National Herbarium in Pretoria, the Compton Herbarium in Cape Town and the KwaZulu-Natal Herbarium in Durban.
2. All Research Grade (confirmed) plant records from within a 20 km radius of the PAOI from the iNaturalist website were investigated for the presence of SCC. This is a peer-reviewed photographic database containing a large dataset of biodiversity records.
3. Lists of mammal, bird, reptile and frog SCC potentially occurring within the PAOI were prepared using data from SANBI's Red List of South African Species website, Child *et al*. (2016), the Virtual Museum and Southern African Bird Atlas Project 2 projects of the Fitzpatrick Institute of African Ornithology, Taylor *et al.* (2016), Minter *et al*. (2004), Bates *et al*. (2014), the IUCN Red List of Threatened Species, the iNaturalist website as well as from the previous surveys conducted by the author in the general area.

The above data were captured mostly at a quarter-degree spatial resolution but were refined by excluding species unlikely to occur within the PAOI due to unsuitable habitat characteristics (e.g., altitude and land-use). Potential occurrence of flora and fauna within the general area around the PAOI was predicted based on the specialist's knowledge of habitat requirements of local species.

[5] Raimondo *et al.* (2009), includes those with a status of Critically Rare, Rare, Near Threatened and Data Deficient as well as threatened species (Vulnerable, Endangered and Critically Endangered)
[6] http://posa.sanbi.org/sanbi/Explore

The following reports were reviewed to establish the environment that was survyed during the initial assessment:

- ECOREX. 2012a. Star Stop Milly's Rebuild and Access Upgrade Baseline Terrestrial Ecology Study & Biodiversity Value Assessment. Unpublished report compiled for EMROSS Consulting (Pty) Ltd.

- ECOREX. 2012b. Machadodorp1 Photovoltaic Solar Energy Facility Baseline Terrestrial Ecology Study & Biodiversity Value Assessment. Unpublished report submitted to Solar to Benefit Africa (Pty) Ltd.

4.3 Fieldwork

The PAOI was inspected during a site visit over one day on the 25th of May 2023. This coincided with the end of the wet season and the data quality are acceptable for this report. The locality of the proposed PV was provided by Savannah and pre-loaded onto a Samsung S20 phone using LocusMap Pro™ software. This area was then surveyed on foot using meandering transects covering as much of the direct and indirect PAOI as possible.

4.4 Assumptions, Limitations and Knowledge Gaps

4.4.1 Project type and infrastructure

It is assumed that the original scope of the Machadodorp PV Solar Project remains unmodified, and no major new infrastructure is planned.

5. ENVIRONMENTAL SCREENING TOOL

5.1 Overview

According to regulation 16(1)(b)(v) of the EIA Regulations (2014), applicants requiring Environmental Authorisation must comply with the protocols within the report generated by the DEA's online EST.

5.2 Theme Results

The result of the site-specific EST query indicated that the PAOI has **High** Sensitivity for the Animal Theme, **Low** Sensitivity for the Avian Theme, **Medium** Sensitivity for the Plant Theme and **Very High** Sensitivity for the Terrestrial Biodiversity Theme (Figure 4) due to the potential or confirmed occurrence of the following Species of Conservation Concern (SCC[7]) or features as presented in Table 1:

Table 1. Results and likelihood of occurrence of species identified in the Environmental Screening Tool query

ANIMAL THEME (HIGH)		
Mammalia		
Ourebia ourebi	EN	Oribi has a moderate likelihood of occasionally utilising the PAOI.
Amblysomus robustus	VU	Robust Golden Mole has a low likelihood of occurrence due to lack of suitable sandy habitat.
Amblysomus robustus	VU	Rough-haired Golden Mole has a low likelihood of occurrence due to lack of suitable sandy habitat.
Crocidura maquassiensis	VU	Maquassie Musk Shrew has a very low likelihood of occurring within the PAOI due to regional rarity.
Hydrictis maculicollis	VU	Spotted-necked Otter has a very low likelihood of occurrence due to a lack of aquatic habitat in the PAOI.
Aves		
Geronticus calvus	VU	Southern Bald Ibis has a high likelihood of utilising the habitat within the PAOI, especially after burns. However, no breeding habitat is present.
Eupodotis senegalensis	VU	White-bellied Korhaan has a low likelihood of occurrence as it is unrecorded from the area.
PLANTS THEME (MEDIUM)		
Asclepias dissona	CR	This herb has a very low likelihood of occurrence within the PAOI due to regional rarity - it has not been recorded since 1932.
Sensitive species 998	EN	This herb has a low likelihood of occurrence within the PAOI due to adequate fieldwork coverage and regional rarity.

[7] Raimondo *et al*. (2009), includes those with a status of Critically Rare, Rare, Near Threatened (NT) and Data Deficient (DD) as well as threatened species (Vulnerable VU, Endangered EN and Critically Endangered CR)

Sensitive species 1086	EN	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable aquatic habitat.
Cymbopappus piliferus	VU	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable habitat.
Khadia carolinensis	VU	This succulent has a very low likelihood of occurrence within the PAOI due to a lack of suitable habitat and adequate fieldwork coverage.
Listed Sensitive Species No. 1252	VU	This climber has a very low likelihood of occurrence due to adequate fieldwork coverage and lack of suitable habitat.
Listed Sensitive Species No. 274	VU	This succulent has a very low likelihood of occurrence due to adequate fieldwork coverage and regional rarity.
Miraglossum davyi	VU	This herb has a low likelihood of occurrence within the PAOI due to regional rarity and adequate fieldwork coverage.
Pachycarpus suaveolens	VU	Although suitable habitat is present for this species within the PAOI, this herb has a very low likelihood of occurrence due to regional rarity - there are no recent records of this taxon in any database.
Sensitive species 1201	VU	This geophyte has a very low likelihood of occurrence within the PAOI due to a lack of suitable habitat and adequate fieldwork coverage.
Sensitive species 1219	VU	This succulent has a very low likelihood of occurrence due to adequate fieldwork coverage, incorrect elevation and regional rarity.
Sensitive species 41	VU	This geophyte has a very low likelihood of occurrence within the PAOI due to lack of suitable aquatic habitat.
Sensitive species 691	VU	This geophyte has a low likelihood of occurrence within the PAOI due to no nearby records - occurs further west in Mpumalanga.
Streptocarpus denticulatus	VU	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable habitat.
Hesperantha bulbifera	Rare	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable habitat.
Khadia alticola	Rare	This succulent has a very low likelihood of occurrence within the PAOI due to a lack of suitable habitat and adequate fieldwork coverage.
Schizochilus cecilii subsp. culveri	Rare	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable habitat.
Sensitive species 311	Rare	This herb has a very low likelihood of occurrence within the PAOI due to lack of suitable habitat and adequate fieldwork coverage.
Sensitive species 321	Rare	Although some suitable habitat is present within the PAOI, this herb has a low likelihood of occurrence due to adequate fieldwork coverage and regional rarity.
TERRESTRIAL BIODIVERSITY THEME (VERY HIGH)		
Ecological Support Area: Local Corridor	Sections of the PAOI are situated within an area assessed as ESA: Local Corridor.	
Kruger National Park	The EST has mapped the PAOI to be situated within the	

	Kruger National Park. This is obviously an error.
National Protected Area Expansion Strategy	The EST has mapped the PAOI to be situated within the National Protected Area Expansion Strategy. However, there are no national parks near the PAOI, and this is obviously an error.

5.3 Site Sensitivity Verification

The site verification performed during the field assessment indicates that the specific identified sensitivity of the PAOI, according to the EST, is only partly justified. This is due to the following factors:

- The PAOI is not situated within or anywhere near to the Kruger National Park;
- The PAOI is therefore not situated within the National Protected Area Expansion Strategy;
- The PAOI lacks aquatic habitat;
- The PAOI lacks rocky outcrops or cliff habitat;
- The PAOI lacks sandy soils;
- The PAOI is mostly flanked by modified habitat, a busy national road and large retail / filling station centre;
- The PAOI was assessed as having High biodiversity value;
- A low number of faunal SCC potentially occur;
- The PAOI is situated within an area assessed as ESA: Local Corridor by the MBSP.

Motivational evidence of the above are presented in Figure 2.

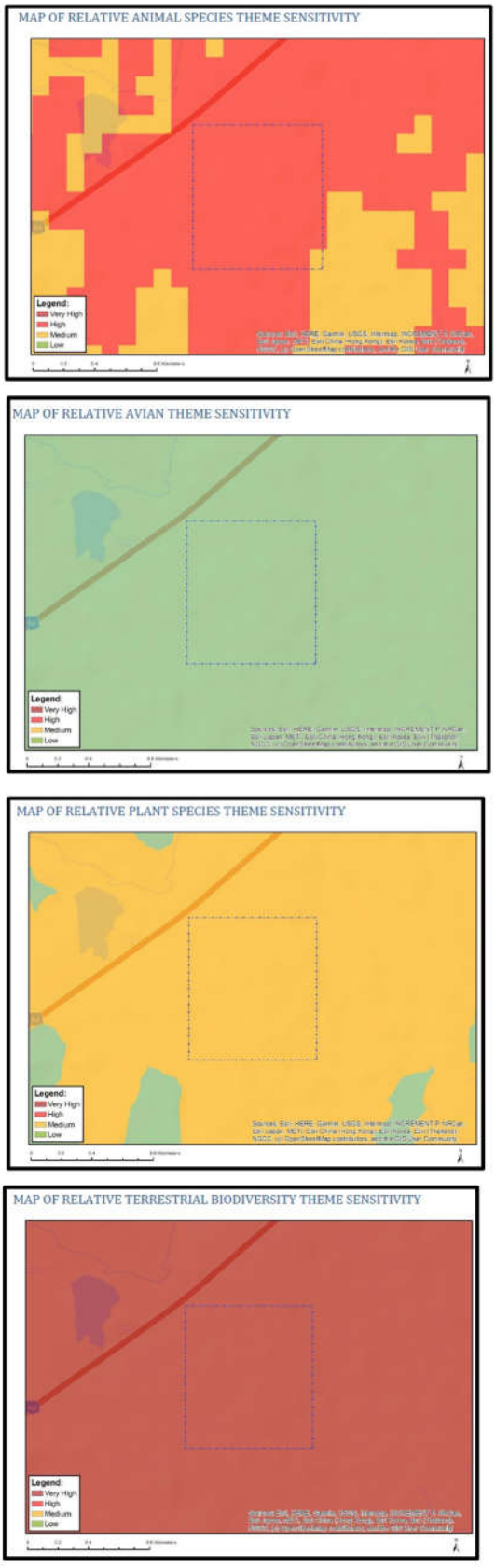

Figure 4. Environmental Screening Tool Themes relevant to terrestrial ecology

6. REVIEW OF THE ECOLOGICAL STATUS OF THE PAOI

6.1 Baseline Ecological Report

6.1.1 General

The entire PAOI fell within an area that has been assessed as **Least Concern** within the Mpumalanga Biodiversity Conservation Plan (MBCP) (Ferrar and Lötter, 2007). ECOREX, 2012b, described the PAOI as being within Lydenburg Montane Grassland which at the time had a conservation status of Vulnerable (Mucina & Rutherford, 2006).

6.1.2 Flora

A single vegetation community was identified within the PAOI, namely *Ctenium concinnum – Brachiaria serrata* Untransformed Grassland. Untransformed Grassland. One hundred and twenty plant species were recorded within the PAOI during fieldwork. Six confirmed plant species were considered to be species of conservation importance, i.e. threatened, endemic and / or protected species. Two of these were listed in the applicable Red Data publication as being of conservation concern (*Boophone disticha, Eucomis autumnalis* subsp*. clavata,* both assessed as Declining), although neither were considered threatened. Seventeen plant SCC were known to have occurred within the general area around the PAOI, with only one species, namely *Callilepis leptophylla* which was assessed as Declining, having a moderate likelihood of occurrence.

6.1.3 Fauna

No fauna species of conservation concern were confirmed during 2012 fieldwork. Two Near Threatened (NT) mammal species were considered to have a High likelihood of occurring in the PAOI, namely Aardvark *Orycteropus afer* and Serval *Leptailurus serval*, although only Serval had national NT status. Eight mammals assessed as DD, four assessed as NT and one as EN were considered to have a Moderate likelihood of occurrence. One threatened bird species (Southern Bald Ibis *Geronticus calvus*) and two NT species (Lanner Falcon *Falco biarmicus* and Secretarybird *Sagittarius serpentarius*) were considered to have a High likelihood of occurrence. One bird assessed as NT had a Moderate likelihood of occurrence. Two reptiles with provincial conservation status had a moderate likelihood of occurring (Coppery Grass Lizard *Chamaesaura aenea*, Many-spotted Snake *Amplorhinus multimaculatus*).

6.1.4 Sensitivity of Terrestrial Ecology

The community was assessed as having **High** Biodiversity Value through the integration of High Conservation Importance and Medium Functional Importance. The community was in an untransformed state, was representative of a nationally threatened vegetation type, had low levels of infestation by alien species, was connected to larger portions of untransformed habitat, and had a high potential for supporting species of conservation concern. The rating of High Biodiversity Value described above was therefore justified.

6.1.5 Impact Assessment

The **key potential impacts** associated with the proposed development were identified as follows:

- Loss of a portion of a Vulnerable vegetation type;
- Loss of plant species of conservation concern;
- Invasion of natural habitat by alien plants;
- Loss of habitat for conservation-important fauna;
- Loss of conservation-important birds through collisions with overhead transmission
- lines.

The **specific potential impacts** of the PV array, access roads and associated infrastructure identified were as follows:

- **Access Road to proposed development** – Loss of vegetation, increase in runoff and erosion, fragmentation of habitat for fauna and flora.
- **Fencing area, may also serve as access road to PV panels as well as fire-break** – Loss of vegetation, loss of micro-habitat, increase in runoff and erosion, window of opportunity for the establishment of alien invasive species, altered topsoil characteristics prone to capping, increased runoff and erosion.
- **Construction and operation of PV panels** – Loss of vegetation, loss of and alteration of microhabitats, altered vegetation cover, altered distribution of rainfall and resultant runoff patterns, increase in runoff and accelerated erosion, fragmentation and/or loss of habitat for fauna.

- **Construction of power line to existing grid** – loss of vegetation, increase in runoff and erosion, possible collision of avifauna with overhead power lines.
- **Construction of workshop area, office and/or guard houses** – Loss of vegetation, increase in runoff and erosion, pollution.

6.1.6 Mitigation Measures/ Recommendations

The following **mitigation measures and recommendations** were suggested:

- Make use of existing tracks and infrastructure as far as possible;
- Ensure an adequate search and rescue program for plants and burrowing vertebrates prior to commencement of activities;
- Reinforce portions of existing access routes that are prone to erosion, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas;
- Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (stormwater and erosion management plan required);
- Prevent leakage of oil or other chemicals or any other form of pollution;
- Monitor the establishment of alien invasive species and remove as soon as detected, whenever possible before regenerative material can be formed;
- After decommissioning, if access road or portion thereof will not be of further use to the landowner, remove all foreign material and rip area to facilitate the establishment of vegetation;
- Remove and collect all bulbous and succulent plants from cleared areas and transplant onto suitable areas and/or use as part of the rehabilitation program;
- Ensure that fencing material still allows the movement of small vertebrates;
- Remove as little indigenous vegetation as practically possible, revegetate areas below/between panels immediately after construction ceases;
- Monitor the area below the PV panels regularly after larger rainfall events to determine where erosion may be initiated and then mitigate by modifying soil microtopography and revegetation efforts accordingly;

- Aim to maintain a reasonable cover of indigenous perennial vegetation throughout the operational phase within and on the periphery of the PV array, preferably low dense perennial grasses;
- Place pylons as far as possible on sites where the slope is negligible;
- Fit overhead transmission lines with suitable perching deterrents and visibility enhancers for avifauna to prevent potential collisions or electrocution;
- Avoid placing infrastructure within small depressions or areas where runoff may accumulate after larger rainfall events;
- Limit disturbance to footprint area as far as practically possible;
- Rehabilitate and revegetate all areas outside footprint area that have been disturbed;

6.2 Current (2023) Ecological Status, Report Revisions and Additions

6.2.1 General

Several changes to legislation and classification of the PAOI have occurred sunce the 2012 ECOREX ecological survey. According to the current National Vegetation Map (SANBI, 2018), the vegetation type present within the PAOI is now classified as Steenkampsberg Montane Grassland. Although still considered Vulnerable by Mucina & Rutherford (2006), this vegetation type is not listed in the National List of Threatened Ecosystems (Notice 1002 of Government Gazette 34809, DEAT, 2011). Additionally, the MBSP has replaced the MBCP. The former provincial status was "Least Concern", however the PAOI has been reclassified as **Ecological Support Areas (ESA): Local Corridor**[8]. ESA: Local Corridors identify areas that provide important ecological connectivity between and play an important role in supporting the functioning of Critical Biodiversity Areas (CBA's). The desired management objectives for ESA's include maintaining the vegetation in a natural state and implementing low-impact, biodiversity-sensitive land uses (Lötter *et al*., 2014).

6.2.2 Flora

The two Red Data plants that were confirmed within the proposed footprint in 2012, namely *Boophone disticha* and *Eucomis autumnalis* subsp*. clavata* (both assessed as Declining) are no longer considered SCC[9]. However, both are still considered Protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA). The EST of the DEA identified 19 additional potentially

[8] Lötter *et al*., 2014
[9] Raimondo *et al*. (2009)

occurring plant SCC, and these are dealt with under Section 5. None of these are likely to occur within the PAOI.

6.2.3 Fauna

The latest conservation assessment of mammals[10] appeared after the 2012 Machadodorp PV survey and replaced all previous versions. Serval is still assessed as NT and still has a high likelihood of occurrence within the PAOI, although visits will most likely be of a relatively short duration due to the small spatial extent of the PAOI. A major new consideration is Mountain Reedbuck *Redunca fulvorufula*, which has subsequently been assessed as Endangered (EN)[11]. This species has a moderate likelihood of occurrence but, as per Serval, will probably only occur irregularly due to the small spatial extent of the PAOI and high disturbance levels from the adjacent retail centre and highway. Several mammal species were identified by the EST query, and these are dealt with under Section 5.

The latest conservation assessment of birds[12] appeared after the 2012 survey. Southern Bald Ibis is still assessed as VU but Lanner Falcon and Secretarybird were elevated to VU from NT. Southern Bald Ibis potentially occurs only as foraging species, with a high likelihood, as it reflects a relatively high reporting rate within the Southern African Bird Atlas Project 2 (SABAP2) database (15,4%). Both Lanner Falcon and Secretarybird are unrecorded from the pentad[13] within which the PAOI is situated (2540_3010) and are therefore only likely to utilise the habitat within the PAOI infrequently. Cape Vulture *Gyps coprotheres,* which is assessed as EN, is the only species in the SABAP2 database that reflects a reporting rate of more than 10% (in this case 15,4%). However, this species has a low likelihood of regular occurrence due to a lack of suitable prey and high disturbance levels. One additional species was listed by the EST, which is dealt with under Section 5. The PAOI is not situated within an area identified as an Important Bird and Biodiversity Area (IBA)[14], with the closest being the Steenkampsberg IBA which is situated *c.* 7 km to the west of the PAOI. The PAOI is not situated within close proximity to any Wetlands of International Importance (Ramsar Sites)[15].

[10] Child *et al*., 2016
[11] Child *et al*., 2016
[12] Taylor *et al*., 2015
[13] Mapping units measuring approximately 77 km^2, which are considerably smaller than a Quarter Degree Grid Square (approximately 694 km^2) and thus a better indication of which species occur in the PAOI.
[14] Marnewick *et al*., 2015
[15] https://www.ramsar.org/wetland/south-africa

No reptile or frog SCC potentially occur within the PAOI, and provincial conservation assessments such as that used in the 2012 baseline report have long been replaced by national assessments such as SANBI's Red List of South African Species[16].

6.2.4 Sensitivity of Terrestrial Ecology

The May 2023 verification survey confirmed the 2012 sensitivity assessment of High. The ecological state of the PAOI has not altered since the baseline survey (Figure 2, Figure 3). However, the indirect PAOI has seen some additional development in the form of a new intersection for improved access into the large retain/ filling station centre (Milly's, Figure 2). This development may increase disturbance levels within the PAOI slightly through noise and the possible introduction of seeds of alien invasive plants.

6.2.5 Impact Assessment

The 2012 report provided a comprehensive Impact Assessment, including cumulative impacts, and no new impacts are identified in this report. The impact rating as provided in the initial assessment remains valid.

6.2.6 Mitigation Measures/ Recommendations

The 2012 report provided a comprehensive list of mitigation measures and recommendations, and no new recommendations are identified in this report.

[16] http://speciesstatus.sanbi.org/

7. SPECIALIST'S OPINION

There is no objection to the request to extend the commencement period of the Machadodorp PV Project in terms of the terrestrial ecosystems of the PAOI, provided that the recommendations suggested in the baseline report are followed. Reasons for there being no objection include the following:

- The lists of potentially occurring plant and animal SCC, supplemented by the EST of the DEA, remain valid, with very few additions of SCC with High likelihood;
- There are no changes to the environment within the PAOI; the natural habitat remains the same as in 2012;
- The ecological sensitivity of the unmodified vegetation remains the same as in the 2012 assessment;
- The impact rating as provided in the initial assessment remains valid;
- The mitigation measures provided in the initial assessment are still applicable and there are no new mitigation measures which need to be included into the EA.

However, if the development were to proceed without the implementation of the recommendations repeated above, then we would object to the extension of the commencement period, due to the potential negative impact on sensitive terrestrial habitat within the PAOI and the possibility of protected plant species being destroyed.

8. CONSENT FROM LANDOWNERS and PUBLIC PARTICIPATION PROCESS

Savannah Environmental, as the EAP, is assumed to have obtained landowner consent and initiated the stakeholder engagement process with the I&AP's including with the information contained in this report and the formal Issues and Comments Register contained in the EIA documentation, fully documenting the responses to all terrestrial ecology related issues and concerns.

9. REFERENCES

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10.APPENDICES

Appendix 1. Curriculum Vitae of Report Author

Profession	Terrestrial Ecologist
Date of Birth	9 November 1977
Name of Firm	Digital Earth (Pty) Ltd.
Position in Firm	Director / Terrestrial Ecologist
Years with firm	4
Nationality	South African

Qualifications

- National Diploma: Nature Conservation (UNISA, 2007)
- National Certificate: Nature Guiding (Drumbeat Academy, 2004)

Membership in Professional Societies

- BirdLife South Africa
- South African Council for Natural Scientific Professions (Reg.No.122647)

Language Proficiency

- English (home language) - excellent
- Afrikaans - good
- isiZulu / isiSwati – fair to good

Countries of Work Experience

Botswana, Democratic Republic of the Congo, Lesotho, Mali, Morocco, Mozambique, Namibia, Republic of Guinea, Sierra Leone, South Africa, Swaziland, Tanzania, Zimbabwe.

EXPERIENCE & ACHIEVEMENTS

- 15 years' experience in specialist species identification, conducting baseline surveys, data analysis and report writing in various biomes in southern Africa, particularly savanna, forest and grassland biomes.
- 2 years' experience game reserve management (KwaZulu-Natal).
- 5 years' experience (part time) of wetland delineation and management.
- 2 years' experience of plant propagation and use for rehabilitation.
- Co-author of the new Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (SANBI, 2020).
- Lead-author of the Birds of Mbombela book, published in 2019 by BirdLife Lowveld.
- Trustee of the John Voelcker Bird Book Fund (Robert's bird books).
- 2017 recipient of BirdLife South Africa's Owl Award.
- SABAP2 Regional Co-ordinator for Mpumalanga.
- eBird Regional Reviewer for Mpumalanga.
- Scientific Advisor for BirdLife Lowveld.

EMPLOYMENT RECORD

2007 - present	ECOREX Consulting Ecologists CC / Digital Earth Pty (Ltd.)	Terrestrial Ecologist / Director
2005 - 2006	Iglu (London, UK)	Specialist Travel Agent
1997 - 2005	Duncan McKenzie Bird Tours	Owner, Specialist Guide
2001	KZN Wildlife	District Conservation Officer, Reserve Manager
1999 - 2001	Institute of Natural Resources	Part-time Horticulturalist and Rehabilitation Officer
1997-2001	Mondi Wetlands Project	Part-time Field Assistant and Regional Co-ordinator
1996-1997	Natal Parks Board	Relief Ranger

RELEVANT PROJECTS & EXPERIENCE

COUNTRY	YEAR	PROJECT	CONTACT
Mozambique			
Mozambique	2018 - 2019	Mozambique LNG Crab Plover Population Study	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2015	Biodiversity Baseline Study for a SASOL Gas Pipeline, Inhassoro	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2014	Terrestrial Fauna Survey of the Quirimbas Palma-Pemba Coastal Road	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2013	Biodiversity Baseline Study and Impact Assessment for Benga Coal Mine, Tete	Nepid Consultants - Dr Rob Palmer rob@nepid.co.za)
	2008	Terrestrial Ecology Study for Chinhanguanine Sugar Expansion Project, Maputo Province	ACER (Africa) Environmental Management Consultants
Tanzania			
Tanzania	2011	Biodiversity Baseline Study and Impact Assessment for Mkuju River Uranium Project, Selous Game Reserve, Songea	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)
	2020	Terrestrial Ecology Survey of Kakono Hydropower Scheme, Kagera Region	SLR - Jessica Hughes (jessica.hughes@slrconsulting.com)
Southern and South-central Africa			
Democratic Republic of Congo	2016	Survey Of the Cupriferous Plant Translocation Programme For Kinsevere Mine, Katanga Province, DRC	Knight Piesold - Amelia Briel (abriel@knightpiesold.com)
	2014	Biodiversity Baseline Study and Impact Assessment for Pumpi Copper Mine, Kolwezi	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)
	2011	Biodiversity Baseline Study and Impact Assessment for Kinsevere Copper Mine, Lubumbashi	Knight Piesold - Amelia Briel (abriel@knightpiesold.com)
South Africa	2021	Biodiversity Baseline Study and Impact Assessment for the Instream Construction on Little Gowrie	Henwood Environmental Services - Steven Henwood (shenwood@mweb.co.za)
	2019	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Ilima Coal Mine	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)

	2018	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Olienhout Dam	Enpact Environmental Consultants CC - Heinrich Kammeyer (heinrich@enpact.co.za)
	2018	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Strathmore Dam	Henwood Environmental Services - Steven Henwood (shenwood@mweb.co.za)
	2017	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Croc River Sub-station and Powerline Routes	Enpact Environmental Consultants CC - Heinrich Kammeyer (heinrich@enpact.co.za)
	2016	Baseline Terrestrial Ecology Study and Biodiversity Sensitivity Assessment of the proposed developments on Lapalala Wilderness	NuLeaf - Peter Velcich (peter@nuleafsa.co.za)
	2014	Botanical Survey for the Kumba Mine Powerline Re-Routing	Synergistics - Chiara Kotze (ckotze@slrconsulting.com)
	2007	Terrestrial Ecology Study for the Groot Letaba Water Resource Development Scheme, Tzaneen	Iliso Consulting - Terry Baker (terry@iliso.com)
Swaziland	2017	Strengthening National Protected Areas Systems in Swaziland (SNPAS)	Linda Loffler (lindad@realnet.co.sz)
	2009	Biodiversity Baseline Study for Siphofaneni Road Developments	Aurecon Nelspruit (mbombela@aurecongroup.com)

BOOKS

- McKenzie, D. & Lawson, P. 2019. *Birds of Mbombela A Comparative Study*. Birdlife Lowveld, Nelspruit.
- Scientific Advisor on van den Berg, P. *Game Drive Birds of Southern Africa*. HPH, Cascades.
- Contributor on Chittenden, H. & Whyte, I. 2008. *Roberts Bird Guide Kruger National Park and Adjacent Lowveld*. John Voelcker Bird Book Fund, Cape Town.
- Contributor on Tarbotan, W. & Ryan, P. 2016. *Guide to Birds of the Kruger National Park*. Struik Nature, Cape Town.

PAPERS

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DECLARATION

I declare that the particulars above are accurate and true to the best of my knowledge and belief.

SIGNATURE **DATE 06 June 2023**

Appendix 2. Professions Certificates of the Study and Review Team

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Robert William Palmer

Registration Number: 400108/95

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Biological Science (Professional Natural Scientist)

Effective **25 October 1995** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Duncan McKenzie

Registration Number: 122647

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Certificated Natural Scientist)

Effective **5 May 2021** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

DIGITAL EARTH (Pty) Ltd. P.O. Box 19787 The Village Mbombela 1218
Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

THE SOUTH AFRICAN COUNCIL FOR
PROFESSIONAL AND
TECHNICAL SURVEYORS

DIE SUID AFRIKAANSE RAAD VIR
PROFESSIONELE EN
TEGNIESE OPMETERS

CERTIFICATE OF REGISTRATION
SERTIFIKAAT VAN REGISTRASIE

This is to certify that — Hiermee word gesertifiseer dat

Linda Mc Kenzie

was registered as a — geregistreer is as 'n

PROFESSIONAL GISc PRACTITIONER

on the 13th day of March 2012 — op die 13de dag van Maart 2012

in accordance with the provisions of the Professional and Technical Surveyors' Act, 1984 (Act No 40 0f 1984) and is entitled to carry on his/her profession or calling in any part of the Republic of South Africa in terms of the said Act and rules framed thereunder.

ingevolge die bepalings van die Wet op Professionele en Tegniese Opmeters, 1984 (Wet nr 40 van 1984) en geregtig is om sy/haar beroep of nering in enige deel van die Republiek van Suid-Afrika te beoefen ingevolge die genoemde Wet en reëls daarvolgens uitgevaardig.

President

Issued under the Seal of the Council
Uitgereik onder die Seël van die Raad

Registration Number
Registrasienommer PGP 0170

Registrar
Registrateur

Appendix 3. Specialists Declaration

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

I …Duncan McKenzie…, as the appointed specialist hereby declare/affirm the correctness of the information provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

X	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or

	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- have expertise in conducting specialist work as required, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014 (as amended in 2017);
- 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 application;
- will take into account, to the extent possible, the matters listed in regulation **18** of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties 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 or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist

Digital Earth (Pty) Ltd.

Name of company

07/06/2023

Date