Scoping Report for the Ummbila Emoyeni Renewable Energy Wind and Solar PV Facilities

Bethal, Mpumalanga Province

March 2022

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Report Name	**Scoping Report for the Ummbila Emoyeni Renewable Energy Wind and Solar PV Facilities**
Reference	**Ummbila Renewable Energy Project**
Submitted to	savannah environmental
Report Writer	**Ivan Baker** 
	Ivan Baker is Pr. Sci Nat registered (119315) in environmental science with Cand. Sci. Nat recognition in geological science. Ivan is a wetland and soil specialist with vast experience in wetlands, pedology, hydropedology and land contamination and has completed numerous specialist studies ranging from basic assessments to EIAs. Ivan has carried out various international studies following FC standards. Ivan completed training in Tools for Wetland Assessments with a certificate of competence and completed his MSc in environmental science and hydropedology at the North-West University of Potchefstroom. Ivan is also affiliated with the Fertiliser Society of South Africa after the acquiring a certificate of competence following the completion of the FERTASA training course.
Report Writer / Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

DECLARATION

I, Ivan Baker, 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 71 and is punishable in terms of Section 24F of the Act.

Ivan Baker

Pedologist

The Biodiversity Company

March 2022

Table of Contents

List of Tables

List of Figures

List of Acronyms

ARC	Agricultural Research Council
CARA	Conservation of Agricultural Resources Act
DEM	Digital Elevation Model
EAP	Environmental Assessment Practitioner
MAP	Mean annual precipitation
MAPE	Mean Annual Potential Evaporation
MASL	Metres Above Sea Level
QGIS	Quantum geographic information system
SAGA	System for Automated Geoscientific Analyses
ToR	Terms of Reference

1 Introduction

The Biodiversity Company was appointed by Savannah Environmental (Pty) Ltd (Savannah) to undertake an agricultural potential scoping level assessment for the Ummbila Emoyeni Renewable Energy project. The Ummbila Emoyeni Renewable Energy project comprises of photovoltaic (PV) and wind energy facilities, with associated grid connections and ancillary infrastructure (i.e. substations). The refined layout is not yet available due to the fact that the layout will be amended according to the sensitivities depicted in this report.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the published Government Notices (GN) 320 in terms of NEMA, dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities at a scoping level, enabling informed decision making.

1.1 Project Description

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of renewable energy facilities, collectively known as the Ummbila Emoyeni Renewable Energy Facility, consisting of a commercial wind farm, solar PV facility, and associated grid infrastructure, including a battery energy storage system, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa.

A preferred project focus area with an extent of 27,819 ha been identified by Emoyeni Renewable Energy Farm (Pty) Ltd as a technically suitable area for the development of the Ummbila Emoyeni Renewable Energy Farm with a contracted capacity of up to 666MW of wind energy and 150MW of solar energy. This layout, and project capacity, will reduce as the EIA and scoping process identifies environmental constraints that exclude areas for development.

The project site comprises the following farm portions (see Table 1-1):

Table 1-1 Farm portions associated with the larger project area

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 13, 18
Farm 455 – Ebenhaezer	0, 1, 2, 3

Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

The wind farm is proposed to accommodate the following infrastructure:

- Up to 111 wind turbines with a maximum hub height of up to 200m. The tip height of the turbines will be up to 300m;
- 33kV / 132kV onsite collector substations;
- Battery Energy Storage System (BESS);
- Cabling between turbines, to be laid underground where practical;
- Laydown and O&M hub (approximately 300m x 300m):
  - Batching plant of 4ha to 7ha
  - Construction compound (temporary) of approximately 6 Ha
  - Operation and Maintenance office of approximately 1.5Ha
- Laydown and crane hardstand areas (approximately 75m x 120m); and
- Access roads of 12-13m wide, with 12m at turning circles.

The solar PV facility is proposed to accommodate the following infrastructure:

- PV modules and mounting structures with a capacity per panel of 350W to 450W and dependent on optimization and cost;
- Inverters and transformers;
- 33kV/132kV onsite collector substation;
- BESS;
- Cabling between project components;
- Laydown and O&M hub (approximately 300m x 300m):
  - Construction compound (temporary),
  - Maintenance office
- Access roads (up to 12m wide).

The project will include associated grid infrastructure that is required to connect the Ummbila Emoyeni Renewable Energy Facility to the national grid. The grid connection solution entails establishing a 400/132 kV MTS, between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400 kV line. The location of the MTS will be refined through an ongoing process of communication with Eskom Planning but will be within close proximity to the 400kV line in order to cut into this line.

It is anticipated that the power generated by the project will be bid into the REIPPPP tender process (DMRE) and/or into private off take opportunities.

1.2 Scope of Work

The principle aim of the assessment was to provide information to determine any level of risk posed by the proposed in regard to local wetland and soil attributes. This was achieved through the following:

- A desktop assessment of all relevant national and provincial datasets. If available, municipal datasets were also considered;
- Completion of a desktop level impact assessment with supporting mitigation measures; and
- Presentation of specialist Terms of Reference (ToR) for the impact phase of the process.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment has only been completed at a desktop level. It is assumed all datasets and information considered for the assessment is representative of the area and is well suited for the intended purposes of this scoping report; and
- No decommissioning phase impacts have been considered for this project. The life of operation is unknown and expected for perpetuity.

1.4 Key Legislative Requirements

1.4.1 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations, as amended in April 2017, state that prior to certain listed activities taking place, an environmental authorisation application (EA) process needs to be followed. This could follow either the Basic Assessment (BA) process or the EIA process, depending on the scale of the impact. An EIA process will be undertaken for the project.

GN 350 was gazetted on the 20 March 2020, which has replaced the requirements of Appendix 6 of the EIA Regulations in respect of certain specialist reports. These regulations provide the criteria and minimum requirements for specialist's assessments, in order to consider the impacts on soil for activities which require EA.

2 Receiving Environment

The study focus area comprises of large stretch of land starting at Morgenzon to the south and stretches north to Bethal. The surrounding land use includes watercourses, mining and predominantly agricultural activities (see Figure 2-1).

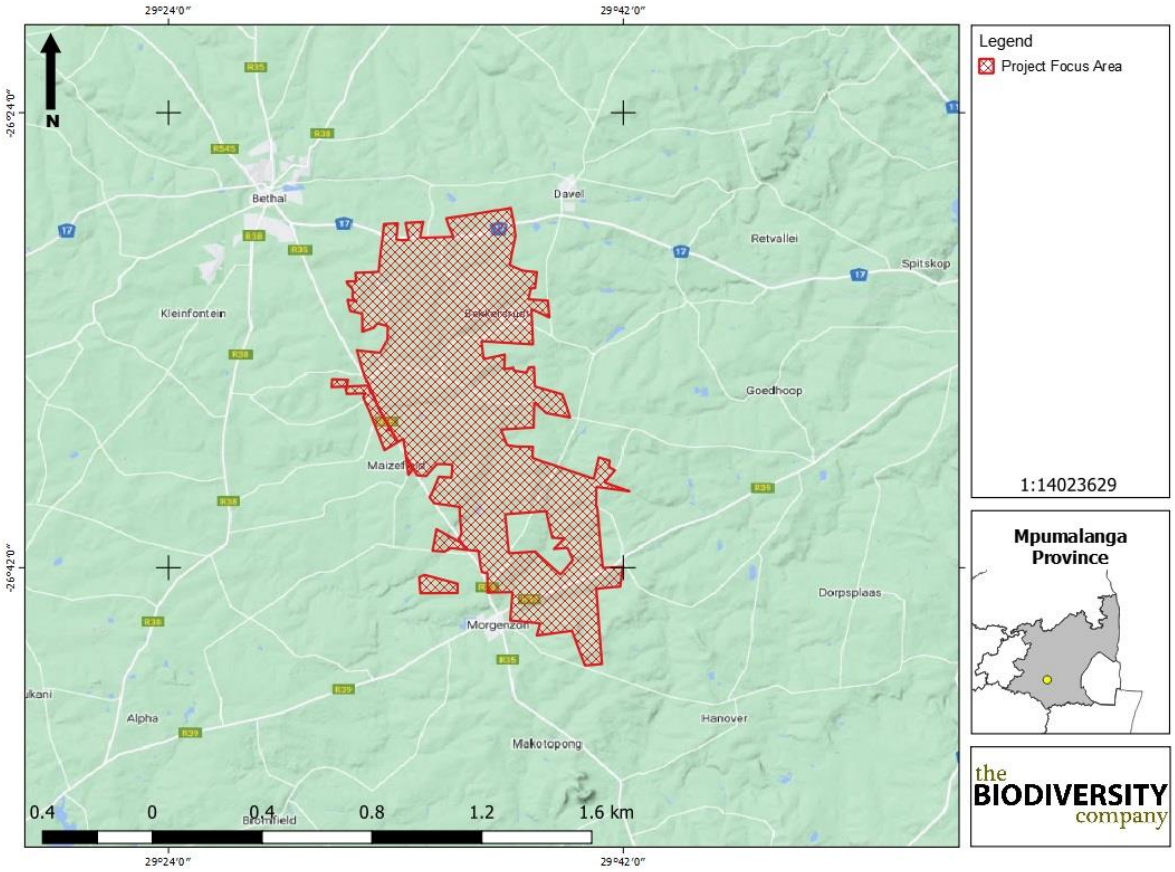

Figure 2-1 The location of the project area in relation to the general setting

As part of the desktop assessment, soil information was obtained using published South African Land Type Data. Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 - 2006). The land type data is presented at a scale of 1:250 000 and comprises of the division of land into land types. In addition, a Digital Elevation Model (DEM) as well as the slope percentage of the area was calculated by means of the National Aeronautics and Space Administration (NASA) Shuttle Radar Topography Mission Global 1 arc second digital elevation data by means of Quantum geographic information system (QGIS) and System for Automated Geoscientific Analyses (SAGA) software.

2.1 Climate

The mean annual precipitation for this region reaches approximately 662mm and is characterised by summer rainfall (Mucina & Rutherford, 2006). This area is characterised by high and low extreme temperatures during the summer and winter respectively with frost frequently occurring (see Figure 2-2).

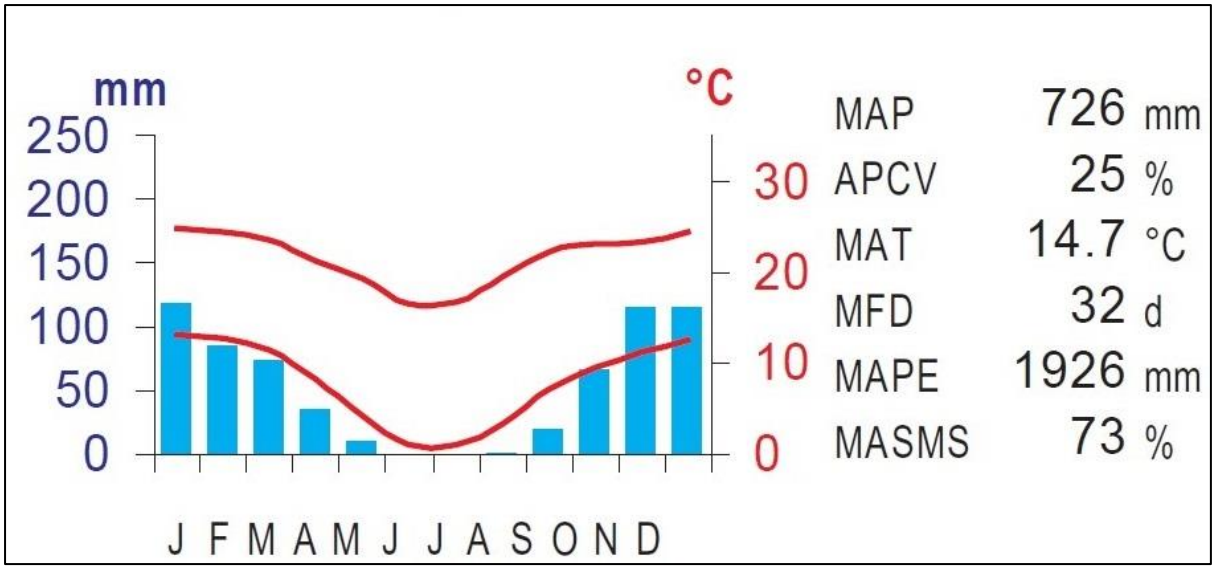

Figure 2-2 Climate diagram for the region (Mucina & Rutherford, 2006)

2.2 Geology and Soil

The geology of this area is characterised by the Madzaringwe Formation shale, mudstone and sandstone from the Karoo Supergroup or the Karoo Suite dolerites which feature prominently in this area. To the west, the rocks of Ventersdorp, old Transvaal and Witwatersrand Supergroups are significant with the south being characterised by the Volksrust Formation from the Karoo Supergroup. Deep soils occur in this area and is typically labelled by Ea, Ba and Bb land types (Mucina and Rutherford, 2006).

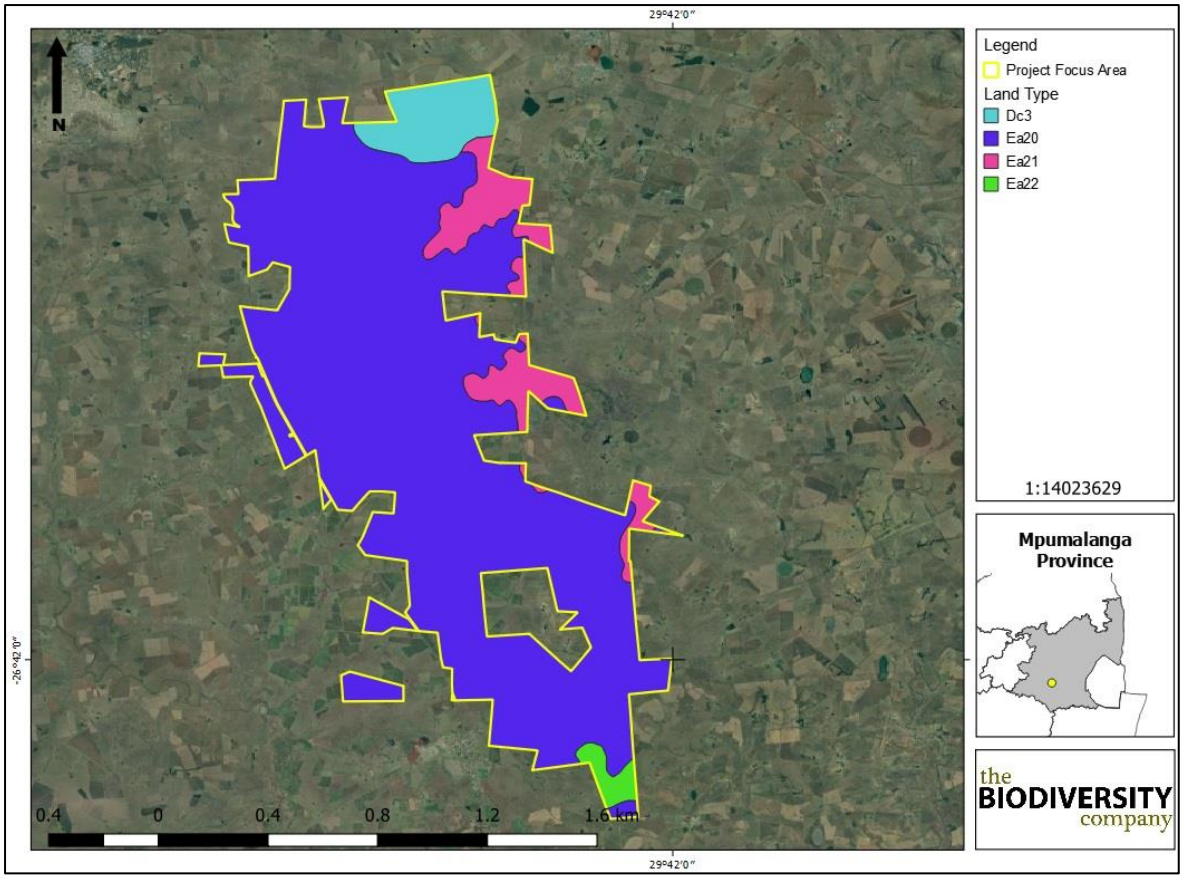

Figure 2-3 Land Types present within the project area

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Dc 3, Ea 20, Ea 21 and the Ea 22 land types (see Figure 2-3). The Dc land type is characterised by Prismacutanic and/or pedocutanic diagnostic horizons with the addition of one or more of the following; Vertic, melanic and red structured diagnostic horizons. The Ea land type consists of consists of one or more of the following soils: Vertic, Melanic, and red structured diagnostic horizons, of which these soils are all undifferentiated. The land terrain units for the featured land types are illustrated from Figure 2-4 to Figure 2-7 with the expected soils listed in Table 2-1 to Table 2-4.

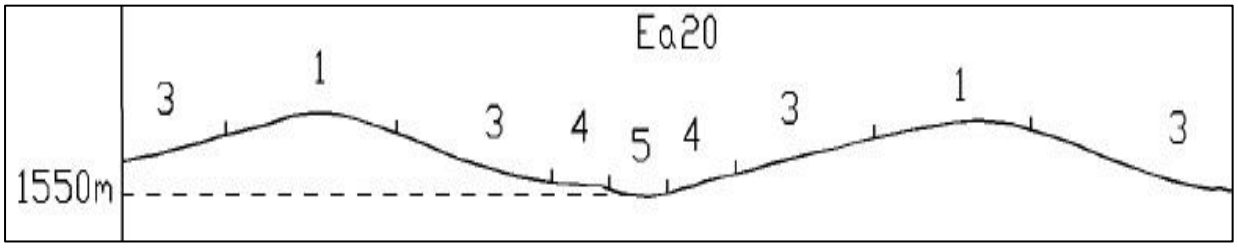

Figure 2-4 Illustration of land type Ea 20 terrain unit (Land Type Survey Staff, 1972 - 2006)

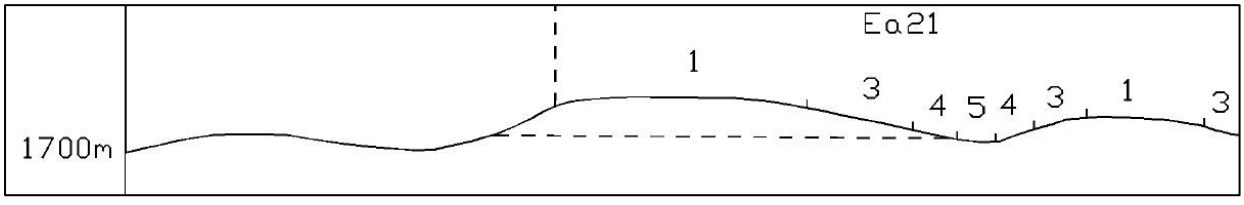

Figure 2-5 Illustration of land type Ea 21 terrain unit (Land Type Survey Staff, 1972 - 2006)

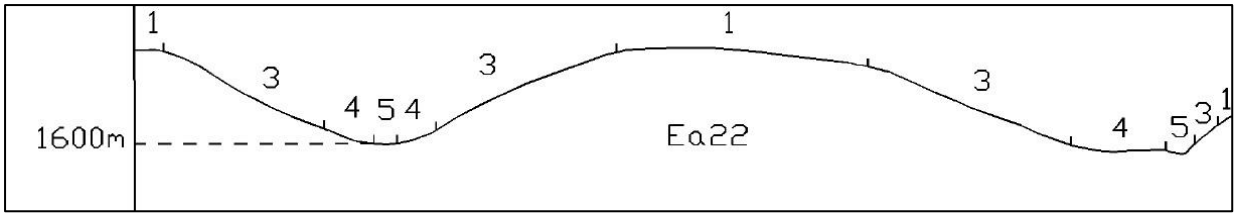

Figure 2-6 Illustration of land type Ea 22 terrain unit (Land Type Survey Staff, 1972 - 2006)

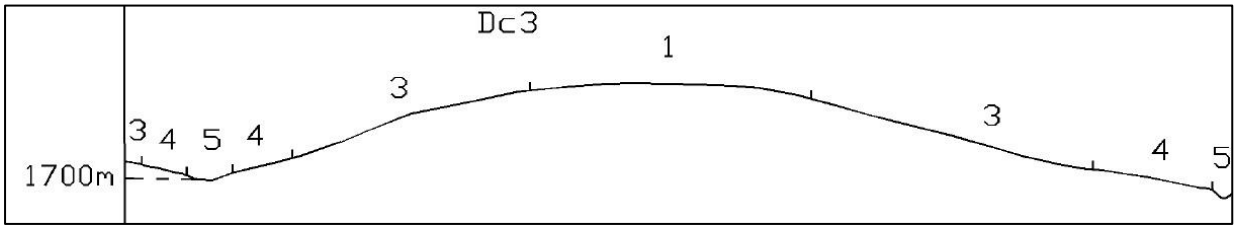

Figure 2-7 Illustration of land type Dc 3 terrain unit (Land Type Survey Staff, 1972 - 2006)

Table 2-1 Soils expected at the respective terrain units within the Ea 20 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (30%)		**3 (60%)**		**4 (3%)**		**5 (7%)**	
Arcadia	30%	Arcadia	30%	Arcadia	40%	Willowbrook	80%
Milkwood	15%	Milkwood	10%	Valsrivier	25%	Streambed	20%
Swartland	15%	Swartland	10%	Bonheim	10%		
Glenrosa	15%	Glenrosa	10%	Milkwood	5%		
Avalon	10%	Avalon	10%	Swartland	5%		
Westleigh	10%	Valsrivier	10%	Willowbrook	5%		
Rock	5%	Westleigh	5%	Estcourt	5%		
		Estcourt	5%	Sterkspruit	5%		
		Sterkspruit	5%				
		Rock	5%				

Table 2-2 Soils expected at the respective terrain units within the Ea 21 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (50%)		**2 (40%)**		**3 (5%)**		**5 (5%)**	
Arcadia	30%	Arcadia	30%	Arcadia	40%	Willowbrook	80%
Shortlands	15%	Milkwood	10%	Valsrivier	25%	Streambeds	20%
Milkwood	15%	Shortlands	10%	Bonheim	10%		
Swartland	10%	Swartland	10%	Milkwood	5%		
Avalon	10%	Avalon	10%	Swartland	5%		
Estcourt	5%	Valsrivier	10%	Estcourt	5%		
Sterkspruit	5%	Bare Rock	5%	Sterkspruit	5%		
Westleigh	5%	Estcourt	5%	Willowbrook	5%		

		Sterkspruit	5%				
		Westleigh	5%				

Table 2-3 Soils expected at the respective terrain units within the Ea 22 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (50%)		**2 (40%)**		**3 (5%)**		**5 (5%)**	
Arcadia	20%	Arcadia	20%	Arcadia	25%	Rensburg	70%
Mayo	20%	Bonheim	20%	Rensburg	20%	Streambeds	20%
Bonheim	20%	Mayo	15%	Kroonstad	20%	Valsrivier	10%
Milkwood	15%	Milkwood	10%	Valsrivier	15%		
Swartland	10%	Swartland	10%	Bonheim	10%		
Bare Rock	10%	Bare Rock	5%	Hutton	5%		
Mispah	5%	Kroonstad	5%	Avalon	5%		
		Valsrivier	5%				
		Hutton	5%				
		Avalon	5%				

Table 2-4 Soils expected at the respective terrain units within the Dc 3 land type (Land Type Survey Staff, 1972 - 2006)

Terrain units							
1 (50%)		**3 (30%)**		**4 (15%)**		**5 (5%)**	
Swartland	35%	Kroonstad	35%	Valsrivier	30%	Willowbrook	70%
Kroonstad	20%	Swartland	20%	Kroonstad	20%	Kroonstad	10%
Estcourt	20%	Estcourt	20%	Estcourt	15%	Valsrivier	10%
Sterkspruit	20%	Sterkspruit	10%	Willowbrook	10%	Bonheim	10%
Valsrivier	5%	Valsrivier	10%	Arcadia	10%		
		Arcadia	5%	Bonheim	10%		
				Swartland	5%		

2.3 Terrain

The slope percentage of the project area has been calculated and is illustrated in Figure 2-8. Most of the project area is characterised by a slope percentage between 0 and 4%, with some smaller patches within the project area characterised by a slope percentage ranging from 4 to 81%. This illustration indicates a non-uniform topography in scattered areas the majority of the area being characterised by a gentle slope. The DEM of the project area (Figure 2-9) indicates an elevation of 1 581 to 1 778 Metres Above Sea Level (MASL).

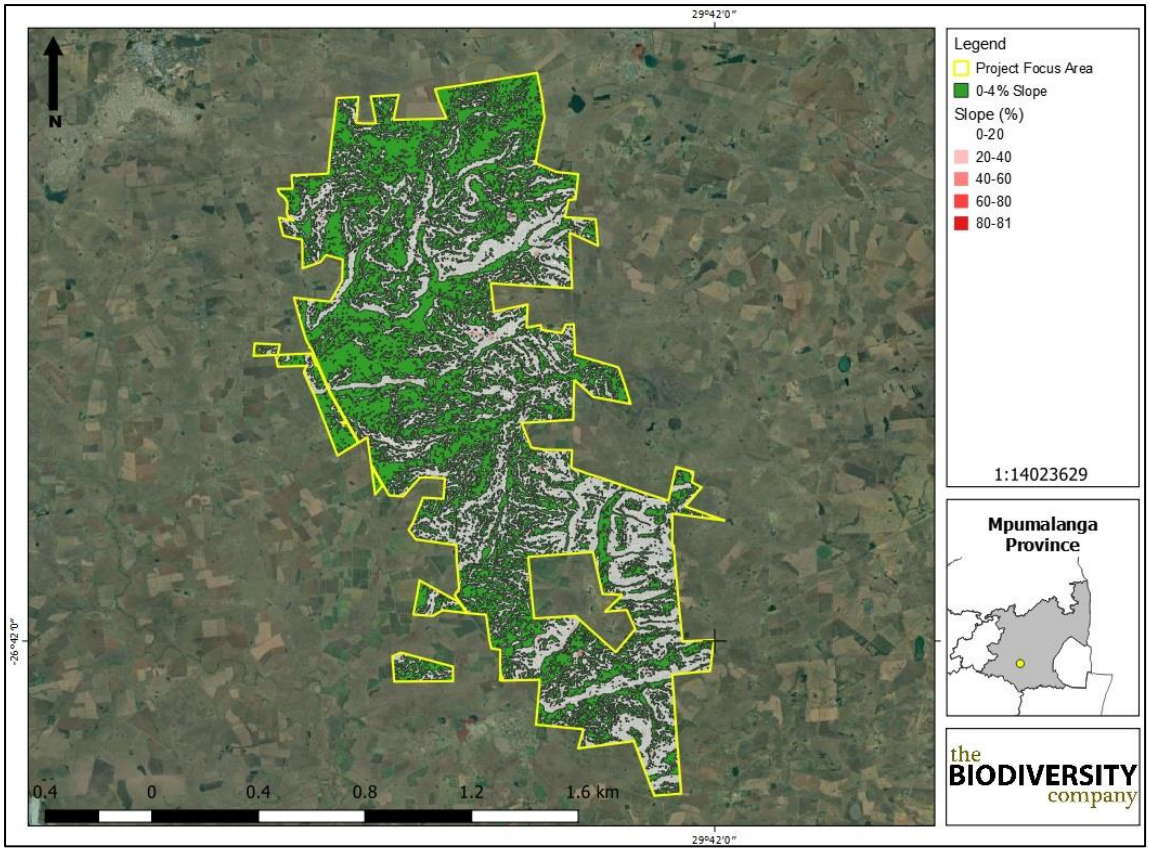

Figure 2-8 The slope percentage calculated for the project area

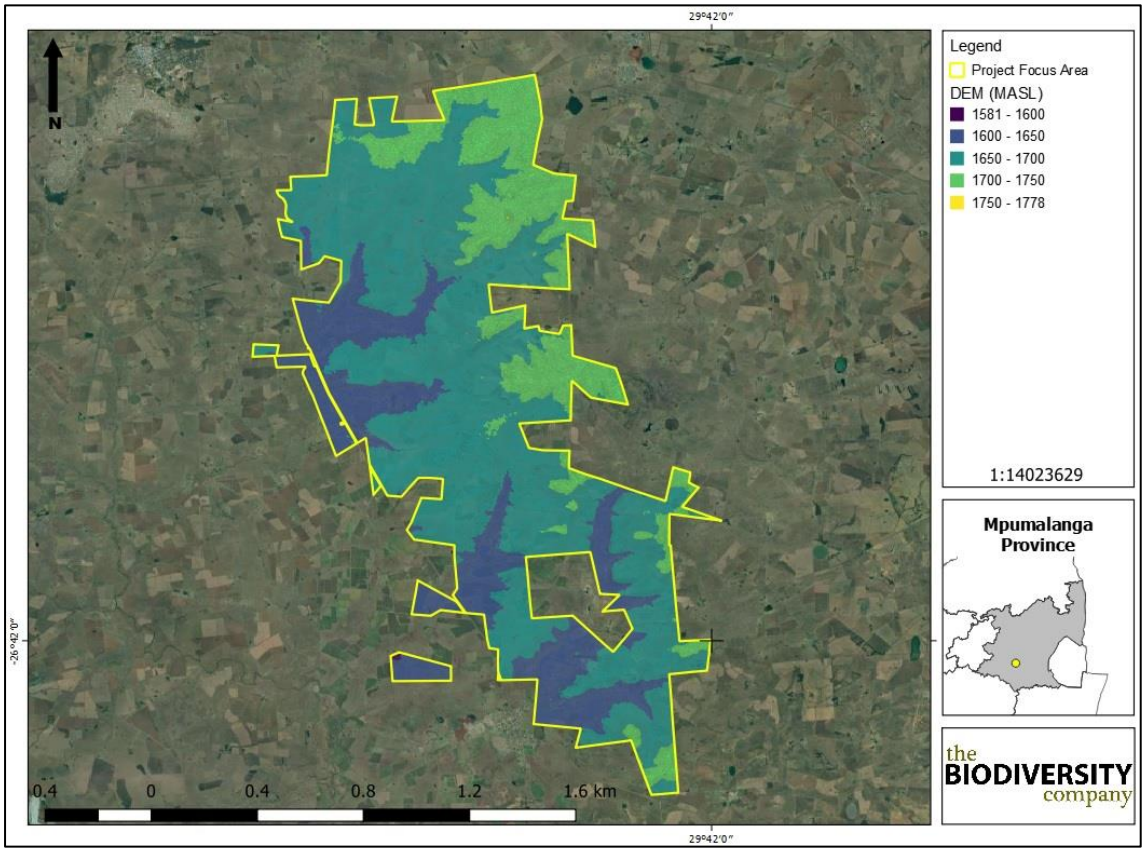

Figure 2-9 The DEM generated for the project area

2.4 Sensitivity

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly covers “Moderately Low” to “Moderate” sensitivities. Smaller patches are characterised by sensitivities up to “Moderately High” (Figure 2-10). Furthermore, various crop field boundaries were identified by means of the DEA Screening Tool (2022), which are predominantly characterised by “High” sensitivities with one area being classified as “Very High” sensitivity.

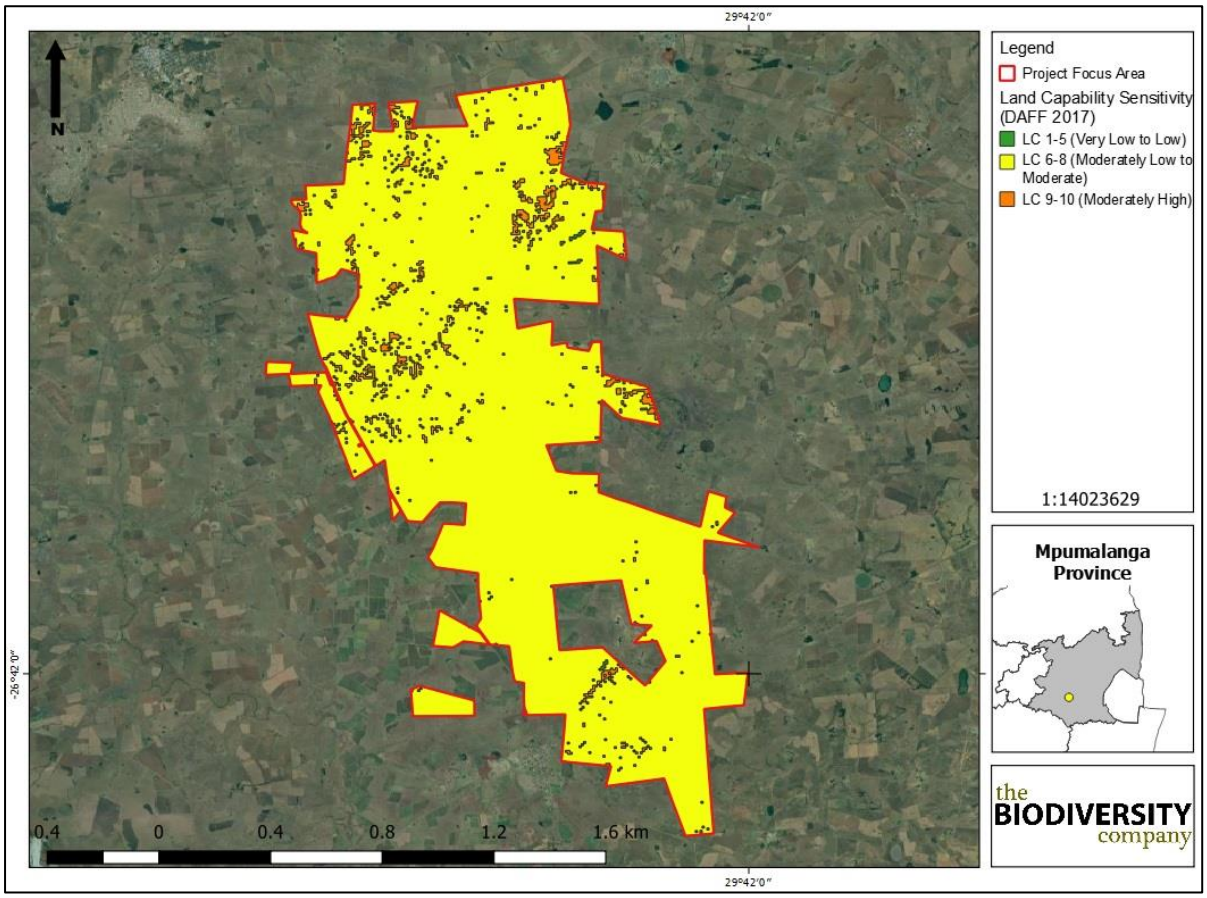

Figure 2-10 The land capability sensitivity (DAFF, 2017)

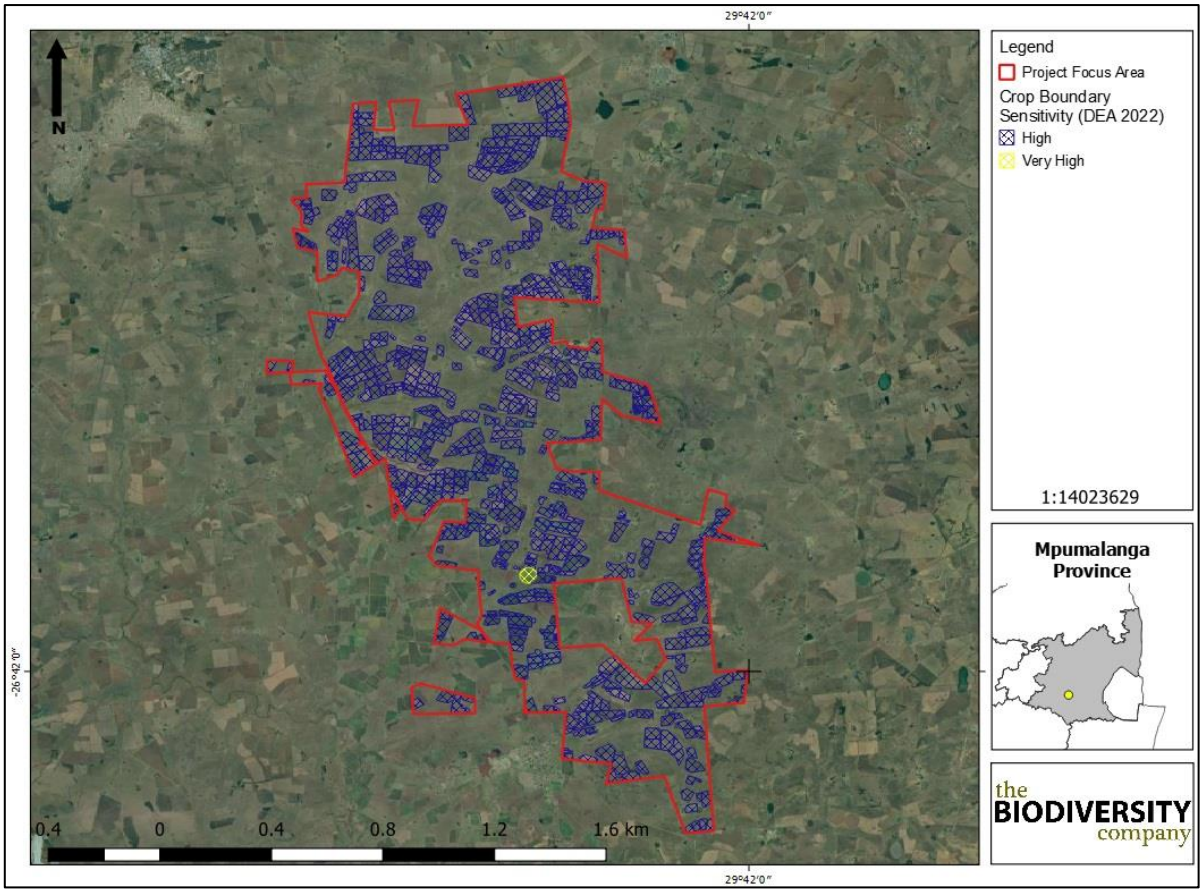

Figure 2-11 Crop boundary sensitivity (DEA Screening Tool, 2022)

3 Terms of Reference

3.1 Land Capability

Land capability and agricultural potential will be determined by a combination of soil, terrain and climate features. Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes.

Land capability is divided into eight classes and these may be divided into three capability groups. Table 3-1 shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use and sensitivity increases from class I to class VIII (Smith, 2006).

Table 3-1 Land capability class and intensity of use (Smith, 2006)

Land Capability Class	Increased Intensity of Use									Land Capability Groups
I	W	F	LG	MG	IG	LC	MC	IC	VIC	Arable Land
II	W	F	LG	MG	IG	LC	MC	IC		
III	W	F	LG	MG	IG	LC	MC			
IV	W	F	LG	MG	IG	LC				
V	W	F	LG	MG						Grazing Land
VI	W	F	LG	MG						
VII	W	F	LG							

VIII	W									**Wildlife**
W - Wildlife		**MG - Moderate Grazing**			**MC - Moderate Cultivation**					
F- Forestry		**IG - Intensive Grazing**			**IC - Intensive Cultivation**					
LG - Light Grazing		**LC - Light Cultivation**			**VIC - Very Intensive Cultivation**					

Land capability has been classified into 15 different categories by the DAFF (2017) which indicates the national land capability category and associated sensitivity related to soil resources.

The land potential classes are determined by combining the land capability results and the climate capability of a region as shown in Table 3-2. The final land potential results are then described in Table 3-3. These land potential classes are regarded as the final delineations subject to sensitivity, given the comprehensive addition of climatic conditions as those relevant to the DAFF (2017) land capabilities. The main contributors to the climatic conditions as per Smith (2006) is that of MAP, Mean Annual Potential Evaporation (MAPE), mean September temperatures, mean June temperatures and mean annual temperatures. These parameters will be derived from Mucina and Rutherford (2006) for each vegetation type located within a relevant project area. This will give the specialist the opportunity to consider micro-climate, aspect, topography etc.

Table 3-2 The combination table for land potential classification

Land capability class	**Climate capability class**							
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
I	L1	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 3-3 The Land Potential Classes.

Land potential	**Description of land potential class**
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.
L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures or rainfall. Non-arable

3.1.1 Climate Capability

According to Smith (2006), climatic capability is determined by taking into consideration various steps pertaining to the temperature, rainfall and Class A-pan of a region. The first step in this methodology is to determine the MAP to Class A-pan ratio.

Table 3-4 Climatic capability (step 1) (Smith, 2006)

Climatic Capability Class	Limitation Rating	Description	MAP: Class A pan Class
C1	None to Slight	Local climate is favourable for good yields for a wide range of adapted crops throughout the year.	0.75-1.00
C2	Slight	Local climate is favourable for a wide range of adapted crops and a year-round growing season. Moisture stress and lower temperature increase risk and decrease yields relative to C1.	0.50-0.75
C3	Slight to Moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.	0.47-0.50
C4	Moderate	Moderately restricted growing season due to the occurrence of low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options more limited than C3.	0.44-0.47
C5	Moderate to Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops at risk of some yield loss.	0.41-0.44
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops that frequently experience yield loss.	0.38-0.41
C7	Severe to Very Severe	Severely restricted choice of crops due to heat and moisture stress.	0.34-0.38
C8	Very Severe	Very severely restricted choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss.	0.30-0.34

In the event that the MAP: Class A-pan ratio is calculated to fall within the C7 or C8 class, no further steps are required, and the climatic capability can therefore be determined to be C7 or C8. In cases where the above-mentioned ratio falls within C1-C6, steps 2 to 3 will be required to further refine the climatic capability.

Step 2

Mean September temperatures;

- <10℃ = C6
- 10 - 11℃ = C5
- 11 - 12℃ = C4
- 12 - 13℃ = C3
- >13℃ = C1

Step 3

Mean June temperatures;

- <9℃ = C5
- 9 - 10℃ = C4
- 10 - 11℃ = C3
- 11 - 12℃ = C2

3.1.2 Current Land Use

A generalised land-use will be derived for the larger project area considering agricultural productivity.

- Mining;
- Bare areas;
- Agriculture crops;
- Natural veld;
- Grazing lands;
- Forest;
- Plantation;
- Urban;
- Built-up;
- Waterbodies; and
- Wetlands.

4 Impact Assessment

4.1 Impact Assessment Method

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah. The assessment of the impact considers the following, the:

- Nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected;
- Extent of the impact, indicating whether the impact will be local or regional;
- Duration of the impact, very short-term duration (0-1 year), short-term duration (2-5 years), medium-term (5-15 years), long-term (> 15 years) or permanent;
- Probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable, probable, highly probable or definite;
- Severity/beneficial scale, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit); severe/beneficial (long-term impact that could be mitigated/long-term benefit); moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit); slight; or have no effect;
- Significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high;
- Status, which will be described as either positive, negative or neutral;
- Degree to which the impact can be reversed;
- Degree to which the impact may cause irreplaceable loss of resources; and
- Degree to which the impact can be mitigated.

4.2 Soil Impact Assessment

This impact assessment considers the impacts from activities associated with the construction and operation of wind energy facilities as well as solar PV facilities. Considering the occurrence of various soil forms that are commonly associated with high land capabilities, it is likely that areas with high land capability sensitivity do occur within the project area. However, due to the poor climatic capability, the ultimate land potential is more likely to be low.

Table 4-1 Scoping evaluation table summarising the impacts identified to soils

Impact Loss of land capability			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Compaction/soil stripping/transformation of land use which leads to loss of land capability	Direct impacts: » Loss of soil / land capability Indirect impacts:	Regional	None identified at this stage

	» Loss of land capability		
Description of expected significance of impact The development of the area could result in the encroachment into areas characterised by high land potential properties, which can ultimately result in the loss of land capability. These disturbances could also result in the infestation and establishment of alien vegetation, which in turn can have a detrimental impact on soil resources. Earthworks will expose and mobilise earth materials which could result in compaction and/or erosion. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of soil resources, which could affect the salinity or pH of the soil, which can render the fertility of the soil unable to provide nutrition to plants. During the operational phase, the impacts associated with the substation and collector sub will be easily managed by best "housekeeping" practices.			
Gaps in knowledge & recommendations for further study » This is completed at a desktop level only. » Identification and delineation of soil forms. » Determine of soil sensitivity. **Recommendations with regards to general field surveys** » Field surveys to prioritise the development areas.			

4.2.1 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general loss and transformation resulting from other activities in the area. The expected post-mitigation risk significance for the project in isolation is expected to be low, but in consideration of the larger Ummbila Emoyeni Renewable Energy Project the overall cumulative impact is expected to be medium.

Table 4-2 Cumulative soil impact assessment

Impact Nature: Loss of land capability		
General degradation of soil resources		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Moderate (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Improbable (2)	Probable (3)
Significance	**Low**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Residual Impacts:		
Unlikely considering the adherence to recommendations and mitigations		

5 Conclusion

5.1 Land Capability

Various soil forms are expected throughout the project area, of which some are commonly associated with high land capabilities. Even though the soil depth, texture and permeability of these soils ensure high land capability, the climatic capability of the area often reduces the land potential considerably. Therefore, very few areas characterised by “High” land potential is expected.

Considering the lack of sensitivity, together with holistic mitigation measures, it has been determined that none of the aspects scored during the impact assessment (post-mitigation) are associated with any scores higher than “Low”. It is recommended that the site assessment to be conducted for focus areas that potentially are characterised by greater micro-climates (i.e. aspect) and low laying areas characterised by deep soils.

The expected post-mitigation risk significance for the project in isolation is expected to be low, but in consideration of the larger Ummbila Emoyeni Renewable Energy Project the overall cumulative impact is expected to be medium.

6 References

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

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

Smith, B. (2006). The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.