SOIL AND AGRICULTURAL POTENTIAL ASSESSMENT REPORT FOR THE POORTJIES WES RENEWABLE ENERGY FACILITIES PROJECT- BRAKPAN 1

CENTRAL KAROO DISTRICT MUNICIPALITY, WESTERN CAPE

May 2022

CLIENT

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Report Name	**SOIL AND AGRICULTURAL POTENTIAL ASSESSMENT REPORT FOR THE POORTJIES WES RENEWABLE ENERGY FACILITIES PROJECT- BRAKPAN 1**
Reference	**Poortjies WES Renewable Energy- Brakpan**
Submitted to	savannah environmental
Report Writer	**Matthew Mamera** 
	Matthew Mamera is a Cand. Sci Nat registered (116356) in natural and agricultural sciences recognized in soil science. Matthew is a soil and hydropedology specialist with experience in soil, pedology, hydropedology, water and sanitation management and land contamination and has field experience and numerous peer reviewed scientific publications in international journals. Matthew completed his M.Sc. in soil science, hydropedology and water management at the University of Fort Hare, Alice. He is also a holder of a PhD in soil science, hydropedology, water and sanitation obtained at the University of the Free State, Bloemfontein. Matthew is also a member of the Soil Science Society of South Africa (SSSSA).
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.

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DECLARATION

I, Matthew Mamera, 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.

Matthew Mamera

Soil Pedologist

The Biodiversity Company

May 2022

1 Introduction

The Biodiversity Company was appointed by Savannah Environmental (Pty) Ltd (Savannah) to undertake a soil and agricultural potential assessment for the Poortjies WES Renewable Solar project in the Western Cape Province.

The renewable solar project has proposed different site locations for the Poortjies WES project and associated infrastructure as follows:

- Brakpan 1 Solar Energy Facility (Pty) Ltd (Option A);
- Belvedere Solar Energy Facility (Pty) Ltd (Option B);
- Montana 3 Solar Energy Facility (Pty) Ltd (Option C);
- Montana 2 Solar Energy Facility (Pty) Ltd Option D);
- Montana 1 Solar Energy Facility (Pty) Ltd (Option E); and
- Brakpan 2 Solar Energy Facility (Pty) Ltd (Option F).

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 focuses on the proposed Brakpan 1 solar energy facility (Option A), 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 and enable informed decision making. This report aims to also present and discuss the findings following the DAFF, (2017) land capability potentials and sensitivities from the soil resources identified within the regulated 50 m, the soil suitability and land potential of these soils, the land uses within the regulated area and the risk associated with the proposed project.

1.1 Scope of Work

According to the National Web based Environmental Screening Tool, the proposed development is located within a “Medium” sensitivity land capability area. The protocols for minimum requirements (DEA, 2020)[1] stipulates that in the event that a proposed development is located within “Low” or “Medium” sensitivities, an agricultural compliance statement will be sufficient. It is worth noting that according to these protocols, a site inspection will still need to be conducted to determine the accuracy of these sensitivities. After acquiring baseline information pertaining to soil resources within the 50 m regulated areas, it is the specialist’s opinion that the soil forms and associated land capabilities concur with the sensitivities stated

[1] A site identified by the screening tool as being of ’High” or “Very High” sensitivity for agricultural resources must submit a specialist assessment unless the impact on agricultural resources is from an electricity pylon (item 1.1.2).

by the screening tool. Therefore, only an agricultural compliance statement will be compiled. This includes:

- The feasibility of the proposed activities;
- Confirmation about the “Low” and “Medium” sensitivities;
- The effects that the proposed activities will have on agricultural production in the area;
- A map superimposing the proposed footprint areas, a 50 m regulated area as well as the sensitivities pertaining to the screening tool;
- Confirmation that no agricultural segregation will take place and that all options have been considered to avoid segregation;
- The specialist’s opinion regarding the approval of the proposed activities; and
- Any potential mitigation measures described by the specialist to be included in the Environmental management Programme (EMPr).

1.2 Expertise of the Specialists

1.2.1 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.

1.2.2 Matthew Mamera

Matthew Mamera is a Cand. Sci Nat registered (116356) in natural and agricultural sciences, recognition in soil science. Matthew is a soil and hydropedology specialist with experience in soil pedology, hydropedology, water and sanitation management and land contamination and has field experience and numerous scientific publications in international peer reviewed journals. Matthew completed his MSc in soil science, hydropedology and water management at the University of Fort Hare, Alice. He is also a holder of a PhD in soil science, hydropedology, water and sanitation obtained at the University of the Free State, Bloemfontein. Matthew is also a member of the Soil Science Society of South Africa (SSSSA).

2 Project Area

The proposed Poortjies WES Renewable Solar project is located in the Beaufort West Local Municipality in the central karoo district within the Western Cape Province. The project is located approximately 12 km south-east of the town of Nelspoot at the foot of the Nuweveld Mountains and the old N1 road. The project area is also 29 km south of the Three Siters town (Figure 2-1). The surrounding land use includes game reserves and agricultural activities predominantly livestock production.

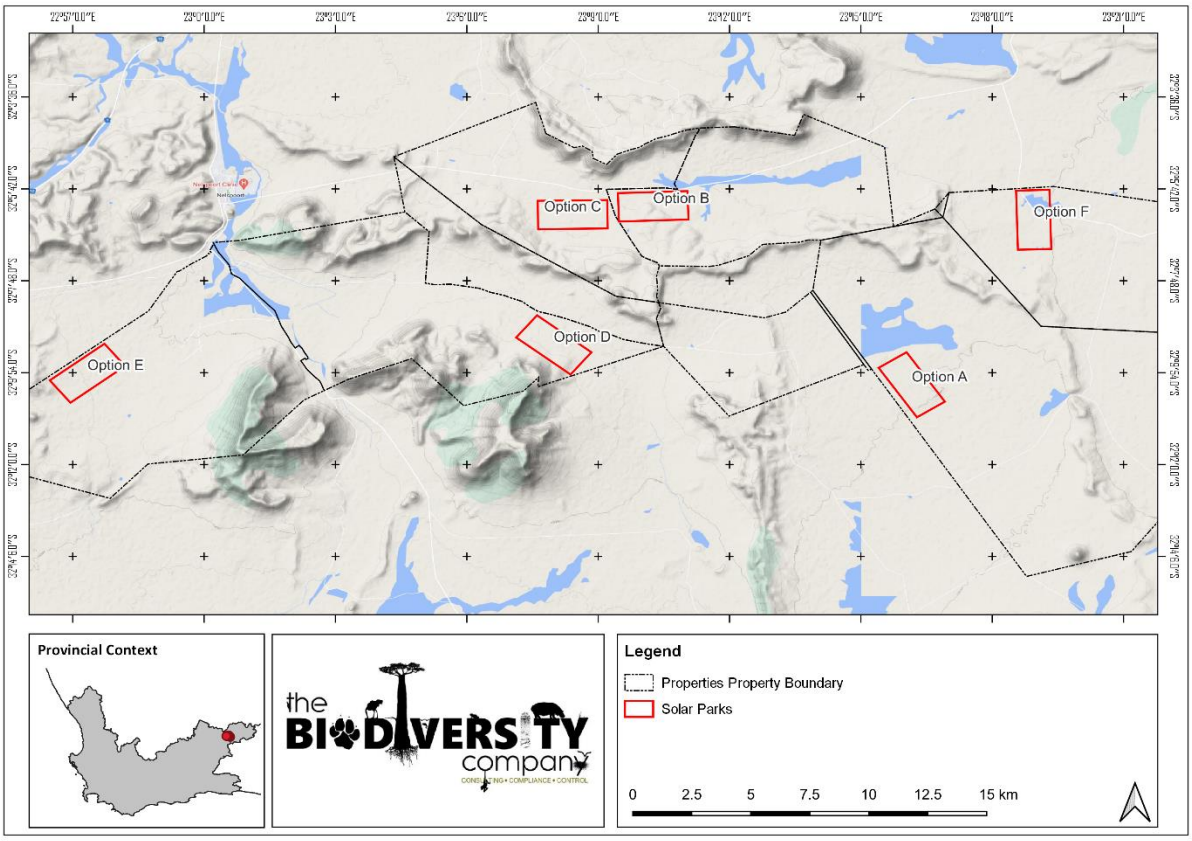

Figure 2-1 The location of the project area

3 Methodology

3.1 Desktop Assessment

As part of the desktop assessment, baseline 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 NASA Shuttle Radar Topography Mission Global 1 arc second digital elevation data by means of QGIS and SAGA software.

3.2 Land Capability

Given the nature of the compliance statement and the fact that baseline findings correlate with the screening tool's sensitivities, land capability was solely determined by means of the National Land Capability Evaluation Raster Data Layer (DAFF, 2017). Land capability and land potential will also briefly be calculated to match to that of the screening tool to ultimately determine the accuracy of the land capability sensitivity from (DAFF, 2017).

Land capability and agricultural potential will briefly 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 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					

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.

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

3.3 Limitations

The following limitations should be noted for the study:

- 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 soil compliance report;
- The sensitivity map included in this report is based on desktop information alone; and
- This assessment has only considered pedological resources.

4 Project Area

4.1 Soil and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Fc 396 land type. The Ae land types are characterised with Glenrosa and Mispah soil forms according to the Soil Classification Working Group, (1991) with the possibility of other soils and bare rocky areas also commonly occurring within the terrain. There are shallow and rocky profiles in the upper terrains. Lime is present in the entire landscape. The land terrain units for the featured Fc 396 land type are illustrated in Figure 4-1 with the expected soils listed in Table 4-1.

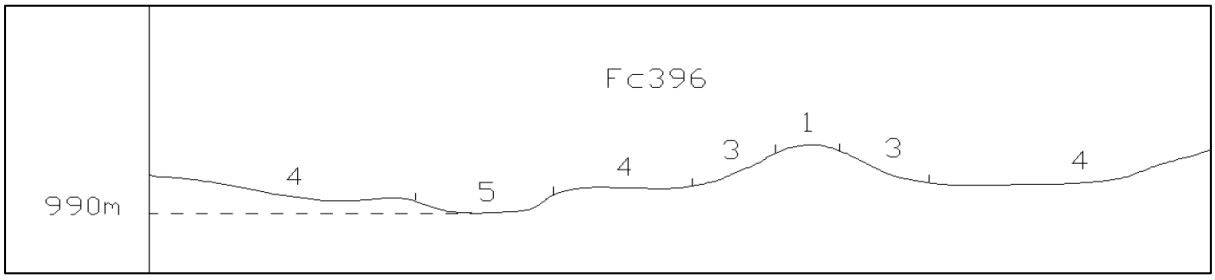

Figure 4-1 Illustration of land type Fc 396 terrain unit (Land Type Survey Staff, 1972 - 2006)

Table 4-1 Soils expected at the respective terrain units within the Fc 396 land type (Land Type Survey Staff, 1972 - 2006)

Terrain Units							
1 (8%)		3 (6%)		4 (50%)		5(36%)	
Bare Rocks	42%	Bare Rocks	60%	Glenrosa	40%	Glenrosa	60%
Mispah	30%	Mispah	35%	Swartland	20%	Swartland	20%
Glenrosa	25%	Glenrosa	5%	Mispah	20%	Hutton	10%
Swartland	3%			Bare Rocks	10%	Oakleaf	10%
				Hutton	10%		

4.2 Terrain

The slope percentage of the project area has been calculated and is illustrated in Figure 4-2. Most of the project area is characterised by a slope percentage between 0 and 10%, with some smaller patches within the project area characterised by a slope percentage ranging from 10 to 30%. This illustration indicates a non-uniform topography in few scattered areas most of the area being characterised by a gentle slope. The DEM of the project area (Figure 4-3) indicates an elevation of 991 to 1153 Metres Above Sea Level (MASL).

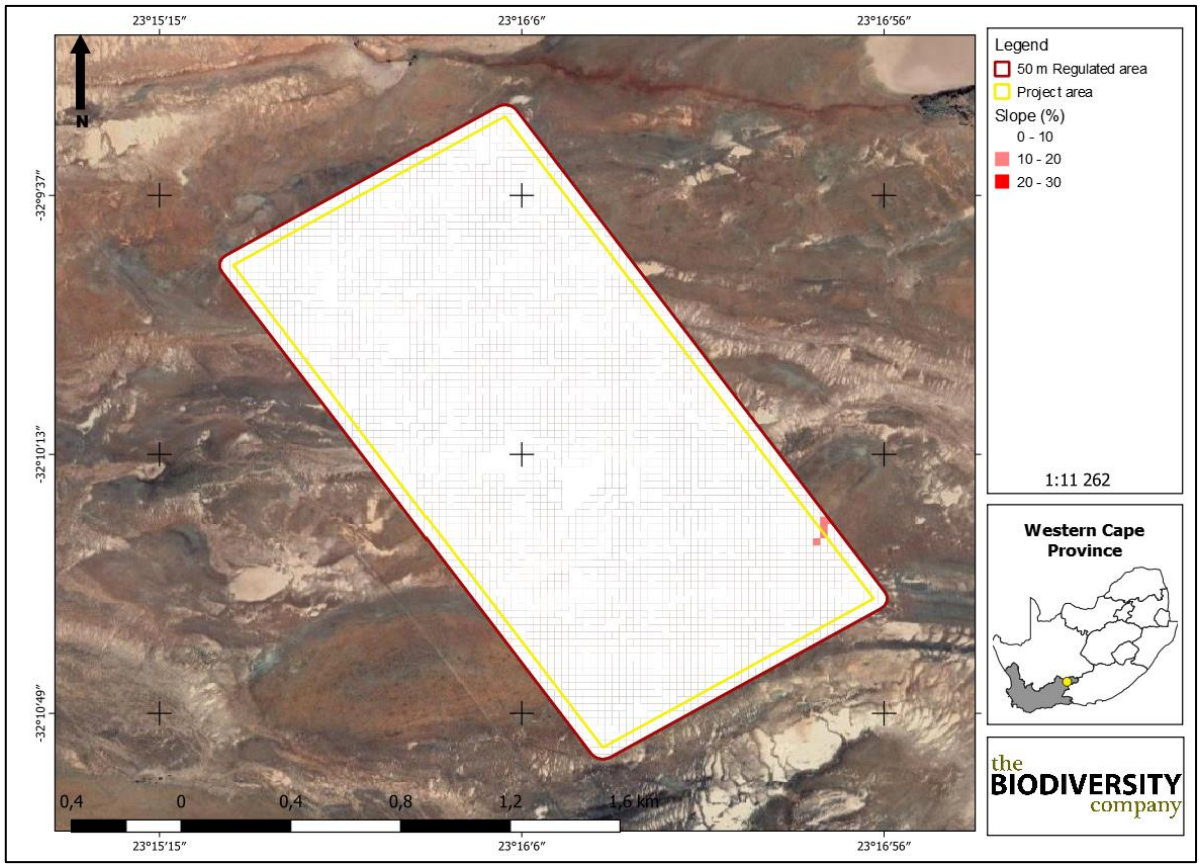

Figure 4-2 The slope percentage calculated for the project area

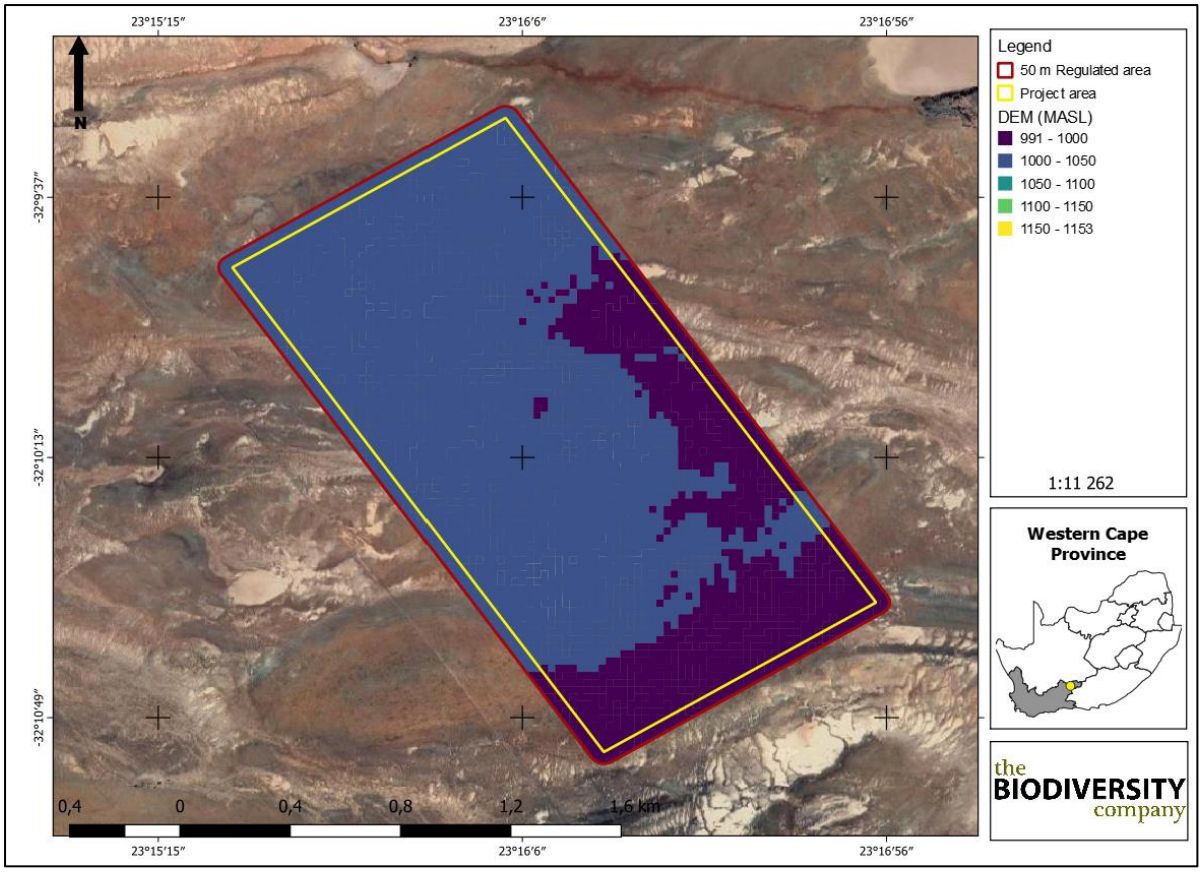

Figure 4-3 The DEM generated for the project area

5 Results and Discussion

5.1 Baseline Findings

The most sensitive soil forms that can be expected based on Table 4-1 within the area is the Hutton and Oakleaf soil forms, with other associated soils also occurring. The Hutton soil form consists of an orthic topsoil on top of a thick red apedal horizon. The Oakleaf soil form has an orthic topsoil underlain with a neocutanic subsurface diagnostic horizon.

The climate capability level of the above-mentioned soils has been determined to have a climate capability level "8". This climate capability has low Mean Annual Precipitation (MAP) and high Mean Annual Potential Evapotranspiration (MAPE) rates. Commonly severe to moderate limitations occur due to soil, slope, temperatures, or rainfall in such areas.

5.2 Sensitivity Verification

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which eight potential land capability classes are located within the proposed footprint area, including;

- Land Capability 1 to 5 (Very Low to Low Sensitivity); and
- Land Capability 6 to 8 (Low to Moderate Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly covered by "Very Low" to "Low"

sensitivities. Some patches are characterised by “Moderate Low to Moderate” sensitivities (see Figure 5-1). In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. It is also worth noting that, there are limitations on the actual soil distribution and field occurrence as the baseline soil assessment results were not presented. The “Very Low to Moderate” sensitivities fall within the DAFF, (2017) requirements for a compliance statement report only. It is the specialist`s recommendation that, the proposed solar renewable energy will have limited effects based on the desktop sensitivities and potentials from the DAFF, (2017). Therefore, the project may be favourably considered.

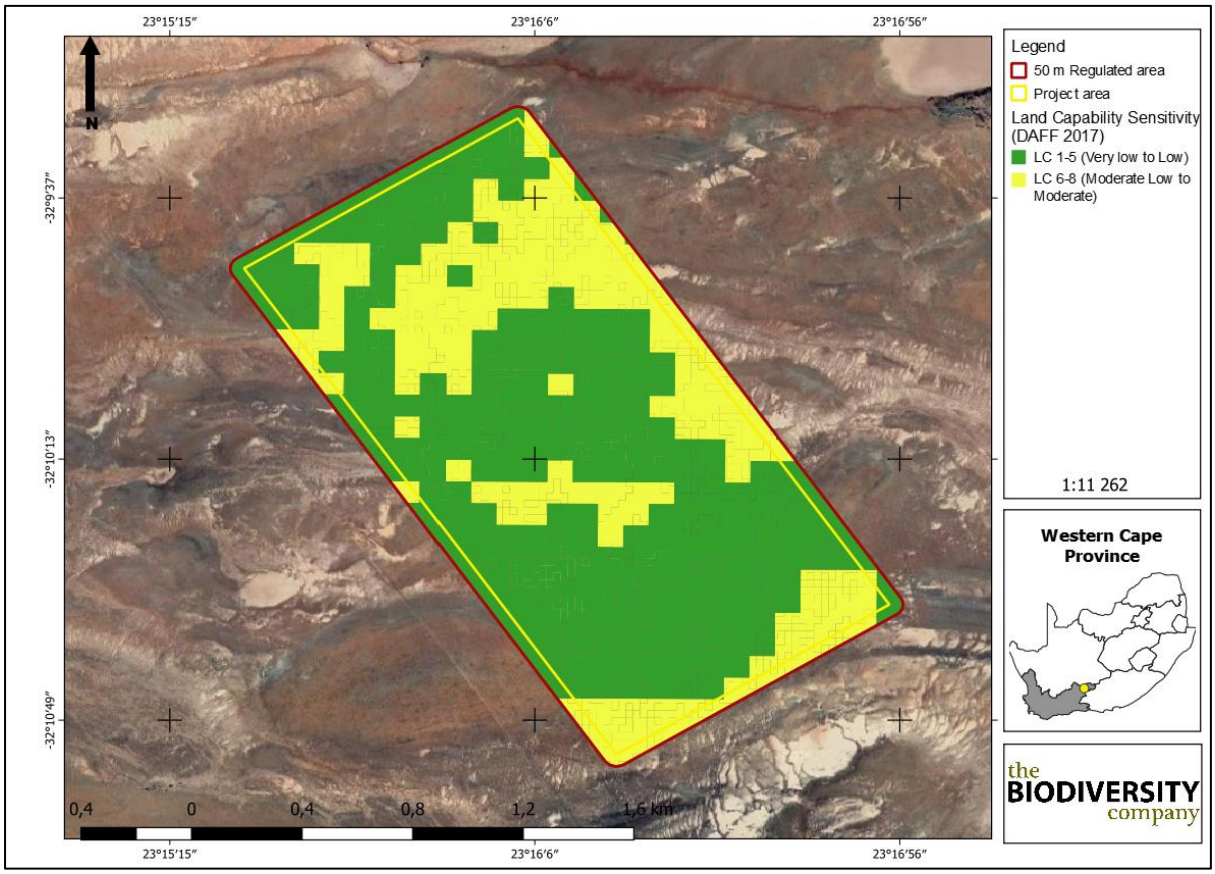

Figure 5-1 The land capability sensitivity (DAFF, 2017)

6 Conclusion

The most sensitive soil forms that can be expected for the area include the Hutton and Oakleaf soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with “Very Low to Moderate” sensitivities, which correlates with the requirements for a compliance statement only.

The available climate can limit crop production significantly. The harsh climatic conditions are associated with low annual rainfall and high evapotranspiration potential demands of the area. The area is not favourable for most cropping practices.

It is worth noting that, additional baseline soil field assessments can provide for a better understanding of the soil or land potentials for the project area. It is the specialist’s opinion that the proposed solar renewable energy project based on the DAFF (2017) land capability sensitivity of the area will have limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar renewable energy project development may be favourably considered.

7 References

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