AGRICULTURAL COMPLIANCE STATEMENT FOR THE PROPOSED BECRUX TWO SOLAR PV DEVELOPMENT

Sasolburg, Free State Province

February 2022

Client

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Report Name	**Agricultural Compliance Statement for the proposed Becrux Two Solar PV**
Submitted to	**Savannah Environmental**
Report Reviewer	**Andrew Husted** Mr. Andrew Husted is an aquatic ecologist, specializing in freshwater systems and wetlands, who graduated with a MSc in Zoology. He, is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Mr Husted is an Aquatic, Wetland and Biodiversity Specialist with 12 years' experience in the environmental consulting field. In addition to his ecological working experience, Andrew has experience in agricultural and soil assessments, this includes the consideration of land uses and land cover.
Report Reviewer	**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	**Michael Douglas** Michael Douglas is a soil scientist with experience in soil classification. Michael completed his BSc Honours in environmental science and geological science at the North-West University of Potchefstroom. Michael has been part of various agricultural potential, land capability and pedology studies as part of Environmental Impact Assessments and Basic Assessments.
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, **Michael Douglas** 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.

Michael Douglas

Soil Specialist

The Biodiversity Company

February 2022

1 Introduction

The Biodiversity Company was appointed to conduct a pedological assessment for the proposed establishment of a solar photovoltaic (PV) energy facility and associated infrastructure with a generation capacity of up to 10 MW_{ac}.

The infrastructure of this project will include:

- A 10 MW_{ac} solar PV facility; and
- An 11kV powerline with a grid connection corridor that will be up to 200 m wide (extending to 400 m around the footprint of the existing Sigma substation) and up to 500 m long.

The approach adopted for the assessment has taken cognisance of the recently published Government Notice 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".

This report aims to present and discuss the findings from the soil resources identified on-site, the agricultural and land potential of these resources, the land uses within the project area as well as the risks associated with the proposed PV facility.

2 Project Area

The project area is 4 km south from the town Sasolburg and is located 2 km south east from the R57 road (see Figure 2-1). Presently, the project area is surrounded by agricultural fields, mining activity as well as informal settlement areas.

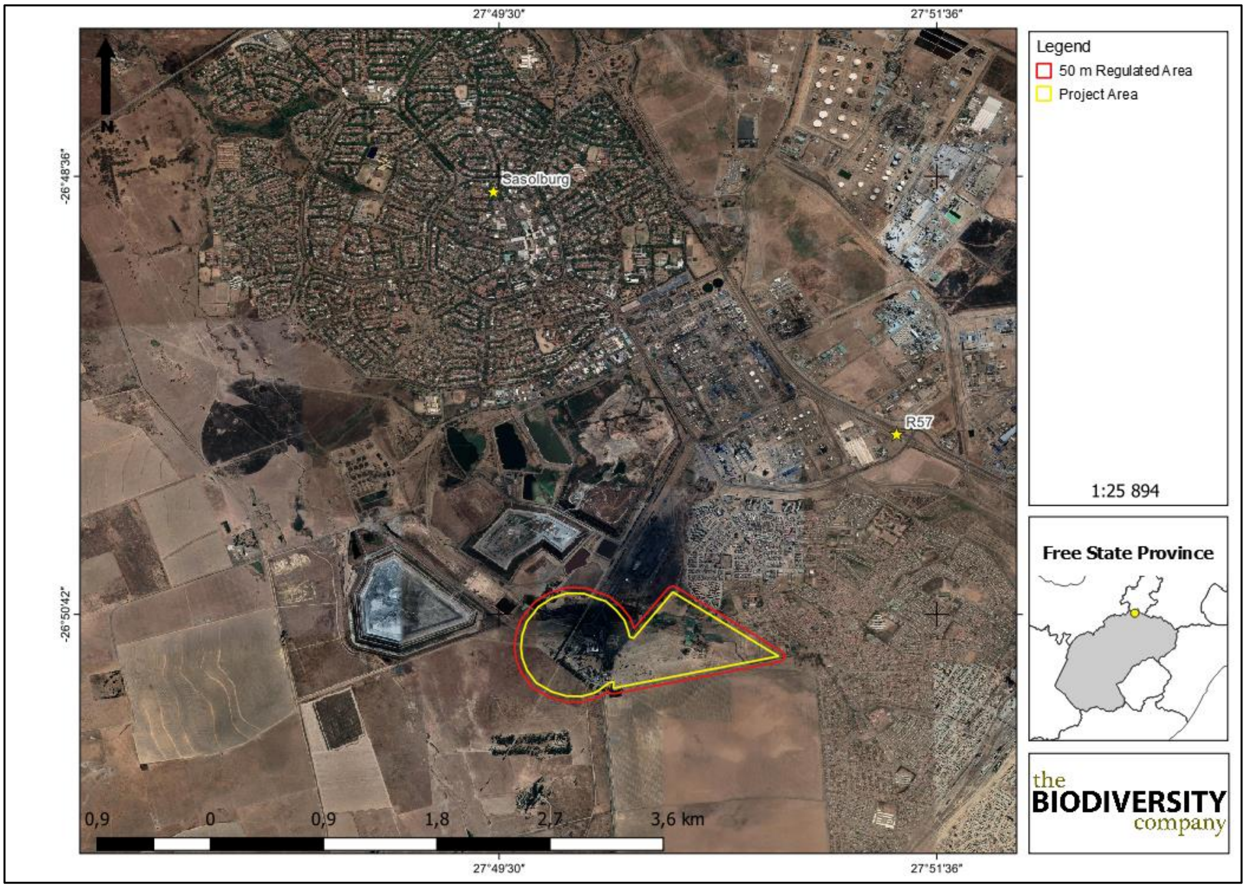

Figure 2-1 Map illustrating the location of the proposed project area in relation to nearby features

3 Scope of Work

The following tasks were completed in fulfilment of the terms of reference for this assessment:

- To conduct a soil assessment which includes a description of the physical properties which characterise the soil within the proposed area of development of the relevant portions of the affected properties;
- Using the findings from the soil assessment to determine the existing land capability/potential and current land use of the entire surface area of the relevant portions of the project area;
- To delineate soil resources;
- To determine the sensitivity of the baseline findings;
- The soil classification was done according to the Taxonomic Soil Classification System for South Africa, 1991. The following attributes must be included at each observation:
  - Soil form and family (Taxonomic Soil Classification System for South Africa, 1991);
  - Soil depth;
  - Estimated soil texture;
  - Soil structure, coarse fragments, calcareousness;
  - Buffer capacities;
  - Underlying material;
  - Current land use; and
  - Land capability.
- To complete an impact statement;
- Discussing the feasibility of the proposed activities;
- Confirmation that no agricultural segregation will take place and that all options have been considered to avoid segregation; and
- Recommend relevant mitigation measures to limit all associated impacts.

4 Limitations

The following limitations are relevant to this agricultural compliance statement;

- It has been assumed that the extent of the properties to be assessed together with the locations of the proposed components are correct and final; and

- The handheld GPS used potentially could have inaccuracies up to 5 m. Any and all delineations therefore could be inaccurate within 5 m.

5 Expertise of the Specialists

5.1 Andrew Husted

Mr. Andrew Husted is an aquatic ecologist, specializing in freshwater systems and wetlands, who graduated with a MSc in Zoology. He, is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Mr Husted is an Aquatic, Wetland and Biodiversity Specialist with 12 years' experience in the environmental consulting field. In addition to his ecological working experience, Andrew has experience in agricultural and soil assessments, this includes the consideration of land uses and land cover.

5.2 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.

5.3 Michael Douglas

Michael Douglas is a soil scientist with experience in soil classification. Michael completed his BSc Honours in environmental science and geological science at the North-West University of Potchefstroom. Michael has been part of various agricultural potential, land capability and pedology studies as part of Environmental Impact Assessments and Basic Assessments.

6 Literature Review

6.1 Land Capability

According to Smith (2006), the capability of land concerns the wise use of land to ensure economical production on a sustained basis, under specific uses and treatments. The object of land classification is the grouping of different land capabilities, to indicate the safest option for use, to indicate permanent hazards and management requirements. These land capability classes decrease in capability from I to VIII and increase in risk from I to VIII. DAFF (2017) further defines land capability as "*the most intensive long-term use of land for purposes of rainfed farming, determined by the interaction of **climate, soil** and **terrain**.*

DAFF (2017) has further modelled the land capability on a rough scale for the entire of South Africa and has divided these results into 15 classes (see Table 6-1). Terrain, climate and soil capability was used as the building blocks for this exercise to ensure a national land capability data set.

Table 6-1 Land Capability (DAFF, 2017)

Land Capability Class (DAFF, 2017)	Description of Capability
1	Very Low
2	
3	Very Low to Low
4	
5	Low
6	Low to Moderate
7	
8	Moderate
9	Moderate to High
10	
11	High
12	High to Very High
13	
14	Very High
15	

It is worth noting that this nation-wide data set has some constraints of its own. According to DAFF (2017), inaccuracies and the level of detail of these datasets are of concern. Additionally, the scale used to model these datasets is large (1:50 000 to 1:100 000) and is not suitable for farm level planning. Furthermore, it is mentioned by DAFF (2017) that these datasets should not replace any site-based assessments given the accuracies perceived.

7 Methodology

The pedology assessment was conducted using the Provincial and National Departments of Agriculture recommendations. The assessment was broken into two phases. Phase 1 was a desktop assessment to determine the following:

- Historic climatic conditions;
- The base soils information from the land type database (Land Type Survey Staff, 1972 - 2006); and
- The geology for the proposed project site.

7.1 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.

7.2 Agricultural Potential Assessment

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 7-1 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 7-1 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 DAFF (2017) which indicates the national land capability category and associated sensitivity related to soil resources. Given the fact that ground truthing and Digital Soil Map (DSM) exercises have indicated anomalies in the form of high sensitivity soil resources (which was not indicated by the DAFF (2017) raster file), the ground-truthed baseline delineations and sensitivities were used for this assessment rather than that of DAFF (2017).

The land potential classes are determined by combining the land capability results and the climate capability of a region as shown in Table 7-2. The final land potential results are then described in Table 7-3. 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 Mean Annual Precipitation (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 the relevant project area. This will give the specialist the opportunity to consider micro-climate, aspect, topography etc.

Table 7-2 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 7-3 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

7.3 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 Mean Annual Precipitation (MAP) to Class A-pan ratio.

Table 7-4 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; and
- >13℃ = C1.

Step 3

Mean June temperatures;

- <9℃ = C5;
- 9 - 10℃ = C4;

- 10 - 11℃ = C3; and
- 11 - 12℃ = C2.

7.4 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.

8 Desktop Findings

8.1 Climate

The Gh 6 vegetation type is characterised by summer rainfall with a Mean Annual Precipitation (MAP) of 560 mm which peaks in December and January. The Mean Annual Temperature has been calculated at approximately 15 ℃ with a relatively high frost occurrence (Mucina & Rutherford, 2006) (see Figure 8-1).

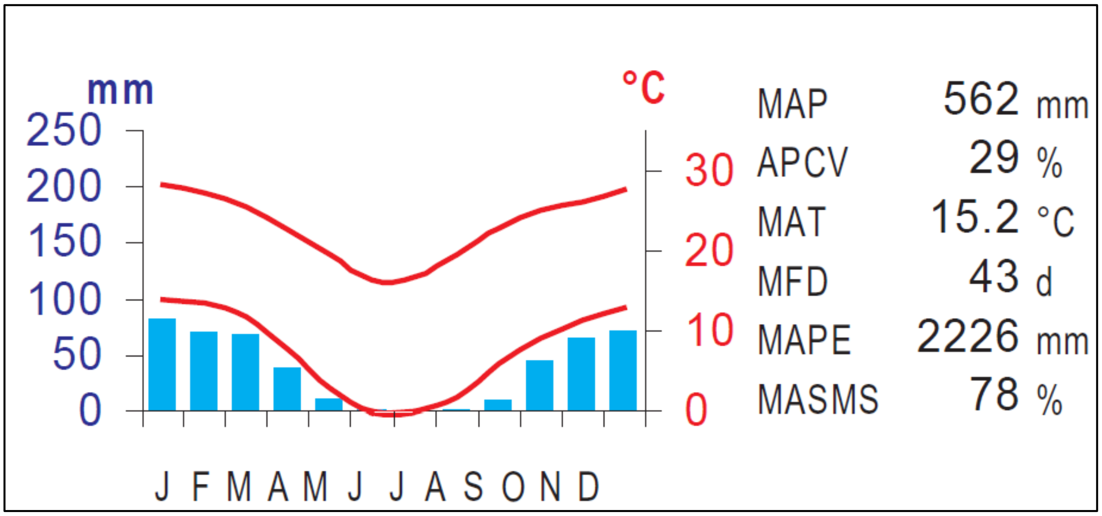

Figure 8-1 Climate for the Central Free State Grassland (Mucina & Rutherford, 2006)

8.2 Soils and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the development falls within the Ca 1 and Dc 7 land types.

The Ca land type is characterised by plinthic catena. Upland duplex and/or margalitic soils are common in this land type and is undifferentiated. The Ca 1 land type terrain units and expected soils are illustrated in Figure 8-2 and Table 8-1 respectively.

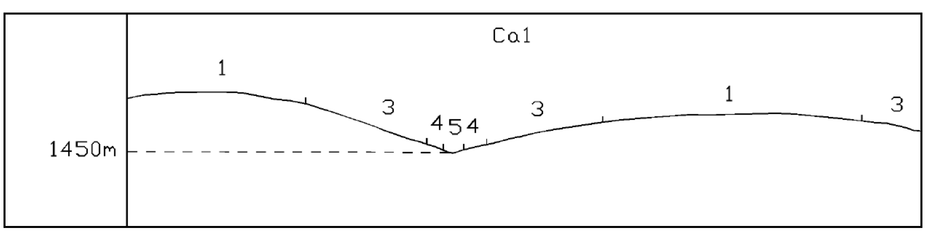

Figure 8-2 Illustration of land type Ca 1 terrain units (Land Type Survey Staff, 1972 – 2006)

Table 8-1 Soils expected at the respective terrain units within the Ca 1 land type (Land Type Survey Staff, 1972 – 2006)

Terrain units			
1 (50%)	**3 (40%)**	**4 (5%)**	**5 (5%)**

Longlands	30%	Longlands	30%	Valsrivier	30%	Rensburg	50%
Kroonstad	20%	Kroonstad	20%	Kroonstad	20%	Westleigh	20%
Avalon	20%	Avalon	15%	Rensburg	15%	Streambeds	20%
Fernwood	10%	Fernwood	10%	Westleigh	15%	Vasrivier	20%
Hutton	5%	Hutton	5%	Estcourt	10%	Estcourt	10%
Clovelly	5%	Clovelly	5%	Avalon	10%		
Glencoe	5%	Glencoe	5%				
Wasbank	5%	Wasbank	5%				

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 Dc 7 land type terrain units and expected soils are illustrated in Figure 8-3 and Table 8-2 respectively.

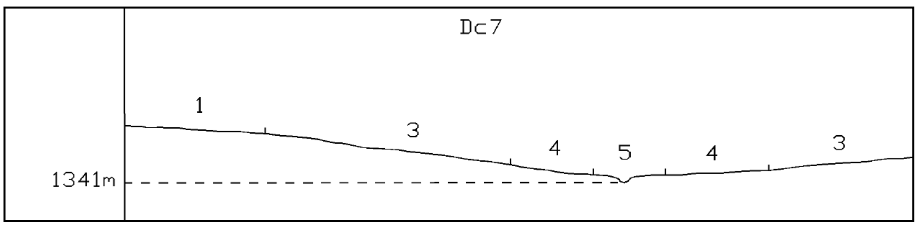

Figure 8-3 Illustration of land type Dc 7 terrain units (Land Type Survey Staff, 1972 – 2006)

Table 8-2 Soils expected at the respective terrain units within the Dc 7 land type (Land Type Survey Staff, 1972 – 2006)

Terrain units							
1 (20%)		**3 (40%)**		**4 (35%)**		**5 (5%)**	
Arcadia	26%	Valsrivier	55%	Rensburg	41%	Rensburg	70%
Valsrivier	25%	Bonheim	16%	Valsrivier	17%	Katspruit	12%
Swartland	16%	Arcadia	14%	Bonheim	17%	Bonheim	10%
Mayo	10%	Swartland	5%	Arcadia	11%	Arcadia	8%
Glenrosa	5%	Bare Rock	2%	Estcourt	5%		
Bare Rock	5%	Glenrosa	2%	Katspruit	6%		
Westleigh	4%	Mayo	2%	Sterkspruit	6%		
Shortlands	4%	Westleigh	2%	Estcourt	2%		
Hutton	4%	Shortlands	1%				
Avalon	1%	Avalon	1%				

The Adelaide Subgroup's Sandstone and Sedimentary mudstone are found in the extreme northern section of this vegetation type together with that of the Ecca Group. This geology gives rise to Melanic, Vertic and red soils typically from the Dc land type (Mucina and Rutherford, 2006).

8.3 Terrain

The slope percentage of the project area has been calculated and is illustrated in Figure 8-4. The majority of the project area is characterised by a slope percentage between 0 and 5%, with some smaller patches within the project area characterised by a slope percentage up to 30%. This illustration indicates a non-uniform undulating topography. The elevation of the project area (Figure 8-5) indicates an elevation of 1 453 to 1 480 Metres Above Sea Level (MASL).

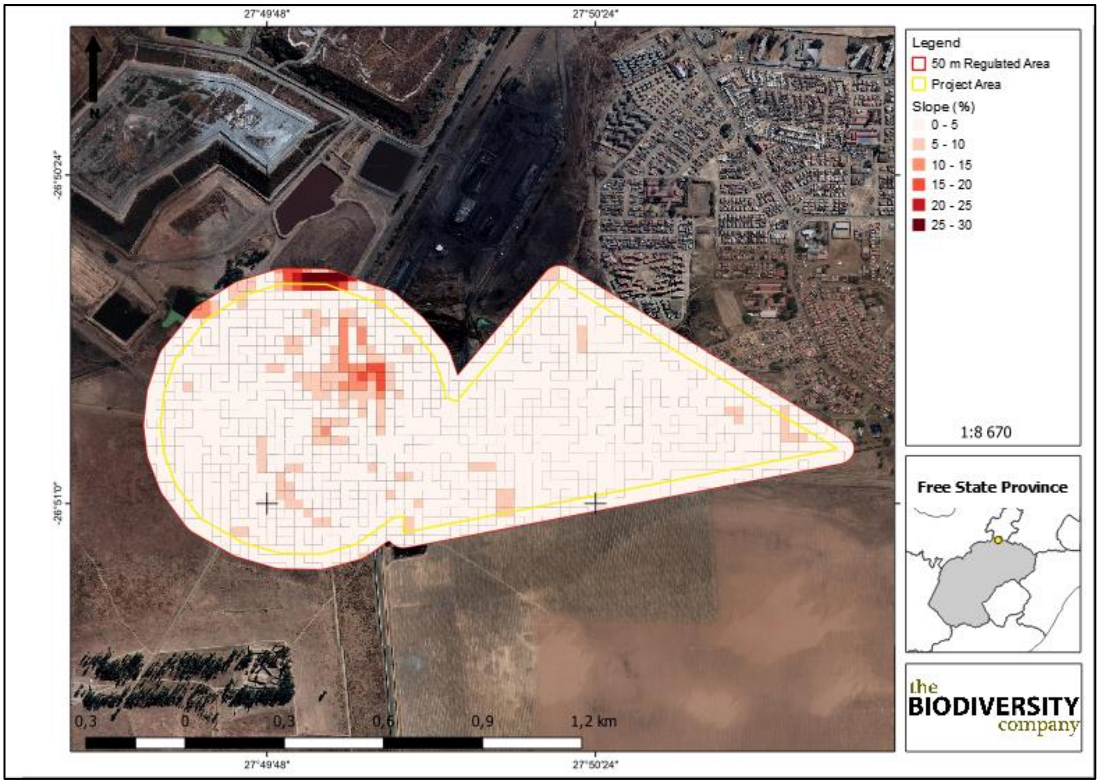

Figure 8-4 Slope percentage map for the project area

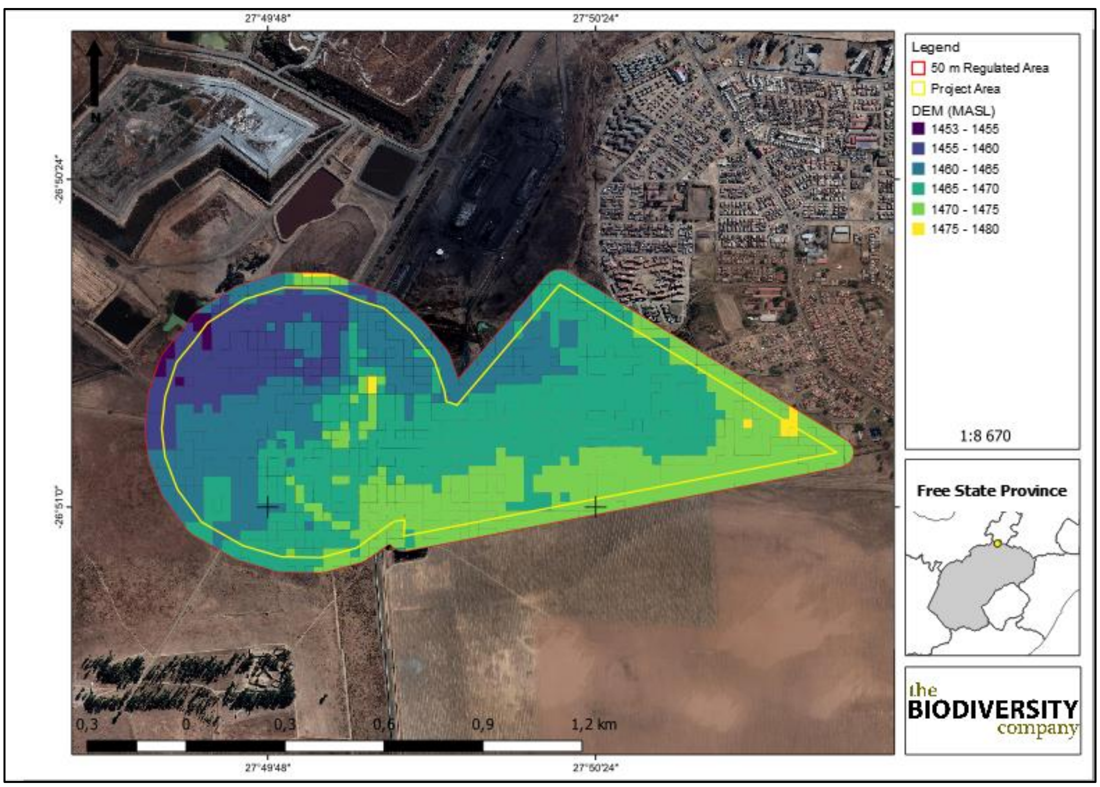

Figure 8-5 Elevation of the project area (metres above sea level)

9 Results and Discussion

9.1 Baseline Findings

Four soil forms were identified throughout the 50 m regulated area namely Avalon, Longlands, Westleigh and Rensburg, with the Avalon soil form being the most dominant soil form over the regulated area. Various hydromorphic soil forms were also identified throughout the 50 m regulated area, which were mostly dominated by the Rensburg soil form.

The Avalon soil form is regarded to be most important in the study area as it demonstrates the most sensitive land capability. It consists of an orthic topsoil on top of a yellow- brown apedal horizon, which in turn is underlain by a soft plinthic horizon. The different soil horizons are illustrated in Figure 9-1.

The most sensitive land capability of the above mentioned soils and wetlands have been determined to be class “II”. A climate capability level 8 has been assigned to the area given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. By using the determined land capability for the most sensitive soil and the determined climate capability, a land potential of “L5” was calculated. According to Smith (2006), the “L5” land potential level is characterised by restricted potential. Regular and/or moderate to severe limitations are expected due to soil, slope, temperatures or rainfall.

Figure 9-1 Example of an Avalon soil form

9.2 Sensitivity Verification

The following land potential levels have been determined;

- Land potential level 5 (This land potential level is characterised by restricted potential. Regular and/or moderate to severe limitations are expected due to soil, slope, temperatures or rainfall);
- Land potential level 'Vlei' (Characterized by hydromorphic soils); and
- Land potential level 6 (This land potential level is characterised by very restricted potential. Regular and/or severe limitations are expected due to soil, slope, temperatures or rainfall. It is non-arable).

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

- Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity); and
- Land Capability 9 to 10 (Moderately high).

The baseline findings and the sensitivities as per the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) national raster concur well with one another.

In addition, some crop boundary areas have been identified by means of the DEA Screening Tool (2022). These areas have been classified as having high sensitivity. It is worth noting that these sensitivities are not associated with the potential of soil resources but rather the presence of crop field land uses. By the use of aerial satellite imagery as well as field work observation, it is evident that there are no active crops present in the proposed project area.

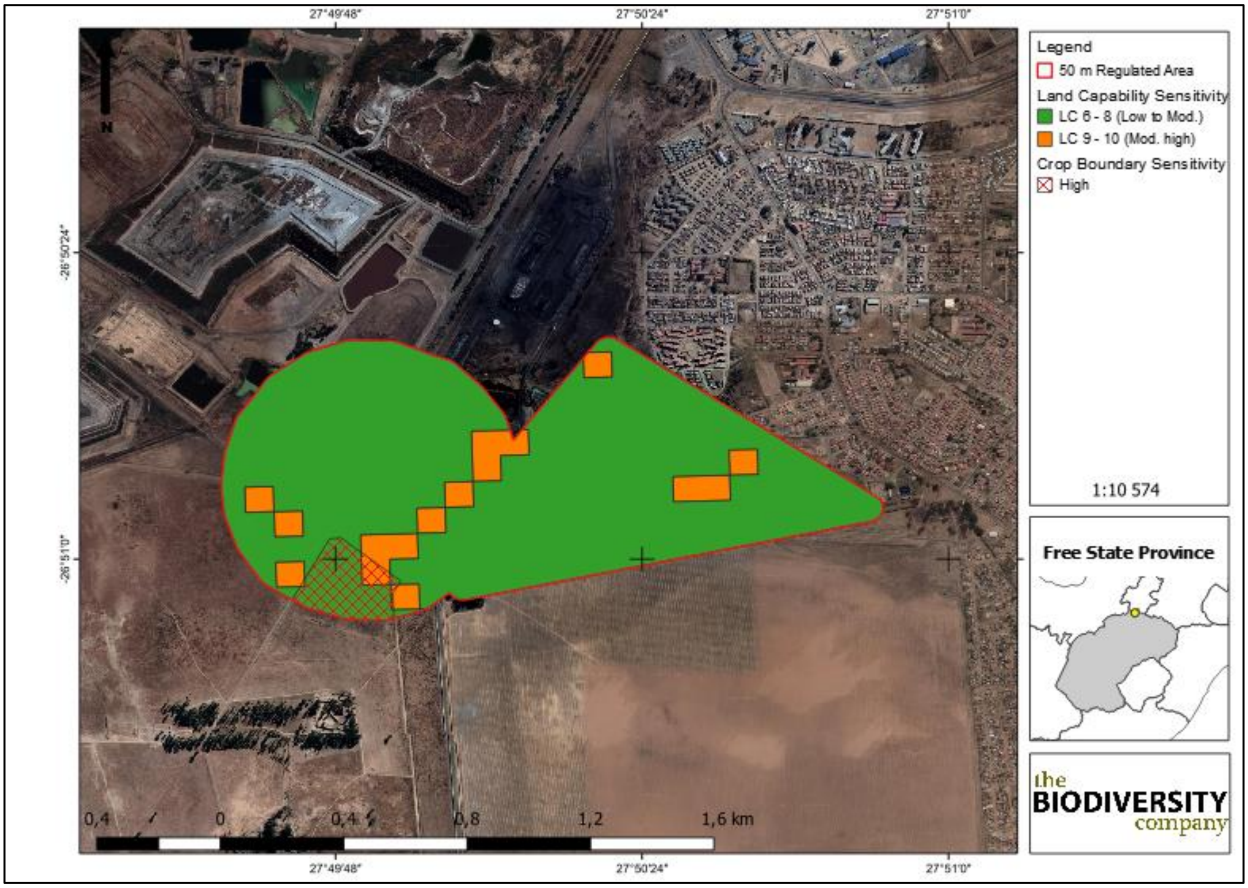

Figure 9-2 Land Capability Sensitivity (DAFF, 2017) and Crop Boundary Sensitivity (DEA, 2022).

10 Impact Statement

10.1 Proposed PV

Construction Phase

During the construction phase, heavy vehicles (trucks) will be used to transport PV structures throughout the footprint area with reliance on manual labour for finer refinement. Potential erosion is possible during the construction phase due to compaction of the soil due to the increased traffic on site.

It is evident from the impact calculations in Table 10-1 that in a pre-mitigation as well as a post-mitigation state, moderate impacts are expected. The assumption is made that the vegetation beneath the panels will be cleared, allowed to re-grow during operation and managed.

Table 10-1 Impact assessment related to the loss of land capability during the construction phase of the proposed PV area

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Highly probable (4)
Significance	**Medium (60)**	**Medium (48)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: See *Table 11-1*		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to the fact that the soil is not classified as being sensitive and therefore the project area will not be characterised by measurable residual impacts.		

Operational Phase

During the operational phase, limited impacts are foreseen. Potential erosion is possible during the operation phase due to the clearance of vegetation impacting natural flow of surface water run-off. It is assumed that the majority of impacts to the soil will be occur during the construction phase, whereas the operation phase will not result in any major further impacts.

It is evident from the impact calculations in Table 10-2 that in a pre-mitigation as well as a post-mitigation state, low impacts are expected.

Table 10-2 Impact assessment related to the loss of land capability during the operational phase of the proposed PV area

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)

Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:* See *Table 11-1		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to low levels of impacts foreseen.		

10.2 Proposed Powerline

Construction Phase

During the construction phase, heavy vehicles (trucks) will be used to transport powerline structures throughout the powerline corridor with reliance on manual labour for finer refinement. During this phase, limited impacts are expected towards low to moderately high sensitivity soil resources in the form of minor excavations and installations of powerline pylons.

It is evident from the impact calculations in Table 10-3 that limited impacts are expected considering the low and moderately high sensitivity of soil resources in the area as well as the fact that the construction of the powerline is not expected to pose significant threats to the land capability. The proposed activity is therefore not expected to reduce the land capability of this area any further.

Table 10-3 Impact assessment related to the loss of land capability during the construction phase of the proposed powerline

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:* See *Table 11-1		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to low levels of impacts foreseen.		

Operational Phase

The only impact expected towards the land capability of the area during the operation of the powerline is potential erosion at the base of the powerline pylons. This impact, together with the low sensitivity of the area, is expected to be minor. The pre-and post-mitigation significance ratings have been calculated to be "Low" (see Table 10-4).

Table 10-4 Impact assessment related to the loss of land capability during the operational phase of the proposed powerline

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Very Low (1)	Very Low (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Very improbable (1)
Significance	**Low (14)**	**Low (7)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
***Mitigation:* See Table 11-1**		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to low levels of impacts foreseen.		

10.3 Proposed Substation

Construction Phase

During the construction phase, heavy vehicles (trucks) will be used to transport building material for the building of the substation foundation and structure. Manual labour will also be reliant on for this phase and general movement will increase on site and impact the land capability.

During this phase, impacts are expected towards low to moderately high sensitivity soil resources in the form of excavations, building of a small operation office, building and construction of a foundation concrete layer for the substation as well as installations of powerline terminals.

It is evident from the impact calculations in due to construction.

Table 10-5 that moderate impacts are expected post-mitigation due to the proposed activities being associated with an increase in compaction, excavation, as well as more traffic that will be present on site due to construction.

Table 10-5 Impact assessment related to the loss of land capability during the construction phase of the substation.

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)

Duration	Short Term (2)	Short Term (2)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Highly probable (4)
Significance	**Medium (60)**	**Medium (48)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation:* See *Table 11-1		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to the fact that the soil is not classified as being sensitive and therefore the project area will not be characterised by measurable residual impacts.		

Operational Phase

It is assumed that the majority of impacts to the soil will be done during the construction phase, whereas the operation phase will not result in any major further impacts due to limited change in the new infrastructure.

The impact expected towards the land capability of the area during the operation of the substation is potential erosion at the base of the substation cemented area due to the natural flow of run-off water being disturbed. This impact, together with the low to moderately high sensitivity of the area, is expected to be minor. The pre-and post-mitigation significance ratings have been calculated to be "Low".

Table 10-6 Impact assessment related to the loss of land capability during the operational phase of the substation

Nature: Loss of land capability		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:* See *Table 11-1		
Residual Impacts:		
Limited residual impacts will be associated with these activities due to low levels of impacts foreseen by operations of substation		

10.4 Cumulative Impacts

Cumulative impacts within the proposed PV area and its surroundings have been determined to be low. Soil resources in the area have been impacted upon by means of built-up areas, yet, not to such an extent that the larger integrity of soil resources within the area is at stake.

Table 10-7 Impact assessment related cumulative impacts

Nature: Loss of land capability		
	Cumulative impact of the project and other projects in the area	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Low (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (18)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:* See *Table 11-1		

11 Specialist Management Plan

Table 10-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators. The mitigations within this section have been taken into consideration during the impact assessment in cases where the post-mitigation environmental risk is lower than that of the pre-mitigation environmental risk. Additionally, the implementation of these strategies will improve the possibility of restoring degraded soil resources, which are likely to be impacted upon during the operational phase especially.

Table 11-1 Mitigation measures, including requirements for timeframes, roles and responsibilities

Action plan				
Phase	**Management action**	**Timeframe for implementation**	**Responsible party for implementation**	**Responsible party for monitoring/audit/review**
Planning phase	The establishment of large concrete areas should be avoided as far as possible	At least 6 months prior to the implementation of soil stripping or any other disturbances	Developer/Design Engineer	Developer's Environmental Officer (dEO)
	Develop and implement a rehabilitation management and monitoring plan from the onset of construction	At least 2 months prior to the implementation of soil stripping	Developer Specialist	dEO
Construction	Demarcate all access routes	This activity should be finished at least two weeks prior to any construction activities	Contractor	Environmental Control Officer (ECO)
	Vegetate or cover all stockpiles after stripping/removing soils	During construction phase	Contractor	ECO
	Storage of potential contaminants should be undertaken in bunded areas	During construction phase	Contractor	ECO
	All contractors must have spill kits available and be trained in the correct use thereof.	During construction phase	Contractor	ECO
	All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".	During construction phase	Environmental Officer (EO)/Contractor	ECO
	No cleaning or servicing of vehicles, machines and equipment may be	During construction phase	Contractor	ECO

	undertaken in water resources.			
	Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems.	During construction phase	Contractor	ECO
Operation	Continuously monitor erosion on site	During the timeframe assigned for the life of the PV plant	Operator	dEO
	Monitor compaction on site	During the timeframe assigned for the life of the PV plant	Operator	dEO

12 Recommendations and Mitigation Measures

12.1 General Mitigation

General mitigations will ensure the conservation of all soil resources, regardless of the sensitivity of resources and the intensity of impacts.

- Prevent any spills from occurring. Machines must be parked within hard park areas and must be checked daily for fluid leaks;
- Proper invasive plant control must be undertaken quarterly; and
- All excess soil (soil that is stripped and stockpiled to make way for foundations) must be stored and managed/maintained to be used for rehabilitation of eroded areas.

12.2 Restoration of Vegetation Cover

Restoring vegetation cover is the first step to successful rehabilitation. Vegetation cover decreases flow velocities and minimises on.

12.2.1 Ripping Compacted Areas

All areas outside of the footprint areas that will be degraded (by means of vehicles, laydown yards etc.) must be ripped where has taken place. According to the Department of Primary Industries and Regional Development (Agriculture and Food) (2017), ripping tines must penetrate to just below the compacted horizons (approximately 300 – 400 mm), with soil moisture being imminent to the success of ripping. Ripping must take place within 1-3 days after seeding, and also following a rain event to ensure a higher moisture content. To summarise;

- Rip all compacted areas outside of the developed areas that have been compacted;
- This must be done by means of a commercial ripper that has at least two rows of tines; and
- Ripping must take place between 1 and 3 days after seeding and following a rainfall event (seeding must therefore be carried out directly after a rainfall event).

12.2.2 Revegetate Degraded Areas

Vegetation within the footprint areas will be cleared to accommodate the excavation activities coupled with the proposed footprint areas' foundations. This impact will degrade soil resources, ultimately decreasing the land capability of resources and increasing erosion. According to Russell (2009), areas characterised by a loss of soil resources should be revegetated by means of vegetation with vigorous growth, stolons or rhizomes that more or less resembles the natural vegetation in the area.

It is recommended that all areas surrounding the development footprint areas that have been degraded by traffic, laydown yards etc. must be ripped and revegetated by means of indigenous grass species where possible. Mixed stands or monocultures will work sufficiently for revegetation purposes. Mixed stands tend to blend in with indigenous vegetation species and are more natural. Monocultures however could achieve high productivity. In general, indigenous vegetation should always be preferred due to various reasons, including the aesthetical presence thereof as well as the ability of the species to adapt to its surroundings.

Plant phase plants which are characterised by fast growing and rapid spreading conditions. Seed germination, seed density and seed size are key aspects to consider before implementing revegetation activities. The amount of seed should be limited to ensure that competition between plants are kept to a minimum. During the establishment of seed density, the percentage of seed germination should be taken into consideration. *E curvula* is one of the species recommended due to the ease of which it germinates. This species is also easily sown by means of hand propagation and hydro seeding.

The following species are recommended for rehabilitation purposes;

- *Eragrostis teff;*
- *Cynodon species (Indigenous and altered types);*
- *Chloris gayana;*
- *Panicum maximum;*
- *Digitaria eriantha;*
- *Anthephora pubescens; and*
- *Cenchrus ciliaris.*

12.3 Specialist Recommendation

The proposed activities may proceed as have been planned without the concern of loss of high sensitivity land capabilities or agricultural productivity. It is also expected that no segregation of high production agricultural resources will occur.

13 Conclusion

During the baseline assessment, four soil forms were identified throughout the 50 m regulated area namely Avalon, Longlands, Westleigh and Rensburg. The Avalon soil form is of most importance in the study area as it demonstrates the most sensitive land capability, but in a limited extent.

The Avalon's land capability has been determined to be class "**II**" and a climate capability level 8 has been assigned to the area given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the most sensitive determined land capability and climate capability resulted in a land potential level "L5". According to Smith (2006), the "L5" land potential level is characterised by restricted potential. Regular and/or moderate to severe limitations are expected due to soil, slope, temperatures or rainfall.

The land potential level, mentioned above, was used to determine the sensitivities of soil resources. "Moderately Low" sensitivities were determined throughout the project area by means of baseline findings. These baseline findings concur well with the Department of Agriculture, Forestry and Fisheries (DAFF, 2017) which also indicated "Moderately Low" sensitivities as well as "Moderately high" sensitivities.

Considering the low sensitivities associated with land potential resources, it is the specialist's opinion that the proposed activities will have an acceptable impact on soil resources and that the proposed activities should proceed as have been planned as no loss of land capability is evident. It is also expected that no segregation of high production agricultural resources will occur.

14 References

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