PROPOSED DEVELOPMENT OF THE RICHARDS BAY COMBINED CYCLE POWER PLANT (CCPP) AND ASSOCIATED INFRASTRUCTURE ON A SITE NEAR RICHARDS BAY, KWAZULU-NATAL PROVINCE - SCOPING STUDY

AGRICULTURAL POTENTIAL

CLIENT

AFZELIA

DATE

28 April 2017

REFERENCE

RICHARDS BAY

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Report name	**PROPOSED DEVELOPMENT OF THE RICHARDS BAY COMBINED CYCLE POWER PLANT (CCPP) AND ASSOCIATED INFRASTRUCTURE ON A SITE NEAR RICHARDS BAY, KWAZULU-NATAL PROVINCE - SCOPING STUDY** **AGRICULTURAL POTENTIAL**	
Reference code	**RICHARDS BAY**	
Submitted to	**AFZELIA**	
Report writer	**Wayne Jackson**	

Wayne Jackson is a Soils Scientist & Hydrologist, and has 9 years' experience in the classification of soils, both nationally and internationally. Wayne completed a B.Sc. degree (Soil Science and Hydrology) from the University of KwaZulu-Natal and has 8 years of consulting experience.

Wayne specialises in soil surveying using the South African taxonomic classification system, Soil sample analysis, Fertilizer recommendations, rehabilitation strategies, land contamination assessments, water resources analyses, drainage designs, water reticulation systems (Bulk & infield), crop water demand assessments, Compliance Monitoring and Integrated Waste Management Plans. Wayne has gained experience working throughout Africa specifically Liberia, Tanzania, Cameroon, and DRC.

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1 INTRODUCTION

The Biodiversity Company (TBC) was appointed to undertake an Agricultural Potential Scoping Study for a proposed development site associated with the Richards Bay Combined Cycle Power Plant (CCPP) and associated infrastructure project. The proposed project will only be developed on Erf 2/11376 (65ha) and Erf 4/11376 (6ha). Eskom proposes to construct and operate the CCPP, which will have an installed capacity of 3000 MW, and an inclusive footprint of 40-60 ha. The site is also located within the Industrial Development Zone (IDZ) of Richards Bay.

The conservation of South Africa's limited soil resources is essential. In the past misuse and poor management of the soil resource has led to the loss of the resource through erosion and destabilisation of the natural systems. In addition, loss of high potential agricultural land due to land use changes is currently a big concern in South Africa.

Soil can be seen as the foundation for ecological function as shown in Figure 1. Without a healthy soil system for microbes to thrive in, both flora and fauna would be negatively impacted, which in turn feeds the natural soil system with organics and nutrients.

To identify soils accurately, it is necessary to undertake a soil survey. The aim is to provide an accurate record of the soil resources of an area. Land capability and land potential is then determined from these results. The objective of determining the land capability/potential is to find and identify the most sustainable use of the soil resource without degrading the system.

Soil mapping is essential to determine the types of soils present, their depths, their land capability and land potential. These results will then be used to provide practical recommendations on preserving and managing the soil resource.

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Figure 1: The relationship between soil and above-ground ecological succession.

2 PROJECT AREA

The project site is located in the greater Richards Bay area on the KwaZulu-Natal north coast (Figure 2).

Figure 2: Map showing the project site

3 KEY LEGISLATIVE REQUIREMENTS

Currently, various pieces of legislation and related policies exist that guide and direct the land user in terms of land use planning both on a national and provincial level. This legislation includes, but is not limited to:

- The Constitution of the Republic of South Africa (Act 108 of 1996);
- Sub-division of Agricultural Land Act (Act 70 of 1970);
- Municipal Structures Act (Act 117 of 1998);
- Municipal Systems Act (Act 32 of 2000); and
- Spatial Planning and Land Use Management Act, 16 of 2013 (not yet implemented).

The above are supported by additional legislation that aims to manage the impact of development on the environment and the natural resource base of the country. Related legislation to this effect includes:

- Conservation of Agricultural Resources Act (Act 43 of 1983);
- Environment Conservation Act (Act 73 of 1989);
- National Environmental Management Act (Act 107 of 1998); and
- National Water Act (Act 36 of 1998).

4 LIMITATIONS

This scoping level assessment was conducted as a desktop study exercise only, no site inspections have been completed. The scoping study has therefore assumed that all information provided for the study is correct.

5 METHODOLOGY

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

- Historic climatic conditions;
- The terrain features using 5m contours;
- The base soils information from the land type database (Land Type Survey Staff, 1972 - 2006);
- The geology for the proposed development site; and
- Phase 2 EIA methodology included 7.1.

6 RESULTS

6.1 Climate

The project area receives about 1200 mm of mean annual rainfall. The following list contains the dominant climatic features of the proposed development site:

- The average daily temperature for the area is 24 °C; and
- The frost risk for the area is moderate.

6.2 Terrain

The project area was assessed by using 5m contour terrain data. The contours were used to create a digital elevation model (DEM). The DEM was then used to create a relief map (Figure 3), a slope percentage map (Figure 4), and a slope aspect map (Figure 5).

The relief map: The project area is relatively flat with the maximum and minimum elevations being between 25m and 35m above sea level.

The slope map: The project area is very flat with the slopes all being no more than 4%.

The aspect map: The map shows that the site is mostly south facing.

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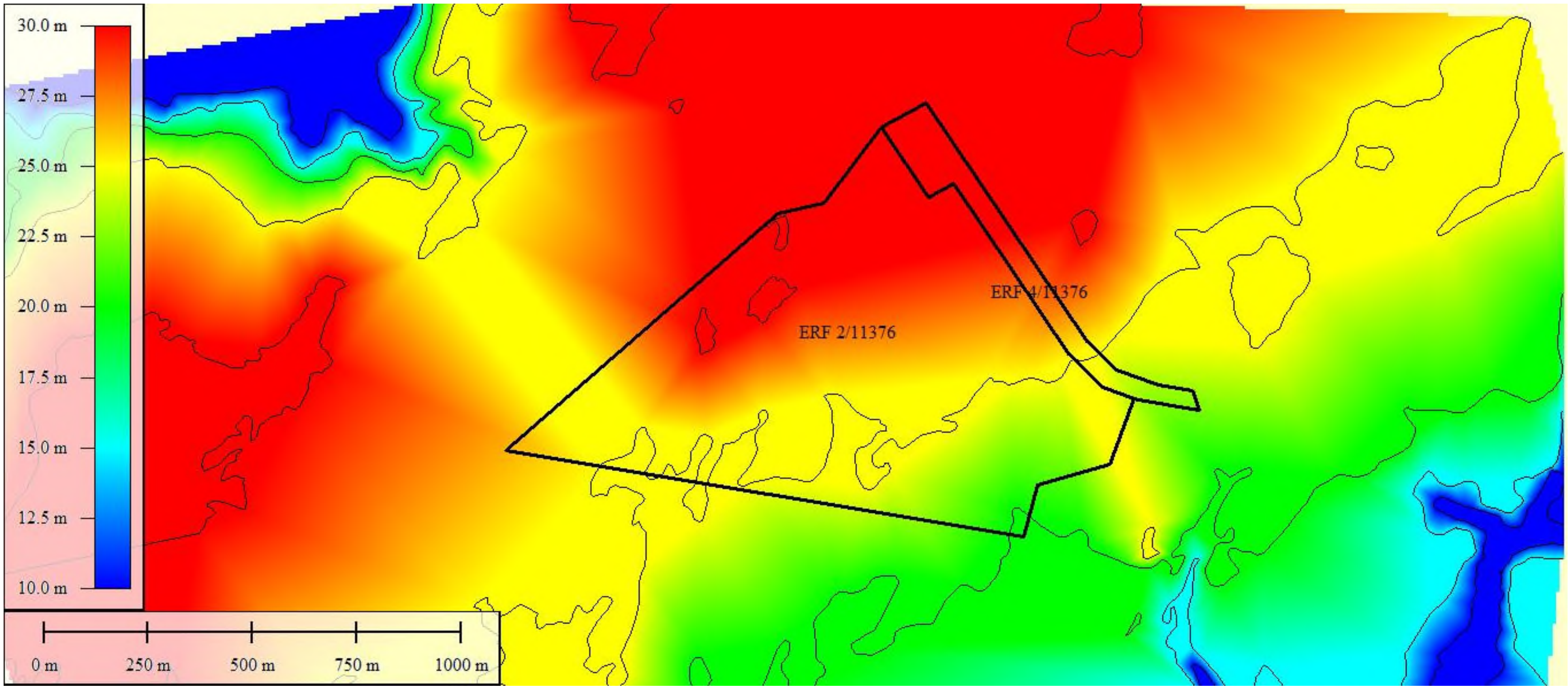

Figure 3: The relief map for the project area.

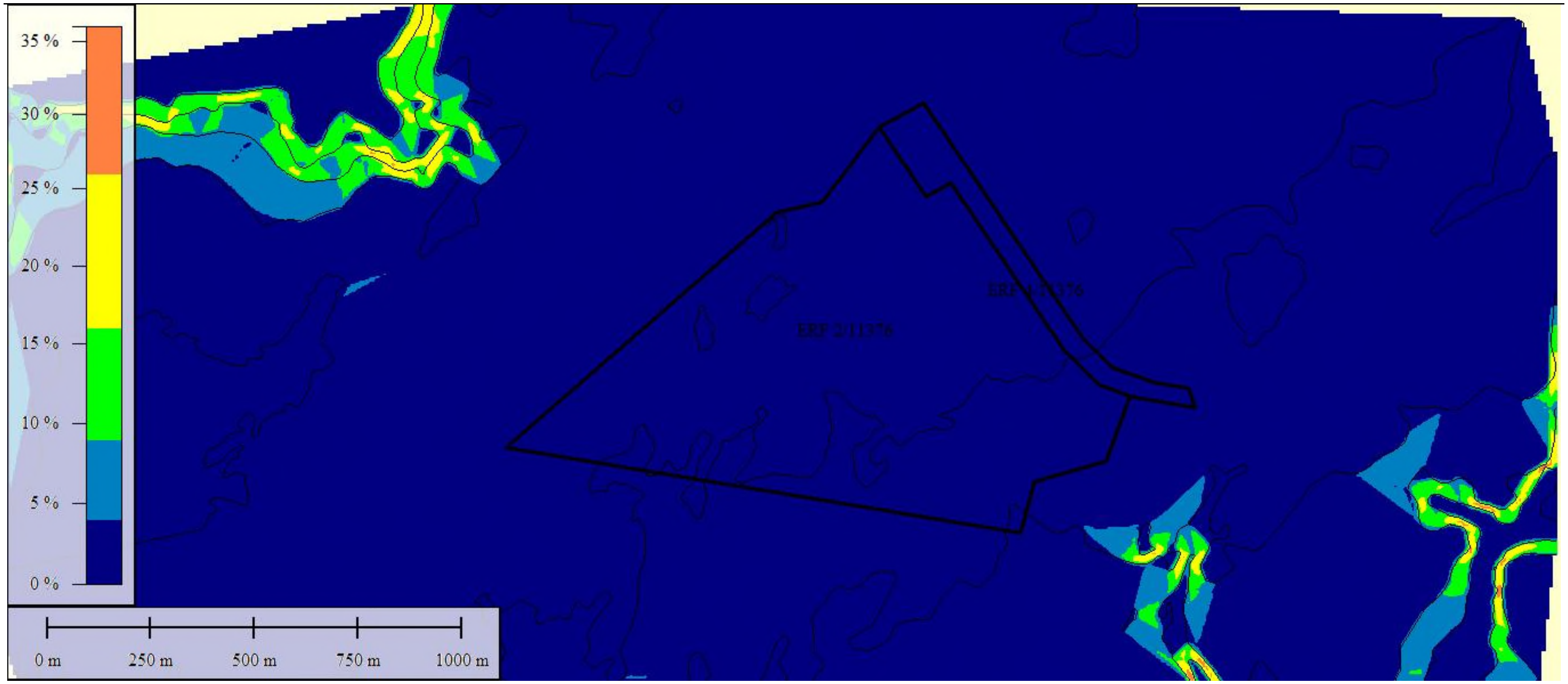

Figure 4: The Slope Percentage map for project area.

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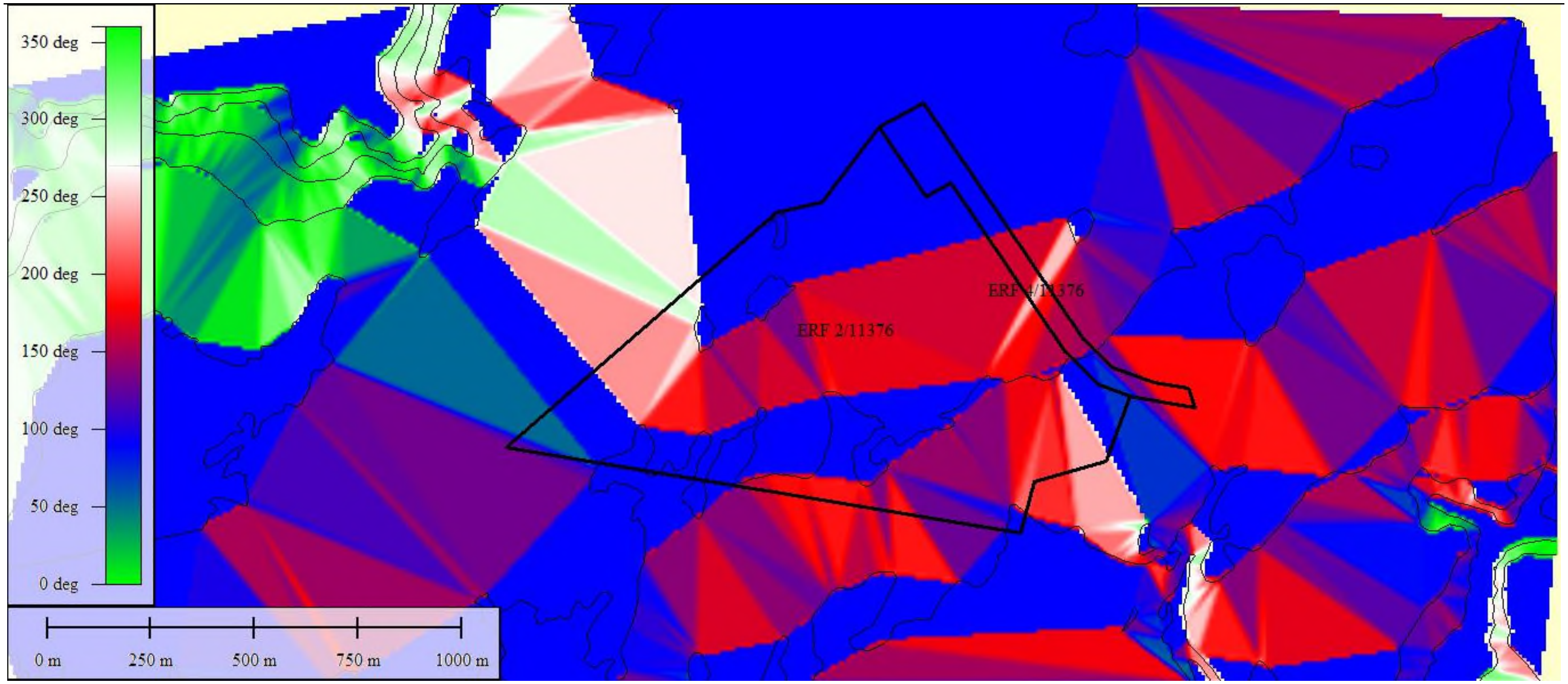

Figure 5: The Slope Aspect map for project area.

6.2.1 Geology & Soils

The geology of the area is mainly yellowish redistributed sand, with small areas of alluvium.

According to the land type database (Land Type Survey Staff, 1972 - 2006) the project falls within the Hb75 land type. It is expected that, the dominant soils in the crest and midslope positions will be soils of the Fernwood and Villafontes forms. The soils that dominated the footslopes and the valley bottoms are the Fernwoods and Champagne soil form.

The average land capability for the land type is Class III (moderate cultivation). Class III land would pose moderate limitations to agriculture with some erosion hazard, and would require special conservation practice and tillage methods. The farming method for this capability would require the rotation of crops and ley (50%).

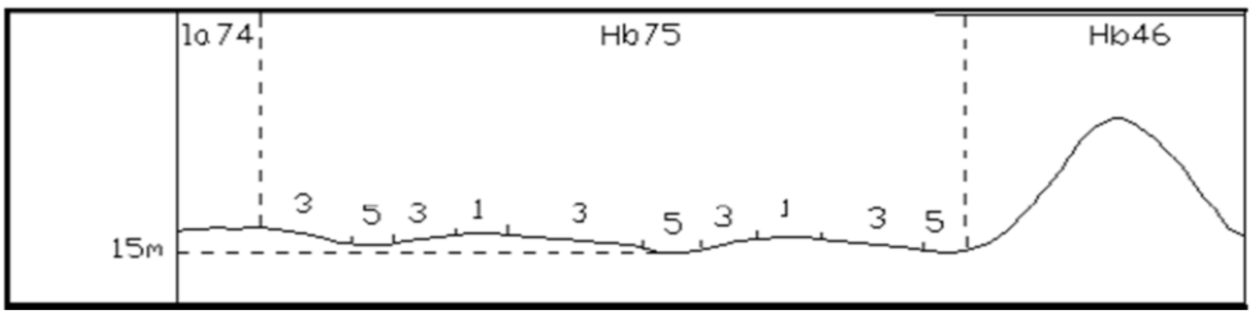

Figure 6: Land type HB75 terrain form A1

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Figure 7: Land type map for the project area

7 DISCUSSION

The project area is flat in relief with slopes of less than 4%. The land type data suggest that sandy E-horizon type soils (Fernwood and Villafontes) are present in the crest to midslope positions, with organic soils in the valley bottoms. The average land capability based on the land type data is that of a class III (moderate cultivation). Class III land would pose moderate limitations to agriculture with some erosion hazard, and would require special conservation practice and tillage methods. The farming method for this capability would require the rotation of crops and ley (50%).

The current land use seems to be natural veld with some depressions and some disturbed areas.

The land capability would need to be verified in the field however the potential impacts that could arise from the development are as follows:

Table 1: Potential impacts expected for the proposed development

Impact	Description	Mitigation
Loss of agricultural land and / or loss of agricultural potential as a result of the proposed activity	• Potential disturbances include compaction, physical removal and potential pollution. The exposed soil surfaces have the potential to erode easily if left uncovered which could lead to the loss of the soil resource. • Soil that are excavated for the installation of foundations will have their physical and chemical states altered negatively; • Potential loss of stockpiled topsoil and other materials through erosion if not protected properly; • Insufficient stormwater control measures may result in localised high levels of soil erosion, possibly creating dongas or gullies, which may lead to decreased water quality in surrounding watercourses; • Increased erosion could result in increased sedimentation which could impact on ecological processes; • The additional hardened surfaces created during construction could increase the amount of stormwater runoff, which has the potential to cause erosion; • Physical disturbance of the soil and plant removal may result in soil erosion/loss; and • Erosion and potential soil loss from cut and fill activities and areas where naturally dispersive soils occur.	• Soil erosion prevention measures should be implemented such as gabions, sand bags etc. while energy dissipaters should be constructed at any surface water outflow points. The site should be monitored weekly for any signs of off-site siltation. All areas impacted by earth-moving activities should be re-shaped post-construction to ensure natural flow of runoff and to prevent ponding. All exposed earth should be rehabilitated promptly with suitable vegetation to stabilise the soil; • The areas surrounding watercourse crossings must be regularly checked for signs of erosion. If erosion is evident, corrective action must be taken; • Any exposed earth should be rehabilitated promptly with suitable vegetation to protect the soil. Vigorous grasses planted with fertiliser are very effective at covering exposed soil. It is important to note, that the use of fertilisers, must be undertaken with caution and must not be allowed, in any circumstances, to run into drainage lines, rivers, wetlands or the dams, to avoid any possible Eutrophication impacts. • Special care and erosion prevention measures must be taken when working in areas where naturally dispersive soils occur. Final designs must take into account specialised recommendations made by the geotechnical engineers for sensitive areas which may be naturally prone to soil erosion.

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Table 2: A summary of potential issues, impacts and likely No-Go areas identified for the study

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Development of the facility will result in the loss of Agricultural potential	Loss of non-renewable soil resource Erosion and sedimentation Loss of natural vegetation cover	Local	The Class III land capability would need to be confirmed.
Gaps: No layout alternatives or project descriptions were made available for the scoping study, therefore the likely extent and significance of impacts is based on expected impacts only, and is not an accurate indication for this stage of the project.			

7.1 Field Verification Methodology for Phase 2 EIA

A soil auger will be used to determine the soil form/family and depth. The soil will be hand augured to the first restricting layer or 1.5 m. Soil survey positions will be recorded as waypoints using a handheld GPS. Soils will be identified to the soil family level as per the "Soil Classification: A Taxonomic System for South Africa" (Soil Classification Working Group, 1991). Landscape features such as existing open trenches will also be helpful in determining soil types and depth.

Agricultural Potential Assessment

Land capability and agricultural potential is 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 (Smith, 2006)

Land capability is divided into eight classes and these may be divided into three capability groups. Table 3 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: 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		

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III	W	F	LG	MG	IG	LC	MC			
IV	W	F	LG	MG	IG	LC				
V	W		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 4. The final land potential results are then described in Table 5.

Table 4: 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 5: 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.

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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

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8 REFERENCES

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