SCOPING REPORT:
SOIL AND AGRICULTURAL POTENTIAL OF PORTIONS OF THE FARMS LANGEBERG 187 AND UYEKRAAL 189 IN THE WESTERN CAPE PROVINCE

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DECLARATIONS

I, Petrus Stephanus Rossouw, declare that I –

- act as an independent specialist consultant in the fields of Soil Science and the Assessment of the Agricultural Potential, Land Use and Land Capability of soil;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2006;
- have and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report; and
- will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

P.S. ROSSOUW

I, Johan Hilgard van der Waals, declare that I –

- act as an independent specialist consultant in the fields of Soil Science and the Assessment of the Agricultural Potential, Land Use and Land Capability of soil;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2006;
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- will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

J.H. VAN DER WAALS

EXECUTIVE SUMMARY

Savannah Environmental (Pty) Ltd., on behalf of CRENERSOL, contracted Terra Soil Science cc to carry out a soil, agricultural potential, land type and land use study for portions of the farms Langeberg 187 and Uyekraal 189 in the Western Cape Province. The area comprises a total of 533.3 hectares.

The Langeberg and Uyekraal farm portions (West Coast region near Vredenburg) have been proposed to serve as a locality for the construction and operation of a commercial wind energy component (wind turbines) with associated infrastructure.

This study forms part of the scoping phase for an environmental impact assessment (EIA) and aims to determine the possible impact that this development could have on the soil environment, with emphasis on land use, land capability and agricultural potential.

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 area lies predominantly in the Hb land type, although a small area in the southern portion lies in the Fc land type. The Hb land type is described as “Grey regic sands” and stated to accommodate areas where the Fernwood soil form is a prominent feature. The “grey regic sand” soils and shallow rocky soils make up at least 80 % of the landscape.

The Fc land type is described as “Glenrosa and/or Mispah forms” and accommodates pedologically young landscapes that are not predominantly rock or aeolian and alluvial. The most dominant soil forming process is that of weathering. This gives rise to orthic topsoil horizons and clay illuviation. Lime is encountered regularly in this land type. The Mispah and Glenrosa soil forms dominate this landscape.

The soils of the survey area fall mainly into Class VI land capability: Land which has such severe soil and/or slope limitations that cropping must be excluded, but which is productive under perennial vegetation, but is susceptible to moderate erosion. Limitations include steep slopes, very shallow soil and physical hazards of rock outcrops and unevenness. Its use is one of permanent grassland, which, with sound methods of veld management, can provide good grazing or hay.

The soils of the study area, for the greater part, are shallow and overlie hard or weathering rock. The majority of the soils that are deep exhibit a sandy texture, low water holding capacity and binds plant nutrients poorly. The latter is especially the case for the soils of the Fernwood soil form. The soils of the study are of low agricultural potential.

The nature of the impact on soils includes the compaction and possibly the stripping and stockpiling of soil for construction purposes. Heavy machinery traffic on the soil surface could constitute further impacts on soil.

The impact on soils will be limited to the immediate area or site of development (local) and is assessed as follows:

- Significance rating: MODERATE. The productivity of the soil will cease until rehabilitation takes place. The area is of low agricultural potential and does not contribute, in a significant way, to food security in South Africa. This lowers the significance rating from high to moderate.
- Extent: SITE OF DEVELOPMENT in the case of primary impacts but can extend to surrounding area in the case of secondary impacts such as access routes to the site.
- Duration (temporal scale): LONG TERM to permanent
- Degree of certainty: DEFINITE

It is imperative that the Environmental Impact Assessment (EIA) include a survey of the area to verify the deductions made from the desktop study (scoping report) in terms of:

- Soil form and distribution (for recommendation of detail mitigation measures related to construction activities and potential land degradation)
- Agricultural potential;
- Current and possible land use;
- Land Capability; and
- Possible occurrence of wetland areas.

The land type data does not indicate a wetland in the study area. It is, however, important to remember that the land type data are based on 1:250 000 surveys and was compiled prior to the compilation of “A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas” (Department: Water Affairs and Forestry). Furthermore, the occurrence of soils of the Fernwood and Oakleaf soil forms might indicate some water movement in the landscape. The occurrence of these soils can simply be due to parent material and the weathering rates encountered in this landscape. Wetlands are protected areas and any development should take this into account. A survey of the area will shed light on this aspect.

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SOIL AND AGRICULTURAL POTENTIAL OF PORTIONS OF THE FARM LANGEBERG 189 AND UYEKRAAL 187 SITUATED IN THE WESTERN CAPE PROVINCE

1. TERMS OF REFERENCE

Savannah Environmental (Pty) Ltd., on behalf of CRENERSOL, contracted Terra Soil Science cc to carry out a soil, agricultural potential, land type and land use study for portions of the farms Langeberg 187 and Uyekraal 189 in the Western Cape Province. The area comprises a total of 533.3 hectares.

2. INTRODUCTION

The Langeberg and Uyekraal portions (West Coast region near Vredenburg) have been proposed to serve as a locality for the construction and operation of a commercial wind energy component (wind turbines) with associated infrastructure.

This study forms part of the scoping phase for an environmental impact assessment (EIA) and aims to determine the possible impact that this development could have on the soil environment, with emphasis on land use, land capability and agricultural potential.

2.1 Survey Area Boundary

The area lies between 32˚ 58' 15.26" and 33˚ 00' 26.68" S and 18˚ 03' 03.81" and 18˚ 04' 55.64" E approximately 13 km east of Saldanha, Western Cape Province. Figure 1 is a locality map.

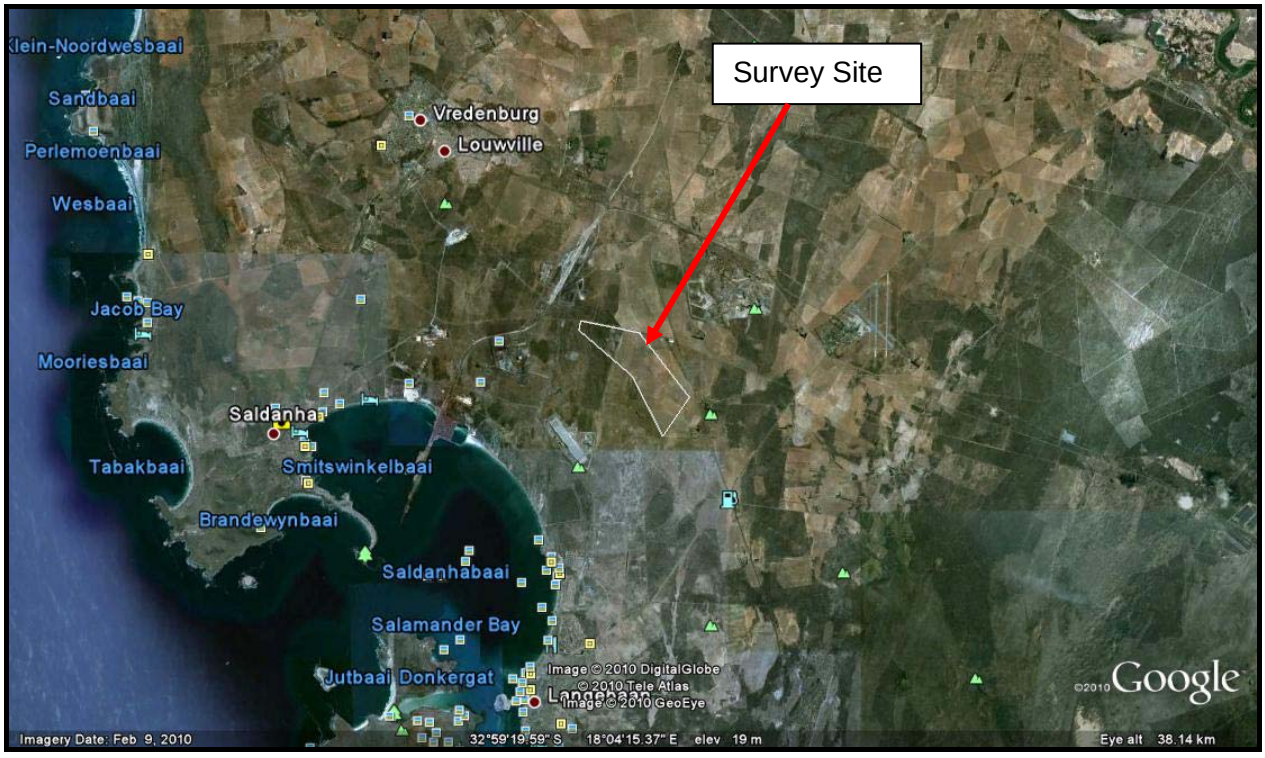

Figure 1 The survey site is situated between the coordinates 32˚ 58' 15.26" and 33˚ 00' 26.68" S and 18˚ 03' 03.81" and 18˚ 04' 55.64" E

2.2 Survey Area Physical Features

The survey area slopes from north to south. The northern section of the site is elevated approximately 28 m above sea level while the southern section lies 12 m above sea level.

2.3 Agricultural Potential Background

The assessment of agricultural potential rests primarily on the identification of soils that are suited to crop production. In order to qualify as high potential soils they must have the following properties:

- Deep profile (more than 600 mm) for adequate root development,
- Deep profile and adequate clay content for the storing of sufficient water so that plants can weather short dry spells,
- Adequate structure (loose enough and not dense) that allows for good root development,
- Sufficient clay or organic matter to ensure retention and supply of plant nutrients,
- Limited quantities of rock in the matrix that would otherwise limit tilling options and water holding capacity,
- Adequate distribution of soils and size of high potential soil area to constitute a viable economic management unit, and
- Good enough internal and external (out of profile) drainage if irrigation practices are considered. Drainage is imperative for the removal (leaching) of salts that accumulate in profiles during irrigation and fertilization.

In addition to soil characteristics climatic characteristics need to be assessed to determine the agriculture potential of a site. The rainfall characteristics are of primary importance and in order to provide an adequate baseline for the viable production of crops rainfall quantities and distribution need to be sufficient and optimal. The combination of the above mentioned factors will be used to assess the agricultural potential of the soils on the site.

3 METHOD OF SURVEY

3.1 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 entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System (MacVicar et al., 1977). The soil data was interpreted and re-classified according to the Taxonomic System (MacVicar, C.N. et al. 1991).

3.2 Rainfall data

Rainfall data for the area was obtained from the Department of Agriculture (AGIS).

4 DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 Land Type Data

The area lies predominantly in the Hb land type, although a small area in the southern portion lies in the Fc land type (Land Type Survey Staff, 1972 – 2006). Figure 2 is a map of the area that illustrates the land types encountered in the area. The Hb land type is described as “Grey regic sands” and stated to accommodate areas where the Fernwood soil form is a prominent feature. The “grey regic sand” soils make up at least 80 % of the landscape.

The Fc land type is described as “Glenrosa and/or Mispah forms” and accommodates pedologically young landscapes that are not predominantly rock or aeolian and alluvial. The most dominant soil forming process is that of weathering. This gives rise to orthic topsoil horizons and clay illuviation. Lime is encountered regularly in this land type. The Mispah and Glenrosa soil forms dominate this landscape

4.1.1 The Hb14 and Hb22 land types

The following soil forms are encountered in the Hb14 and Hb22 land types:

- The Mispah soil form comprises an orthic A-horizon that overlies hard rock. These soils range in depth from 100 to 400 mm.
- The Fernwood soil form comprises an orthic A-horizon overlying a deep E-horizon on unspecified material. The E-horizon is essentially greyish in colour (bleached), paler than the overlying topsoil and the horizon which underlies it, relatively coarse textured and without structure. Temporary build-up of water above the underlying material, reduction and lateral removal of iron oxides, organic matter and clay particles give rise to the development of E-horizons. Coarse materials require relatively mild reducing conditions to develop this bleached appearance. E-horizons can be very hard and brittle when dry. In this case any subsoil layer that restricts drainage lies at between 400 and more than 1200 mm below the soil surface.
- The Clovelly soil form comprises an orthic A-horizon overlying a yellow-brown apedal B-horizon, underlain by unspecified material. The yellow-brown apedal B-horizon has macroscopically weakly developed structure or is altogether without structure and reflects weathering under well drained, oxidised conditions. The clay fraction is dominated by non-swelling 1:1 clay minerals and the yellow-brown colour of the soil is ascribed to iron oxide coatings on individual soil particles that are dominated by goethite. These soils range in depth from a 1000 to 1200 mm.
- The Oakleaf soil form comprises an orthic A-horizon that overlies a neocutanic B-horizon and unspecified material. The neocutanic B-horizon is characterised by colour variation due to clay movement and accumulation and an apedal or weakly developed structure. Soils of this soil form range in depth from 400 to 600 mm.

Eighty five percent and 94 % of land type Hb14 and Hb22, respectively, are located in terrain unit 4. Terrain units are indicative of the position in the landscape of soils. Figures 2 and 3 illustrate the concept of terrain units.

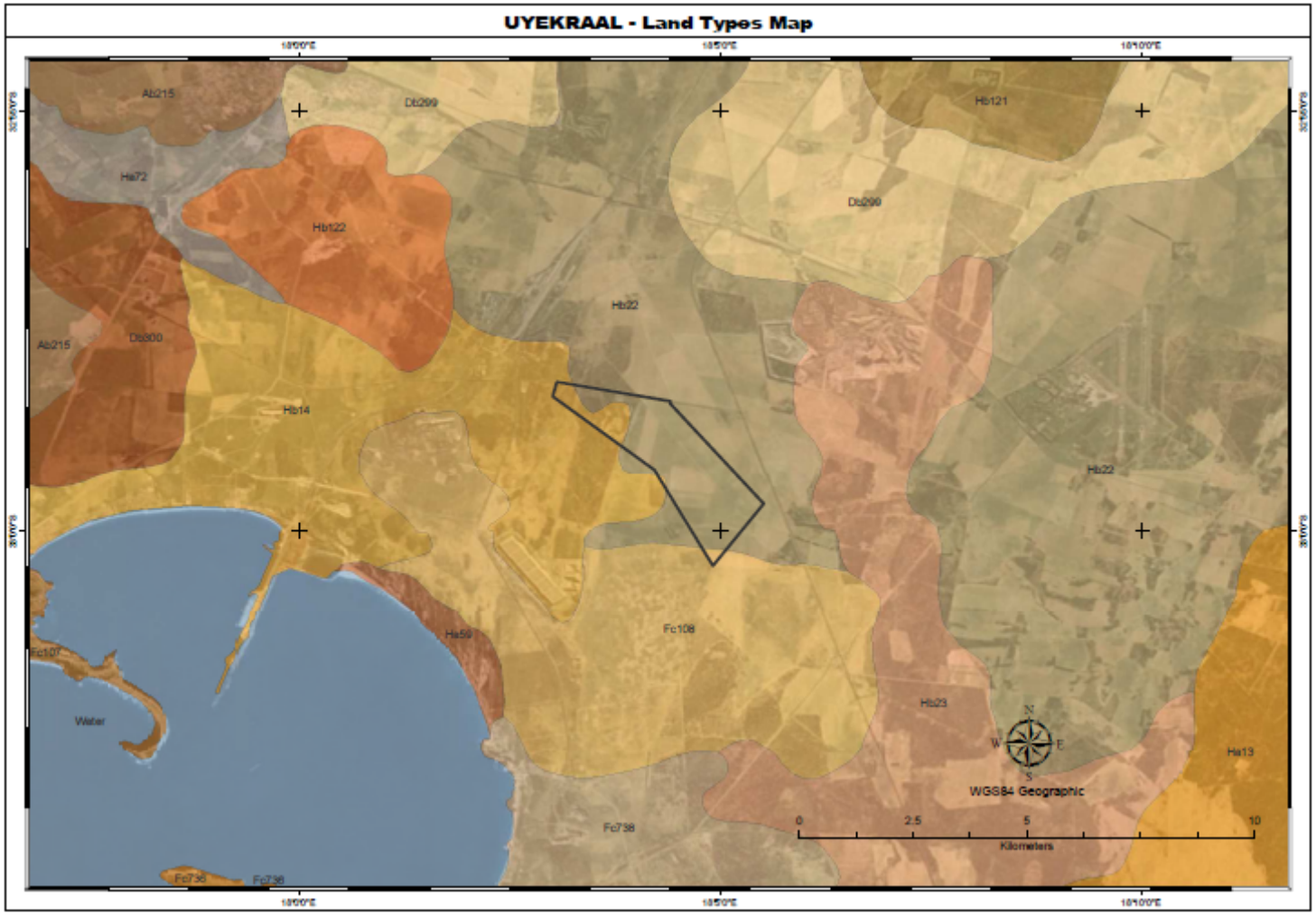

Figure 2 The survey area lies in the Hb and Fc land types which are described as described as “Grey regic sands” and ‘Glenrosa and/or Mispah soils”

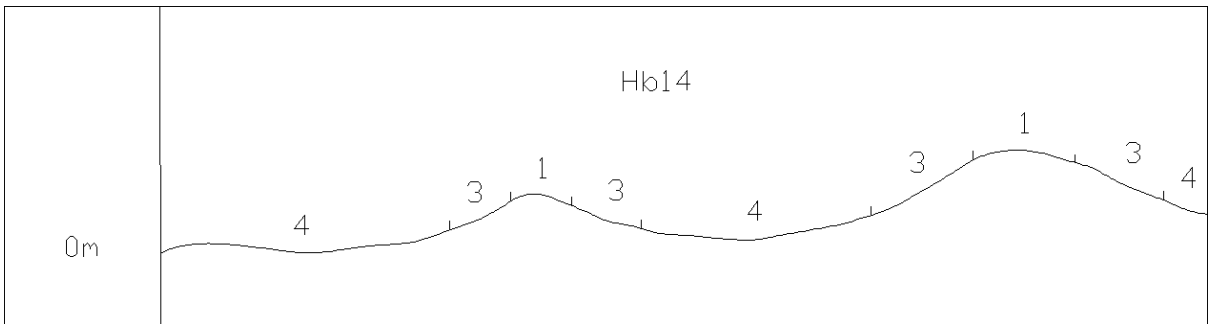

Figure 3 Terrain units are indicative of the position in the landscape of the soils encountered in the Hb14 land type (Department of Agriculture and Water Supply, 1987)

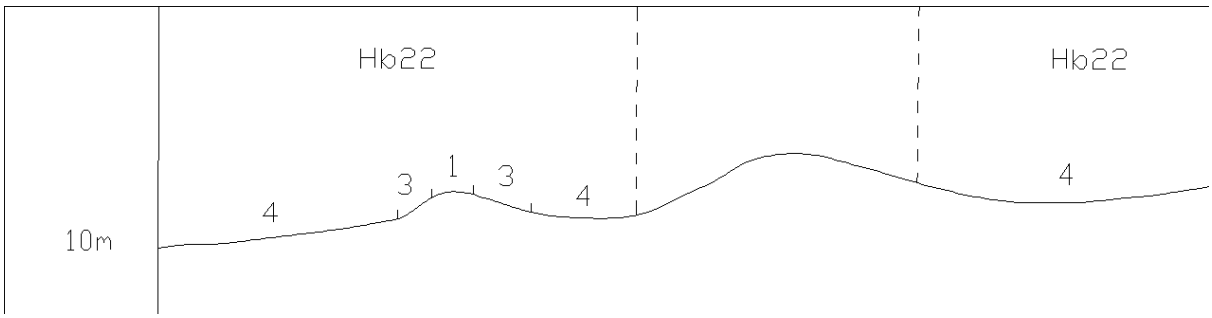

Figure 4 Terrain units are indicative of the position in the landscape of the soils encountered in the Hb22 land type (Department of Agriculture and Water Supply, 1987)

Table 1 and 2 summarise the percentage of specific soil forms encountered in terrain unit 4 of land type Hb 14 and Hb22

Table 1 The percentage of specific soil forms encountered in terrain unit 4 of land type Hb14

Soil Form	Percentage of Terrain Unit 4 in Land type Hb14
Mispah	45
Fernwood	45
Clovelly	7
Oakleaf	2
Rock	1

Table 2 The percentage of specific soil forms encountered in terrain unit 4 of land type Hb22

Soil Form	Percentage of Terrain Unit 4 in Land type Hb22
Mispah	45
Fernwood	40
Clovelly	10
Oakleaf	1
Rock	4

4.1.2 The Fc108 land type

The Fc108 land type comprises soils of the Mispah and Fernwood soil forms. The soils of the Mispah soil form range in depth from 20 to 300 mm and the soils of the Fernwood soil form from 600 to 1200+ mm. Ninety two percent of the land type is situated in terrain unit 4. The position of terrain unit 4 in this landscape is indicated by Figure 5. Terrain unit 4 is made up of 20 % rock, 67 % soils of the Mispa soil form and 13 % soil of the Fernwood soil form.

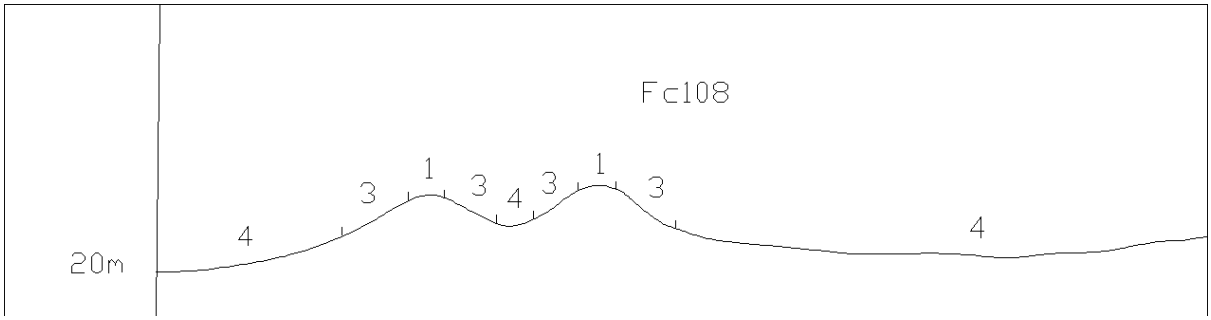

Figure 5 Terrain units are indicative of the position in the landscape of the soils encountered in the Fc108 land type (Department of Agriculture and Water Supply, 1987)

4.2 Land Capability

Eight land capability classes are recognised and these are divided into three land capability groups. Table 3 summarises this division.

Table 3 Land capability classes and intensity of use

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		LG	MG						Grazing land
VI	W	F	LG	MG						
VII	W	F	LG							
VIII	W									Wildlife

W - wildlife
F - forestry
LG - light grazing
MG - moderate grazing
IG - intensive grazing
LC - light cultivation
MC - moderate cultivation
IC - intensive cultivation
VIC - very intensive cultivation

The soils of the survey area mainly fall into Class VI:

- Class VI: Land which has such severe soil and/or slope limitations that cropping must be excluded, but which is productive under perennial vegetation, but is susceptible to moderate erosion. Limitations include steep slopes, very shallow soil and physical hazards of rock outcrops and unevenness. Its use is one of permanent grassland, which, with sound methods of veld management, can provide good grazing or hay.

4.3 Rainfall Data

The rainfall for the area varies from 201 to 400 mm per year. Figure 6 is a map that indicates the mean annual rainfall for South Africa.

5 AGRICULTURAL POTENTIAL

The soils of the study area, for the greater part, are shallow and overlie hard or weathering rock. The majority of the soils that are deep exhibit a sandy texture, low water holding capacity and binds plant nutrients poorly. The latter is especially the case for the soils of the Fernwood soil form. The soils of the study are of **low agricultural potential**.

The low rainfall also inhibits dry-land crop production. It is unsure whether an adequate water source is available for irrigation. Crop production can be viable on the deep soils of the Clovelly and Oakleaf soil forms but these make up a small portion of the site.

The soils of the study area can only be used for carefully managed grazing.

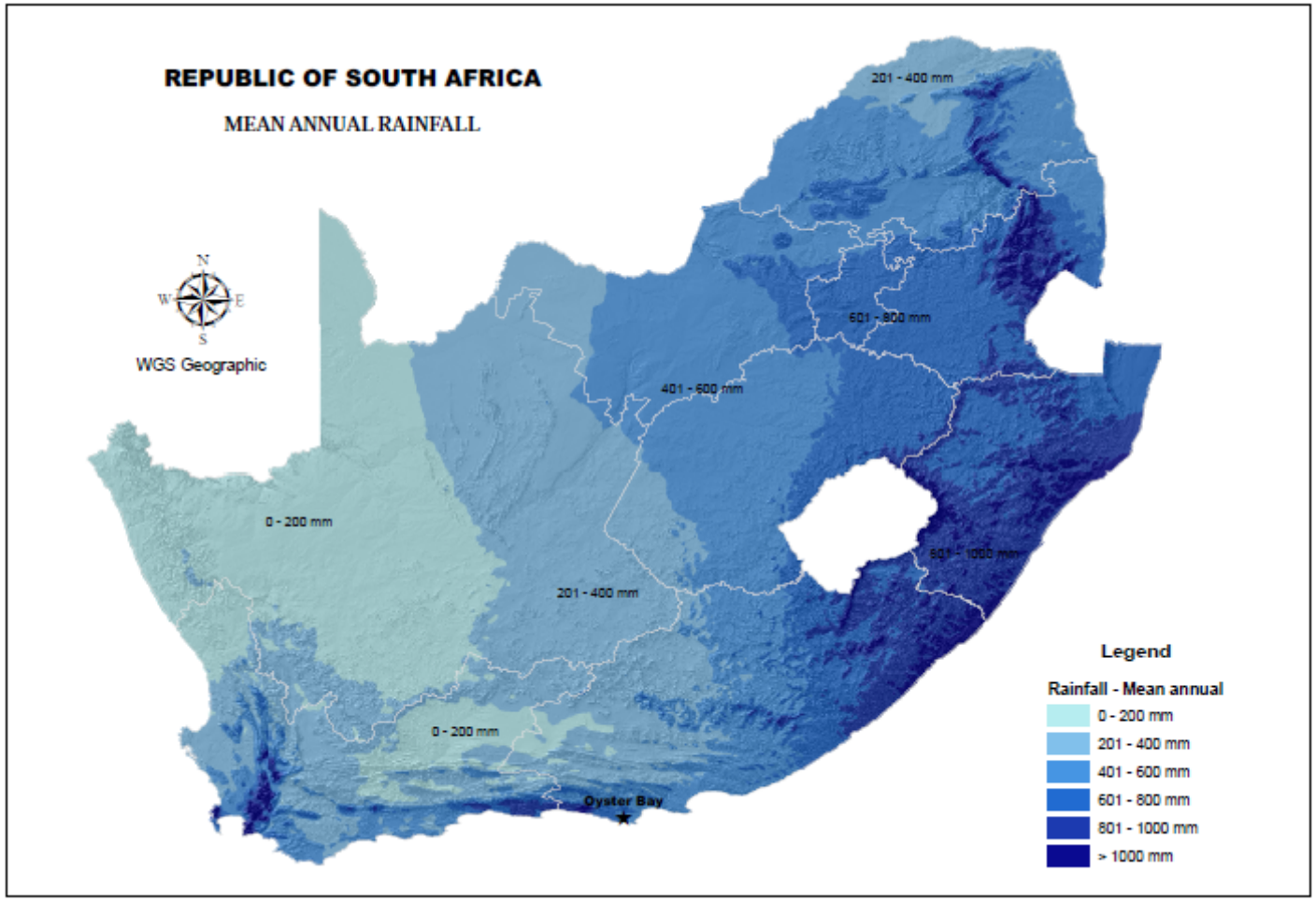

Figure 6 Mean annual rainfall for the Republic of South Africa

6 SCOPING EVALUATION

6.1 Impact on the Agricultural Potential and Land Capability

The nature of the impact on soils includes the compaction and possibly the stripping and stockpiling of soil for construction purposes. Heavy machinery traffic on the soil surface could constitute further impacts on soil.

Compaction, stripping and stockpiling of soil usually result in:

- Loss of the original spatial distribution of natural soil forms and horizon sequences.
- Loss of natural topography and drainage pattern.
- Loss of original soil depth and soil volume.
- Loss of original fertility and organic carbon content.
- Soil compaction will adversely affect root development, effective soil depth and general soil fertility (in certain instances extensive surface crusting can occur that has a negative impact on revegetation efforts).

The impact on soils will be limited to the immediate area or site of development (local) and is assessed as follows:

- Significance rating: MODERATE because the productivity of the soil will cease until rehabilitation takes place. The area is of low agricultural potential and does not contribute, in a significant way, to food security in South Africa. This lowers the significant rating from high to moderate.
- Extent (spatial scale): SITE OF DEVELOPMENT in the case of primary impacts but can extend to surrounding area in the case of secondary impacts such as access routes to the site.
- Duration (temporal scale): LONG TERM to permanent
- Degree of certainty: DEFINITE

6.2 Identification of Potentially Significant Impacts

It is imperative that the Environmental Impact Assessment (EIA) include a survey of the area to verify the deductions made from the desktop study (scoping report) in terms of:

- Soil form and distribution (for recommendation of detail mitigation measures related to construction activities and potential land degradation)
- Agricultural potential;
- Current and possible land use;
- Land Capability; and
- Possible occurrence of wetland areas.

The land type data does not indicate a wetland in the study area. It is, however, important to remember that the land type data are based on 1:250 000 surveys and was compiled prior to the compilation of “A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas” (Department: Water Affairs and Forestry). Furthermore, the occurrence of soils of the Fernwood and Oakleaf soil forms might indicate some water movement in the

landscape. The occurrence of these soils can simply be due to parent material and the weathering rates encountered in this landscape. Wetlands are protected areas and any development should take this into account. A survey of the area will shed light on this aspect.

A geological / erosion potential survey of the area will shed light on the mentioned aspects and current uncertainties. The following should be discussed:

- Soil potential linked to current land use and other possible uses and options;
- Cost-benefit analysis
- Water availability, source and quantity
- Access routes and condition thereof
- Surrounding developments and activities
- Economic viability
- Current status of land
- The implications of the proposed activities on soil quality and possible measures of mitigation

7 SUMMARY AND CONCLUSIONS

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8 REFERENCE

Land Type Survey Staff. 1972 – 2006. Land Types of South Africa: Digital map (1:250 000 scale) and soil inventory databases. ARC-Institute for Soil, Climate and Water, Pretoria.

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