OYSTER BAY WIND ENERGY FACILITY

SCOPING REPORT:
SOIL AND AGRICULTURAL POTENTIAL OF THE OYSTER BAY WIND ENERGY FACILITY IN THE EASTERN 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 Renewable-Energy Systems (RES) Southern Africa (Pty) Ltd, contracted Terra Soil Science cc to carry out a soil, agricultural potential, land type and land use study for Portion 3 of Farm Klein Rivier 713; Portion 1, 2, 3, 4 and the Remainder of Farm Rebok Rant 715; Portion 1 and 3 of Farm Ou Werf 738; Portion 5 of Farm Klippedrift 732; Portion 10 and Portion 12 of Farm Kruis Fontein 681 in the Eastern Cape Province. The area comprises a total of 2300 hectares.

The area has been proposed to serve as a locality for the construction and operation of a commercial renewable wind energy facility 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.

The area lies predominantly in the Bb and Ha land types (Land Type Survey Staff, 1972 – 2006). The Bb land type is described as a “Pinthic catena: upland duplex and margalitic soils rare”. A perfect catena is represented by (from higher to lower lying areas) Hutton, Bainsvlei, Avalon and Longlands soil forms. Gleyed soils, such as Rensburg, Willowbrook, Katspruit and Champagne soil forms, can occur in the valley bottom. Soils with hard plinthite are common in areas where sandstone underlies the area. Where water tables have not extended far beyond the valley bottom, red soils may dominate. In these cases plinthic soils are restricted to valley bottoms and pans.

The Ha land type is described as “Grey regic sands”. These units accommodate areas in which deep, grey sands of the Fernwood soil form are a prominent feature. More than 80% of the Ha land type is made up of these grey and deep sands.

The soils of the survey area fall into Class I, II and VI land capability. The soils of the area are mainly deep but may be difficult to cultivate owing to the occurrence of E-horizons and podzol B-horizons. Cultivation practices would have to be managed carefully.

Rainfall in this area is relatively high and should support dry-land agriculture, especially on soils of the Clovelly soil form. Close inspection of aerial photographs (Google Maps) indicate irrigation practices. The Kromriver is also situated near the site and might serve as a water source.

The area can mainly be deemed of **moderate to high agricultural potential**, although a site visit that entails a dedicated soil survey might indicate otherwise. Currently, the majority of the site is used for cattle and sheep farming and pastures.

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 re-vegetation efforts).

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

- Significance rating: This rating depends on the location of each wind turbine. If the wind turbines are built on areas of cultivation, the impact can be HIGH (dependant on the results obtained from a site visit and soil survey in terms of agricultural potential) but if the wind turbines are situated so that agricultural practices are not influence, the impact will be MODERATE or even LOW.
- 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

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;
- Agricultural potential;
- Current and possible land use;
- Land Capability; and
- Possible occurrence of wetland areas.

The land type data does not indicate wetlands in the study area, however drainage lines and rivers do occur. . 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 wide occurrence of the E-horizons (especially those located in the northern part of the area), podzol B-, soft plinthic B- and G-horizons, coupled with the proximity of the Kromriver, indicates water movement in the 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 survey of the area will shed light on the mentioned aspects and current uncertainties. The following methodology is proposed:

- The study area should be traversed and observations regarding the landscape and occurrence of soils made continuously. Specific soil characteristics should be noted and logged. Auguring, using a handheld soil auger, should be conducted on a grid that was designed to cover the area adequately. A TLB can be used to verify observations.

- The following should be noted:
  - Diagnostic soil horizons, soil form (SA taxonomic system) and soil depth at auguring point localities that were designed to adequately cover the area;
  - Soil colour, texture, structure;
  - Presence and intensity/frequency of mottles, concretions, and rocks;
  - Soils that display morphological indicators of temporary or seasonal wetness within 500 mm of the soil surface, together with those subject to prolonged and permanent saturation, must be delineated as hydromorphic or wetland soils.
- 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.

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2. INTRODUCTION

The mentioned area has been proposed to serve as a locality for the construction and operation of a commercial renewable wind energy facility 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 34˚ 03’ 56.33” and 24˚ 39’ 04.16” S and 34˚ 03’ 56.33” and 24˚ 40’ 49.84” E approximately 6 km north of Oyster Bay and 14 km south west of Humansdorp, Eastern Cape Province. Figure 1 is a locality map.

2.2 Survey Area Physical Features

The survey area is situated south of the Krom River. The floodplain of this river system encompasses a large part of the site. The survey area lies approximately 138 m in the north, 145 m in the east, 150 m in the west and 50 m in the south above sea level. The central part of the area is situated approximately 120 m above sea level. The area is mainly undulating.

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.

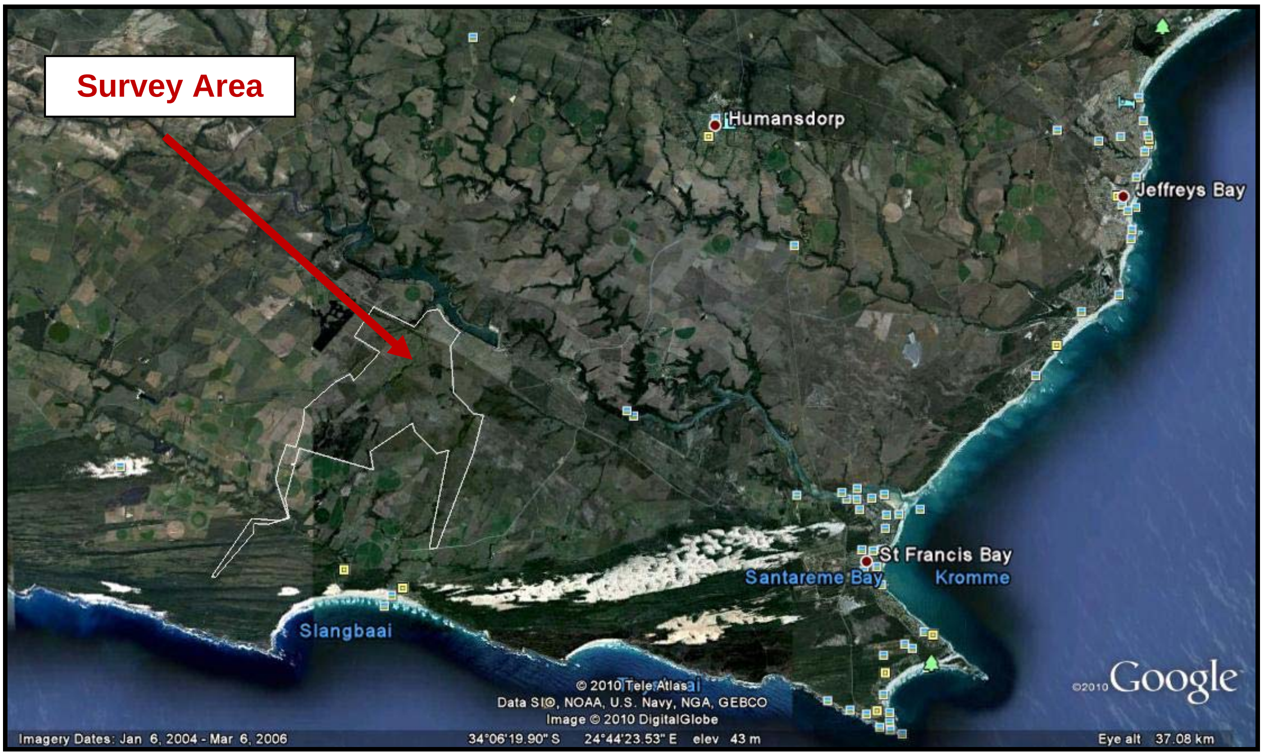

Figure 1 The area lies between 34˚ 03’ 56.33” and 24˚ 39’ 04.16” S and 34˚ 03’ 56.33” and 24˚ 40’ 49.84” E approximately 6 km north of Oyster Bay and 14 km south west of Humansdorp, Eastern Cape Province.

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 Bb and Ha land types (Land Type Survey Staff, 1972 – 2006). Figure 2 is a map of the area that illustrates the land types encountered in the area. The Bb land type is described as “Pinthic catena: upland duplex and margalitic soils rare”. A perfect catena is represented by (from higher to lower lying areas) Hutton, Bainsvlei, Avalon and Longlands soil forms. Gleyed soils, such as Rensburg, Willowbrook, Katspruit and Champagne soil forms, can occur in the valley bottom. Soils with hard plinthite are common in areas where sandstone underlies the area. Where water tables have not extended far beyond the valley bottom, red soils may dominate. In these cases plinthic soils are restricted to valley bottoms and pans.

The Ha land type is described as “Grey regic sands”. These units accommodate areas in which deep, grey sands of the Fernwood soil form are a prominent feature. More than 80% of the Ha land type is made up of these grey and deep sands.

4.1.1 The Bb75 land type

The following soil forms are encountered in this land type:

- The Mispah soil form comprises an orthic A-horizon that overlies hard rock. These soils range in depth from 200 to 300 mm.
- The Glenrosa soil form comprises an orthic A-horizon overlying a lithocutanic B-horizon. The lithocutanic B-horizon is a pedologically young horizon where clay illuviation has occurred. This is a horizon of minimal development. Soil depth ranges from 250 to 400 mm.
- 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 Al substituted goethite. These soils are all deeper than 1200 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 (not always) 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 more than 1200 mm below the soil surface.
- The Glencoe soil form comprises an orthic A-horizon overlying a yellow-brown apedal B-horizon and a hard-plinthic B-horizon. The hard-plinthic B-horizon consists

of an indurated zone of iron and manganese oxides (ironpan), also known as ferricrete, that is formed by the same processes that give rise to a soft plinthic B-horizon – if this process continues for a long enough period of time. Soil depth ranges from 700 to 900 mm.

- The Wasbank soil form comprises an orthic A-horizon overlying an E-horizon on a hard plinthic B-horizon. These soils range in depth from 400 to 800 mm.
- The Longlands soil form comprises an orthic A-horizon that overlies an E-horizon and soft plinthic B-horizon. The soft plinthic B-horizon is characterised by mottling (high chroma colouration) that is either found within a matrix of low chroma colouration or just above such a matrix. The mottles are vesicular in form and must encompass at least ten percent of the soil matrix. This horizon is indicative of a fluctuating water table. These soils range in depth from 400 to 800 mm.
- The Constantia soil form comprises an orthic A-horizon that overlies an E-horizon and a yellow brown apedal B-horizon. These soils are deeper than 1200 mm.
- The Dundee soil form comprises an orthic A-horizon that overlies a stratified alluvium. Stratified alluvial is unconsolidated material that exhibit layering owing to being deposited through alluvial or colluvial processes. These soils are deeper than 1200 mm.
- The Cartref soil form comprises an orthic A-horizon that overlies an E-horizon and a lithocutanic B-horizon. These soils range in depth from 250 to 400 mm.
- The Houwhoek soil form comprises an orthic A-horizon that overlies an E-horizon, an E-horizon, a podzol B-horizon and saprolite. The podzol B-horizon is a horizon that is enriched with organic matter and sesquioxide (Fe, Mn and Al) minerals. The saprolithic horizon comprises weathering rock. These soils range in depth from 300 to 600 mm.

A prominent feature in this landscape is that of water movement. The E-horizons and especially soft plinthic B-horizons and podzol B-horizons are indicative of lateral water flow and/or the occurrence of fluctuating water tables.

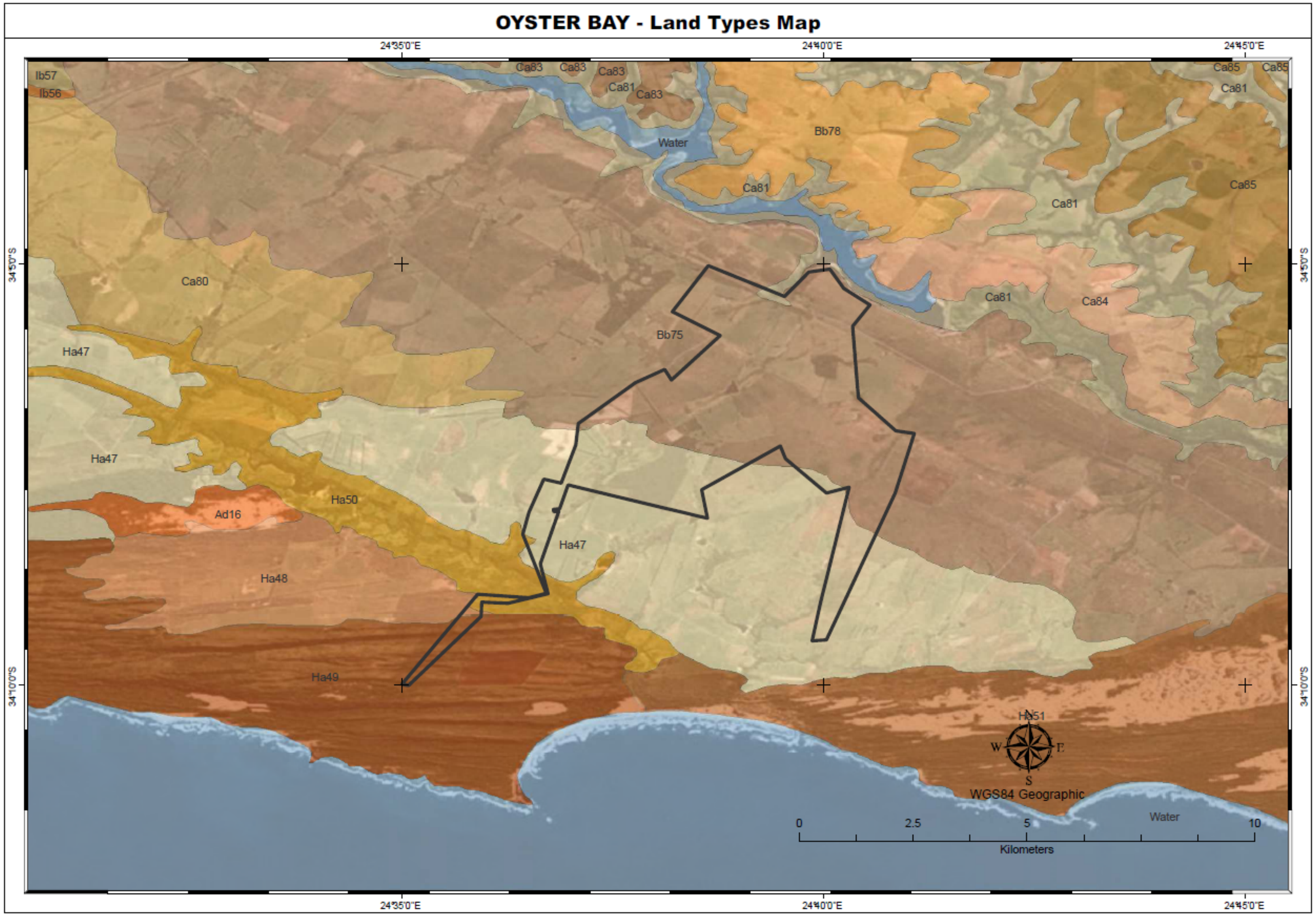

Figure 2 The survey area lies in the Bb and Ha land types

The Bb75 land type is mostly encountered in terrain units 4 (40 %) and 3 (30 %). A further 25 % of this land type is situated in terrain unit 1 while 5 % is situated in terrain unit 5. Figure 3 illustrates the concept of terrain units.

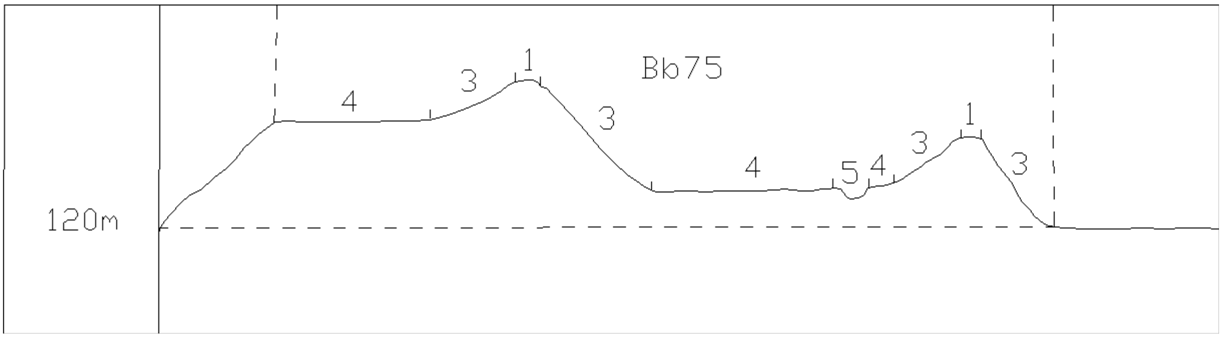

Figure 3 Terrain units are indicative of the position in the landscape of the soils encountered in the Bb75 land type (Land Type Survey Staff, 1972 – 2006)

Table 1 summarises the percentage of specific soil forms encountered in the dominant terrain unit of land type Bb75.

Table 1 The percentage of specific soil forms encountered in terrain unit 4 of land type Bb75

Soil Form	Percentage of Terrain Unit 4 in Land type Bb75
Constantia	35
Fernwood	35
Wasbank	10
Longlands	5
Clovelly	5

4.1.2 The Ha47, Ha48, Ha49 and Ha50 land types

The Ha land type comprises soils of the Fernwood, Cartref, Clovelly, Longlands, Kroonstad, Katspruit and Lamotte soil forms. The Kroonstad soil form comprises an orthic A-horizon that overlies an E-horizon and a G-horizon while the Katspruit soil comprises an orthic A-horizon overlying a G-horizon. G-horizons develop when water saturation for long periods gives rise to gleying with the reduction of ferric oxides and hydrated oxides. The G-horizon is dominated by grey, low chroma colours, usually with marked clay illuviation. These soils occur in the seasonal to permanent zone of wetlands.

The Lamotte soil form comprises an orthic A-horizon that overlies an E-horizon, a podzol B-horizon and unconsolidated material with signs of wetness. Signs of wetness are characterised by grey colouration owing to the reduction of ferric iron and is indicative of a fluctuating water table.

The soils of these land types range in depth as follows:

- Fernwood soil form: 800 to 1200 mm;
- Cartref soil form: > 1200 mm;

- Clovelly soil form: > 1200 mm;
- Longlands soil form: 800 to 1200 mm;
- Katspruit soil form: 400 to 450 mm;
- Kroonstad soil form: 800 to 1000 mm; and
- Lamotte soil form: 800 to deeper than 1200 mm.

Water movement is a prominent feature in this area. Especially the Katspruit soil form is a strong indicator of the occurrence of wetland areas.

Fifty percent of land type H47 is encountered in terrain unit 3. The remaining 10 %, 35 %, and 5 % are situated in terrain units 1, 4 and 5 respectively. The position of the terrain units in this landscape are indicated by Figure 4. Table 2 summarises the percentage of specific soil forms encountered in the dominant terrain unit of land type H47.

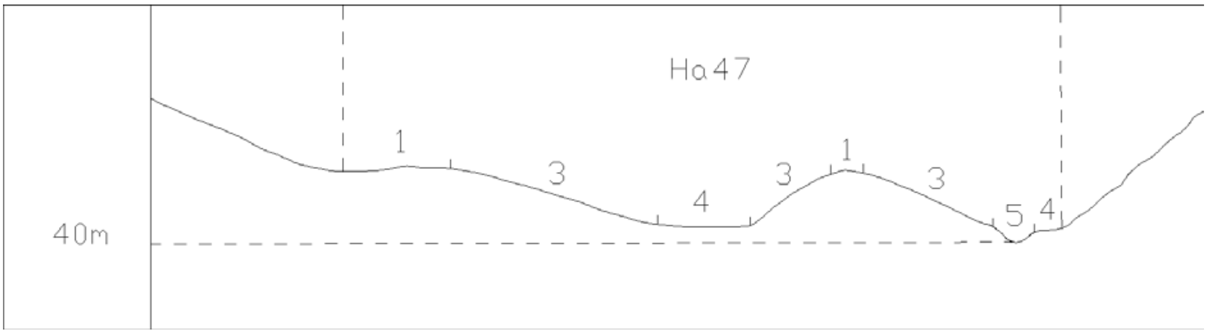

Figure 4 Terrain units are indicative of the position in the landscape of the soils encountered in the H47 land type (Land Type Survey Staff, 1972 – 2006)

Table 2 The percentage of specific soil forms encountered in terrain unit 3 of land type H47

Soil Form	Percentage of Terrain Unit 4 in Land type Ae111
Rock	5
Fernwood	45
Cartref	35
Clovelly	10
Longlands	5

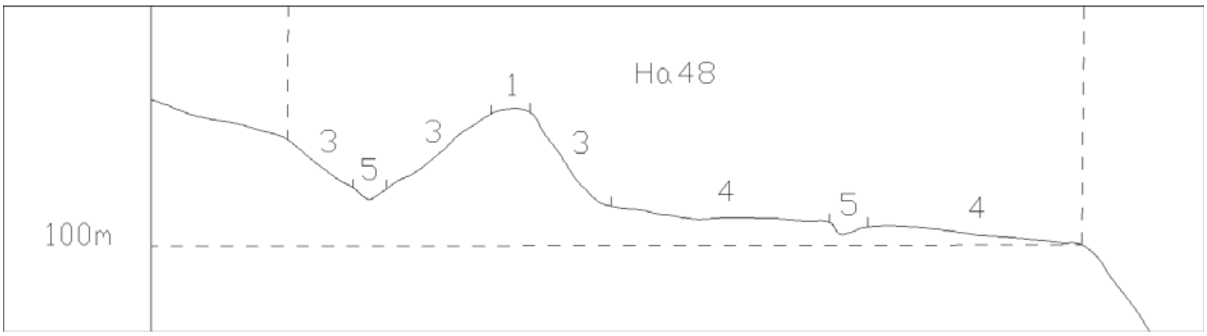

Figure 5 Terrain units are indicative of the position in the landscape of the soils encountered in the Ha48 land type (Land Type Survey Staff, 1972 – 2006)

The Hf48 land type is encountered in terrain unit 4 (100 %). The Cartref soil form dominates the area.

The Hf49 land type is situated mainly in terrain unit 3 (75%). A further 15 % is situated in terrain unit 1 while 5 % and 5 % are encountered in terrain units 4 and 5 respectively. Terrain unit 3 is dominated by the Fernwood soil form (95%). The Clovelly soil form comprises 5 % of the terrain unit. Figure 6 illustrates the position of the terrain units in the landscape.

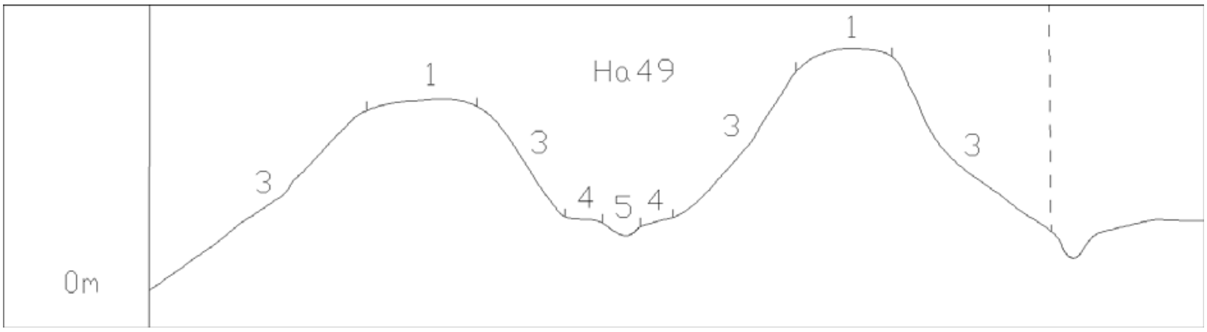

Figure 6 Terrain units are indicative of the position in the landscape of the soils encountered in the Ha49 land type (Land Type Survey Staff, 1972 – 2006)

The Ha50 land type is mostly encountered in terrain units 3 (75 %) and 5 (20 %). The remaining 5 % is situated in terrain unit 4. Figure 7 illustrates the concept of terrain units for this land type.

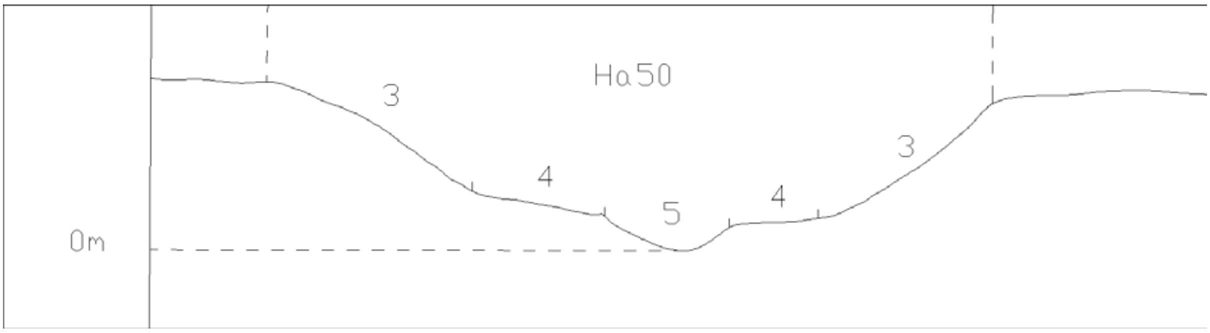

Figure 7 Terrain units are indicative of the position in the landscape of the soils encountered in the Ha50 land type (Land Type Survey Staff, 1972 – 2006)

Table 3 summarises the percentage of specific soil forms encountered in the terrain unit 3 of land type Ha50.

Table 3 The percentage of specific soil forms encountered in terrain unit 3 of land type Ha50

Soil Form	Percentage of Terrain Unit 3 in Land type Ha50
Cartref	50
Clovelly	5
Fernwood	40
Rock	5

4.2 Land Capability

Eight land capability classes are recognised and these are divided into three land capability groups. Table 4 summarises this division.

The soils of the survey area fall into Class I, II and VI. These are defined as:

- Class I: Land with few or no limitations or hazards. With good management this class is suitable for long, continued cropping with no, or minimal, conservation practices. Soils are deep or moderately deep and naturally well-drained, with a stable structure and good working properties. Slopes are slight and the only limitations are those of maintenance of soil structure and fertility.

- Class II: Land subject to certain limitations or hazards. It is suitable for cropping with adequate protection measures, which may sometimes include special management practices and regular ley rotations. Limitations may include one or more of the following: moderately shallow soil-depth, slightly unfavourable surface physical characteristics, inadequate permeability in the lower root zone or moderate wetness existing as a permanent land character. Such land needs conservation practices which will depend on the limiting characteristics, but will include both moderate mechanical and biological conservation methods in varying combinations.

- 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.

Table 4 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

4.3 Rainfall Data

The rainfall for the area varies from 700 to 900 mm per year. Figure 8 is a map that exhibits the mean annual rainfall for South Africa.

5. AGRICULTURAL POTENTIAL

The soils of this area fall mainly into Class II land type. These soils are deep but may be difficult to cultivate owing to the occurrence of E-horizons and podzol B-horizons. Cultivation practices would have to be managed carefully.

Rainfall in this area is relatively high and should support dry-land agriculture, especially on the soils of the Clovelly soil form. Close inspection of aerial photographs (Google Maps) indicate irrigation practices. The Kromriver is also situated near the site and might serve as a water source.

The area can mainly be deemed of **moderate to high agricultural potential**, although a site visit that entails a dedicated soil survey might indicate otherwise.

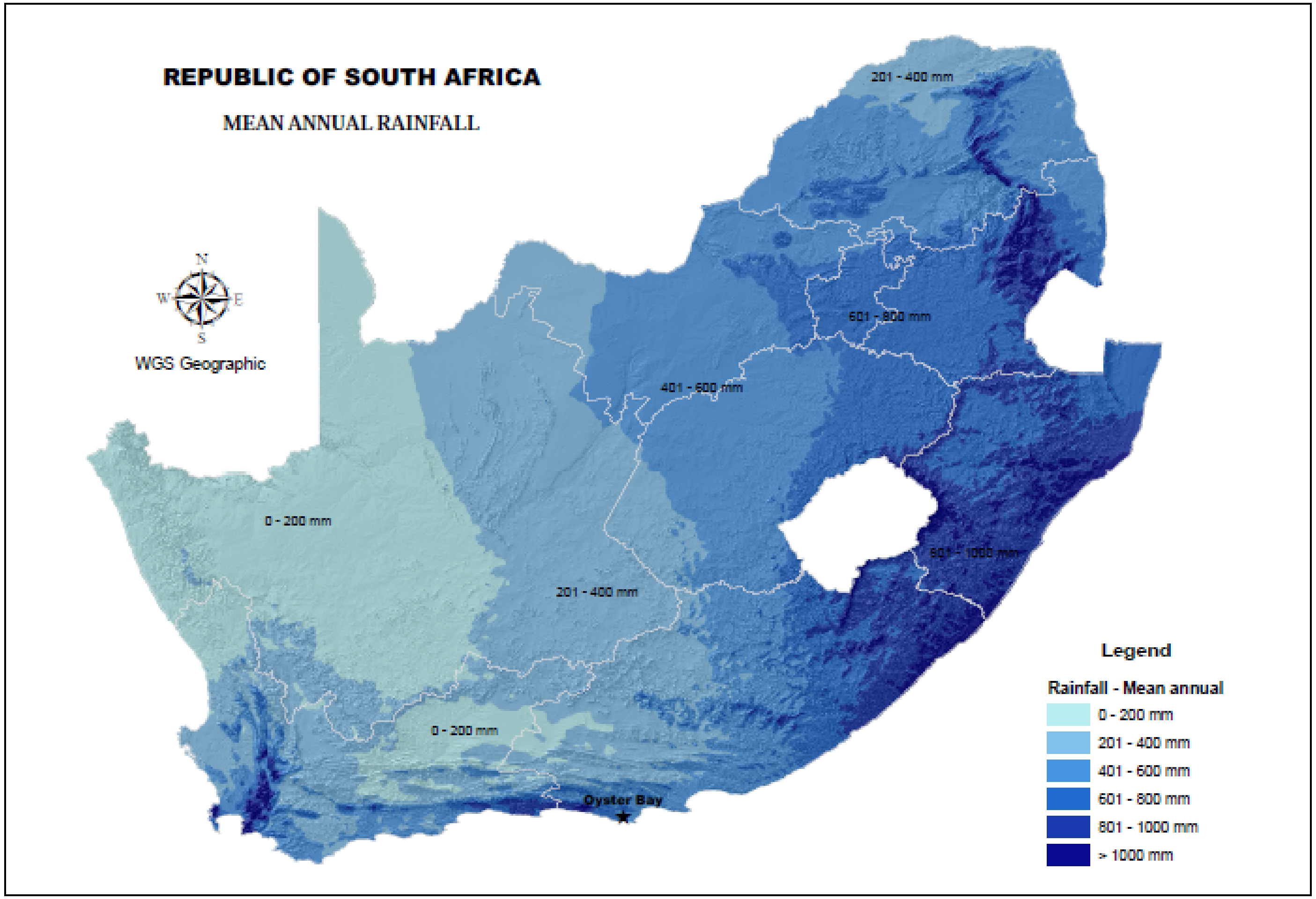

Figure 8 Mean annual rainfall for the Republic of South Africa

6. SCOPING EVALUATION

6.1 Impact on the Agricultural Potential and Land Capabilty

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: This rating depends on the location of each wind turbine. If the wind turbines are built on areas of cultivation, the impact can be HIGH (dependant on the results obtained from a site visit and soil survey in terms of agricultural potential) but if the wind turbines are situated so that agricultural practices are not influence, the impact will be MODERATE or even LOW.
- 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;
- 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 wide occurrence of the E-horizons (especially those located in the northern part of the area), podzol B-, soft plinthic B and G-horizons, coupled with the proximately of the Kromriver, indicates water movement in the 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 survey of the area will shed light on the mentioned aspects and current uncertainties. The following methodology is proposed:

- The study area should be traversed and observations regarding the landscape and occurrence of soils made continuously. Specific soil characteristics should be noted and logged. Auguring, using a handheld soil auger, should be conducted on a grid that was designed to cover the area adequately. A TLB can be used to verify observations.
- The following should be noted:
  - Diagnostic soil horizons, soil form (SA taxonomic system) and soil depth at auguring point localities that were designed to adequately cover the area;
  - Soil colour, texture, structure;
  - Presence and intensity/frequency of mottles, concretions, and rocks;
  - Soils that display morphological indicators of temporary or seasonal wetness within 500 mm of the soil surface, together with those subject to prolonged and permanent saturation, must be delineated as hydromorphic or wetland soils.
- 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

Savannah Environmental (Pty) Ltd., on behalf of Renewable-Energy Systems (RES) Southern Africa (Pty) Ltd, contracted Terra Soil Science cc to carry out a soil, agricultural potential, land type and land use study for Portion 3 of Farm Klein Rivier 713; Portion 1, 2, 3, 4 and the Remainder of Farm Rebok Rant 715; Portion 1 and 3 of Farm Ou Werf 738; Portion 5 of Farm Klippedrift 732; Portion 10 and Portion 12 of Farm Kruis Fontein 681 in the Eastern Cape Province. The area comprises a total of 2300 hectares.

The area has been proposed to serve as a locality for the construction and operation of a commercial renewable wind energy facility 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.

The area lies predominantly in the Bb and Ha land types (Land Type Survey Staff, 1972 – 2006). The Bb land type is described as a “Pinthic catena: upland duplex and margalitic soils rare”. A perfect catena is represented by (from higher to lower lying areas) Hutton, Bainsvlei, Avalon and Longlands soil forms. Gleyed soils, such as Rensburg, Willowbrook, Katspruit and Champagne soil forms, can occur in the valley bottom. Soils with hard plinthite are common in areas where sandstone underlies the area. Where water tables have not extended far beyond the valley bottom, red soils may dominate. In these cases plinthic soils are restricted to valley bottoms and pans.

The Ha land type is described as “Grey regic sands”. These units accommodate areas in which deep, grey sands of the Fernwood soil form are a prominent feature. More than 80% of the Ha land type is made up of these grey and deep sands.

The soils of the survey area fall into Class I, II and VI land capability. The soils of the area are mainly deep but may be difficult to cultivate owing to the occurrence of E-horizons and podzol B-horizons. Cultivation practices would have to be managed carefully.

Rainfall in this area is relatively high and should support dry-land agriculture, especially on the soils of the Clovelly soil form. Close inspection of aerial photographs (Google Maps) indicate irrigation practices. The Kromriver is also situated near the site and might serve as a water source.

The area can mainly be deemed of **moderate to high agricultural potential**, although a site visit that entails a dedicated soil survey might indicate otherwise.

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: This rating depends on the location of each wind turbine. If the wind turbines are built on areas of cultivation, the impact can be HIGH (dependant on the results obtained from a site visit and soil survey in terms of agricultural potential) but if the wind turbines are situated so that agricultural practices are not influenced, the impact will be MODERATE or even LOW.

- 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

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;
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- Current and possible land use;
- Land Capability; and
- Possible occurrence of wetland areas.

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  - 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.

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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