RENOSTERBERG WIND ENERGY COMPANY AND THE INDUSTRIAL DEVELOPMENT CORPORATION

Proposed Renosterberg PV and Wind Energy Facility

Desktop Agricultural Assessment and Fatal Flaw Analysis

Issue Date: 18 September 2012
Revision No.: 1.1
Project Number: 11482

Date:	18 September 2012
Document Title:	Proposed Renosterberg PV and Wind Energy Facility Desktop Agricultural Assessment and Fatal Flaw Analysis
Author:	Kurt Barichievy (*Pr.Sci.Nat.*)
Revision Number:	# 1.1
Checked by:	
Approved:	Kurt Barichievy (*Pr.Sci.Nat.*)
Signature:	
For:	SiVEST Civil Engineering Division

Declaration

I, Kurt Barichievy, declare that I –

- act as an independent specialist consultant for the **Desktop Agricultural Assessment and Fatal Flaw Analysis of the Proposed Renosterberg PV and Wind Energy Facility**;
- 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, plan or document required in terms of the Environmental Impact Assessment Regulations, 2006; and
- will provide the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not.

Mr. K.R. Barichievy (Pr. Sci. Nat.)
Scientist
SiVEST

RENOSTERBERG WIND ENERGY COMPANY AND THE IDC

PROPOSED RENOSTERBERG PV AND WIND ENERGY FACILITY

DESKTOP AGRICULTURAL ASSESSMENT AND FATAL FLAW ANALYSIS

Contents **Page**

1 INTRODUCTION

SiVEST Environmental Division (SiVEST) on behalf of the **Renosterberg Wind Energy Company** (RWEC), in partnership with the **Industrial Development Corporation of South Africa** (IDC) requested a desktop agricultural assessment and fatal flaw analysis for the area affected by the proposed Renosterberg renewable energy facility near De Aar, in the Northern Cape Province. The primary objective of this assessment is to provide specialist agricultural, soil and land use input for the overarching Environmental Scoping Report. In order to achieve this objective, a study of the climate, soils, terrain, aspect, land capability, geology and current agricultural practices was carried out. This report serves to summarise such a study and present the relevant results.

The Renosterberg Site is located approximately 20 km north of De Aar, and influences 9 farm portions. The proposed project includes the construction of a Photovoltaic (PV) solar power facility, a wind farm as well as associated infrastructure. The Renosterberg Site covers 8066 ha and primarily influences the farms Blaauwbosh Dam and Rhenosterhook (**Figures 1** and **2**). A much larger area, known as the *Broad Scoping Area* (incorporating 473 km^2), has been added to this assessment so as to include, the potential areas for grid connections and flag and any potential fatal flaws in the wider environment (**Figure 3**). In order to avoid duplication of information, the proposed solar and wind energy facilities as well as associated activities are assessed in a single Agricultural Report. It is hoped that this assessment, along with the other specialist studies, will indicate which initial areas to avoid due to high environmental sensitivity, and thus minimise the predicted impacts on the receiving environment.

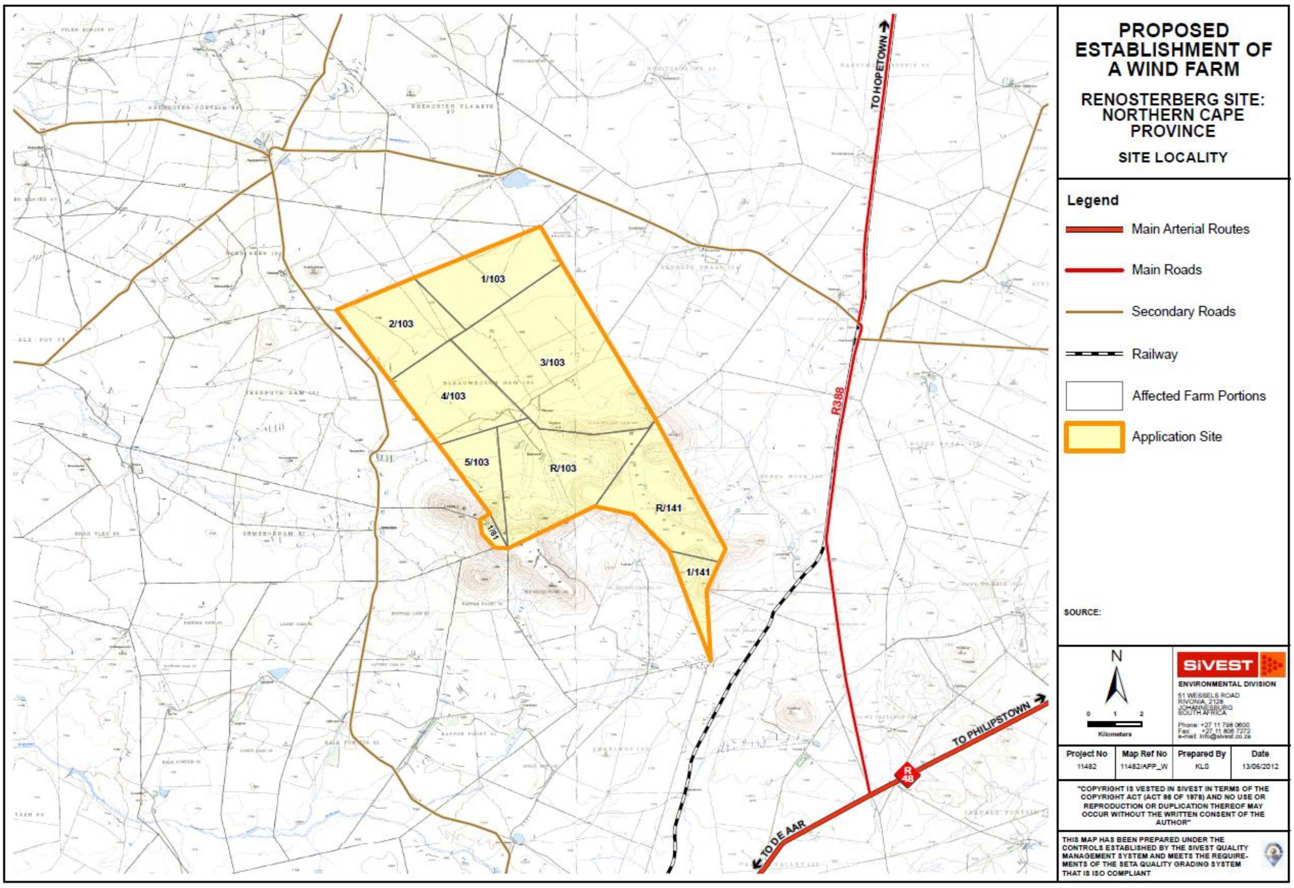

Figure 1: Site Locality Map

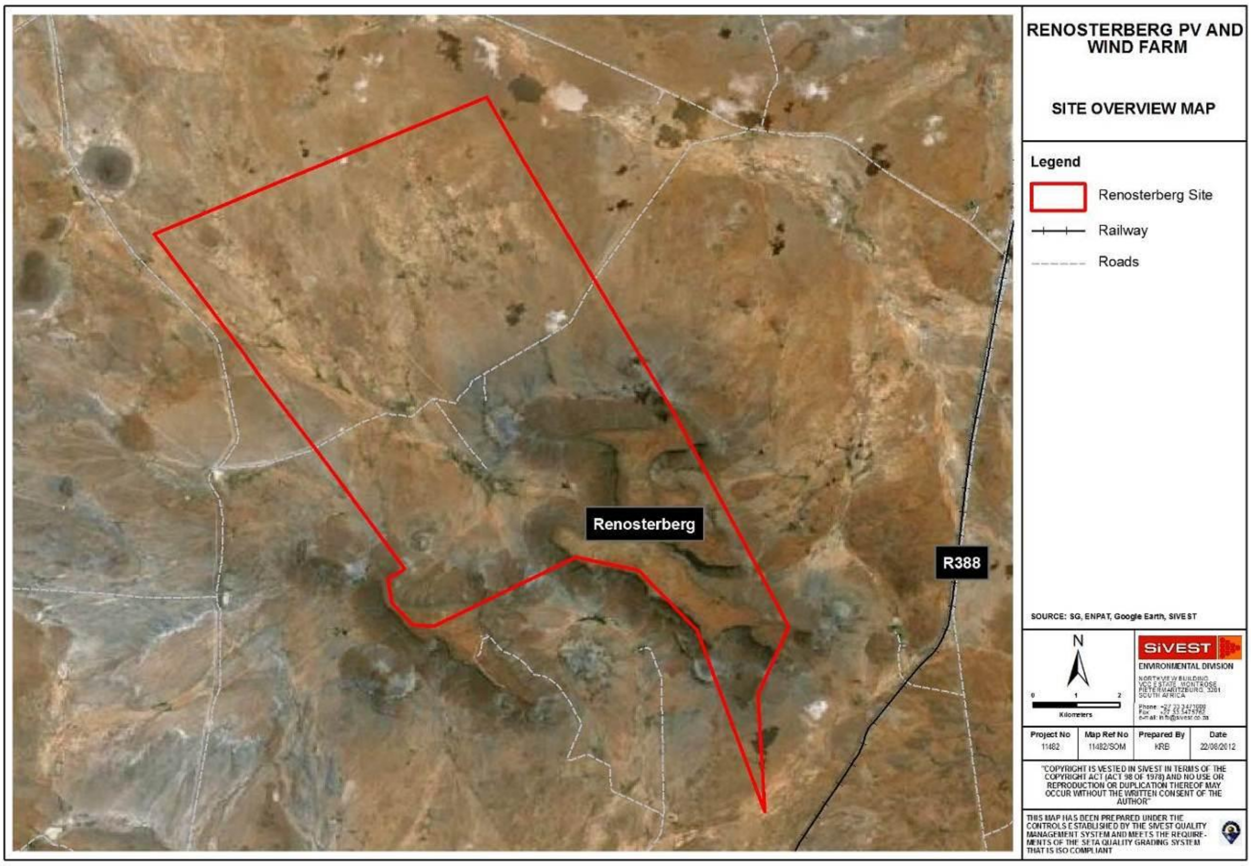

Figure 2: Site overview map

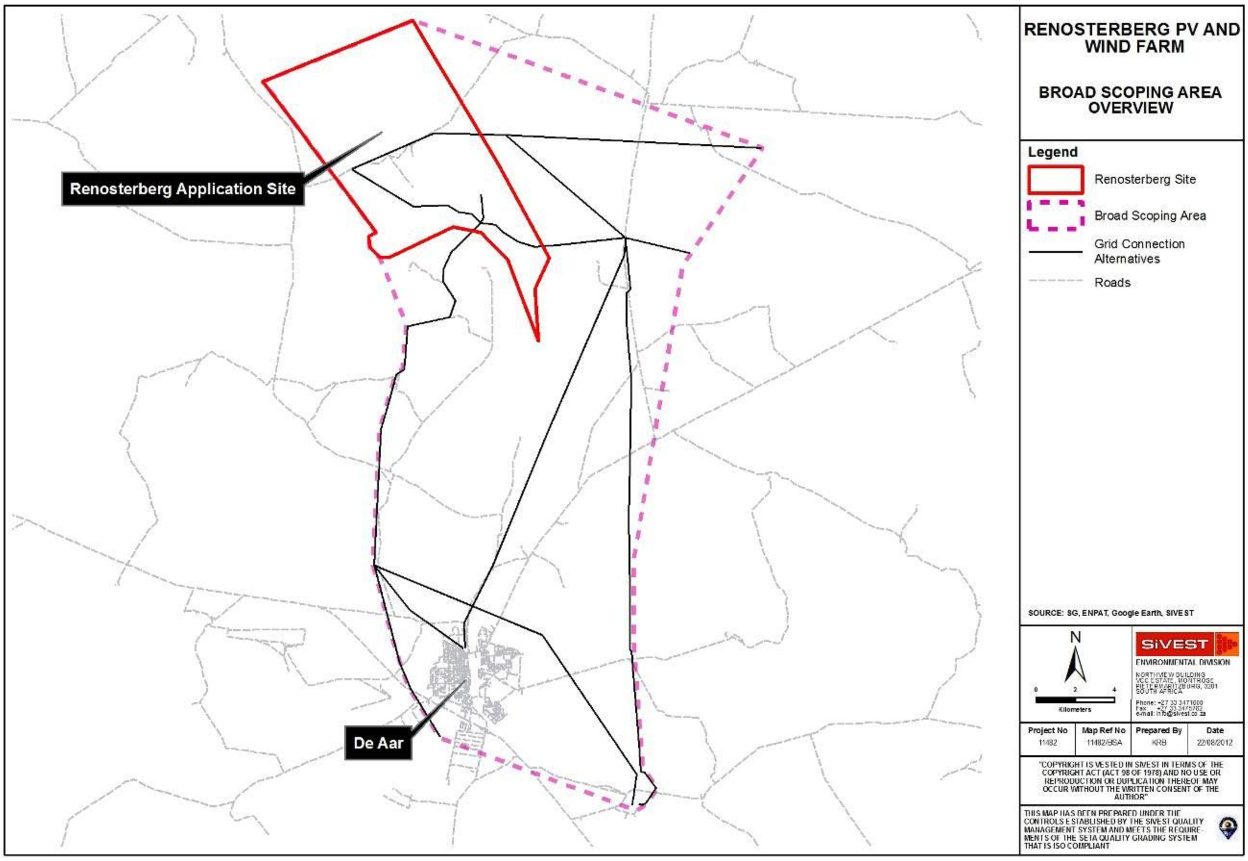

Figure 3: Broad Scoping Area overview map

1.1 Study Objectives

1.1.1 Compile a detailed desktop agricultural potential assessment

In terms of this study, agricultural potential is described as an area's suitability and capacity to sustainably accommodate an agricultural land use, and in most cases this potential is benchmarked against crop production. Thus the objective of this desktop study is to broadly assess the agricultural potential of the affected land by interrogating relevant climate, topographic, landuse and soil datasets. By combining these relevant datasets one is able to broadly assess the agricultural potential of the affected land.

1.1.2 Undertake an agricultural fatal flaw analysis

The fatal flaw analysis utilises the desktop findings to indicate, from an agricultural perspective, any potential fatal flaws which could result from the proposed activities. This section will outline predicted impacts on agricultural resources, highlight problematic areas and specify 'no-go zones'.

1.2 Assumptions and Limitations

This desktop assessment is used to identify any major agricultural impacts relating to the proposed development. It should be clearly noted that, since the spatial information used in this report is of a reconnaissance nature, only broad/large scale climate, land use and soil details are provided.

2 TECHNICAL INFORMATION

The technical details provided in this section are primarily extracted from previous projects and technical information produced by SiVEST (2012).

2.1 Wind Farm Technical Description

At this stage, it is estimated that the proposed project will encompass the installation of a number of wind turbine generators and their associated components in order to generate electricity that is to be fed into the existing Eskom distribution and/or transmission lines that cross or are located nearby the proposed site. The total power generation capacity limit and the number of wind turbines to be accommodated, will ultimately depend on the size of the developable area which will be determined by the EIA. However, it is currently envisaged that approximately 83-138 wind turbines (depending on the maximum output capacity of each wind turbine) are to be developed with a cumulative generation capacity of approximately 250 Megawatts (MW). The maximum output capacity of each wind turbine may range from 1.8 to 3 MW each. The voltage of the connection lines from the wind farm substation to the grid will be dependent on the total generation capacity and the actual available connection as to be determined by Eskom at a later stage.

2.1.1 Turbines

Ultimately, the size of the wind turbines will depend on the developable area and the total generation capacity that can be produced as a result. The wind turbines will have a hub height of between 80 to 125m and a rotor diameter of 80 to 112m (**Figure 4**). The blade rotation direction will depend on wind measurement information received later in the process. The rotation will range from 6 to 20 rpm. The foundation of each wind turbine will be approximately 18m x 18m. The footprint for each wind turbine will therefore be approximately 324m². A hard standing area, of between 50m x 25m (assuming a compact mobile crane) or 150m x 25m (assuming a traditional crawler crane) is anticipated for crane usage for each wind turbine. The total hard standing area will therefore either be 1 250m² or 3 750m² depending on which crane type will be used. This will be decided on at a later stage in the proposed development based on environmental constraints and design factors. The total footprint for each wind turbine and the associated hard standing area will either be 1 574m² or 4 074m². The foundation will be up to 4m deep.

As already mentioned, it is anticipated at this stage that 83-138 wind turbines will be constructed. The total area for all the wind turbines for the Renosterberg study site will therefore be between approximately 26 892m² and approximately 44 712m² (not including the hard standing areas).

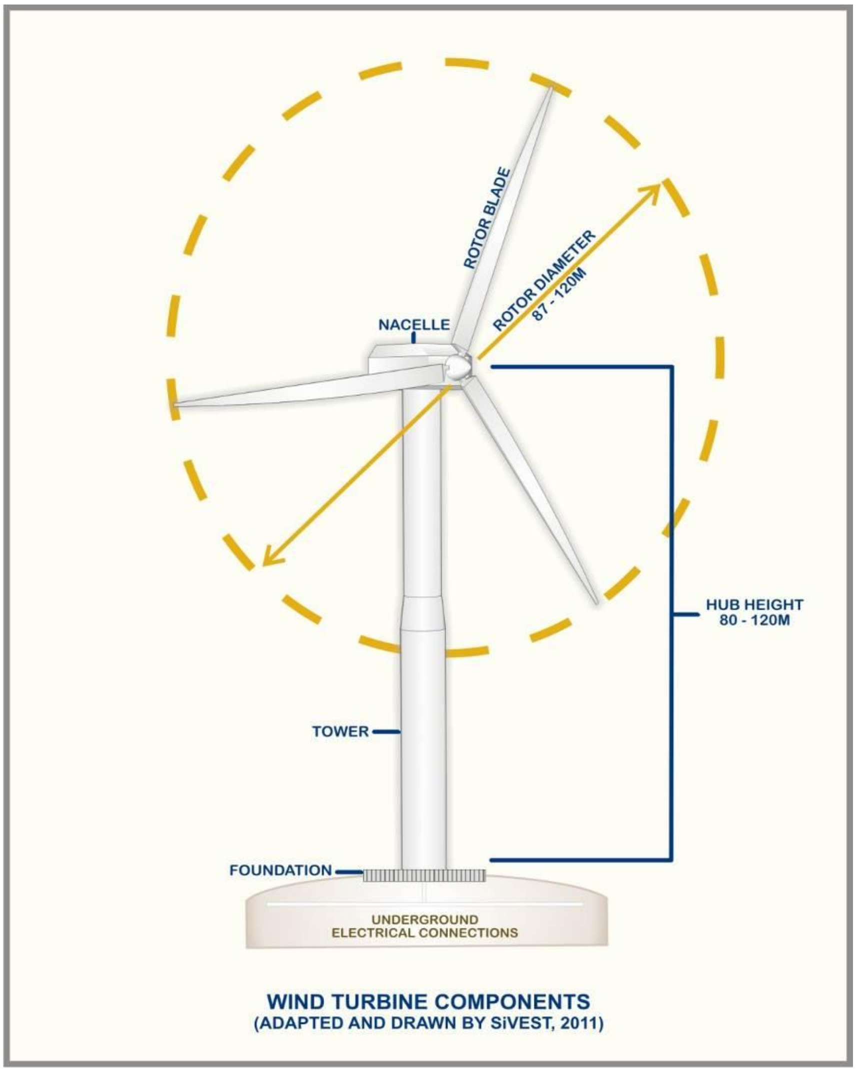

Figure 4: Typical Components of a wind turbine

2.1.2 Electrical Connections

The wind turbines will be connected to each other and to a substation using buried 33kV voltage cables (**Figure 5**) except where a technical assessment of the proposed design suggests that overhead lines are appropriate such as over rivers and gullies. Where overhead power lines are to be constructed, the connection will be established using either pole or pylon structures depending on the voltage. The dimensions of the monopole structures will depend on grid safety requirements and the grid operator. No servitudes will be associated with the wind farm infrastructure although servitudes for Eskom infrastructure may be required on site. As previously mentioned, the electrical connection to the grid will be dependent on the total generation capacity and the actual available connection as determined by Eskom.

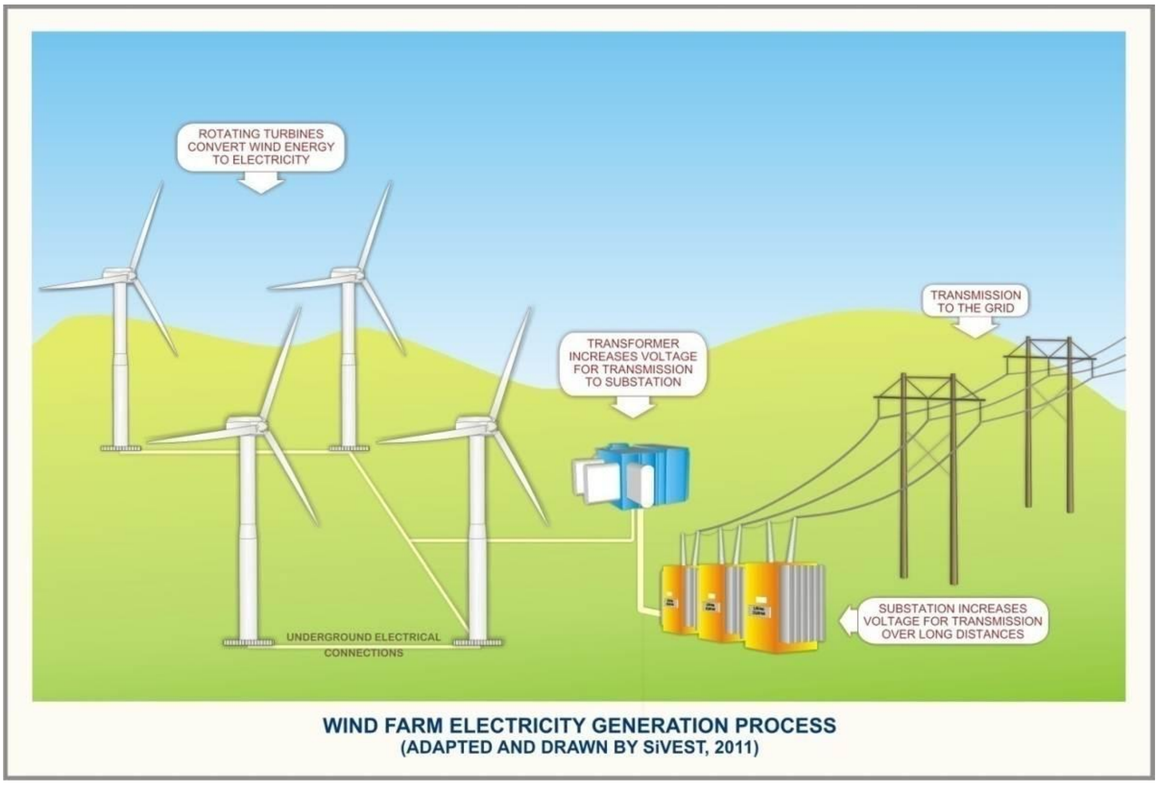

Figure 5: Conceptual wind farm electricity generation process showing electrical connections

2.2 Solar PV Power Plant Technical Description

At this stage of the project, it is estimated that the proposed project will encompass the installation of a solar field and their associated components, in order to generate electricity that is to be fed into the existing Eskom grid. The solar PV power plant area will occupy an area of approximately 250 hectares. The total power generation capacity limit will ultimately depend on the size of the developable area which will be determined by environmental constraints (if any) to be identified in the EIA. It is currently envisaged that the total generation capacity will be no more than 150 Megawatts (MW). The voltage of the connection lines from the solar PV power plant substation to the grid will be dependent on the total generation capacity and the actual available connection, as determined by Eskom after EIA approvals have been granted. The key components of the project follow in the sub-sections below.

2.2.1 PV Project Components

RWEC and the IDC are proposing the establishment of a solar PV power plant on the development site near De Aar. The objective of the solar project is to generate electricity to feed into the national grid. The solar PV power plant will have a maximum capacity of 150 MW.

The project will consist of two components:

- Solar PV Power Plant
- Associated infrastructure

The solar PV power plant will consist of the following infrastructure

- Solar field
- Buildings

The section below describes the typical technical components that would be involved in the construction of the proposed infrastructure.

2.2.2 Solar field

Solar PV panels are usually arranged in rows or 'arrays' consisting of a number of PV panels. The area required for the PV panel arrays would not need to be entirely cleared or graded. However, tall vegetation, where present, may need to be removed from the PV array area.

The solar PV panels have a variable range in size. The actual size will be determined in the final design stages of the project. The PV panels are mounted into metal frames which are usually aluminium. Concrete or screw pile foundations are commonly used to support the panel arrays. The arrays are tilted at a fixed angle (typically 25° from the horizontal plane) equivalent to the latitude at which the site is located in order to capture the most sun (**Figure 6**). Arrays can reach up to between 5m and 10m above ground level.

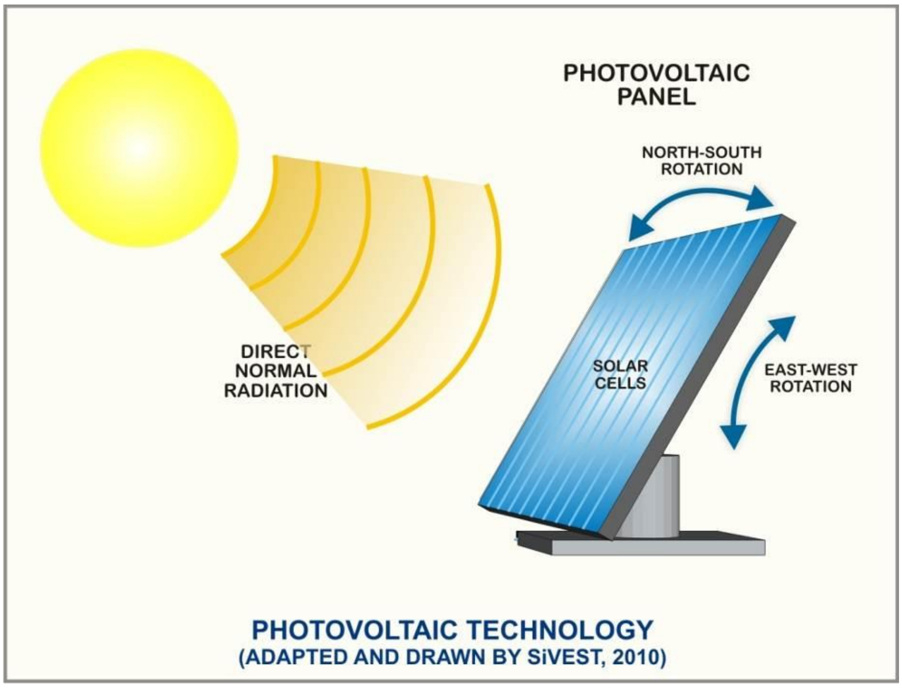

Figure 6: Illustration of how a CPV panel operates

2.2.3 Building infrastructure

The solar field will require an onsite building which will relate to the daily operation of the plant. The solar PV power plant will therefore require an administration building (office). Potential locations for the administration building will be determined at a later stage in the EIA process based on environmental constraints and design factors. The buildings will likely be a single storey building approximately 150 to 350m² which will be required to accommodate the following:

- Control room
- Workshop
- HV switchgear
- Mess Room
- Toilets
- SCADA Room
- Storeroom

2.2.4 Associated infrastructure: Electrical Infrastructure

The solar PV panel arrays are connected to each other in strings. In turn, the strings are connected to DC to AC inverters (**Figure 7**). The DC to AC inverters may be mounted on the back of the panel support substructures / frames or alternatively in a central inverter station. The strings are connected to the inverters by low voltage DC cables. Power from the inverters is collected in medium voltage transformers through AC cables. Cables are likely to have a voltage of 33 kilovolts (kV) and will be buried or pole mounted depending on the voltage level and site conditions.

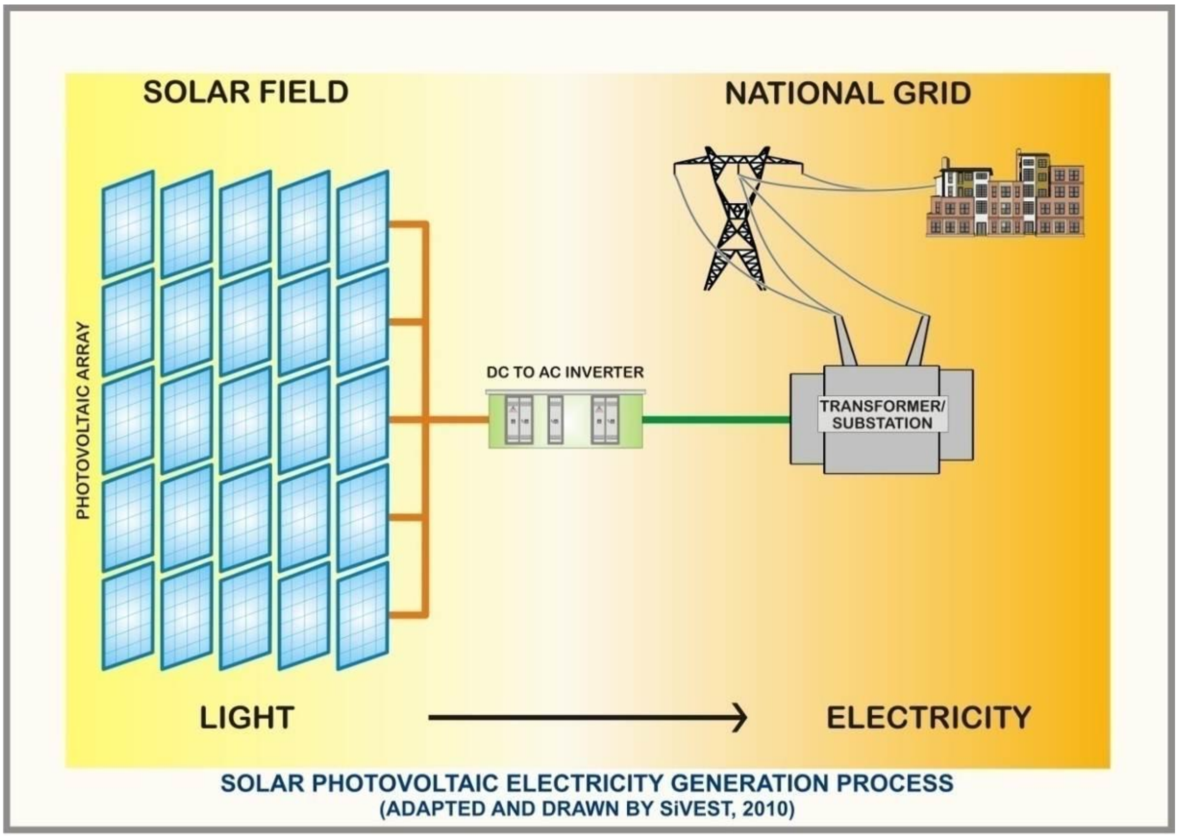

Figure 7: PV process

The medium voltage transformers can be compact transformers distributed throughout the solar field or alternatively located in a central substation. It is likely to be a central substation in this instance. The location of the construction substation will be determined at a later stage in the EIA process based on environmental constraints and design factors.

The distribution substation will ideally be located in close proximity to the existing power lines where possible to limit impact. The substation will be a transmission substation and will include transformer bays which will contain transformer oils. Bunds will be constructed to ensure that any oil spills are suitable attenuated and not released into the environment. The substation will be securely fenced.

Where the substation is beside the line, the connection to the line will be via drop-down conductors. Where the line is remote from the substation, the connection will be by overhead line, using either pole or pylon structures depending on the voltage.

As previously mentioned, the electricity generated by the proposed PV plant is to be fed into the existing Eskom grid. The electrical connection to the grid will be dependent on the total generation capacity and the actual available connection as determined by Eskom. At this stage a number of power line route alternatives have been proposed and will be further investigated in the EIA phase.

3 DESKTOP AGRICULTURAL ASSESSMENT

Existing high level GIS data was sourced from National GIS Datasets as well as the Environmental Potential Atlas for South Africa (ENPAT) Database for the Northern Cape Province of South Africa, compiled by the Department of Environmental Affairs and Tourism (**DEAT**, **2001**). The main purpose of ENPAT is to proactively indicate potential conflicts between development plans and critical, endangered or sensitive environments. By combining the aforementioned data sources one is able to broadly assess the site alternatives, receiving environment, and their ability to accept change, in the form of development. More agriculturally relevant spatial information was obtained from the AGIS Database (***http://www.agis.agric.za)***. The site has the following midpoint co-ordinate:

30^{o} 24’ 07.50” S 23^{o} 58’ 11.39”E

3.1 Climate

The study area has a semi-arid to arid continental climate with a summer rainfall regime i.e. most of the rainfall is confined to summer and early autumn. Mean Annual Precipitation (MAP) is approximately 300 mm per year (**SAWS, 2010**). An MAP of 300 mm is deemed low remembering that 500 mm is considered the minimum amount of rain required for sustainable dry land farming (**Figure 8**). Thus, without some form of supplementary irrigation natural rainfall for the study area is insufficient to produce sustainable harvests. This is reflected in the lack of dry land crop production within the study area. The area around De Aar typically experiences hot days and cold nights with the highest maximum temperature of approximately 40 ^{o}C and the lowest minimum temperature of approximately - 8 ^{o}C (**Table 1** and **Figure 9**). Evaporation is estimated to be in the region of 2000 mm per annum and thus the area is subjected to very severe moisture availability restrictions (**AGIS, 2012**)

In summary the climate for the study area is severely restrictive to arable agriculture which is primarily due to the low, seasonal rainfall and associated moisture availability restrictions.

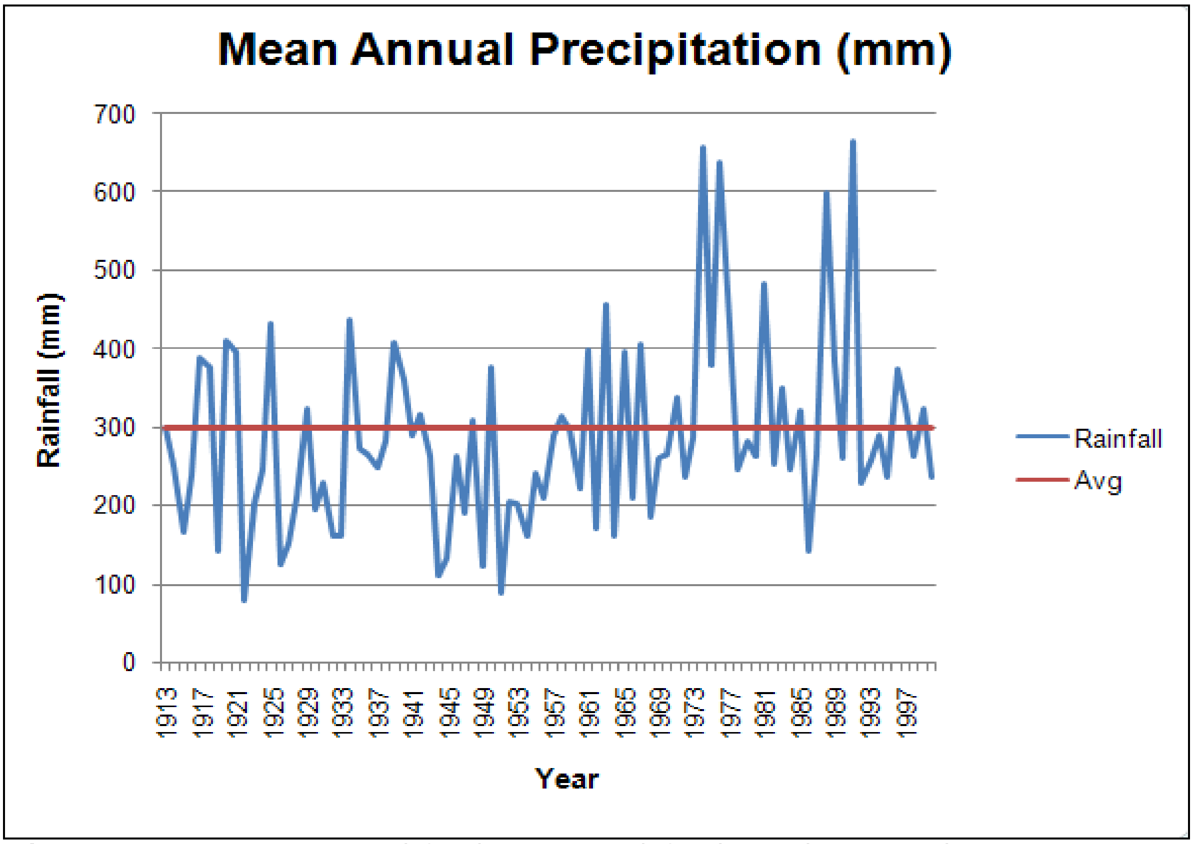

Figure 8: Long term annual rainfall (1913 – 1998) for the study area and long term average (indicated by the red line) (Source: **SAWS, 2010**)

Table 1: Monthly Temperature Table for De Aar (**SAWS, 2010**)

Month	Temperature (° C) (1961 – 1990)			
	Highest Recorded	Average Daily Maximum	Average Daily Minimum	Lowest Recorded
January	40	32	16	7
February	38	31	15	4
March	37	28	13	1
April	34	24	9	-1
May	30	20	4	-5
June	26	16	1	-7
July	25	17	1	-8
August	28	19	2	-8
September	35	23	6	-5
October	36	26	9	-3
November	38	29	12	-1
December	39	31	14	3
Year	**40**	**25**	**9**	**-8**

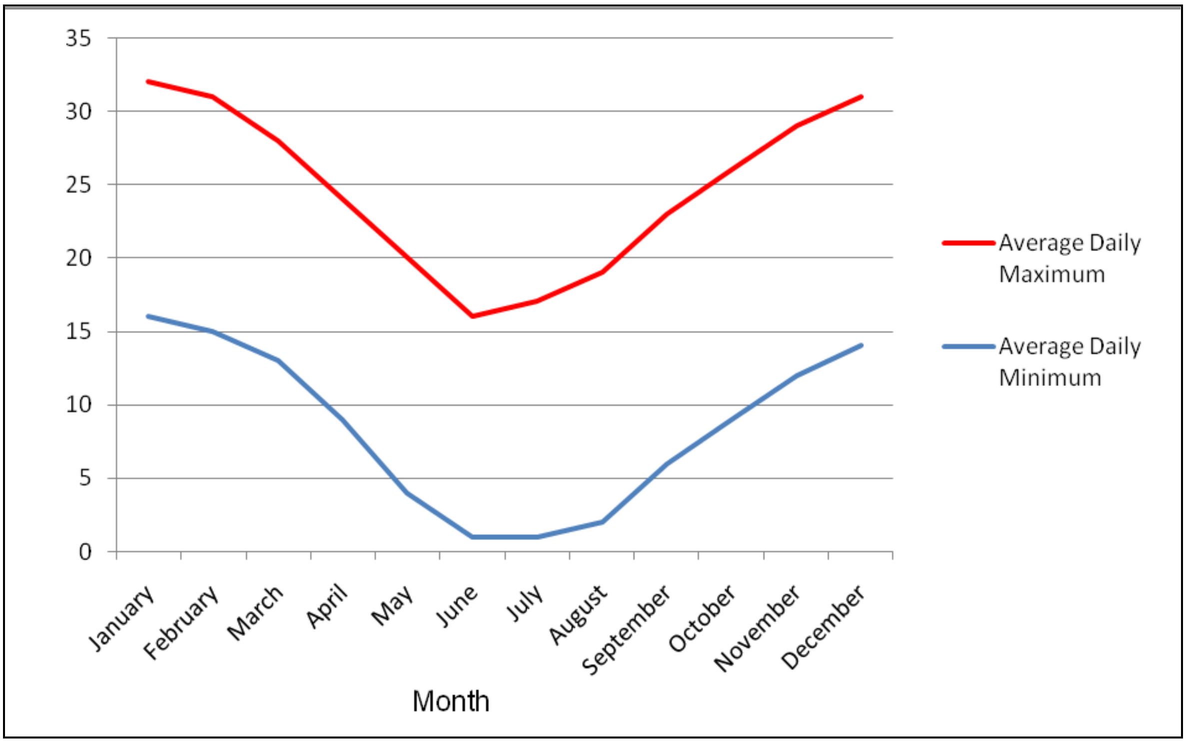

Figure 9: Average Daily Minimum and Maximum Temperatures for De Aar **(SAWS, 2010)**

3.2 Geology

The Renosterberg site is underlain by a variety of geological materials including shale, mudstone and tillite (**Figure 10**). Shale dominates the majority of the study and is formed by the settling and accumulation of clay rich minerals and other sediments, and due to the settling process, this material usually takes the form of parallel rock layers which lithifies over time.

Mudstone is found in the south eastern corner of the site and encircles the footslopes of the Renosterberg. Like shale, mudstone is clastic sedimentary rock, which is formed from the lithification of deposited mud and clay. Mudstone consists of a very fine grain size of less than 0.005 mm but unlike shale it is mostly devoid of bedding. Tillite, consisting of consolidated masses of un-weathered blocks and unsorted glacial till, caps the top of the Renosterberg.

The Broad Scoping Area illustrates a similar Geologic spatial pattern, where shale is the dominant underlying material (**Figure 11**).

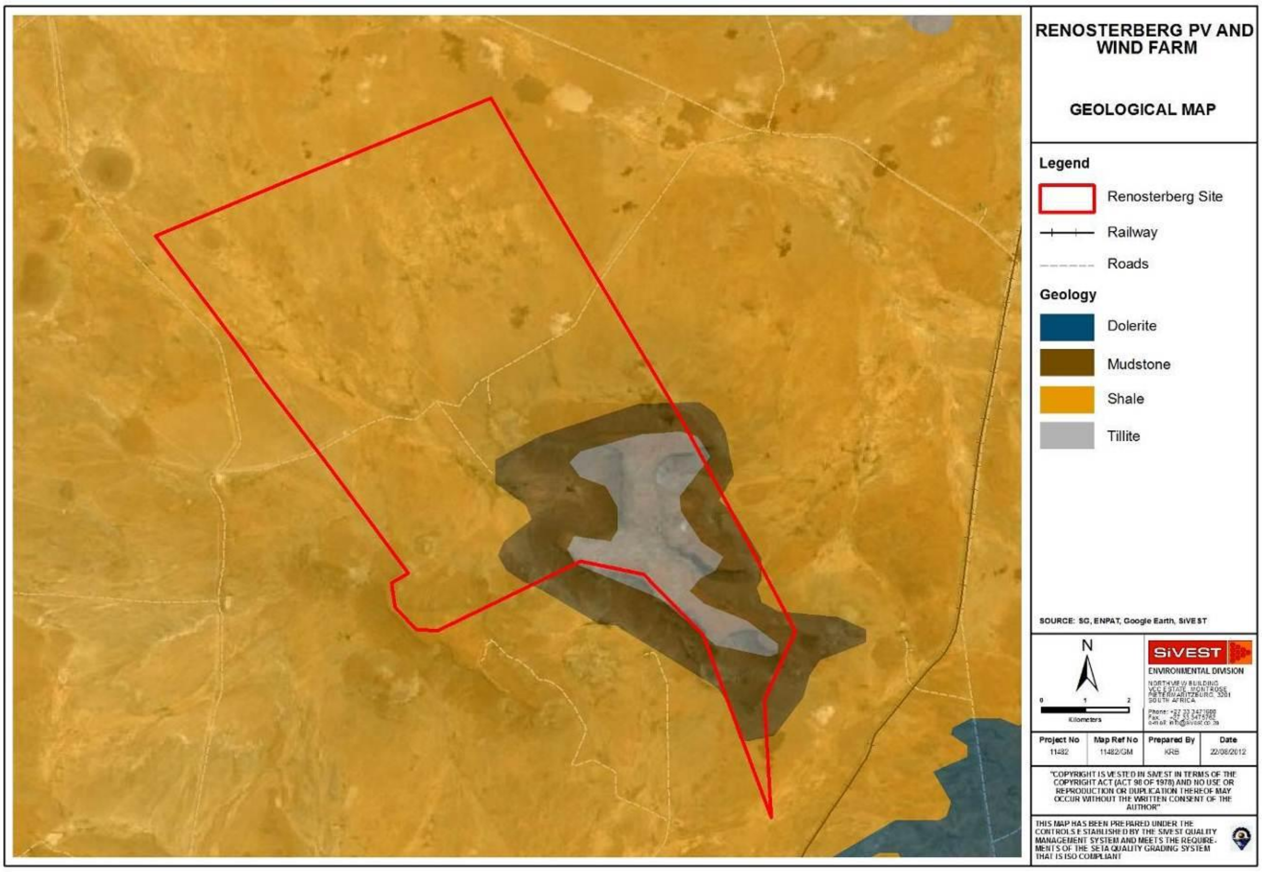

Figure 10: Geological Map for the Renosterberg Site

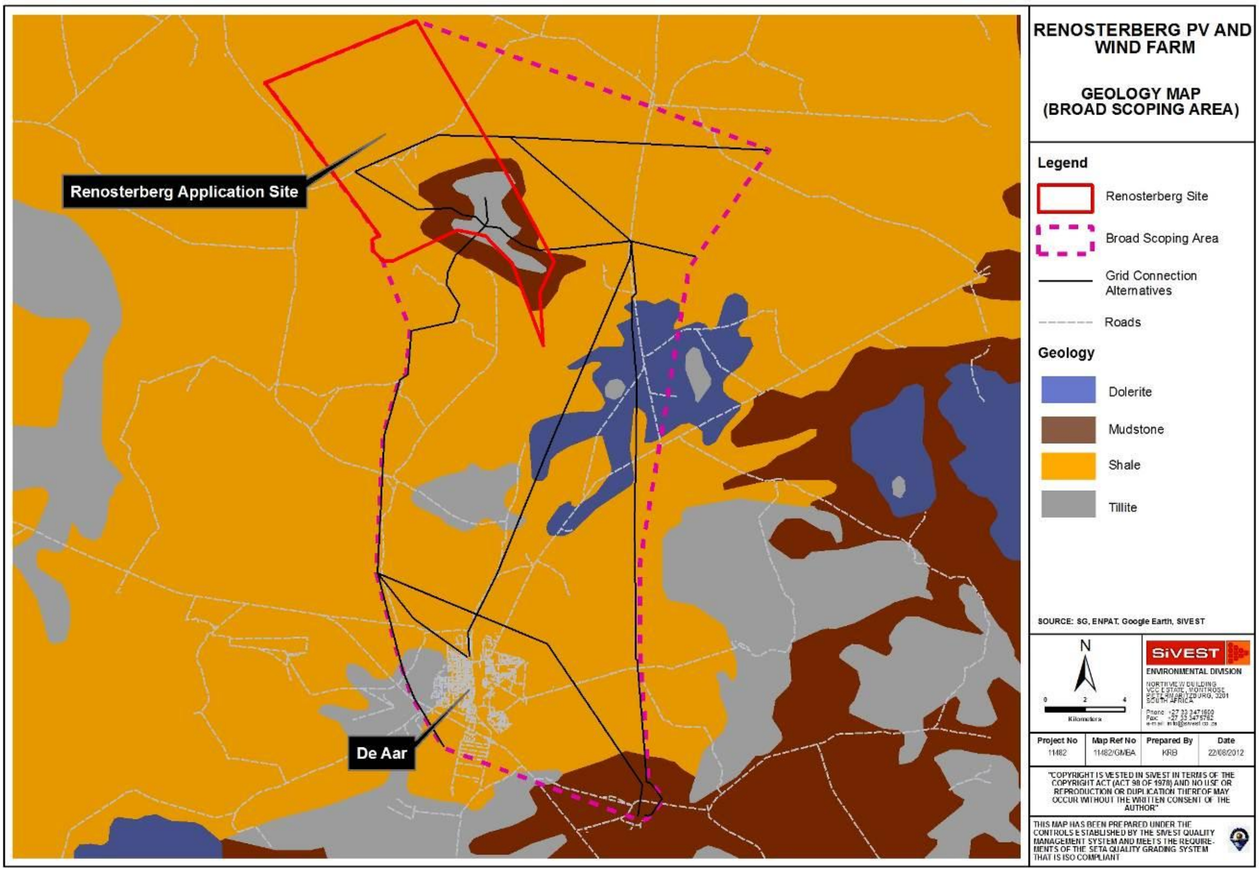

Figure 11: Geology map for the Broad Scoping Area

3.3 Slope

Slope, or terrain, is used to describe the lie of the land. Terrain influences climate and soils characteristics and thus plays a dominant role in determining whether land is suitable for agriculture. In most cases sloping land is more difficult to cultivate and usually less productive than flatland, and is subject to higher rates of water runoff and soil erosion (**FAO, 2007**).

The Renosterberg Site is characterised by two distinct topographical regions. The north eastern portion of the site is characterised by flat and gently sloping topography with an average gradient of less than 5% (**Figure 12**), making this area ideal for intensive agriculture with a high potential for large scale mechanisation. The flat topography also makes the study area ideal for the proposed development, as minimal earthworks will be required to prepare this portion of the site. Conversely, the south western portion is dominated by steep slopes and includes the Renosterberg. The Renosterberg can be described as a Mesa landform, which is an elevated area of land with a flat top and steep sides (**Internet 1**). These steep slopes are limiting to arable agriculture and are also associated sever engineering constraints (**Figure 13**). The flat areas atop the Renosterberg could, however, form part of the wind farm development layout.

Like the Renosterberg Site, the Broad Scoping Area is dominated by flat and gently sloping topography with sporadic rocky outcrops (**Figure 14)**.

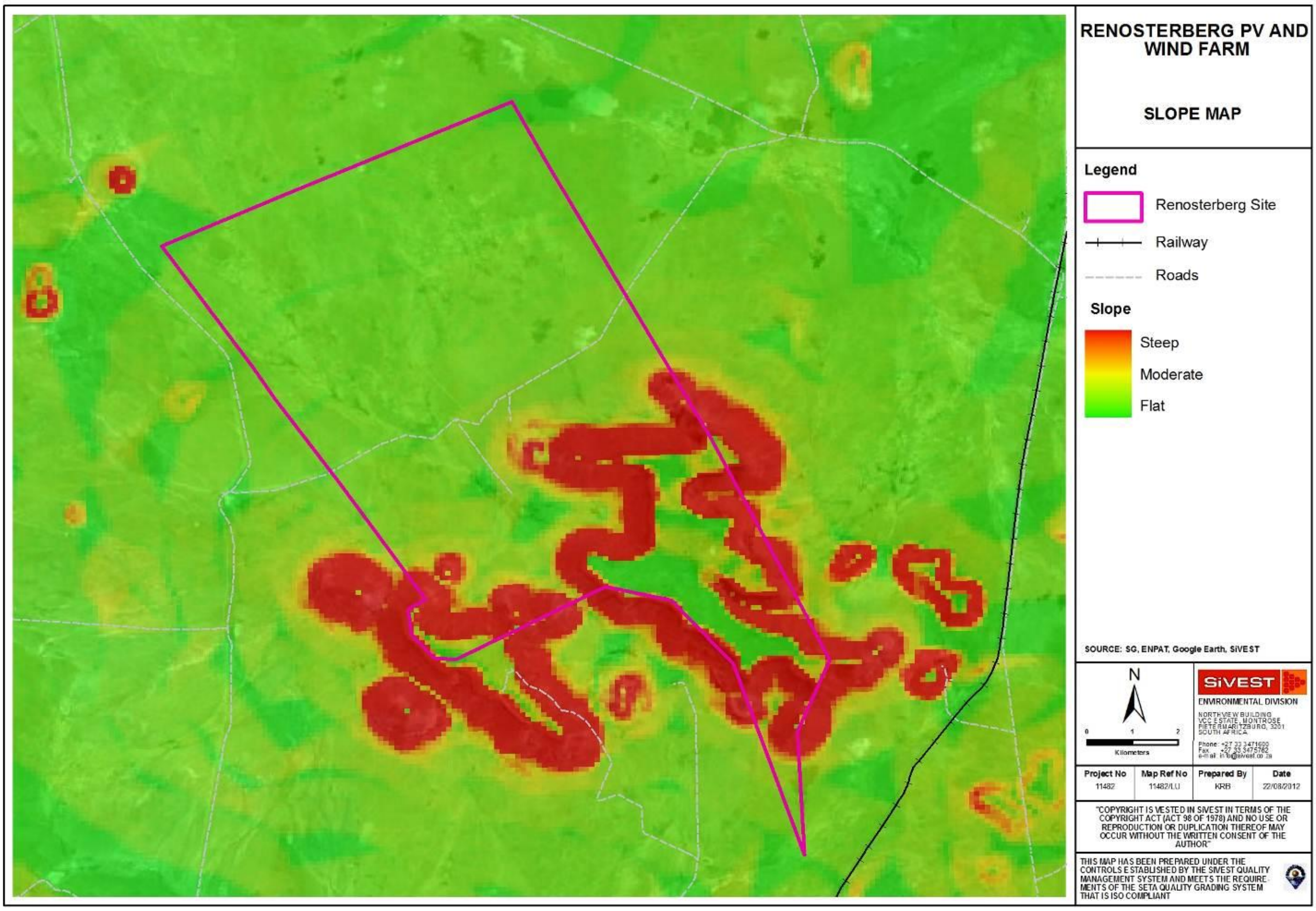

Figure 12: Slope Map for the Renosterberg Site

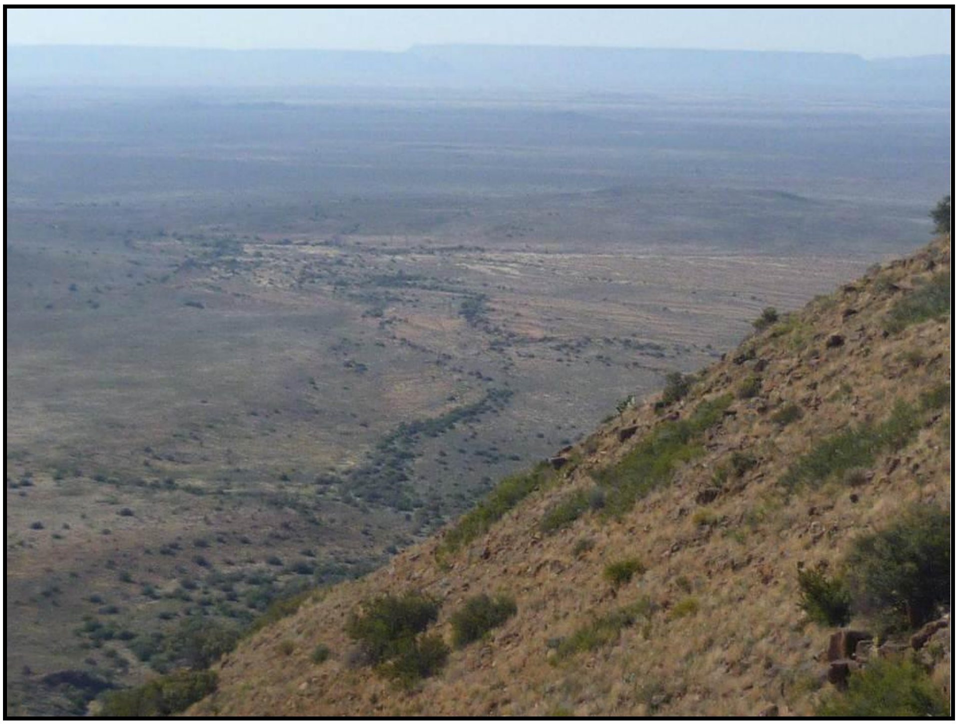

Figure 13: The steep sides of the Renosterberg

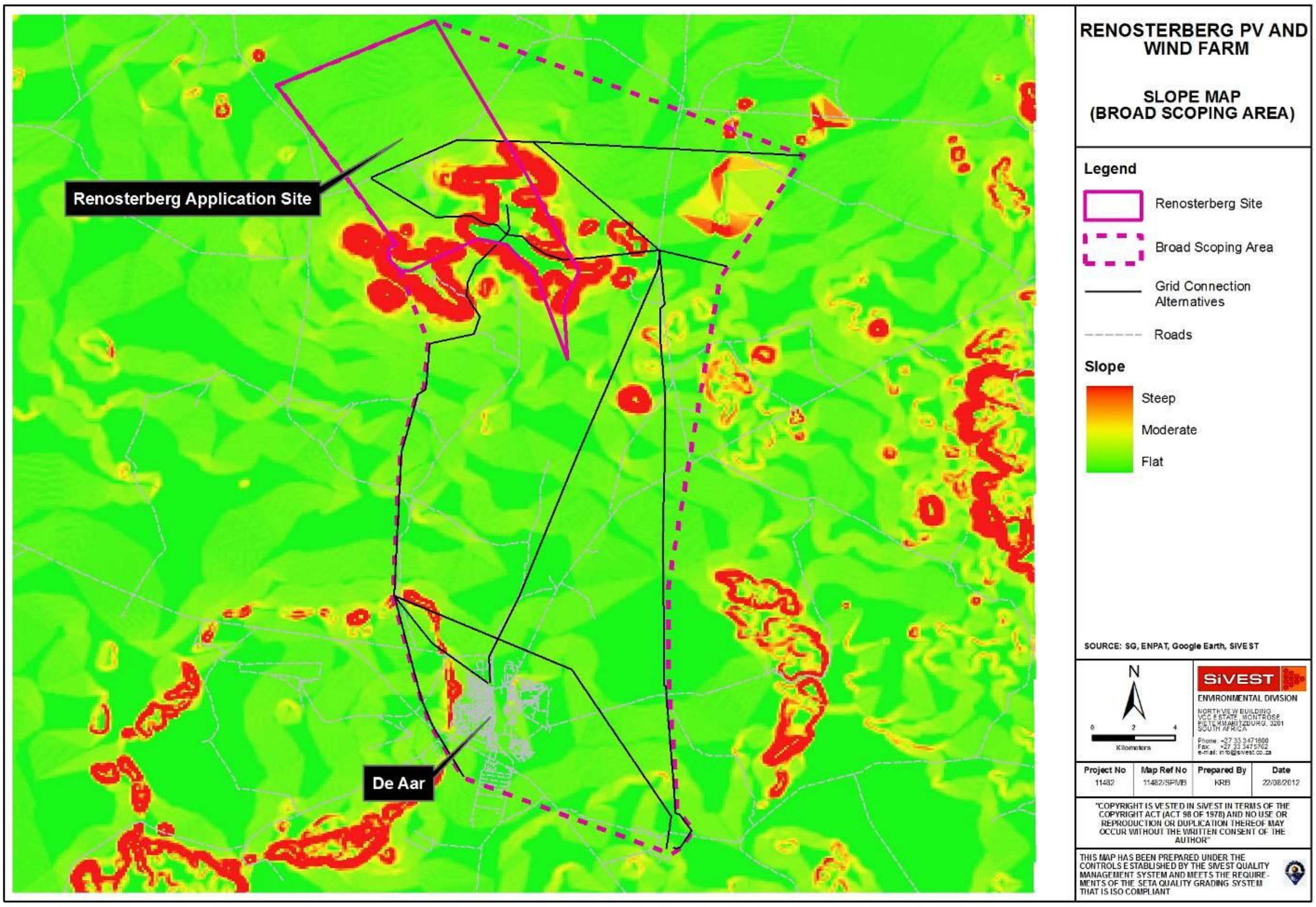

Figure 14: Slope map for the broad study area

3.4 Land Use

According to Mucina and Rutherford (**2006**) the flat northern and central plains are classified by the *Northern Karoo* vegetation type, which is located in the Nama-Karoo Biome. The steeper slopes, including the Renosterberg are classified as Besemkaree Koppies Shrubland.

The entire Renosterberg Site consists of a mix of natural veld and vacant land, which is used as general grazing land for livestock (**Figure 15** and **17**). Vast grazing land is interspersed with non-perennial stream beds which flow intermittently and seasonal pans dot the landscape. According to the spatial databases there are no cultivated fields or irrigated lands which could be detrimentally impacted upon by the proposed development. The land uses surrounding the assessment area are virtually identical to the site itself and included grazing land for livestock and game.

The Broad Scoping Area is also dominated by unimproved veld, while the urban center of De Aar is located in the south western corner of the encompassing study area (**Figure 16**).

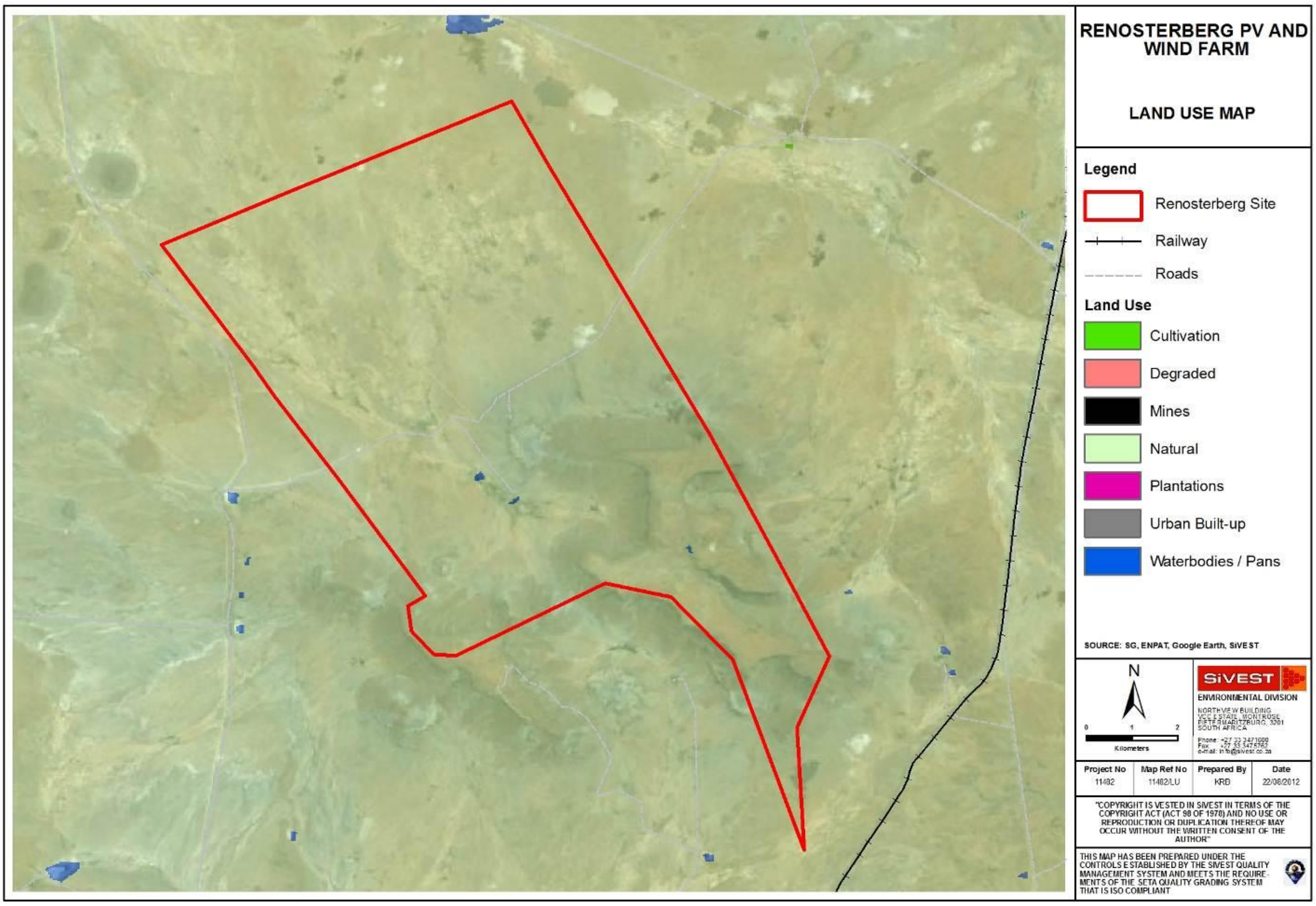

Figure 15: Land Use Map for the Renosterberg Site

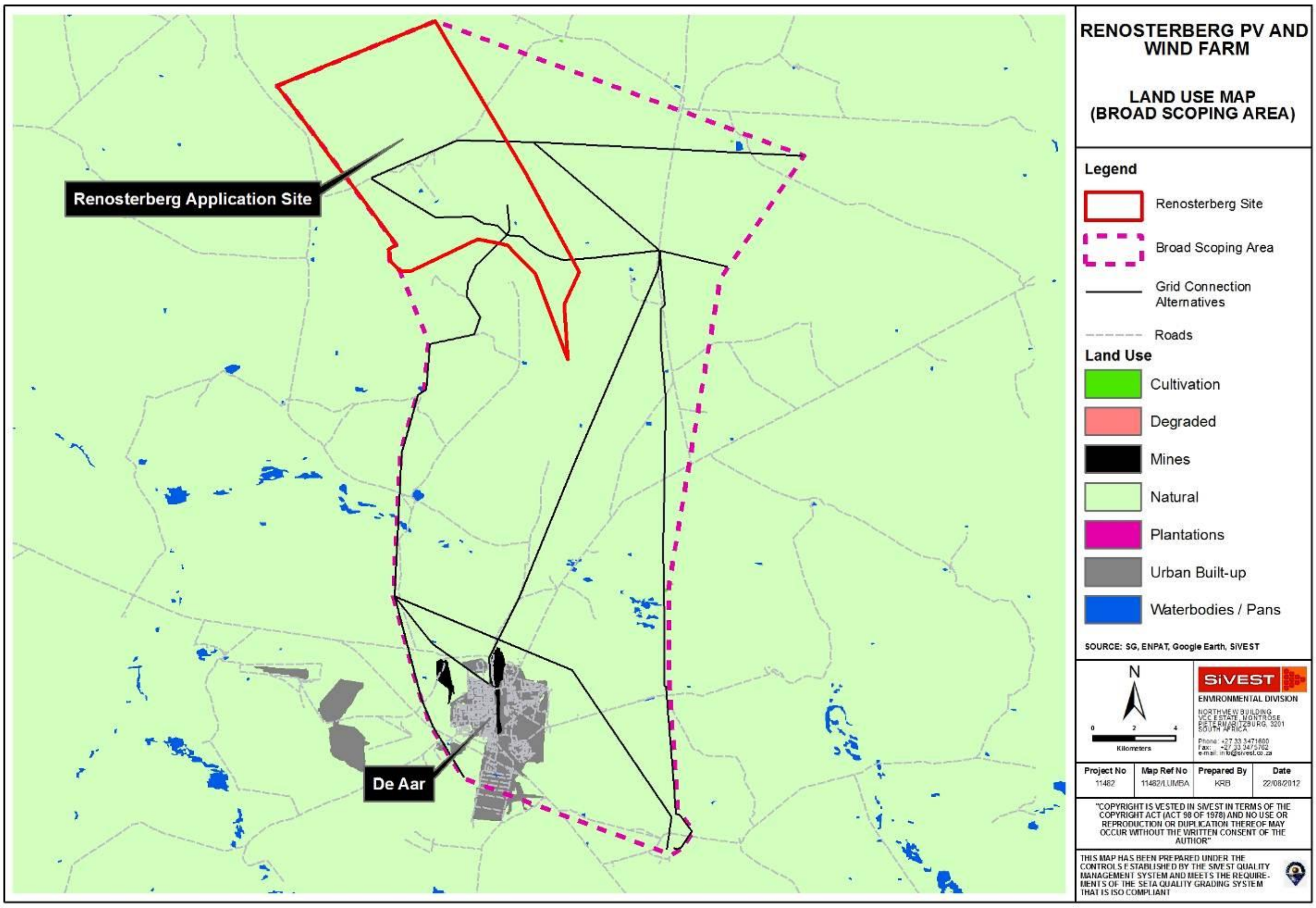

Figure 16: Land use for the Broad Scoping Area

Figure 17: Unimproved grazing land dominates the site

3.5 Soil Characteristics and Soil Potential

The ENPAT spatial dataset for the Northern Cape Province also provides details pertaining to the broad soil type and approximate agricultural potential for the study area. **Figure 18** provides a spatial characterisation of the major soil groups which underlie the Renosterberg Site.

The central and eastern portions of the site are underlain by red apedal soil types. Apedal soils lack well formed peds[1], other than porous micro-aggregates, and are weakly structured. Apedal soils tend to be freely drained, and the red colour generally signifies good aeration in the soil profile. The north western corner of the site is underlain by Glenrosa and Mispah soil forms. These forms are associated with shallow soils, where parent rock is found close to the land surface. These soils have an inherently low agricultural potential due to a prohibitive rooting depth. As expected shallow, rocky soils correspond to the steeper slopes which encircle the Renosterberg.

According to the ENPAT database, the flat areas atop the Renosterberg are the underlain by strongly structured duplex type soils. The defining characteristic of duplex soils is the enrichment of clay within the soil profile and lead to the development of pedo- and prismacutanic horizons. Duplex soils are mostly found in the drier parts of South Africa and have in common the development of a strong structure in the B-horizon and a marked increase in clay compared to the overlying horizon (**Fey, 2010**). This strong structure can, in certain circumstances, be considered an impediment to root growth and water movement.

The Broad Scoping Area illustrates a similar soil spatial pattern, where shallow red Apedal soil types dominate the encompassing assessment area. Shallow, rocky soils are associated with steeper slopes and outcrops (**Figure 19**).

The entire study area is classified as having an effective soil depth (depth to which roots can penetrate the soil) of less than 0.45 m deep, which is a limiting factor in terms of sustainable crop production (**Figures 20 and 21**). According to the AGIS database the soils in the assessment area are associated with low organic carbon content and a basic pH.

[1] A ped is an individual natural soil aggregate (**Soil Classification Working Group**, **1991**)

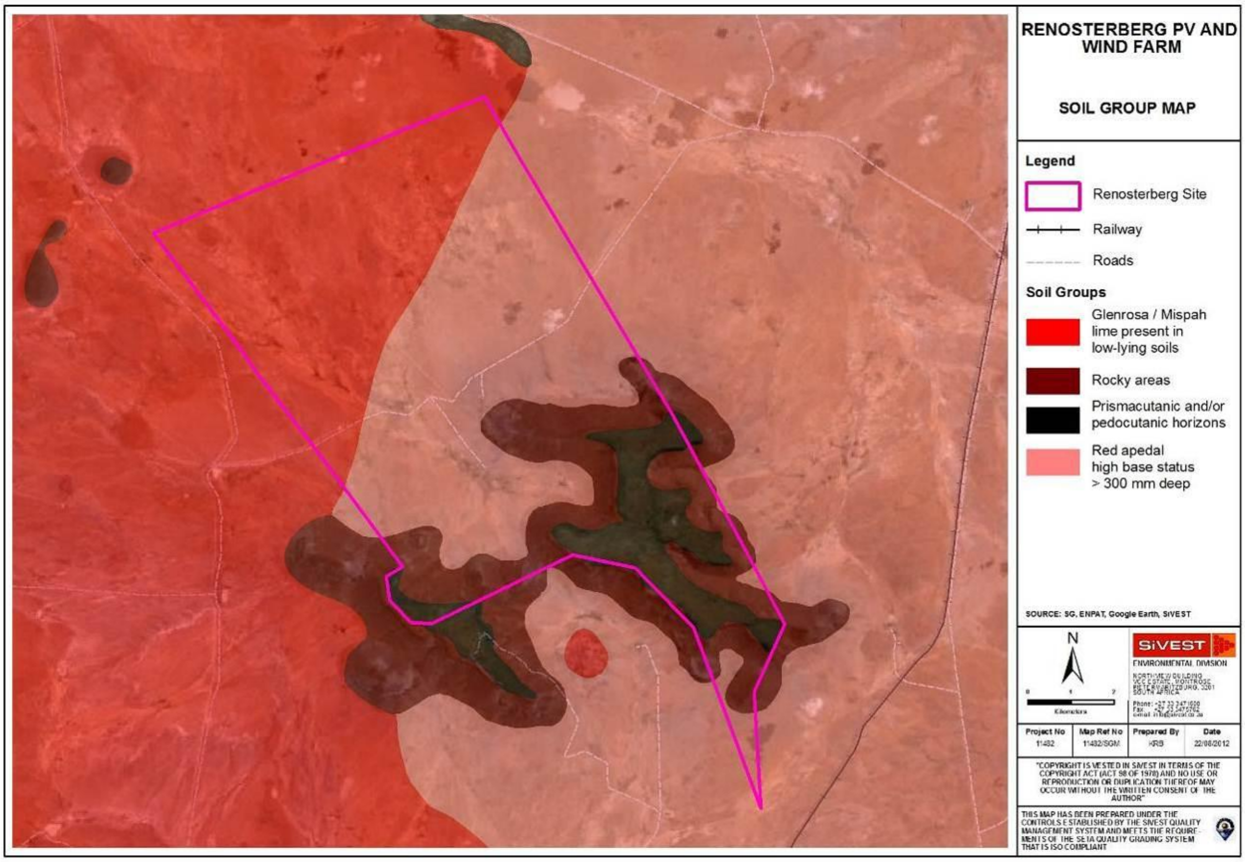

Figure 18: Soil map for the Renosterberg Site

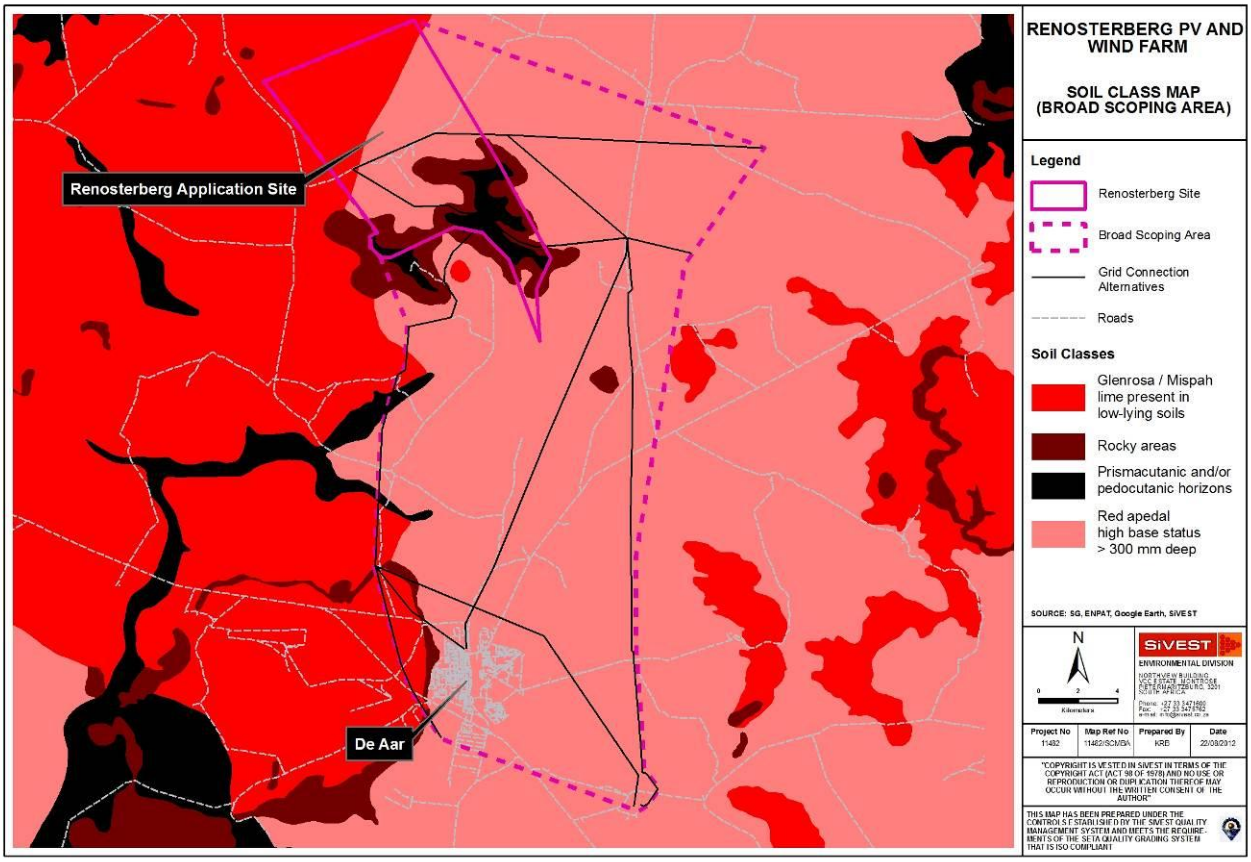

Figure 19: Soil map for the Broad Scoping Area

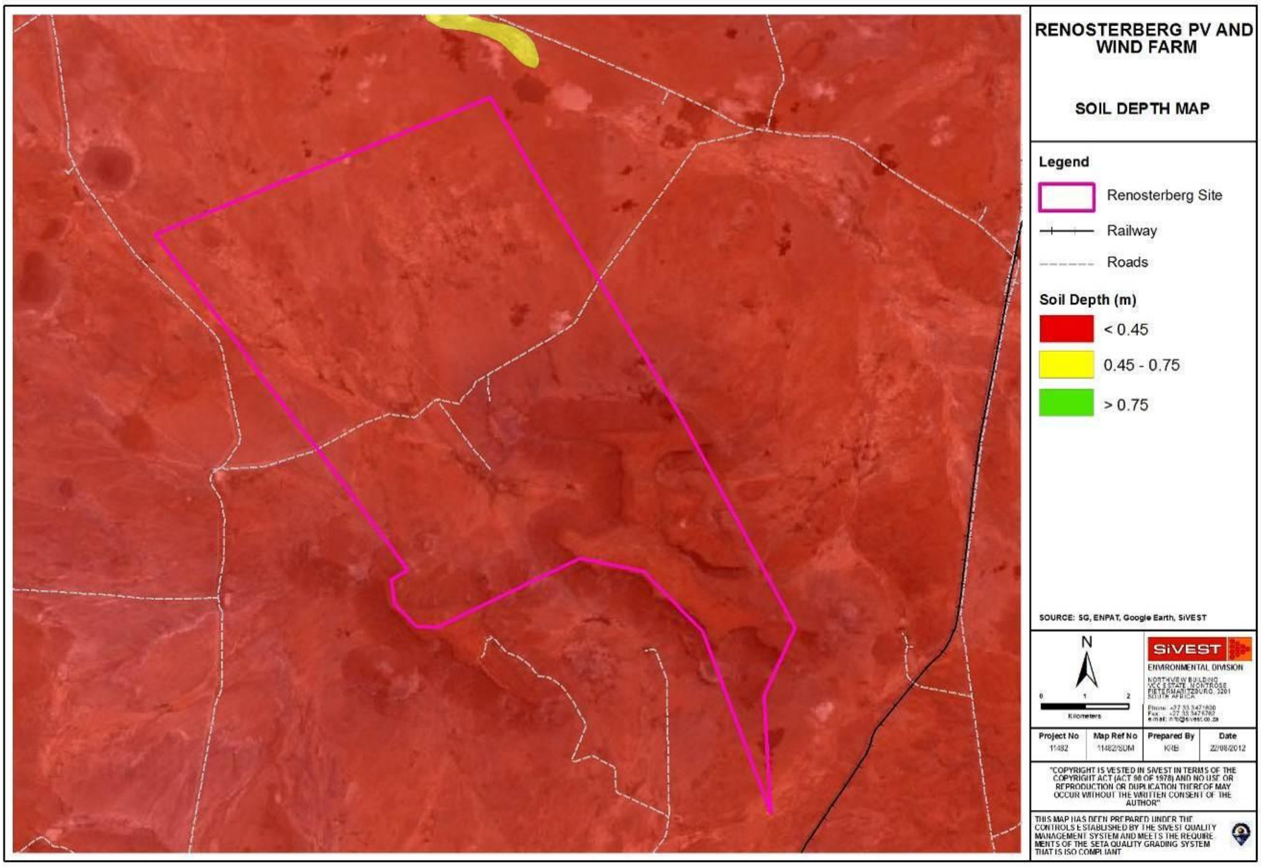

Figure 20: Soil depth map for the Renosterberg Site

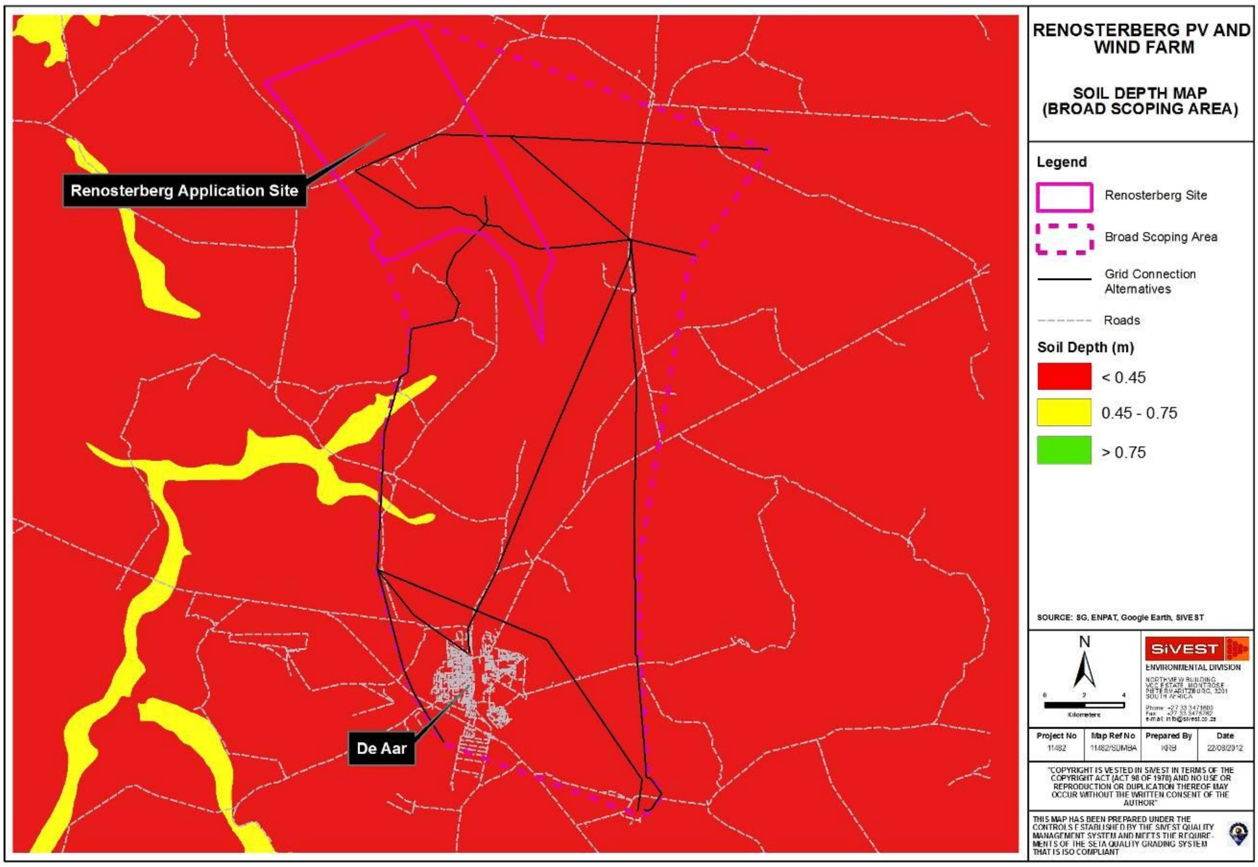

Figure 21: Soil depth map for the broad study area

The ENPAT Database also provides an overview of the study area's agricultural potential, based on its soil characteristics, although it should be noted this spatial dataset does not take *prevailing climate into account*. According to the ENPAT agricultural dataset the vast majority of the Renosterberg Site is dominated by soils which are not suited for arable agriculture, but which can still be used as grazing land (**Figure 22**). The steeper slopes giving rise to the Renosterberg are only suitable for conservation and for water catchments.

Like the smaller Renosterberg Site, the Broad Scoping Area is dominated by soils, which are not suited for arable agriculture, but which can still be used as grazing land. Small pockets of soil, which have a slightly higher suitability for arable agriculture, are located the eastern and western edges of the encompassing study area. Restrictive climate characteristics, due to a low and strong seasonal rainfall regime further reduces the agricultural potential of the entire study area.

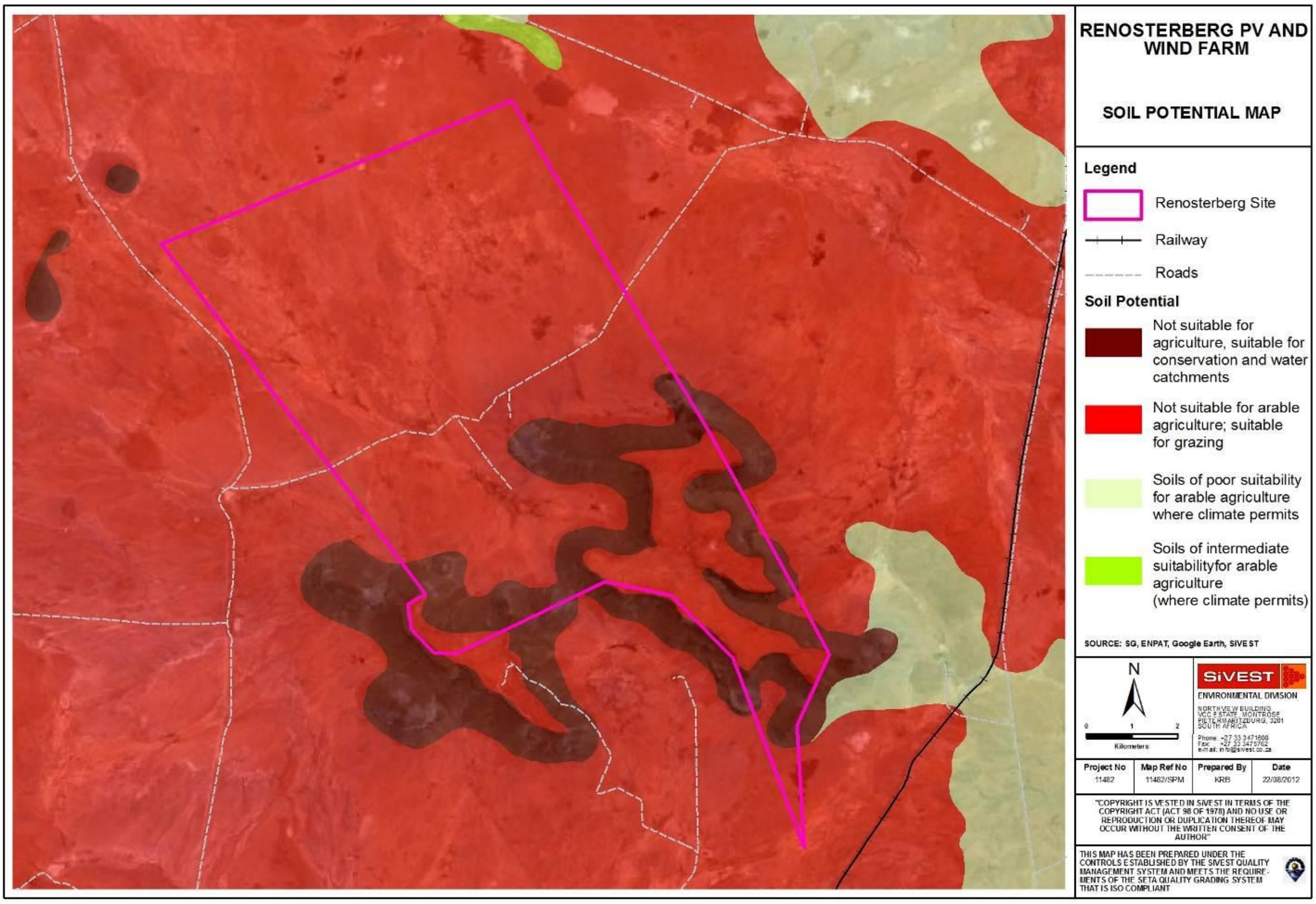

Figure 22: Soil potential map for the Renosterberg Site

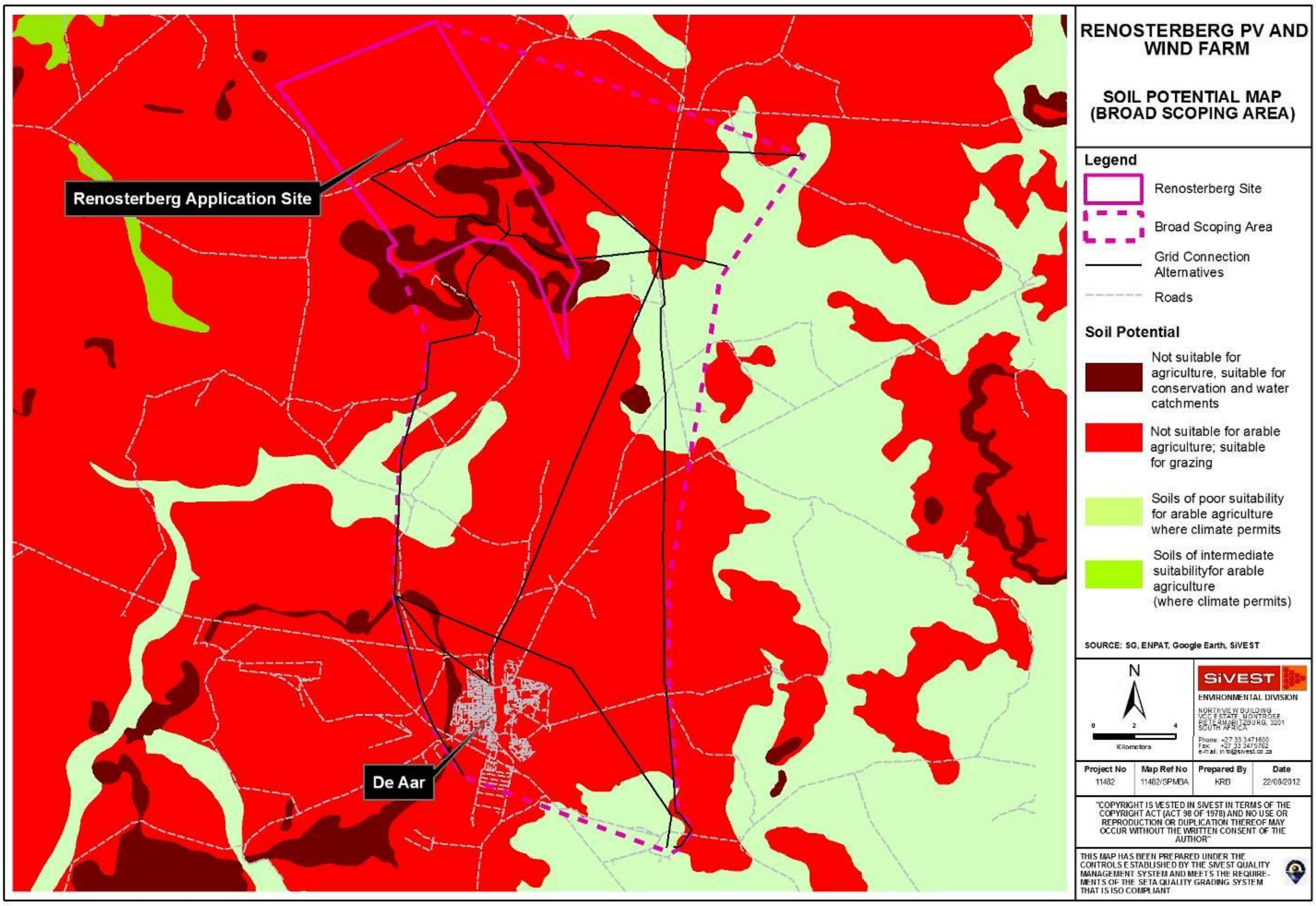

Figure 23: Soil potential map for the Broad Scoping Area

3.6 Desktop Agricultural Assessment: Result Summary

By taking all the site characteristics (climate, geology, land use, slope and soils) into account, the agricultural potential for the Renosterberg Site and Board Scoping Area is classified as being low for crop production while moderate for grazing. This poor agricultural potential rating is primarily due to restrictive climatic characteristics and soil depth limitations. The site is not classified as high potential, nor is it a unique dry land agricultural resource.

4 CONSTRAINT AND FATAL FLAW ANALYSIS

The primary aim of the constraint analysis is to highlight problematic areas and 'no-go zones' in terms of agricultural production and potential. In terms of this study, agricultural potential is described as an area's suitability and capacity to sustainably accommodate an agricultural land use and in most cases this potential is benchmarked against crop production. The proposed development's primary impact on agricultural activities will involve the construction of the solar fields, wind turbines and associated infrastructure.

4.1 Solar PV Facility

The proposed development includes the construction of a Solar PV facility. This will entail the limited clearing of vegetation and leveling of the solar field footprint. Unless grazing is permitted within the PV site, the proposed solar development will effectively eliminate the lands agricultural potential, for as long as the development persists. The construction of the solar field will only influence a portion of the total farm area (250). A large portion of remaining land will continue to function as it did prior to the development. The desktop assessment (**Section 3**) has already shown that the study area is unsuitable for dry land crop production and is dominated by unimproved grazing land.

The results from the desktop assessment indicate that the Renosterberg site has low agricultural value and is replaceable when assessed within the context of the proposed development. Consequently the overall impact of the Solar Energy Facility on the study area's agricultural potential and production will be low, due to the site's low inherent agricultural potential and value.

There are no centre pivots, irrigation schemes or active agricultural fields which will be influenced by the proposed development, and as such there are no problematic or fatal flaw areas for the Renosterberg Site (**Figure 24**). **Table 2** summarises the potential impacts of the solar fields on agricultural potential of the Renosterberg Site.

Table 2: Summary of potential impacts from the Solar PV Facility

ISSUE	Loss of agricultural land and production.
DISCUSSION	Loss of agricultural land due to the construction of the solar and associated infrastructure.
EXISTING IMPACT	N/A
PREDICTED IMPACT	The proposed development's primary impact on agricultural activities will involve the construction of the solar fields and associated infrastructure. This will entail the limited clearing of vegetation and levelling of the land within the solar fields. Unless grazing is permitted within the PV site, the proposed solar development will effectively eliminate the lands agricultural potential, for as long as the development persists. However, the agricultural potential of the land is considered to be low for crop production, and moderate for grazing. The construction of the solar field will also only influence a small portion of the total farm area. A large portion remaining land will continue to function as it did

	prior to the development. It is predicted that the impact severity on the local agricultural production and soil resources will be of a local extent, low magnitude, and therefore of low significance.
EIA INVESTIGATION REQUIRED	The Department of Agriculture will require a detailed soil survey and in-field verification in order to assess the application.
CUMULATIVE EFFECT	A number of solar and renewable energy projects have been proposed in the De Aar area and thus, the cumulative impact of these developments, on surrounding farms could become detrimental to local agricultural resources, if the loss of usable grazing land is not taken into account when determining optimum herd size.

4.2 Wind Farm

A wind energy facility is also planned for the Renosterberg Site. This development's primary impact on agricultural activities will involve the construction of the wind energy facility (wind turbines) and associated infrastructure. This will entail the clearing of vegetation around the footprint of the turbines and crane hardstand. The site is currently dominated by grazing land and this land use can be seen as a non-sensitive when assessed within the context of the proposed development. Consequently the impact of the proposed development on the study area's agricultural potential will be extremely low, with the only direct loss of agricultural land being directly underneath the turbines, crane hardstand and buildings as normal grazing (the dominant agricultural activity) will be permitted around these areas.

Again there are no centre pivots, irrigation schemes or active agricultural fields which will be influenced by the proposed developments, and as such there are no problematic or fatal flaw areas for the Renosterberg Site (**Figure 24**). **Table 3** summarises the potential impacts of the wind farm on agricultural potential of the Renosterberg Site.

Table 3: Summary of potential impacts from the wind farm development

ISSUE	Loss of agricultural land and production.
DISCUSSION	Loss of agricultural land due to the construction of the wind energy facility and associated infrastructure.
EXISTING IMPACT	None
PREDICTED IMPACT	The proposed development will have a very limited impact on agricultural potential or production on the Renosterberg site as normal agricultural activities (grazing) can still take place around the turbines and associated infrastructure. The only loss of grazing land will be directly below the turbine, the crane hardstand footprint, new buildings and within the road servitude. The area lost is typically less than 2% of the total site.
FURTHER INVESTIGATION REQUIRED	In order to assess the application the Department of Agriculture will require a more detailed agricultural assessment, which includes a soil survey and in-field verification.
CUMULATIVE	A number of solar and renewable energy projects have been proposed

EFFECT	in the De Aar area and thus, the cumulative impact of these developments, on surrounding farms could become detrimental to local agricultural resources, if the loss of usable grazing land is not taken into account when determining optimum herd size.

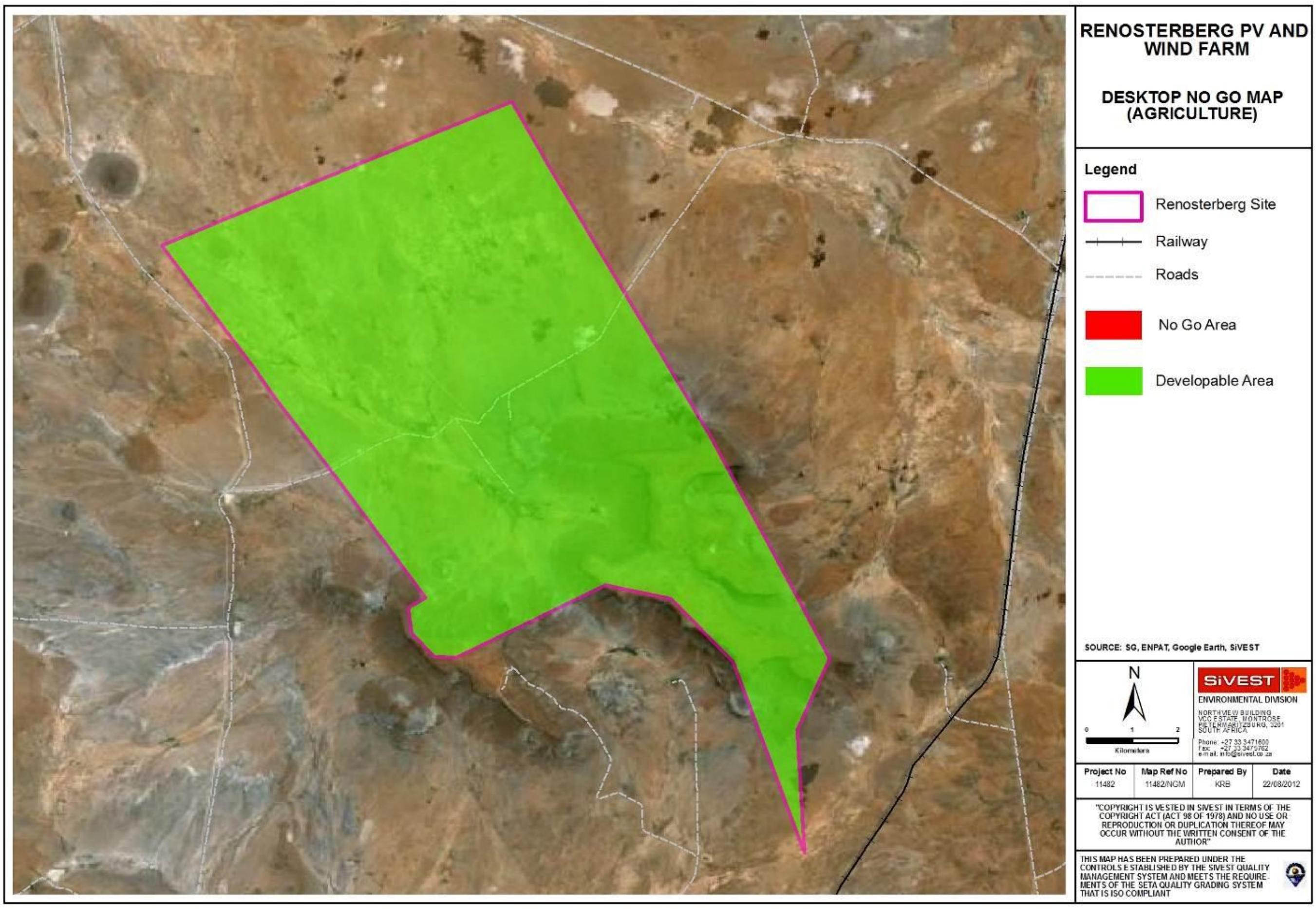

Figure 24: Developable and no-go areas from an agricultural perspective for the Renosterberg Site

4.3 Broad Scoping Area

The proposed developments, for the Broad Scoping Area, will take the form of grid connections (transmission lines). Like the Renosterberg Site the Broad Scoping Area is currently dominated by low potential grazing land. Owing to this, the crossing of agricultural land by these lines should have a very limited impact on agricultural production, as grazing can still take place under the power lines. The only loss of agricultural land will be directly below the tower's footprint. Therefore, from an agricultural perspective and at this level of assessment, there are also no fatal flaw areas for the Broad Scoping Area (**Figure 25**).

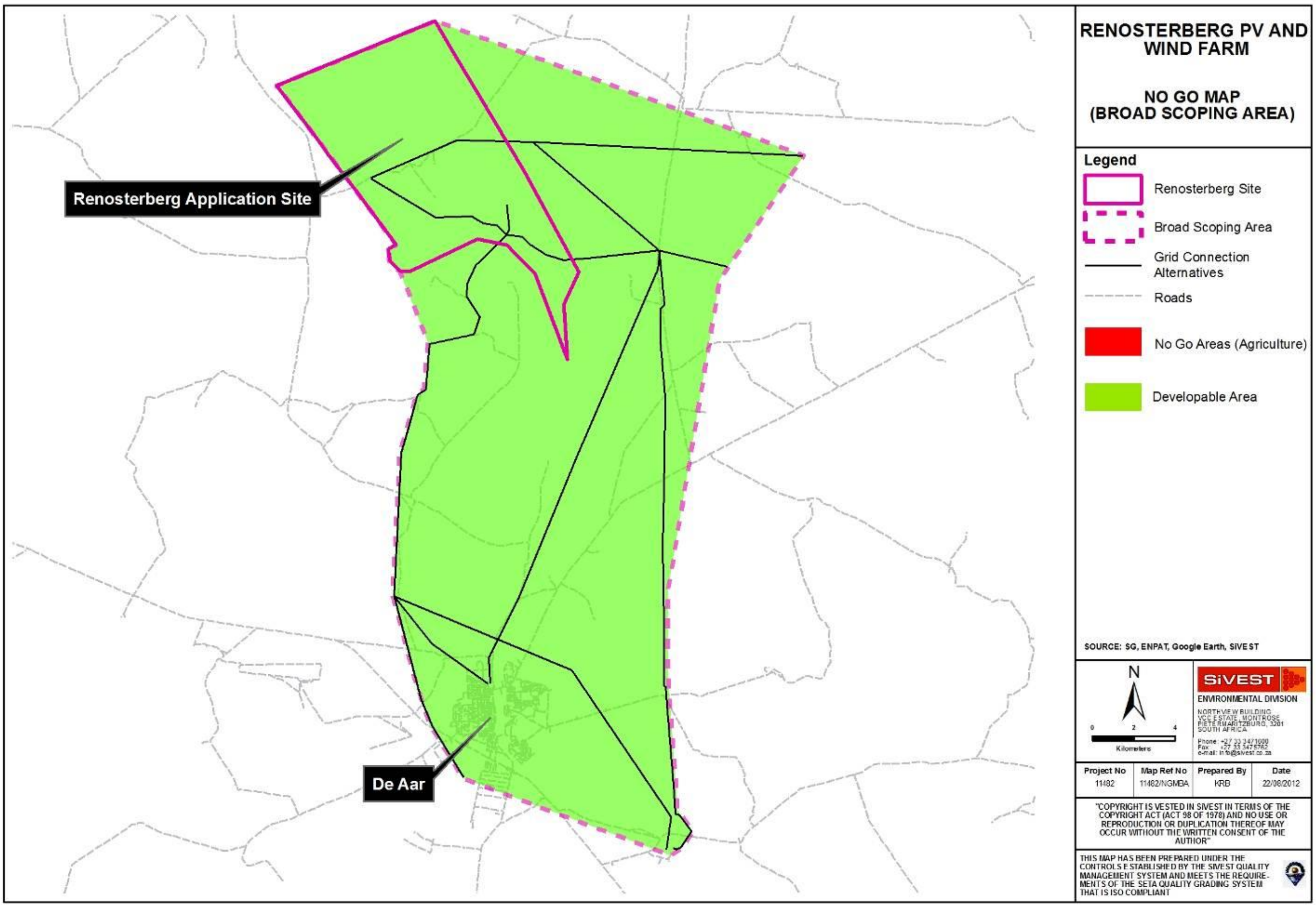

Figure 25: Developable and no-go areas from an agricultural perspective for the Broad Scoping Area

5 CONCLUSIONS AND RECOMMENDATIONS

SiVEST Environmental on behalf of RWEC and the IDC, requested a desktop agricultural assessment and fatal flaw study for the area affected by the proposed solar and wind energy facility near De Aar, in the Northern Cape Province. The primary objective of this assessment is to provide specialist agricultural, soil and land use input for the overarching Environmental Scoping Report.

By taking all the site characteristics (climate, geology, land use, slope and soils) into account, the agricultural potential for the study area is classified as being low for crop production while moderate for grazing. This poor agricultural potential rating is primarily due to restrictive climatic characteristics and soil depth limitations. The Renosterberg site is not classified as high potential, nor is it a unique dry land agricultural resource.

The Renosterberg site is dominated by grazing land, and this land use can be characterised by having a low sensitivity when assessed within the context of the proposed development. There are no centre pivots, irrigation schemes or active agricultural fields which would be influenced by the proposed developments, and as such there are no fatal flaw areas for the Renosterberg site.

The proposed developments, for the Broad Scoping Area, will take the form of grid connections (transmission lines). Like the Renosterberg Site the Broad Scoping Area is currently dominated by low potential grazing land. Owing to this, the crossing of agricultural land by these lines should have a very limited impact on agricultural production, as grazing can still take place under the power lines. The only loss of agricultural land will be directly below the tower's footprint. Therefore, from an agricultural perspective and at this level of assessment, there are also no fatal flaw areas for the Broad Scoping Area.

A more detailed agricultural assessment, would however be required in the Environmental Impact Assessment phase of the environmental process, in order to meet the minimum requirements set out by the Department of Agriculture.

6 REFERENCES

AGIS Database 2012. Source: *http://www.agis.agric.za/agisweb/agis.html* (Accessed 21/08/2012)

Department of Environmental Affairs and Tourism. 2001. *Environmental Potential Atlas for South Africa.* Source: *www.environment.gov.za/enviro-info/enpat.htm.*

FAO. 2007. Mapping biophysical factors that influence agricultural production and rural vulnerability. Source: www.fao.org/docrep/010/a1075e/a1075e00.HTM.

Fey, M. 2010. Soils of South Africa. Cambridge University Press.

Internet 1: Source: *http://en.wikipedia.org/wiki/Mesa* (Accessed 21/08/2012)

Mucina, L. and Rutherford, M.C.(eds). 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Smith, B. 2006. The Farming Handbook. University of KwaZulu-Natal Press.

SAWS. (2010). Climate Information for De Aar. Source: http://www.weathersa.co.za/Climat/Climstats/DeAarStats.jsp

Soil Classification Working Group. 1991. Soil Classification: a taxonomic system for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

SiVEST Civil Engineering Division

VCC Estate, North View Building,
170 Peter Brown Drive, Montrose, Pietermaritzburg, 3201
PO Box 707, Msunduzi, 3231
South Africa

Tel + 27 33 347 1600
Fax +27 33 347 5762

Email info@sivest.co.za
www.sivest.co.za

Contact Person: Kurt Barichievy
Cell No.: 084 5549442
Email: KurtB@sivest.co.za