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Agricultural Compliance Statement for the Proposed Rondavel Solar PV Facility

Submitted by TerraAfrica Consult cc

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15 March 2021

Declaration of the Specialist

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Declaration of Independence

I, Mariné Pienaar, hereby declare that TerraAfrica Consult, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

I further declare that I was responsible for collecting data and compiling this report. All assumptions, assessments and recommendations are made in good faith and are considered to be correct to the best of my knowledge and the information available at this stage.

TerraAfrica Consult cc represented by M Pienaar
15 March 2021

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1. Introduction

Terra-Africa Consult cc was appointed by Savannah Environmental (Pty) Ltd to conduct the Agricultural Compliance Assessment to be included in Environmental Impact Assessment report for proposed Rondavel Solar PV Facility (from here onwards also referred to as the project). The project application is South Africa Mainstream Renewable Power Developments (Pty) Ltd.

The development area for this project is located approximately 7 km south-west of Kroonstad within in the Moqhaka Local Municipality which falls within jurisdiction of the Fezile Dabi District Municipality of the Free State Province (Error! Reference source not found.). The development area is 299.7ha and the southern boundary of this area borders on the R34 road that runs between Kroonstad and Welkom.

The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MWAC. The facility will be located within the remaining extent of the farm Rondavel Noord No. 1475 and the remaining extent of the farm Rondavel No. 627.

The Rondavel Solar PV facility will be connected to the grid via a separately authorised grid connection solution, which will consist of a loop into, either the Kroonstad Municipality – Kroonstad SW STN 1 132 kV power line, or connect directly with the Kroonstad Municipality 132/66kV substation, depending on which alternative is constructed. Since the grid connection solution is already authorised, this report only describes the project area targeted for the solar energy facility.

2. Purpose and objectives of the compliance statement

The purpose of the Agricultural Compliance Statement, is to ensure that the sensitivity of the site from the perspective of agricultural production to the proposed development, is sufficiently considered.
To meet this objective, site sensitivity verification must be conducted of which the results must meet the following objectives:

- It must confirm or dispute the current land use and the environmental sensitivity as was indicated by the National Environmental Screening Tool. **Please refer to Section 9.3 for confirmation of the screening tool report.**
- It must contain proof in the form of photographs of the current land use and environmental sensitivity pertaining to the study field. **Please refer to Chapter 9 for detail and proof of current land use.**
- All data and conclusions are submitted together with the Environmental Impact Assessment Report (prepared in accordance with the NEMA regulations) for the proposed project. **This report will be submitted as part of the Environmental Assessment being conducted for environmental authorisation by Savannah Environmental.**

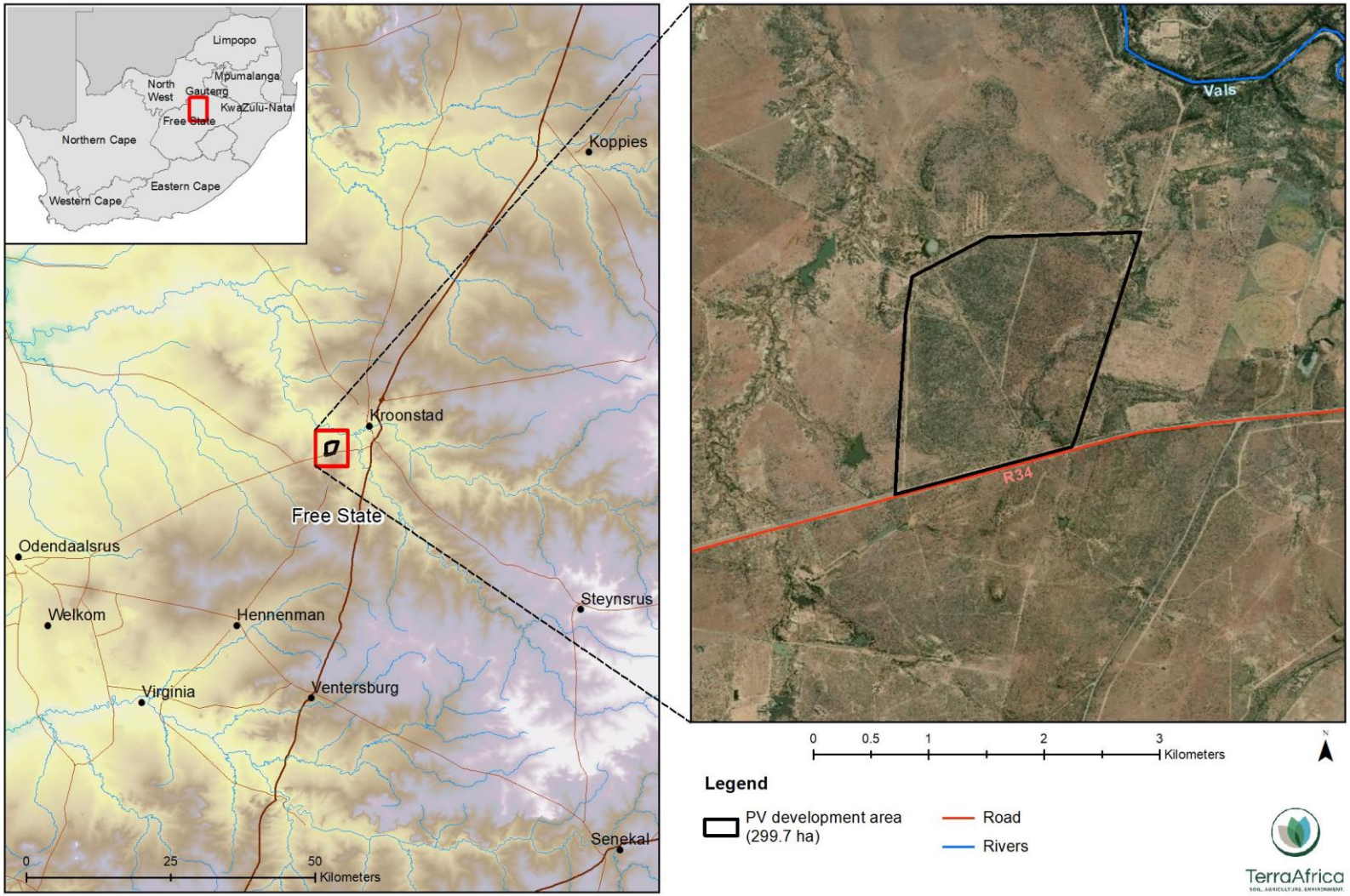

Figure 1: Locality of the proposed Rondavel Solar PV Facility

According to GN320, the agricultural compliance statement that is submitted must meet the following requirements:

- It must be applicable to the preferred site and the proposed development footprint.
- It has to confirm that the site is of “low” or “medium” sensitivity for agriculture.
- It has to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.

The following checklist is supplied as per the requirements of GNR 320, detailing where in the report the various requirements have been addressed:

GNR 320 requirements of an Agricultural Compliance Statement (Low to Medium Sensitivity)	Reference in this report
3.1. The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP.	Page 2
3.2. The compliance statement must: 3.2.1. be applicable to the preferred site and proposed development footprint;	Page 6
3.2.2. confirm that the site is of "low" or "medium" sensitivity for agriculture; and	Section 9.3
3.2.3. indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.	Section 12
3.3. The compliance statement must contain, as a minimum, the following information: 3.3.1. contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae;	Page 2
3.3.2. a signed statement of independence;	Page 2
3.3.3. a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool;	Figure 2
3.3.4. confirmation from the specialist that all reasonable measures have been taken through micro- siting to avoid or minimise fragmentation and disturbance of agricultural activities;	Section 12
3.3.5. a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development;	Section 12
3.3.6. any conditions to which the statement is subjected;	Section 10
3.3.7. in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;	N/A – not a linear activity
3.3.8. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; and	Section 10
3.3.9. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data.	Section 7
3.4. A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	This report forms part of the EIA process

	reports for authorisation

3. Terms of Reference

In addition to the requirements stipulated in GN320, the following Terms of Reference as stipulated by Savannah Environmental (Pty) Ltd applies to the Agricultural Compliance Statement:

- To ensure a thorough assessment, that includes both the desktop assessment of databases and aerial photography as well as a description of previous on-site verification of the agricultural potential of the area and the soil forms present in the development area.
- Identify and assess potential impacts on both agricultural potential as well as soil, resulting from the proposed project.
- Identify and describe potential cumulative soil, agricultural potential and land capability impacts resulting from the proposed development in relation to proposed and existing developments in the surrounding area.
- Recommend mitigation, management and monitoring measures to minimise impacts and/or optimise benefits associated with the proposed project.

4. Agricultural Sensitivity

For the purpose of the assessment, the development area of 205.4ha was considered. The requirements of GN320 stipulates that a 50m buffered development envelope must be assessed with the screening tool. Following the Final Scoping Report for the project (Savannah Environmental, January 2021), the approximate area that will be covered by infrastructure is 186.1ha. The development area exceeds this area and therefore includes all the project layout components and allows for a buffered assessment area of 50m and more around the proposed infrastructure.

The development area was screened by using the National Environmental Screening Tool (www.screening.environment.gov.za). The Agricultural Theme of the screening tool considers a combination of the national land capability raster data as well as the field crop boundaries as compiled by Department of Agricultural, Forestry and Fisheries (DAFF) (DAFF 2017, DAFF 2019).

Based on the screening report, the Relative Agricultural Sensitivity of the area, is presented as Figure **2**. The results provided by the screening tool indicated that the development area consist almost entire of land with Medium agricultural sensitivity. Four small isolated blocks located in the corners of the development area, has Low agricultural sensitivity. Areas with High and Very High agricultural sensitivity is present mostly east of the development area with two small areas located north and north-west of the area.

Figure 2 Agricultural Combined Sensitivity of the Rondavel Solar PV facility development area (generated by Savannah Environmental, 2021)

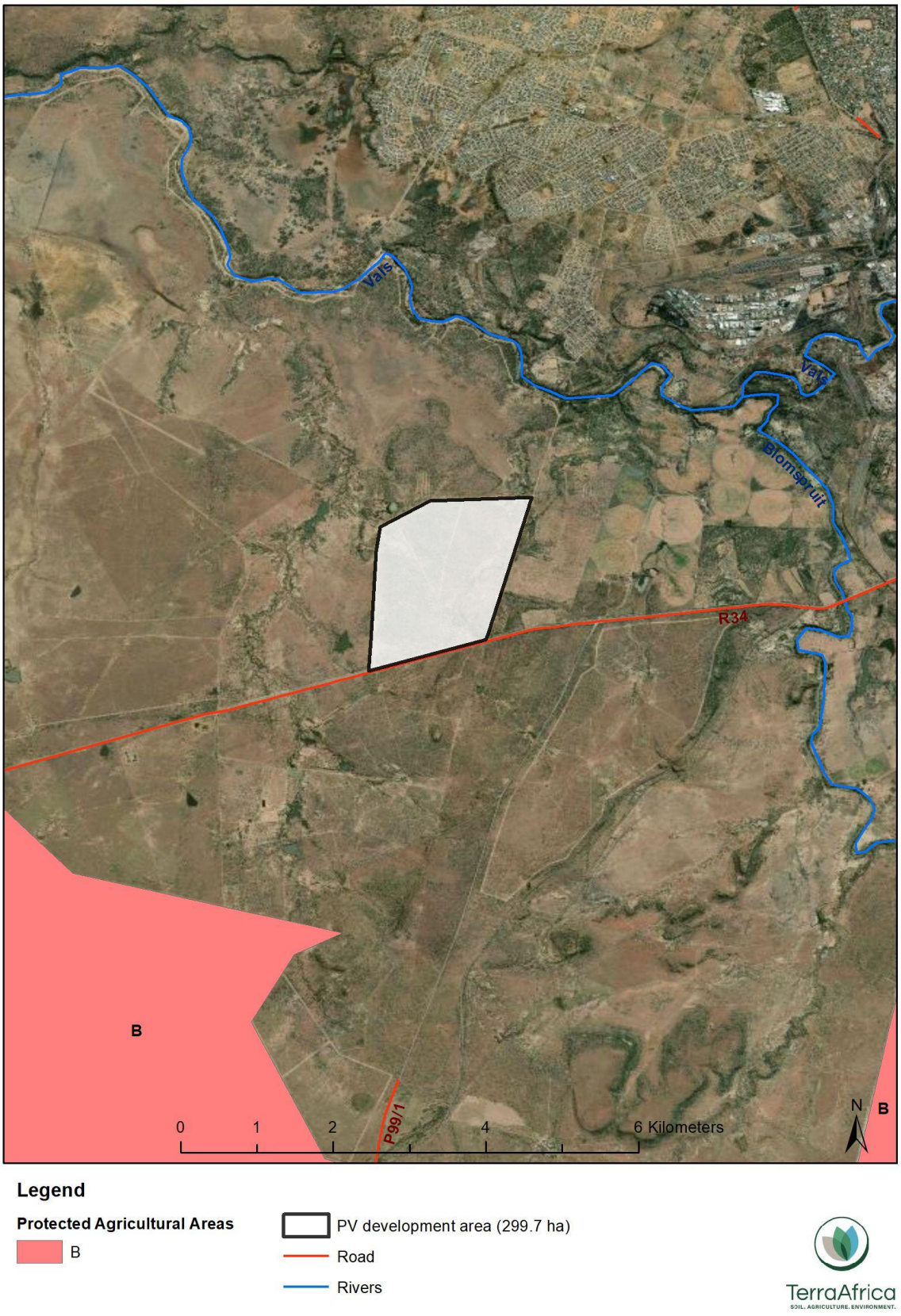

Figure 3 Presence of High Potential Agricultural Areas around the Rondavel solar PV facility development area (DALRRD, 2019)

In alignment with the Conservation of Agricultural Resources Act (CARA), the Department of Agriculture, Land Reform and Rural Development (DALRRD) developed spatial data that depict High Potential Agricultural Areas (HPAA) of the different provinces of South Africa. According to the Department, these areas can be defined as “large, relative homogeneous portions of high value agricultural land that has the potential to sustainably, in the long-term, contribute significantly to the production of food.”

The data layer of the High Potential Agricultural Areas for Cultivation: Free State Province, 2019 was obtained from DALRRD and the development area boundary was superimposed on the data. The result of this process is depicted in **Figure 3**. Following this data, the Rondavel solar PV facility falls outside of any HPAA. Two category B HPAA are located south-west and south-east of the development area, with the closest one being around 4km from the south-western corner proposed development.

5. Environmental legislation and soil management guidelines applicable to study

The report follows the protocols as stipulated for agricultural assessment in Government Notice 320 of 2020 (GN320). This Notice provides the procedures and minimum criteria for reporting in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (No. 107 of 1998) (from here onwards referred to as NEMA). It replaces the previous requirements of Appendix 6 of the Environmental Impact Assessment Regulations of NEMA.

Since the results of the environmental screening report indicated that the area has Medium to Low sensitivity with regards to the combined agricultural theme, an Agricultural Compliance Statement is required as part of the Environmental Impact Assessment process. In addition to the specific requirements of GN320 for this study, the following South African legislation is also considered applicable to the interpretation of the data and conclusions made with regards to environmental sensitivity and the conservation of soil resources of the project area:

- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal. This Act requires the protection of land against soil erosion and the prevention of water logging and salinisation of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.
- Section 3(a) of the Subdivision of Agricultural Land Act 70 of 1970 states that agricultural land must not be subdivided. Although the Environmental Authorisation application is not for the purpose of a subdivision of agricultural land, it will change the current land use from extensive livestock production to that of infrastructure development for energy generation.
- In addition to this, the National Water Act (Act 36 of 1998) deals with the protection of water resources (i.e. wetlands and rivers) and is considered in the case that hydric soils with wetland land capability is part of the proposed development area.

6. Methodology

The different steps that were followed to gather the information used for the compilation of this report, is outlined below. The methodology is in alignment with the requirements of GN320.

6.1 Desktop analysis of satellite imagery

The most recent aerial photography of the area available from Google Earth was obtained. The satellite imagery was analysed to determine areas of existing impact and land uses within the grid connection corridor as well as the larger landscape. It was also scanned for any areas where crop production and farming infrastructure may be present.

6.2 Site assessment

The two adjacent land parcels that are part of the development site, were visited on 5 March 2021. The observation points where soil and landscape features were examined, are depicted in Figure **4**.

For the soil classification, soil profiles were examined to a maximum depth of 1.5m or refuse, using a hand-held auger. The soils are described using the South African Soil Classification: A Natural and Anthropogenic System for South Africa (2018). Observations were made regarding soil form, texture, structure, nature and depth of underlying material as well as any signs of existing soil degradation. A cold 10% hydrochloric acid solution was used on site to test for the presence of carbonates in the soil.

Other observations included the agricultural activities in the area, the quality of the natural vegetation that support the livestock farming in the area and the presence of existing farming infrastructure that may be affected by the proposed project.

6.3 Analysis of all other relevant available information

To ensure a comprehensive analysis of the proposed development area, the following data was analysed in addition to the data already discussed:

- The Climate Capability Raster Data Layer of 2016 that is part of the Refined Land Capability Evaluation for South Africa (DAFF, 2016).
- The National Land Capability Evaluation Raster Data Layer was obtained from the DAFF to determine the land capability classes of the project assessment zone according to this system. The data was developed using a spatial evaluation modelling approach (DAFF, 2017).
- The long-term grazing capacity for South Africa 2018 was analysed for the area and surrounding area of the project assessment zone. This data set includes incorporation of the RSA grazing capacity map of 1993, the Vegetation type of SA 2006 (as published by Mucina L. & Rutherford M.C.), the Land Types of South Africa data set as well as the KZN Bioresource classification data. The values indicated for the different areas represent long term grazing capacity with the understanding that the veld is in a relatively good condition.

- The Free State Field Crop Boundaries (November 2019) was analysed to determine whether the proposed project assessment zone falls within the boundaries of any crop production areas. The crop production areas may include rainfed annual crops, non-pivot and pivot irrigated annual crops, horticulture, viticulture, old fields, small holdings and subsistence farming.
- Land type data for the project assessment zone 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.

For a description of the ecological characteristics (including any freshwater bodies) of the site as well as other aspects such as climate and geology, the following reports were reviewed:

- Final Scoping Report for the Construction and Operation of the 100MW Rondavel Photovoltaic Solar Energy Facility, Battery Energy Storage System (BESS) and Associated Infrastructure located near Kroonstad, Free State Province – submitted by Savannah Environmental, January 2021.
- Ecology and Freshwater Resource Assessment: Scoping Phase – report submitted by Nkurenkuru Ecology & Biodiversity, November 2020.

6.4 Impact assessment methodology

Following the methodology prescribed by Savannah Environmental (Pty) Ltd., the direct, indirect and cumulative impacts associated with the project have been assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

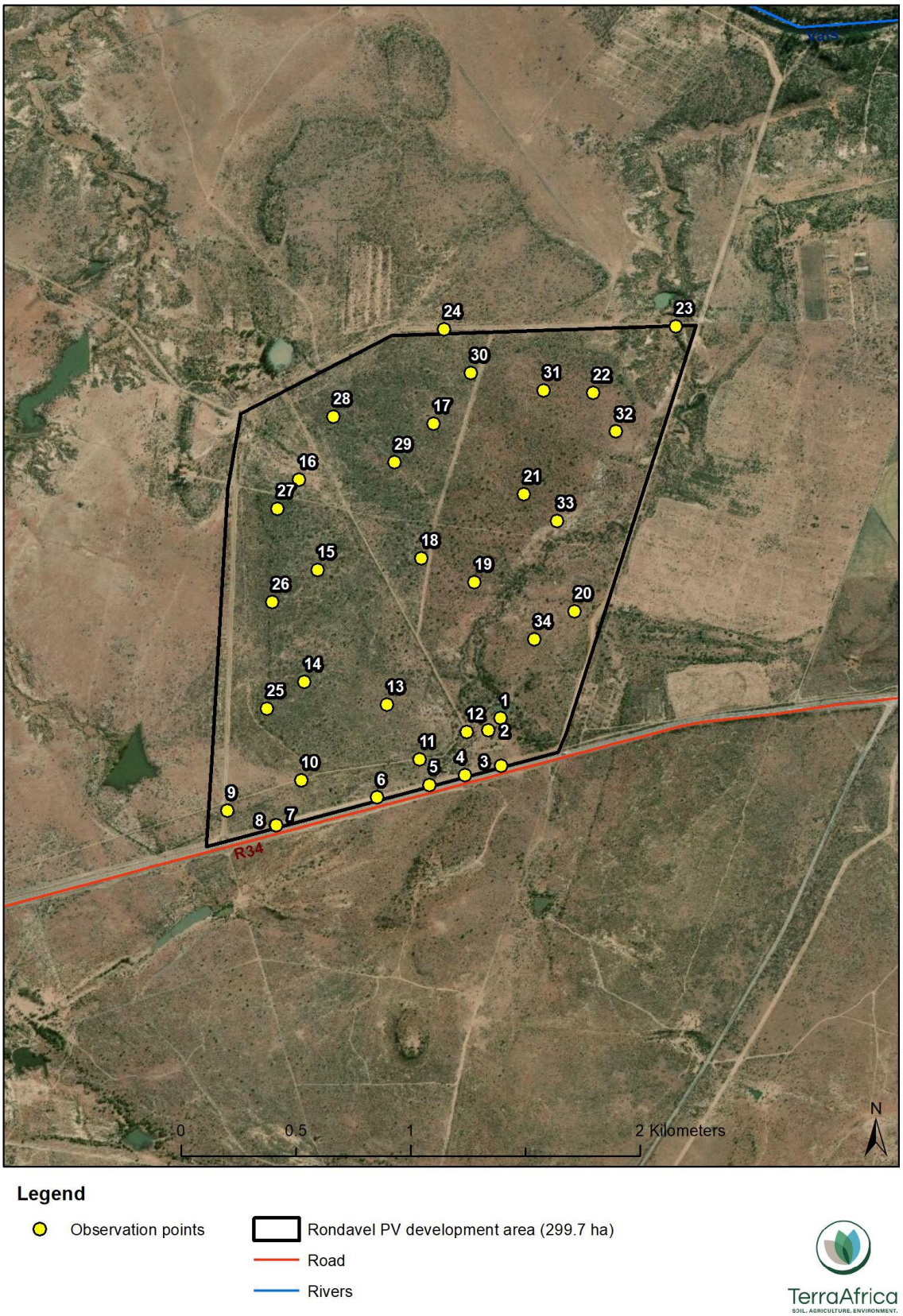

Figure 4 Locality of on-site inspection observation points

- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

7. Study gaps, limitations and assumptions

- The exact layout of the infrastructure footprint was not available to superimpose on the baseline data. It is assumed that the final infrastructure layout will avoid any environmental sensitivities where possible.
- No signs of historical crop farming activities on the farm were observed. Following the discussion with the land owner's farm manager, the land is currently used for livestock farming as part of a larger farming unit.
- No other uncertainties and gaps have been identified that may affect the conclusions made in this report.

8. Results of desktop analysis

8.1 Climate capability

The Department of Agriculture, Forestry and Fisheries (2017) compiled an updated description of the agricultural suitability of South African climatic conditions, accompanied by a raster data layer of the entire country. The description of climate capability refers to a definition by Strydom (2014) that defines it as the “capability of a geographic area to grow an agricultural crop under existing climatic conditions” (DAFF, 2017). The climate capability includes three parameters i.e. moisture supply capacity, physiological capacity and climatic constraints. The climate capability classes range from 1 (the lowest or worst) to 9 (the highest or best climate for agricultural production).

According to the climate capability raster data, the development area consist of two climate capability classes i.e. Low-Moderate (Class 04) that covers the largest portion of the area as well as Moderate (Class 05). This indicates that the climate is marginal for the production of crops with rainfed agriculture and that the area experiences drought spells from time to time as well as climate extremes such as high temperatures and frost during winter. The climate capability classification shows that grain crops may be produced successfully during higher rainfall years but livestock production may be a more sustainable long-term agricultural land use of the area.

8.2 Land capability

The Rondavel Solar PV Facility development area includes four different land capability classes according to the land capability data (DAFF, 2017). **Figure 6** indicates the position of the different classes within the farm portions that form the proposed development area.

The entire development area largely consists of land with Low-Moderate (Class 6) land capability. Smaller patches of land in a strip that runs from the north-eastern corner with a curve to the south-eastern corner consist of land with Low- Moderate to Moderate (Classes 07 and 08) land capability. Class 08 have potential for the production of specific crops under rainfed conditions while classes 05 to 07 are likely to be very marginal arable land that is more suitable for livestock grazing.

8.3 Field crop boundaries

The position of field crops around the proposed Rondavel Solar PV Facility development area is illustrated in (refer to **Figure 7**). There are no field crop boundaries within this area. Planted pastures to the north and east of the development area. Several pivot irrigation fields are located outside the development area, to the east of it. Some old fields are located to the south of the development area. Following this data, there is no risk that rainfed or irrigated crop production will be affected by the proposed development.

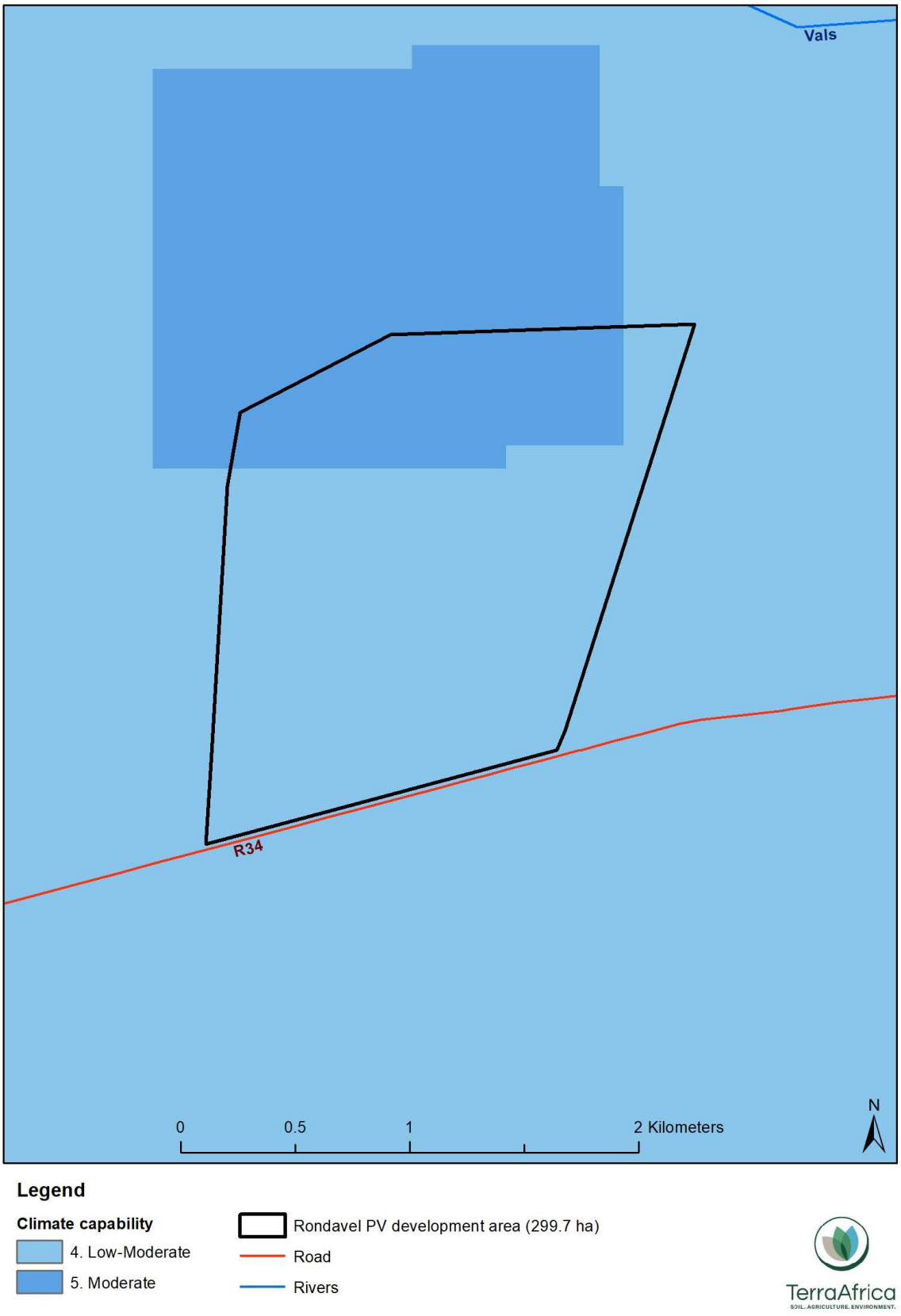

Figure 5 Climate capability classification of the Rondavel solar PV facility development area

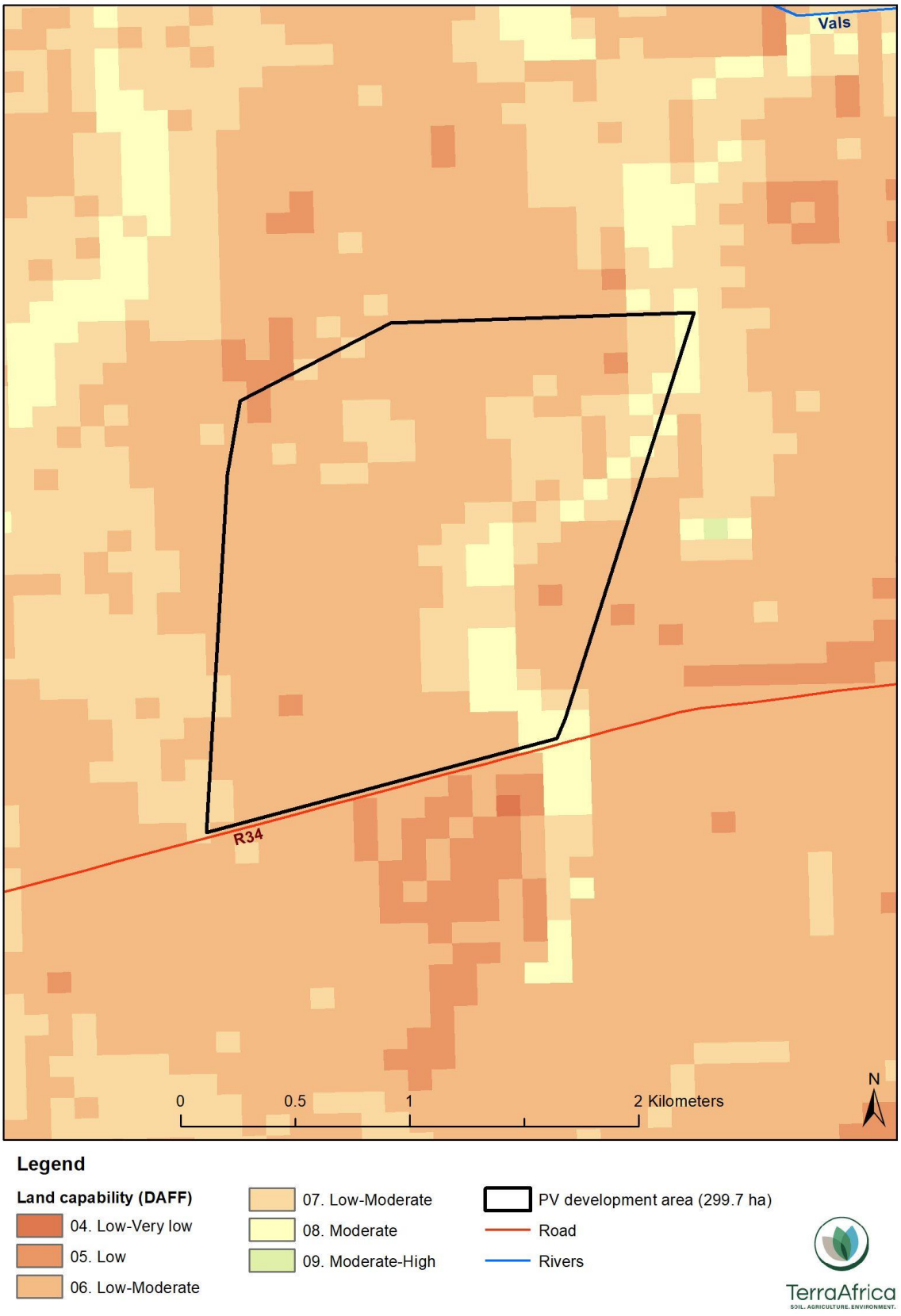

Figure 6 Land capability classification of the Rondavel Solar PV project area (data source: DAFF, 2017)

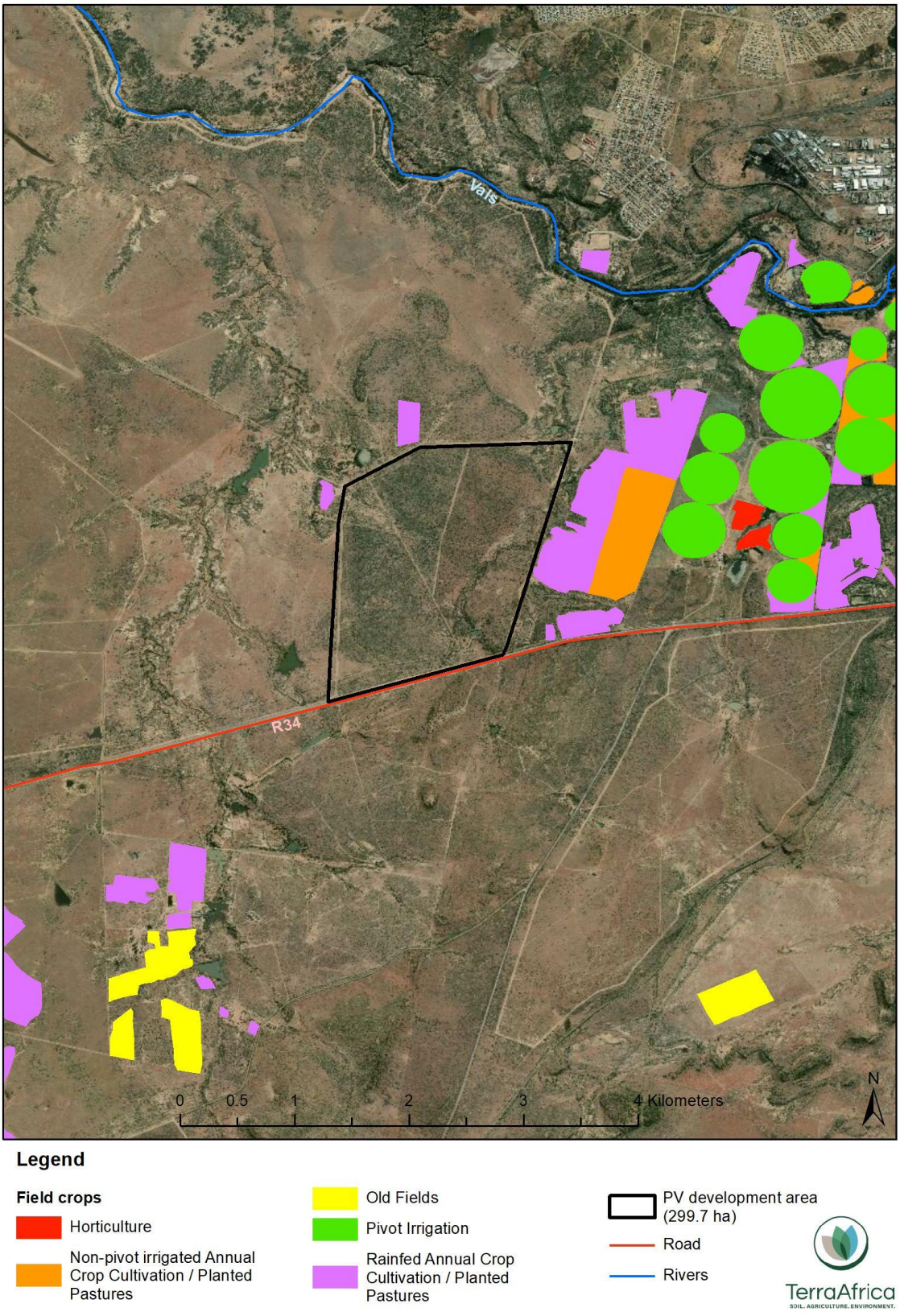

Figure 7 Location of field crop boundaries around the project area (data source: DAFF, 2019)

8.4 Grazing capacity

The ideal grazing capacity is an indication of the long-term production potential of the vegetation layer growing in an area. More specifically, it relates to its ability to maintain an animal with an average weight of 450 kg (defined as 1 Large Stock Unit (LSU)) with an average feed intake of 10 kg dry mass per day over the period of approximately a year. This definition includes the condition that this feed consumption should also prevent the degradation of the soil and the vegetation. The grazing capacity is therefore expressed in a number of hectares per LSU (ha/LSU) (South Africa, 2018). Following the metadata layer obtained from DAFF, the long-term grazing capacity of the entire development area, is 5 ha/LSU (see Figure **8**).

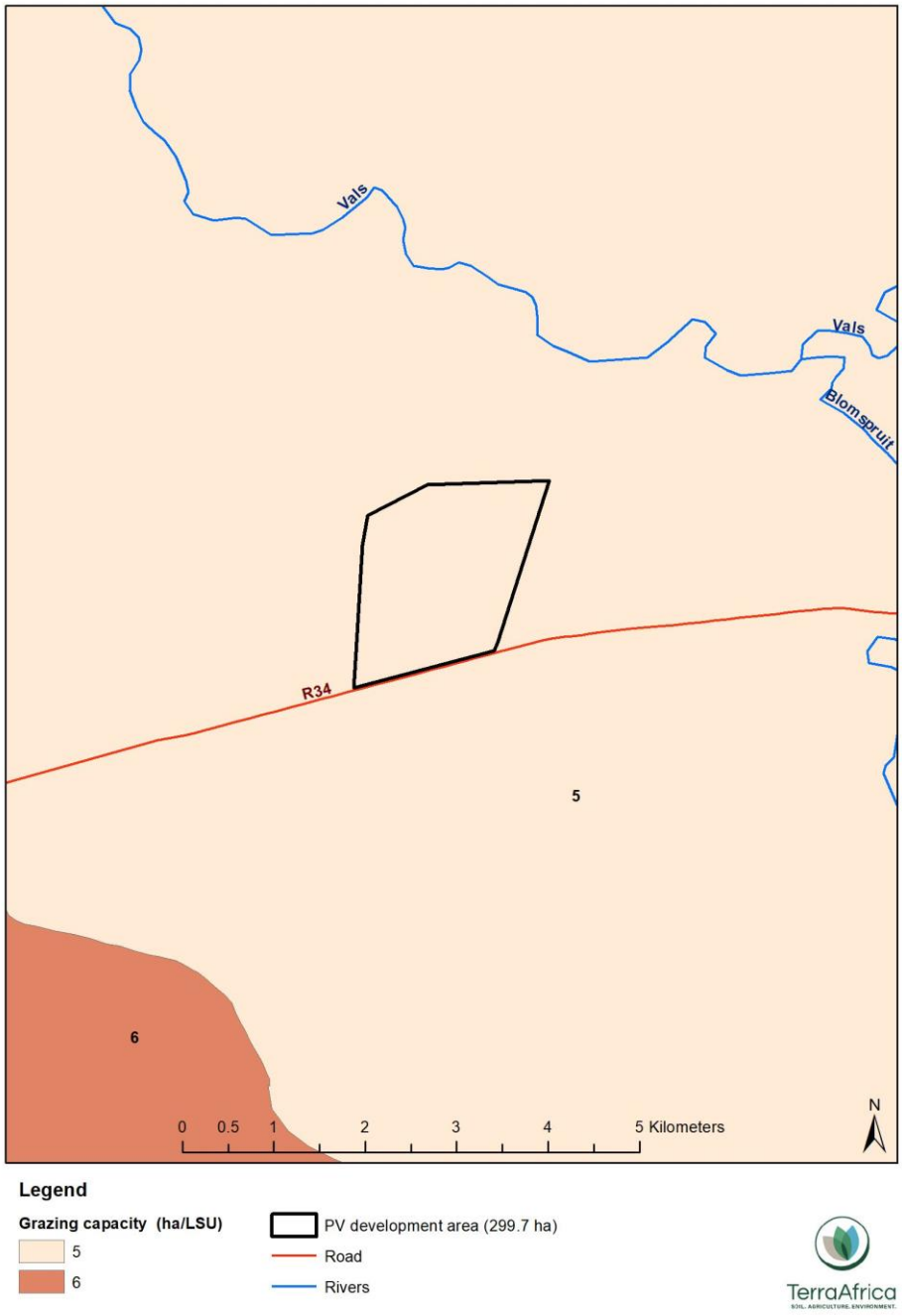

Figure 8 Grazing capacity of the proposed Rondavel Solar PV Facility (data source: DAFF, 2018)

8.5 Land types

The development area consists of two Land Types namely Land Types Dc6 and Dc10. The characteristics of the land types are described below and their positions in the landscape are depicted in Figure **9**.

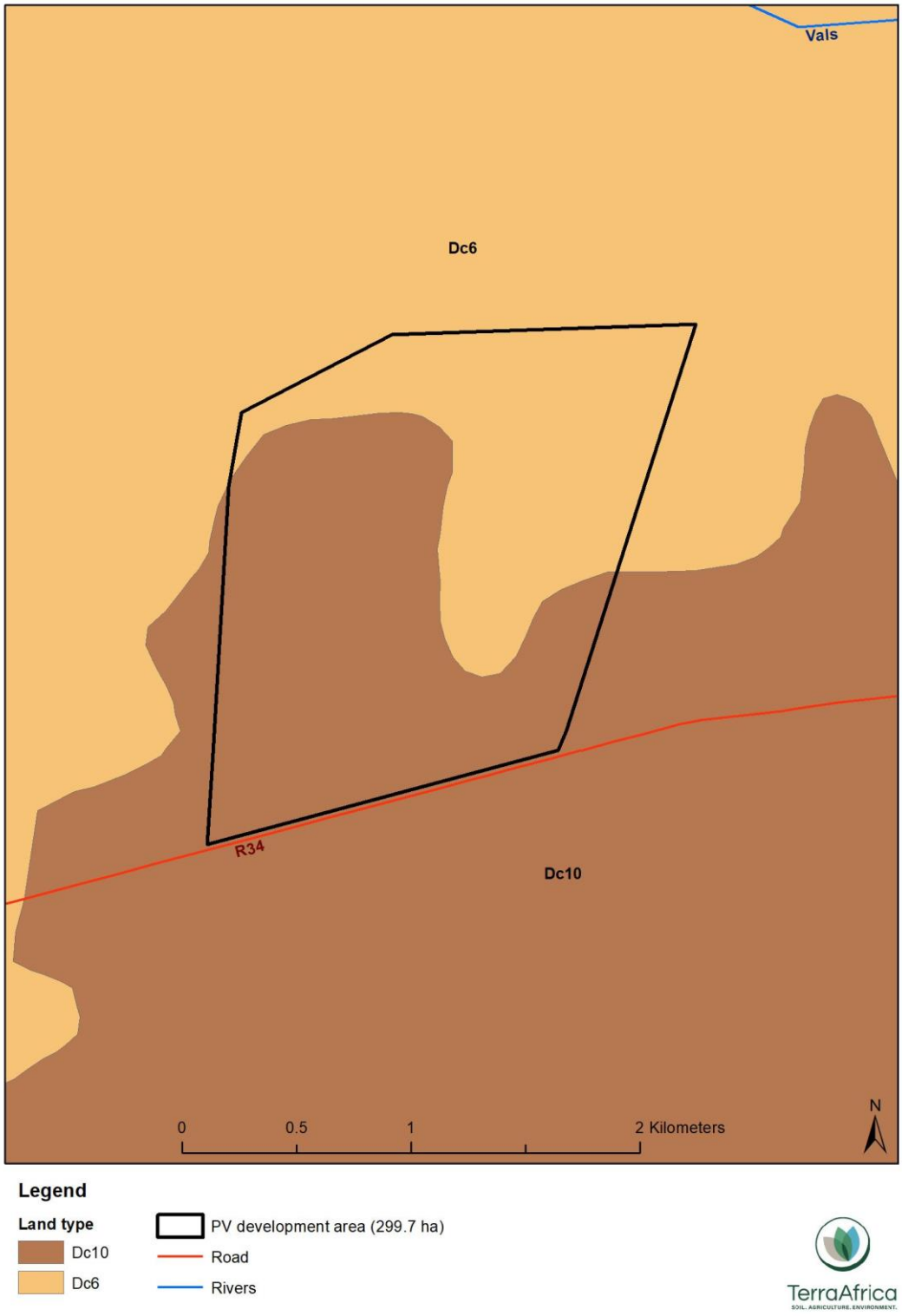

Figure 9 Land type classification of the proposed Rondavel Solar PV Facility

Land Type Dc6

Land Type Dc6 consists of four terrain units and the landscape can be described as undulating with slopes ranging between 0 and 12% (Figure 10). The soil formed from sandstone, grit and shale. The crest (Terrain Unit 1) is dominated by rock and shallow Mispah and Glenrosa soil forms (0.1 – 0.2m). The texture of soil in this terrain unit is dominated by sand-clay-loam with the clay fraction estimated as 15 - 35%.

Terrain unit 3 (mid-slope) forms 45% of land type Dc6. The mid-slope consists of rock and shallow Mispah and Glenrosa soil forms (0.1 – 0.2m), Valsrivier soil form (0.1 – 0.3m), Bonheim soil form (0.3 – 0.58m) and Mayo soil form (0.2 – 0.4m). The toe slope (Terrain Unit 4) is dominated by the shallow Valsrivier soil form. Mispah, Bonheim, Sterkspruit and Arcadia soil forms are also present in the toe slope. Terrain Unit 5 (Valley bottom) consists of Inhoek, Arcadia, Willowbrook, Mayo, Bonheim and Valsrivier soil forms. The soil depth ranges from 0.1m (Valsrivier) to >1.2m (Inhoek). The clay content ranges from 15 – 65% and the texture ranges from sand-clay-loam to clay.

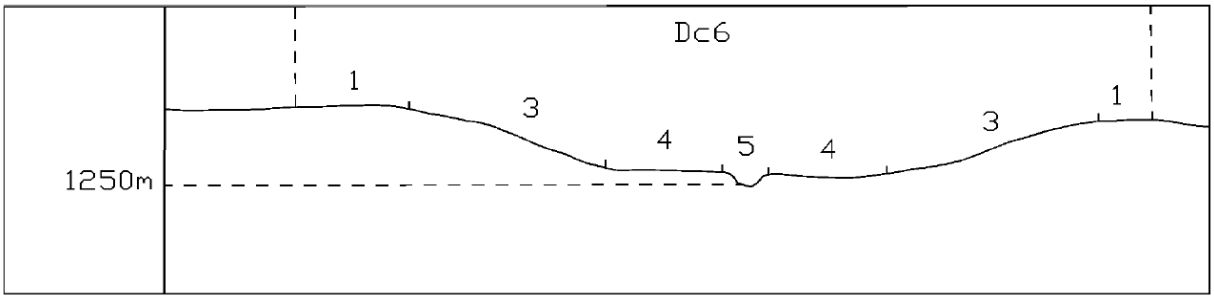

Figure 10 Terrain form sketch of Land Type Dc6

Land Type Dc10

Land Type Dc10 comprise of five terrain units where Terrain Units 1, 3 and 4 which dominate the landscape (93%) represent an undulating landscape (Figure 11). Terrain Unit 5 are the areas of slight depression at the valley bottoms with a slope of 1 – 2%. Terrain Unit 2 (upper slope) has steep slopes of >100% but represent only 1% of the Land Type. Terrain Unit 3 (lower slope) has a slope of 4 – 12% while the slopes of the other terrain units (crest and toe slope) range between 1 and 5%. The soil originated on the crests and scarps (upper slopes) from dolerite or sandstone and the mid slopes and toe slopes mainly from mudstone and shale.

The texture of soil in this land type is dominated by sandy clay and clay on the mid slope and toe slope with the clay ranging between 15 and 30%. Terrain Units 3 and 4 that represent 71% of this land type mainly consists of rock, shallow soil profiles (0.1 – 0.3m) of the Swartland and Mispah forms with an estimated 7 - 12% of areas in these terrain units consisting of deeper soil profiles (0.3 – 0.58m) of the Bonheim form. The valley bottoms are dominated by deep soil profiles (>1.2m) of the Dundee and Inhoek soil forms.

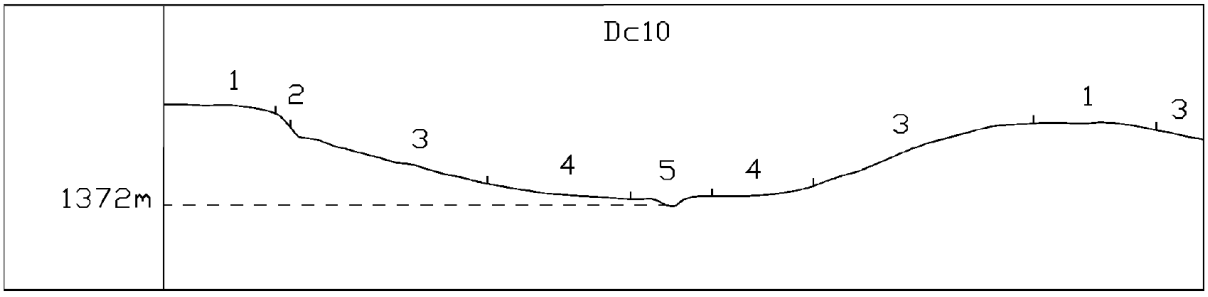

Figure 11 Depiction of the terrain forms of Land Type Dc10

9. Results of on-site inspection

9.1 Soil properties

Soil within the development area has texture ranging between Sandy Loam, Sandy Clay, Sandy Clay Loam and Clay Loam. The north-eastern portion as well as the middle section of the southern boundary, is dominated by soil with vertic topsoil of the Glen, Arcadia and Bakwena forms. The wetland area along the eastern boundary of the development area, consist of a combination of the Bakwena (see Figure **12**) and Mkuze (see Figure **13**) forms. Gley horizons are not present below the topsoil and subsoil horizons and it seems that the wetland area is not a zone of permanent wetness.

Figure 12 Photographic evidence of the Bakwena soil found in the north-eastern corner of the development area

Figure 13 Example of the visible cracks in the vertic topsoil of the Arcadia soil form within the development area

The south-eastern corner of the development area as well as the middle section and along the western boundary of the site, is dominated by lithic soil profiles where the soil depth ranges between 0.25 and 0.7m. The underlying material in these areas are a mixture of fractured rock, solid rock (refer to Figure **14**) and lithic material.

Figure 14 Exposed solid rock in the south-eastern section of the site

The orthic topsoil has red and yellow-brown apedal chromic colours and has Sandy Loam to Sandy Clay Loam texture. The lithic soil forms are that of the Mispah and Glenrosa forms. Along the southern boundary, the lithic material contain some calcium carbonate nodules, although the it is estimated to be less than 5% of the lithic matrix volume.

Pockets of deeper soils of the Tubatse and Bethesda forms are found in between the shallower, lithic profiles. These forms consist of orthic topsoil that overlies neocutanic subsoil that is restricted in depth (between 0.8 and 1.3m) by either hard rock (Bethesda) or lithic material (Tubatse) (see Figure **15**).

Figure 15 Example of the Tubatse soil form within the development area

9.2 Land use and agricultural activities

The development area is used for cattle grazing. During the site visit, there were no cattle within the two land parcels but evidence of cattle grazing from time to time, was observed. The properties are equipped with a water trough and a small cement dam but no cattle handling facilities. An earth dam wall was observed along the eastern boundary of the property, positioned in the flow path of the wetland area. An old quarry is present on the opposite side

of the dam wall. During the site visit, the quarry was filled with rainwater from the current rainy season.

Figure 16 Cattle water facility within the development area

During a discussion session with the landowner's manager, it was indicated that the two land parcels of the development area, is part of a larger farming operation that consists of mixed farming activities (mainly crop production and livestock farming). The cattle are rotated between the development area and other land parcels, depending on grazing system used by the landowner. The cattle is mainly of the Bonsmara breed although there are also some animals of other breeds. A mixed-breed cattle herd was observed on a neighbouring land parcel (along the northern boundary of the development area (refer to Figure **17**) .

Although the site is dominated by natural vegetation, two *Opuntia* species (both Category 1B alien invasive species) were identified within the development area. The species found is *Opuntia ficus-indica* (the prickly pear) (see Figure **18**) and *Opuntia aurantiaca* (jointed cactus or tiger pear). The veld quality and availability of grazing grass is also affected by the encroachment of wild asparagus (*Asparagus laricinus*).

The long-term grazing capacity of the entire development area is 5ha/LSU (refer to Section 8.4 and **Figure 8**). Following this figure, the development area can provide feed to 60 head of cattle while the veld quality is maintained. However, taking the encroachment with sweet thorn (Vachellia karroo) and wild asparagus into consideration, the development area has reduced capacity and a more realistic grazing capacity is likely 6ha/LSU. The development of 186.1ha of land for the proposed Rondavel solar PV facility, will therefore alienate grazing veld that can feed approximately 33 head of cattle.

Figure 17 A herd of mixed cattle breeds on the land parcel directly north of the development area

Figure 18 Prickly pear (an alien invasive plant) growing within the development area

No crop farming activities, rainfed or irrigated, are present within the development area. Also, no horticultural crops are produced here.

9.3 Sensitivity analysis

Following the consideration of all the desktop and gathered baseline data above, the report agrees with the results of the Environmental Screening Tool i.e. **the area is considered to have Low to Medium Agricultural Sensitivity** to the proposed development. The soil forms present within the development area are a mixture of vertic profiles with high clay content and shrink-swell properties and shallow lithic soils or profiles limited in depth by fractured rock. Smaller sections of deeper neocutanic soil profiles are present between these main soil groups but these areas show no sign of previous crop cultivation. No irrigation infrastructure such as centre pivots or drip irrigation as well are present within the development area and irrigated agricultural is currently not practiced in the area.

From a soil quality conservation perspective, the area is considered to have **Low to Medium Sensitivity** to the proposed development. Where the terrain is sloped, soil will be sensitive to soil erosion in the absence of vegetation cover.

The anticipated impacts of the proposed project on the soil properties and land productivity, are discussed in Section 10 below.

10. Impact assessment

10.1 Project description

The infrastructure associated with the Rondavel solar PV facility, will include:

- Solar PV array comprising PV modules and mounting structures
- Inverters and transformers
- Cabling between the project components
- On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid
- Battery Energy Storage System (BESS)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage
- Laydown areas
- Access roads, internal distribution roads and fencing around the development area
- Telecommunication infrastructure
- Stormwater channels, and
- Water pipelines.

The development footprint of the planned infrastructure will cover an area of approximately 186.1ha that will fall within the development area of 205.4ha (refer to Figure 19).

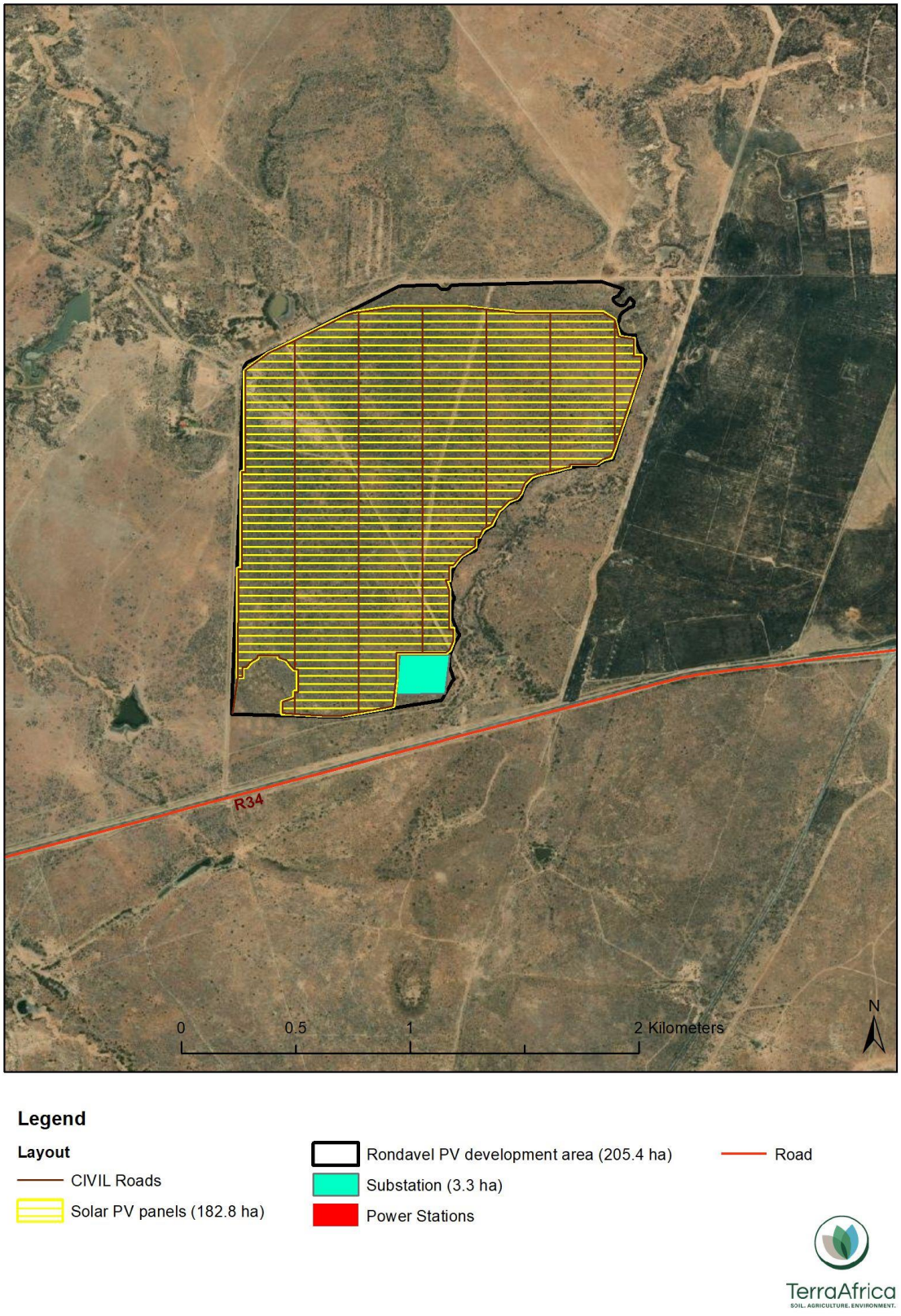

Figure 19 Infrastructure layout of the proposed Rondavel PV development

The most significant impacts of the proposed Rondavel solar PV facility on soil and agricultural productivity, will occur during the construction phase when the vegetation is removed and the soil surface is prepared for road building and infrastructure commissioning. During the operational phase, the risk remains that soil will be polluted by the waste generated during the operational phase or in the case of a spill incident. During the decommissioning phase, soil will be prone to erosion when the infrastructure is removed from the soil surface. Below follows a rating of the significance of each of the impacts.

10.2.1. Construction phase

Impact: Change in land use from livestock farming to energy generation

Nature: Prior to construction of the solar PV facility, the area will be fenced off and livestock farming will be excluded from approximately 186.1ha of land. Any livestock farming infrastructure present within this area, will be decommissioned. The development footprint will no longer be suitable for livestock grazing.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium duration (3)	Medium duration (3)
Magnitude	Low (4)	Low (4)
Probability	Definite (4)	Definite (4)
Significance	**Medium (32)**	**Medium (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	N/A
Mitigation: • The development footprint must be fenced-off from the remaining section of the development area, prior to construction of any infrastructure. • Vegetation clearance must be restricted to areas where infrastructure is constructed. • No materials removed from development area must be allowed to be dumped in nearby livestock farming areas. • Prior arrangements must be made with the landowners to ensure that livestock are moved to areas where they cannot be injured by vehicles traversing the area. • No boundary fence must be opened without the landowners' permission. • All left-over construction material must be removed from site once construction is completed. • No open fires made by the construction teams are allowable during the construction phase.		
Residual Impacts: The residual impact from the construction and operation of the Rondavel solar PV facility on livestock farming, is considered low.		
Cumulative Impacts: Any additional infrastructure development in support of the Rondavel solar PV facility, will result in additional areas where grazing veld will be disturbed.		

Impact: Soil erosion

Nature: All areas where vegetation is removed from the soil surface in preparation for the infrastructure construction, will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk as the area falls within a region that experience thunderstorms in the summer months and sometimes strong winds during the dry winter months, especially August and September.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)

Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint;
- Unnecessary land clearance must be avoided;
- Level any remaining soil removed from excavation pits (where the PV modules will be mounted) that remained on the surface instead of allowing small stockpiles of soil to remain on the surface;
- Where possible, conduct the construction activities outside of the rainy season; and
- Stormwater channels must be designed to minimise soil erosion risk resulting from surface water runoff.

Residual Impacts:

The residual impact from the construction and operation of the proposed Rondavel solar PV facility on the susceptibility to erosion is considered low.

Cumulative Impacts:

Any additional infrastructure development in support of the Rondavel solar PV facility, will result in additional areas where exposed to soil erosion through wind and water movement.

Impact: Soil compaction

Nature: The clearing and levelling of land for construction of the infrastructure, will result in soil compaction. In the area where the access roads, buildings and BESS will be constructed, topsoil will be removed and the remaining soil material will be deliberately compacted to ensure a stable surface prior to construction.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint;
- Unnecessary land clearance must be avoided;
- Materials must be off-loaded and stored in designated laydown areas;
- Where possible, conduct the construction activities outside of the rainy season; and
- Vehicles and equipment must park in designated parking areas.

Residual Impacts:

The residual impact from the construction and operation of the proposed Rondavel solar PV facility on soil compaction is considered low.

Cumulative Impacts:

Any additional infrastructure development in support of the Rondavel solar PV facility, will result in additional areas exposed to soil compaction.

Impact: Soil pollution

During the construction phase, construction workers will access the land for the preparation of the terrain and the construction of the thermal plant and access road. Both potential spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution.

Nature: The following construction activities can result in the chemical pollution of the soil:

1. Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation.
2. Spills from vehicles transporting workers, equipment, and construction material to and from the construction site.
3. The accidental spills from temporary chemical toilets used by construction workers.
4. The generation of domestic waste by construction workers.
5. Spills from fuel storage tanks during construction.
6. Pollution from concrete mixing.
7. Pollution from road-building materials.
8. Any construction material remaining within the construction area once construction is completed.
9. Containment breaches related to the battery units and any inadvertent chemical exposure therefrom (related to the constructed of the BESS).

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:

- Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills;
- Any waste generated during construction, must be stored into designated containers and removed from the site by the construction teams.
- Any left-over construction materials must be removed from site.
- The construction site must be monitored by the Environmental Control Officer (ECO) to detect any early signs of fuel and oil spills as well as waste dumping.
- Ensure battery transport and installation by accredited staff / contractors.
- Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.

Residual Impacts:

The residual impact from the construction and operation of the proposed project will be low to negligible.

Cumulative Impacts:

Any additional infrastructure that will be constructed to strengthen and support the operation of the Rondavel solar PV facility and where waste is not removed to designated waste sites, will increase the cumulative impacts associated with soil pollution in the area.

10.2.2. Operational phase

Impact: Soil erosion

During the operational phase, staff and maintenance personnel will access the Rondavel solar PV facility, daily. This phase will have no additional impact on the livestock farming potential of the area. The following impacts on soil is expected for this phase:

Nature: The areas where vegetation was cleared, will remain at risk of soil erosion, especially during a rainfall event when runoff from the cleared surfaces will increase the risk of soil erosion in the areas directly surrounding the Rondavel solar PV facility infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: • The area around the Rondavel solar PV facility, including the internal access roads, must regularly be monitored to detect early signs of soil erosion on-set. • If soil erosion is detected, the area must be stabilised by the use of geo-textiles and facilitated re-vegetation.		
Residual Impacts: The residual impact from the operation of the proposed Rondavel solar PV facility on the susceptibility to erosion is considered low.		
Cumulative Impacts: Any additional infrastructure that will be constructed to strengthen and support the operation of the Rondavel solar PV facility, will result in additional areas where exposed to soil erosion through wind and water movement.		

Impact: Soil pollution

Nature: During the operational phase, potential spills and leaks from maintenance vehicles and equipment as well as waste generation on site, can result in soil pollution. Also, any spillages around the workshop area or damaged infrastructure such as inverters and transformers, can be a source of soil pollution.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: • Maintenance must be undertaken regularly on all vehicles and maintenance machinery to prevent hydrocarbon spills;		

• No domestic and other waste must be left at the site and must be transported with the maintenance vehicles to an authorised waste dumping area. • Regularly monitor areas alongside the roads, parking area and workshop for any signs of oil, grease and fuel spillage or the presence of waste.
Residual Impacts: The residual impact from the operation of the proposed project will be low to negligible.
Cumulative Impacts: The operation of any additional infrastructure to strengthen and support the operation of the Rondavel solar PV facility and where waste is not removed to designated waste sites, will increase the cumulative impacts associated with soil pollution in the area.

10.2.3. Decommissioning phase

The decommissioning phase will have the same impacts as the construction phase i.e. soil erosion, soil compaction and soil pollution. It is anticipated that especially the risk of soil erosion will remain until the vegetation growth has re-established in the area where the Rondavel solar PV facility's infrastructure was decommissioned.

11. Cumulative Impacts

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1].

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The cumulative impacts of the proposed project have been discussed in Section 10 above.

Table 1 Assessment of cumulative impact of decrease in areas available for livestock farming

Nature: Decrease in areas with suitable land capability for cattle farming.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short duration - 2-5 years (2)	Long-term (4)

[1] Unless otherwise stated, all definitions are from the EIA Regulations 2014 (GNR 326).

Magnitude	Low (4)	Low (4)
Probability	Highly likely (4)	Highly likely (4)
Significance	**Low (28)**	**Medium (40)**
Status (positive/negative)	Negative	Negative
Reversibility	High	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: The only mitigation measure for this impact is to keep the footprints of all renewable energy facilities as small as possible and to manage the soil quality by avoiding far-reaching soil degradation such as erosion. Other mitigation measures to implement include those specified in Section 10.2.1.		

Table 2 Assessment of cumulative impact of areas susceptible to soil erosion

Nature: Increase in areas susceptible to soil erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Medium (33)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: Each of the projects should adhere to the highest standards for soil erosion prevention and management as defined in Sections 10.2.1 and 10.2. above.		

Table 3 Assessment of cumulative impact of areas susceptible to soil compaction

Nature: Increase in areas susceptible to soil erosion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (27)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		

Each of the projects should adhere to the highest standards for soil compaction prevention and management as defined in Sections 10.2.1 and 10.2.2 above.

Table 4 Assessment of cumulative impact of increased risk of soil pollution

Nature: Increase in areas susceptible to soil pollution		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Confidence in findings: High.		
Mitigation: Each of the projects should adhere to the highest standards for soil pollution prevention and management as defined in Sections 10.2.1 and 10.2.above.		

12. Mitigation and management measures

The objective of the mitigation and management measures presented below are to reduce the risk of soil degradation that will in turn result in affect the ability of soils in within the project site to support the natural vegetation and provide ecosystem services.

<u>Prevention and management of soil erosion:</u>

Project component/s	• Construction of infrastructure • Construction of the access road
Potential Impact	Soil particles can be removed from the area through wind and water erosion
Activity/risk source	The removal of vegetation in areas where infrastructure will be constructed
Mitigation: Target/Objective	To avoid the onset of soil erosion that can spread into other areas

Mitigation: Action/control	**Responsibility**	**Timeframe**
• Limit vegetation clearance to only the areas where the surface infrastructure will be constructed. • Avoid parking of vehicles and equipment outside of designated parking areas. • Plan vegetation clearance activities for dry seasons (late autumn, winter and early spring).	Environmental Control Officer / SHEQ division	During the entire construction, operational and decommissioning phases

• Design and implement a Stormwater Management System where run-off from surfaced areas are expected. • Re-establish vegetation along the access road to reduce the impact of run-off from the road surface.		

Performance Indicator	No visible signs of soil erosion around the project infrastructure
Monitoring	• Regular inspections around the constructed infrastructure to detect early signs of soil erosion developing. • When signs of erosion is detected, the areas must be rehabilitated using a combination of geo-textiles and re-vegetation to prevent the eroded area(s) from expanding.

Prevention and management of soil pollution:

Project component/s	• Construction of infrastructure • Daily activities and maintenance during the operational phase
Potential Impact	Potential fuel and oil spills from vehicles as well as the generation of waste can cause soil pollution.
Activity/risk source	• Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation. • Spills from vehicles transporting workers, equipment, and construction material to and from the construction site. • The accidental spills from temporary chemical toilets used by construction workers. • The generation of domestic waste by construction workers. • Spills from fuel storage tanks during construction. • Pollution from concrete mixing. • Pollution from road-building materials. • Any construction material remaining within the construction area once construction is completed. • Containment breaches related to the battery units and any inadvertent chemical exposure therefrom.
Mitigation: Target/Objective	To avoid soil pollution that can harm the surrounding environment and human health.

Mitigation: Action/control	**Responsibility**	**Timeframe**
• Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills; • Any waste generated during construction, must be stored into designated containers and removed from the site by the construction teams.	Environmental Control Officer / SHEQ division	During the entire construction, operational and decommissioning phases

• Any left-over construction materials must be removed from site. • Ensure battery transport and installation by accredited staff / contractors. • Compile (and adhere to) a procedure for the safe handling of battery cells during transport and installation.		

Performance Indicator	• No visible signs of waste and spills within the project site. • No accumulation of contaminants in the soils of the project site.
Monitoring	• Regular inspections of vehicles and equipment that enter the project site. • Analysis of soil samples around high-risk areas to determine whether soil contaminants are present. • In the case that soil pollution is detected, immediate remediation must be done.

13. Acceptability statement

Following the data analysis and impact assessment above, the proposed Rondavel solar PV facility is considered an acceptable development within the area of the project assessment zone that was assessed for the purpose of compiling the Agricultural Compliance Report.

The soil forms present within the development area are a mixture of vertic profiles with high clay content and shrink-swell properties and shallow lithic soils or profiles limited in depth by fractured rock. Smaller sections of deeper neocutanic soil profiles are present between these main soil groups but these areas show no sign of previous crop cultivation. No irrigation infrastructure such as centre pivots or drip irrigation as well are present within the development area and irrigated agricultural is currently not practiced in the area.

The land capability of the site is mainly Low-Moderate (Class 06) and the grazing capacity (according to DAFF, 2018), is around 5ha/LSU. Site observations found that encroachment with sweet thorn and wild asparagus may already have affected the grazing capacity and a more realistic grazing capacity is considered to be 6ha/LSU.

It is anticipated that the construction and operation of the Rondavel solar PV facility will have impacts that range from medium to low. Through the consistent implementation of the recommendation mitigation measures, most of impacts can be reduced to low. Since the area around the plant will be fenced off, it is not anticipated that the impact on livestock farming can be mitigated as this area, will now be excluded from livestock farming. The area that will be fenced off is approximately 186.1ha and this will alienate grazing veld for about 50 head of cattle.

Considering that the project infrastructure components will be placed in close proximity to each other, I confirm that all reasonable measures have been taken to avoid or minimize

fragmentation and disturbance of agricultural activities, provided that the mitigation measures provided in this report are implemented.

It is my professional opinion that this application be considered favourably, on the condition that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the proposed footprint boundaries that will be fenced off.

14. Reference list

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APPENDIX 1 - CURRICULUM VITAE OF SPECIALIST

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Wolmaransstad,
South Africa

EXPERTISE

Soil Quality Assessment

Soil Policy and Guidelines

Agricultural Agro-Ecosystem Assessment

Sustainable Agriculture

Data Consolidation

Land Use Planning

Soil Pollution

Hydropedology

EDUCATION

MASTER'S DEGREE
Environmental Science
University of Witwatersrand
2010 – 2018

BACHELOR'S DEGREE
Agricultural Science
University of Pretoria
2001 – 2004

PROFESSIONAL PROFILE

I contribute specialist knowledge on agriculture and soil management to ensure long-term sustainability of projects in Africa. For the past thirteen years, it has been my calling and I have consulted on more than 200 projects. My clients include environmental and engineering companies, mining houses, and project developers. I enjoy the multi-disciplinary nature of the projects that I work on and I am fascinated by the evolving nature of my field of practice. The next section provide examples of the range of projects completed. A comprehensive project list is available on request.

PROJECT EXPERIENCE

Global Assessment on Soil Pollution

Food and Agricultural Organisation (FAO) of the United Nations (UN)

Author of the regional assessment of Soil in Sub-Saharan Africa. The report is due for release in February 2021. The different sections included:

- Analysis of soil and soil-related policies and guidelines for each of the 48 regional countries
- Description of the major sources of soil pollution in the region
- The extent of soil pollution in the region and as well as the nature and extent of soil monitoring
- Case study discussions of the impacts of soil pollution on human and environmental health in the region
- Recommendations and guidelines for policy development and capacitation to address soil pollution in Sub-Saharan Africa

Data Consolidation and Amendment

Range of projects: Mining Projects, Renewal Energy

These projects included developments where previous agricultural and soil studies are available that are not aligned with the current legal and international best practice requirements such as the IFC Principles. Other projects are expansion projects or changes in the project infrastructure layout. Tasks on such projects include the incorporation of all relevant data, site verification, updated baseline reporting and alignment of management and monitoring measures.

Project examples:

- Northam Platinum's Booysendal Mine, South Africa
- Musonoi Mine, Kolwezi District, Democratic Republic of Congo
- Polihali Reservoir and Associated Infrastructure, Lesotho
- Kaiha 2 Hydropower Project, Liberia
- Aquarius Platinum's Kroondal and Marikana Mines

PROFESSIONAL MEMBERSHIP

South African Council for Natural Scientific Professions (SACNASP)

Soil Science Society of South Africa (SSSSA)

Soil Science Society of America (SSSA)

Network for Industrially Contaminated Land in Africa (NICOLA)

LANGUAGES

English (Fluent)

Afrikaans (Native)

French (Basic)

PRESENTATIONS

There is spinach in my fish pond
TEDx Talk
Available on YouTube

♦

Soil and the Extractive Industries
Session organiser and presenter
Global Soil Week, Berlin (2015)

♦

How to dismantle an atomic bomb
Conference presentation (2014)
Environmental Law Association (SA)

PROJECT EXPERIENCE (Continued)

Agricultural Agro-Ecosystem Assessments

Range of projects: Renewable Energy, Industrial and Residential Developments, Mining, Linear Developments (railways and power lines)

The assessments were conducted as part of the Environmental and Social Impact Assessment processes. The assessment process includes the assessment of soil physical and chemical properties as well as other natural resources that contributes to the land capability of the area.

Project examples:

- Mocuba Solar PV Development, Mozambique
- Italthai Railway between Tete and Quelimane, Mozambique
- Lichtenburg PV Solar Developments, South Africa
- Manica Gold Mine Project, Mozambique
- Khunab Solar PV Developments near Upington, South Africa
- Bomi Hills and Mano River Mines, Liberia
- King City near Sekondi-Takoradi and Appolonia City near Accra, Ghana
- Limpopo-Lipadi Game Reserve, Botswana
- Namoya Gold Mine, Democratic Republic of Congo

Sustainable Agriculture

Range of projects: Policy Development for Financial Institutions, Mine Closure Planning, Agricultural Project and Business Development Planning

Each of the projects completed had a unique scope of works and the methodology was designed to answer the questions. While global indicators of sustainable agriculture are considered, the unique challenges to viable food production in Africa, especially climate change and a lack of infrastructure, in these analyses.

Project examples:

- Measurement of sustainability of agricultural practices of South African farmers – survey design and pilot testing for the LandBank of South Africa
- Analysis of the viability of avocado and mango large-scale farming developments in Angola for McKinsey & Company
- Closure options analysis for the Tshipi Borwa Mine to increase agricultural productivity in the area, consultation to SLR Consulting
- Analysis of risks and opportunities for farm feeds and supplement suppliers of the Southern African livestock and dairy farming industries
- Sustainable agricultural options development for mine closure planning of the Camutue Diamond Mine, Angola

PROFESSIONAL DEVELOPMENT

Contaminated Land Management 101Training Network for Industrially Contaminated Land in Africa
2020

Intensive Agriculture in Arid & Semi-Arid Environments
CINADCO/MASHAV R&D Course, Israel
2015

World Soils and their Assessment Course
ISRIC – World Soil Information Centre, Netherlands
2015

Wetland Rehabilitation Course
University of Pretoria
2010

Course in Advanced Modelling of Water Flow and Solute Transport in the Vadose Zone with Hydrus
University of Kwazulu-Natal
2010

Environmental Law for Environmental Managers
North-West University Centre for Environmental Management
2009

PROJECT EXPERIENCE (Continued)

Soil Quality Assessments

Range of projects: Rehabilitated Land Audits, Mine Closure Applications, Mineral and Ore Processing Facilities, Human Resettlement Plans

The soil quality assessments included physical and chemical analysis of soil quality parameters to determine the success of land rehabilitation towards productive landscapes. The assessments are also used to understand the suitability for areas for Human Resettlement Plans

Project examples:

- Closure Planning for Yoctolux Colliery
- Soil and vegetation monitoring at Kingston Vale Waste Facility
- Exxaro Belfast Resettlement Action Plan Soil Assessment
- Soil Quality Monitoring of Wastewater Irrigated Areas around Matimba Power Station
- Keaton Vanggatfontein Colliery Bi-Annual Soil Quality Monitoring

REFERENCES

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