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Agricultural Assessment for the Proposed Hillardia PV Facility and Associated Infrastructure

Submitted by TerraAfrica Consult cc

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Table of Contents

1. Introduction	4
2. Details of the specialist	4
3. Purpose and objectives of the compliance statement	6
4. Terms of Reference	7
5. Legislative framework of the assessment	7
6. Agricultural Sensitivity	8
7. Methodology	11
7.1 Assessment of available data	11
7.2 Site assessment.....	11
7.3 Impact assessment methodology	13
8. Study gaps, limitations and assumptions	14
9. Baseline description	14
9.1 Soil properties	14
9.2 Land capability	18
9.3 Agricultural potential.....	20
9.4 Sensitivity analysis.....	23
10. Impact assessment	26
10.1 Project description.....	26
10.2 Impact significance rating	27
10.3 Consideration of alternatives	31
10.4 Cumulative impact assessment and rating.....	32
11 Mitigation and management measures	35
12 Acceptability statement	37
13 Reference list	39

List of Figures

Figure 1: Locality of the proposed Hillardia PV facility and associated infrastructure	5
Figure 2 Agricultural Combined Sensitivity of the Hillardia PV facility assessment area (generated 7 July, 2022).....	9
Figure 3 Presence of High Potential Agricultural Areas around the Hillardia solar PV facility development area (DALRRD, 2019)	10
Figure 4 Locality of survey points within the Hillardia project area.....	12
Figure 5 Soil classification map of the Hillardia PV facility	15
Figure 6 Solid rock on the surface of the Mispah soils	16
Figure 7 Nkonkoni soils with 0.5m effective soil depth	17
Figure 8 Hutton soils within the Hillardia PV development area	18
Figure 9 Land capability classification of the Hillardia PV facility and associated infrastructure (data source: DALRRD, 2016)	19
Figure 10 Agricultural potential of the Hillardia PV development area	21
Figure 11 Grazing capacity of the proposed Hillardia PV facility and associated infrastructure (data source: DALRRD, 2018)	22
Figure 12 Photographic example of vegetation within the study area.....	23
Figure 13 Field crop boundaries as delineated by DALRRD (DALRRD, 2019)	24
Figure 14 Agricultural sensitivity rating of the proposed Hillardia PV facility project area.....	25
Figure 15 Renewable energy projects within a 50 km radius around the proposed Hillardia PV Facility and associated infrastructure	33

List of Tables

Table 1 GNR 320 requirements of an Agricultural Compliance Statement (Low to Medium Sensitivity)	6
Table 2 Assessment of cumulative impact of decrease in areas available for livestock farming	34
Table 3 Assessment of cumulative impact of areas susceptible to soil erosion	34
Table 4 Assessment of cumulative impact of areas susceptible to soil compaction	34
Table 5 Assessment of cumulative impact of increased risk of soil pollution	35

1. Introduction

Terra-Africa Consult cc was appointed by Hillardia PV (Pty) Ltd to conduct the Agricultural Compliance Assessment for the proposed Hillardia Photovoltaic (PV) Facility and Associated Infrastructure (from here onwards also referred to as the project). An assessment area of approximately 230 ha is being assessed as part of this EIA process.

The project applicant is Hillardia PV (Pty) Ltd and the proposed development will be located approximately 10km north west of the town of Lichtenburg in the North West Province (see Figure 1). The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 120MW. The development area is situated within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality and is accessible via the R505, located east of the development area.

The development area for the PV facility and associated infrastructure will be located on the following properties:

- Portion 2 of the Farm Houthaalboomen 31
- Portion 3 of the Farm Houthaalboomen 31
- Portion 4 of the Farm Houthaalboomen 31

Two additional 120 MW PV facilities (Euphorbia PV and Verbena PV) are concurrently being considered on the project site (within Portion 2, Portion 3, and Portion 4 of the Farm Houthaalboomen 31) and are assessed through separate Environmental Impact Assessment (EIA) processes.

2. Details of the specialist

Mariné is a scientist registered with the South African Council for Natural Scientific Professions (SACNASP) and is specialised in the fields of Agricultural Science and Soil Science. Her SACNASP Registration Number is 400274/10. Mariné holds a BSc. degree in Agricultural Science (with specialisation in Plant Production) from the University of Pretoria and a MSc. Degree in Environmental Science from the University of the Witwatersrand.

She has consulted in the subject fields of soil, agriculture, pollution assessment and land use planning for the environmental sector of several African countries including Botswana, Mozambique, Democratic Republic of Congo, Liberia, Ghana and Angola. She has also consulted on the soil and agricultural assessment of a gas infrastructure project in Afghanistan. Mariné's project experience conducting assessments for renewable energy projects include solar and wind energy facilities in the Western, Northern and Eastern Cape as well as the North West, Free State and KwaZulu Natal Provinces. Her contact details are provided in Appendices 1 and 2 attached.



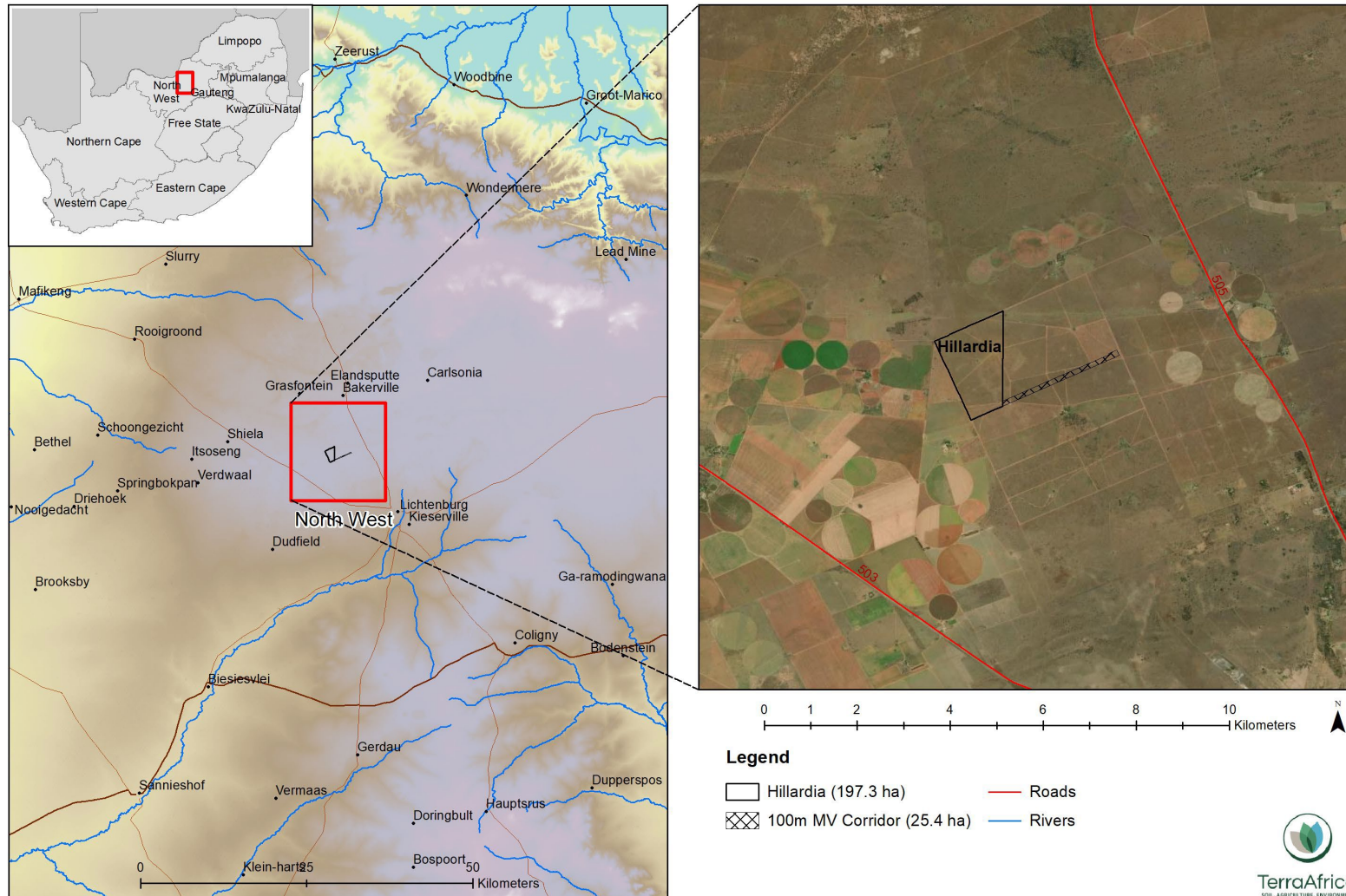


Figure 1: Locality of the proposed Hillardia PV facility and associated infrastructure



3. 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.
- It must contain proof in the form of photographs of the current land use and environmental sensitivity pertaining to the study field.
- All data and conclusions are submitted together with the Environmental Impact Assessment Report (prepared in accordance with the NEMA regulations) for the proposed project.

According to GNR 320, 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;
- confirm that the site is of “low” or “medium” sensitivity for agriculture; and
- 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:

Table 1 GNR 320 requirements of an Agricultural Compliance Statement (Low to Medium Sensitivity)

Requirement	Report reference
3.1. The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP.	Page 3 & Appendix 2
3.2. The compliance statement must:	Section 9
3.2.1. be applicable to the preferred site and proposed development footprint;	
3.2.2. confirm that the site is of "low" or "medium" sensitivity for agriculture; and	Section 10.5
3.2.3. indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.	Section 10.4 and Section 13
3.3. The compliance statement must contain, as a minimum, the following information:	Page 3, Appendices 1, 2 and 3
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;	
3.3.2. a signed statement of independence;	Appendix 1



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 12
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;	Not applicable
3.3.8. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMP; and	Section 11
3.3.9. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data.	Section 8
3.4. A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Submitted as part of final report

4. Terms of Reference

In addition to the requirements stipulated in GNR 320, the following Terms of Reference, as stipulated by Hillardia PV (Pty) Ltd, apply to the Agricultural Compliance Statement:

- to ensure a thorough assessment, that includes both the desktop assessment of databases and aerial photography; a description of the 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 and soil resulting from the proposed project;
- identify and describe potential cumulative soil, agricultural potential and land capability impacts resulting from the proposed project in relation to proposed and existing developments in the surrounding area; and
- recommend mitigation, management and monitoring measures, to minimise impacts and/or optimise benefits associated with the proposed project.

5. Legislative framework of the assessment

The report follows the protocols as stipulated for agricultural assessment in Government Notice 320 of 2020 (GNR 320). 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) (NEMA). It replaces the previous requirements of Appendix 6 of the Environmental Impact Assessment Regulations of NEMA.



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 (No 43 of 1983) (CARA) states that the degradation of the agricultural potential of soil is illegal. CARA 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; and
- the National Water Act (No 36 of 1998) (NWA) deals with the protection of water resources (i.e. wetlands and rivers). Hydric soils with wetland land capability are not part of the proposed development area and the NWA is therefore not applicable.

6. Agricultural Sensitivity

The combined Agricultural Sensitivity of the proposed project area was determined by using the National Environmental Screening Tool (www.screening.environment.gov.za). The screening report was generated on 7 July 2022. The requirements of GNR 320 stipulate that a 50m buffered development envelope must be assessed with the screening tool. The map depicted in Figure 2 shows the agricultural sensitivity of both the 190ha development area; and a buffered area of at least 2km around the proposed development.

The results provided by the screening tool indicate that the largest part of the development consists of land with Medium agricultural sensitivity (refer to **Figure 2**). Small areas with High agricultural sensitivity are located on the northern, southern, and eastern boundaries.

The areas directly north, east and south of the project area consist mainly of land with Medium sensitivity while the area directly west of the project area, is land with High and Very High sensitivity because of rainfed and irrigated crop production the area.

In alignment with the CARA, the Department of Agriculture, Land Reform and Rural Development (DALRRD) developed spatial data that depict High Potential Agricultural Areas (HPAAs) of the different provinces of South Africa (DALRRD, 2019). According to the DALRRD, 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 HPAA's of North West Province shows that the proposed project area falls outside of any HPAA (refer to **Figure 3**). The project area borders on a Category B irrigated HPAA (IR) along the northern and western boundaries. Since the development footprint will remain within the boundaries of the Hillardia PV development area, it will not affect or fragment the neighbouring HPAA.



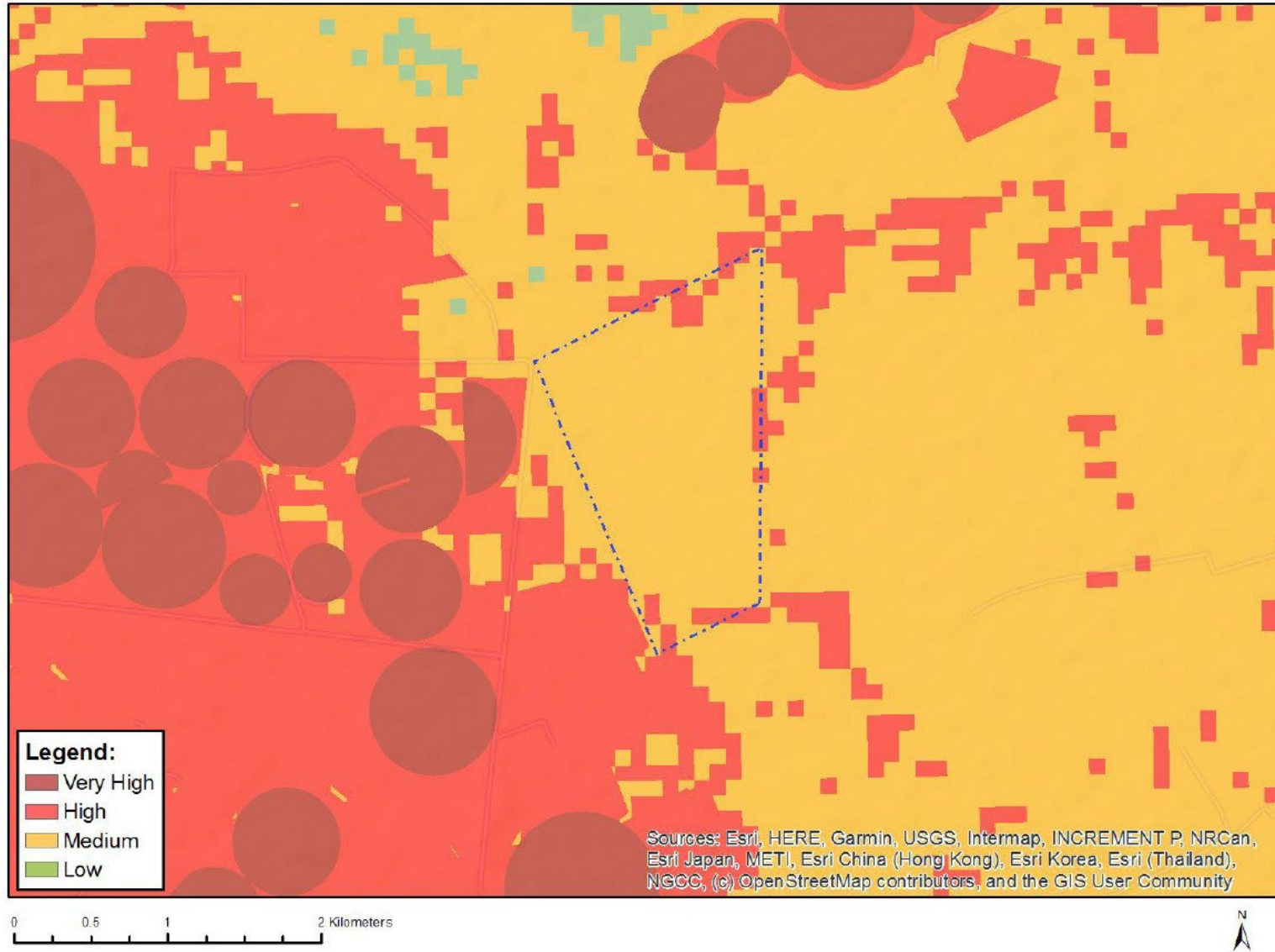


Figure 2 Agricultural Combined Sensitivity of the Hillardia PV facility assessment area (generated 7 July, 2022)





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



7. 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 GNR 320.

7.1 Assessment of available data

The most recent aerial photography of the area available from Google Earth was obtained. The satellite imagery was used to analyse the terrain of the proposed project area and the surrounding area. The analysis considered the slope, typical terrain units and landscape features, such as existing roads, farm infrastructure and areas where land degradation may be present. The proposed development area was also superimposed on four different raster data sets obtained from the National Department of Agriculture, Land Reform and Rural Development (DALRRD). The data sets are:

- The Refined Land Capability Evaluation Raster Data for South Africa that was developed using a spatial evaluation modelling approach (DALRRD, 2016).
- The long-term grazing capacity for South Africa 2018 that present the long-term grazing capacity of an area with the understanding that the veld is in a relatively good condition (South Africa, 2018).
- The North West Field Crop Boundaries show crop production areas may be present within the development area. The field crop boundaries include rainfed annual crops, non-pivot and pivot irrigated annual crops, horticulture, viticulture, old fields, small holdings and subsistence farming (DALRRD, 2019).
- The High Potential Agricultural Areas for Cultivation: North West Province, 2019 are large, relatively homogeneous areas of land within the province regarded as having high potential and capability to contribute towards food production in both the province and the country (DALRRD, 2019).

7.2 Site assessment

The site visit was conducted on 6 April 2022. The soil profiles were examined to a maximum depth of 1.5m using a hand-held auger. Observations on site were made regarding soil texture, structure, colour and soil depth at each survey point. A cold 10% hydrochloric acid solution was used on site to test for the presence of carbonates in the soil. A hand-held Garmin GPS was used to log the coordinates of each of the survey points. The position of the survey points are shown in **Figure 4**. The soils are described using Soil Classification: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018).

Other observations made during the site visit include recording the presence of farm buildings, cattle handling facilities and water troughs. The larger area around the study area was also assessed by driving through the area to gain an understanding of the agro-ecosystem within which the study area functions. Photographic evidence of soil properties, current land uses and farm infrastructure were taken with a digital camera and presented in Section 9 of the report.



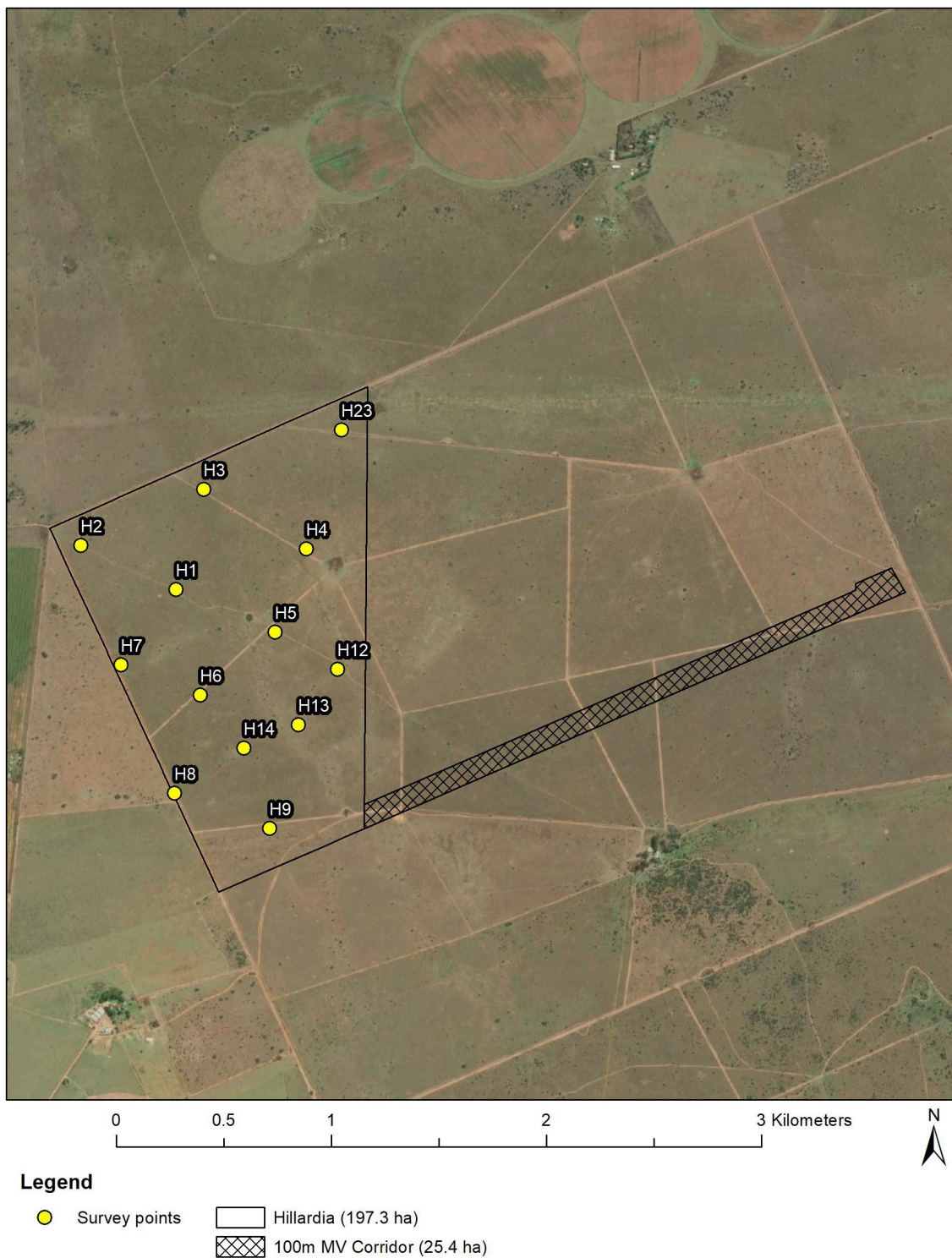


Figure 4 Locality of survey points within the Hillardia project area



7.3 Impact assessment methodology

The direct, indirect and cumulative impacts associated with the project have been assessed in terms of the following criteria:

- the **nature**, including 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;
- the **probability of occurrence**, describing 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**, determined through a synthesis of the characteristics described above and can be assessed as low, medium or high;
- the **status**, 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; and
- 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); and
- 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

8. Study gaps, limitations and assumptions

All assumptions made with the interpretation of the baseline results and anticipated impacts, are listed below:

- it is assumed that the development footprint will be within the project area of up to 230 ha that was assessed in this report;
- it is also assumed that the impacts of the grid connection will be assessed in a separate report as part of a Basic Assessment process;
- it is assumed that the project area will be fenced off and excluded as land available for any future farming activities; and
- it is further assumed that the activities for the construction and operation of the infrastructure are limited to that typical for the construction and operation of a solar PV facility, inclusive of the infrastructure listed in Section 10.1.

The following limitations is part of the assessment:

- the anticipation and rating of impacts are based on the report author's knowledge and experience on the nature of construction and operation of PV facilities. Therefore, it is done as accurately as possible but must not be considered as absolute measures.

No other information gaps, limitations and assumptions have been identified.

9. Baseline description

9.1 Soil properties

The soil profiles classified within the Hillardia development area consist of the Glenrosa, Mispah, Vaalbos and Nkonkoni forms. The Medium-Voltage (MV) cabling corridor consists of Glenrosa soils and a smaller area (4 ha) of Mispah soils. The distribution of the soil forms within the project area, is shown in Figure 5 and a description of each soil form is provided following Figure 5.



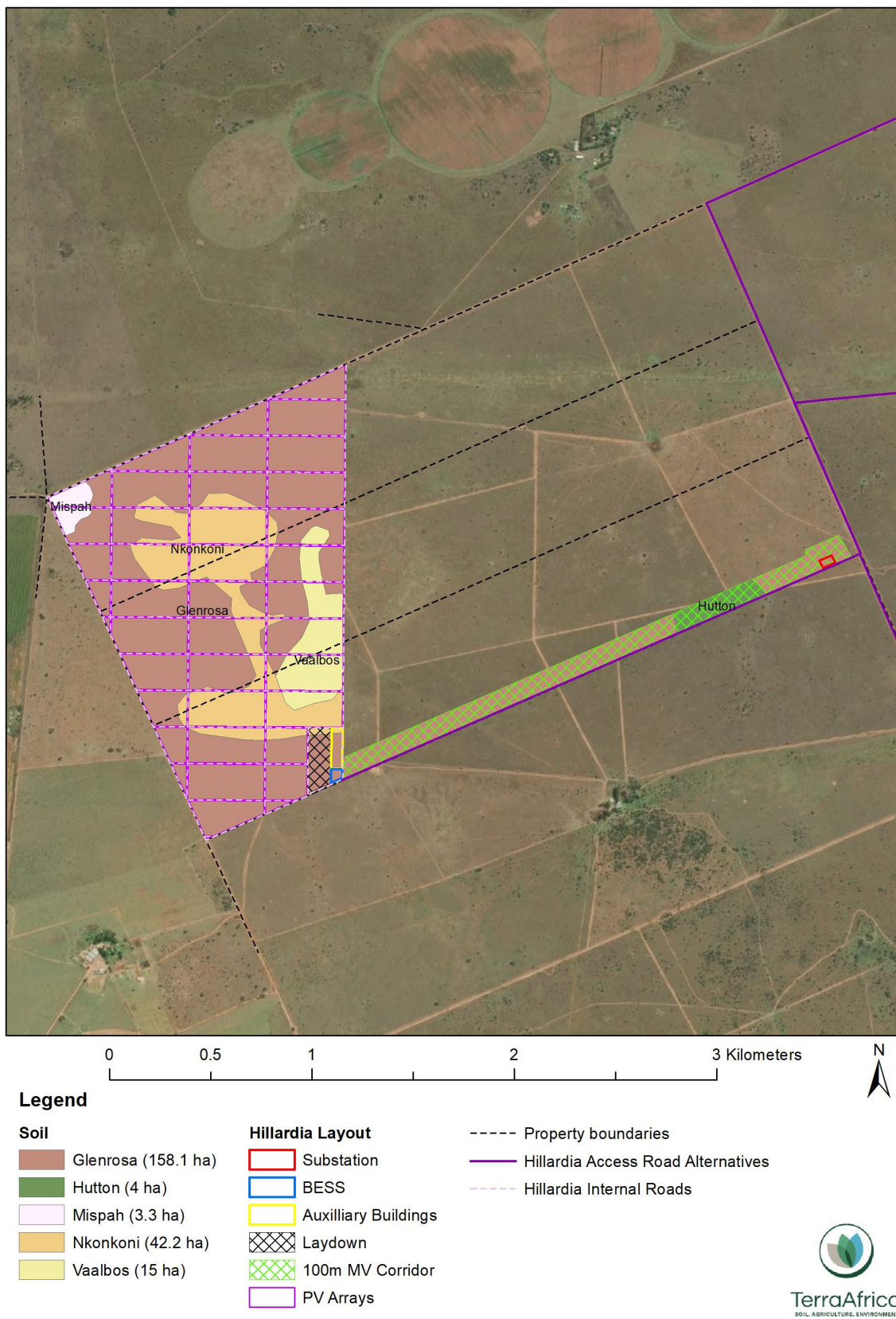


Figure 5 Soil classification map of the Hillardia PV facility



Glenrosa soils

The Glenrosa soils is the dominant soil form in the project area and is found in 158.1 ha of the project area, including the largest part of the MV corridor. These soils range in depth between 0.05 and 0.30m and consist of orthic topsoil horizons that are either bleached or chromic (light red in colour) with lithic material underneath. The lithic horizon of the Glenrosa soils within the Hillardia PV development area belongs to the geolithic family and consists of soil material as illuvial infillings between partly weathered and fractured rock (Soil Classification Working Group, 2018).

Mispah soils

The Mispah soils is present at 3.3ha of the north-western corner of the project area. The Mispah soils have similar shallow soil depth as the Glenrosa soils (0.05 to 0.30m) but differ in regard to the nature of the underlying material. The effective soil depth of the Mispah soils is restricted by solid and fractured rock. In some areas, the solid rock is visible on the surface as rock outcrops.



Figure 6 Solid rock on the surface of the Mispah soils

Nkonkoni soils

The Nkonkoni soil form is present mainly in the middle of the project area and over an area of 42.2 ha. The Nkonkoni soils consist of chromic (red) topsoil with sandy-loam texture that overlies a red apedal horizon. The red apedal horizon is limited in soil depth by the presence of lithic material. The Nkonkoni soils are between 0.4 and 0.6m deep.





Figure 7 Nkonkoni soils with 0.5m effective soil depth

Vaalbos soils

The Vaalbos soils is found on 15ha of land east of the Nkonkoni soils (see Figure 5). The Nkonkoni soils consist of orthic topsoil on red apedal subsoil that is limited in depth at about 0.5m deep by fractured and solid rock.

Hutton soils

The Hutton soils are located only in the middle of the MV corridor of the project area (a total of 3.3 ha). The Hutton soils consist of chromic (red) topsoil with sandy-loam texture that overlies a red apedal horizon. The red apedal horizon is deeper than 1.5m. The deep Hutton soils are suitable for rainfed crop production as there are no physical limitations to crop root development and sufficient effective soil depth for soil-water storage. However, the area is too small to be a crop field of viable size on its own and the surrounding land consists of shallow Glenrosa soils that are not suitable for crop production.





Figure 8 Hutton soils within the Hillardia PV development area

9.2 Land capability

The position of the different land capability classes within the development area, are depicted in Figure 9. The largest part of the Hillardia PV development area consists of land with Class 06 and Class 07 (Low-Moderate) land capability. A few very small areas of Moderate (Class 08) land capability are scattered through the middle of the development area. These areas have been assigned Medium agricultural sensitivity by the screening tool report.

The northern and southern boundaries of the area consist of small areas with higher land capability that is considered Moderate-High (Class 09). These areas haven been assigned High agricultural sensitivity by the screening tool report.



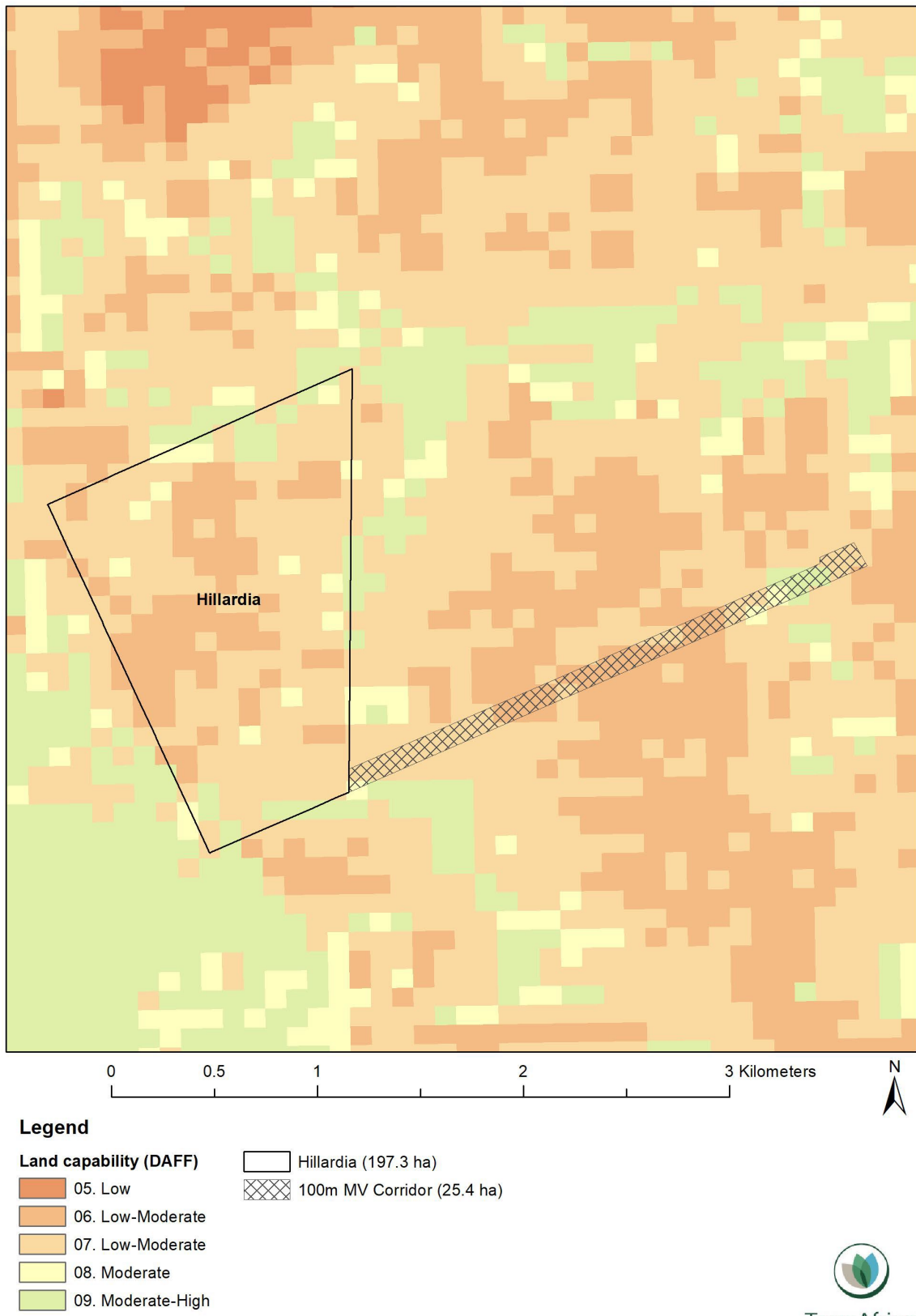


Figure 9 Land capability classification of the Hillardia PV facility and associated infrastructure (data source: DALRRD, 2016)



9.3 Agricultural potential

The largest part of the project area has Low agricultural potential where the Glenrosa and Mispah soils are present (161.4 ha). Low agricultural potential has been assigned because of the shallow soil depth that limits root growth and water storage capacity within these profiles. The areas where the Vaalbos and Nkonkoni soils are found have Moderate agricultural potential as the soil profiles are deeper than that of the Mispah and Glenrosa soils but the effective soil depth (not deeper than 0.6m) is still a limitation to rainfed crop production.

The small 3.3 ha with deep Hutton profiles within the MV corridor, have Moderate-High agricultural potential. The soil profiles are deep (1.5m or deeper) and the sandy clay loam texture makes the soil suitable for rainfed crop production. Even though the Hutton soils have Moderate-High Agricultural potential, it has always been used for livestock farming and not crop production. There is currently no crop production within the Hillardia PV development area (see Figure 10). The area is entirely used for extensive livestock farming.

Following the metadata layer obtained from DALRRD, the long-term grazing capacity of the entire project area is 8 ha/LSU (see Figure 11). 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 number of hectares per LSU (ha/LSU) (DALRRD, 2018).

Using the long-term grazing capacity of 8ha/LSU, the PV development area of 207 ha can provide forage to 28 head of cattle. The grazing capacity is moderate to moderate-high in comparison to the grazing capacity of the rest of the country. The vegetation consists of a mixture of grasses as well as *Vachelia* and *Searsia* species (see Figure 12). The grass cover shows signs of regular grazing and cattle watering facilities are present on site.



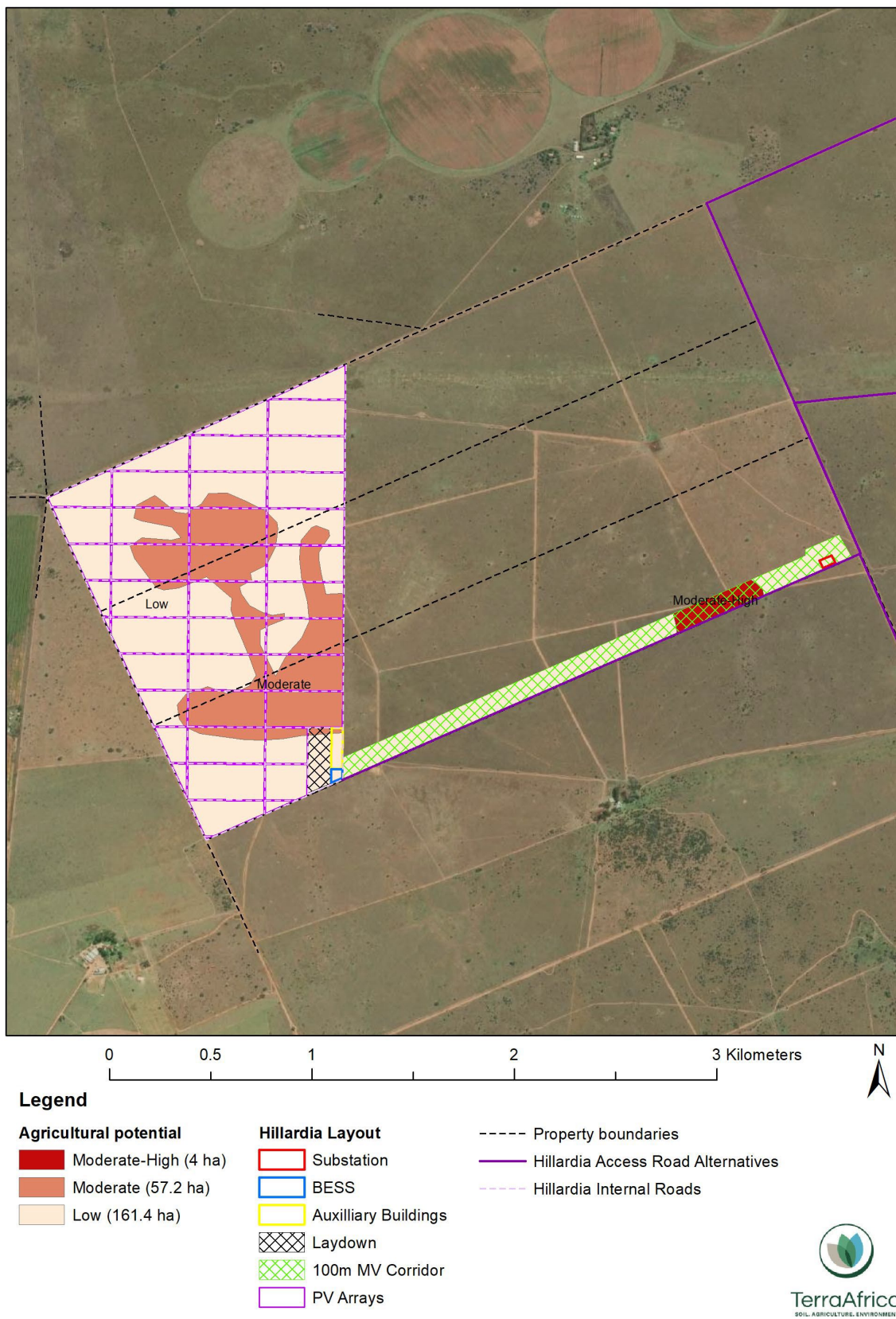


Figure 10 Agricultural potential of the Hillardia PV development area



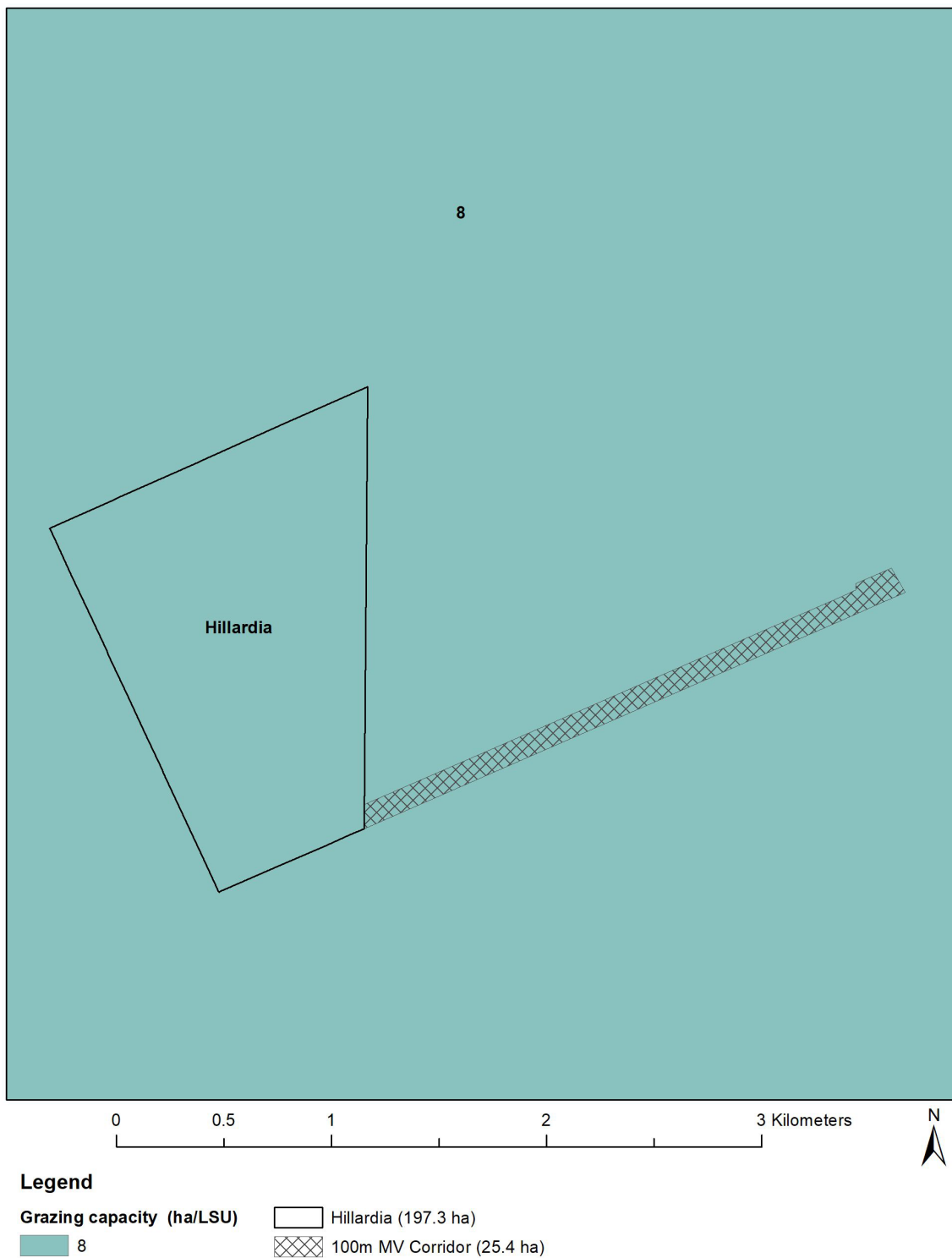


Figure 11 Grazing capacity of the proposed Hillardia PV facility and associated infrastructure (data source: DALRRD, 2018)





Figure 12 Photographic example of vegetation within the study area

9.4 Sensitivity analysis

Following the consideration of all the desktop and gathered baseline data above, the findings of the report differ with the results of the Environmental Screening Tool. The largest part of the development area consists of shallow Glenrosa soils that range in depth between 0.05 and 0.30m. The Glenrosa soils as well as the Mispah soils have Low agricultural potential and is not suitable for rainfed crop production. The area with Glenrosa soils has been assigned **Low agricultural sensitivity** (see **Figure 14**).

One area of 3.3 ha within the MV corridor, has deep soil profiles of the Hutton form and this area has Moderate-High agricultural potential. Even though the Hutton soils are suitable for rainfed crop production such a small area is not considered viable area for a standalone crop field for commercial grain production. The area is considered better suited to extensive livestock production, which is also the current land use on site. This area as well as the areas with the Nkonkoni and Vaalbos soils with effective depth of 0.4 to 0.6m, has been assigned **Medium agricultural sensitivity**.

The entire project area is not currently used for crop production and nor has it been used historically been used for this purpose. This is confirmed by the field crop boundaries delineation that shows there are not crop fields within the project area (DALRRD, 2019) (refer to **Figure 13**). No irrigation infrastructure, such as centre pivots or drip irrigation, are present within the project area and irrigated agricultural is currently not practiced in the area. The area is currently used for livestock farming only and the proposed Hillardia PV development area can support 28 head of cattle at the long-term grazing capacity of 8ha/LSU (DALRRD, 2018).



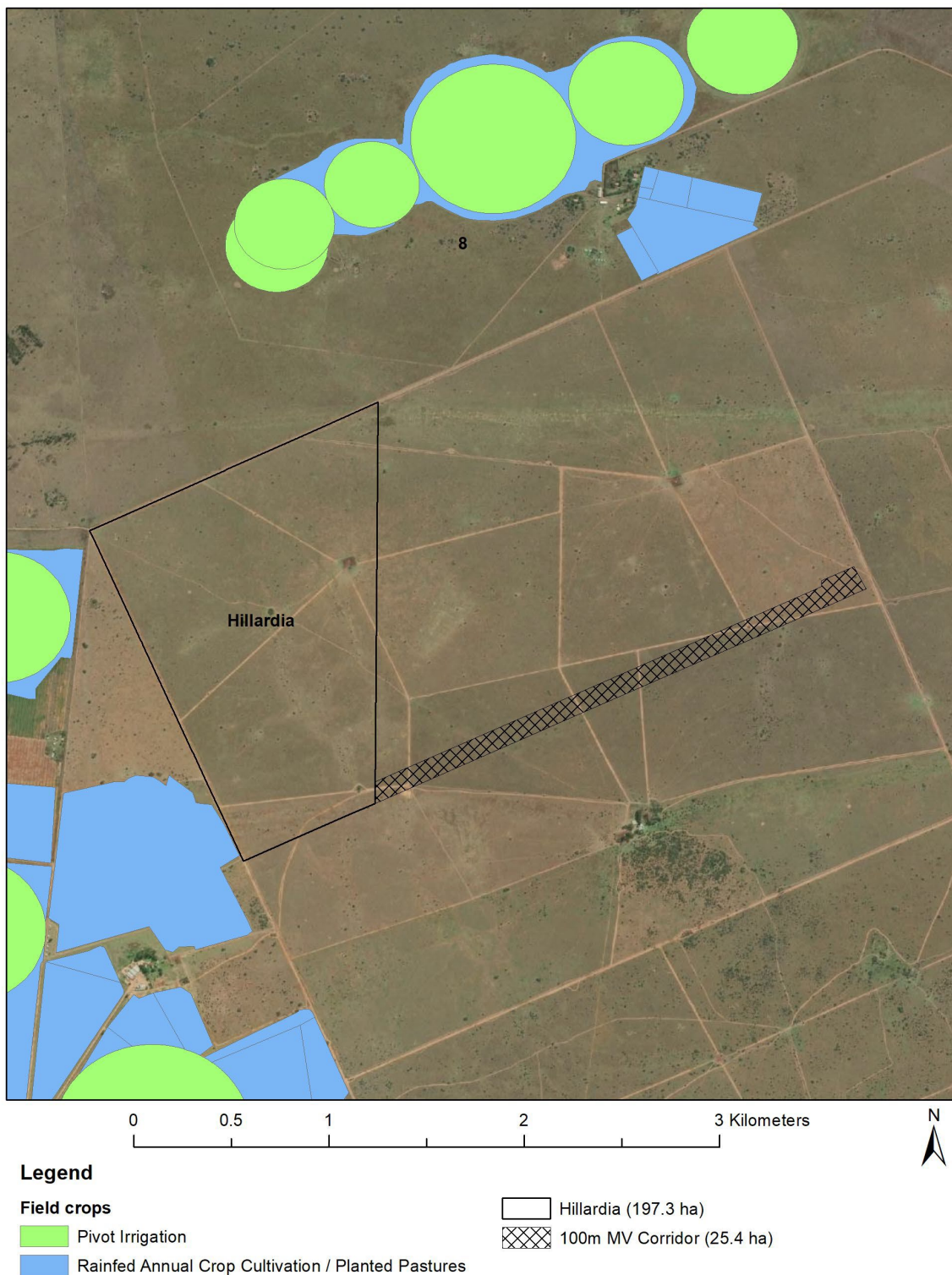


Figure 13 Field crop boundaries as delineated by DALRRD (DALRRD, 2019)



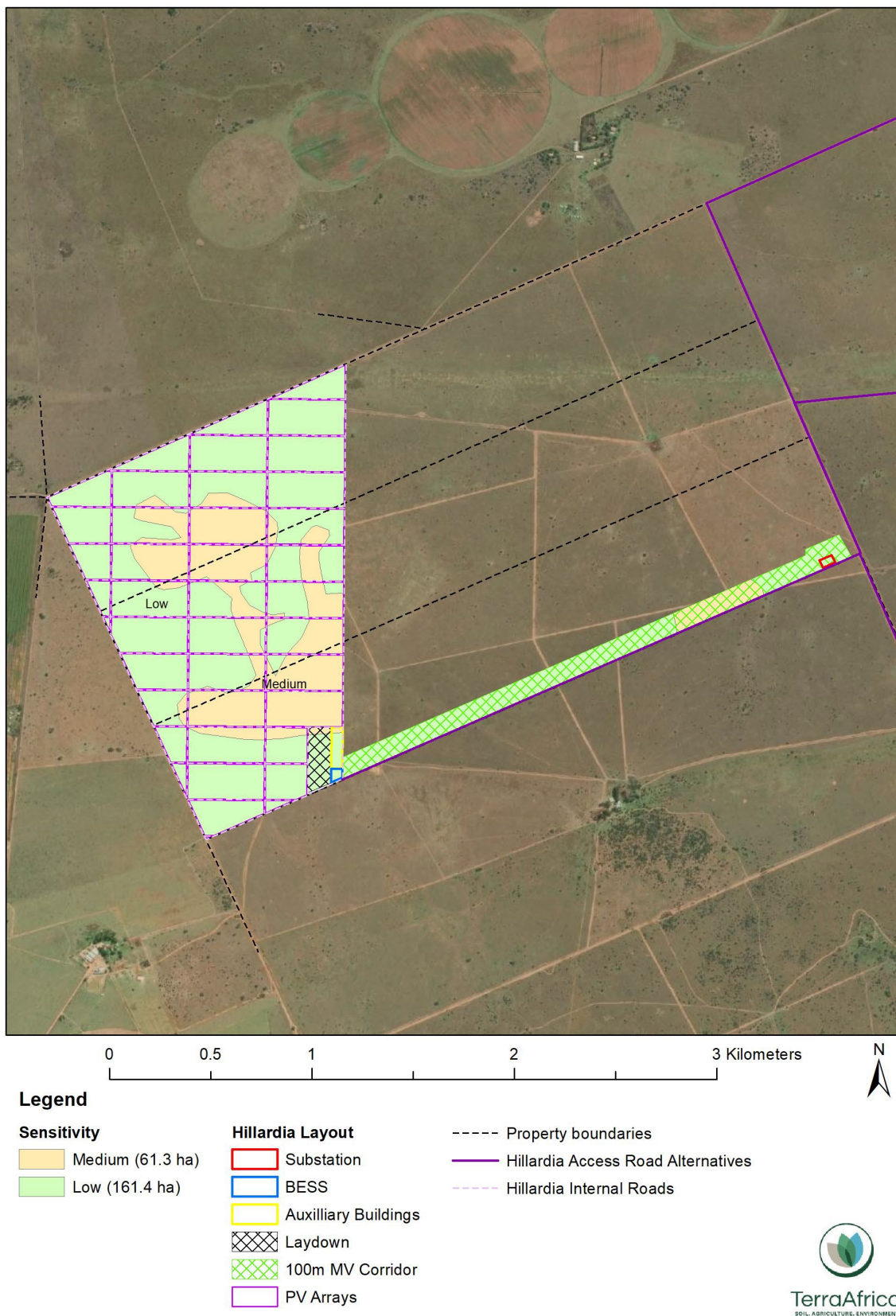


Figure 14 Agricultural sensitivity rating of the proposed Hillardia PV facility project area



10. Impact assessment

10.1 Project description

An assessment area of approximately 230 ha is being assessed as part of this EIA process and the infrastructure associated with the 120 MW facility includes:

- PV modules (mono- or bifacial) and mounting structures;
- Inverters and transformers;
- Battery Energy Storage System (BESS);
- Site access road up to 8m wide (three alternative access points assessed) ;
- Internal access roads (up to 8m wide);
- Auxiliary buildings (22kV or 33kV switch room, gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Temporary and permanent laydown area;
- Cabling between the panels, to be laid underground where practical; and
- Grid connection infrastructure, including:
 - Underground medium-voltage cabling between the project components and the facility substation (within a 100 m wide and 2.5 km in length corridor); and
 - Up to 132kV on-site facility substation

The Hillardia PV facility substation (as well as the Euphorbia PV and Verbena PV facility substations) will be located directly adjacent to the Houthaalboomen North collector switching station in the south-eastern corner of Portion 4 of the Farm Houthaalboomen 31.

The Houthaalboomen North collector substation/ switching station will facilitate the connection of the cluster facility substations to the Watershed Main Transmission Substation (MTS) via a single or double circuit 132 kV overhead powerline.

The connection infrastructure associated with this grid solution (i.e., between the collector switching station and the MTS) will be assessed as part of a separate Environmental Application.

The alternative site access points and associated routes assessed include:

Access Road Alternative 1: Access to the facility off the R505-5 at a new farm access point at km 13. This road alternative is ~5.9 km long and aligned as follows:

- From the R505-5, this route follows the northern boundary of Portion 25 of Farm Houthaalboomen in a westerly direction for ~2.5 km. This portion of the route will be new;
- Continues in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for 0.8 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~2.6 km. This portion of the route will be new and is common amongst the other access road alternatives.



Access Road Alternative 2: Access to the facility off the R505-5 at an existing farm access point at km 11.59. This road alternative is ~6.1 km long and aligned as follows:

- From the R505-5, this route follows an existing farm road that dissects Portion 25 of Farm Houthaalboomen in a westerly direction for ~2.5 km;
- Continues along an existing gravel road in a northerly direction along the eastern boundary of Portions 5 and 6 of Farm Houthaalboomen 31 for ~1 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~2.6 km. This portion of the route will be new and is common amongst the other access road alternatives.

Access Road Alternative 3: Access to the facility off the R505-5 at an existing farm access point at km 14.87. This road alternative is ~6.7 km long and aligned as follows:

- From the R505-5, this route follows an existing farm road on the southern border of Remaining Extent and Portion 3 of Farm Houthaalboomen 2 in a westerly direction for ~2.2 km;
- Continues along an existing gravel road in a southerly direction along the eastern boundary of Portions 3 and 4 of Farm Houthaalboomen 31 for ~1.9 km; and
- Continues in westerly direction along the southern boundary of Portion 4 of Farm Houthaalboomen 31 for ~2.6 km. This portion of the route will be new and is common amongst the other access road alternatives.

The proposed layout of the project infrastructure, superimposed on the delineated agricultural sensitivity of the area, is shown in **Figure 12**.

10.2 Impact significance rating

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase when the vegetation is removed and the soil surface is prepared for the delivery of materials and erection of the infrastructure. During the operational phase, the risk remains that soil will be polluted by the waste generated 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 the rating of the significance of each of the impacts for each of the project phases.

10.2.1 Construction phase

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

Nature: Prior to construction of the project infrastructure, the PV development area will be fenced off and livestock farming will be excluded from up to 207 ha of land. The area where the access road will be constructed will be stripped of vegetation and 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	Moderate (6)	Low (4)
Probability	Definite (4)	Definite (4)
Significance	Medium (40)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	N/A
Mitigation:		
<ul style="list-style-type: none"> 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 and game animals are moved to areas where they cannot be injured by vehicles traversing the area. Access to areas outside of the authorised development footprint should be strictly prohibited. Access to areas outside of the authorised development footprint should be strictly prohibited. All left-over construction material must be removed from site once construction on a land portion is completed. No open fires made by the construction teams are allowable during the construction phase. 		
Residual Impacts:		
The residual impact from the construction of the Hillardia PV Facility and Associated Infrastructure is considered medium.		
Cumulative Impacts:		
Any additional infrastructure development in support of the Hillardia 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 experiences 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:		
<ul style="list-style-type: none"> 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 project on the susceptibility to erosion is considered low.		
Cumulative Impacts:		



Any additional infrastructure development in support of the project will result in additional areas 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 and substation 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:		
<ul style="list-style-type: none"> • 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 project on soil compaction is considered low.		
Cumulative Impacts:		
Any additional infrastructure development in support of the project, 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. Potential spills and leaks from construction vehicles and equipment and waste generation on site can result in soil pollution.

Nature: The following construction activities can result in the chemical pollution of the soil:		
<ol style="list-style-type: none"> 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; and 8. Any construction material remaining within the construction area once construction is completed. 		
	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:		
<ul style="list-style-type: none"> 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 and waste dumping; Ensure battery transport and installation by accredited staff / contractors; and 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 Hillardia PV facility and waste 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 project area daily. The following impacts on soil are 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 project area.		
	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:		
<ul style="list-style-type: none"> The area around the project, including the internal access roads, must regularly be monitored to detect early signs of soil erosion on-set; and If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation. 		
Residual Impacts:		
The residual impact from the operation of the project 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 project will result in additional areas 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 and 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:		
<ul style="list-style-type: none"> • 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; and • 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 Hillardia PV facility and waste 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 the risk of soil erosion will especially remain until the vegetation growth has re-established in the area where the project infrastructure was decommissioned.

10.3 Consideration of alternatives

Three road alternatives are considered for the proposed Hillardia PV project. The access road alternatives are described in detail in Section 10.1. All three the access road alternatives will consist of existing gravel roads and new sections of gravel road. Access Road Alternative 1 has the longest section of new gravel road with a total of 5.1km new access road that comprises of two sections, i.e. 2.5km and 2.6km. Access Road Alternative 2 and Access Road Alternative 3 will each have only 2.5km of new access road together with the existing gravel roads.



The impacts of the new sections of access is road for each of the three alternatives, is similar to that of the PV facility, i.e., soil erosion risk, soil compaction, soil pollution and a loss of grazing land that is used for livestock farming. The mitigation measures for these impacts are identical to the mitigation measures proposed for the construction and operational phases of the PV plant in Section 10.2 above.

While Alternatives 2 and 3 are the preferred alternatives as they both have only 2.6km of new access road and it will be a smaller area with impacts on soil and agriculture than Alternative 1, Alternative 1 is also considered a suitable option for the proposed project and no fatal flaws are associated with Alternative 1.

10.4 Cumulative impact assessment and rating

“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 activities¹.

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 project will result in:

- unacceptable risk;
- unacceptable loss;
- complete or whole-scale changes to the environment or sense of place; and
- unacceptable increase in impact.

The proposed project will be located within a 50km radius of other PV facilities that may result in cumulative impacts. The position of these facilities are indicated in Figure 14. The cumulative impacts of the proposed project in addition to the authorised solar developments are rated and discussed below.

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



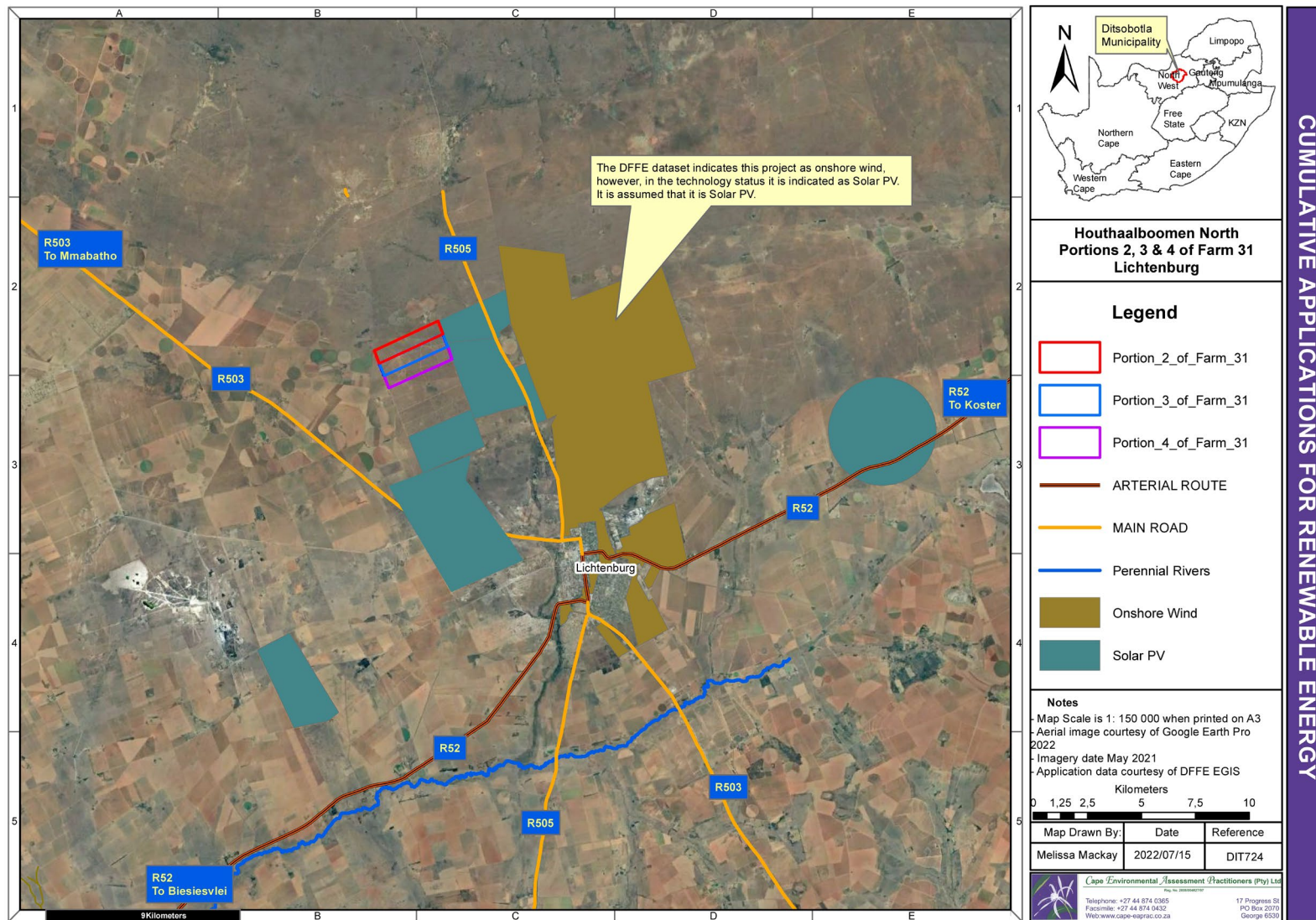


Figure 15 Renewable energy projects within a 50 km radius around the proposed Hillardia PV Facility and associated infrastructure



Table 2 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)
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.		

Table 3 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 11.1.1 and 11.1.2. above.		

Table 4 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 11.1.1 and 11.1.2 above.		

Table 5 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 11.1.1 and 11.1.2. above.		

11 Mitigation and management measures

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

Prevention and management of soil erosion:

Project component/s	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Limit vegetation clearance to only the areas where the surface infrastructure will be constructed. 	Environmental Officer / SHEQ division	During the entire construction, operational and decommissioning phases



<ul style="list-style-type: none"> • Avoid parking of vehicles and equipment outside of designated parking areas. • Plan vegetation clearance activities for dry seasons (late autumn, winter and early spring). • Design and implement a Stormwater Management System where run-off from surfaced areas is expected. • Re-establish vegetation along the access road to reduce the impact of run-off from the road surface. 		
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Performance Indicator	No visible signs of soil erosion around the project infrastructure
Monitoring	<ul style="list-style-type: none"> • Regular inspections around the constructed infrastructure to detect early signs of soil erosion developing. • When signs of erosion are 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	<ul style="list-style-type: none"> • Construction of infrastructure • Daily activities and maintenance during the operational phase
Potential Impact	Potential fuel and oil spills from vehicles and waste generation can cause soil pollution.
Activity/risk source	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills. 	Environmental Officer / SHEQ division	During the entire construction, operational and decommissioning phases



<ul style="list-style-type: none"> Any waste generated during construction must be stored in designated containers and removed from the site by the construction teams. 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. 		
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Performance Indicator	<ul style="list-style-type: none"> No visible signs of waste and spills within the project site. No accumulation of contaminants in the soils of the project site.
Monitoring	<ul style="list-style-type: none"> 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.

12 Acceptability statement

Following the data analysis and impact assessment above, the proposed Hillardia PV facility and Associated Infrastructure is considered an acceptable development within the area that was assessed for the purpose of compiling the Agricultural Assessment Report.

The Hillardia PV development area consists of five soil forms i.e. Mispah, Glenrosa, Nkonkoni, Vaalbos and Hutton soils. The largest part of the development area consists of shallow Glenrosa soils underlain by lithic that has severe limitations to rainfed crop production. The Glenrosa and Mispah soils have Low agricultural potential and is only suitable for livestock farming. Only one area of 3.3 ha within the MV corridor consists of deep Hutton soils (1.5m or deeper) that have Moderate-High agricultural potential and is suitable for rainfed crop production. Even though this area is suitable for crop production, it is too small in size as an isolated unit to be used as a commercial crop field. The areas with Nkonkoni and Vaalbos soils have Moderate agricultural potential.

The entire project area has never been used for crop production and is currently used for livestock farming, together with the surrounding land of the proposed project area. There is no irrigation infrastructure, such as centre pivots or drip irrigation, present within the project area. The grazing capacity (according to DALRRD, 2018), is 8ha/LSU, indicating that the proposed development area of 207 ha has forage to feed 26 head of cattle.

The largest part of the Hillardia PV development area consists of land with Class 06 and Class 07 (Low-Moderate) land capability. A few very small areas of Moderate (Class 08) land capability are scattered through the middle of the development area. The northern and



southern boundaries of the area consist of small areas with higher land capability that is considered Moderate-High (Class 09).

It is anticipated that the construction and operation of the Hillardia PV facility and Associated Infrastructure will have impacts that range from medium to low. Through the consistent implementation of the recommendation mitigation measures, most of impacts can all be reduced to low.

Considering that the project infrastructure components will be placed close to each other and not interfere with the nearby High Potential Agricultural Areas that have delineated over neighbouring farm portions, 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.

Three access road alternatives are considered. Three road alternatives are considered for the proposed Hillardia PV project. All three the access road alternatives will consist of existing gravel roads and new sections of gravel road. Access Road Alternative 1 has the longest section of new gravel road with a total of 5.1km new access road that comprises of two sections, i.e., 2.5km and 2.6km. Access Road Alternative 2 and Access Road Alternative 3 will each have only 2.5km of new access road together with the existing gravel roads. While Alternatives 2 and 3 are the preferred alternatives as they both have only 2.6km of new access road and it will be a smaller area with impacts on soil and agriculture than Alternative 1, Alternative 1 is also considered a suitable option for the proposed project and no fatal flaws are associated with Alternative 1.

The impacts of the new sections of access are road for each of the three alternatives, is the same as that of the PV facility, i.e., soil erosion risk, soil compaction, soil pollution and a loss of grazing land that is used for livestock farming. The mitigation measures for these impacts are identical to the mitigation measures proposed for the construction and operational phases of the PV plant.

It is my professional opinion that this application be considered favourably, permitting 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 project area that will be fenced off.



13 Reference list

Crop Estimates Consortium, 2019. *Field crop boundary data layer (NW province)*, 2019. Pretoria. Department of Agriculture, Land Reform and Rural Development.

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Land Type Survey Staff, 1972 – 2006. *Land Types of South Africa data set*. ARC – Institute for Soil, Climate and Water. Pretoria.

The Soil Classification Working Group, 2018. *Soil Classification – Taxonomic System for South Africa*. Dept. of Agric., Pretoria.



APPENDIX 1 – DECLARATION OF INDEPENDENCE AND SPECIALIST DETAILS



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED HILLARDIA PV FACILITY AND ASSOCIATED INFRASTRUCTURE, NORTH WEST PROVINCE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za



1. SPECIALIST INFORMATION

Specialist Company Name:	TerraAfrica Consult CC			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Mariné Pienaar			
Specialist Qualifications:	MSc. Environmental Science (Wits) ; BSc. (Agric) Plant Production (UP)			
Professional affiliation/registration:	SACNASP Registration No:400274/10 Soil Science Society of South Africa ; IAIAAsa			
Physical address:	Farm Strydpoort 403, Ottosdal, 2610			
Postal address:	P.O. Box 433, Ottosdal			
Postal code:	2610	Cell:	082 828 3587	
Telephone:	082 828 3587	Fax:	N/A	
E-mail:	mpienaar@terraafrica.co.za			

2. DECLARATION BY THE SPECIALIST

I, Mariné Pienaar, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

TerraAfrica Consult

Name of Company:

2022-07-08

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3



3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Mariné Pienaar, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

TerraAfrica Consult CC

Name of Company

2022-07-08

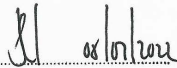
Date



Signature of the Commissioner of Oaths

08/07/2022

Date



Commissioner of Oaths (RSA)
Stephanus Francois Kasselman
59 Kruger street Wolmaransstad 2630
T: 018 596 1320 F: 018 596 1395



APPENDIX 2 - 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 Booyendal 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



MARINÉ PIENAAR

Specialist Scientist

PROFESSIONAL MEMBERSHIP

South African Council for Natural Scientific Professions (SACNASP)

Soil Science Society of South Africa (SSSA)

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






APPENDIX 3 – PROOF OF SACNASP REGISTRATION OF SPECIALIST



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that
Mariné Pienaar
Registration Number: 400274/10
is a registered scientist


in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)
Soil Science (Professional Natural Scientist)
Agricultural Science (Professional Natural Scientist)

Effective **20 October 2010** Expires **31 March 2022**






Chairperson



Chief Executive Officer



To verify this certificate scan this code



