Agricultural Assessment Report for the proposed Makoppa Solar PV Facility and Associated Infrastructure

Submitted by TerraAfrica Consult (Pty) Ltd

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1. Introduction

The applicant Makoppa Solar PV (Pty) Ltd are proposing the construction of a Solar Photovoltaic (PV) Energy Facility and associated infrastructure, known as Makoppa Solar PV, on Portion 1 of Farm 465 located South of Louis Trichardt in the Makhado Local Municipality, Vhembe District, Limpopo Province (Figure 1). The Applicant appointed TerraAfrica Consult (Pty) to conduct the agricultural assessment as part of the Environmental Authorisation process for the PV Energy Facility.

A study site of approximately 341 ha is being assessed as part of this Environmental Process and the infrastructure associated with an up to 75 Megawatt (MW) PV facility.

The proposed Makoppa Solar PV Project will include the following components:

- Solar Field
- Associated Infrastructure such as access roads, fencing and O&M buildings
- Project IPP Substation

This environmental application process includes Electrical Grid Connection Infrastructure required to connect the Makoppa Solar PV to the National Grid via the existing Tabor Main Transmission Substation (MTS). Three Grid connection alternatives are under investigation as part of this environmental process. Different land portions are affected by the various grid connection alternatives.

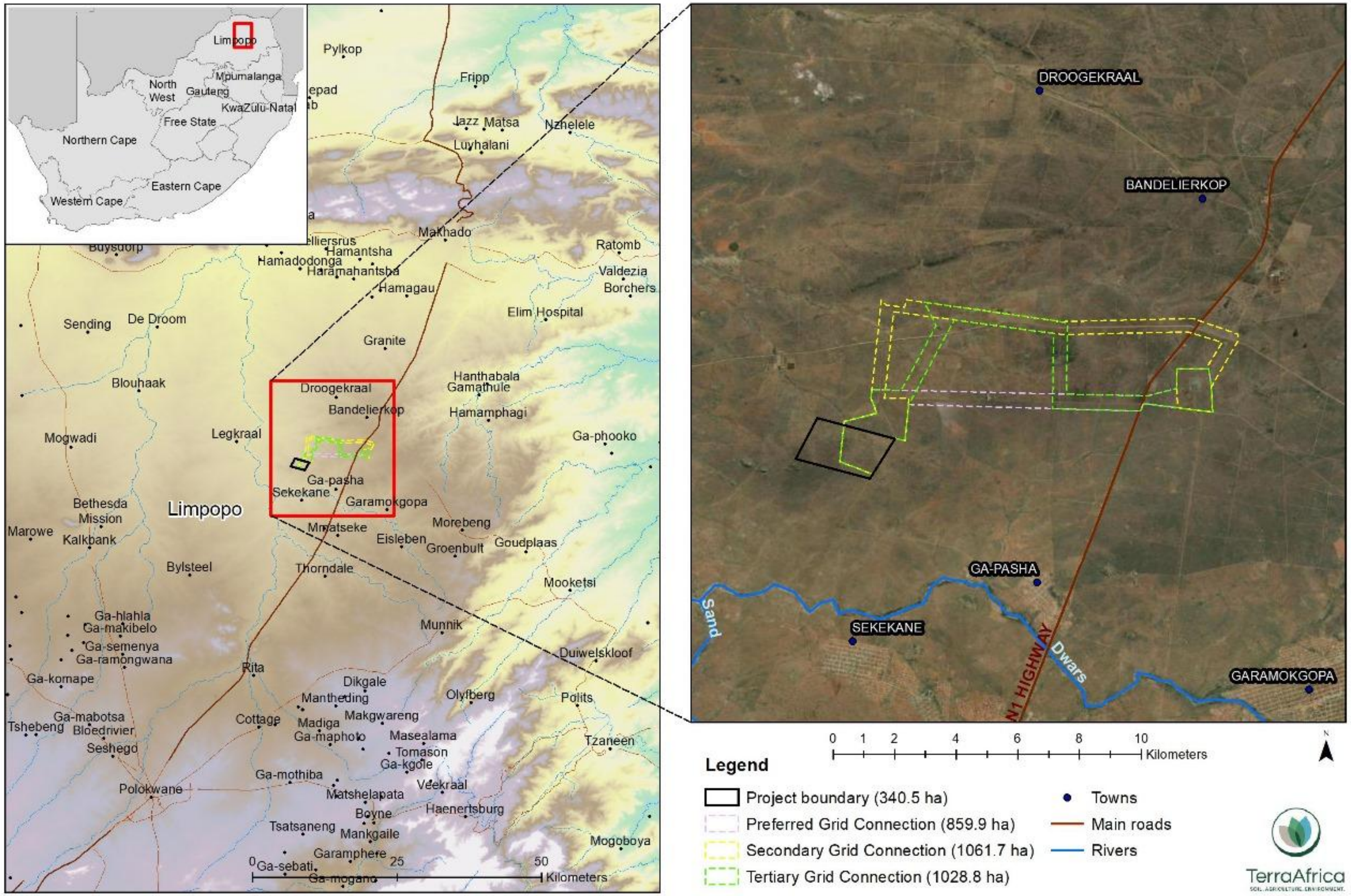

Figure 1: Locality map of the Makoppa Solar PV Energy Facility and the grid connection alternatives

2. Project description

The proposed layout of the Makoppa Solar PV Energy Facility and the locality of the grid connection alternatives are shown in Figure 2.

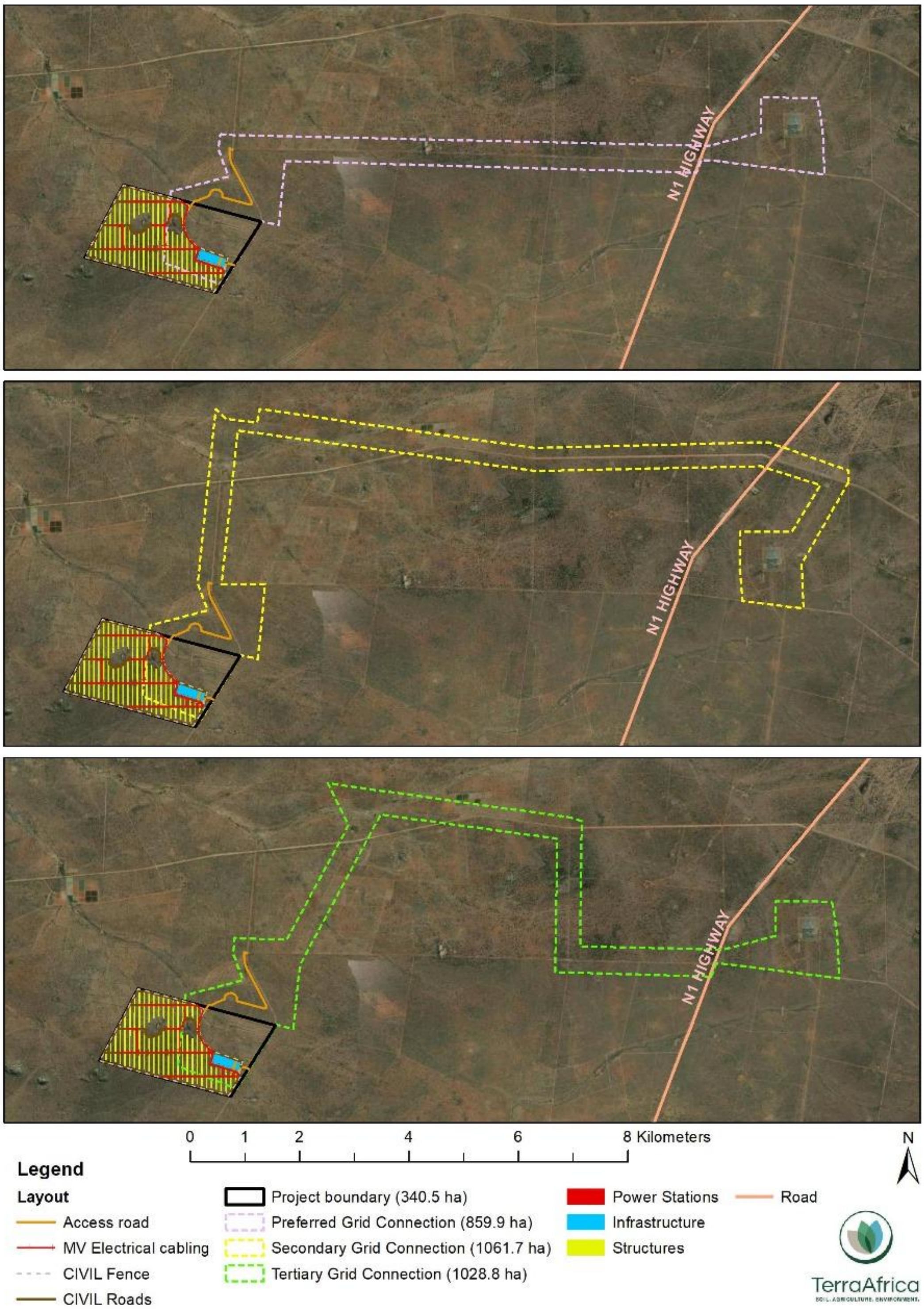

Figure 2: Layout map of the Makoppa Solar PV project and alternative locations of the grid connection corridor

The different components of the Makoppa Solar PV Project will consist of:

- Solar Field
    - Solar Arrays: PV modules;
    - Single axis tracking technology maximum height of 5m (aligned north-south);
    - Solar module mounting structures comprised of galvanised steel and aluminium;
    - Foundations which will likely be drilled and concreted into the ground;
    - Solar measurement and weather stations;
    - Central/string Inverters and MV transformers in in field;
    - DC coupled Battery Energy Storage system (BESS) containers distributed through PV field located adjacent to inverters ;
        - Lithium Ion battery Cells, Modules, Racks and containers.
        - Power Conversion Equipment.
        - Battery Management System.
        - Energy Management System.
- Associated Infrastructure
    - Medium Voltage (MV =22/33 kV) overhead powerlines and underground cables;
    - MV Collector stations;
    - Access road;
    - Internal gravel roads;
    - Fencing;
    - General maintenance area;
    - Storm water channels and berms;
    - Water storage tanks and pipelines;
    - Temporary work area during the construction phase (i.e. laydown area) (up to 7ha);
    - O&M buildings (up to 1ha);
    - Storerooms;
    - Diesel storage area (up to 0.25ha).
- Project IPP Substation (up to 1ha);
    - 132kV substation;
    - HV transformer;
    - Substation Control Building;
    - HV metering, Scada and protection building;
    - MV collector switchgear buildings;
    - Compensation equipment (Filters capacitors reactors statcoms).

The Electrical Grid Infrastructure includes:

- Onsite Switching Station (SS) (up to 1ha), adjacent to the IPP Substation.
- 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the existing Eskom Tabor Substation;
- Access Road to Switching Station;
- Maintenance access road below or adjacent to the power line.

3. Purpose and objectives

The overarching purpose of the agricultural assessment is to ensure that the site's sensitivity to agricultural production from the proposed project activities is sufficiently considered. Also, the information provided in this report enables the Competent Authority to come to a sound conclusion on the impact of the proposed project on the agricultural production potential of the study area and development area.

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 Assessment Report (prepared in accordance with the NEMA regulations) for the proposed PV facility.

4. Legislative framework for the assessment

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 development area has Medium to Low sensitivity with regards to the combined agricultural theme, an Agricultural Compliance Statement is required as part of the Basic Assessment process. This was confirmed by the desktop assessment of available data and aerial imagery as well as the findings of the site verification visit.
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 must 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.	Appendix 2, and 3
3.2. The compliance statement must: 3.2.1. be applicable to the preferred site and proposed development footprint;	Section 7
3.2.2. confirm that the site is of "low" or "medium" sensitivity for agriculture; and	Section 8
3.2.3. indicate whether the proposed development will have an unacceptable impact on the agricultural production capability of the site.	Section 11
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;	Appendix 2, 3 and 4
3.3.2. a signed statement of independence;	Appendix 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;	Figures 14 and 15
3.3.4 calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development including supporting infrastructure;	Section 1
3.3.5 confirmation that the development footprint is in line with the allowable development limits	Section 8.3
3.3.6. 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
3.3.7. 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
3.3.8. any conditions to which the statement is subjected;	Section 12
3.3.9. 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;	Sections 7.5.2 and 12
3.3.10. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; and	Section 10
3.3.11. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data.	Section 6
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 BA process reports for authorisation

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 of the Subdivision of Agricultural Land Act 70 of 1970 may also be relevant to the development since dominant land use of the land portion will change from agriculture to 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 may be relevant if wetland areas are identified within the development area.

5. 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.

5.1 Desktop analysis of satellite imagery

The most recent aerial photography of the area available from Google Earth was obtained and used together with the contours of the area, to identify different landscape features and terrain units in preparation of the site visit. The satellite imagery was also scanned for any areas where crop production and farming infrastructure may be present. The results of this analysis were used to pre-determine sampling and observation points and the coordinates of these points were transferred to the GPS for the site assessment.

5.2 Analysis of all other relevant available information

The proposed development area was also superimposed on five different raster data sets for the desktop analysis of the proposed project area. The data sets are:

- Land type data was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The data is presented at a scale of 1:250 000 and entails dividing land into land types, presenting typical terrain cross sections for each type, and identifying dominant soil types for each identified terrain unit.
- The Refined Land Capability Evaluation Radar Data for South Africa was developed using a spatial evaluation modelling approach (DALRRD, 2016).
- The long-term grazing capacity for South Africa 2018 presents the long-term grazing capacity of an area assuming the veld is in relatively good condition (South Africa, 2018).
- The Limpopo Province Field Crop Boundaries show crop production areas may be present within the affected properties. 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 Protected Agricultural Areas for Cultivation (Limpopo Province) (2019) show the areas within the province regarded as having high agricultural potential and capability to contribute to food production in both the province and the country (DALRRD, 2019).

5.3 Site assessment

The site visit was done from 4 until 10 December 2024. The soil was classified on a reconnaissance-level grid with survey points about 400 m apart. The survey points were logged on-site with a handheld Garmin GPS. During the site visit, a larger area was assessed that includes the Makoppa Solar PV facility's project boundary and grid connection alternatives. All the survey points assessed during the site visit are shown in Figure 3, in relation to the project boundary and grid connection alternatives of the Makoppa PV facility. The data recorded at each survey point is presented in Appendix 1. Photographic evidence of the soil properties and current land uses of the assessment area was collected at each survey point.

The data recorded at each survey point include soil form, colour of the topsoil and subsoil horizons, clay content of the respective horizons, nature of the depth-limiting material, and current land use at the specific point. A 10% hydrochloric acid solution was used to test for the presence of carbonates in the profiles.

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

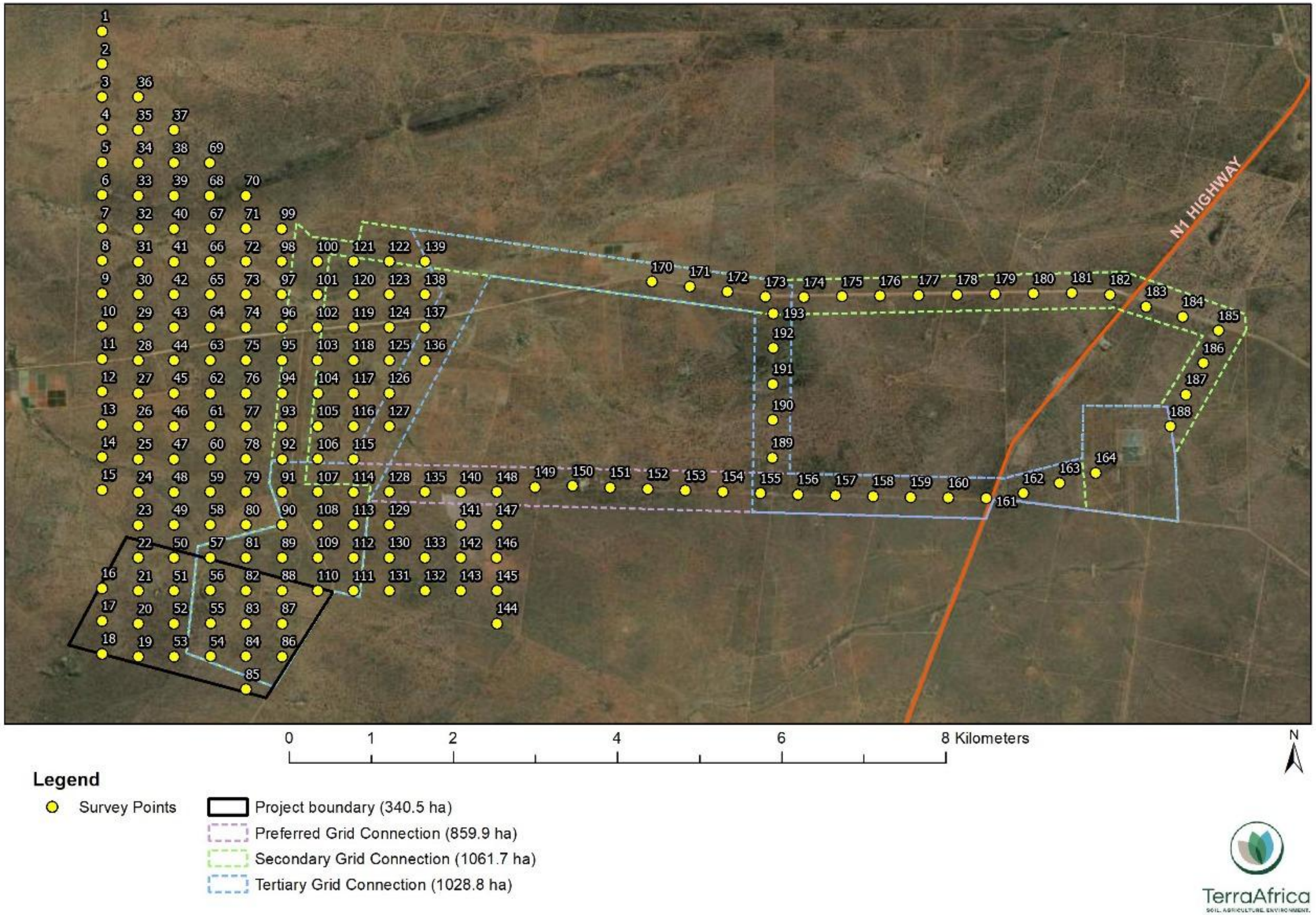

Figure 3: Survey points map of the Makoppa PV Energy Facility project

6.4 Impact Assessment Methodology

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.
- 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).

6. Study gaps, limitations and assumptions

Site visit access was unavailable in two areas of the proposed grid connection corridors. However, the analysis of desktop data, in addition to the site data gathered, is considered sufficient to analyse the sensitivity of these areas.

No other uncertainties and gaps have been identified that may affect the conclusions made in this report.

7. Results

7.1 Land type

Approximately 75% of the project boundary area consists of Land Type Bc48, located in the western part of this area (see Figure 4). The remaining 25% of the project area consists of Land Type Bd51 (along the eastern boundary of the area). The western part of all three grid connection alternatives also consists of Land type Bd51, which changes into Land Type Bc48 towards the east of the grid connection alternatives. This changes again into Land Type Bd51 in the eastern ends of the grid corridors. The only other land type present in the area is Land Type Ca102, located in the far northeastern corner of the Secondary Grid Connection Alternative.

A detailed description of each land type and the geology associated with it follows Figure 4.

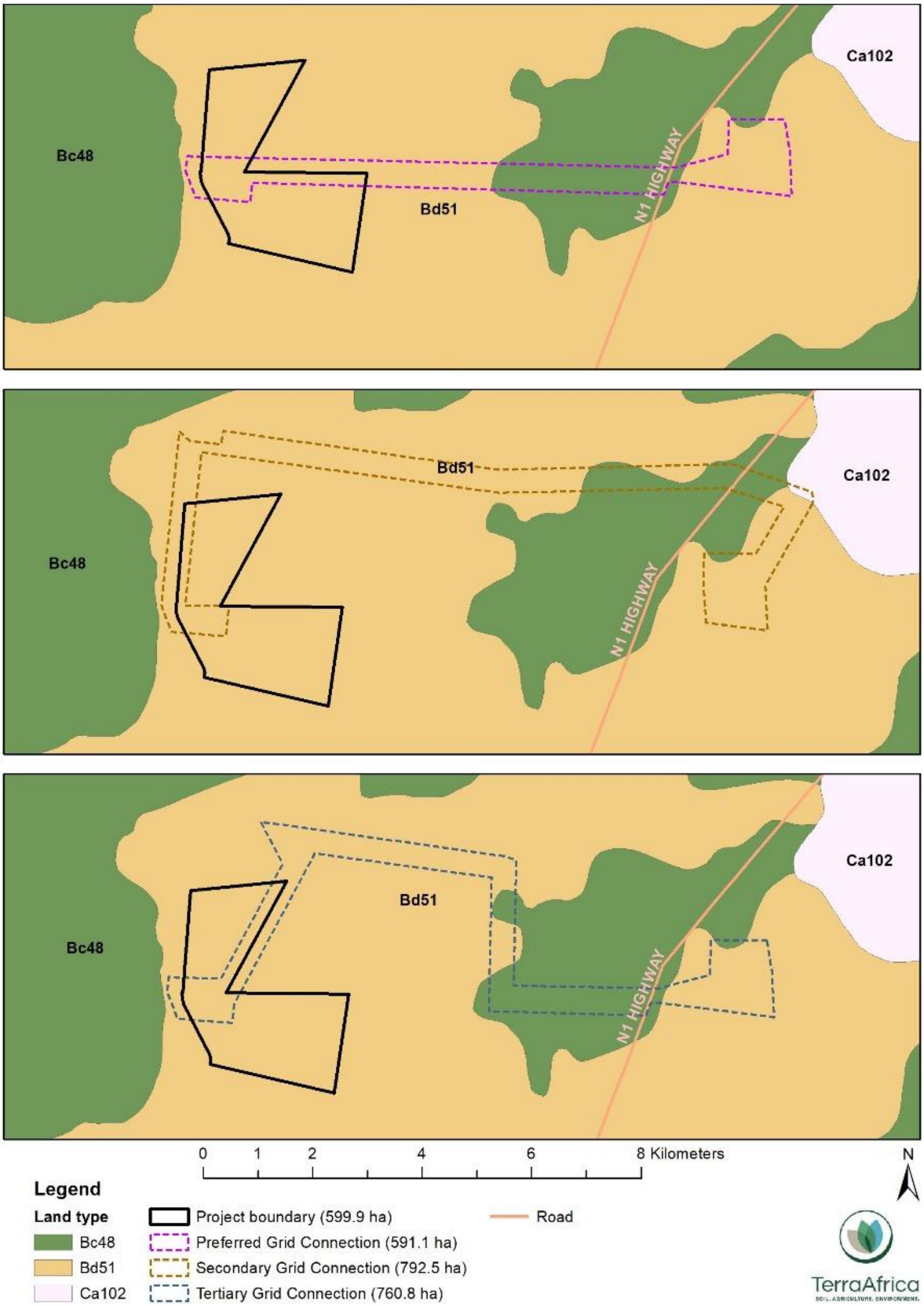

Figure 4: Land type map for the Makoppa Solar PV area and grid connection alternatives

7.1.1 Land Type Bc48

Approximately 47% of the total area consisting of this land type, are long flat toe-slopes (Terrain unit 4) with slopes ranging between 1 to 3% and slope lengths of 400 to 2000 m. These areas comprise of red and yellow-brown apedal soil forms shallower than 1000 mm. It also includes about 20% Glenrosa soils and lesser occurrence of Mispah soil.

Both the mid-slopes (Terrain unit 3) and crests (Terrain unit 1) consists of approximately 50% Glenrosa and red apedal soils shallower than 800 mm. The slope of the crests is 1 to 2% and that of the mid-slopes range between 1 and 5%. The mid-slopes have short slope length of 50 to 300 m and that of the crests are 200 to 800 m. The landscape depressions or valley bottoms (Terrain unit 5) consist of a combination of Oakleaf, Clovelly, Pinedene, Avalon and Mispah soil. The valley bottoms have short slope length of 100 to 300 m and slope of 2 to 4%. The typical terrain form and elevation of Land Type Bc48 are illustrated in Figure 5.

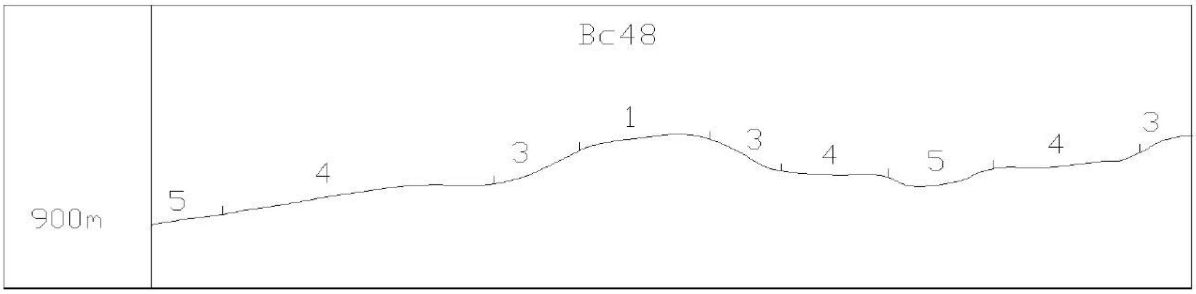

Figure 5: Terrain form sketch of Land Type Bc48

The land type data indicates the underlying geology of this land type as leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss and minor muscovite-bearing granite, pegmatite and gneiss of the Hout River Gneiss Formation. There is also metapelite of the Banderlierkop Complex.

7.1.2 Land Type Bd51

Land Type Bd51 represent a slightly undulating landscape where the valley bottoms have slightly higher elevation (920 masl) in contrast to that of Land Type Bc48 (900 masl). Land Type Bd51 also consist of only three terrain units and do not have mid-slope positions. The typical terrain form and elevation of Land Type Bd51 are illustrated in Figure 6.

Approximately 60% of the total area consists of long, flat toe-slopes (Terrain unit 4), with slopes ranging from 0% to 2% and slope lengths of 400 to 3000 m. These areas comprise of red and yellow-brown apedal soil forms shallower than 1000 mm. It also includes Glenrosa soils and a lesser occurrence of Oakleaf, Longlands, Mispah and Westleigh soil forms. The rest of the land type area consists of 20% crests (Terrain unit 1) and 20% valley bottoms (Terrain unit 5). The slope of both the crests and valley bottoms range between 0 and 2% and the slope length is 200 to 500 m. The crests and valley bottoms consist of a similar combination of soil forms to that of the toe-slopes, except for the Longlands and Bainsvlei forms that are not found in crest positions.

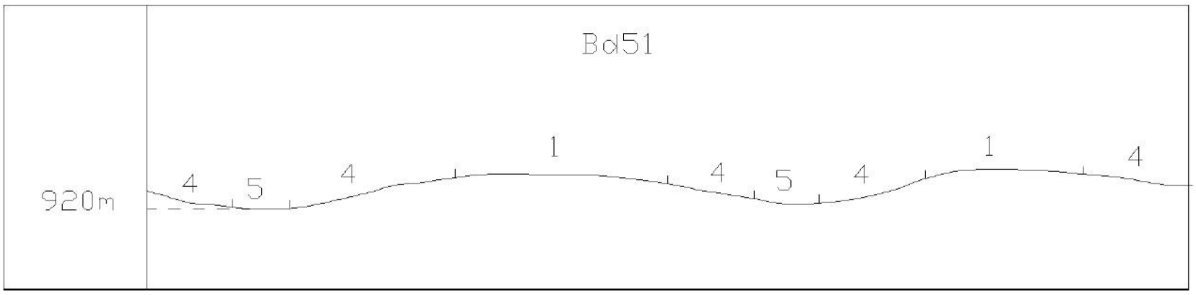

Figure 6: Terrain form sketch of Land Type Bd51

The land type data indicate the underlying geology of Land Type Bd51 as leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss, and minor muscovite-bearing granite, pegmatite, and gneiss of the Hout River Gneiss Formation. There is also sand and alluvium of the Quaternary System.

7.1.3 Land Type Ca102

Land Type Ca102 represents a flat to slightly undulating landscape consisting of 30% mid-slopes (Terrain unit 3), 40% toe-slopes (Terrain unit 4) and 30% valley bottoms (Terrain unit 5). The slope of all terrain units ranges between 0 and 5% and the slope lengths range between 300 and 3000 m. The typical terrain form of Land Type Ca102 is illustrated in Figure 7. The mid-slopes consist of approximately 65% red apedal soils between 400 and 750 mm deep and about 14% duplex soil of the Swartland form. The valley bottoms and toe-slopes consist of the same soil forms, but also include soil from the Valsrivier, Oakleaf, Westleigh, and Pinedene forms. The underlying geology consists of dark grey to light grey biotite-hornblende gneiss, sand banded gneiss of the Goudplaats Gneiss. It also includes metapelite, amphibolite, mafic granulite of the Bandelierskop Complex.

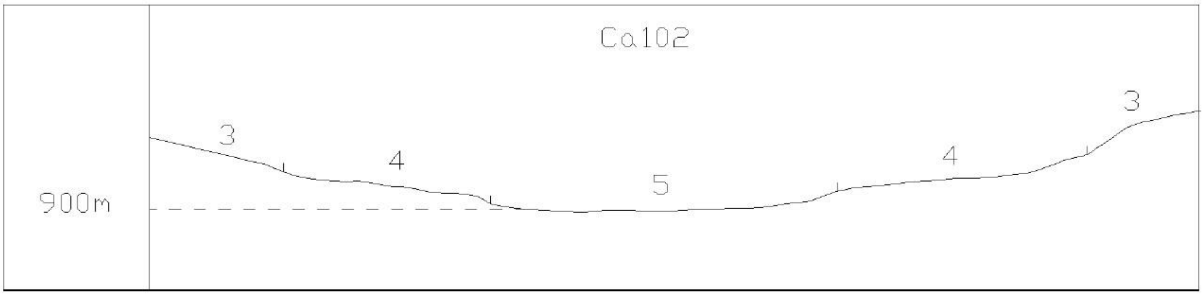

Figure 7: Terrain form sketch of Land Type Ca102

7.2 Soil forms

Fourteen different soil forms were classified within the Makoppa PV Energy Facility's project area and grid connection alternatives (see Figure 8). The area of each soil form within the project boundary and grid connection alternatives is shown in Table 1.

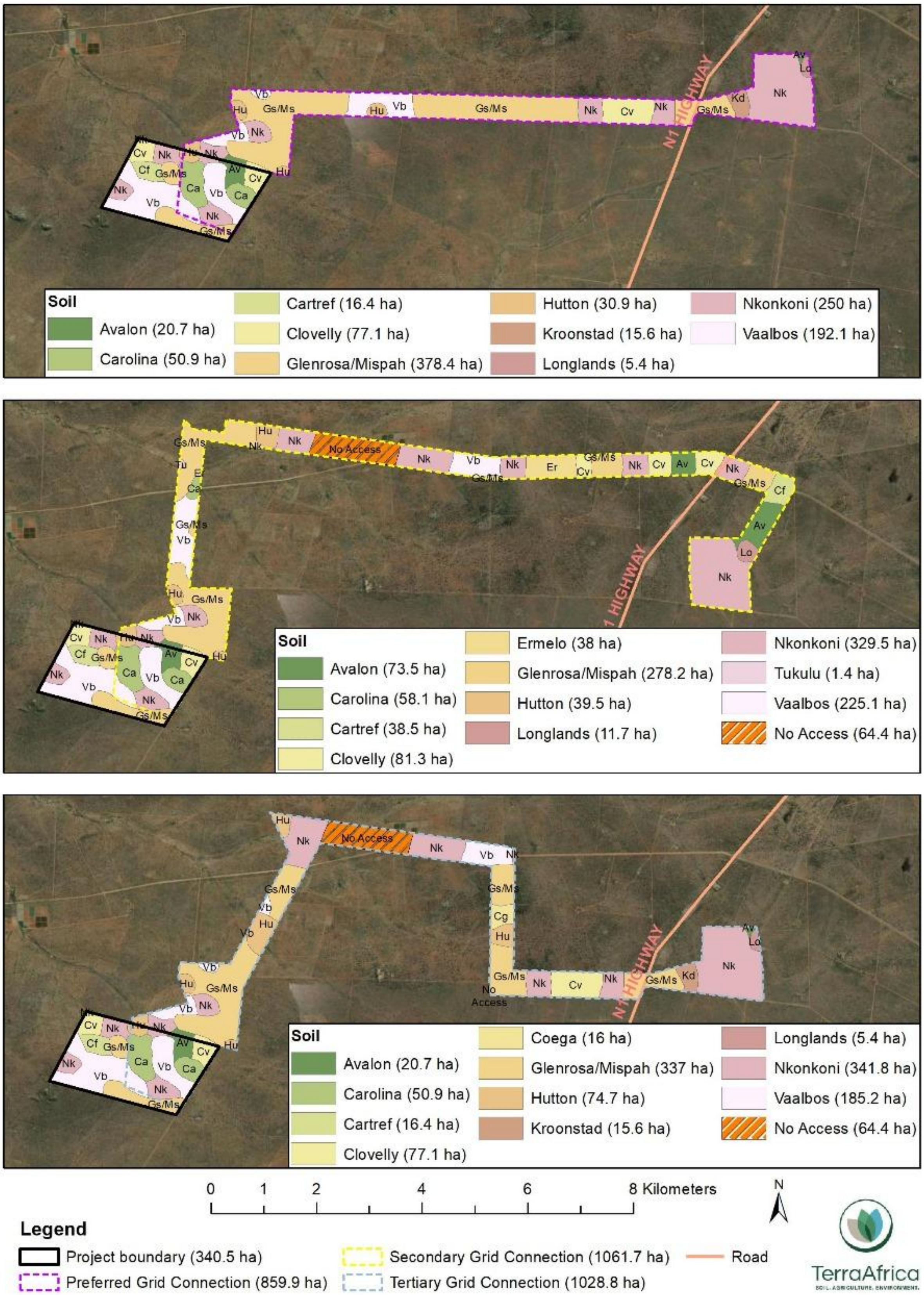

Figure 8: Soil map of the Makoppa PV Facility's project area and grid connection alternatives

Table 1: Soil forms present within the project area and grid connection alternatives of the Makoppa PV project

Soil form	Project area (ha)	Preferred grid connection (ha)	Secondary grid connection (ha)	Tertiary grid connection (ha)
Avalon	13.9	6.8	59.6	6.8
Carolina	50.6	0.3	7.5	0.3
Cartref	16.4	-	22.1	-
Clovelly	30.2	46.9	51.1	46.9
Coega	-	-	-	16
Ermelo	-	-	38	-
Glenrosa/Mispah	46.8	331.6	231.4	290.2
Hutton	6.5	24.4	33	68.2
Kroonstad	-	15.6	-	15.6
Longlands	-	5.4	11.7	5.4
Nkonkoni	50.5	199.5	279	291.3
Tukulu	-	-	1.4	-
Vaalbos	125.6	66.5	99.5	59.6

Within the project boundary area, soil of the Avalon, Carolina, Cartref, Clovelly, Hutton, Nkonkoni, Vaalbos, Mispah and Glenrosa forms are present. The Glenrosa and Mispah soil forms were grouped together for the soil map, as both consist of shallow orthic topsoils that overlay solid rock or lithic material. These soils consist of orthic topsoil that is between 100 and 400 mm deep and restricted in depth by either lithic material (Glenrosa) or fractured and/or solid rock (Mispah).

Both the Vaalbos and Nkonkoni soil forms consist of orthic topsoil and red apedal subsoil. In the case of the Vaalbos soil, the red apedal subsoil is limited in depth by hard rock (either solid or fractured) and the Nkonkoni soil, is limited in depth by lithic material. In contrast, the Hutton soil is at least 1.5 m deep or deeper. Similar to the red apedal soils, there are yellow-brown apedal soil forms consisting of orthic topsoil with yellow-brown apedal subsoil that covers different depth-limiting materials. These soils are characterised by the Avalon form, which features a soft plinthic horizon underneath (see Figure 9), the Carolina form, limited in depth by hard rock, and the Clovelly form, restricted by lithic material.

The only soil form within the project boundary characterised by an albic subsoil horizon is that of the Cartref form, which is present in one area of about 16.4 ha. The Cartref soil has orthic topsoil with albic subsoil and lithic material that limits the effective depth of the profiles at 300 mm (see Figure **10**).

The soil forms present in the project area are also present in the grid connection alternative corridors. Soil forms that only occur in the grid connection alternatives and not within the project boundary area, are those of the Coega, Ermelo, Kroonstad, Longlands and Tukulu forms. The Tukulu soil form is present in one area of 1.4 ha in the Secondary Grid Connection alternative and consists of orthic topsoil, neocutanic subsoil that is limited in depth by gleyic materials. There is one area of 16 ha of Coega soil within the Tertiary Grid Connection alternative only, where orthic topsoil overlies a hard carbonate horizon. The Kroonstad and Longlands soil forms consist of orthic topsoil that overlies bleached albic subsoil and only differs in the underlying material that limits the effective depth. The Kroonstad form by a gley horizon and the Longlands form has soft plinthic material underneath the albic subsoil.

An area of about 64 ha, present within the Secondary and Tertiary grid connection alternatives, was inaccessible during the site visit. It is highly likely that this area consists of one or more of the soil forms identified within the rest of the grid connection corridors.

Figure 9: Avalon soil profile at survey point 88

Figure 10: Shallow Cartref profile of 300mm deep at survey point 21

7.3 Agricultural potential

The agricultural potential of the different soil forms was determined using expert knowledge of the soil forms present, their effective soil depth, water-holding capacity, and terrain capabilities. The soils within the Makoppa PV project area and grid connection alternatives can either be classified as Moderate, Low-Moderate or Low agricultural potential. The most significant part of project boundary area where the PV arrays will be located, has Low agricultural potential (about 293.3 ha) while the areas with Low-Moderate agricultural potential in the project area measures 80.8 ha and that with Moderate agricultural, about 20.4 ha.

The total area of each agricultural potential class within the project boundary as well as the individual grid connection alternative corridors, are summarised in Table 2. The position of the different agricultural potential classes in relation to the Makoppa PV project's boundary area and the grid connection alternatives, are depicted in Figure 11.

Table 2: Agricultural potential of soil within the project area and grid connection alternatives of the Makoppa PV project

Agricultural potential	Project area (ha)	Preferred grid connection (ha)	Secondary grid connection (ha)	Tertiary grid connection (ha)
Moderate	20.4	31.2	165.7	108.1
Low-Moderate	80.8	296.6	343.1	343.6
Low	293.3	315.2	271.7	294.6
Unknown (No access)	-	-	64.4	64.4

The soil forms with Moderate agricultural potential are Ermelo, Tukulu, Hutton, Avalon and Vaalbos soil deeper than 1000 mm. While all these soils are deeper than 1000mm, the hot, drier climate reduces the suitability of the soils for rainfed crop production. The soil with Low-Moderate agricultural potential is that of the Clovelly and Carolina forms, and the Vaalbos and Nkonkoni soils between 600 and 1000 mm deep. The agricultural potential of these soils is lower than that of the soils with Moderate potential because of less effective soil depth.

Soil forms with Low agricultural potential are those of the Cartref, Coega, Glenrosa/Mispah, Kroonstad and Longlands soil forms. The Cartref, Coega, Glenrosa and Mispah soil have very limited effective soil depth and therefore also limited water-holding capacity. The Kroonstad and Longlands soils have depth-limiting horizons at shallow depths, consisting of soft plinthite and gley, which retain moisture and can result in short periods of depleted oxygen in the profile, making these soil forms unsuitable for crop roots.

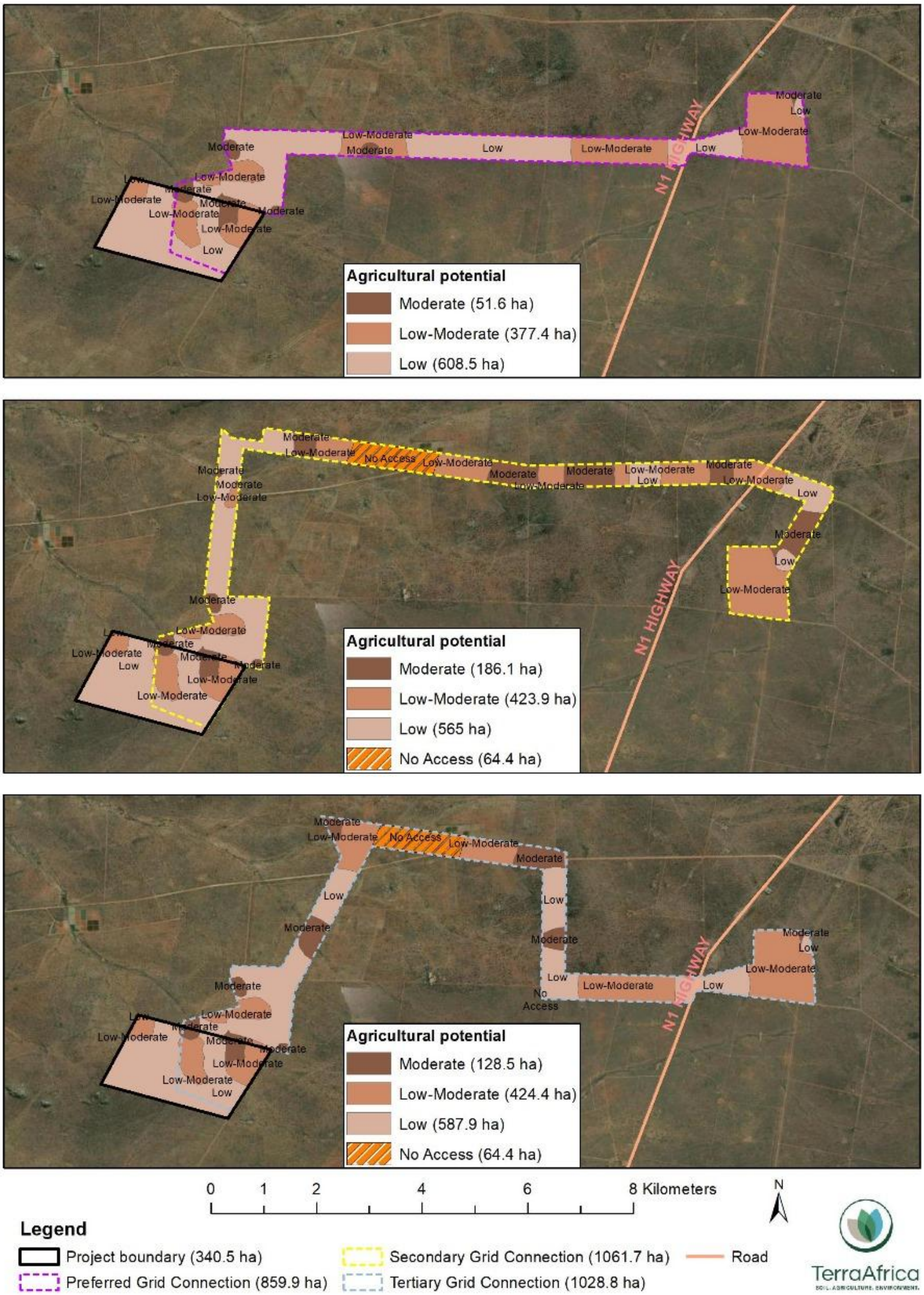

Figure 11: Agricultural potential of the Makoppa PV Facility's project area and grid connection alternatives

7.4 Land capability

The land capability as determined by Department of Agriculture, Land Reform and Rural Development (DALRRD) through a spatial delineation process, was shown by overlying the project boundary and grid connection alternatives on the land capability raster data (DALRRD, 2016) (see Figure 12).

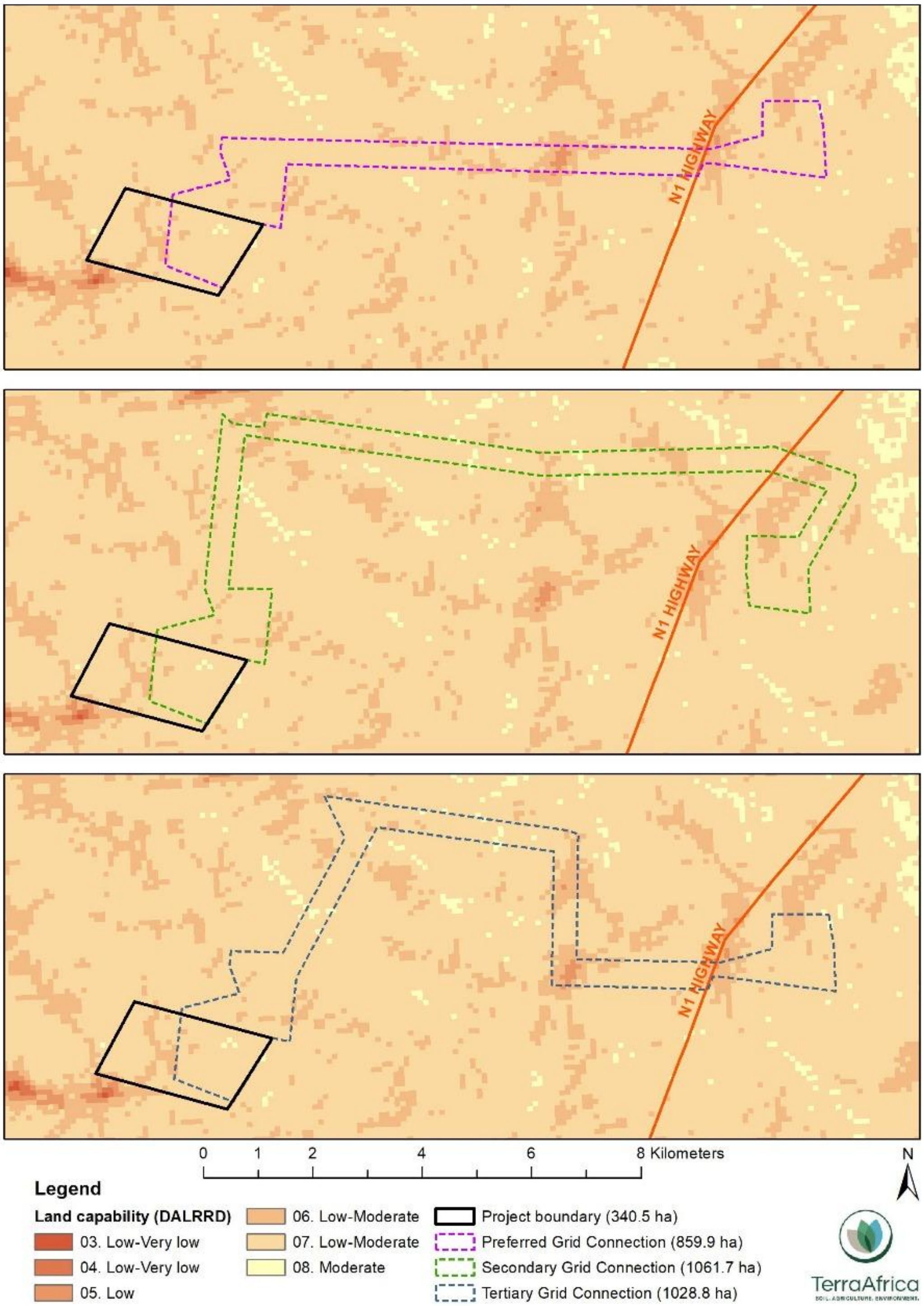

Figure 12: Land capability classification of the project area and grid connection alternatives (data source: DALRRD, 2016).

Following the raster data of DALRRD (DALRRD, 2016), the project area and all three grid connection alternatives consist mainly of land with Class 07 (Low-Moderate) land capability. Small, scattered areas consist either of land with slightly lower land capability (Classes 05 and 06) or somewhat higher land capability (Class 08). The project area and grid connection alternatives' land capability classification largely agrees with the agricultural potential verified by the soil survey, differing mainly in the position where soil with moderate potential was identified.

7.5 Agricultural land use

7.5.1 Crop production

The field crop boundary map (see Figure 17) shows that two old field is present within the project boundary (DALRRD, 2019). This old fields are located in the northeastern corner of the project area (where survey points 82, 87 and 88 are located). A small section of an old field overlaps with the western end of all three the Grid Connection alternatives (where survey point 91 is located). There is also an old field in the mid-section of both the Secondary and Tertiary Grid Connection alternatives.

During the site visit, it was confirmed that there is no rainfed crop production within the project boundary area or the grid connection corridor alternatives. Even if the old field at survey points 82, 87, 88 and 91 were used for crop production historically, these areas are now covered in natural vegetation used for a combination of game and livestock farming. This was confirmed during the Site Sensitivity Verification visit. The photographic evidence of the land cover and land use at survey point 82 (Figure 13), survey point 87 (Figure 14), survey point 88 (Figure 15) and survey point 91 (Figure 16), shows that there wasn't any recent cultivation.

Figure 13: Photographic evidence of the land cover at survey point 82

Figure 14: Photographic evidence of the land cover at survey point 87

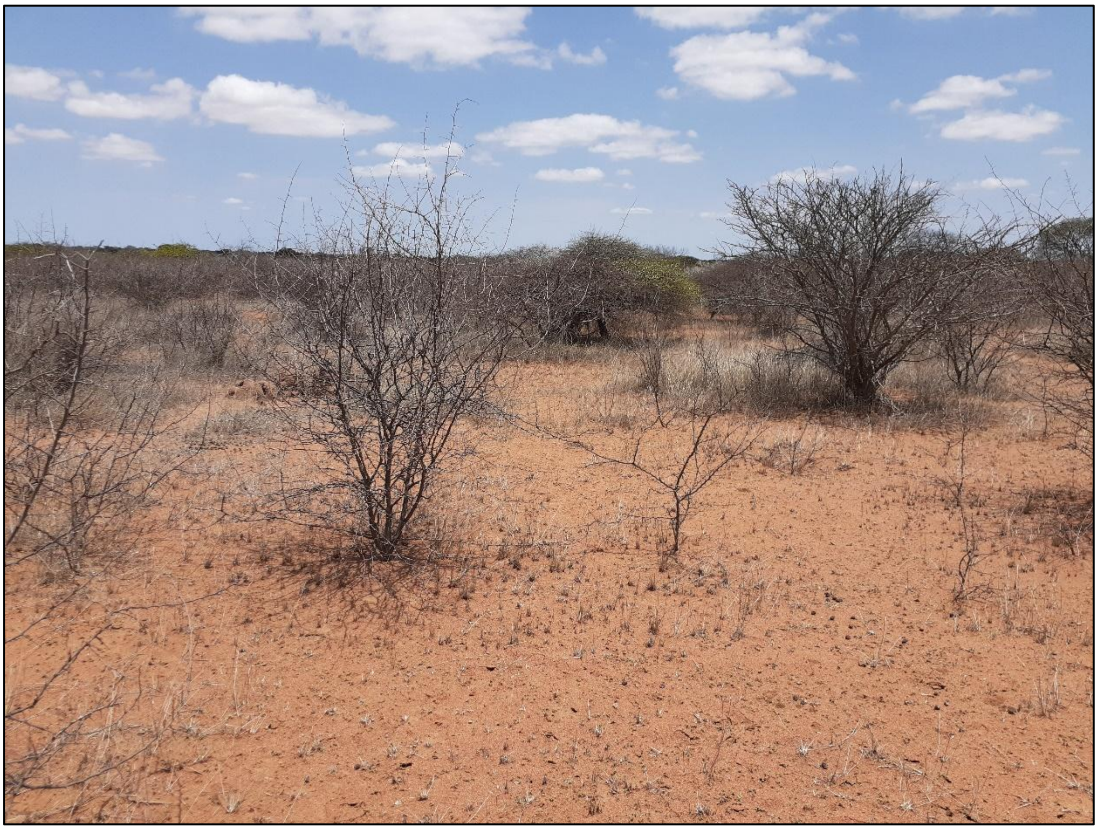

Figure 15: Photographic evidence of the land cover at survey point 88

Figure 16: Land use and land cover at survey point 91

According to DALRRD (2019), there are old fields located northwest of the project boundary area (refer to Figure 17). These areas were part of the larger area surveyed during the Site Verification Visit and were confirmed not to be used for crop production.

Further to the northwest, there is a centre pivot that overlaps with a field of rainfed annual crops or planted pastures, just west of the northern part of the western boundary of the project boundary. This area falls outside the scope of the investigation during the Site Sensitivity Verification visit.

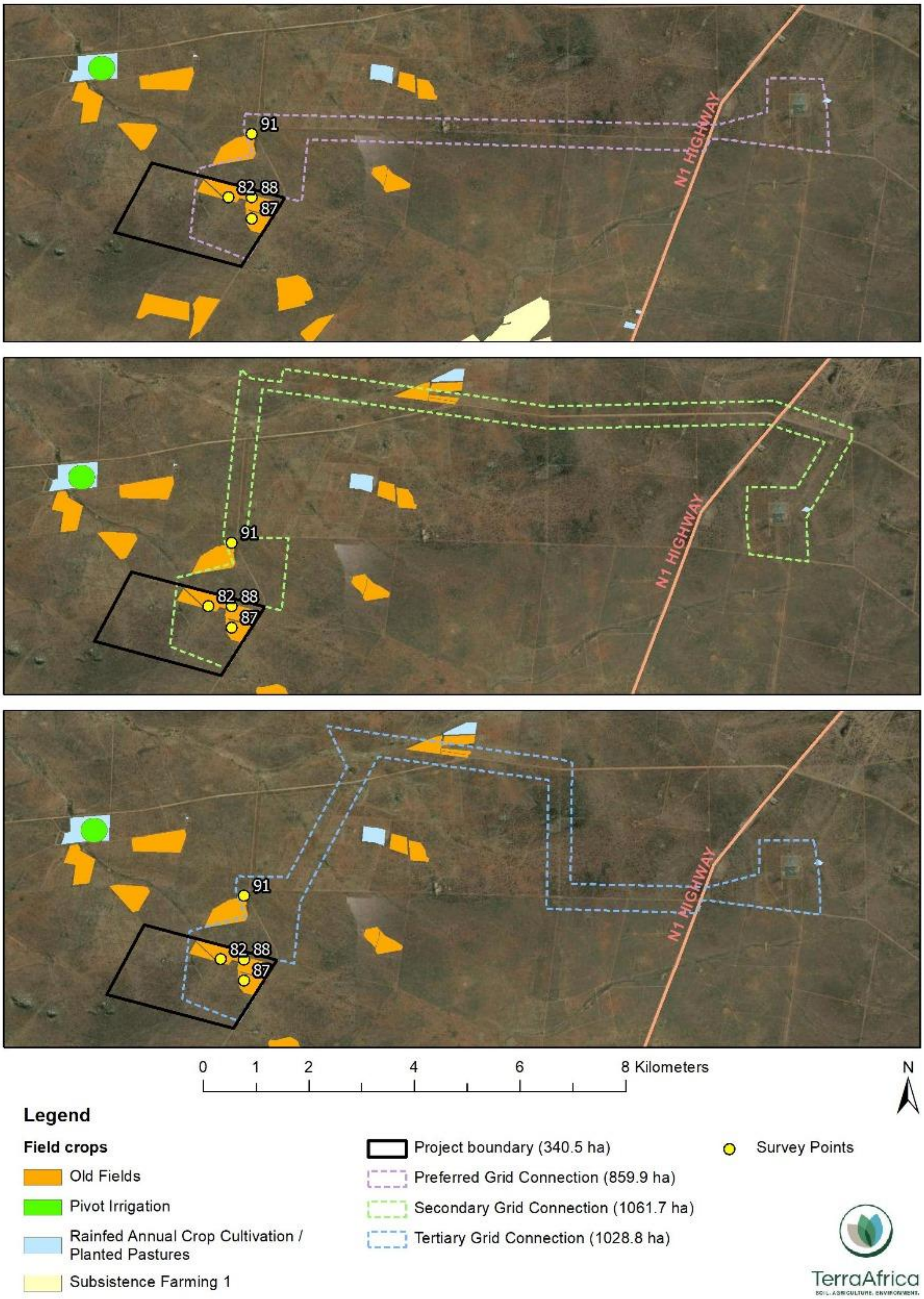

Figure 17: Field crop boundaries within the Makoppa PV project area and grid connection alternatives (data source: DALRRD, 2019)

7.5.2 Animal production

The entire project area is currently used for animal production, and a combination of game animals and livestock was observed during the site visit. Animal watering facilities are also present in the study area. Following the metadata layer obtained from DALRRD, the grazing capacity of the project area and grid connection alternatives is 9 ha/LSU (refer to Figure 18).

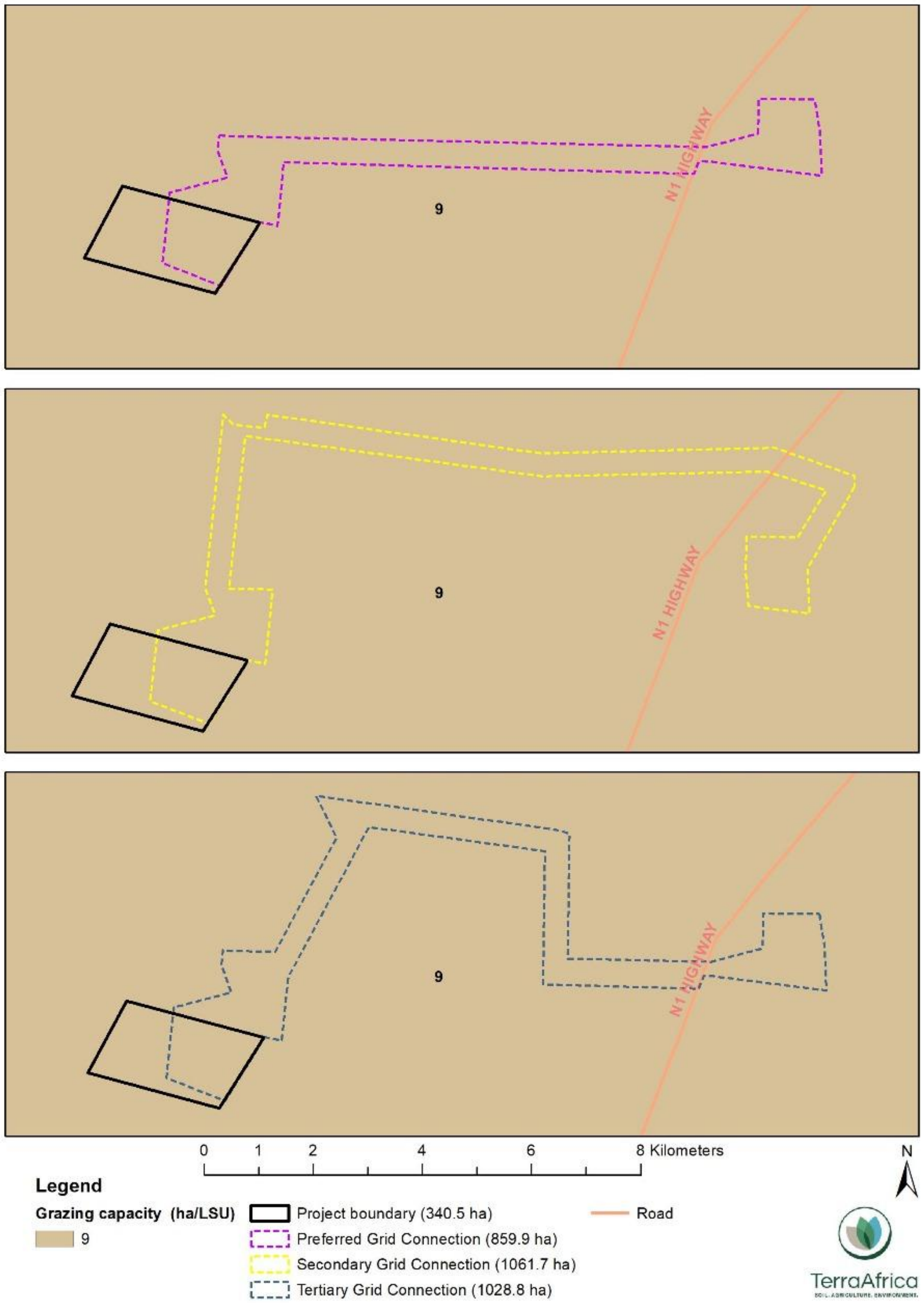

Figure 18: Grazing capacity of the Makoppa PV project area and grid connection alternatives (data source: DALRRD, 2018)

The project boundary area, where solar panels will be located, will temporarily be fenced off and won't be available for grazing for the life of the project. At a long-term grazing capacity of 9 ha/LSU, the forage within the project boundary of up to 341 ha, can feed **38 Large Stock Units**. This forage will no longer be available for livestock or game farming once construction of the Makoppa PV project commences.

The grid connection corridors are not expected to significantly impact the area's grazing capacity and, thereby, livestock and game farming. While construction of the OHL will result in temporary impacts on the soil and grazing capacity of the chosen alternative grid connection corridor, if mitigation and remedial measures are rigorously implemented, the land can be returned to the current state within two years of completion of the construction phase and animals will be able to graze in the grid corridor.

8. Agricultural sensitivity

8.1 Sensitivity according to the environmental screening tool

Cape EAPrac generated a screening report for the entire screening area that was surveyed during the Site Sensitivity Verification visit. This area is inclusive of the Makoppa PV project's boundary area and also show a buffered area that far exceeds 50 m. A separate screening report was created for the grid connection alternatives, also inclusive of the grid connection alternatives considered for the Makoppa PV project's grid corridor. The screening report for the PV area was generated on 2 May 2024, and one for the proposed grid connection corridor options on 8 August 2024. The agricultural sensitivity map of the PV screening area is shown in Figure 19 and the one for the grid connection corridor alternatives in Figure 20.

According to the screening tool, the Tabor Cluster PV screening area consists predominantly of land with Medium sensitivity. The Medium sensitivity was assigned because the land capability classification rates the area as having Low-Moderate (Class 07) land capability (DALRRD, 2016) (see Figure 12). A few scattered blocks within the area are rated as having High agricultural sensitivity. The high sensitivity was assigned to areas that have been marked as field crop boundaries because old fields likely existed here (DALRRD, 2019) (see Figure 17).

For the screening area considered for the grid connection options, a similar agricultural sensitivity is seen as for the PV area. Again, Medium sensitivity was assigned because the land capability classification rates the area as having Low-Moderate (Class 07) land capability (DALRRD, 2016) (see Figure 12). In the middle of the western part of the grid connection area, three blocks are shown as having High agricultural sensitivity because of old crop fields that may have existed here (DALRRD, 2019). A small block with Low agricultural sensitivity is shown near the southeastern corner of the area.

The areas around both the PV screening area as well as the grid connection area, consists mainly of land with Medium agricultural sensitivity. There are a few scattered blocks with High sensitivity around these areas that are associated with areas where crop production possibly occurs. The areas where centre pivots are present further away, has been indicated as having Very High agricultural sensitivity.

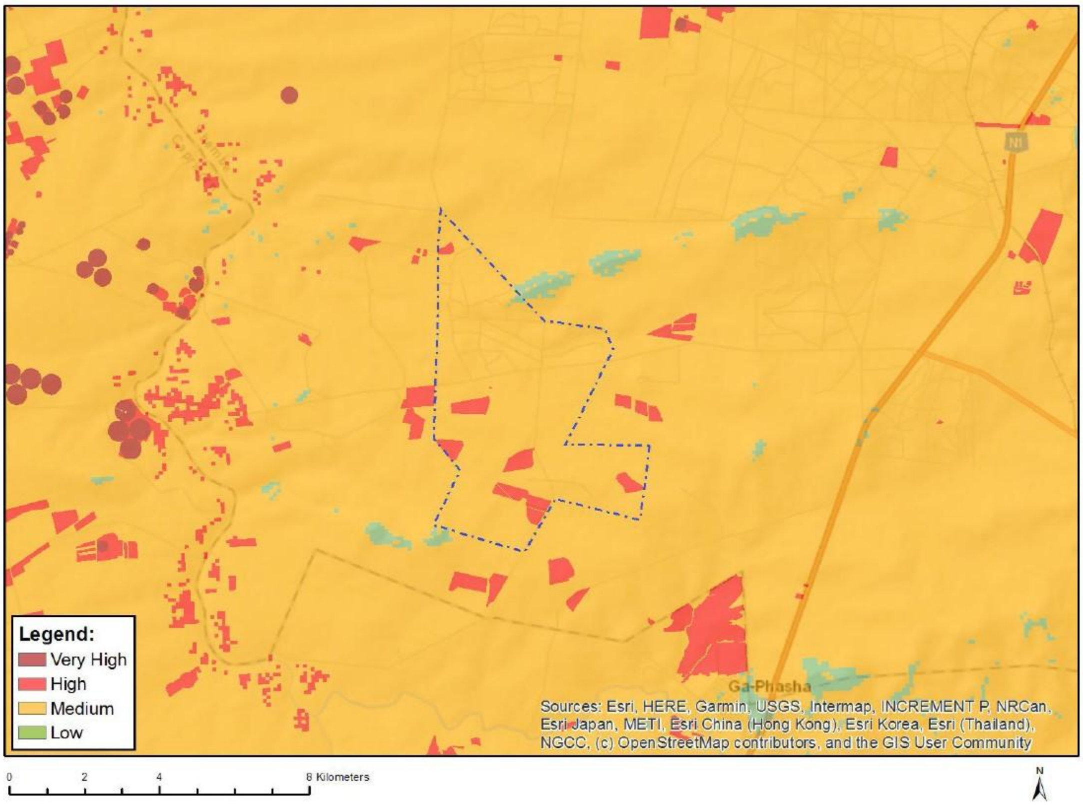

Figure 19: Agricultural sensitivity of the screening area, inclusive of the Makoppa PV project's boundary area, according to the screening report of the Environmental Screening Tool

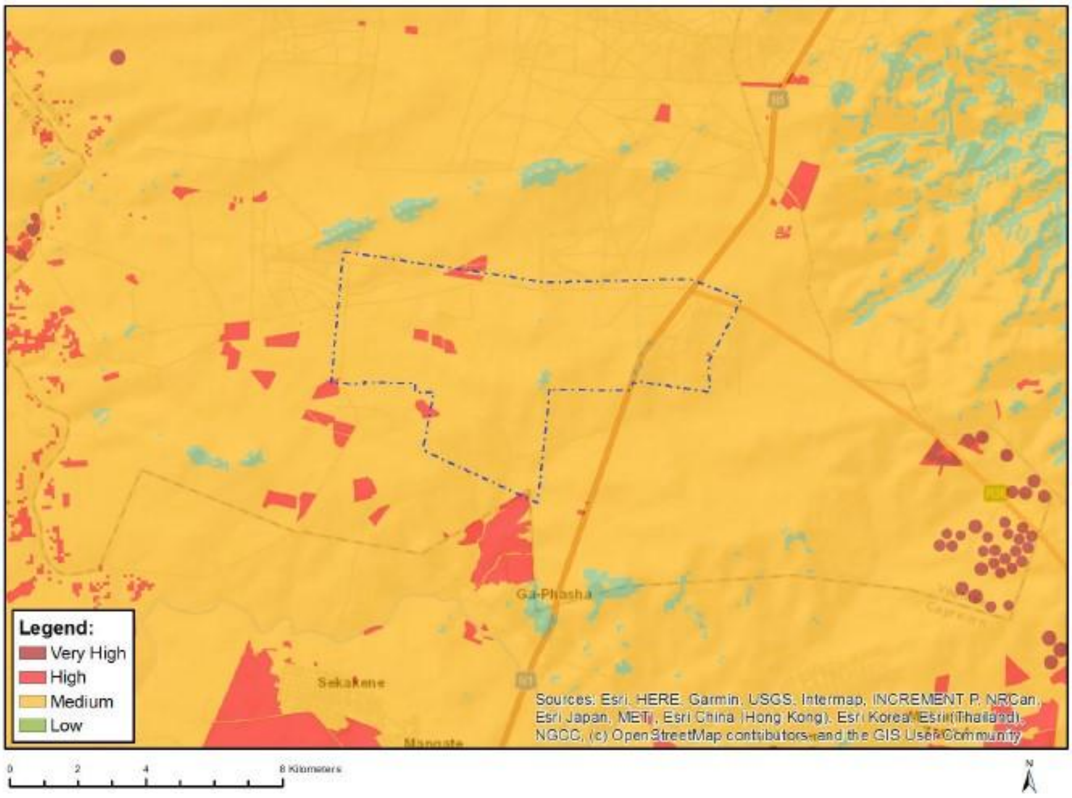

Figure 20: Agricultural sensitivity of the screening area, inclusive of the Makoppa PV project's boundary area, according to the screening report of the Environmental Screening Tool

8.2 Verified agricultural sensitivity

After considering the desktop data and site verification data, the Makoppa PV project area and grid connection alternatives have been assigned an agricultural sensitivity rating. The result is shown in Figure 21 and the area of each sensitivity class affected by the project boundary area and the grid connection alternatives, is summarised in Table 3.

The most significant part of the project area has Low agricultural sensitivity (320.1 ha). The soils in this area has Low-Moderate and Low agricultural potential and is not suitable for crop production under rainfed conditions. There are no crop fields in these areas; the only land use is game and livestock farming. The site visit confirmed that areas indicated as “Old fields” by DALRRD (2019) have reverted to natural veld, if they were ever cultivated.

Soils with Moderate agricultural potential have been assigned Medium sensitivity because they are suitable for supporting vegetation for grazing, but not highly suitable for crop production. Within the project area, soil with Medium agricultural sensitivity measures 20.4 ha.

The preferred grid connection alternative consists primarily of land with Low agricultural sensitivity and five relatively small areas of Medium agricultural sensitivity (a total area of 51.6 ha). In contrast, the secondary and tertiary grid connection alternatives encompass more areas with Medium sensitivity, which measure 186.1 ha and 128.5 ha, respectively. Both the secondary and tertiary grid connection alternatives also include an area of 64 ha where the site could not be accessed for soil classification, which can have either Low or Medium sensitivity. No areas with High agricultural sensitivity have been identified in either the PV area or the grid corridor area.

Table 3: Agricultural sensitivity of the project area and grid connection alternatives of the Makoppa PV project

Agricultural potential	Project area (ha)	Preferred grid connection (ha)	Secondary grid connection (ha)	Tertiary grid connection (ha)
Medium	20.4	31.2	165.7	108.1
Low	320.1	665.8	668.7	692.4
Low/Medium	-	-	64.4	64.4

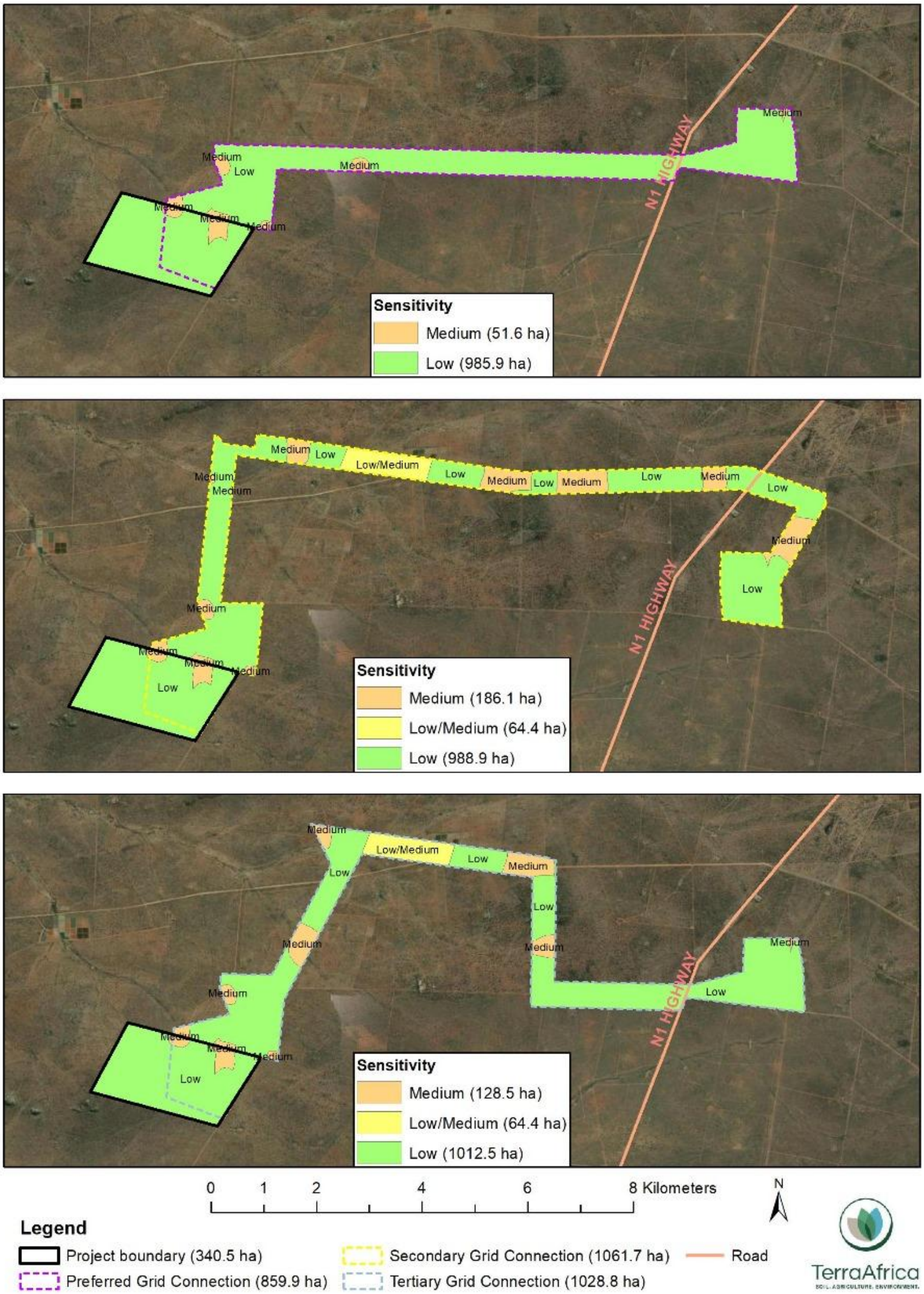

Figure 21: Agricultural sensitivity of the Makoppa PV project area and grid connection alternatives

8.3 Allowable development limits

Following the delineation of the development area's sensitivity, the allowable development limit for the project area of up to 341 ha, was calculated. The allowable development limit for areas outside crop field boundaries was used (as published in the GNR 320 guidelines. The results of the calculations are provided in Table 4 below.

For the proposed Makoppa PV project, the area with Medium agricultural sensitivity falls within the allowable development limits for a 75 MW project. The area with Low agricultural sensitivity exceeds the allowable development limit by 132.5 ha.

Table 4: Calculated allowable development limits of the development footprint

Sensitivity class	Area that will be affected by development footprint (ha)	Allowable limit (ha/MW)	Area allowed for a 75MW development (ha)	Area that exceeds allowable limit (ha)
Medium	20.4	0.35	26.25	0
Low	320	2.50	187.5	132.5

9. Impact assessment

9.1 Description of project activities

The proposed development area currently has limited access roads. It is anticipated that the most significant change to the soil profiles will occur during the construction phase when the main and internal access roads as well as the areas where infrastructure will be erected, will be cleared of vegetation. During the construction phase, vehicles will traverse in and out of the construction camps and fuel, oils and greases that will be used by construction equipment and vehicles, may be stored on site. Construction materials will be transported and stored on site in the temporary laydown areas. The cabling between the project components and the facility substation will also be laid underground. The fence around the array areas will be erected during this phase and this will exclude grazing of livestock until the end of the project life cycle.

During the operation phase, the footprint of the project will remain the same as that developed during the construction phase. Maintenance vehicles and equipment will travel on the main and internal access roads between the PV modules and the offices and workshop. It is foreseen that the soil surfaces of the access roads will remain bare and will be exposed to soil erosion by wind and water movement. Under the PV modules, non-woody vegetation will be allowed to establish and will be maintained via brush-cutting.

The decommissioning phase will have similar impacts to that of the construction phase as special cranes and other equipment will be used to remove the wind turbine materials. Soil in the areas where the PV modules and mounting structures are removed will be exposed to soil erosion and soil pollution with materials as well fuel and lubricants from the construction vehicles, are impacts associated with this phase.

9.2 Rating of impact significance

9.2.1 Construction phase

a) Reduction of land with natural vegetation for livestock grazing

Earth-moving equipment will be used to clear the vegetation from the access road areas as well as all the areas where structures will be erected. In areas where obstacles such as rock outcrops are present, earth-moving equipment will be used to remove these rocks and lithic material and level the surface. The area will also be fenced off and will no longer be accessible to livestock.

Nature: The availability of grazing land that can be used for livestock and game farming will be reduced during the construction phase. It is anticipated that the impact will remain as long the infrastructure is present and the impact will only cease once all surface infrastructure has been decommissioned and vegetation has re-established in these areas.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short duration - 2-5 years (2)	Very short duration - 0-1 years (1)
Magnitude	Low (4)	Minor (2)
Probability	Definite (4)	Probable (3)
Significance	**Low (28)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: • Vegetation clearance must be restricted to infrastructure and access road areas. • Materials and equipment must only be stored in the pre-determined laydown areas. • Prior arrangements must be made with the landowner and neighbouring landowners to ensure that farm animals are moved to areas where they cannot be injured by vehicles traversing the area. • No boundary fence must be opened without the landowner or neighbouring landowners' permission. • No open fires are allowable during the construction phase. • The supporting infrastructure must be constructed as closely as possible to avoid fragmentation of the entire development area.		
Residual Impacts: The residual impact from the construction of the project is considered low.		
Cumulative Impacts: Any additional renewable energy projects to be developed in the area will result in additional areas where grazing will be unavailable for small stock farming.		

b) Soil erosion

All areas where vegetation is removed from the soil surface will result in exposed soil surfaces prone to erosion. Both wind and water erosion are a risk. Even though the project area is in an arid climate, the intensity of a single rainstorm may result in soil particles being transported away. Once the soil particles are removed, vegetation will have difficulty establishing itself on the area's rock, lithic and hard carbonate material.

Nature: The clearing and levelling of land within the proposed development area will increase the risk of soil erosion. The risk is anticipated to naturally reduce as grass and lower shrubs re-establishes in the area once the construction has been completed and the operation phase commences.

	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/servitude;
- Unnecessary land clearance must be avoided;
- Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.
- Regularly monitor the site to check for areas where signs of soil erosion may start to appear.
- Should any soil erosion be detected, it must be addressed immediately through rehabilitation and surface stabilisation techniques.

Residual Impacts:
The residual impact from the project's construction on the susceptibility to erosion is considered low.

Cumulative Impacts:
Any additional renewable energy projects to be developed in the area will result in additional areas exposed to soil erosion through wind and water movement.

c) Soil pollution

During the construction phase, construction workers will access the land to prepare the terrain and construct the PV plant and access roads. Potential spills and leaks from construction vehicles and equipment and waste generation on site can result in soil pollution. Unsafe transport and handling of batteries can result in damaged batteries that can cause chemical 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. Accidental damaging of batteries through transport and handling; 8. Pollution from road-building materials; and 9. 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: • 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 safely handling 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 Makoppa PV Project and waste not removed to designated waste sites will increase the cumulative impacts associated with soil pollution in the area.		

d) Soil compaction

The weight of vehicles and equipment traversing in the construction areas as well as deliberate compaction in areas where buildings will be constructed, will reduce the pore space between soil particles and reduce the water infiltration rate of soil. The reduced water infiltration will increase the risk of soil erosion during rainfall events.

Nature: Earthworks for preparing the terrain where the PV modules, supporting infrastructure and the access roads will be installed, will result in soil compaction. In the area where the access road

will be constructed, topsoil will be removed and the remaining soil material will be deliberately compacted to ensure a stable road surface.		
	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: • Apart from the drilling and piling machines that need to install the PV arrays, all other vehicles and machines must utilise the internal access road network and not travel outside of it. • Unnecessary land clearance must be avoided; • High impact construction activities (i.e. road construction, trenching etc) should be done outside of the rainy season and • Vehicles and equipment must park in designated parking areas.		
Residual Impacts: The residual impact from the proposed project's construction on soil compaction is considered low.		
Cumulative Impacts: Any additional renewable energy projects to be developed in the area will result in additional areas exposed to soil compaction.		

9.2.2 Operation phase

a) Soil erosion

During the operation phase, staff and maintenance personnel will access the development 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 Development 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:		

• 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 project's operation on the susceptibility to erosion is considered low.
Cumulative Impacts: Any additional infrastructure constructed to strengthen and support the project's operation will result in additional areas exposed to soil erosion through wind and water movement.

b) 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 batteries, 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 and • Regularly monitor areas alongside the roads, parking area and workshop for any signs of oil, grease and fuel spillage or 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 Makoppa PV Facility and waste not removed to designated waste sites will increase the cumulative impacts associated with soil pollution in the area.		

9.2.3 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. 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).

Within 30 km of the development area, four other renewable energy projects have already been authorised (refer to

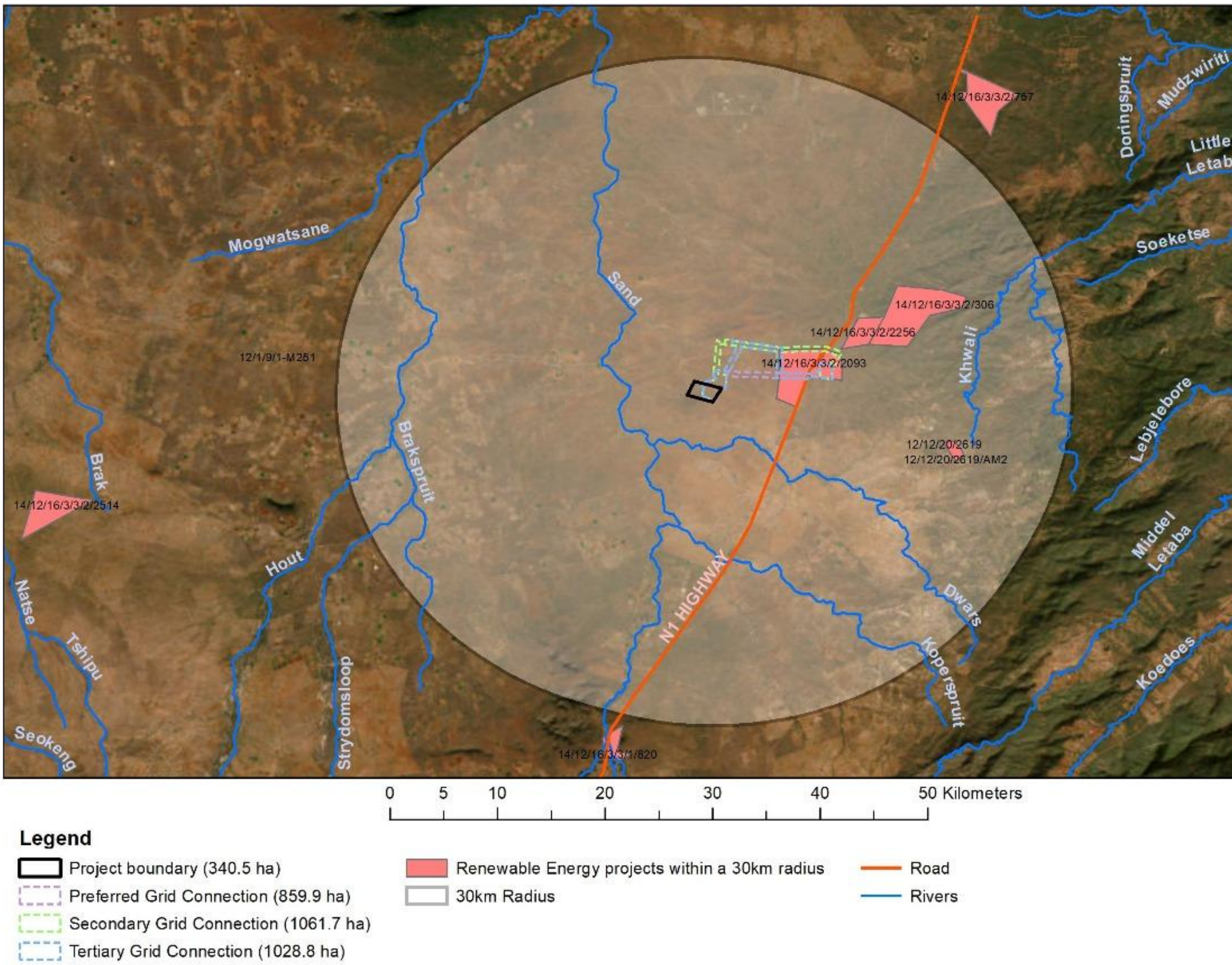

Figure 22). In addition to that, three other PV projects are currently being applied for, which are adjacent to the Makoppa PV project's location. These three projects are the Bethel, Klipput

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

and Draailoop PV projects respectively. The cumulative impacts of the proposed project have been discussed in Section 9 above. Below follows the rating of each of the cumulative impacts.

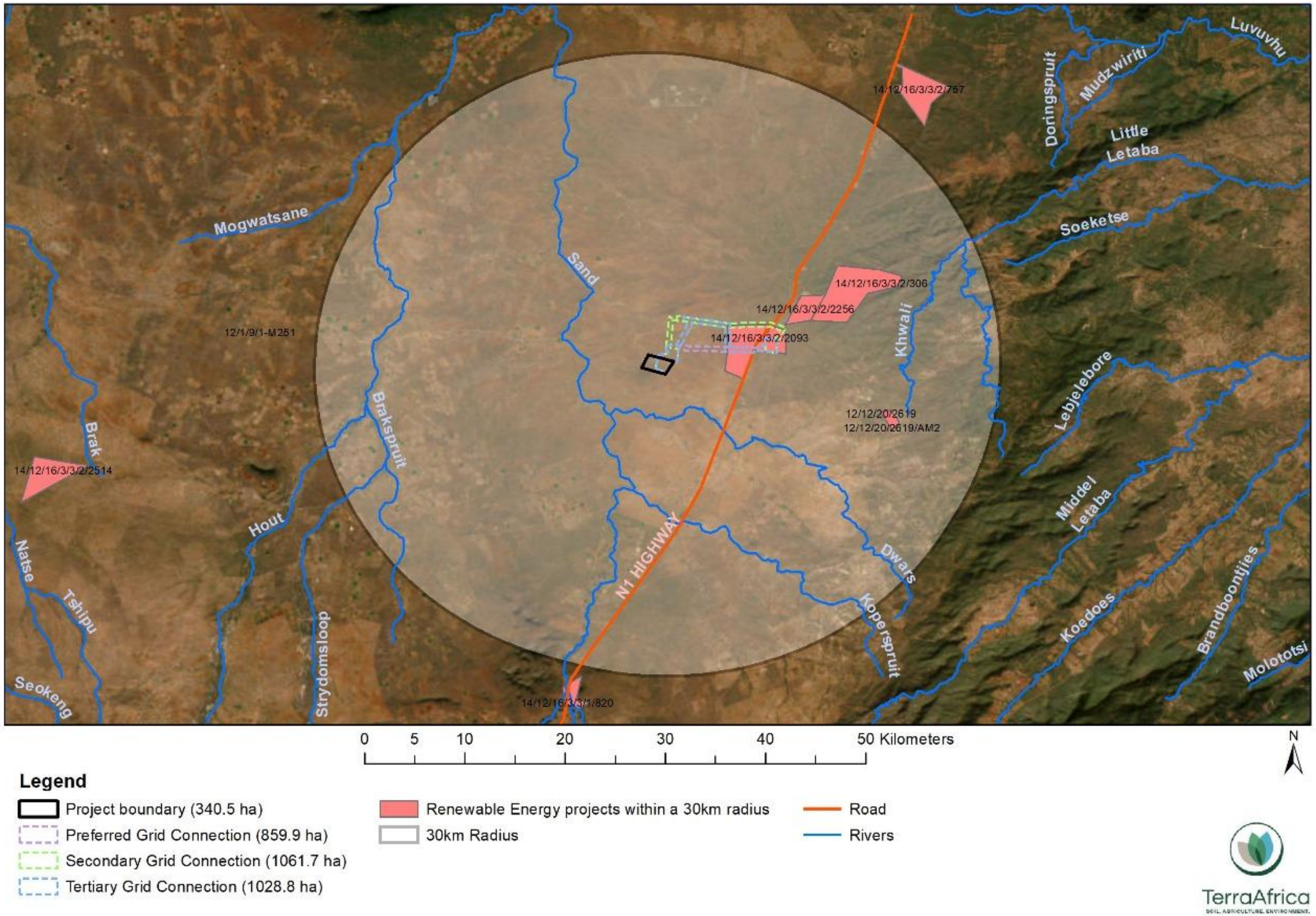

Figure 22: Locality of other renewable energy projects in the area that may result in cumulative impacts

Table 5 Assessment of cumulative impact of decrease in areas available for farming activities

Nature: Additional PV and other renewable energy projects will increase the areas that are fenced off and where farming activities can no longer continues. This will result in a decrease in areas with suitable land capability for food production.		
	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 duration (3)	Medium duration (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (4)	Definite (4)
Significance	**Medium (40)**	**Medium (44)**
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 6 Assessment of cumulative impact of areas susceptible to soil erosion

Nature: Increase in areas susceptible to soil erosion as there will be new areas where there will be clearing and levelling of land for the construction of the infrastructure. Additional traffic on the existing gravel roads (that are already at risk of soil erosion) will further increase the risk of 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 Section 10 above.		

Table 7 Assessment of cumulative impact of areas susceptible to soil compaction

Nature: Increase in areas with compacted soils because any additional access roads, PV array areas and buildings will require deliberate compaction to ensure a stable surface prior to construction. The increased size of compacted areas will increase the risk surface water run-off and reduced water infiltration into soil profiles.		
	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 Section 9 above.		

Table 8 Assessment of cumulative impact of increased risk of soil pollution

Nature: Increase in areas at risk of soil pollution, especially during the construction phase. Each of the projects that contribute to cumulative impacts will require construction workers to traverse the area in vehicles and use equipment. The vehicles and equipment pose the risk of leaks that add petroleum hydrocarbons to soil. The construction phase will include cement mixing and the generation of general waste on site, with all unmanaged waste a potential source of soil contaminants.		
	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 Section 10 above.

12. Acceptability statement

Following the data analysis and impact assessment above, the proposed Makoppa Solar PV Facility and Associated Infrastructure is considered an acceptable development within the development area that was assessed. The project boundary area consists of different soil forms that mostly have Low and Low-Moderate agricultural potential, with an area of 20.4 ha that has Moderate agricultural potential. The areas with Low and Low-Moderate agricultural potential have Low agricultural sensitivity (320.1 ha), as they are used for extensive grazing of livestock and game, with no crop production. The areas with Moderate agricultural potential have Medium agricultural sensitivity (20.4 ha) and will support better vegetation growth.

The areas measured for each agricultural sensitivity class was compared with the allowable development limits for a 75 MW project. The area with Low agricultural sensitivity exceeds the allowable development limit by 132.5 ha while the area with Medium agricultural sensitivity falls within the allowable development limits for a 75 MW project,

The project boundary area, where solar panels will be located, will temporarily be fenced off and won’t be available for grazing for the life of the project. At a long-term grazing capacity of 9 ha/LSU, the forage within the project boundary can feed **38 Large Stock Units**. This forage will no longer be available for livestock or game farming once construction of the Makoppa PV project commences. The grid connection corridors are not expected to significantly impact the area's grazing capacity and, thereby, livestock and game farming. Even though the impacts are expected to recover within two years after construction commenced, the shortest grid connection is the preferred one from the perspective of agricultural impacts. Therefore, the preferred grid connection is considered the one that will result in the least impacts on agricultural resources.

While the development of the Makoppa Solar Facility and Associated Infrastructure may be a more or as sustainable a land use as agriculture, the project will have negative impacts on the soil quality of the areas to be affected by the infrastructure. These impacts include the risks of soil erosion, soil compaction and soil contamination. It is anticipated that the construction phase will have impacts that range from medium to low and that through the consistent implementation of the recommended mitigation measures, these impacts can all be reduced to low and acceptable levels. Impacts during the operation phase are associated with possible repairs that may be required to maintain the infrastructure.

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 land parcels that will be affected. The project infrastructure should also remain within the development area boundaries and in the positions indicated in the layout map.

13. Reference list

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APPENDIX 1 – SOIL CLASSIFICATION DATA OF SURVEY POINTS

Survey point no.	Coordinates		Soil form[2]	Clay content (%)		Soil colour (Moist)		Effective depth (mm)	Depth-limiting material	Current land use
	Latitude	Longitude		A horizon	B horizon	A horizon	B horizon			
1	-23,328352	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	300	Lithic	Grazing
2	-23,331945	29,669744	Bainsvlei	12	16	2.5YR 3/3	2.5YR 3/4	850	Lithic	Grazing
3	-23,335539	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
4	-23,339132	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
5	-23,342724	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	300	Lithic	Grazing
6	-23,346317	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
7	-23,34991	29,669744	Katspruit	12	25	10YR 5/1	10YR 6/1	250	Gley	Grazing
8	-23,353503	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	300	Saprolite	Grazing
9	-23,357096	29,669744	Glenrosa	12	-	2.5YR 3/3	-	200	Lithic	Grazing
10	-23,360689	29,669744	Mispah	14	-	2.5YR 3/3	-	100	Hard Rock	Grazing

[2] Soil form classification was done according to the latest version (Third Revised Edition) of the South African Soil Classification System (Soil Classification Working Group, 2018).

11	-23,364282	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	300	Lithic	Grazing
12	-23,367875	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
13	-23,371468	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	350	Lithic	Grazing
14	-23,375061	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
15	-23,378654	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
16	-23,389433	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
17	-23,393026	29,669744	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	350	Lithic	Grazing
18	-23,396619	29,669744	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
19	-23,39694457	29,673721	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	300	Hard Rock	Grazing
20	-23,39333386	29,673721	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
21	-23,38972314	29,673721	Cartref	6	6	10YR 4/1	10YR 6/2	300	Lithic	Grazing
22	-23,38611243	29,673721	Clovelly	12	16	7.5YR 4/3	7.5YR 4/4	400	Lithic	Grazing
23	-23,38250171	29,673721	Nkonkoni	6	8	2.5YR 3/3	2.5YR 3/4	350	Lithic	Grazing
24	-23,378891	29,673721	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	400	Saprolite	Grazing
25	-23,37528029	29,673721	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	400	Lithic	Grazing

26	-23,37166957	29,673721	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	450	Saprolite	Grazing
27	-23,36805886	29,673721	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
28	-23,36444814	29,673721	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
29	-23,36083743	29,673721	Glenrosa	12	-	7.5YR 3/3	-	200	Lithic	Grazing
30	-23,35722671	29,673721	Glenrosa	12	-	2.5YR 3/3	-	200	Lithic	Grazing
31	-23,353616	29,673721	Mispah	12	-	2.5YR 3/3	-	100	Hard Rock	Grazing
32	-23,350006	29,673721	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
33	-23,346395	29,673714	Mispah	15	-	2.5YR 3/3	-	150	Hard Rock	Grazing
34	-23,342783	29,673708	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
35	-23,339172	29,673714	Bainsvlei	12	16	2.5YR 3/3	2.5YR 3/4	900	Lithic	Grazing
36	-23,335562	29,673708	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	450	Lithic	Grazing
37	-23,339182	29,677639	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	450	Lithic	Grazing
38	-23,342794	29,677639	Nkonkoni	6	8	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
39	-23,346401	29,677649	Glenrosa	12	-	2.5YR 3/3	-	200	Lithic	Grazing
40	-23,350008	29,677639	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing

41	-23,353619	29,677649	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
42	-23,35722833	29,677649	Mispah	12	-	7.5YR 3/3	-	200	Hard Rock	Grazing
43	-23,36083762	29,677649	Lichtenburg	12	16	2.5YR 3/3	2.5YR 3/4	900	Hard Plinthic	Grazing
44	-23,3644469	29,677649	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
45	-23,36805619	29,677649	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
46	-23,37166548	29,677649	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
47	-23,37527476	29,677649	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
48	-23,37888405	29,677649	Vaalbos	12	15	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
49	-23,38249333	29,677649	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
50	-23,38610262	29,677649	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
51	-23,3897119	29,677649	Glenrosa	12	-	2.5YR 3/3	-	200	Lithic	Grazing
52	-23,39332119	29,677649	Vaalbos	12	15	2.5YR 3/3	2.5YR 3/4	350	Hard Rock	Grazing
53	-23,39693048	29,677649	Mispah	12	-	2.5YR 3/3	-	200	Hard Rock	Grazing
54	-23,3968951	29,68163562	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	400	Hard Rock	Grazing
55	-23,3932876	29,68163128	Carolina	12	16	7.5YR 4/3	7.5YR 4/4	500	Hard Rock	Grazing

56	-23,3896801	29,68162693	Carolina	12	16	7.5YR 4/3	7.5YR 4/4	550	Hard Rock	Grazing
57	-23,3860726	29,68162259	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
58	-23,3824651	29,68162	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
59	-23,37886	29,6816139	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
60	-23,3752501	29,68160956	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	400	Hard Rock	Grazing
61	-23,3716426	29,68160522	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
62	-23,3680351	29,68160088	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	450	Hard Rock	Grazing
63	-23,3644276	29,68159653	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing
64	-23,3608201	29,681591	Glenrosa	12	-	2.5YR 3/3	-	200	Lithic	Grazing
65	-23,357212	29,681591	Glenrosa	22	-	7.5YR 3/3	-	200	Lithic	Grazing
66	-23,353605	29,681581	Tukulu	15	22	10YR 4/2	10YR 3/4	900	Gleyic	Grazing
67	-23,349998	29,681581	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	450	Hard Rock	Grazing
68	-23,346392	29,681572	Glenrosa	14	-	2.5YR 3/3	-	250	Lithic	Grazing
69	-23,342781	29,681572	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
70	-23,346388	29,685505	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	500	Lithic	Grazing

71	-23,349993	29,685514	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	550	Lithic	Grazing
72	-23,3536	29,685505	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	450	Hard Rock	Grazing
73	-23,35721	29,68551	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	550	Lithic	Grazing
74	-23,360819	29,685507	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	500	Hard Rock	Grazing
75	-23,364431	29,685514	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
76	-23,3680391	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	500	Hard Rock	Grazing
77	-23,3716486	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	500	Hard Rock	Grazing
78	-23,3752581	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	500	Hard Rock	Grazing
79	-23,3788676	29,685514	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
80	-23,3824771	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	550	Hard Rock	Grazing
81	-23,3860866	29,685514	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	550	Lithic	Grazing
82	-23,3896961	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	550	Hard Rock	Grazing
83	-23,3933056	29,685514	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	550	Hard Rock	Grazing
84	-23,3969151	29,685514	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	550	Lithic	Grazing
85	-23,4005246	29,685514	Glenrosa	6	-	2.5YR 3/3	-	250	Lithic	Grazing

86	-23,396925	29,68949	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	550	Hard Rock	Grazing
87	-23,393315	29,68949	Carolina	6	8	7.5YR 4/3	7.5YR 4/4	900	Hard Rock	Grazing
88	-23,389705	29,68949	Avalon	14	18	7.5YR 4/3	7.5YR 4/4	750	Lithic	Grazing
89	-23,386095	29,68949	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
90	-23,382485	29,68949	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	600	Hard Rock	Grazing
91	-23,378875	29,68949	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
92	-23,375265	29,68948	Glenrosa	6	-	7.5YR 3/3	-	250	Lithic	Grazing
93	-23,371655	29,68948	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	600	Hard Rock	Grazing
94	-23,368046	29,68948	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	600	Hard Rock	Grazing
95	-23,364437	29,689474	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	600	Hard Rock	Grazing
96	-23,360826	29,689466	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
97	-23,357216	29,689459	Tukulu	18	24	10YR 4/2	10YR 3/4	1200	-	Grazing
98	-23,353605	29,689453	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
99	-23,349995	29,689444	Glenrosa	6	-	2.5YR 3/3	-	250	Lithic	Grazing
100	-23,353609	29,693371	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing

101	-23,357224	29,693377	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
102	-23,360826	29,693377	Carolina	12	16	7.5YR 4/3	7.5YR 4/4	900	Hard Rock	Grazing
103	-23,364433	29,693384	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	650	Hard Rock	Grazing
104	-23,368044	29,693419	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
105	-23,371651	29,693411	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	700	Hard Rock	Grazing
106	-23,375259	29,693419	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	700	Hard Rock	Grazing
107	-23,37886771	29,693419	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
108	-23,38247593	29,693419	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
109	-23,38608414	29,693419	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
110	-23,38969236	29,693419	Clovelly	12	16	7.5YR 4/3	7.5YR 4/4	450	Lithic	Grazing
111	-23,389719	29,69734	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
112	-23,386108	29,69734	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
113	-23,382497	29,69734	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
114	-23,378886	29,69734	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
115	-23,375275	29,697329	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing

116	-23,371662	29,697329	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
117	-23,368052	29,697323	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	750	Hard Rock	Grazing
118	-23,364439	29,697315	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
119	-23,360828	29,697309	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
120	-23,35722	29,697309	Ermelo	12	16	7.5YR 4/3	7.5YR 4/4	1200	-	Grazing
121	-23,353609	29,697309	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
122	-23,353598	29,701244	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
123	-23,357208	29,701239	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
124	-23,360819	29,701244	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
125	-23,364428	29,70125	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	800	Hard Rock	Grazing
126	-23,368042	29,70125	Hutton	6	11	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
127	-23,371648	29,7012523	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
128	-23,378868	29,7012569	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	800	Hard Rock	Grazing
129	-23,382478	29,7012592	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
130	-23,386088	29,7012615	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing

131	-23,389698	29,7012638	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
132	-23,389698	29,705168	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
133	-23,386088	29,705168	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
135	-23,378868	29,705168	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
136	-23,364431	29,705164	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
137	-23,360823	29,705173	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
138	-23,357208	29,705168	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Saprolite	Grazing
139	-23,353598	29,705173	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
140	-23,378874	29,709095	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	900	Hard Rock	Grazing
141	-23,382483	29,709095	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	900	Hard Rock	Grazing
142	-23,386095	29,709101	Vaalbos	6	11	2.5YR 3/3	2.5YR 3/4	900	Hard Rock	Grazing
143	-23,389709	29,709095	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
144	-23,393324	29,713034	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
145	-23,389715	29,71303	Rock	0	-	-	-	0	-	Grazing
146	-23,386103	29,713024	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing

147	-23,382494	29,71303	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	900	Hard Rock	Grazing
148	-23,378878	29,71303	Hutton	12	16	2.5YR 3/3	2.5YR 3/4	1200		Grazing
149	-23,378344	29,7172	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	950	Hard Rock	Grazing
150	-23,37822	29,72134	Rock	0	-	-	-	0	-	Grazing
151	-23,378383	29,725458	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
152	-23,378555	29,729583	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
153	-23,378721	29,733707	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
154	-23,378847	29,737816	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
155	-23,379021	29,741934	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
156	-23,379149	29,746056	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
157	-23,379236	29,750166	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
158	-23,379353	29,754305	Clovelly	15	20	7.5YR 4/3	7.5YR 4/4	600	Lithic	Grazing
159	-23,379462	29,758413	Clovelly	16	22	7.5YR 4/3	7.5YR 4/4	650	Lithic	Grazing
160	-23,379529	29,762536	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
161	-23,37957	29,766695	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing

162	-23,379022	29,770779	Glenrosa	16	-	2.5YR 3/3	-	250	Lithic	Grazing
163	-23,377922	29,774742	Kroonstad	10	12	7.5YR 3/3	10YR 6/2	550	Gley	Grazing
164	-23,376778	29,778694	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
170	-23,355805	29,73005	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
171	-23,356351	29,734185	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
172	-23,356911	29,738323	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	1000	Hard Rock	Grazing
173	-23,357475	29,742488	Vaalbos	12	16	2.5YR 3/3	2.5YR 3/4	1000	Hard Rock	Grazing
174	-23,357526	29,746702	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
175	-23,357428	29,750884	Ermelo	12	16	7.5YR 4/3	7.5YR 4/4	1200	-	Grazing
176	-23,357369	29,755056	Ermelo	12	16	7.5YR 4/3	7.5YR 4/4	1200	-	Grazing
177	-23,357282	29,759263	Clovelly	12	16	7.5YR 4/3	7.5YR 4/4	700	Lithic	Grazing
178	-23,357249	29,763493	Mispah	12	-	2.5YR 3/3	-	250	Hard Rock	Grazing
179	-23,357151	r	Nkonkoni	16	22	2.5YR 3/3	2.5YR 3/4	600	Lithic	Grazing
180	-23,357125	29,771866	Clovelly	12	16	7.5YR 4/3	7.5YR 4/4	800	Lithic	Grazing
181	-23,357052	29,776098	Avalon	18	26	7.5YR 4/3	7.5YR 4/4	750	Lithic	Grazing

182	-23,357252	29,780292	Clovelly	12	16	7.5YR 4/3	7.5YR 4/4	850	Lithic	Grazing
183	-23,358544	29,78426	Nkonkoni	12	16	2.5YR 3/3	2.5YR 3/4	650	Lithic	Grazing
184	-23,359659	29,788278	Glenrosa	22	-	7.5YR 3/3	-	250	Lithic	Grazing
185	-23,361181	29,792191	Cartref	18	24	7.5YR 3/3	10YR 6/2	300	Lithic	Grazing
186	-23,364745	29,790519	Avalon	18	26	7.5YR 4/3	7.5YR 4/4	800	Lithic	Grazing
187	-23,368197	29,788596	Avalon	12	16	7.5YR 4/3	7.5YR 4/4	900	Hard Rock	Grazing
188	-23,371691	29,786879	Longlands	12	14	7.5YR 3/3	10YR 6/2	750	Lithic	Grazing
189	-23,375136	29,743243	Glenrosa	12	-	7.5YR 3/3	-	250	Lithic	Grazing
190	-23,370991	29,743293	Hutton	13	17	2.5YR 3/3	2.5YR 3/4	1200	-	Grazing
191	-23,367036	29,743312	Coega	12	-	7.5YR 3/3	-	250	Hard Carbonate	Grazing
192	-23,363085	29,743359	Glenrosa	12	-	2.5YR 3/3	-	250	Lithic	Grazing
193	-23,359324	29,743363	Mispah	12	-	7.5YR 3/3	-	250	Hard Rock	Grazing

APPENDIX 2 – DECLARATION OF INDEPENDENCE

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for 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)

REPORT TITLE
Proposed Bethel Solar PV, Draailoop Solar PV, Klipput Solar PV and Makoppa Solar PV in the Makhado Local Municipality in the Vhembe District, Limpopo Province

Kindly note the following:

1. This form must always be used for assessment that are in support of 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 August 2023. 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.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)*', where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Agricultural Impact Assessment
Specialist Company Name	TerraAfrica Consult (Pty) Ltd
Specialist Name	Mariné Pienaar
Specialist Identity Number	8207250025080
Specialist Qualifications:	MSc. Environmental Science, BSc. Agric.
Professional affiliation/registration:	SACNASP ; SSSSA
Physical address:	Farm Strydpoort, Ottosdal, 2610
Postal address:	30 Joubert Street
Postal address	Wolmaransstad, 2630
Telephone	082 828 3587
Cell phone	082 828 3587
E-mail	mpienaar@terraafrica.co.za

SPECIALIST DECLARATION FORM – AUGUST 2023

2. DECLARATION BY THE SPECIALIST

I, Mariné Pienaar declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- 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 NEMA Act.

Signature of the Specialist

TerraAfrica Consult (Pty) Ltd

Name of Company:

08 Jul 2025

Date

SPECIALIST DECLARATION FORM – AUGUST 2023

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 (Pty) Ltd

Name of Company

08 Jul 2025

Date

Signature of the Commissioner of Oaths

08 Jul 2025

Date

08/07/2025

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

Batho pele- putting people first

APPENDIX 3 - CURRICULUM VITAE OF SPECIALIST

MARINÉ PIENAAR
Specialist Scientist

+2782-828-3587

mpienaar@terraafrica.co.za

linkedin.com/in/marinepienaar

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

MARINÉ PIENAAR
Specialist Scientist

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

MARINÉ PIENAAR
Specialist Scientist

PROFESSIONAL DEVELOPMENT

Contaminated Land Management 101 Training
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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APPENDIX 4 – PROOF OF SACNASP REGISTRATION

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 2026**

Chairperson

Chief Executive Officer

To verify this certificate scan this code