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Agricultural Assessment for the Proposed Msenge Emoyeni Grid Deviation

Submitted by TerraAfrica Consult cc

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Table of Contents

List of Figures

List of Tables

1. Introduction

Terra-Africa Consult cc was appointed by Nala Environmental (Pty) Ltd (Nala Environmental) to conduct the Agricultural Assessment for the proposed overhead powerline at Msenge Emoyeni Wind Energy Facility ("Msenge Emoyeni WEF") from the authorised Msenge Emoyeni WEF onsite substation to the Poseidon Main Transmission Substation (MTS), (DFFE Ref: 12/12/20/1754/2). The authorised Msenge Emoyeni WEF is located approximately 20km south of the town of Bedford in the Eastern Cape Province. The grid connection infrastructure related to the authorised WEF is located within the Cookhouse Renewable Energy Development Zone ("REDZ") and Eastern Power Corridor

The project has been selected as a preferred bidder via private offtake. Following liaison with Eskom it was determined that in order to provide suitable setbacks to the existing Amakhala and Nojoli WEFs' turbines and to follow the existing Albany-Poseidon 132kV powerline as closely as possible, while reducing/optimizing crossing points, and as a result the authorised 132kV powerline routing has deviated from the authorised routing which falls outside of the previously assessed and authorised 20-30m wide servitude.

A 66kV powerline route with a corridor of approximately 300m (150m on either side of the centre line) is proposed to evacuate power from the proposed 33/132kV Msenge Emoyeni WEF, informed by the most feasible grid connection point into the national grid by providing suitable setbacks to the operational Amakhala and Nojoli wind farms' turbines and to follow the existing Albany-Poseidon 132kV powerline as closely as possible, while reducing/optimizing crossing points. The assessment of the 300m grid connection corridor also provides an opportunity for the consolidation of linear electrical infrastructure within the area, inclusive of the impacts that are bundled together at this location, this can be seen as an advantage to the development of the grid connection infrastructure from a social and environmental impact perspective.

A Basic Assessment ("BA") process is to be undertaken to assess and permit the powerline deviation, on-site substation and associated access tracks and water course crossings after considering all the above-mentioned factors.

The infrastructure and key components considered as part of this Basic Assessment process includes:

- 66kV overhead single circuit powerline approximately 22,7km long in a 300m wide assessment corridor (150m on either side), from the authorised Msenge Emoyeni WEF onsite substation to the Poseidon MTS.
- Access tracks of up to 7m in width following the powerline route from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS to enable construction and maintenance activities.
- Water course crossings along the powerline route from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS.
- 33kV/132kV on-site substation with a footprint occupying an area of 250m x 200m, within a 300m radius to allow movement where possible.

The following properties have been identified for the deviation of the new 66kV powerline and associated infrastructure for the associated Msenge Emoyeni WEF:

- Remainder of Farm Leeuw Fontein No. 221
- Portion 1 of Farm Normandale No. 206
- Portion 3 of Farm Plat House No. 203
- Remaining Extent of Farm Kop Leegte No. 205
- Remainder of Farm 260 No. 260
- Remainder of Farm 242 No. 242
- Remainder of Farm 148 No. 148
- Portion 3 of Farm 148 No. 148
- Portion 5 of the Farm Van Wyks Kraal No.73

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 Province, Free State and KwaZulu Natal Provinces. Her contact details are provided in Appendices 1 and 2 attached.

Jan-Dirk is a candidate scientist registered with the South African Council for Natural Scientific Professions (SACNASP) and is specialized in the fields of Agricultural Science and Soil Science. His SACNASP registration number is 400274/13. Jan-Dirk holds a BSc. Degree in Agricultural Science (with specialisation in Soil Science) from the University of the Free State and a MSc. Degree in Soil Science from the University of the Free State.

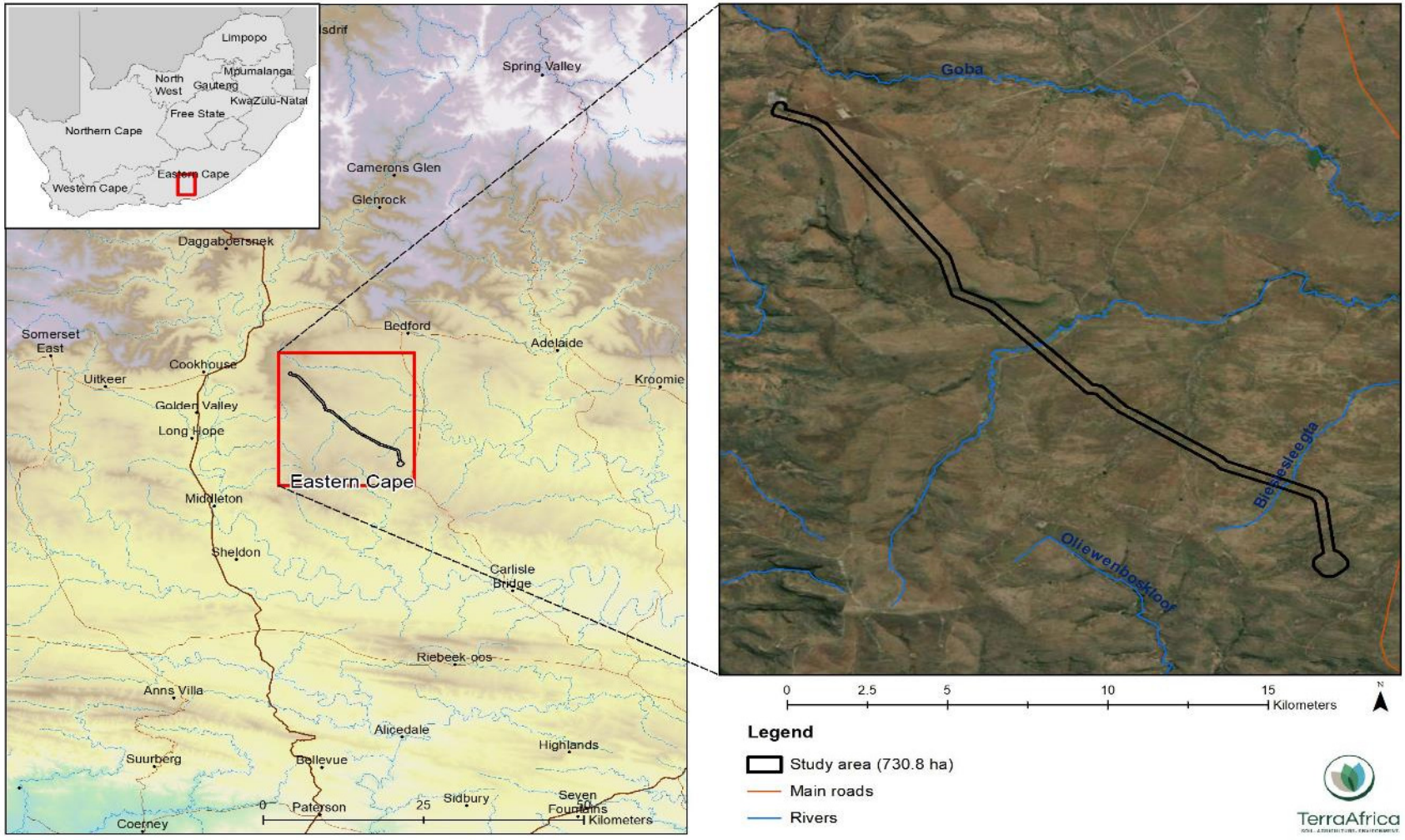

Figure 1: Locality of the proposed Msenge Emoyeni Grid Deviation

3. Purpose and objectives of the compliance statement

The purpose of the Agricultural Compliance Statement, is to ensure that the sensitivity of the grid assessment corridor 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 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 4 & Appendices 2 and 3
3.2. The compliance statement must: 3.2.1. be applicable to the preferred site and proposed development footprint;	Section 9
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: 3.3.1. contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae;	Page 3, Appendices 1, 2 and 3
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;	
3.3.8. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; 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 Nala Environmental, 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 proposed Msenge powerline deviation corridor;
- identify and assess potential impacts on both agricultural potential and soil resulting from the proposed project;
- identify and describe potential cumulative soil and agricultural potential 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 by Nala Environmental (Pty) Ltd on 8 May 2022. The requirements of GNR 320 stipulate that a 50m buffered development envelope must be assessed with the screening tool. The map depicted in Error! Reference source not found.**Figure 2** shows the agricultural sensitivity of the 66kV powerline corridor while **Figure 3** indicates the sensitivity of the 33kV/132kV on-site substation.

The results provided by the screening tool indicate that the largest part of the Msenge Emoyeni Grid Deviation has Medium sensitivity. Only small areas are of Low sensitivity which are found in the centre of the proposed 66kV powerline (refer to **Figure 2).** The northern half of the substation area consists of land with Medium agricultural sensitivity while the southern half have Low agricultural sensitivity (see **Figure 3**). There are only a few very isolated small areas of High sensitivity in the middle section of the powerline deviation corridor. The area adjacent to the grid deviation, consists mostly of land with Medium agricultural sensitivity. The proposed on-site substation area is surrounded by land of Low and Medium agricultural sensitivity.

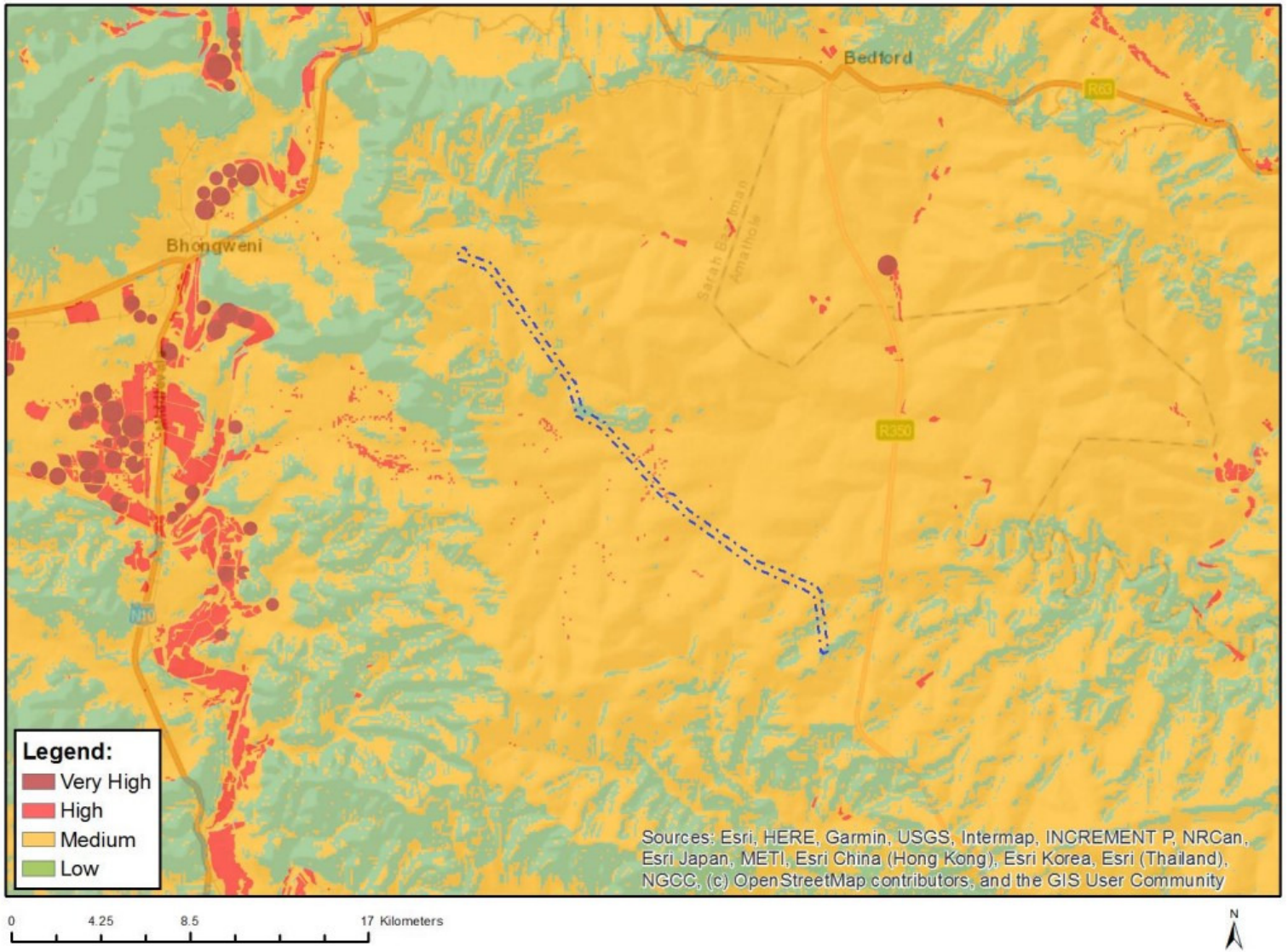

Figure 2: Agricultural sensitivity of the Msenge Grid Deviation corridor (generated by Nala Environmental, 8 May 2022)

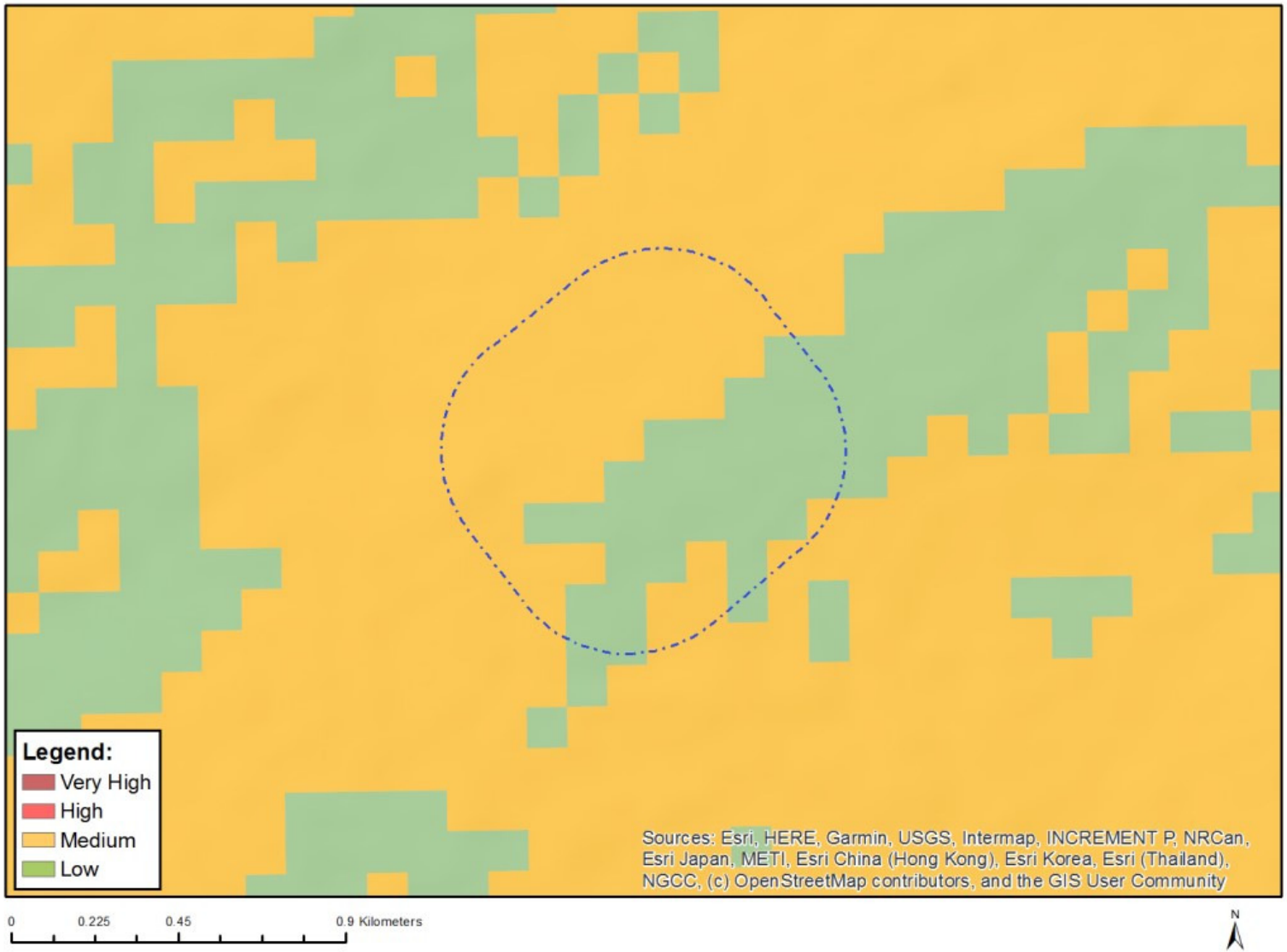

Figure 3: Agricultural sensitivity of the Msenge Grid Deviation corridor (generated by Nala Environmental, 8 May 2022)

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 grid deviation 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 five different raster data sets obtained from the National Department of Agriculture, Land Reform and Rural Development (DALRRD). The data sets are:

- Land type data for the project assessment zone was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units.
- 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 Eastern Cape 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).

7.2 Site assessment

The site visit was conducted to ensure that all the properties within the grid deviation, could be accessed for soil classification. The site visit was done on the 20th of April 2022.The soil profiles were examined to a maximum depth of 1.5 m 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. Qfield software were used to the log the coordinates of each of the survey points. 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 any farm or other 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.

7.3 Impact assessment methodology

Following the methodology prescribed by Savannah, 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:

$$S=(E+D+M)P$$

where:

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 only area to be fenced off will be the Eskom collector substation and that grazing between the pylons of the powerline, will still be possible. The assumption is therefore made that farming will not be excluded from the powerline corridor;
- 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 132 kV power line and a collector substation; and
- The assumption is made that the construction team that will install the power line and collector substation, are trained and knowledgeable in following best practice environmental management measures to minimise or avoid environmental degradation.

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 grid infrastructure. 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 Msenge grid deviation consists of natural soil profiles (undisturbed by human activities). Four different natural soil forms have been identified within the grid corridor and the collector substation study area. The positions of the different soil forms are depicted in Figure 4 and each of the soil forms are described in detail below it.

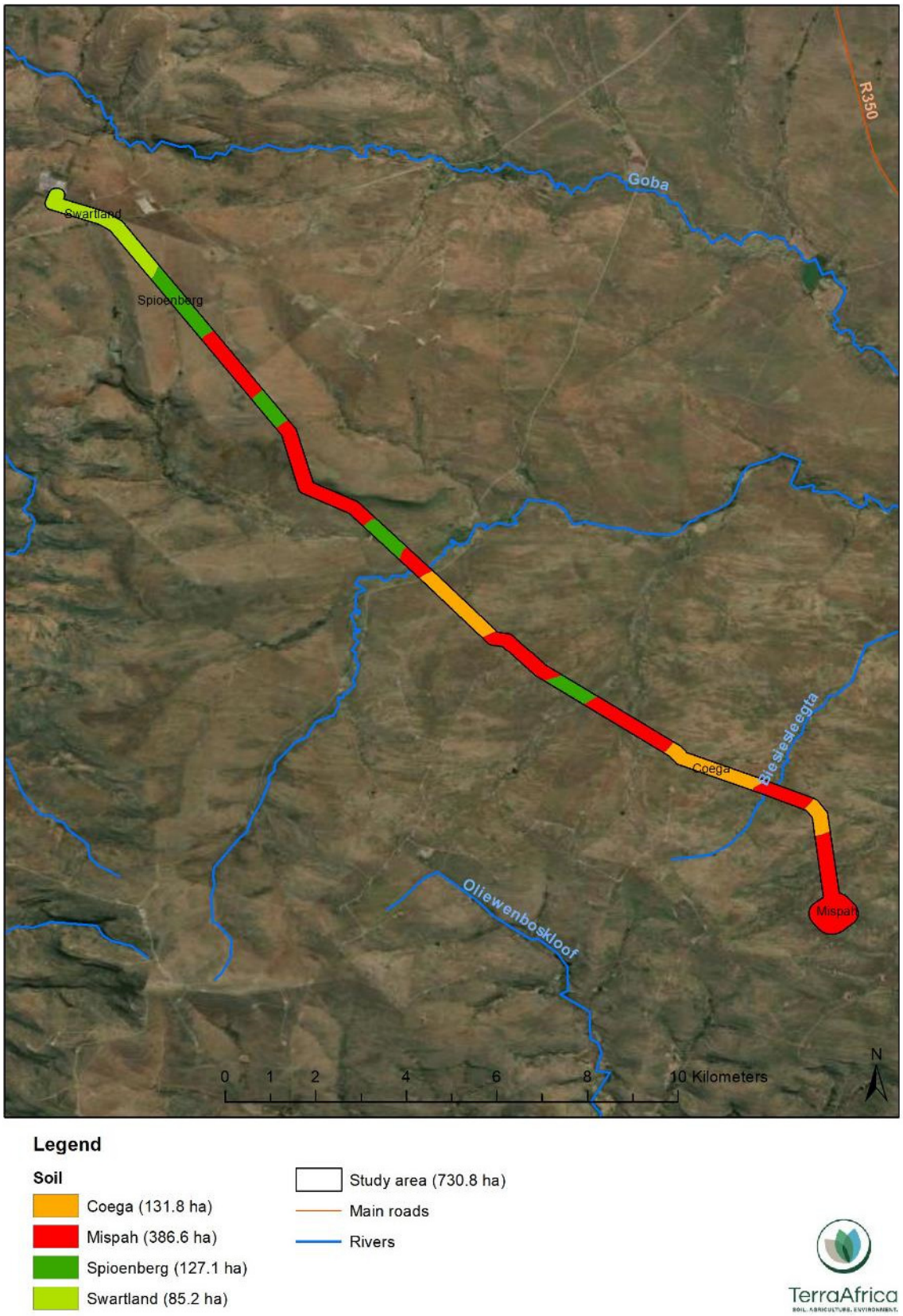

Figure 4 Soil classification map of the Msenge Emoyeni Grid Deviation

a) Mispah

The Mispah soils have shallow soil depths (100-300 mm) 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 (as shown in Figure 6). The Mispah soil form was found throughout the study area and covered most of the site (386.6 ha). The entire study area for the collector substation also consists of soils of the Mispah form.

b) Coega

The Coega soil form covers the second largest area within the grid deviation corridor. The total area of Coega soils is 131.8 ha. These soils are found in three separate areas in the southern half of the powerline corridor. The Coega soil form consists of an orthic horizon on hard carbonate. The effective soil depth of these soils is restricted by solid and fractured hard carbonate.

c) *Swartland*

The Swartland soil covered 85.2 ha of the grid deviation corridor and was found only in the northern end of the corridor. The Swartland soil form consists of orthic topsoil overlying a pedocutanic subsoil horizon. The pedocutanic horizon of these soils reaches a soil depth of 500 mm from where it is underlain by a lithic C horizon that is 300 mm thick.

d) Spioenberg

The Spioenberg soils are present in four different areas, covering a total area of 127.1 ha within the grid deviation corridor and collector substation study area. The Spioenberg soil form also consists of orthic topsoil overlying a pedocutanic subsoil horizon. However, the pedocutanic horizon of the Spioenberg soils reaches only a soil depth of 400 mm from where it is underlain by hard rock.

9.2 Land capability

The position of the different land capability classes within the Msenge powerline deviation, are depicted in **Figure 5**. The dominant land capability class within the grid deviation, is Low-Moderate (Class 07). The highest land capability class within this area is Moderate-High (Class 09) which is in the middle of the study area and only occurs in very small areas.

Land adjacent and further away from the Msenge grid deviation consists of a similar mixture of land capability class than that within the grid deviation.

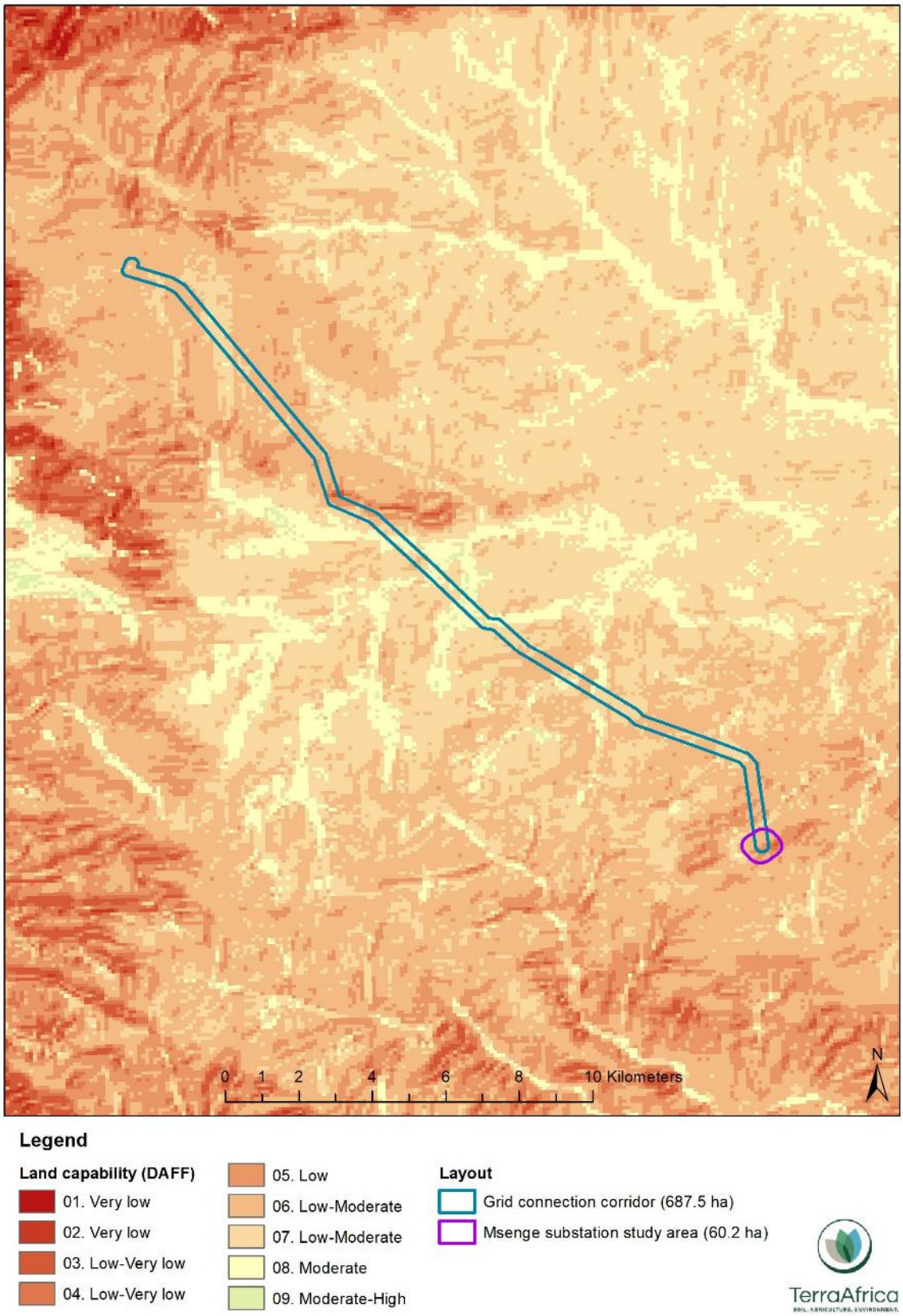

Figure 5: Land capability classification of the Msenge Emoyeni Grid Deviation and collector substation study area (data source: DALRRD, 2016).

9.3 Agricultural potential

Following the classification of the soil and the consideration of other factors that influence rainfed crop production, the agricultural potential of the grid deviation and collector substation area were determined. The agricultural potential of the areas is depicted in **Figure 6**.

The largest part of the Msenge grid deviation, has low agricultural potential (645.6 ha) and included all the soil forms except the Swartland soil. Low-Moderate classes were assigned to the Swartland soil form which occurred in the northwestern parts. This is mainly due to the depths of the Swartland soil which reached 800 mm.

The low agricultural potential of the soils within the development area confirmed by the absence of crop field boundaries within the Msenge grid deviation (see **Figure 7**). No pivot irrigation areas, rainfed annual crops or planted pastures as well as old fields occurred in the study area or close to it.

The grid assessment corridor and collector substation area properties is currently used either for livestock farming or game farming and cattle water troughs and handling facilities were observed within the area assessed. This is the only agricultural land use within the grid corridor.

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). Following the metadata layer obtained from DALRRD, the long-term grazing capacity of the north-western parts are 6 ha/LSU, the centre area is 7 ha/LSU and the south-eastern parts are 12 ha/LSU (see **Figure 8)**.

Using the long-term grazing capacity, the Msenge grid deviation in north-western parts (6 ha/LSU), the center (7 ha/LSU) and the south eastern parts (12 ha/LSU) can hold 91 head of cattle. The average grazing capacity of the area is considered to be moderate-high.

Figure 6: Agricultural potential of the Msenge grid deviation corridor and the collector substation area

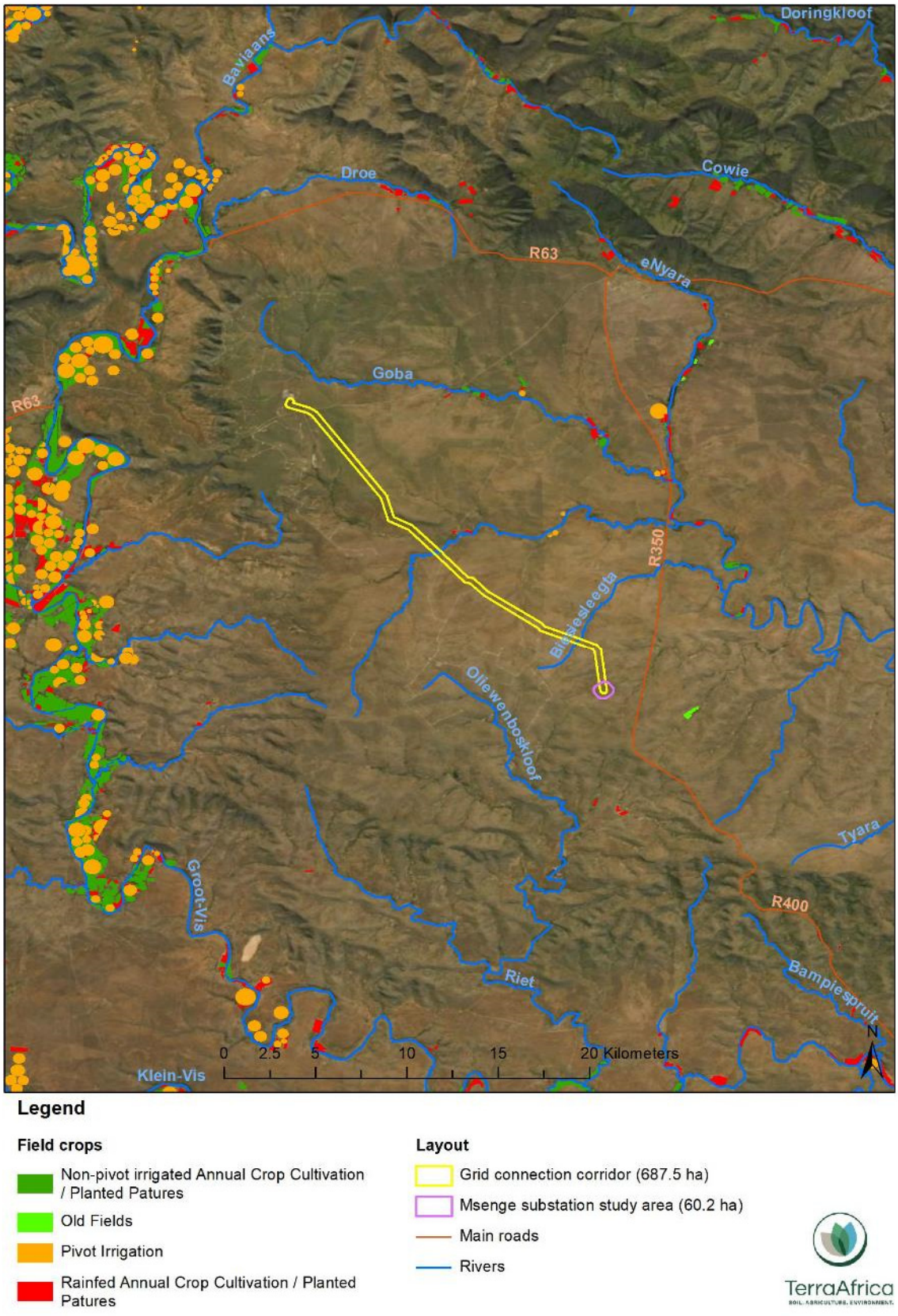

Figure 7: Location of field crop boundaries around the Msenge Emoyeni Grid Deviation and collector substation area (data source: DALRRD, 2019).

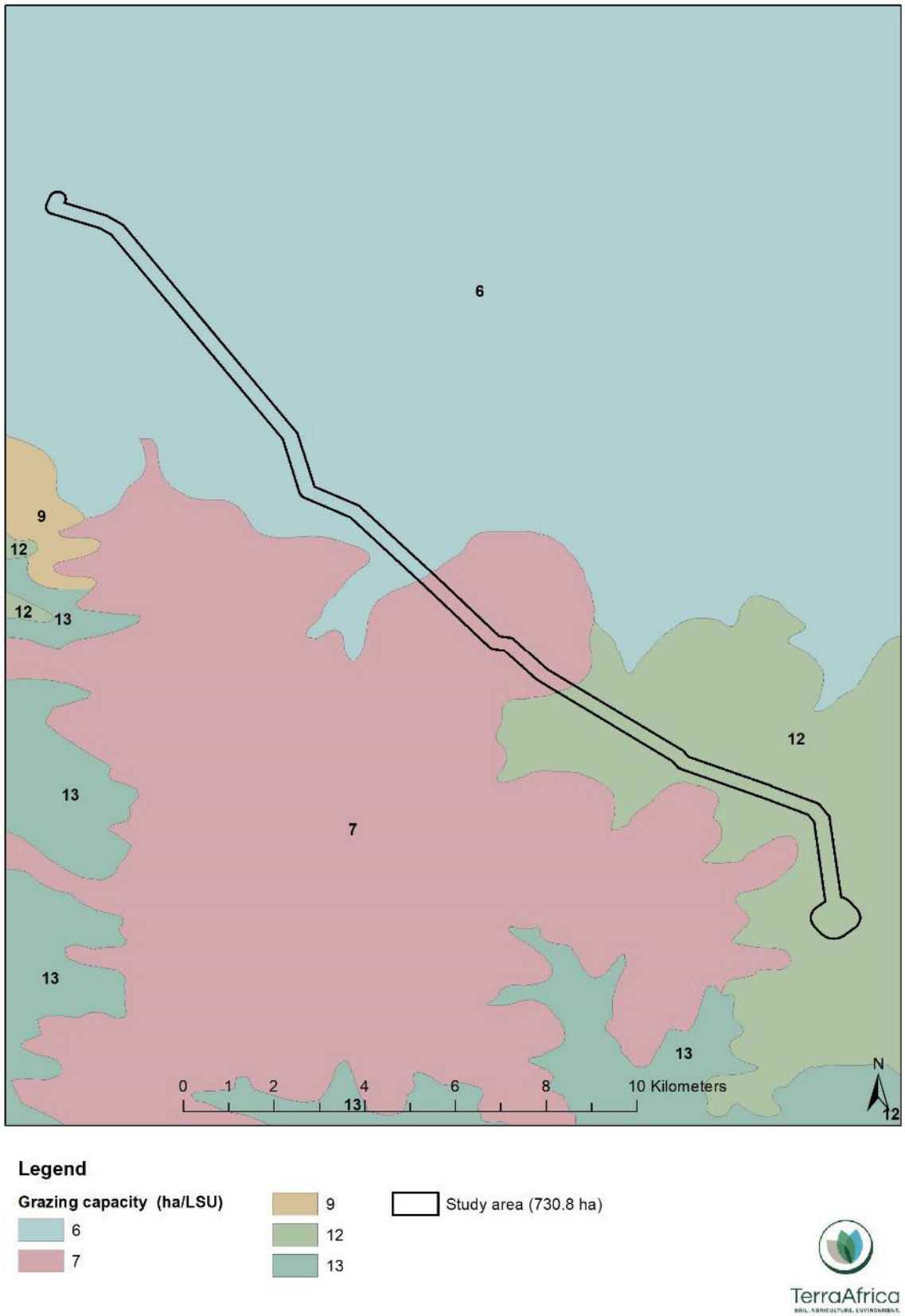

Figure 8: Grazing capacity of the Msenge Emoyeni Grid Deviation and collector substation area (data source: DALRRD, 2018).

9.4 Sensitivity analysis

The verified site sensitivity of the Msenge grid deviation, differs from the results of the Environmental Screening Tool. Following on-site verification, it was found that the largest part of the Msenge grid deviation as well as the entire area of the collector substation, has Low agricultural sensitivity. The total area with Low sensitivity is 645.6 ha (see **Figure 9**).

The soil forms present within the grid deviation, are mainly shallow soils that range in depth between 300 to 400 mm. These shallow soils are unsuitable for rainfed crop production and is best left under natural vegetation that can be used for livestock and game grazing.

The only exception to this, was the area in the northern part of the grid deviation where Swartland soils with effective soil depth of 800 mm, are present. This area of 85.2 ha has been classified as having Medium agricultural sensitivity. Although the area with the Swartland soils may be more suitable for rainfed crop production, the entire Msenge grid deviation area is used for livestock and game farming. No irrigation infrastructure, such as centre pivots, are present within the project.

The area can support approximately 91 head of cattle at the average long-term grazing capacity of the area. However, it is not anticipated that livestock and game farming will be excluded from the area and livestock will be allowed to graze in the areas around the power line pylons.

Soil in the grid deviation will have low sensitivity, depending on the successful implementation of mitigation measures to prevent soil erosion, compaction and pollution. The significance of the impacts and mitigation measures proposed are discussed in **Section 10**.

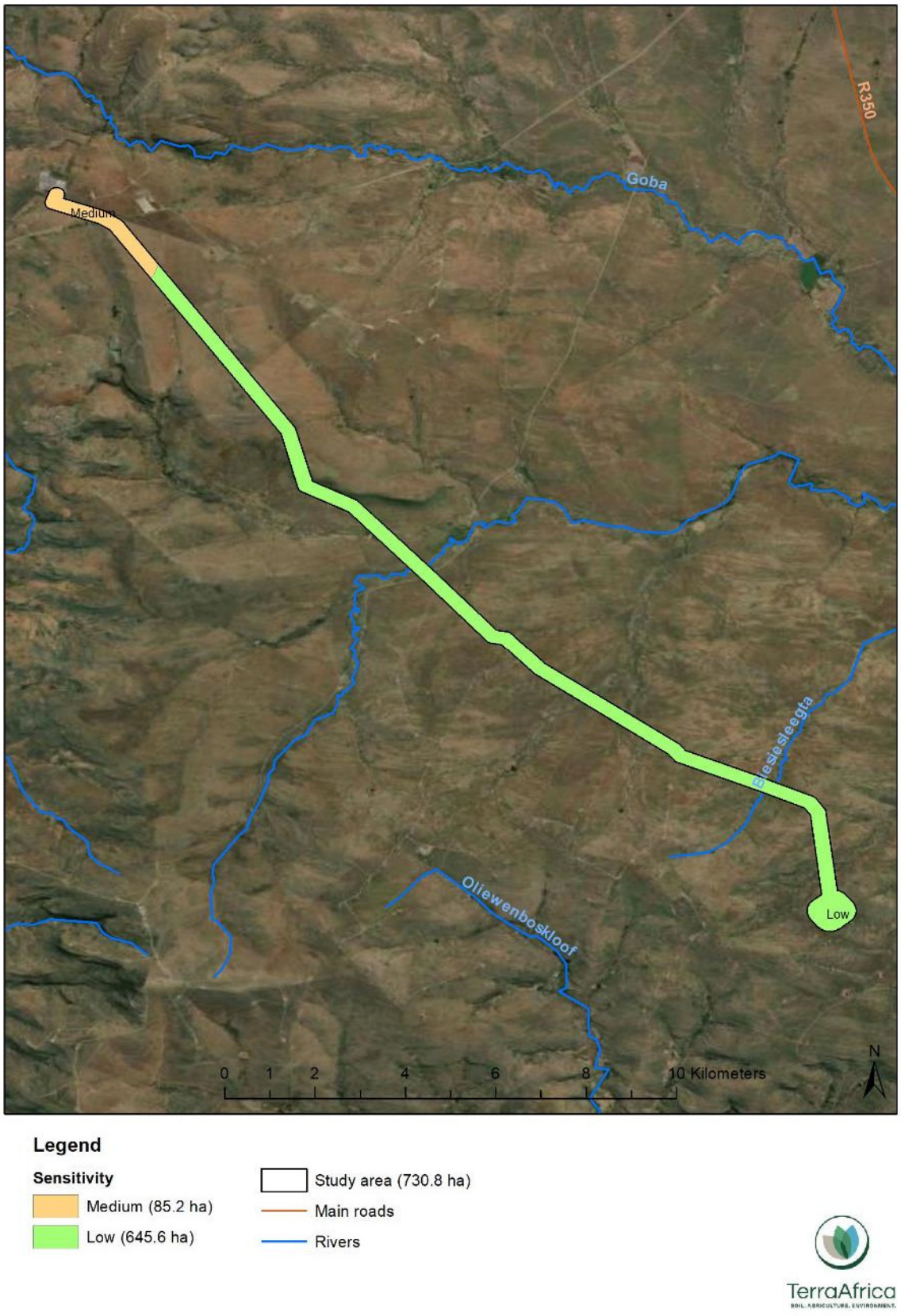

Figure 9: Agricultural sensitivity rating of the Msenge Emoyeni Grid Deviation and collector substation area

10. Impact assessment

10.1 Impact significance rating of direct impacts

The most significant impacts of the proposed project on soil and agricultural productivity will occur during the construction phase of the power line pylons and collector substation During the construction phase, the vegetation will be removed and the soil surface 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 when maintenance workers visit the area to do any maintenance work or repairs. 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

10.2.1. Impact: Reduction of land with natural vegetation for livestock and game grazing

Earth-moving equipment will be used to clear the vegetation all along the proposed power line alignment. In areas where obstacles such as rock outcrops are present, earth-moving equipment will be used to prepare the surface for the delivery of the construction materials.

Nature: The availability of grazing land for livestock and game farming will be reduced during the construction phase. It is anticipated that the significance of the impact will gradually reduce as vegetation re-establishes during the operational phase and animals can graze again around the pylons.		
	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	Positive
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: • Vegetation clearance must be restricted to areas within the servitude where the power line will be constructed. • Removal of obstacles to allow for access of construction vehicles must be kept to only where essential. • Prior arrangements must be made with the landowners to ensure that livestock and game are moved to areas where they cannot be injured by vehicles traversing the area. • No boundary fence must be opened without the landowners' permission. • All left-over construction material must be removed from site once construction 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 and operation of the Msenge grid infrastructure is considered low.		
Cumulative Impacts:		

Any additional power lines and other grid infrastructure that are built in the area to strengthen the electricity grid, will result in additional areas where grazing veld will be disturbed.

10.2.2 Impact: Soil erosion

All areas where vegetation is removed from the soil surface in preparation for the powerline construction, will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk. Once the soil particles are removed, vegetation will have difficulty establishing itself on the rock, lithic and hard carbonate material in the area.

Nature: The clearing and levelling of a limited area of land within the proposed power line servitude will increase the risk of soil erosion in the area. It is anticipated that the risk will naturally reduce as grass and lower shrubs re-establishes in the area once the construction has wrapped up and the operational phase continues.

	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.
- Where possible, conduct the construction activities outside of the rainy season.

Residual Impacts:

The residual impact from the construction and operation of the Msenge grid infrastructure on the susceptibility to erosion is considered low.

Cumulative Impacts:

Any additional power lines and substations that are built in the area to strengthen the electricity grid, will result in additional areas where exposed to soil erosion through wind and water movement.

10.2.3 Impact: Soil pollution

During the construction phase, construction workers will access the different farm portions for the preparation of the terrain and the installation of the pylons. Both potential spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution.

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

1. Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation.
2. Spills from vehicles transporting workers, equipment, and construction material to and from the construction site.
3. The accidental spills from temporary chemical toilets used by construction workers.
4. The generation of domestic waste by construction workers.
5. Spills from fuel storage tanks during construction.

6. Pollution from concrete mixing.
7. Any construction material remaining within the construction area once construction is completed.

During the operational phase of the power line, maintenance and repairs can result in waste generation within the servitude area.

	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.

Residual Impacts:

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

Cumulative Impacts:

Any additional power lines and substations that are built in the area where waste is not removed to designated waste sites, will increase the cumulative impacts associated with soil pollution in the area.

10.2.2 Operational phase

Impact: Soil pollution

Nature: During the operational phase, there can be potential spills and leaks from maintenance vehicles that transport maintenance workers and equipment. Also, any waste generated during maintenance and repairs on site can result in 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 used for maintenance work to prevent hydrocarbon spills;
- No domestic and other waste must be left within the grid assessment corridor by maintenance and repair workers.

Residual Impacts:

The residual impact from the operation of the Msenge grid infrastructure will be low to negligible.

Cumulative Impacts:

The operation of any additional infrastructure to strengthen and support the operation of the Msenge grid infrastructure 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 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 activities[1].

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed 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 Msenge grid infrastructure will be located within a larger area with seven authorised renewable energy facilities and two existing substations. The position of the renewable energy facilities and substations in relation the proposed Msenge facilities, are shown in **Figure 10**. The cumulative impacts of the proposed project in addition to the authorised developments are rated and discussed below.

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

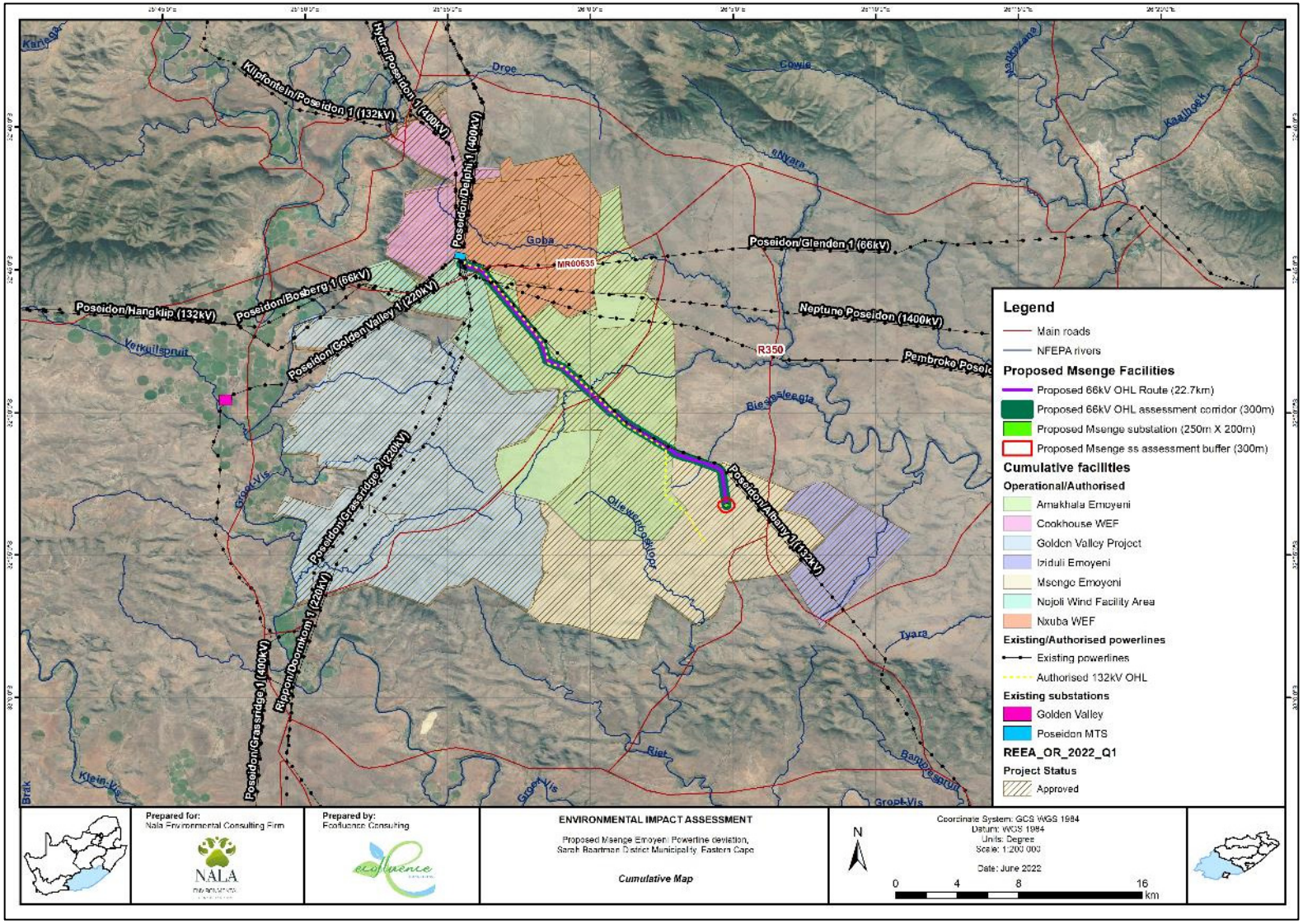

Figure 10: Renewable energy projects and associated infrastructure that can result cumulative impacts to the Msenge Grid Deviation

Table 2: Assessment of cumulative impact of decrease in areas available for livestock and game farming

Nature: Decrease in areas with suitable land capability for cattle and game 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	Very short duration - 0-1 years (1)	Short duration – 2 – 5 years (2)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (12)**	Low (24)
Status (positive/negative)	Negative	Negative
Reversibility	High	Low
Loss of resources?	No	Yes
Can impacts be mitigated?	N/A	No
Confidence in findings: High.		
Mitigation: The only mitigation measure for this impact is to keep the footprints of all grid infrastructure 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 10.2. 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 Section 10.2 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 10.2 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.

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

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

Mitigation: Action/control	**Responsibility**	**Timeframe**

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

Performance Indicator	No visible signs of soil erosion around the project infrastructure
Monitoring	• Regular inspections around the constructed infrastructure to detect early signs of soil erosion developing. • When signs of erosion 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	• 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	• Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation. • Spills from vehicles transporting workers, equipment, and construction material to and from the construction site. • The accidental spills from temporary chemical toilets used by construction workers. • The generation of domestic waste by construction workers. • Spills from fuel storage tanks during construction. • Pollution from concrete mixing. • Pollution from road-building materials. • Any construction material remaining within the construction area once construction is completed. • Containment breaches related to the battery units and any inadvertent chemical exposure therefrom.
Mitigation: Target/Objective	To avoid soil pollution that can harm the surrounding environment and human health.

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

• Any left-over construction materials must be removed from site.		

Performance Indicator	• No visible signs of waste and spills within the project site. • No accumulation of contaminants in the soils of the project site.
Monitoring	• Regular inspections of vehicles and equipment that enter the project site.

12. Acceptability statement

Following the data analysis and impact assessment above, the proposed Msenge grid deviation is considered an acceptable grid infrastructure development within the area of the grid deviation.

The soil forms present within the development area consist mostly of shallow soils underlain by hard rock, lithic and hard carbonate material that has severe limitations to rainfed crop production. These soils are of the Mispah, Coega, Spioensberg and Swartland soil forms.

The soils in the study area mostly have shallow depths of between 300-400 mm that are not suitable for rainfed crop production. Most of the area have Low agricultural sensitivity (645.6 ha), while the north-western part associated with the Swartland soil form have Medium agricultural sensitivity. The land use for these soils is livestock and game farming. No irrigation infrastructure, such as centre pivots, are present within the project. The Msenge grid deviation area is currently used for livestock and game farming and can support approximately 91 head of cattle at the long-term grazing capacity of 8ha/LSU (DALRRD, 2018). However, it is not anticipated that livestock and game farming will be excluded from the area and livestock that animals will be allowed to graze in the areas around the power line pylons.

It is anticipated that the construction phase will have impacts that range from medium to low and that through the consistent implementation of the recommendation mitigation measures, these impacts can all be reduced to low. Impacts during the operational phase are associated with possible repairs that may be required to maintain the power line.

It is my professional opinion that this application be considered favorably as the grid deviation and collector substation are acceptable, permitting that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimize impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the assessed 399m corridor within which the power line will be constructed.

13. Reference list

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

Department of Agriculture, Land Reform and Rural Development, 2018. *Long-term grazing capacity for South Africa*: Data layer. Government Gazette Vol. 638, No. 41870. 31 August 2018. Regulation 10 of the Conservation of Agricultural Resources Act (CARA): Act 43 of 1983. Pretoria. Government Printing Works.

Department of Agriculture, Land Reform and Rural Development, 2016. *National land capability evaluation raster data: Land capability data layer*, 2016. Pretoria.

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

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			
Physical address:	Farm Strydpoort, 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 CC

Name of Company:

2022-03-14

Date

APPENDIX 2 - CURRICULUM VITAE OF SPECIALIST

MARINÉ PIENAAR

Specialist Scientist

+2782-828-3587

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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 Bolfast 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 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 fields(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 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code