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Agricultural Assessment for the Proposed Houthaalbomen Grid Connection Infrastructure

Submitted by TerraAfrica Consult cc

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14 March 2022

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1. Introduction

Terra-Africa Consult cc was appointed by Savannah Environmental (Pty) Ltd (Savannah) to conduct the Agricultural Assessment for the proposed Houthaalbomen Grid Connection Infrastructure (from here onwards also referred to as the project). The project applicant is Houthaalbomen Grid (Pty) Ltd. The grid connection infrastructure is situated within the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality between 5 and 7km north west of the town of Lichtenburg in the North West Province (see Figure 1). The grid connection infrastructure is located within a 6km long and 200m wide grid connection corridor and will be located on the following properties:

- Portion 1 of the Farm Houthaalboomen 31
- Portion 0 of Farm Talene 25
- Portion 39 of Farm Elandsfontein 34-
- Portion 93 of Farm Elandsfontein 34
- Portion 41 of Farm Elandsfontein 34
- Portion 0 of Farm Priem 30
- Portion 25 of Farm Houthaalboomen 31
- Portion 1 of Farm Lichtenburg Town and Townlands, No 27

The proposed grid connection infrastructure will enable the evacuation of the generated power from the three (3) onsite facility substations for the Houthaalboomen PV Cluster (i.e., Barleria PV DFFE Ref: 14/12/16/3/3/2/2107, Dicoma PV DFFE Ref: 14/12/16/3/3/2/2108, Setaria PV DFFE Ref: 14/12/16/3/3/2/2106) to the collector substation (Houthaalboomen Collector Substation) to the existing Watershed MTS. This is considered as the grid connection infrastructure for Houthaalboomen PV Cluster and includes a collector substation and a 132kV single or double-circuit power line.

2. Details of the specialist

Mariné is a scientist registered with the South African Council for Natural Scientific Professions (SACNASP) and is specialised in the fields of Agricultural Science and Soil Science. Her SACNASP Registration Number is 400274/10. Mariné holds a BSc. degree in Agricultural Science (with specialisation in Plant Production) from the University of Pretoria and a MSc. Degree in Environmental Science from the University of the Witwatersrand. She has consulted in the subject fields of soil, agriculture, pollution assessment and land use planning for the environmental sector of several African countries including Botswana, Mozambique, Democratic Republic of Congo, Liberia, Ghana and Angola. She has also consulted on the soil and agricultural assessment of a gas infrastructure project in Afghanistan. Mariné's project experience conducting assessments for renewable energy projects include solar and wind energy facilities in the Western, Northern and Eastern Cape as well as the North West, Free State and KwaZulu Natal Provinces. Her contact details are provided in Appendices 1 and 2 attached.

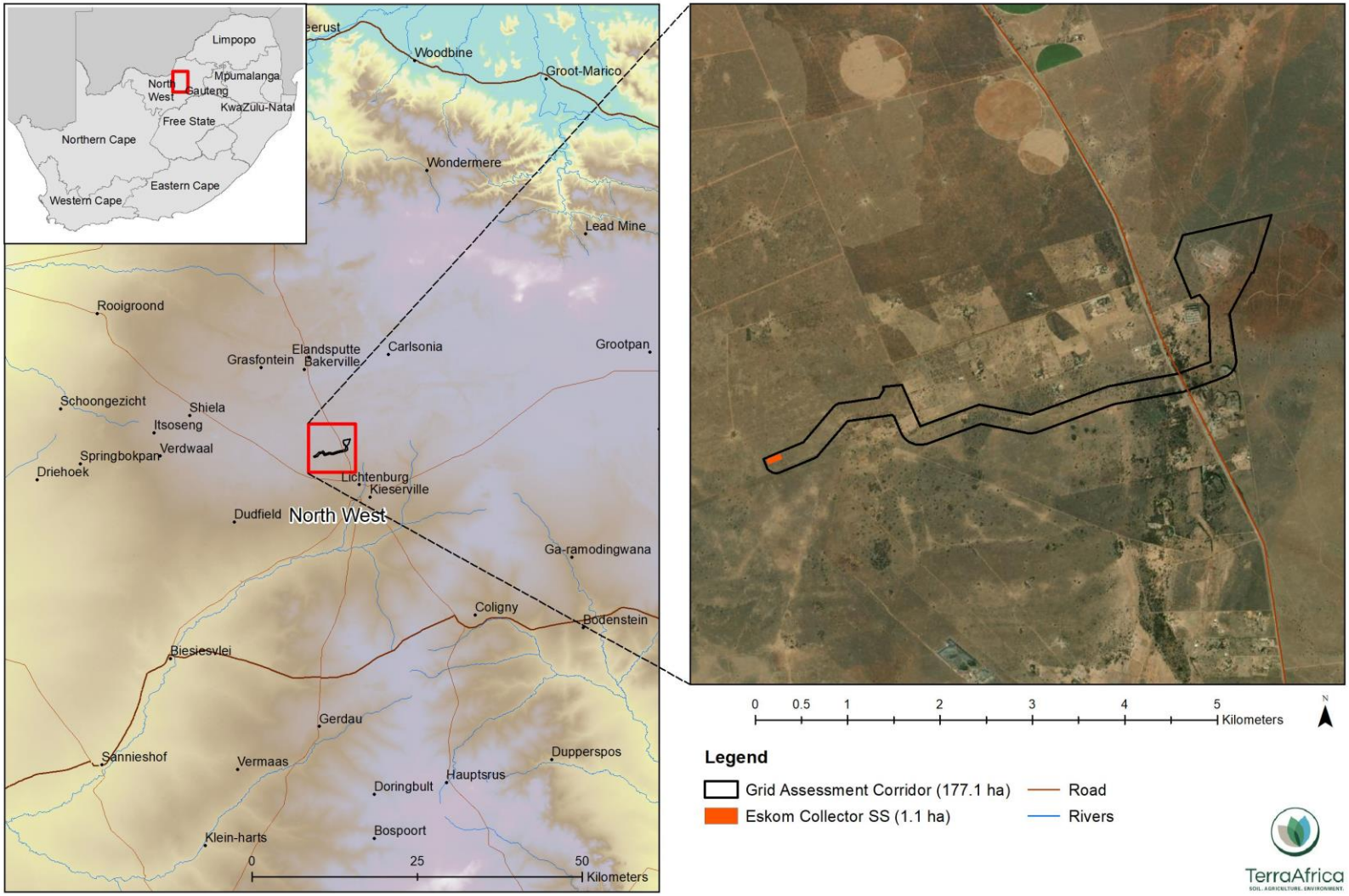

Figure 1: Locality of the proposed Houthaalboomen Grid Connection Infrastructure

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 or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.

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

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

Requirement	**Report reference**
3.1. The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP.	Page 3 & Appendix 2
3.2. The compliance statement must: 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 Savannah, apply to the Agricultural Compliance Statement:

- to ensure a thorough assessment, that includes both the desktop assessment of databases and aerial photography; a description of the on-site verification of the agricultural potential of the area; and the soil forms present in the development area;
- identify and assess potential impacts on both agricultural potential and soil resulting from the proposed project;
- identify and describe potential cumulative soil 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 Savannah on 03 March 2022. The requirements of GNR 320 stipulate that a 50m buffered development envelope must be assessed with the screening tool. The map depicted in Figure 2 shows the agricultural sensitivity of both the 177.1ha grid assessment corridor; and a buffered area of at least 4km around the proposed development area.

The results provided by the screening tool indicate that the largest part of the grid assessment corridor consists of land with Medium agricultural sensitivity (refer to Figure 2). Four small areas with High agricultural sensitivity is located within the grid assessment corridor. One area is located in the northern part of the corridor while the three other areas are located in the middle section of the grid assessment corridor, mostly along its southern boundary. There are no areas with Low agricultural sensitivity within the grid assessment corridor. The area adjacent to the grid assessment corridor, consists mostly of land with Medium agricultural sensitivity. Small, scattered areas with High sensitivity are located mainly north and south of the corridor. Areas with Very High sensitivity (associated with centre pivot irrigation) is located 2km and further away to the north and west of the grid assessment corridor.

In alignment with the CARA, the Department of Agriculture, Land Reform and Rural Development (DALRRD) developed spatial data that depict High Potential Agricultural Areas (HPAAs) of the different provinces of South Africa (DALRRD, 2019). According to the DALRRD, these areas can be defined as: *"large, relative homogeneous portions of high value agricultural land that has the potential to sustainably, in the long-term, contribute significantly to the production of food.*"

The data layer of the HPAA's of North West Province shows that the proposed grid assessment corridor falls mostly outside of any HPAA except for a small section of land on the northern end of the corridor (refer to Figure 3). According to the data (DALRRD, 2019), this corner is part of a delineated Category B irrigated HPAA (IR). However, it is uncertain why this area was included in the HPAA as the nearest irrigated areas area located 2.5km northwest of this area.

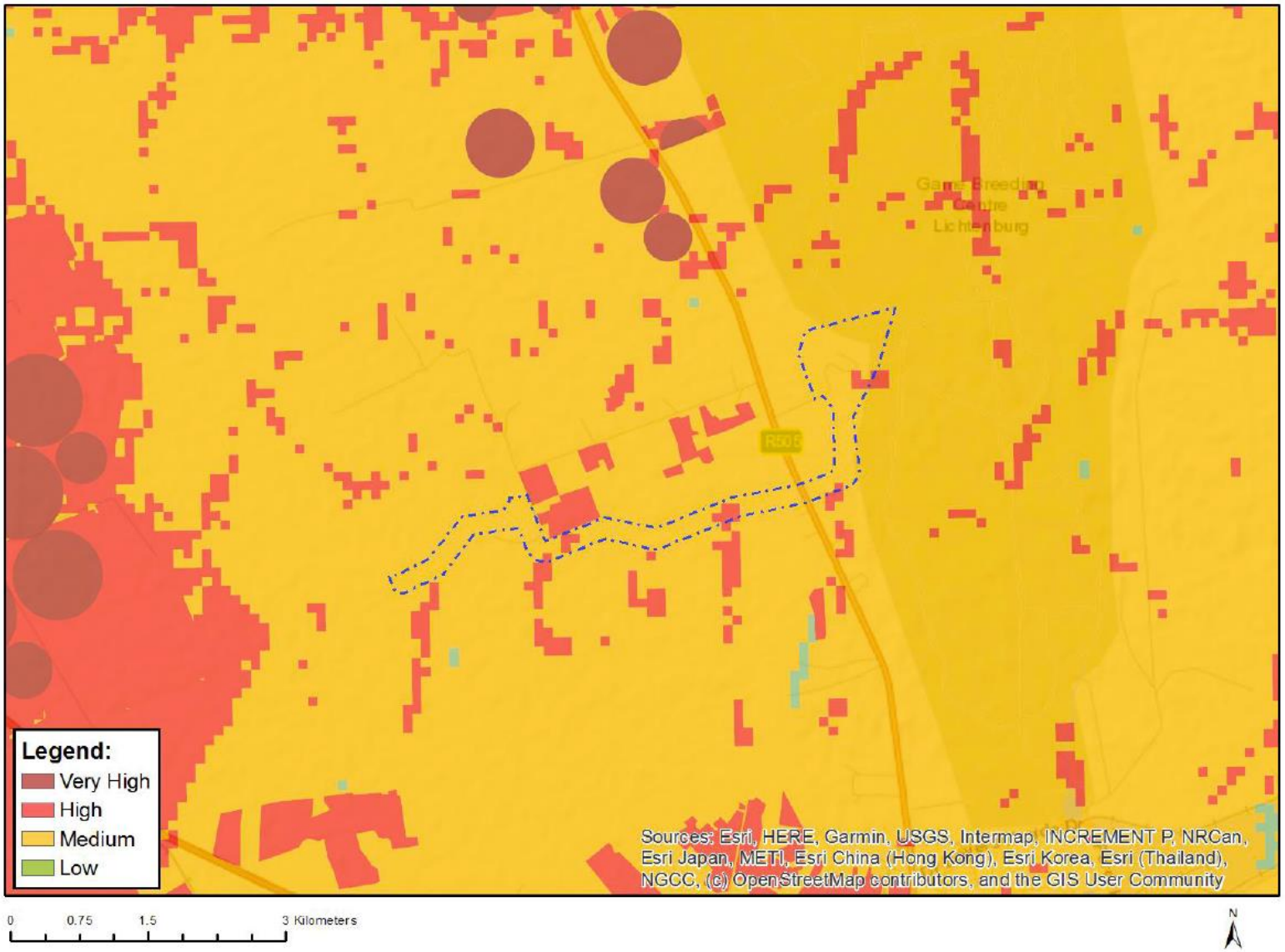

Figure 2 Agricultural Combined Sensitivity of the Houthaalbomen grid assessment corridor (generated by Savannah Environmental, 2022)

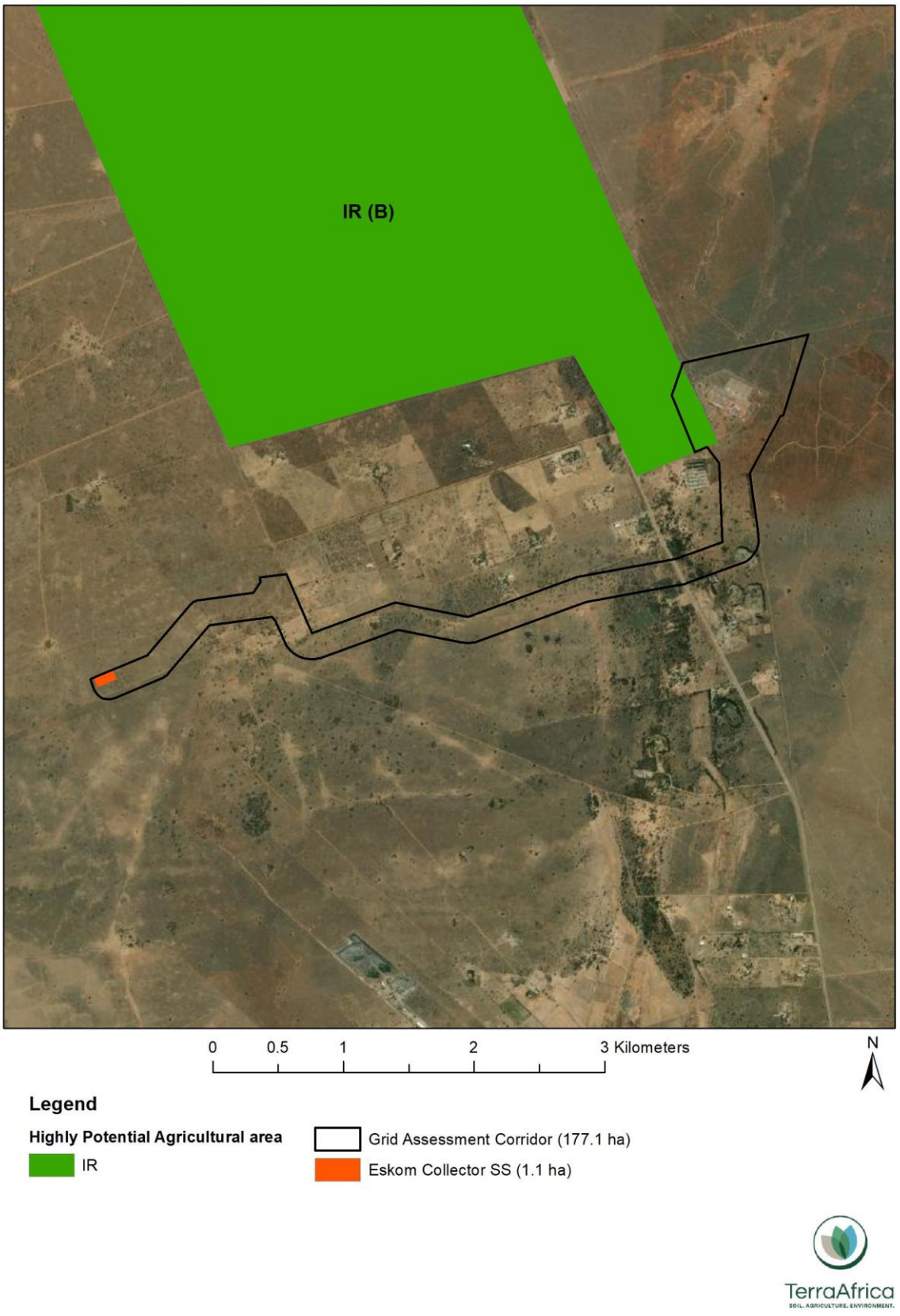

Figure 3: Presence of High Potential Agricultural Areas around the Houthaalbomen grid assessment corridor (DALRRD, 2019)

7. Methodology

The different steps that were followed to gather the information used for the compilation of this report is outlined below. The methodology is in alignment with the requirements of GNR 320.

7.1 Assessment of available data

The most recent aerial photography of the area available from Google Earth was obtained. The satellite imagery was used to analyse the terrain of the proposed grid assessment corridor 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 North West Field Crop Boundaries show crop production areas may be present within the development area. The field crop boundaries include rainfed annual crops, non-pivot and pivot irrigated annual crops, horticulture, viticulture, old fields, small holdings and subsistence farming (DALRRD, 2019).
- The High Potential Agricultural Areas for Cultivation: North West Province, 2019 are large, relatively homogeneous areas of land within the province regarded as having high potential and capability to contribute towards food production in both the province and the country (DALRRD, 2019).

7.2 Site assessment

Two site visits were conducted to ensure that all the properties within the grid assessment corridor, could be accessed for soil classification. The first site visit on 2 and 3 September 2021 (spring) and the second site visit on 26 November (summer). The season of the site visits have no influence on the results. The soil profiles were examined to a maximum depth of 1.5m using a hand-held auger. Observations on site were made regarding soil texture, structure, colour and soil depth at each survey point. The locality of each survey point is shown in
Figure 4. A cold 10% hydrochloric acid solution was used on site to test for the presence of carbonates in the soil. A hand-held Garmin GPS was used to 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).

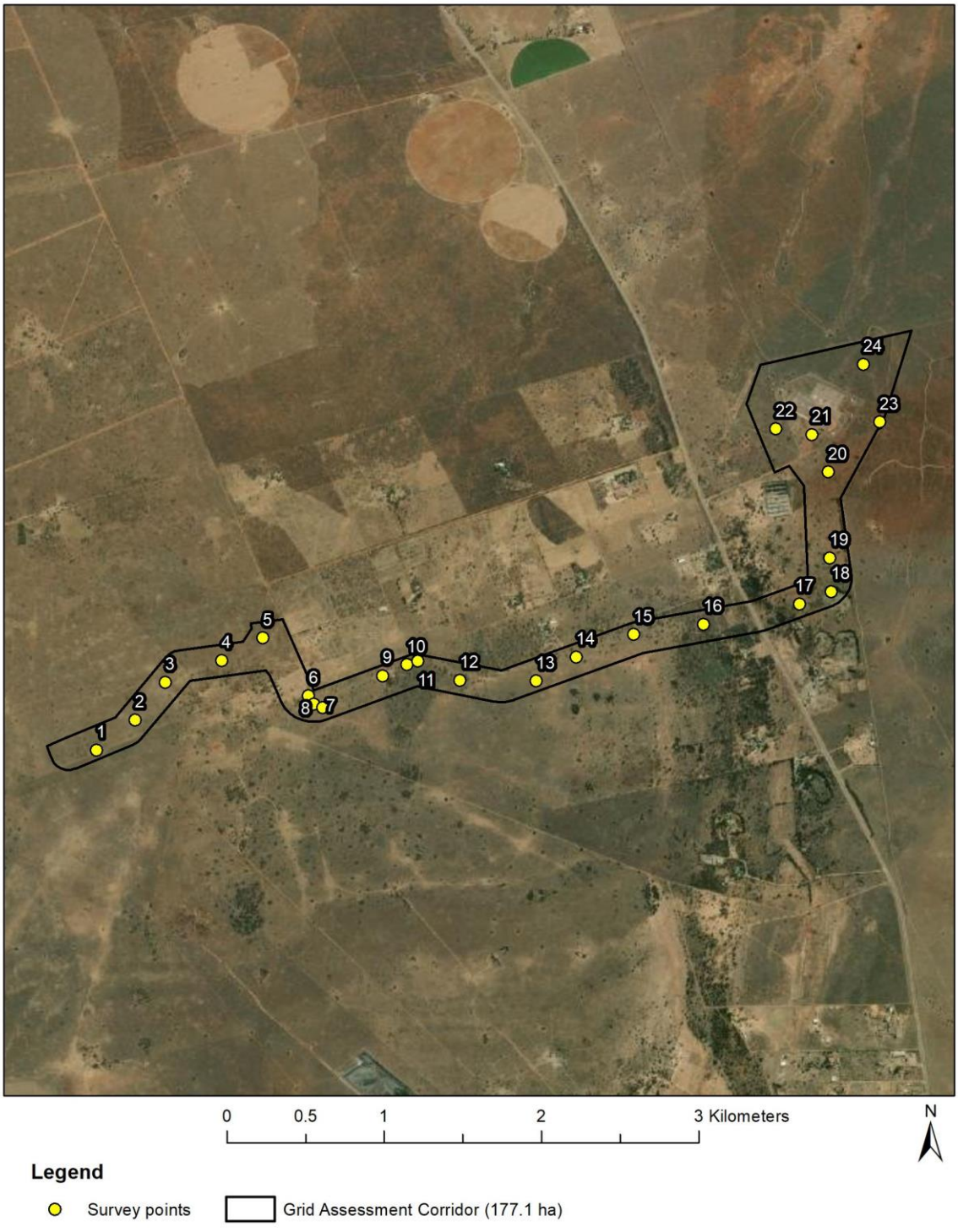

Figure 4: Locality of on-site soil classification and observation points within the Houthaalbomen grid assessment corridor

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 footprint of the grid connection infrastructure will be within the grid assessment corridor of 177.1ha that was assessed in this report;
- 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 grid assessment 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 Houthaalbomen grid assessment corridor consists of either natural soil profiles (undisturbed by human activities) or anthropogenic soils. The positions of the different soil forms are depicted in Figure 6.

9.1.1 Natural soil forms

a) Mispah/Glenrosa soils

The Mispah and Glenrosa soils are grouped together for soil mapping purposes as these soils have similar soil physical properties (except for the nature of the underlying material) and effective depth within the grid assessment corridor. The Mispah/Glenrosa soil group is the dominant soil type within grid assessment corridor and covers approximately 152.7ha (or 86.2% of the total assessment area).

The Glenrosa soils range in depth between 0.05 and 0.30m and consist of orthic topsoil horizons that are either bleached or chromic (light red in colour) with lithic material underneath. The lithic horizon of the Glenrosa soils within the grid assessment corridor belongs to the geolithic family and consists of soil material as illuvial infillings between partly weathered and fractured rock (Soil Classification Working Group, 2018). The Mispah soils have similar shallow soil depth as the Glenrosa soils (0.05 to 0.30m) but differ in regards to the nature of the underlying material. The effective soil depth of the Mispah soils is restricted by solid and fractured rock. In some areas, the solid rock is visible on the surface as rock outcrops (as shown in **Figure 5**).

Figure 5: Photographic example of solid rock on the surface of Mispah soils

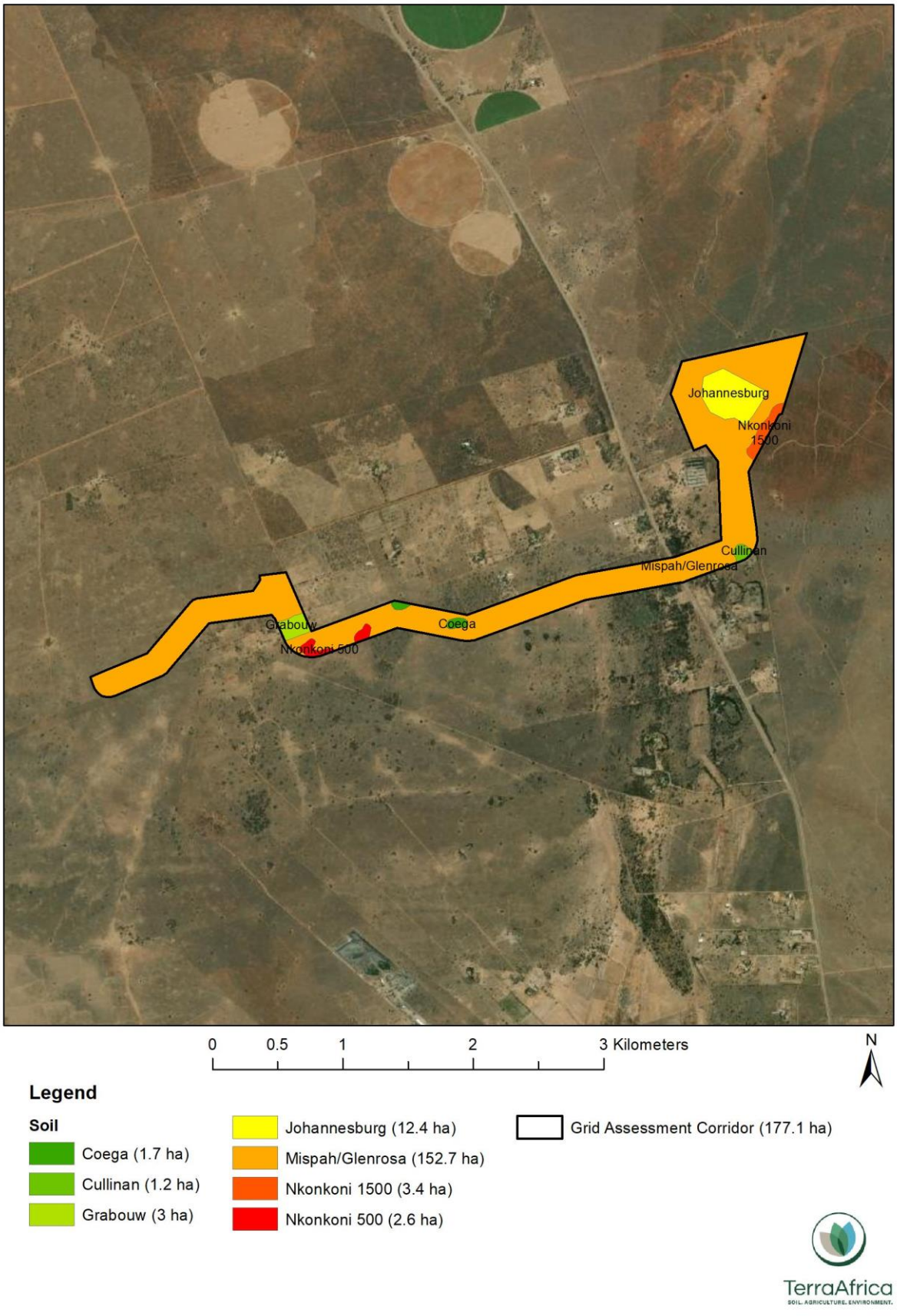

Figure 6: Soil classification map of the Houthaalbomen grid assessment corridor

b) Nkonkoni soils

Three small areas of the Nkonkoni soil form is present within the Houthaalbomen grid assessment corridor. Differentiation was made in the soil map between the effective soil depths of the of Nkonkoni soils as two areas have effective soil depth of 0.5m and the area at the northern end of the grid assessment corridor, has effective soil depth of 1.5m (refer to Figure 6). The effective soil depth has influence on the agricultural potential with the shallower Nkonkoni soils having low-moderate agricultural potential and the deep Nkonkoni soils having moderate-high agricultural potential.

The Nkonkoni soils consist of chromic (red) topsoil with sandy-loam texture that overlies a red apedal horizon. The red apedal horizon is limited in soil depth by the presence of lithic material. The two areas where Nkonkoni soils are 0.5m deep is located along the southern boundary of the middle section of the grid assessment corridor and combinedly covers an area of 2.6ha. The Nkonkoni soils that are 1.5m deep are located along the southeastern boundary of the northern end of the grid assessment corridor and measures 3.4ha.

Figure 7: Nkonkoni soils with 0.5m effective soil depth within the grid assessment corridor

c) Coega soils

The Coega soils are found in two areas in the mid-section of the grid assessment corridor with the total area of Coega soils measured at around 1.7 ha. The Coega soils have very shallow effective soil depth (between 0.05 and 0.25m) and are limited in depth by the hard carbonate

horizon that underlies the orthic topsoil. In the areas where the Coega soils are present, nodules of hard carbonate are present on the soil surface.

Figure 8: Coega soils within the grid assessment corridor with nodules of hard carbonate visible on the surface

9.1.2 Anthropogenic soils

a) Johannesburg

One area of about 12.4ha in the northern end of the Houthaalbomen grid assessment corridor has been classified as the Johannesburg soil class (Urban Technosols). This area consists of the Watershed MTS that has previously been constructed in the area on concrete foundation. The Watershed MTS is fenced off with security fencing. It is classified as Urban Technosols for it include soils and other material where significant areas are disturbed or covered by means of construction and include manufactured layers of different materials. Agriculture is no longer a land use in the area of the Johannesburg soil class.

b) Cullinan

The southeastern corner of the grid assessment corridor consists of soil of the Cullinan class. This soil class is present at approximately 1.2 ha. It consists of an old dolomite quarry that has been never been backfilled or rehabilitated and little soil material that remained within the excavated area (see Figure 9). Indigenous grass and shrubs have already established in the areas within and alongside the sides of the quarry where some soil material is available.

However, the uneven rocky terrain and very sparse grass growth within the Cullinan soil class area, makes it unsuitable for livestock grazing. It also has no potential for crop production.

Figure 9: Old dolomite quarry in the northern part of the grid assessment corridor that classify as Cullinan Technosols

c) <u>Grabouw</u>

Towards the western end of the grid assessment corridor, one area of 3ha is classified as the Grabouw soil class (Physically Disturbed Anthrosols). Although the soils in this area has not undergone any intentional transportation but have been subjected to physical disturbance, including compaction. Within the grid assessment corridor, the Grabouw soils include a few scattered houses and a gravel road with the remaining area affected by previous vegetation clearance and other earth-moving activities. While the area has been disturbed by anthropogenic activities, the agricultural potential of the soils in this area is classified as Low-moderate and livestock grazing in the area, is possible.

9.2 Land capability

The position of the different land capability classes within the Houthaalbomen grid assessment corridor, are depicted in Figure 10.

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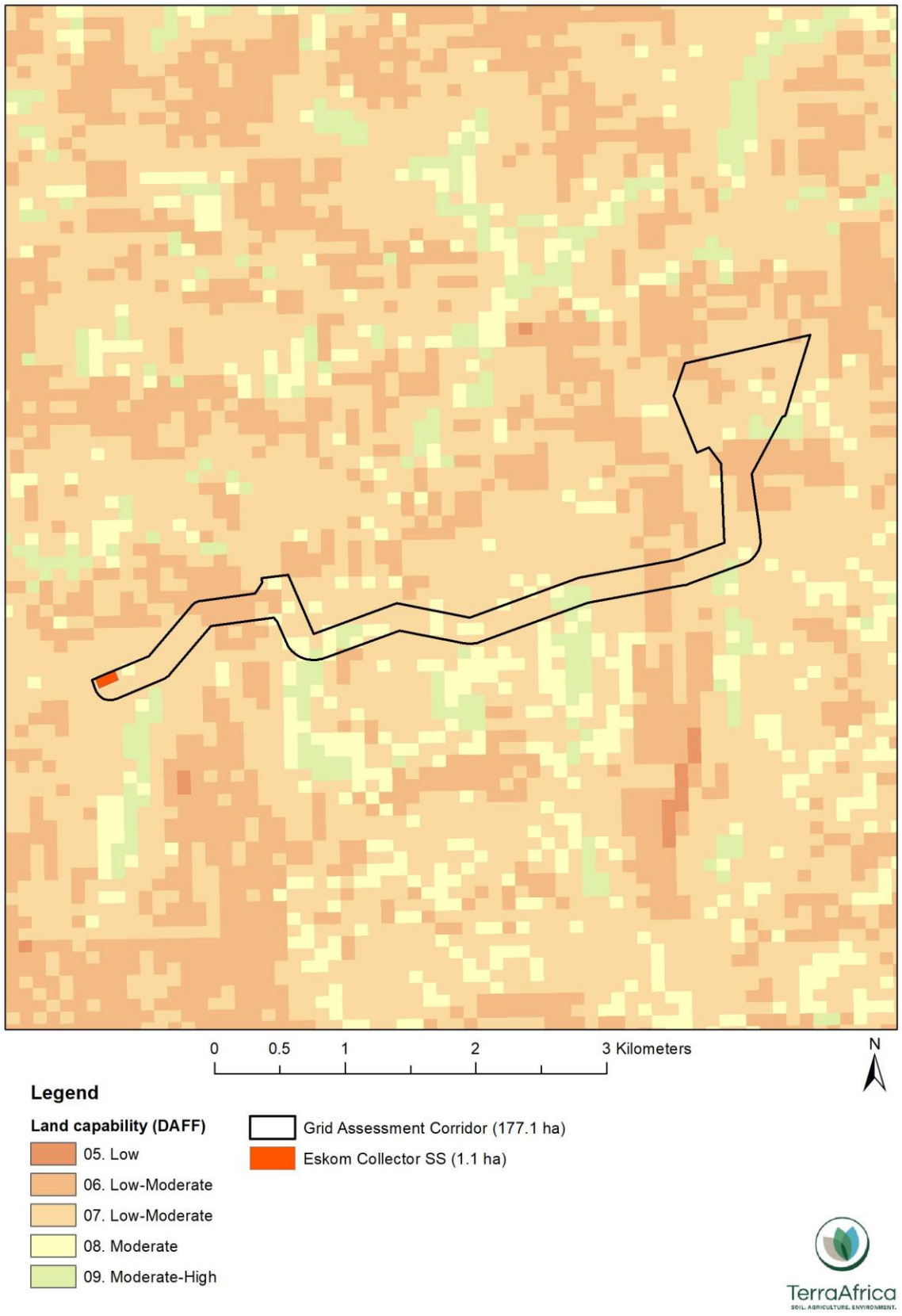

Figure 10: Land capability classification of the Houthaalbomen grid assessment corridor (data source: DALRRD, 2016)

The dominant land capability class within the grid assessment corridor, is Low-Moderate (Class 07). The highest land capability class within this area is Moderate-High (Class 09) which is located in four scattered areas that along the middle section of the grid corridor. The higher land capability largely agrees with the areas where the Nkonkoni soils were identified although only one area of these soils are 1.5m and is considered to have Moderate-High potential. Small areas of land with Moderate (Class 08) and Low-Moderate (Class 06) land capability are also scattered along the grid assessment corridor.

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

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 assessment corridor was determined. The agricultural potential of the area is depicted in Figure 11.

The largest part of the Houthaalbomen grid assessment corridor, has Low agricultural potential (168ha). Low agricultural potential has been assigned to the Mispah/Glenrosa soil group as well the Coega soils as a result of the shallow soil depth that limits root growth and water storage capacity within these profiles. Some areas where these soils occur also have chunks of rocks or nodules of hard carbonate on the surface. Of the anthropogenic soil classes, both the Cullinan and Johannesburg soil classes have Low agricultural potential as livestock farming is either not possible (Johannesburg soil) or possible with severe limitations (Cullinan soil).

The areas with the deeper Nkonkoni profiles (0.5m effective depth), have Low-Moderate agricultural potential. Although the profiles are slightly deeper than the Mispah/Glenrosa soil group and Coega the soils, the effective soil depth still poses limitations to the water-storage capacity of the soil profiles and can limit crop root growth. In addition to the limitations posed by the soil depth, the total areas of these two pockets of Nkonkoni soils are combinedly only 2.6ha and not considered viable areas for commercial grain production. The Grabouw soil class is also classified as having Low-Moderate agricultural potential. These areas are considered better suited to extensive livestock production, which is also the current land use on site.

The only area with Moderate-High agricultural potential is the area of 3.4ha along the eastern boundary of the northern end of the grid assessment corridor. The area has deep soils that is suitable for rainfed crop production. However, the area of 3.4ha is not used for crop production currently and has neither been used historically for crop production. The area is also considered to small to be viable as a rainfed crop field and in the absence of any irrigation infrastructure, it is also not possible to produce irrigated crops in this area.

The low agricultural potential of the soils within the development area and grid connection is confirmed by the absence of crop field boundaries within the Houthaalbomen grid assessment corridor (see Figure 12). Directly north of the grid assessment corridor, there are several small block areas that are delineated as smallholdings. Centre pivot irrigation areas are located

further north (2.5km or further) and rainfed annual crops or planted pasture fields are located further west and south (2.5km or further) of the grid assessment corridor.

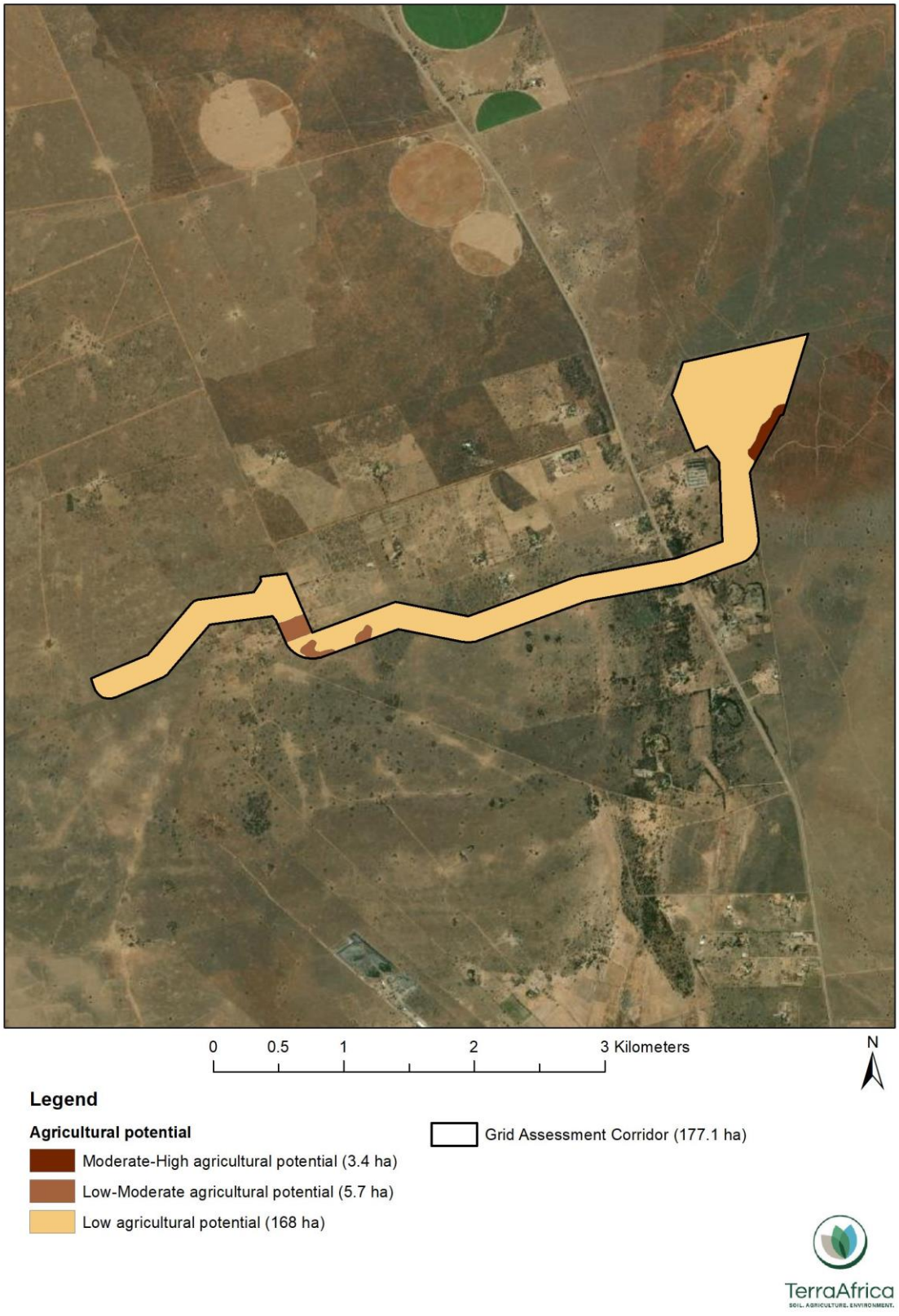

Figure 11: Agricultural potential of the Houthaalbomen grid assessment corridor

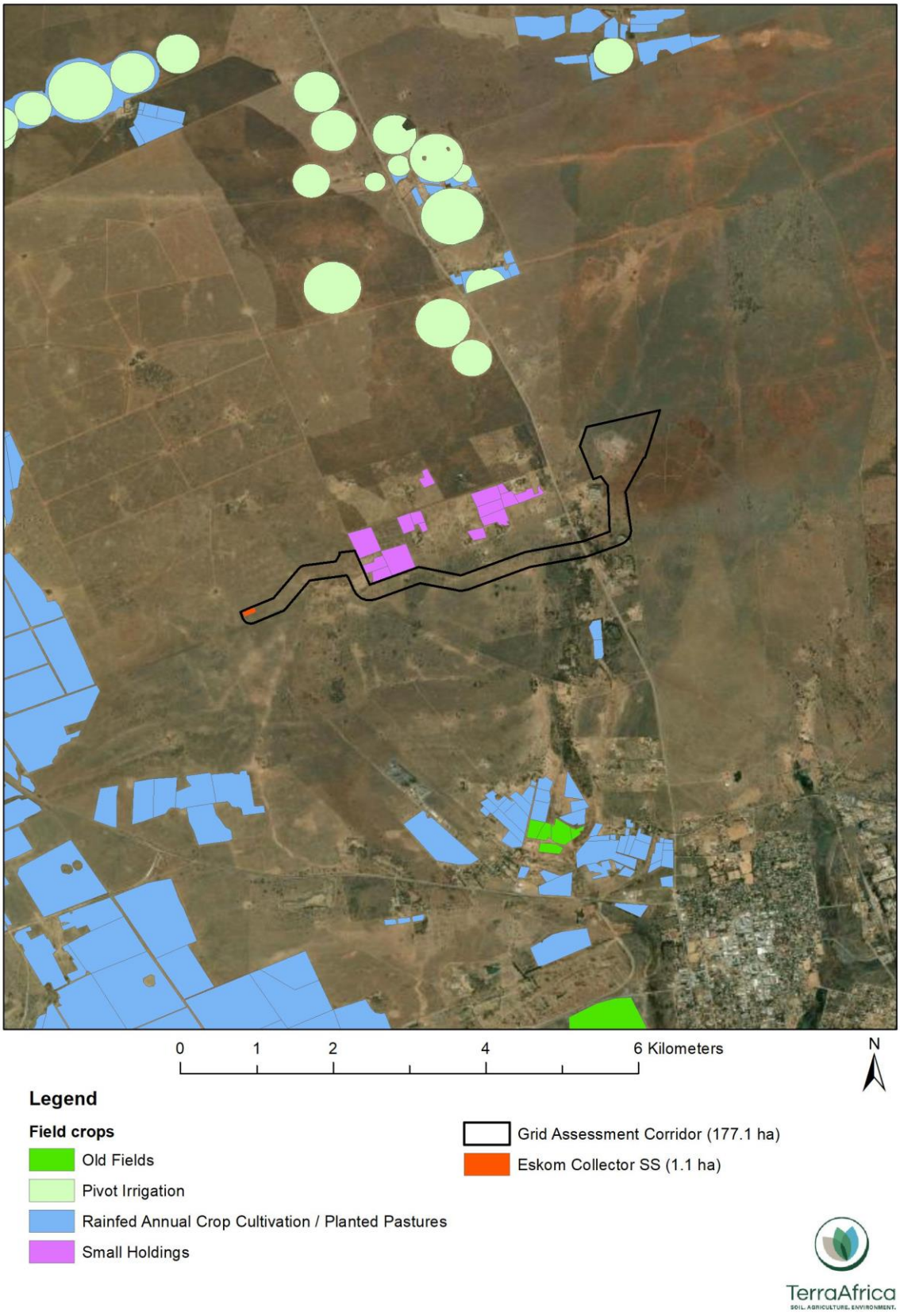

Figure 12: Location of field crop boundaries around the Houthaalbomen grid assessment corridor (data source: DALRRD, 2019)

Following the metadata layer obtained from DALRRD, the long-term grazing capacity of the entire grid assessment corridor is 8 ha/LSU (see Figure 13).

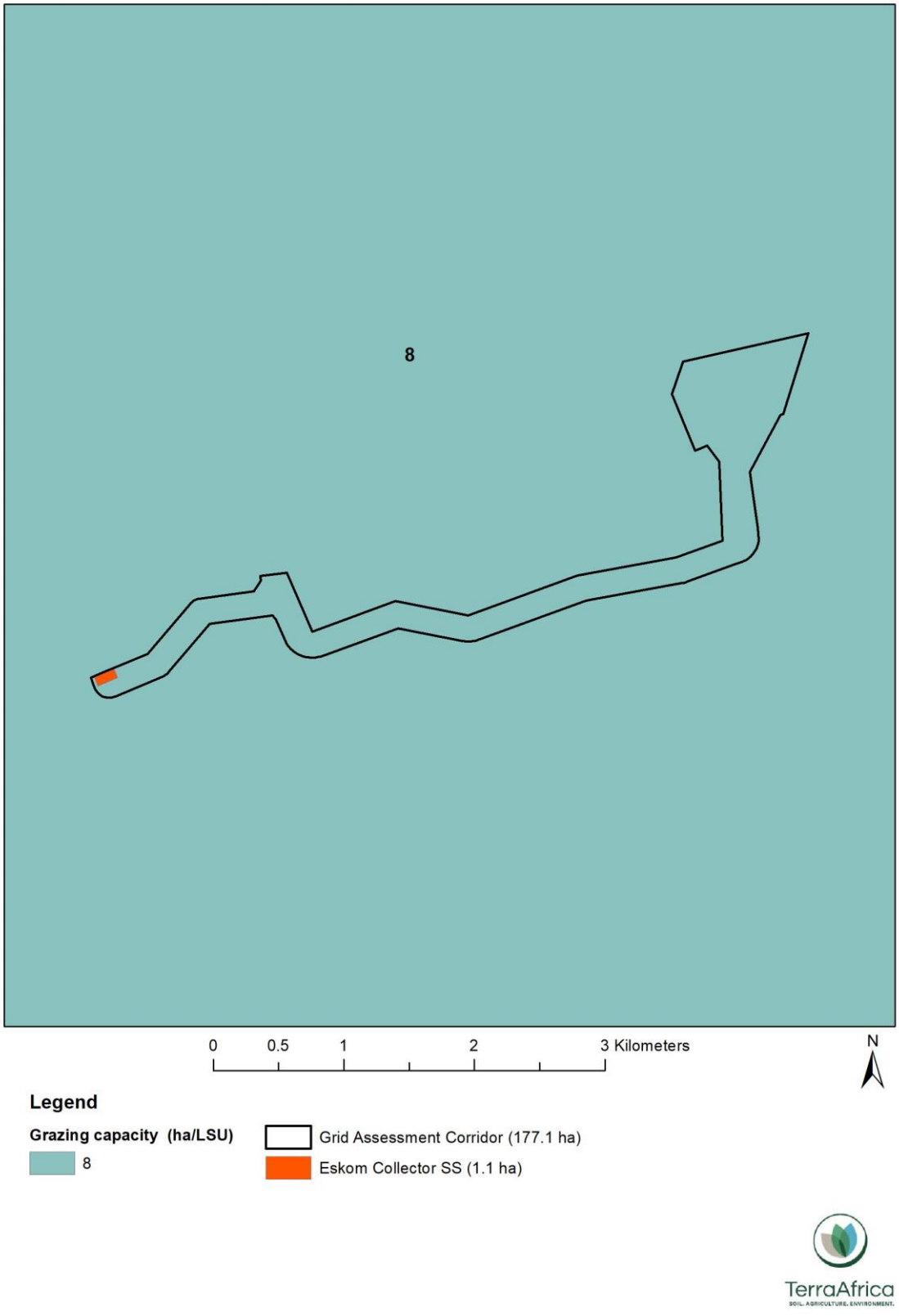

Figure 13**:** Grazing capacity of the Houthaalbomen grid assessment corridor (data source: DALRRD, 2018)

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

The grid assessment corridor is currently used for livestock 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.

Using the long-term grazing capacity of 8ha/LSU, the Houthaalbomen grid assessment corridor (excluding the area of 12.4ha of Johanneburg soils where the existing Watershed MTS is located), can provide forage to 21 head of cattle. The grazing capacity is moderate to moderate-high in comparison to the grazing capacity of the rest of the country. The vegetation consists of a mixture of grasses as well as *Vachelia* and *Searsia* species as well as *Ziziphus mucronata* (see Figure 14).

Figure 14: Photographic evidence of vegetation within the Houthaalbomen grid assessment corridor

9.4 Sensitivity analysis

The verified site sensitivity of the Houthaalbomen grid assessment corridor, differs from the results of the Environmental Screening Tool. The soil forms present within the grid assessment corridor, are mainly shallow soils that range in depth between 0.05 and 0.30m. Rock outcrops are present on the surface in several areas within the Houthaalbomen grid assessment corridor.

Only two small areas in the mid-section of the grid corridor, have Nkonkoni soils that have effective depth of 0.5m. One area of 3.4ha at the northern end of the grid corridor have deeper soils of the Nkonkoni form. None of the three Nkonkoni areas have historically been used for crop production and also not recently, as confirmed by the field crop boundary data of DALRRD (2019) (see Figure 12). No irrigation infrastructure, such as centre pivots or drip irrigation, are present within the project area and irrigated agricultural is currently not practiced in the area. The area is currently used for livestock farming and the proposed Houthaalbomen grid assessment corridor, can support 21 head of cattle at the long-term grazing capacity of 8ha/LSU (DALRRD, 2018). However, it is not anticipated that livestock farming will be excluded from the area and livestock will be allowed to graze in the areas around the power line pylons.

The entire area is therefore assigned Low agricultural sensitivity, except for the 3.4ha where deep Nkonkoni soils are present, that has been assigned Medium agricultural sensitivity (see Figure 15).

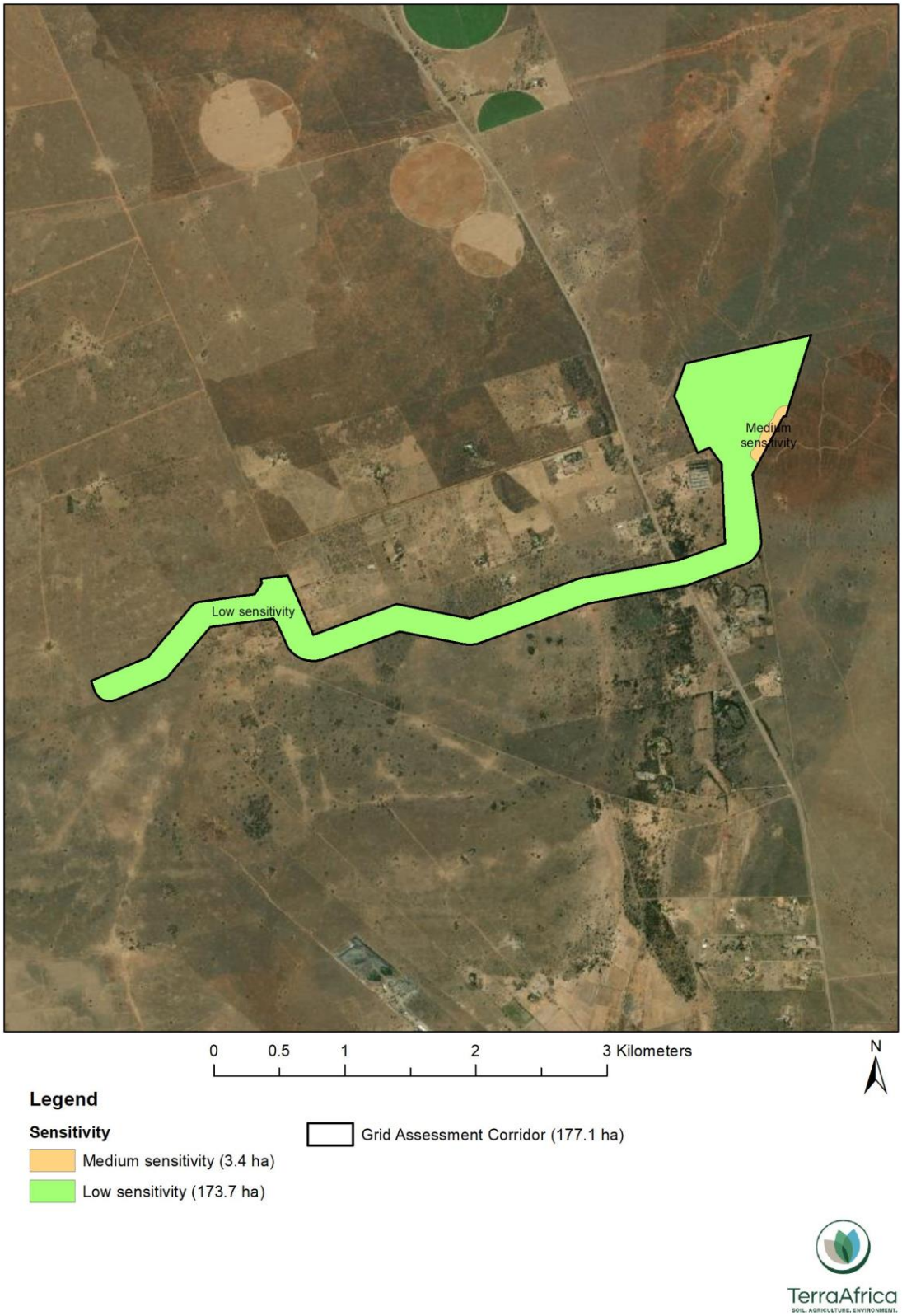

Figure 15: Agricultural sensitivity rating of the Houthaalbomen grid assessment corridor

Soil in the grid assessment corridor will have Low to Medium 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**.

10. Impact assessment

10.1 Project description

The Applicant, Houthaalboomen Grid (Pty) Ltd, is proposing the development of grid connection infrastructure for Houthaalboomen PV Cluster and includes a collector substation (Houthaalboomen Collector Substation) and a 132kV power line to the existing Watershed MTS.

In order to enable the evacuation of the generated power from the three (3) onsite facility substations for the Houthaalboomen PV Cluster (i.e., Barleria PV DFFE Ref: 14/12/16/3/3/2/2107, Dicoma PV DFFE Ref: 14/12/16/3/3/2/2108, Setaria PV DFFE Ref: 14/12/16/3/3/2/2106) to the collector substation to the existing Watershed MTS, two alternative grid connection solutions (within a 200m wide corridor) have been assessed and includes:

Grid Connection Alternative 1: Houthaalboomen Collector Substation, centrally positioned on the southern boundary of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 6km long and 200m wide grid connection corridor

Grid Connection Alternative 2: Houthaalboomen Collector Substation, positioned on the south-eastern corner of Portion 1 of the Farm Houthaalboomen 31, and a 132kV power line connecting into the existing Watershed MTS. The grid connection infrastructure is located within a 4.5km long and 200m wide grid connection corridor

10.2 Impact significance rating

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. It is expected that the impact ratings will be similar for both Grid Connection Alternative 1 and Grid Connection Alternative 2.

10.2.1 Construction phase

10.2.1. Impact: Reduction of land with natural vegetation for livestock 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 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 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 Houthaalbomen 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 power line 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 Houthaalbomen 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 Houthaalbomen grid infrastructure will be low to negligible.		
Cumulative Impacts: The operation of any additional infrastructure to strengthen and support the operation of the Houthaalbomen 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.

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

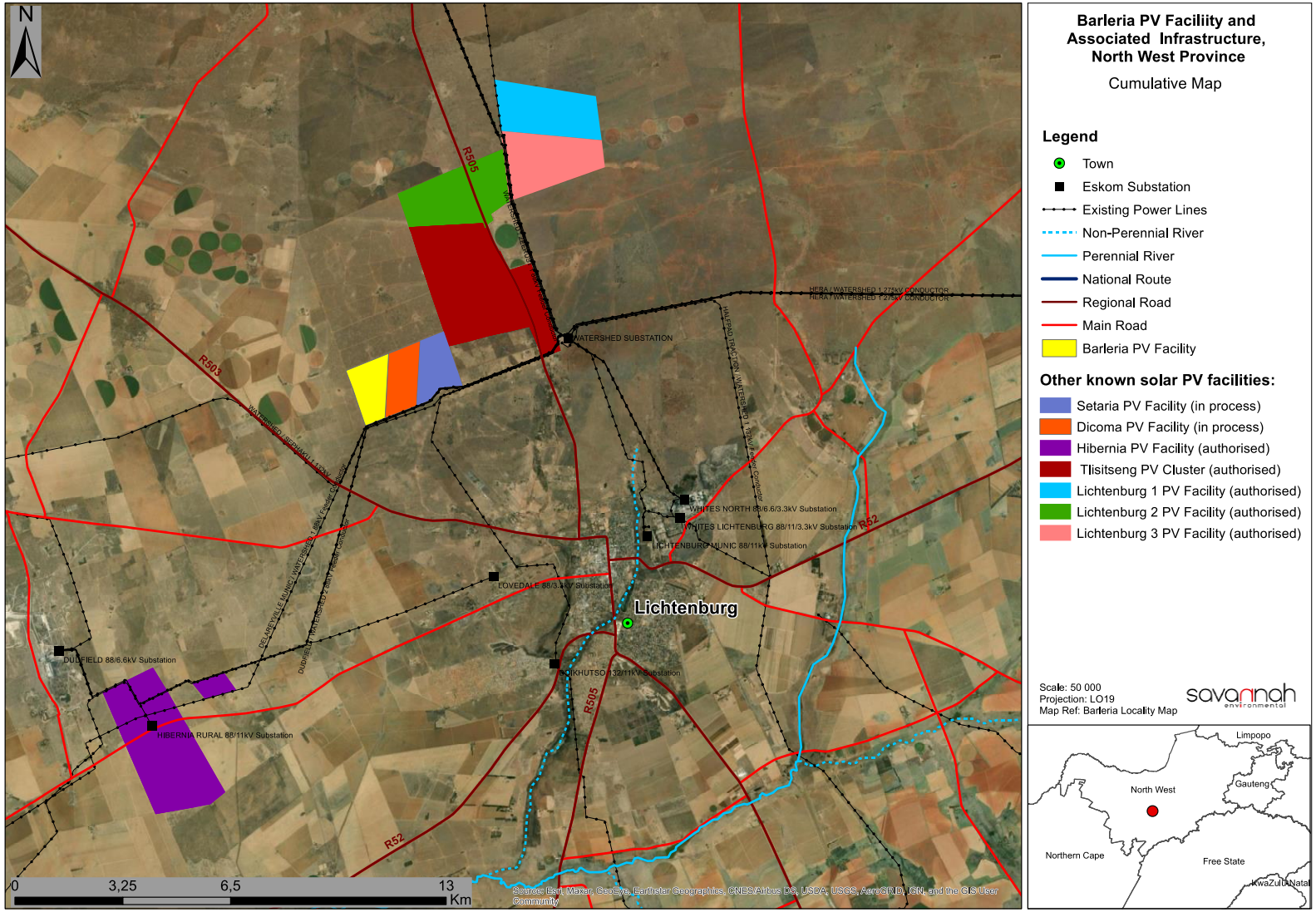

Figure 16 Renewable energy projects within a 20km radius around the proposed Houthaalbomen Grid Connection Infrastructure

The proposed Houthaalbomen grid infrastructure will be located within a 15km radius of five PV facilities that already have been granted Environmental Authorisation (see Figure 16). In addition to the authorised PV facilities, there are two other PV facility applications currently in process (Setaria and Dicoma PV facilities). The cumulative impacts of the proposed project in addition to the authorised solar developments are rated and discussed below.

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

Nature: Decrease in areas with suitable land capability for cattle farming.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	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	Environmental Officer / SHEQ division	During the entire construction, operational and decommissioning phases

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. • 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 Houthaalbomen grid connection infrastructure is considered an acceptable grid infrastructure development within the area of the grid assessment corridor.

The soil forms present within the development area consist mostly of shallow soils underlain by lithic material, rock or hard carbonate that has severe limitations to rainfed crop production. These soils are of the Mispah, Glenrosa and Coega forms. The effective depths of these soils are between 0.05 and 0.30m.

Three small areas with deeper soils of the Nkonkoni are also present with two of these areas having effective soil depth of 0.5m (that measures a total area of 2.6ha) and one area that has effective soil depth of 1.5m (that measures 3.4ha). These three areas are scattered in the grid assessment corridor and the individual areas are not considered a viable size for rainfed crop production. The entire grid assessment corridor has never been used for rainfed or irrigated crop production. There are also no irrigation infrastructure, such as centre pivots or drip irrigation, present within the grid assessment corridor. The current agricultural land use is livestock farming The grazing capacity (according to DALRRD, 2018), is 8ha/LSU, indicating that the grid assessment corridor of 177.1ha (except the 12.4ha already affected by the Watershed MTS), has forage to feed 21 head of cattle.

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 favourably as both grid connection corridor alternatives are considered to be acceptable, permitting that the mitigation measures are followed to prevent soil erosion and soil pollution and to minimise impacts on the veld quality of the farm portions that will be affected. The project infrastructure should also remain within the servitude area within which the power line will be constructed.

13. Reference list

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

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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

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3

APPENDIX 2 - CURRICULUM VITAE OF SPECIALIST

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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

PROFESSIONAL MEMBERSHIP

South African Council for Natural Scientific Professions (SACNASP)

Soil Science Society of South Africa (SSSSA)

Soil Science Society of America (SSSA)

Network for Industrially Contaminated Land in Africa (NICOLA)

LANGUAGES

English (Fluent)

Afrikaans (Native)

French (Basic)

PRESENTATIONS

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

♦

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

♦

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

PROJECT EXPERIENCE (Continued)

Agricultural Agro-Ecosystem Assessments

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

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

Project examples:

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

Sustainable Agriculture

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

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

Project examples:

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

PROFESSIONAL DEVELOPMENT

Contaminated Land Management 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 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

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