Agricultural Compliance Statement for the proposed Olifantshoek 132kV Power Line

Submitted by TerraAfrica Consult cc

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Declaration of the Specialist

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Declaration of Independence

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

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

TerraAfrica Consult cc represented by M Pienaar
July 2020

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1. Introduction

TerraAfrica Consult cc was appointed to conduct the agricultural compliance assessment as part of the Basic Assessment (BAR) process for the proposed Olifantshoek 132kV Power Line. The project applicant is the Gamagara Local Municipality. The only infrastructure that will be constructed as part of this project, is a single circuit power line with capacity of up to 132KV and a 4m wide unsurfaced access road to provide access to the power line servitude during the construction and operation phase of the project. The power line will be connected to the existing Emil Traction Substation directly west of Sishen Mine and will run in a south-western direction all the way to Olifantshoek (Figure **1**). At Olifantshoek, the power line will be connected to the Olifantshoek Substation that has been authorised by the Department of Environmental Affairs (DEA). The Basic Assessment process and the Agricultural Compliance Assessment considers a grid connectioncorridor of 300m wide and 36km long that allows for the optimisation of the infrastructure while avoiding environmental sensitivities.

The grid connection corridor traverses the following affected properties, namely:

- Remaining Extent of the Farm Fritz 540
- Portion 1 of the Farm Fritz 540
- Portion 2 of the Farm Fritz 540
- Portion 4 of the Farm Fritz 540
- Portion 5 of the Farm Fritz 540
- Portion 10 of the Farm Fritz 540
- Remaining Extent of the Farm Gamagara 541
- Portion 1 of the Farm Gamagara 541
- Portion 7 of the Farm Gamagara 541
- Portion 2 of the Farm Dingle 565
- Remaining Extent of the Farm Dingle 565
- Remaining Extent of the Farm Smythe 566
- Remaining Extent of the Farm Murray 570
- Portion 2 of the Farm Murray 570
- Remaining Extent of the Farm Cox 571
- Portion 1 of the Farm Cox 571
- Portion 3 of the Farm Cox 571
- Portion 4 of the Farm Cox 571
- Remaining Extent of the Farm Hartley 573
- Remaining Extent of the Farm Diegaart's Heuwel 765
- Portion 1 of the Farm Neylan 574

2. Purpose and objectives of the compliance statement

The overarching purpose of the Agricultural Compliance Statement that will be included in the Basic Assessment Report, is to ensure that the sensitivity of the site from the perspective of agricultural production to the proposed construction of a power line, is sufficiently considered.

Also, that the information provided in this report, enables the Competent Authority to come to a sound conclusion on the impact of the proposed project on the food production potential of the study area and development area.

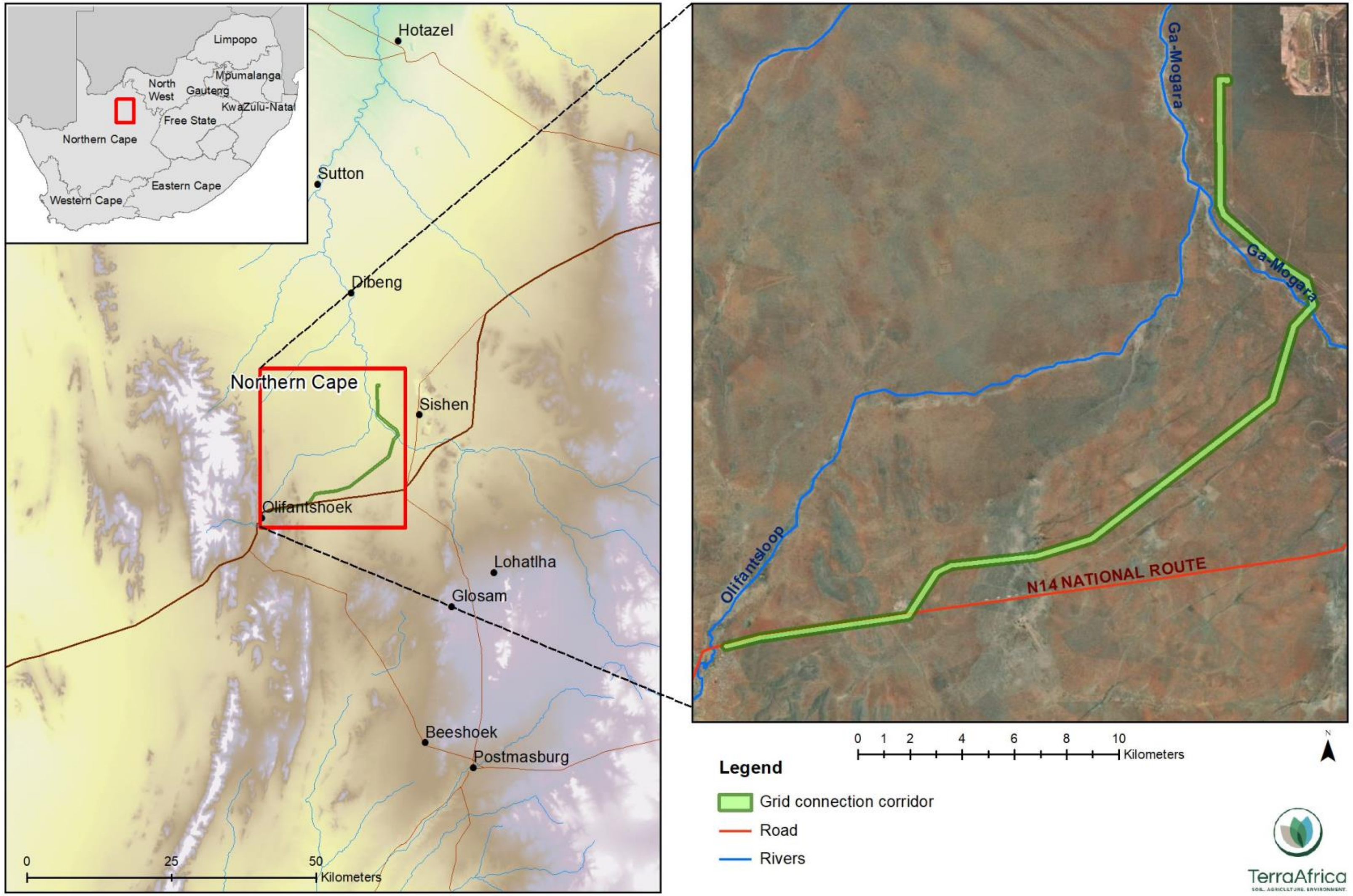

Figure 1: Locality map of the Olifantshoek 132kV Power Line

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.
- As the proposed Olifantshoek 132 kV Power Line will be a linear activity, the compliance statement must confirm whether mitigation and remedial measures will be sufficient to return the land to the current state within two years of completion of the construction phase.
- All data and conclusions are submitted together with the Basic Assessment Report (prepared in accordance with the NEMA regulations) for the proposed Olifantshoek 132kV Power Line.

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

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

3. Terms of Reference

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

- To ensure a thorough assessment, that includes both the desktop assessment of databases and aerial photography as well as on-site verification of the agricultural potential of the area to be affected by the proposed power line.
- Identify and assess potential impacts on both agricultural potential as well as soil, resulting from the proposed Olifantshoek 132kV Power Line Project.
- Identify and describe potential cumulative soil, agricultural potential and land capability impacts resulting from the proposed development in relation to proposed and existing developments in the surrounding area.
- Recommend mitigation, management and monitoring measures to minimise impacts and/or optimise benefits associated with the proposed project.

4. Agricultural Sensitivity

The combined Agricultural Sensitivity of the Olifantshoek 132 kV Power Line grid connection corridor was determined by using the National Environmental Screening Tool (www.screening.environment.gov.za). The Agricultural Theme of the screening tool considers a combination of the national land capability raster data as well as the field crop boundaries as compiled by Department of Agricultural, Forestry and Fisheries (DAFF) (DAFF 2017, DAFF 2019).

The screening report was generated by Savannah Environmental (Pty) Ltd on 6 July 2020. The requirements of GN320 stipulates that a 50m buffered development envelope must be assessed with the screening tool. The servitude for the power line will be 31m wide and the grid connection corridor width used for the assessment is 300m wide. It therefore exceeds the requirement of a 50m buffer zone around the proposed power line.

The results provided by the screening tool indicated that the site has Medium to Low sensitivity to the proposed development (Figure 2).

5. Environmental legislation and soil management guidelines applicable to study

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

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

- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal. This Act requires the protection of land against soil erosion and the prevention of water logging and salinisation of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.
- Section 3 of the Subdivision of Agricultural Land Act 70 of 1970 may also be relevant to the development.
- In addition to this, the National Water Act (Act 36 of 1998) deals with the protection of water resources (i.e. wetlands and rivers).

6. Methodology

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

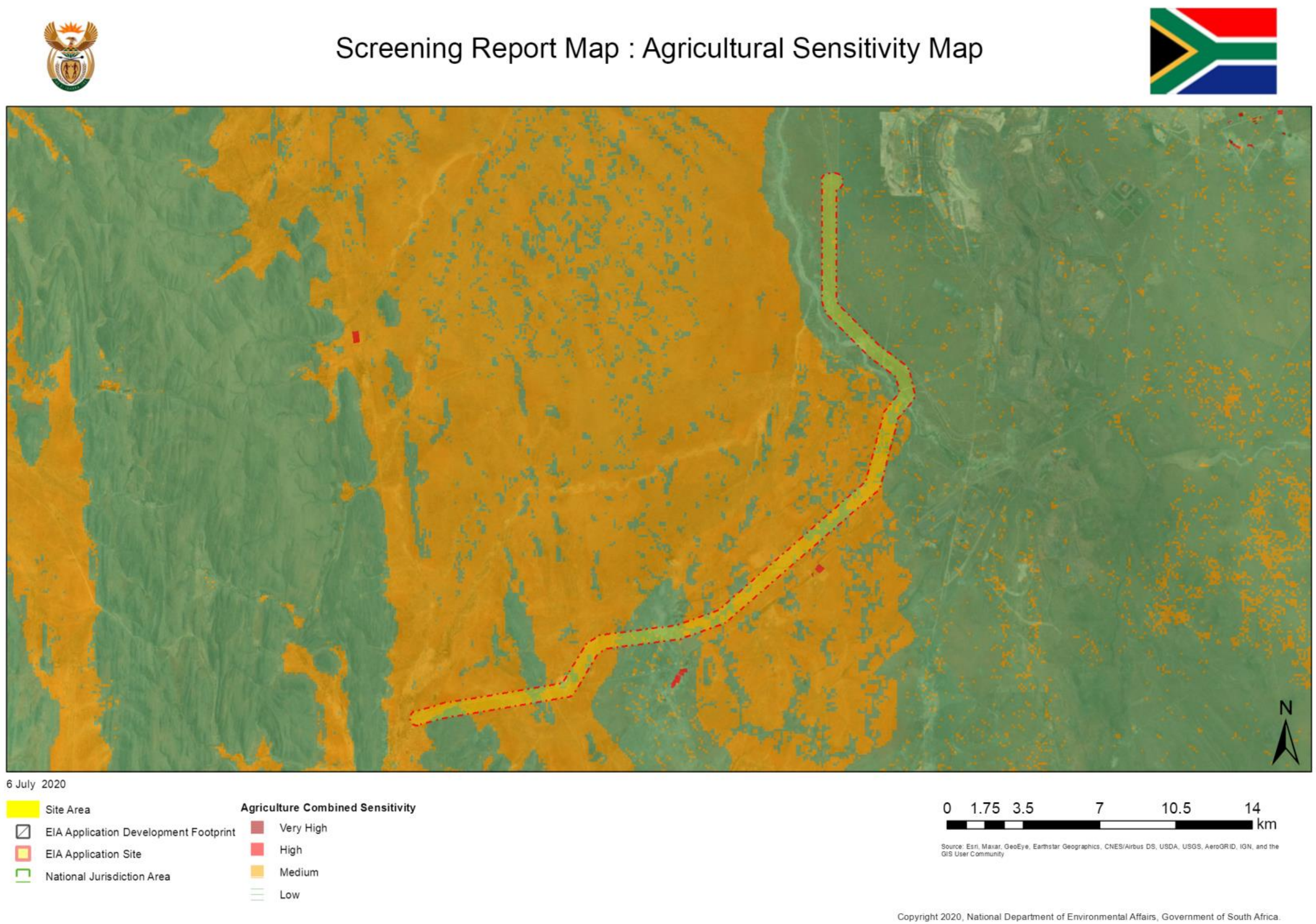

Figure 2 Agricultural Combined Sensitivity of the Olifantshoek 132 kV grid connection corridor (provided by Savannah Environmental, 6 July 2020)

6.1 Desktop analysis of satellite imagery

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

6.2 Site assessment

The land parcels through which proposed grid connection corridor runs, was visited on 23 June 2020. The survey points assessed within and outside the grid connection corridor as well as the respective farms on which the soil survey points and land use observations were made, are depicted in Figure 3. The assessment started on the farm Fritz 540 (the most northern side of the Olifantshoek 132kV Power Line) and continued south, through portions of the farm Gamagara 541. At the Gamagara River, the alignment then turns in a south-western direction and runs through the farms Dingle, Smythe, Murray and Cox, Diegaart's Heuwel, Hartley and Neylan.

For the soil classification, a hand-held bucket soil auger was used to observe soil profiles to a depth of 1.5m or refuse, depending on the effective soil depth of the area. Observations were made regarding soil form, texture, structure, nature and depth of underlying material as well as any signs of existing soil degradation. Other observations included the agricultural activities in the area, the quality of the natural vegetation that support the livestock farming in the area and the presence of existing farming infrastructure that may be affected by the proposed project.

6.3 Desktop analysis of available data sets

Prior to the on-site verification, a number of geo-referenced data sets were analysed to understand what the likely baseline properties of the grid connection corridor and surrounding areas are. The data sets that were analysed are:

- The National Land Capability Evaluation Raster Data Layer was obtained from the DAFF to determine the land capability classes of the grid connection corridor according to this system. The data was developed using a spatial evaluation modelling approach (DAFF, 2017).
- The long-term grazing capacity for South Africa 2018 was analysed for the area and surrounding area of the grid connection corridor. This data set includes incorporation of the RSA grazing capacity map of 1993, the Vegetation type of SA 2006 (as published by Mucina L. & Rutherford M.C.), the Land Types of South Africa data set as well as the KZN Bioresource classification data. The values indicated for the different areas represent long term grazing capacity with the understanding that the veld is in a relatively good condition.
- The Northern Cape Field Boundaries (November 2019) was analysed to determine whether the proposed grid connection corridor falls within the boundaries of any crop production areas. The crop production areas may include rainfed annual crops, non-pivot and pivot irrigated annual crops, horticulture, viticulture, old fields, small holdings and subsistence farming.
- Land type data for the grid connection corridor 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.

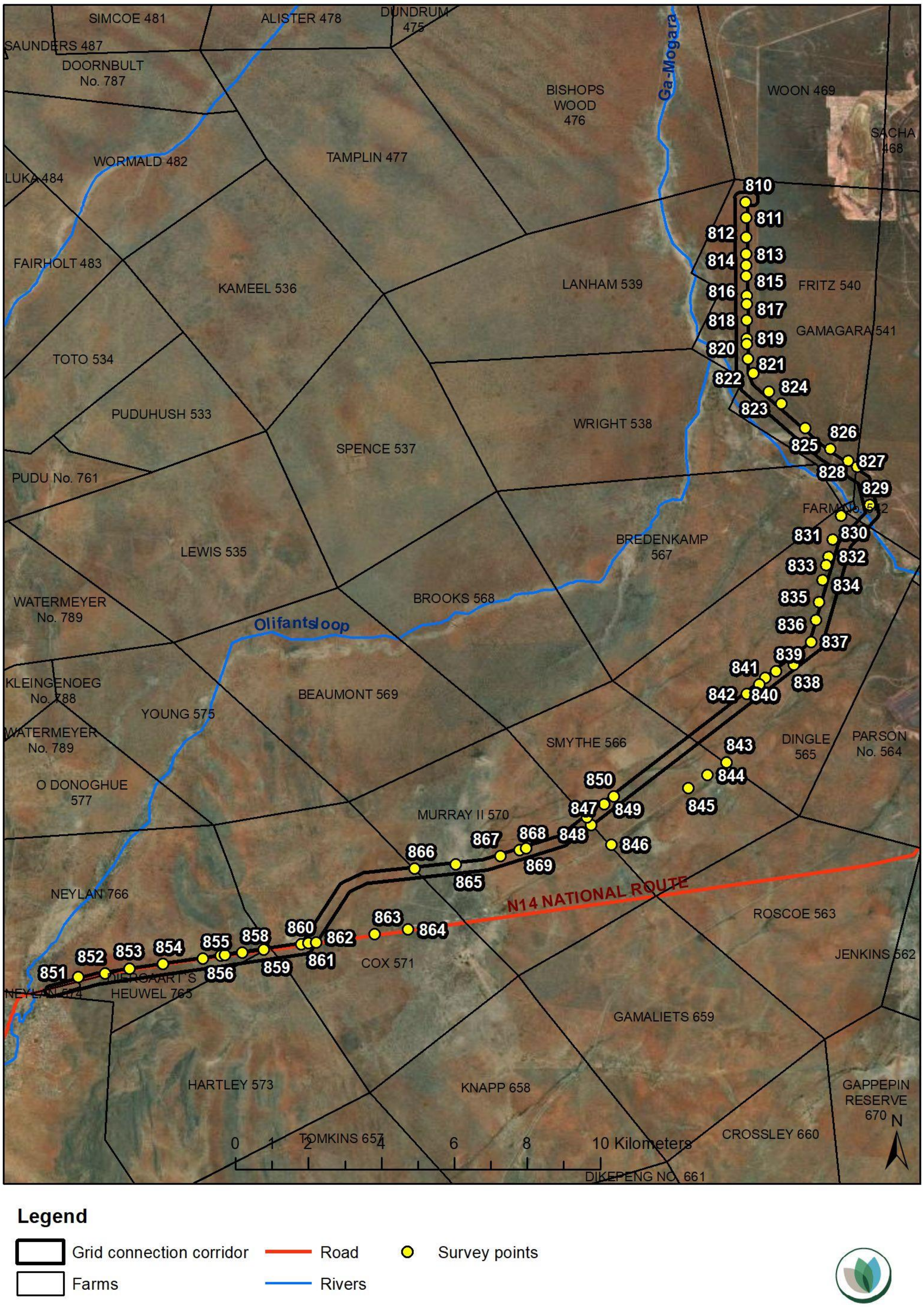

Figure 3 Locality of survey points assessed during the on-site verification of the grid connection corridor

6.4 Impact assessment methodology

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

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

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

S=(E+D+M)P

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

P = Probability

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

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

7. Study gaps, limitations and assumptions

- Two small sections along the grid corridor could not be visited as a result of fenced-off properties. These two sections are located on the farms Cox 571 and Smythe 566. Although access was granted by the landowners, they could not be reached on the day of the site visit to unlock the gates of the specific areas. To address any possible data gaps, soil profiles were classified in close proximity to the grid connection corridor in areas of the same land type classification as the project area.
- No other uncertainties and gaps have been identified that may affect the conclusions made in this report.

8. Results of desktop analysis

8.1 Land capability

The grid connection corridor and the area around it includes eight different land capability classes according to the land capability data (DAFF, 2017). The position of the different land capability classes in the landscape are depicted in Figure 4. The northern section of the grid connection corridor (up to the Ga-Mogara River), mainly consist of land with Low (Class 05) land capability. From there, for approximately 20km of the alignment, land consist of a combination of land capabilities of which the majority of areas ranging Low-Very Low (Class 03) to Low-Moderate (Class 07). Lower land capability (Class 05) dominates the portion of the grid connection corridor that traverses through the farms Murray and Cox. The remaining sections of the grid connection corridor area towards Olifantshoek consist of slightly higher land capability (Class 06) with small patches of Very Low (Classes 01 and 02) are present where rocky hills are located.

8.2 Field crop boundaries

The position of field crops around the proposed Olifantshoek 132kV power line grid connection corridor is illustrated in Figure 5. There are no field crops within the grid connection corridor. Five very small isolated patches of field crop blocks are located south, south-east and north-west from the grid connection corridor – at least 200m away from the grid connection corridor. According to the DAFF data layer, these small field crop blocks consist either of planted pasture or rainfed agriculture.

Figure 4 Land capability classification of the Olifantshoek grid connection corridor and the surrounding area (data source: DAFF, 2017)

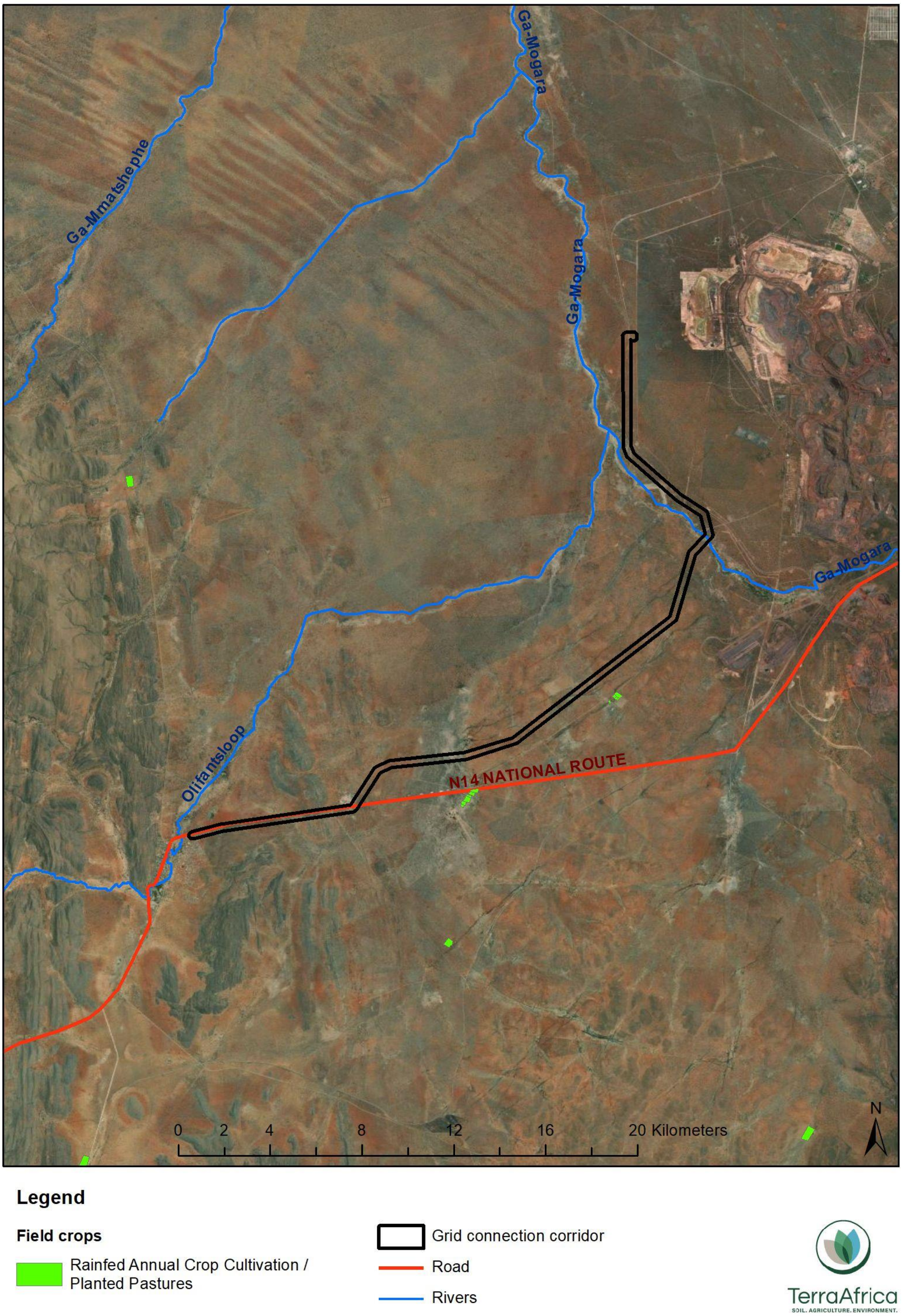

Figure 5 Location of field crop boundaries in the larger area around the proposed Olifantshoek grid connection corridor (data source: DAFF, 2019)

8.3 Grazing capacity

The ideal grazing capacity of a specified area is an indication of the long-term production potential of the vegetation layer growing there to maintain an animal with an average weight of 450 kg (defined as 1 Large Stock Unit (LSU)) with an average feed intake of 10 kg dry mass per day over the period of approximately a year. This definition includes the condition that this feed consumption should also prevent the degradation of the soil and the vegetation. The grazing capacity is therefore expressed in a number of hectares per LSU (ha/LSU) (South Africa, 2018). This unit used for large animals such as cattle can be converted to small animal units or small stock units (SSU). The conversion factor is 4 small stock units that equates one large stock unit. Small stock units are more applicable in areas where sheep and goat farming is a more sustainably type of livestock farming.

Following the metadata layer obtained from DAFF, the grazing capacity of almost the entire power line corridor, is 13ha/LSU. Only a small section directly east of Olifantshoek, has grazing capacity of 15ha/LSU (Figure 7). This can be converted to approximately 3 to 4ha/SSU, depending on the veld quality of the specific area. Although livestock grazing may not be possible in the direct areas of impact during the construction phase of the Olifantshoek 132 kV power line, it is anticipated that impact will be of short-term duration and that livestock grazing will be possible around the power line pylons.

8.4 Land types

The entire grid connection corridor that was assessed, consist of four different land types. Land Type Ae6 is the dominant land type in the area directly outside Olifantshoek for approximately 13km (in the direction towards Kathu). Small areas consisting of Land Type Ic2 may also be present in this area. The remaining length of the grid connection corridor consists mainly of two land types namely Land Type Ag110 and Land Type Ae7. Land Type Ae7 is present from approximately 21km east of Olifantshoek up to where the alignment runs in a northern direction near the Ga-Mogara River. The terrain units, slope and soil forms within each land type is described below.

<u>Land Type Ae6</u>

Following Figure 6, this land type also has four different terrain units with the valley bottoms (Terrain unit 5) located at approximately 1070 metres above sea level (m.a.s.l.), surrounded by flat toe-slope positions (Terrain unit 4) that with minimal occurrence of hills of which the slope is approximately 8 to 30% (Terrain unit 3). The toe-slope positions are dominated by deep Hutton soils (deeper than 1.2m) with sandy-loam and loamy sand texture. The crest (Terrain unit 1) and mid-slope positions consist mainly of rock interspersed with patches of shallow Hutton and Mispah soil forms (0.1 to 0.25m deep).

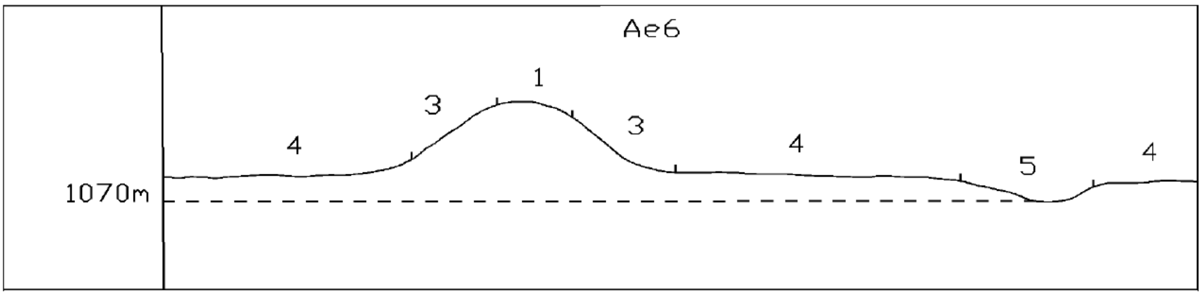

Figure 6: Terrain form sketch of Land Type Ae6

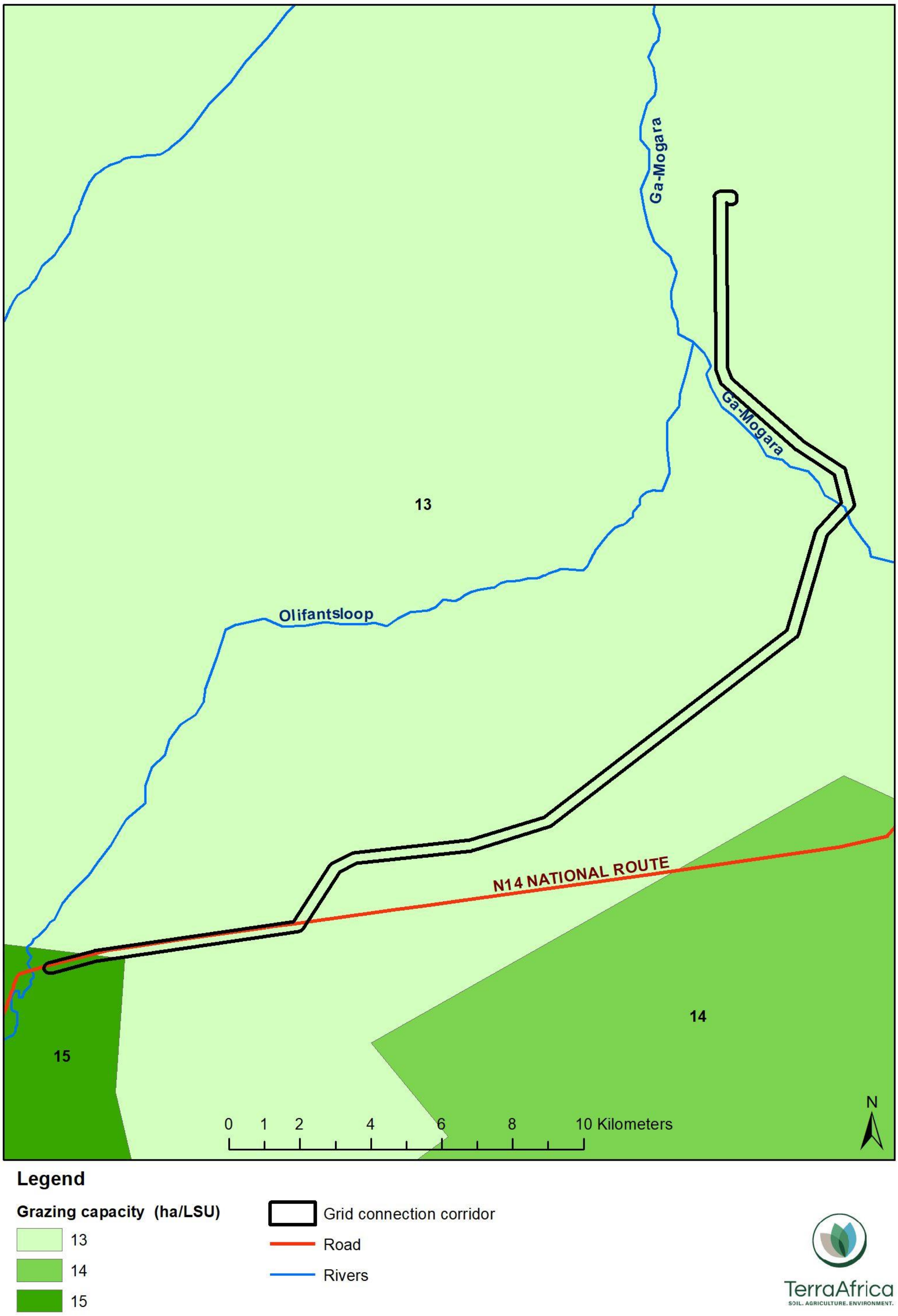

Figure 7 Grazing capacity of the proposed Olifantshoek grid connection corridor as well as the surrounding area (data source: DAFF, 2018)

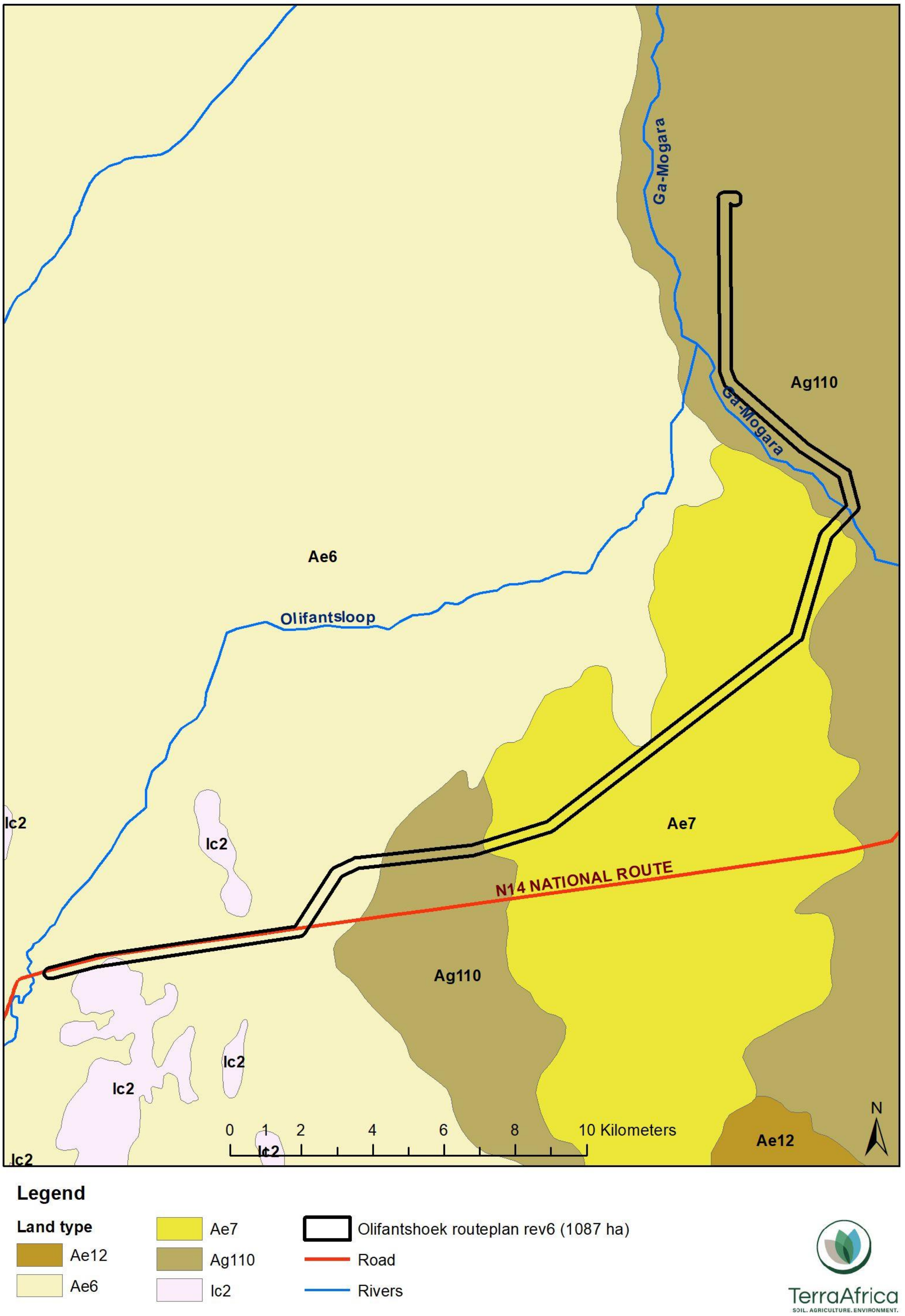

Figure 8 Land type classification of the proposed Olifantshoek grid connection corridor and the surrounding area

Land Type Ic2

The small patches of Land Type Ic2 that are present in the area of the grid connection corridor, represent a hilly terrain consisting of four different terrain (Figure 9). The largest area of this land type consists of rock in mid-slope positions (Terrain unit 3) with slope ranging between 12 and 50% while the crest positions (Terrain unit 1) largely consist of rock (approximately 95% of the areas). The toe-slope and valley bottoms are dominated by Hutton soils of varying depth (between 0.05 and 0.6m deep). In some areas, the toe-slope position may be absent.

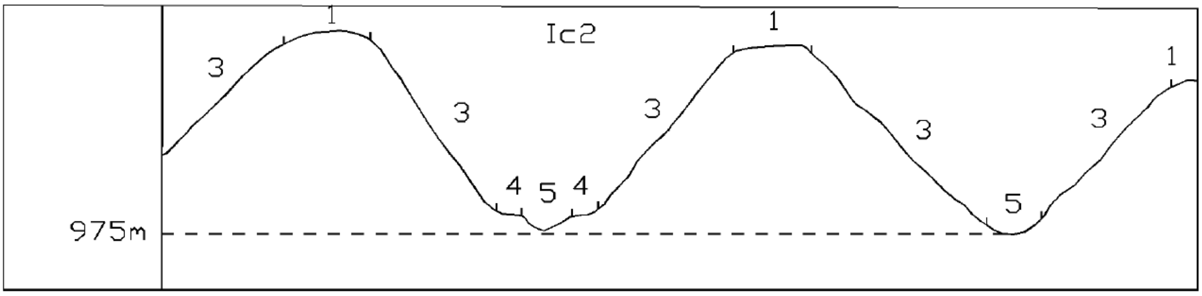

Figure 9: Terrain form sketch of Land Type Ic2

Land Type Ag110

Land Type Ag110 consists of only two terrain units i.e. Terrain units 4 and 5 (Figure 10), both with slope ranging between 0 and 2%. This land type represents shallow, rocky soil profiles of the Mispah and Hutton forms that range in depth between 0.02m and 0.3m. Depth limiting materials consist of rock and hardpan carbonate horizons. Approximately 90% of the area covered by this land type consists of toe-slope positions (Terrain unit 4) while valley bottoms (Terrain unit 5) make up the remaining 10%. The valley bottoms may consist of approximately 3% stream beds.

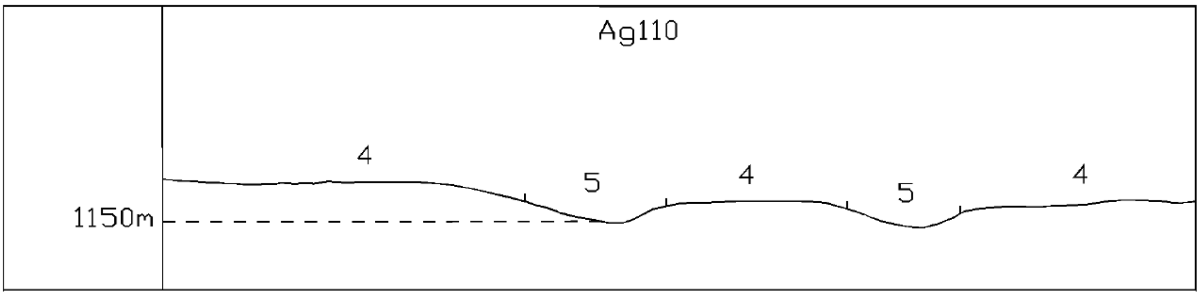

Figure 10: Terrain form sketch of Land Type Ag110

Land Type Ae7

Following Figure 11, Land Type Ae7 can either have three or four terrain units along a hillslope, depending on the landform (Figure 11). The crest positions (Terrain unit 1), consist largely of rock and shallow Hutton profiles (up to 0.3m deep). The mid-slope positions consist of the Hutton soil form with profiles ranging in depth between 0.3m and deeper to deeper than 1.2m. The toe-slope and valley bottoms either consist mostly of Hutton soil with a small likelihood for the presence of the Valsrivier and Oakleaf soil forms. Approximately 10% of the valley bottom positions (Terrain unit 5) may consist of stream beds.

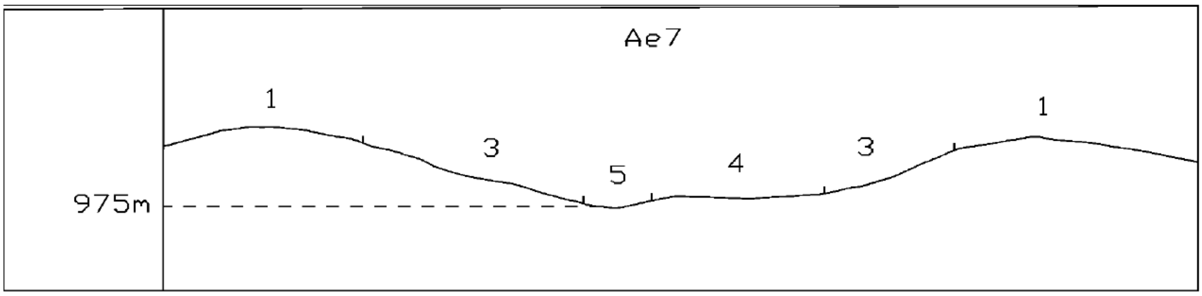

Figure 11: Terrain form sketch of Land Type Ae7

9. Results of on-site inspection

9.1 Soil forms

Eight different soil forms have been identified within the grid connection corridor. The soil forms are Mispah, Glenrosa, Hutton, Vaalbos, Nkonkoni, Coega, Plooysburg and Lichtenburg. Where the grid connection corridor traverses over hill crests, the soil consist mainly of solid rock interspersed with pockets of shallow Mispah and Glenrosa soil. The soil profiles observed in these areas are shallower than 0.25m. Other very shallow soil profiles include that of the Coega form where an orthic topsoil horizon (between 0.05 and 0.25m thick) overlies hardpan carbonate horizons (Figure 12). Profiles of the Coega soil form was mainly seen within the grid connection corridor on the farms Dingle, Smyth and Murray.

Figure 12 Photographic evidence of an exposed Coega soil profile on Portion 2 of the farm Murray 570

Deeper profiles of the Nkonkoni (Figure 13), Vaalbos and Plooysburg forms are present in pockets between the dominant shallow rocky profiles within the grid connection corridor. All three these soil forms consist of chromic (red) structureless topsoil underlain by red structureless topsoil up to a soil depth of 0.5m. The differentiation between the three soil forms are dependent on the nature of the underlying material i.e. hard rock (Vaalbos), lithic material (Nkonkoni) and hard carbonate (Plooysburg).

Figure 13 Example of the Nkonkoni profile on the farm Dingle

Deep soil profiles of the Hutton form were mainly found on the farms Fritz, Gamagara, Diergaart's Heuwel and Neylandt. These profiles have sandy-loam and loamy-sand texture and the profiles classified are mostly deeper than 1.5m. An area with exposed deep Hutton profiles were identified on the farm Neylandt, just outside the municipal wastewater processing area. Only one area with a plinthic soil form (Lichtenburg) was identified on the Remainder Portion of the farm Murray 570. The soil form consist of red orthic topsoil underlain by red apedal subsoil that is restricted in depth by a hard plinthic layer at 1.2m (Figure 14).

Figure 14 Photographic evidence of the hard plinthic horizon at 1.2m depth of the Lichtenburg profile

9.2 Land use and agricultural activities

The current land use on all the land parcels assessed, is animal farming. The animals include game animals such as zebra, eland, springbok and warthog as well as livestock animals. The livestock animals are cattle, sheep, goats and horses (Figure 15). The goats are pure-bred

Kalahari Reds and the rams that are sold at a premium price to stock breeders. Other land uses on the farm portions include accommodation and restaurant facilities on Portion 2 of the farm Murray 570, a brickyard (called Langeberg Stene) on the farm Cox 571 and the Emil Traction Substation on the Remaining Extent of the Farm Fritz 540 (Figure 16).

Figure 15 Zebra grazing on the Portion 2 of the Farm Murray 570

Figure 16 The Emil Traction Substation on the Remaining Extent of the Farm Fritz 540

In confirmation of the field crop data layer for the Northern Cape (DAFF, 2019), the entire grid connection corridor has no rainfed or irrigated crop fields. No special horticultural structures such as tunnels or greenhouses are present within this area.

9.3 Sensitivity analysis

Following the consideration of all the desktop and gathered baseline data above, the area is considered to have Low Sensitivity to the proposed development. Although the dominant shallow, rocky profiles are interspersed with areas with medium-deep to deep soil profiles, the semi-arid climate and especially the erratic rainfall patterns of the area, makes these areas not suitable for rainfed agriculture, regardless of the soil form and effective soil depth. The anticipated impacts of the proposed project on the soil properties and land productivity, are discussed in Section 10 below.

10. Results of on-site inspection

10.1 Project description

The proposed Olifantshoek 132kV Power Line project will consist of the construction and operation of grid connection infrastructure consisting of a single circuit 132kV power line. The grid connection infrastructure will only include a single circuit power line with capacity of up to 132kV and a 4m wide unsurfaced access road to provide access to the power line servitude during the construction and operation phase. The height of the power line pylons will be up to 20m. The servitude of the power line will be 31m in width.

10.2 Impact significance rating

The proposed Olifantshoek 132kV Power Line will grid connection corridor that was assessed largely coincides with an existing power line that connects the electricity grid between Kathu and Olifantshoek. Although a grid connection corridor of 300m wide and 36km long was assessed, the width of the linear development will constitute the width of the servitude that will be registered for the purpose of the power line.

The impacts on soil and agricultural productivity of the servitude within which the power line will be constructed, will mainly occur during the construction phase. Below follows a rating of the significance of each of the impacts.

10.2.1. <u>Impact: Reduction of land with natural vegetation for livestock grazing</u>

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 access routes 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 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 animals 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 Olifantshoek 132kV Power Line 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 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 and even though the project area is in a semi-arid to arid climate, the intensity of single rainstorm may result in soil particles being transported away. 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 Olifantshoek 132kV power line 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.

11. Assessment of cumulative impacts

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

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

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

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

12. Acceptability statement

Following the data analysis and impact assessment above, the proposed Olifantshoek 132kV Power Line is considered an acceptable grid infrastructure development within the area of the grid connection corridor that was assessed.

The grid connection corridor consists largely of shallow rocky soil where soil depths are shallower than 0.25m. Smaller areas with deep, red apedal soils are present on the farm Neylan as well as the farms Fritz and Gamagara. A small, isolated section of the Lichtenburg soil form (1.2m deep) is present on the Remainder Portion of the Farm Murray 570. Although these areas have soils that have no physical limitations to crop production, the crop production potential of the area are very low. This is confirmed by the land capability data that shows that the entire grid connection area has land capability that ranges from Very Low (Class 01) to Low-Moderate (Class 07).

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, 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.

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

13. Reference list

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

South Africa (Republic) 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.

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

APPENDIX 1 - CURRICULUM VITAE OF SPECIALIST

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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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