ENVIRO-SOLUM CONSULTING

DIGGING DEEPER FOR A BRIGHTER TOMORROW

# Site Sensitivity Verification and Soil, Land Use, and Agricultural Compliance Statement For the Proposed Kimberly Strengthening Phase 3 Project Under the Jurisdiction Of John Taolo Gaetsewe District Municipality in Northern Cape and Dr Ruth Segomotsi Mompati District Municipality in North West Provinces, South Africa.

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**DOCUMENT CONTROL**

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| **Report Name** | Site Sensitivity Verification and Soil, Land Use, and Agricultural Compliance Statement: For the Proposed Kimberly Strengthening Phase 3 Project Under the Jurisdiction Of John Taolo Gaetsewe District Municipality in Northern Cape and Dr Ruth Segomotsi Mompati District Municipalities in North West, South Africa. |
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| **Submitted to** | Diges Group |
| **Author** | Tshiamo Setsipane, (Pr. Sci. Nat) |
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# EXECUTIVE SUMMARY

Diges Group appointed Enviro-Solum Consulting to conduct a soil, land use, and land capability assessment as part of the Environmental Impact Assessment (EIA) for the proposed Kimberley Strengthening Phase 3 Project.

The proposed powerline route runs from the Ferrum substation near Kathu (Northern Cape), north to the Mookodi substation near Vryburg (North West Province). The proposed Kimberly Strengthening Phase 3 project area (hereafter referred to as the study area) includes the Gamagara Local Municipality, Joe Morolong Local Municipality, Ga-Segonyana Local Municipality in the Northern Cape Province, and the Greater Taung Local Municipality and Naledi Local Municipality in the North West Province.

The study area is in the hot semi-arid climate zone, which is defined by hot, often extremely hot, summers and mild to cool winters with little to no precipitation. Hot semi-arid temperatures are most common along the edges of subtropical deserts. The western portion of the study region (mainly in the Northern Cape Province) experiences rainfall ranging from 201 to 400 mm. The eastern portion of the study region, primarily in the North West Province, experiences rainfall ranging from 401 to 600 mm. The study area can thus be defined as water-stressed. While the planting dates for rain-fed agriculture are limited under these conditions, a few suitable crops can produce high yields if planted on time.

Based on the observations during the site assessment, the dominant soils within the study area are Clovelly, Plooysburg, Nkonkoni/Hutton, Mispah/Glenrosa, Dundee (associated with the watercourse), and Witbank/Johannesburg. The majority of the soils occurring within the study area meet the conditions for agricultural suitability to a certain extent, and these conditions include:

1. Adequate depth (greater than 60 cm) to accommodate root development for the majority of cultivated crops;
2. Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
3. Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit and
4. Good climatic conditions, such as sufficient rainfall and sunlight, increase crop variety.

The summary findings of the soils identified in the study area, along with their corresponding land capability and agricultural potential status, are illustrated in Tables A and B below.

Table A: Summary findings within the study area.

| Study Area (300 m assessment corridor) | | | | |
|---|---|---|---|---|
| **Soil Forms** | **Area (Ha)** | **Percentage (%)** | **Land Capability** | **Agricultural Potential** |
| Clovelly | 9842.54 | 63.1 | Arable (Class II) | High |
| Nkonkoni/Hutton | 3351.22 | 21.5 | Arable (Class III) | Moderately High |
| PlooysburgTubatse | 10005.50 | 6.4 | | |
| Dundee | 34.77 | 0.2 | Watercourse (Class V) | Low |
| Mispah/Glenrosa | 1230.10 | 7.9 | Grazing (Class VI) | Moderately Low |
| Witbank/Johannesburg | 129.26 | 0.8 | Wilderness (Class VIII) | Very Low |
| **Total Enclosed** | **15 593.40** | **100** | | |

Table A: Summary findings within the study area.

| Soil Form | Land Capability Groups | DAFF (2017) Classification |
|---|---|---|
| Clovelly | Arable Land | 11. High |
| Nkonkoni/Hutton | Arable Land | 9. Moderate to High |
| Plooysburg | | |
| Dundee | Watercourse | 4. Very Low to Low |

| Soil Form | Land Capability Groups | DAFF (2017) Classification |
|---|---|---|
| Mispah/Glenrosa | Grazing Land | 7. Low to Moderate |
| Witbank/Johannesburg | Wilderness/Disturbed | 1. Very Low |

The study area, which encompasses a 300-meter assessment corridor, has been proposed to serve as the locality route for the proposed powerline associated with the Kimberly Strengthening Phase 3 project. Based on inherent soil properties, the majority of the study area is dominated by arable soils (91.1%) due to the weak apedal structure, which favours root and water penetration at greater depths. However, these soils possess an extremely low clay content. This deficiency directly impacts the soils' water-holding capacity, making them less viable for sustained agricultural activities, particularly under dryland farming conditions. While they could theoretically support some level of irrigation, the very low clay content significantly restricts this potential, as clay plays a key role in retaining moisture. Given the sandy composition of the soils, careful management and scheduling of water supply are imperative. Without a reliable and sufficient water source, the potential productivity of the area would be severely compromised, as these soils would struggle to maintain optimal moisture levels necessary for healthy crop growth. Consequently, successful irrigation strategies must be implemented to maximise agricultural output. Considering the overall agricultural potential of the region, it appears to be more conducive to livestock farming rather than crop production. The hot and arid climate characteristics suggest that the land is primarily suited for practices such as game farming or cattle ranching, which are better aligned with the environmental conditions and soil capabilities of the study area.

An agricultural impact refers to any significant change that affects the long-term ability of a particular land area to sustain agricultural production. Such alterations commonly arise when agricultural activities are restricted or eliminated in regions that are experiencing developmental changes, such as urbanisation or industrial expansion.

The proposed overhead powerline project is not anticipated to have a detrimental impact on the agricultural activities occurring within the study area, as it will not affect the future capacity of agricultural production in the study area. All existing agricultural operations, particularly those focused on cattle and game farming, will be able to proceed as they currently do without interruption or constraint beneath the powerline. However, it is important to consider that during both the construction and decommissioning phases of the powerline and pylons installation, there may be instances of topsoil loss and land degradation due to the necessary land disturbance. This could pose temporary challenges for land management and agricultural practices in the immediate vicinity. It is crucial for project planners to implement appropriate mitigation strategies to minimise these impacts and ensure that the agricultural land can be restored to its original condition as efficiently as possible following construction activities.

The potential impact of the project can be effectively mitigated through the implementation of standard, generic measures inherent in the project's engineering design, as well as by adhering to standard best practices for construction sites, all of which are detailed in the Environmental Management Programme (EMPr) as contained within Part B-Section 1 and 2 of the generic EMPr and standards for powerlines and substations. The development of the powerline is anticipated to result in only minimal to no loss of future agricultural production potential. Therefore, the agricultural impact of the proposed powerlines is deemed to be of very low significance.

The proposed development will benefit the local community through job creation, skills development opportunities, and training, mainly during the construction phase, albeit for a short period. This will, in turn, assist in reducing poverty levels and indirectly strengthen the country's electricity supply.

In line with the procedures for evaluating and establishing minimum standards for reporting on recognised environmental themes according to Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when seeking environmental authorisation, it is necessary to verify the current land use and the environmental sensitivity of the site in question as identified by the national web-based environmental screening tool by conducting a site sensitivity verification.

The outcome of this site sensitivity verification is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being high sensitivity in terms of agricultural sensitivity. Based on the outcomes of the field assessment, this was found to have a low significant impact. The sensitivities allocated to the agricultural theme are presented in Table C below.

Table C: Summary of the screening tool vs specialist-assigned sensitivities and motivation.

| Study Area | Screening Tool Assigned Sensitivity | Verified Sensitivity | Reasoning for verification outcome verification |
|---|---|---|---|
| **Powerline Assessment Corridor** | High Sensitivity | Low Sensitivity | The study area is primarily characterised by arable soils (Class II and IV); however, its suitability for successful dryland agriculture is low due to climatic constraints and a lack of irrigation options. The region experiences erratic and very low rainfall, essential for successful dryland farming. Without an irrigation scheme and a robust fertilisation program, the study area will be limited to grazing and wildlife uses. Furthermore, the high evaporation rate typical of the hot, dry climate will necessitate regular irrigation if crops are to be grown successfully. |

It is the opinion of the specialist that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area is made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

## DECLARATION OF INDEPENDENCE

- I, Tshiamo Setsipane, in my capacity as a specialist consultant, hereby declare that I:
- Act/acted as an independent specialist to Diges Group for this project.
- Do not have any personal, business, or financial interest in the project except for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2014, as amended.
- Will not be affected by the outcome of the environmental process, of which this report forms part.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion about the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2014, as amended.

TSetsipane

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Tshiamo Setsipane (Pr. Sci. Nat)
14 November 2024

## DOCUMENT GUIDE

This report was compiled according to the following information guidelines for a specialist report in terms of the Environmental Impact Assessment (EIA) Sections 24(5)(a) and (h) and 44 of The National Environmental Management (NEMA) Act 1998, as summarised in the Table below.

The table below provides the criteria for the specialist assessment and minimum report content requirements for impacts on agricultural resources for activities requiring environmental authorisation related to Government Notice No. 320 Protocol as published in Government Gazette 43110 dated 20 March 2020.

**Table A: Document guide according to Government Notice 320.**

| **Theme-Specific Requirements as per Government Notice No. 320<br>Agricultural Resources Theme – Compliance Statement** | | |
|---|---|---|
| **NO.** | **SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS** | **SECTION IN REPORT/NOTES** |
| **3** | **Agricultural Compliance Statement** | |
| 3.1 | **The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP.** | Appendix B |
| 3.2 | **The compliance statement must:** | |
| 3.2.1 | be applicable to the preferred site and proposed development footprint; | Section 1 |
| 3.2.2 | confirm that the site is of "low" or "medium" sensitivity for agriculture; and | Section 5.2 |
| 3.2.3 | indicate whether or not the proposed development will have an unacceptable impact on the site's agricultural production capability. | Section 5.2 |
| 3.3 | The compliance statement must contain, as a minimum, the following information: | |
| 3.3.1 | contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae; | Appendix B |
| 3.3.2 | a signed statement of independence; | Declaration Section |
| 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; | Section 2.5 |
| 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 5.2.2 |

| | | |
|---|---|---|
| 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 5.2.1 |
| 3.3.6 | any conditions to which the statement is subjected; | Section 5.2.2 and Section 6 |
| 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<br>requirements for inclusion in the EMPr; and | Section 6 |
| 3.3.9 | A description of the assumptions made as well as any uncertainties or gaps in knowledge or data. | Section 1.6 |
| 3.4 | A signed copy of the compliance statement must be appended to the Basic<br>Assessment Report or Environmental Impact Assessment Report. | Declaration Section |

**TABLE OF CONTENTS**

**LIST OF TABLES**



LIST OF FIGURES

# 1. INTRODUCTION

Diges Group appointed Enviro-Solum Consulting to conduct a soil, land use, and land capability assessment as part of the Environmental Impact Assessment (EIA) for the proposed Kimberley Strengthening Phase 3 Project.

The proposed powerline route runs from the Ferrum substation near Kathu (Northern Cape) to the Mookodi substation near Vryburg (North West Province). The proposed Kimberly Strengthening Phase 3 project area (hereafter referred to as the study area) includes the Gamagara Local Municipality, Joe Morolong Local Municipality, Ga-Segonyana Local Municipality in the Northern Cape Province, and the Greater Taung Local Municipality and Naledi Local Municipality in the North West Province.

To account for the potential edge impacts of the proposed development, the powerline route was assigned a 300-meter evaluation corridor. Figure 1 shows a locality map of the proposed study area.

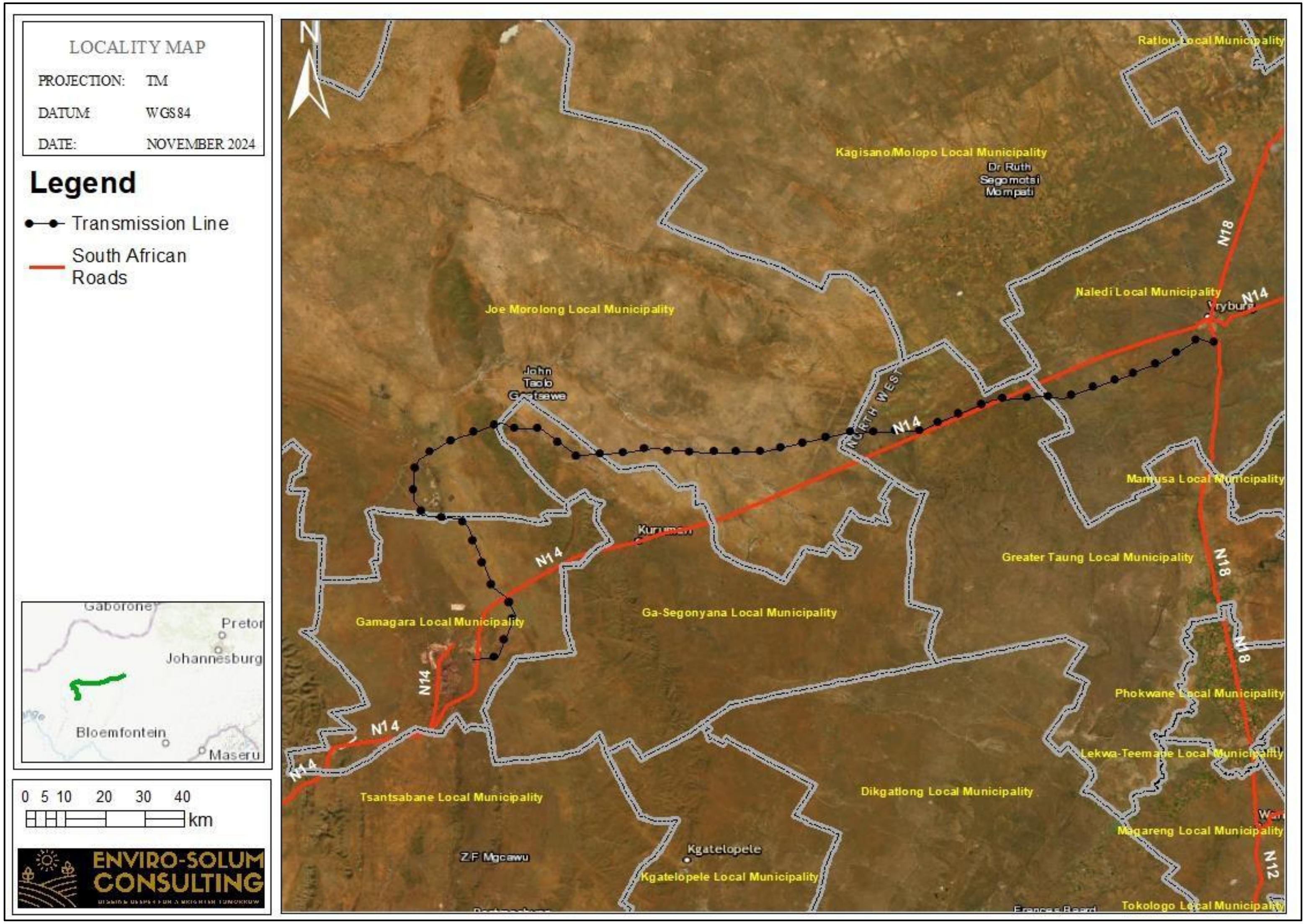


Figure 1: Locality of the study area in relation to the surrounding areas.

## 1.1 PROJECT DESCRIPTION

The study area is proposed to serve as the locality of the Kimberly Strengthening Phase 3 Project powerline. The full scope of works proposed by the National Transmission Company South Africa (NTCSA) SOC Ltd entails:

(i) Construction and operation of ±260km, 400kV transmission powerline from Ferrum Substation to Mookodi Substation.

(ii) Upgrade the Mookodi Substation by installing:
- 1 X 100MVAr busbar reactor at Mookodi 400kV busbar;
- 1x400kV Mookodi feeder bay;
- 1X400kV Line reactor at Mookodi 400kV.

(iii) Upgrade the Ferrum Substation by installing
- 1 X 100MVAr busbar reactor at Ferrum 400kV busbar;
- 1x400kV Ferrum feeder bay; and
- 1X400kV Line reactor at Ferrum 400kV

## 1.2 AIMS AND OBJECTIVES OF THE STUDY

The objective of the Soil, Land Use, and Land Capability is to fulfil and align the proposed project with the requirements of the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) of South Africa. This act aims to promote the conservation of soil, water sources, and vegetation, as well as the control of weeds and invader plants by managing natural agricultural resources. Thus, the proposed study aims to determine the possible impacts of the proposed development on the soil, land use, land capability, and agricultural potential and identify areas of high sensitivity within the study area. This will be achieved by considering parameters such as soil quality, drainage, topography, climate, and water availability and providing sound input to ensure that land is used sustainably and responsibly. As such, this specialist report has assessed and considered the following:

- The soil forms occurring within the study area;
- The associated land capability and agricultural sensitivity of the soils occurring within the study area;
- Discussion of the land capability and sensitivity in terms of the soils, water availability, surrounding development, and current status of land;
- Discussion of potential and actual impacts as a result of the proposed development; and
- Provide mitigation for the impacts as part of the Environmental Management Programme (EMPr).

## 1.3 SUITABILITY OF SOILS FOR AGRICULTURAL CULTIVATION

Assessing soil suitability for agricultural cultivation rests primarily on identifying soils suited to crop production. For soils to be classified as being suitable for crop cultivation, they must have the following properties:

- Adequate depth (greater than 60 cm) to accommodate root development for the majority of cultivated crops;
- Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
- Sufficient clay and organic matter to provide nutrients for growing crops;
- Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit;
- Adequate clay content and deep enough water table to allow for water storage; and
- Good climatic conditions, such as sufficient rainfall and sunlight, increase crop choice variety.

### 1.4 APPLICABLE LEGISLATION

The most recent South African Environmental Legislation that needs to be considered for any new or expanding development regarding assessment and management of soil and land use includes:

- The National Environmental Management Act. 1998 (Act 107 of 1998) requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided, be minimised and remedied.
- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal.
- The Conservation of Agriculture Resources (Act 43 of 1983) requires the protection of land against soil erosion and the prevention of water logging and salinisation of soils employing suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges, and watercourses is also addressed.

### 1.5 TERMS OF REFERENCE

The terms of reference for this study are to fulfil the requirements of the Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The study area includes land classified by the national web-based environmental screening tool as having high sensitivity for impacts on agricultural resources, as depicted in Figure 2 below for the powerline. The level of agricultural assessment required in terms of the protocol (and hence in terms of NEMA) is, therefore, an Agricultural Agro-Ecosystem Specialist Assessment. Nonetheless, the protocol stipulates that an Agricultural Compliance Statement must be prepared if a site sensitivity verification assigns a low sensitivity or, in the case of a linear development where the impacts on the resource are temporary, and the specialist certifies that the land can be returned to the current land capability. The terms of reference for such an assessment, as stipulated in the protocol, are listed in the **Document Guide** with relevant section numbers of this report, which also fulfils each stipulation.

The summarised terms of reference applicable to the Soils, Land Capability, and Land Use Study include the following:

- A review of available desktop information about the study area site and compile various maps illustrating the desktop data;
- Discussion of the relevant desktop literature;
- Conduct a soil classification survey covering the study area according to the South African Soil Classification System: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018);
- Determination of the current (baseline) soil physical, climatic conditions, and land uses, as well as the current land capabilities and agricultural sensitivity associated with the identified soil forms present in the study area;
- Identification and assessment of the potential impacts of the different project phases on the baseline soil, land use, and land capability properties as a result of the proposed development;
- Development of mitigation and management measures to minimise the negative impacts anticipated from the proposed development and
- Compile soil, land use, and land capability reports based on the field-finding data under on-site conditions.

## 1.6 ASSUMPTIONS, UNCERTAINTIES, LIMITATIONS, AND GAPS

The following assumptions, uncertainties, limitations, and gaps were applicable for the soil, land use, and land capability assessment:

- It is assumed that the infrastructure components will remain as indicated on the layout and that the activities for the construction and operation of the infrastructure are limited to that typical for a project of this nature;
- The soil survey was confined to the study area outline with consideration of various land uses outside the study area;
- During the site assessment and compilation of the report, employment figures pertaining to the study area could not be sourced, and
- Soil profiles were observed using a 1.5m hand-held soil auger; thus, a description of the soil characteristics deeper than 1.5m cannot be given.

## 2. METHODOLOGY

The assessment of the Study Area's agricultural potential was based on a combination of desktop studies to gather general information, site visits for status quo assessment, soil classification and characterisation, and validation of the information generated from the desktop studies.

### 2.1 Desktop Study and Literature Review

Before beginning the field assessment, a literature review and background study were conducted to gather the study area's predetermined soil, land use, and land capability data. The data was sourced from the Soil and Terrain (SOTER) database and the Natural Agricultural Atlas of South Africa Version 3:
(https://ndagis.nda.agric.za/portal/apps/webappviewer/index.html?id=8b72eb2a25c04660a1ab2b562f6ec0bf)

### 2.2 Site Survey and Sensitivity Verification

A desktop assessment was followed by a field investigation to validate the predetermined soil results obtained at the desktop level. The field survey was conducted over three days in November 2024. During that time, soil auger tests were conducted, and soils were classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018). It must be noted that the season has no bearing on the soil's morphological properties over a short-term period.

### 2.3 Land Capability Classification

A land capability class is an interpretive grouping of land units with similar potential and containing limitations or hazards for long-term intensive use of land for rainfed farming determined by the interaction of climate, soil, and terrain. It is a more general term than land suitability and is more conservation-oriented (See Table 1 below). It involves consideration of:

- Varying limitations to land use pertaining to rainfed cultivation and soil properties; and
- The risks of land damage from erosion and other causes.

Eight land capability classes were employed, with potential decreases, limitations, and hazards increasing from class 1 to class 8. Classes 1 to 4 are considered arable, whereas Class 5 is considered wet-based soils or watercourses and Classes 6 to 8 are classified as grazing, forestry, or wildlife. This system is based on the Land Capability Classification system of the United States Department of Agriculture (USDA) Soil Conservation Service by Klingelbiel and Montgomery (1961) as well as by Scotney *et.al* (1987).

Table 1: Soil Capability Classification (after Scontey *et al*., 1987).

| **Land Capability Group** | **Land Capability Class** | **Intensity of Land Use** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **wildlife** | **Forestry** | **Light grazing** | **Moderate grazing** | **Intensive grazing** | **Light cultivation** | **Moderate cultivation** | **Intensive cultivation** | **Very intensive cultivation** | **Limitations** |
| Arable | I | | | | | | | | | | There are no or few limitations. Very high arable potential. Very low erosion hazard |
| | II | | | | | | | | | | Slight limitations. High arable potential. Low erosion hazard |
| | III | | | | | | | | | | Moderate limitations. Some erosion hazards |
| | IV | | | | | | | | | | Severe limitations. Low arable potential. High erosion hazard. |
| Grazing | V | | | | | | | | | | Water course and land with wetness limitations |
| | VI | | | | | | | | | | Limitations preclude cultivation. Suitable for perennial vegetation |
| | VII | | | | | | | | | | Very severe limitations. Suitable only for natural vegetation |
| Wildlife | VIII | | | | | | | | | | Extremely severe limitations. Not suitable for grazing or afforestation. |

The updated and refined land capability ratings and database for the whole of South Africa were released by the Department of Fishery and Forestry (DAFF) in 2017. These land capability ratings were derived through a spatial evaluation modelling approach and a raster spatial data layer comprising fifteen (15) land capability evaluation values 9 (see Table 2 below). The new land capability describes the categories as 1 being the lowest and 15 being the highest. Values of below 8 are generally not suitable for producing cultivated crops. (DAFF, 2017). Soil agricultural potential is impacted by several factors (see Table 3 below). The soil agricultural potential was evaluated based on the factors mentioned and described in Table 3 by assigning qualitative criteria ratings such as High, Moderate, or Marginal too low to the updated land capability ratings.

Table 2: National Land Capability Values (DAFF, 2017).

| Land Capability evaluation value | Land Capability Description |
|---|---|
| 1 | Very Low |
| 2 | |
| 3 | Very Low to Low |
| 4 | |
| 5 | Low |
| 6 | Low to Moderate |
| 7 | |
| 8 | Moderate |
| 9 | Moderate to High |
| 10 | |
| 11 | High |
| 12 | High to Very High |
| 13 | |
| 14 | Very High |
| 15 | |

Table 3: Soil Agricultural Potential Criteria

| Criteria | Description |
|---|---|
| **Rock Complex** | If a soil type has prevalent rocks in the upper sections of the soil, it is a limiting factor to the soil's agricultural potential. |
| **Flooding Risk** | The risk of flooding is determined by the closeness of the soil to water sources. |
| **Erosion Risk** | The soil erosion risk is determined by combining the wind and water erosion potentials. |
| **Slope** | The slope of the site could potentially limit the agricultural use thereof. |
| **Texture** | The texture of the soil can limit its use by being too sandy or too clayey. |
| **Depth** | The effective depth of soil is critical for the rooting zone for crops. |
| **Drainage** | The capability of soil to drain water is important as most grain crops do not tolerate submergence in water. |
| **Mechanical Limitations** | Mechanical limitations are any factors that could prevent the soil from being tilled or ploughed. |
| **pH** | The pH of the soil is important when considering soil nutrients and fertility. |
| **Soil Capability** | This section highlights the soil type's capability to sustain agriculture. |
| **Climate Class** | The climate class highlights the prevalent climatic conditions that could influence the agricultural use of a site. |
| **Land Capability / Agricultural Potential** | The land capability or agricultural potential rating for a site combines the soil capability and the climate class to arrive at the potential of the site to support agriculture. |

### 2.4 Site Sensitivity Verification

The Agricultural Agro-Ecosystem Assessment protocol provides criteria for assessing and reporting impacts on agricultural resources for activities requiring Environmental Authorisation (EA). The assessment requirements of this protocol are associated with a level of environmental sensitivity determined by the national web-based environmental screening tool, which, for agricultural resources, is based on the most recent land capability evaluation values provided by the Department of Forestry, Fisheries, and the Environment (DFFE). The national web-based environmental screening tool can be accessed at: https://screening.environment.gov.za/screeningtool.

The primary purpose of the Agricultural Agro-Ecosystem Assessment is to determine the site's sensitivity to the proposed land use change (the transition from potential agricultural land to the proposed development is sufficiently considered). The information in this report aims to enable the Competent Authority (CA) to draw sound conclusions and recommendations on the proposed project and its potential impacts, specifically focusing on food security.

To meet this objective, the protocol requires that site sensitivity verification be conducted, and subsequent outcomes must meet the following objectives:

- It must confirm or dispute the current land use and the environmental sensitivity as indicated by the National Environmental Screening Tool;
- It must contain proof (e.g., photographs) of the current land use and environmental sensitivity pertaining to the study area;
- All data and conclusions must be submitted together with the main report for the proposed development;
- It must indicate whether the proposed development will have an unacceptable impact on the agricultural production capability of the site, and if it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources and
- The report is prepared in accordance with the requirements of the Agricultural specialist protocols

The Screening Tool Report generated for the powerline assigns a high sensitivity for the agriculture theme. See Figure 2 below.

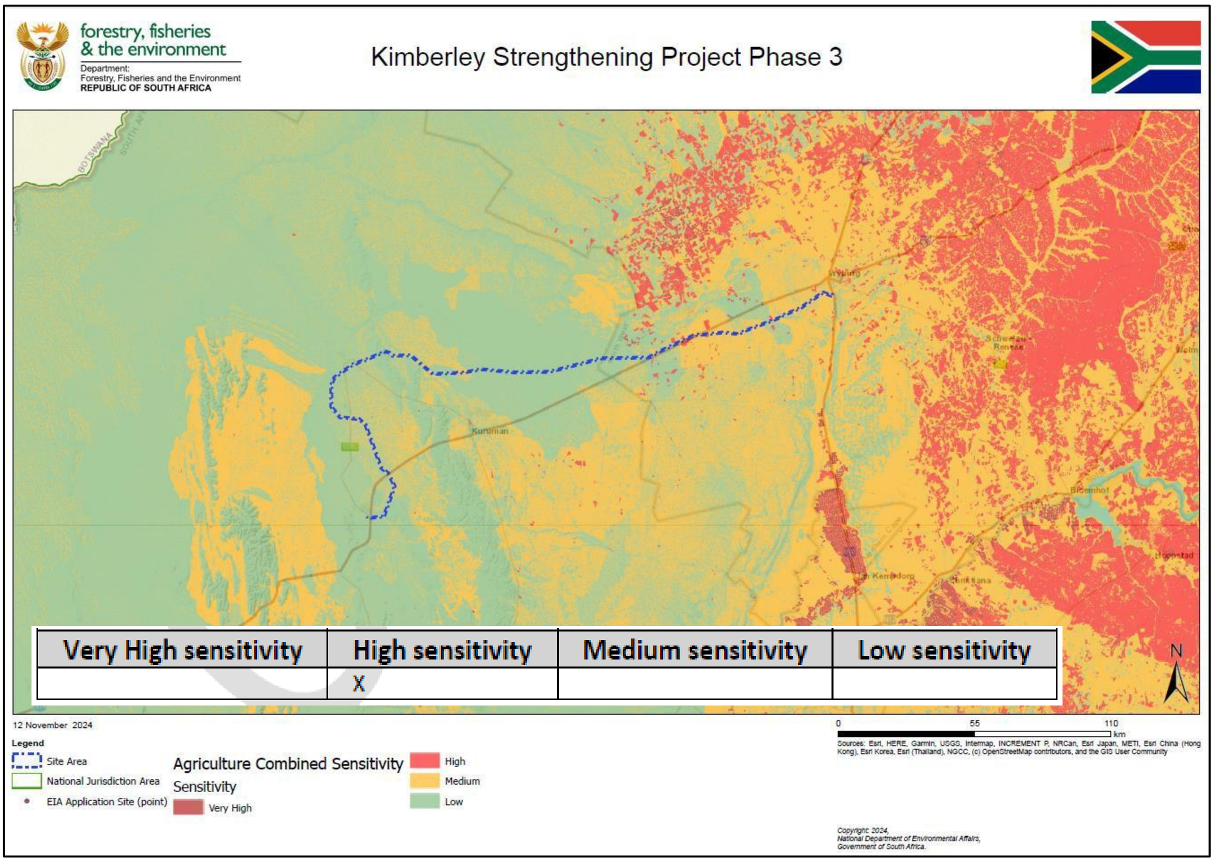


Figure 2: Screening tool sensitivity for the study area.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being high sensitivity in terms of agricultural sensitivity. Based on the outcomes of the field assessment, this was found to have a low significant impact. The sensitivities allocated to the agricultural theme are presented in Table 4 below. The field-verified results are detailed in Section 4.

Table 4: Summary of the screening tool vs specialist-assigned sensitivities and motivation.

| Study Area | Screening Tool Assigned Sensitivity | Verified Sensitivity | Reasoning for verification outcome verification |
|---|---|---|---|
| **Powerline Assessment Corridor** | High Sensitivity | Low Sensitivity | The study area is primarily characterised by arable soils (Class II and IV); however, its suitability for successful dryland agriculture is low due to climatic constraints and a lack of irrigation options. The region experiences erratic and very low rainfall, which is essential for successful dryland farming. Without an irrigation scheme and a robust fertilisation program, the study area will be limited to grazing and wildlife uses. Furthermore, the high evaporation rate typical of the hot, dry climate will necessitate regular irrigation if crops are to be grown successfully. |

Thus, based on the verified sensitivity, a Compliance Statement has been compiled to meet the minimum report content requirements for impacts on agricultural resources by the proposed development.

## 3. DESKTOP RESULTS AND DISCUSSIONS

### 3.1 Climatic Data

The study area is in the hot semi-arid climate zone, defined by hot, often extremely hot, summers and mild to cool winters with little to no precipitation. Hot semi-arid temperatures are most common along the edges of subtropical deserts. The western portion of the study region (mainly in the Northern Cape Province) experiences rainfall ranging from 201 to 400 mm. The eastern portion of the study region, primarily in the North West Province, experiences rainfall ranging from 401 to 600 mm. The study area can thus be defined as water-stressed. While the planting dates for rain-fed agriculture are limited under these conditions, a few suitable crops can produce high yields if planted on time. Figure 3 depicts the mean yearly rainfall for the study area.

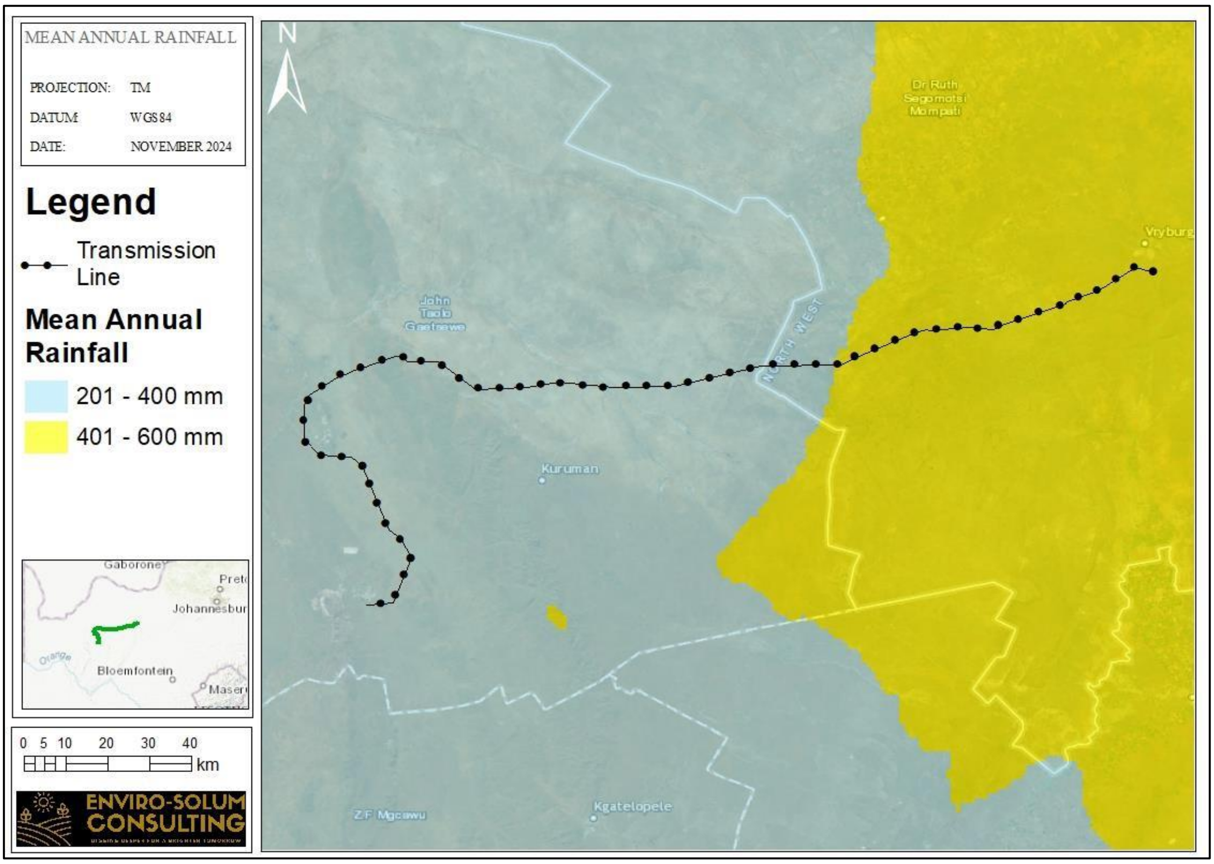


Figure 3: Mean Annual Rainfall associated with the study area.

### 3.2 GEOLOGY

The soils associated with the entire study area are underlain by the Cretaceous to Tertiary Kalahari Formation (Qs) and underlying Griqualand West Basin rocks; the Transvaal Supergroup of Vaalian age dominate the entire study area. The youngest formation of the Kalahari group is the Gordonia Formation, which is generally termed Kalahari sand and comprises red or yellow aeolian sands that cover most of the Kalahari Group sediments. Figure 4, below, depicts the geology associated with the study area.

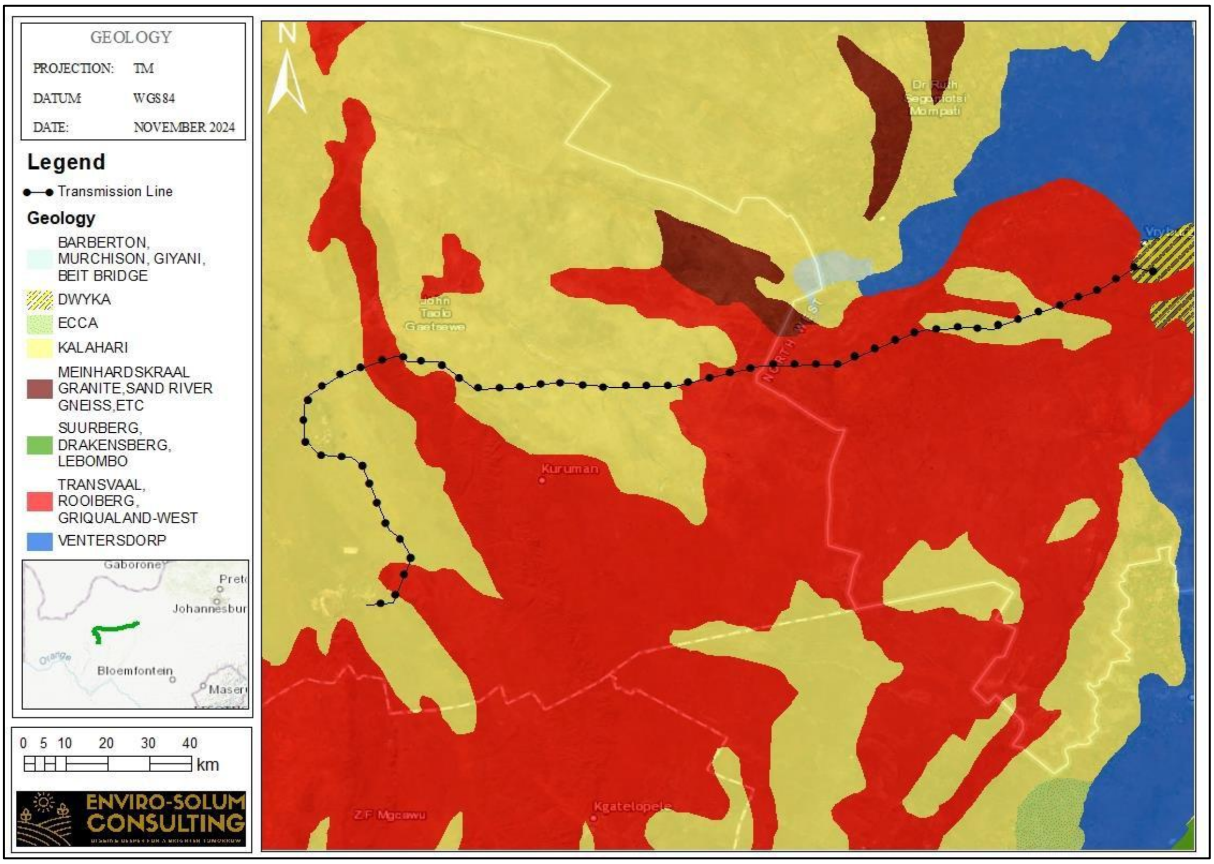


Figure 4: Geological formations associated with the study area.

### 3.3 Soil pH

The soil pH associated with the soils within the study area is between 6.5 and 7.4, which is considered slightly acidic to neutral. This range is ideal because most plants thrive under it, and most nutrients are available for uptake. Figure 5 depicts the soil pH associated with the soils within the study area.

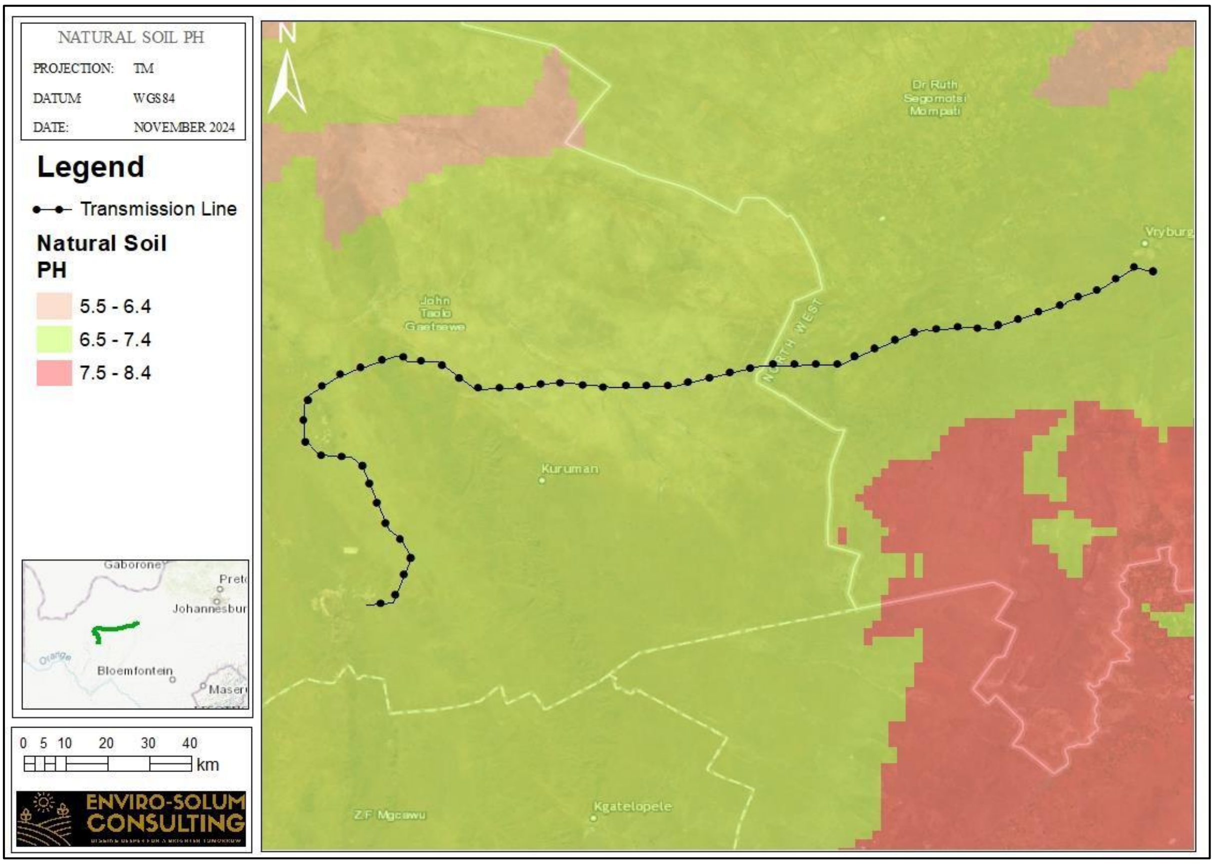


Figure 5: Soil pH associated with the project area.

### 3.4 Soil and Terrain (SOTER) Dominant Soils

The majority of the research region is dominated by ferralic arenosols, followed by chromic cambisols, calcic luvisols, and calcic solonchaks. Ferralic arenosols are primarily composed of sand, with minimal humus or clay, and may require additional inputs prior to cultivation. These soils can be two meters deep and contain greyish to brown sands. In arid regions, these soils are used for extensive grazing but can also be used for agriculture if irrigated. Chromic cambisols are characterised by the absence of a layer of accumulated clay, humus, soluble salts, or iron and aluminium oxides. Due to their favourable aggregate structure and high content of weatherable minerals, they can usually be exploited for agriculture subject to the limitations of terrain and climate. Luvisols show marked textural differences within the profile. The surface horizon is depleted in clay, while the subsurface horizon has accumulated clay. Most Luvisols have favourable physical properties: these are porous and well-aerated. Chemical properties and nutrient status vary with parent material and pedogenetic history, which also determine the options for land utilisation. Solonchaks are largely confined to the arid and semi-arid climatic zones and coastal regions in all climates. Common international names are 'saline soils' due to the high concentration of salts and the high evaporative demand of the areas where they occur. Figure 6 below illustrates the SOTER-dominant soils associated with the study area.

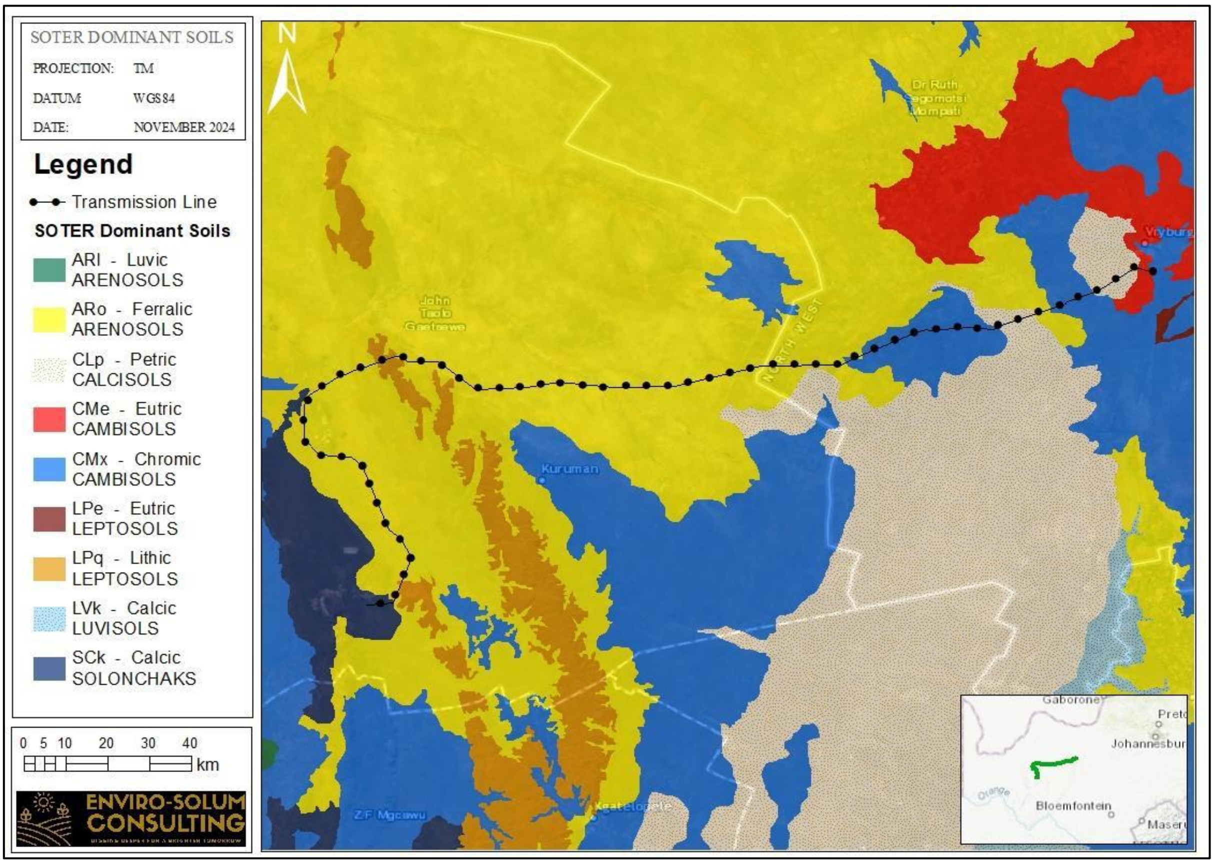


Figure 6: SOTER dominant soils associated with the study area.

#### 3.5 Desktop Land Capability

The desktop land capability associated with the soils within the study area is largely non-arable, and grazing, woodland, or wildlife is of Class V capability. Figure 7 below shows this capability.

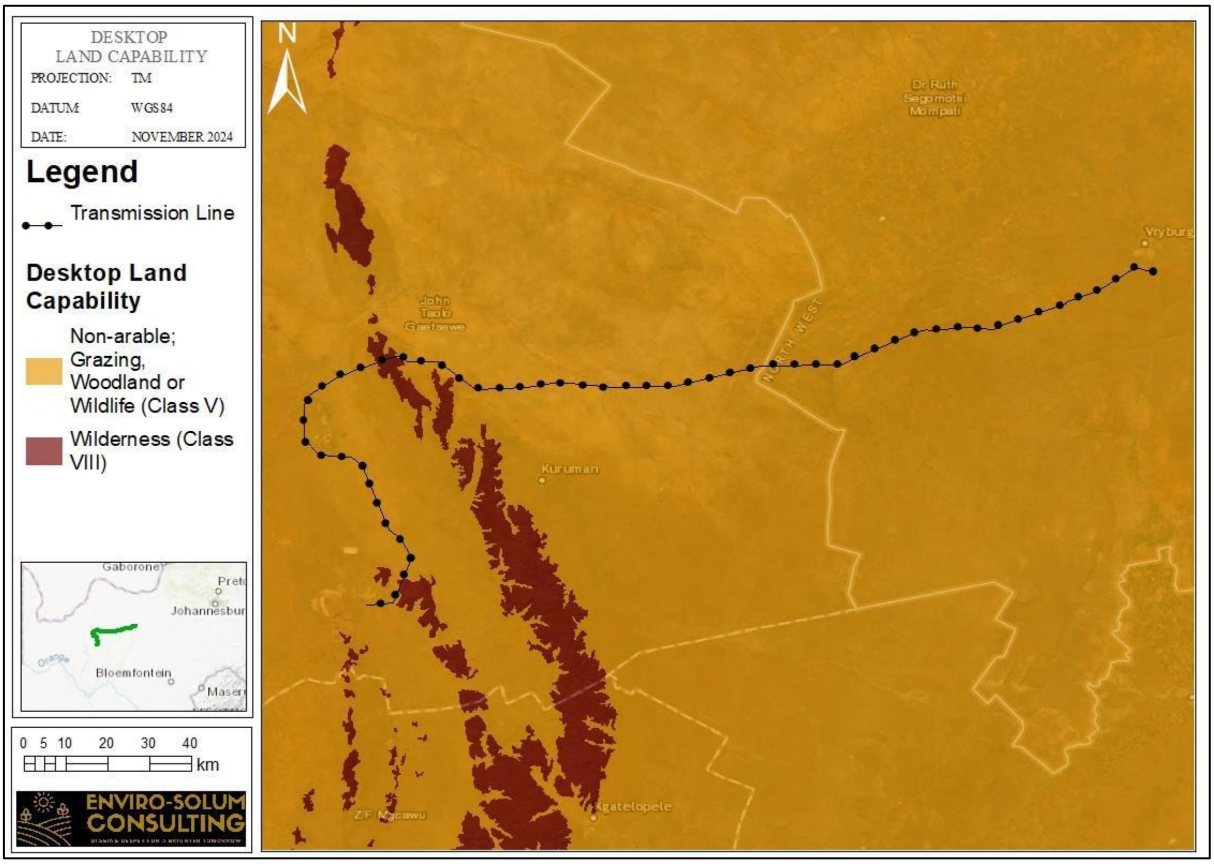


Figure 7: Desktop land capability associated with the study area.

### 3.6 Vegetation Type

According to Mucina and Rutherford (2006), the study area is characterised by six vegetation types: Kathu Bushveld, Kuruman Thornveld, Kuruman Vaalbosveld, Mafikeng Bushveld, Ghaap Plateau and the Gordonia Duneveld. Figure 12 below depicts the vegetation types associated with the study area.

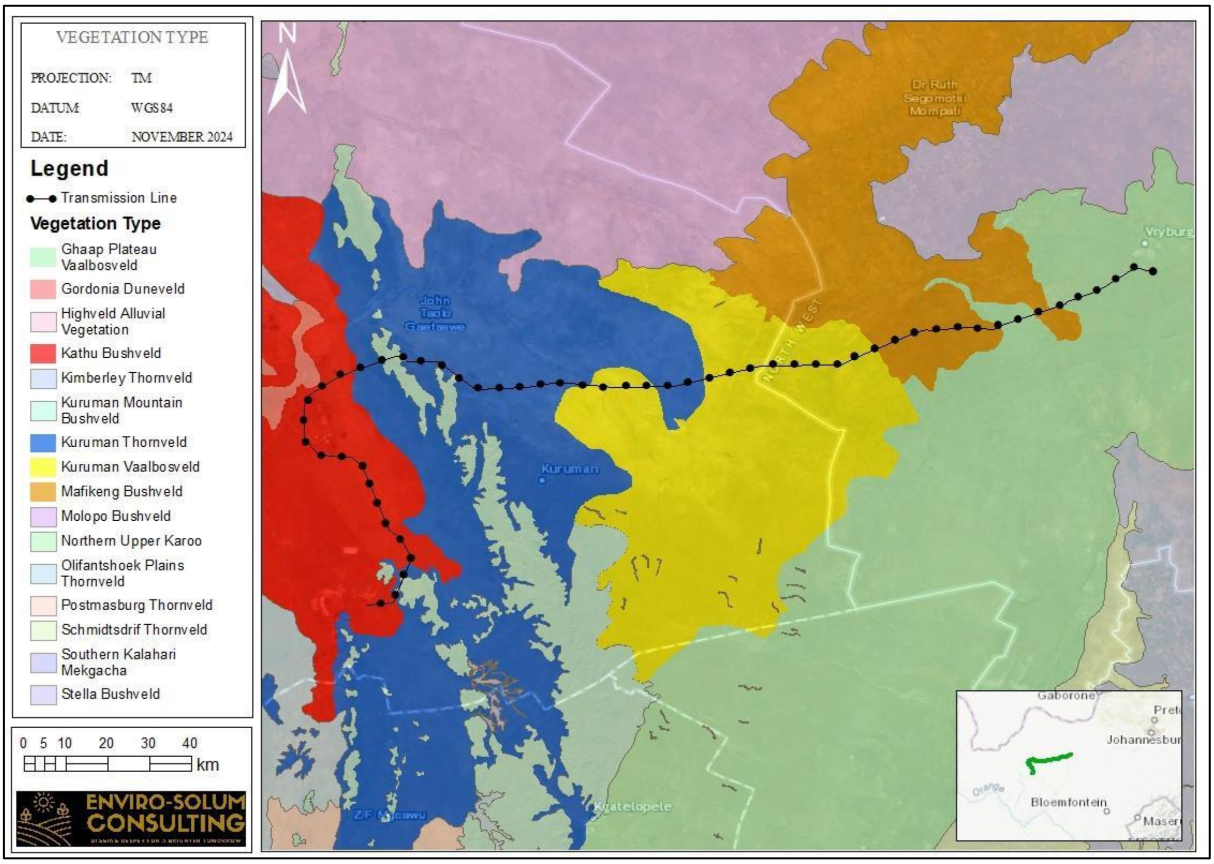


Figure 8: Vegetation type associated with the study area.

## 4. FIELD VERIFIED RESULTS AND DISCUSSIONS

### 4.1 LAND USES WITHIN THE STUDY AREA

The study area was primarily dominated by vast grasses, shrubs, and trees adapted to limited water and extreme temperatures. These areas are primarily used for cattle grazing, wilderness (game farming), and woodland land use with isolated farm properties outside the major towns. Mining areas (Sishen, Mamatwan, Middleplats, Tshipi and Kudumane mines) and supporting substations (Ferrum and Mookodi substations) in the vicinity of the powerline route were also observed. Signs of soil degradation in the form od soil erosion and compaction were observed within the study area. Figure 9 depicts the different land uses identified within the study area.

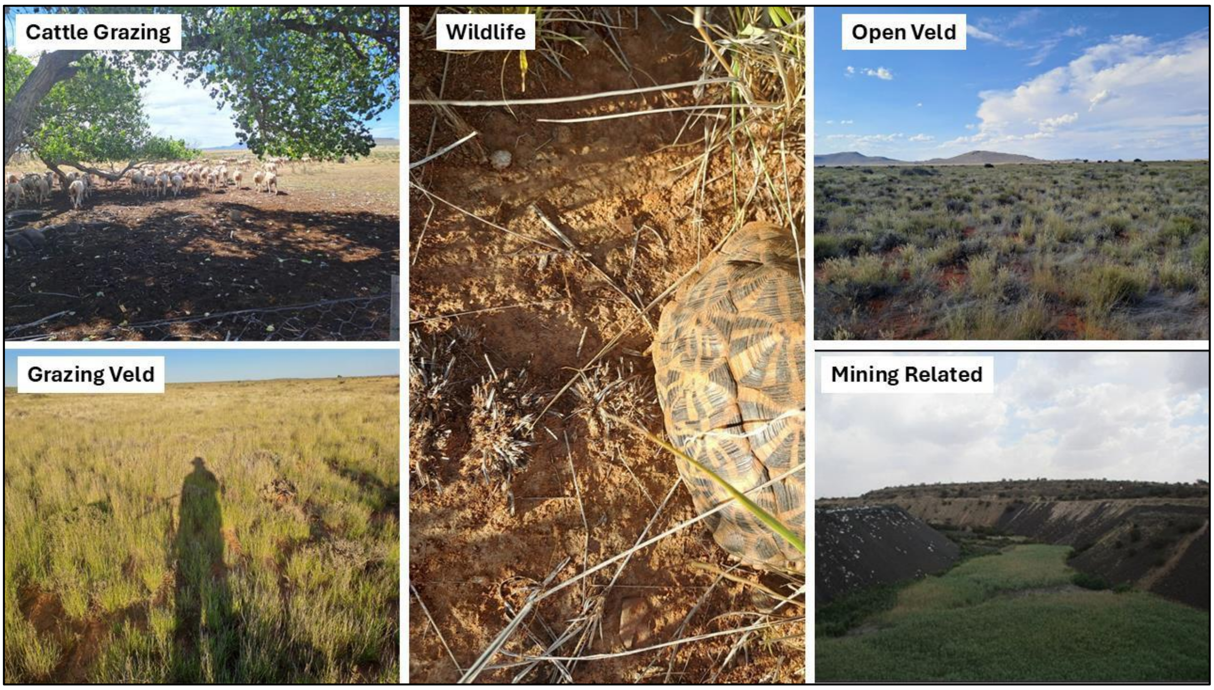


Figure 9: Land uses associated with the study area.

### 4.2 Soil Forms in the Study Area

The section below focuses on the identified soil forms in the described study area. Figures 15 to 17 present the spatial distribution of the identified soil forms within each study area. Table 4 presents a summary table depicting the area of coverage of each identified soil form.

#### 4.2.1 Clovelly

The Clovelly soil form, illustrated in Figure 10, consists of an orthic A-horizon that overlays a yellow-brown apedal B-horizon with a lithic material beneath it. Clovelly soil is classified as an oxidic, iron-enriched soil characterised by its uniform colour (Fey, 2010). These soils typically exhibit a weak apedal structure and a sandy texture due to aeolian sand deposits, which contribute to adequate rooting depth and well-drained characteristics. Additionally, they present limited mechanical constraints for tillage practices. However, these soils are susceptible to leaching, leading to deficiencies in essential plant nutrients and subsoil acidity. Therefore, careful management is necessary for successful cultivation of these soils. Based on the soil's inherent properties, these soils can be classified under Arable (Class II) capability due to minor limitations such as clay content, low nutrient status and water-holding capacity.

Figure 10: Yellow-brown apedal soils associated with the Clovelly soil formations.

#### 4.2.2 Plooysburg and Nkonkoni/Hutton

These soils are characterised by an orthic A-horizon that overlays a red apedal B-horizon, with either a hard plinthic horizon or lithic horizon for the Ploysburg and Nkonkoni/Hutton soil formations, respectively (Figure 11). These soils tend to vary with depth, but in most cases, these soils vary between depths of 700 mm and greater than 1500 mm. Thus, these soils can be considered for agricultural cultivation due to their sandy textural class, as they allow for root development but may be hindered by the shallow depth and provide good aeration for plant growth in some instances. These soils are classified under the Arable (Class IV) land capability class due to depth limitations, moderate arable potential and a lower nutrient status.

Figure 11: View of the red apedal soils and the hard carbonate horizon associated with the Nkonkoni/Hutton and Plooysburg soil formation.

#### 4.2.3 Mispah/Glenrosa

These soils are typically shallow. The shallow depth can be attributed to limited rock weathering and convex topographical conditions at the crest or scarp of the landscape, resulting in soil removal and, in some instances, leaving rocky outcrops behind (Figure 12). These types of soils are usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses unless intense management strategies are used, such as breaking the lithic/saprolite layer. The Mispah/Glenrosa and Mispah/Mayo soil forms are classified under the Grazing (Class VI) land capability class as they are primarily suited for perennial vegetation and have limitations that preclude cultivation.

Figure 12: View of the identified shallow Mispah/Glenrosa soil forms.

#### 4.2.4 Dundee

The Dundee soil type is associated with watercourses due to the alluvial deposition, especially on low-lying terrain. These soils are characterised by little evidence of pedogenic horizonation and consist of unconsolidated fluvial or lacustrine sediments. These soils generally have a significant component of vertical flow (although often slowly permeable), leading to water accumulation over time. An upward water flow can be expected in these soils due to evapotranspiration and capillary rise. Consequently, these soils are classified as having low agricultural value and under the Watercourse (Class V) land capability classification. Figure 13 depicts the identified Dundee soil type.


Figure 13: View of the identified Dundee soil forms.

#### 4.2.5 Witbank/Johannesburg

These soils are usually disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance, which can be due to sand mining or any form of urban development (mining, residential, industrial and commercial). The diagnostic horizons are no longer arranged in any discernible order or recognisable horizonation as expected in natural soil, sometimes rendering them unsuitable for cultivation. Figure 14 below depicts the disturbed soils associated with the Witbank/Johannesburg formation.

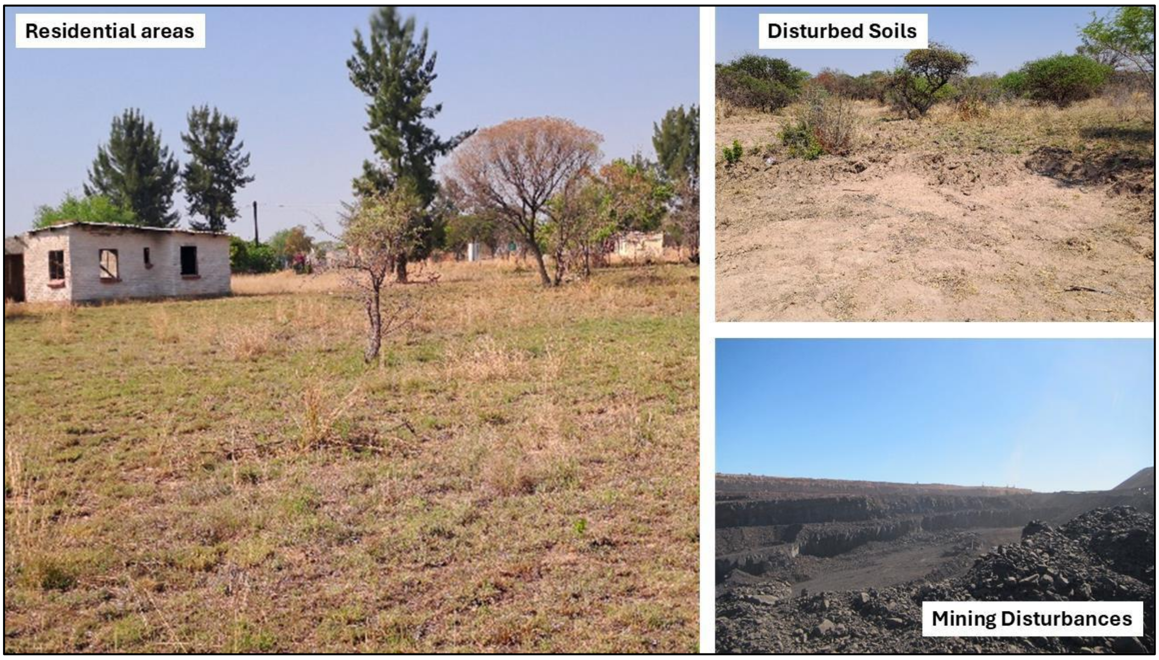


Figure 14: Disturbed soils of the Witbank/Johannesburg formation.

Table 4: Soil forms in hectares (ha) occurring within the study area.

| Study Area (300 m assessment corridor) | | | | |
|---|---|---|---|---|
| **Soil Forms** | **Area (Ha)** | **Percentage (%)** | **Land Capability** | **Agricultural Potential** |
| Clovelly | 9842.54 | 63.1 | Arable (Class II) | High |
| Nkonkoni/Hutton | 3351.22 | 21.5 | Arable (Class III) | Moderately High |
| PlooysburgTubatse | 10005.50 | 6.4 | | |
| Dundee | 34.77 | 0.2 | Watercourse (Class V) | Low |
| Mispah/Glenrosa | 1230.10 | 7.9 | Grazing (Class VI) | Moderately Low |
| Witbank/Johannesburg | 129.26 | 0.8 | Wilderness (Class VIII) | Very Low |
| **Total Enclosed** | **15 593.40** | **100** | | |

Table 5: Land capability (DAFF, 2016) associated with the soils occurring within the study area.

| Soil Form | Land Capability Groups | DAFF (2017) Classification |
|---|---|---|
| Clovelly | Arable Land | 11. High |
| Nkonkoni/Hutton | Arable Land | 9. Moderate to High |
| Plooysburg | | |
| Dundee | Watercourse | 4. Very Low to Low |
| Mispah/Glenrosa | Grazing Land | 7. Low to Moderate |
| Witbank/Johannesburg | Wilderness/Disturbed | 1. Very Low |

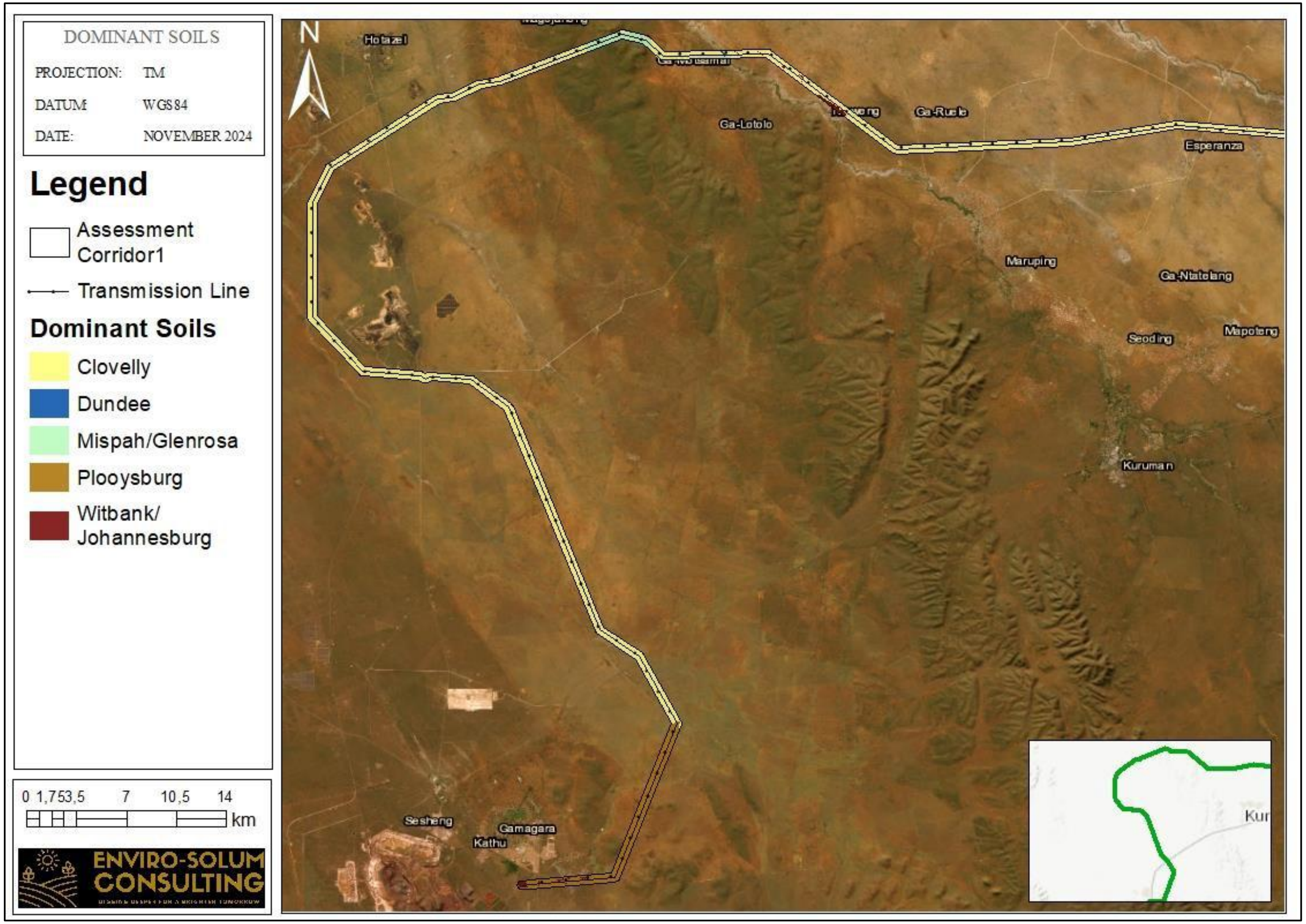


Figure 15: Dominant soils form within the western portion of the study area.

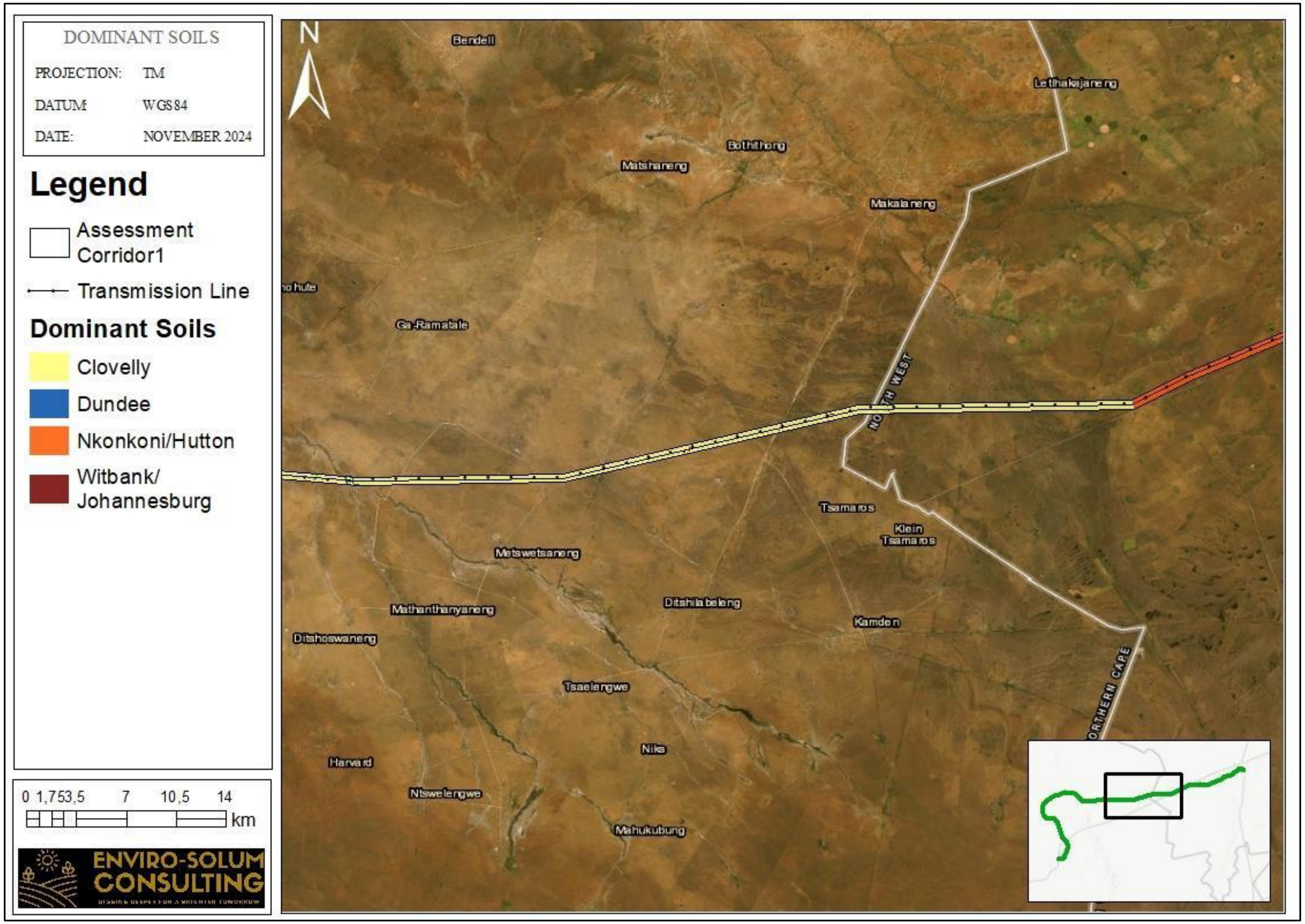


Figure 16: Dominant soils form within the middle portion of the study area.

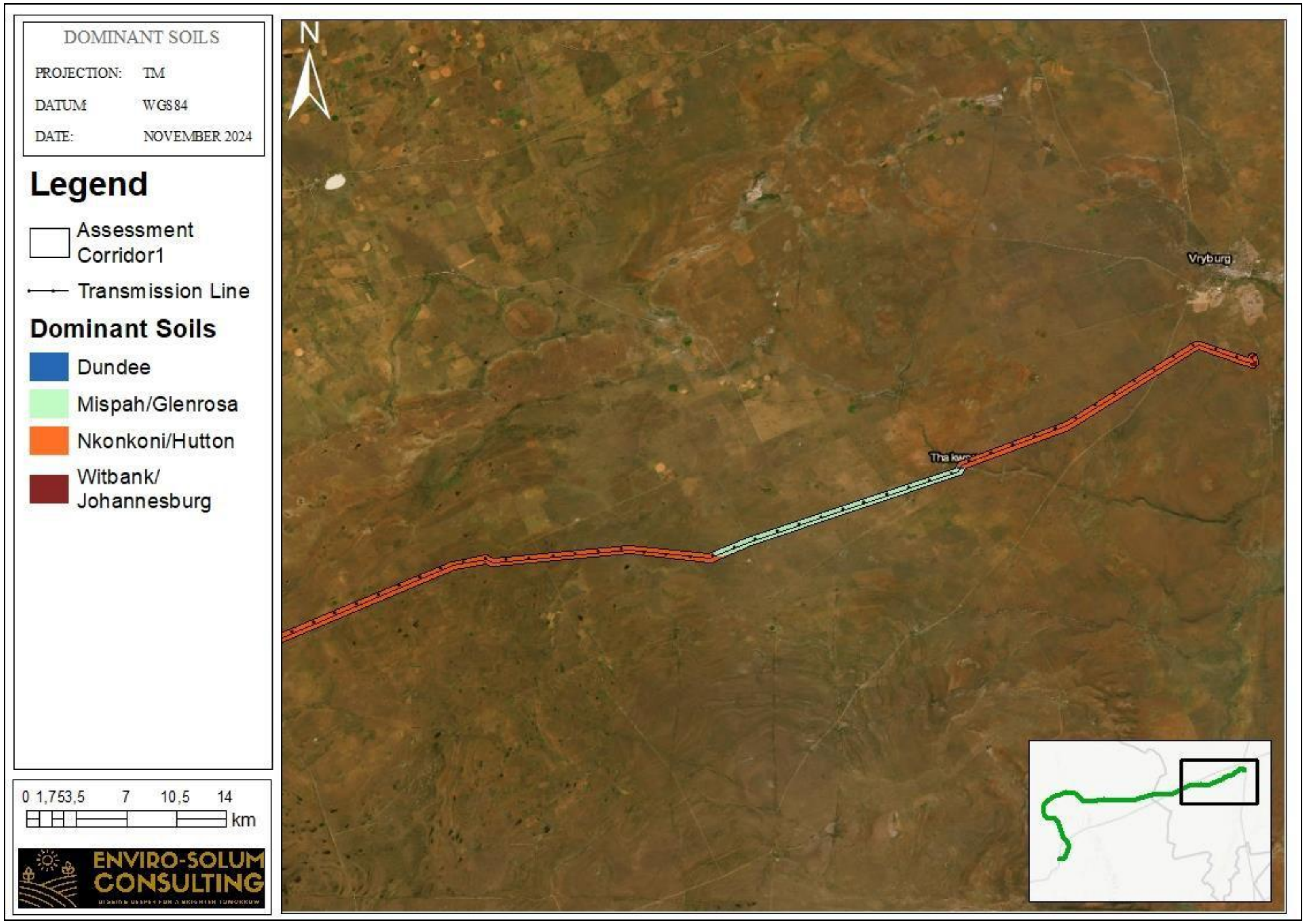


Figure 17: Dominant soils form within the eastern portion of the study area.

### 4.3 LAND CAPABILITY AND AGRICULTURAL POTENTIAL

Land Capability refers to the optimal long-term land utilisation for rainfed agriculture, as determined by the interplay of climate, soil, and topography. The agricultural potential or sensitivity assessed for this assessment was derived from the physical properties of the soil, taking into account recognised land use limits imposed by these properties and the prevailing climatic conditions. Figures 18 to 26 illustrate the land capability of the study area, whereas Figures 27 to 30 represent the agricultural potential.

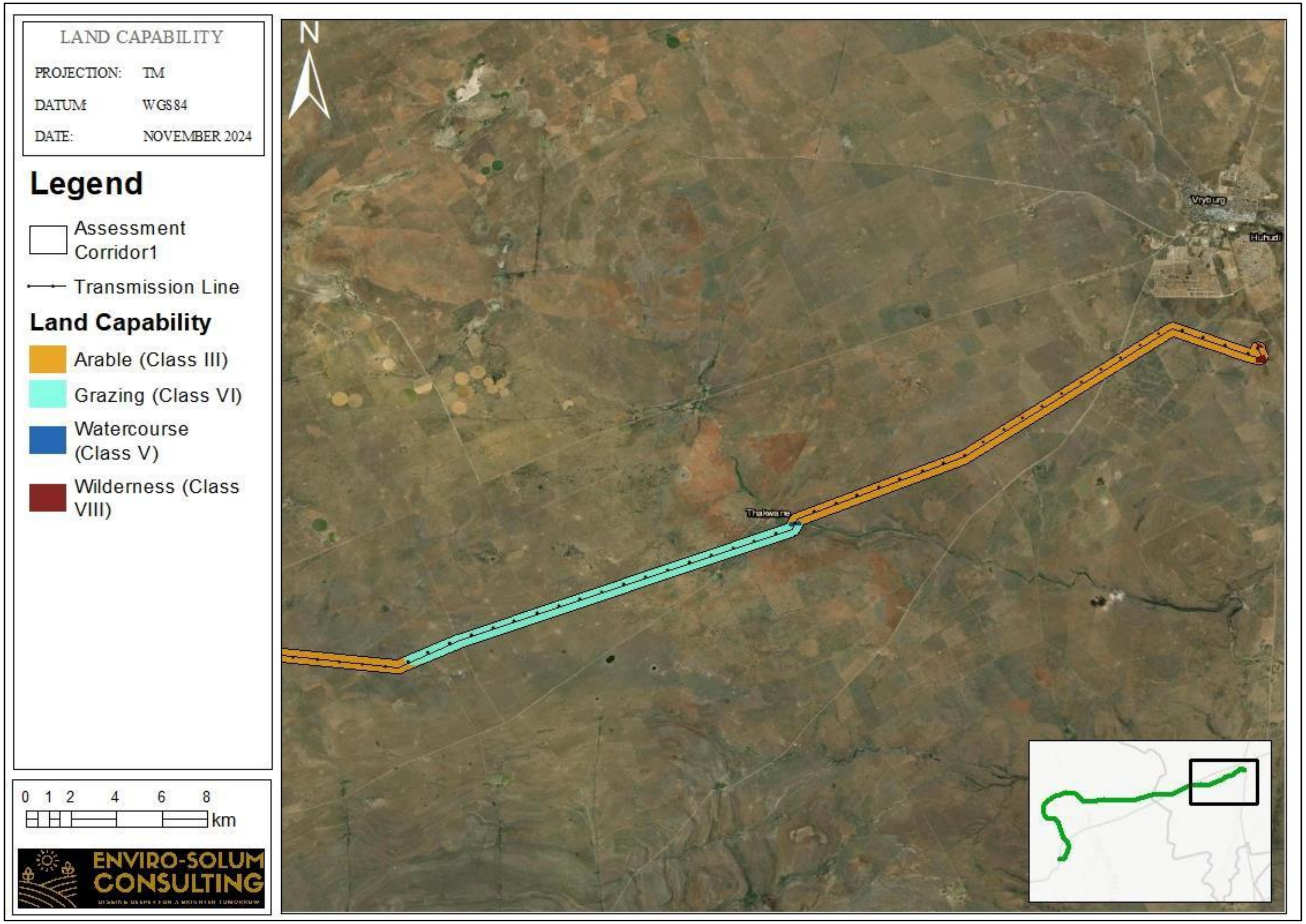


Figure 18: Map depicting land capability of soils within the eastern of the study area.

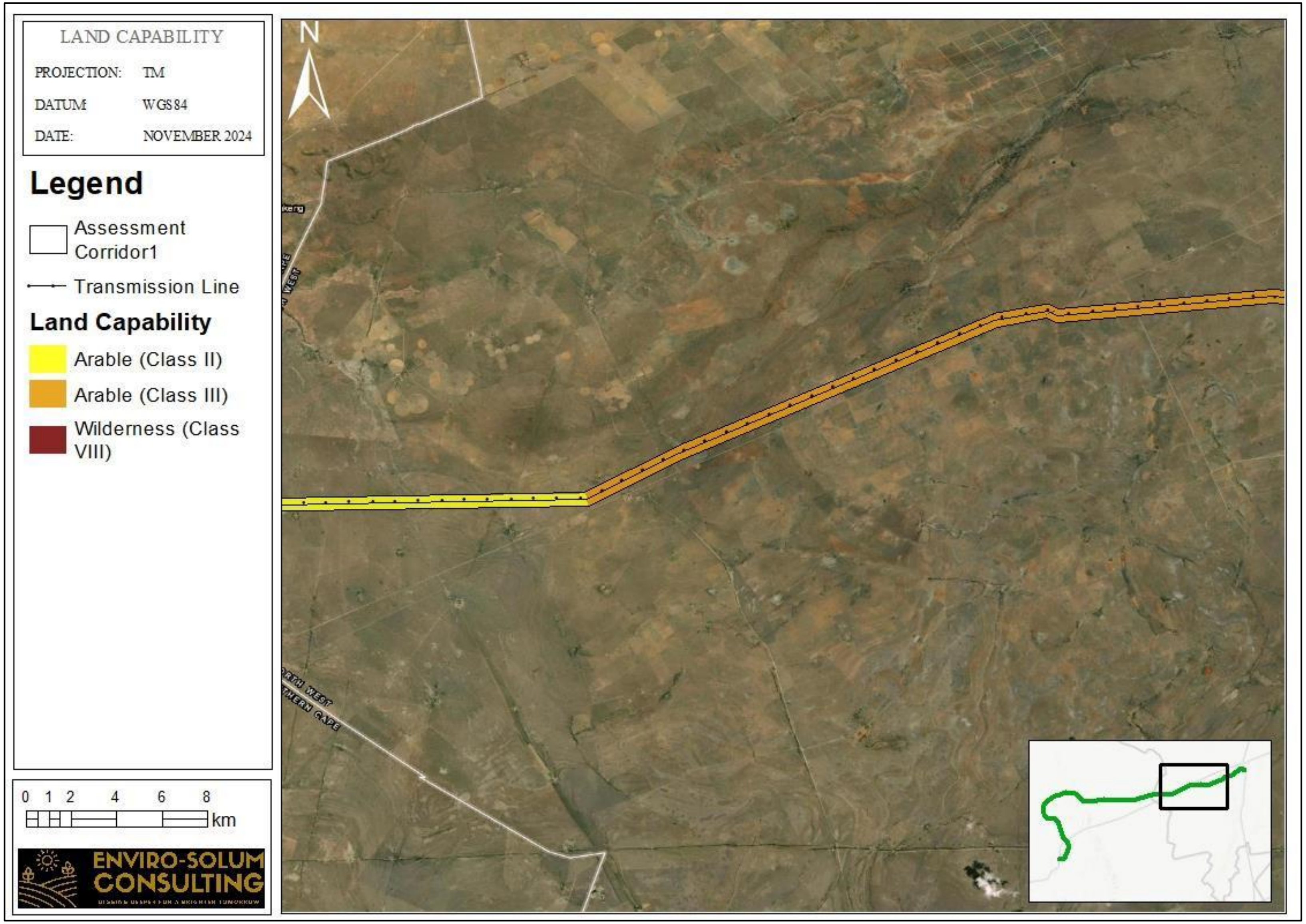


Figure 19: Map depicting land capability of soils within the eastern portion of the study area.

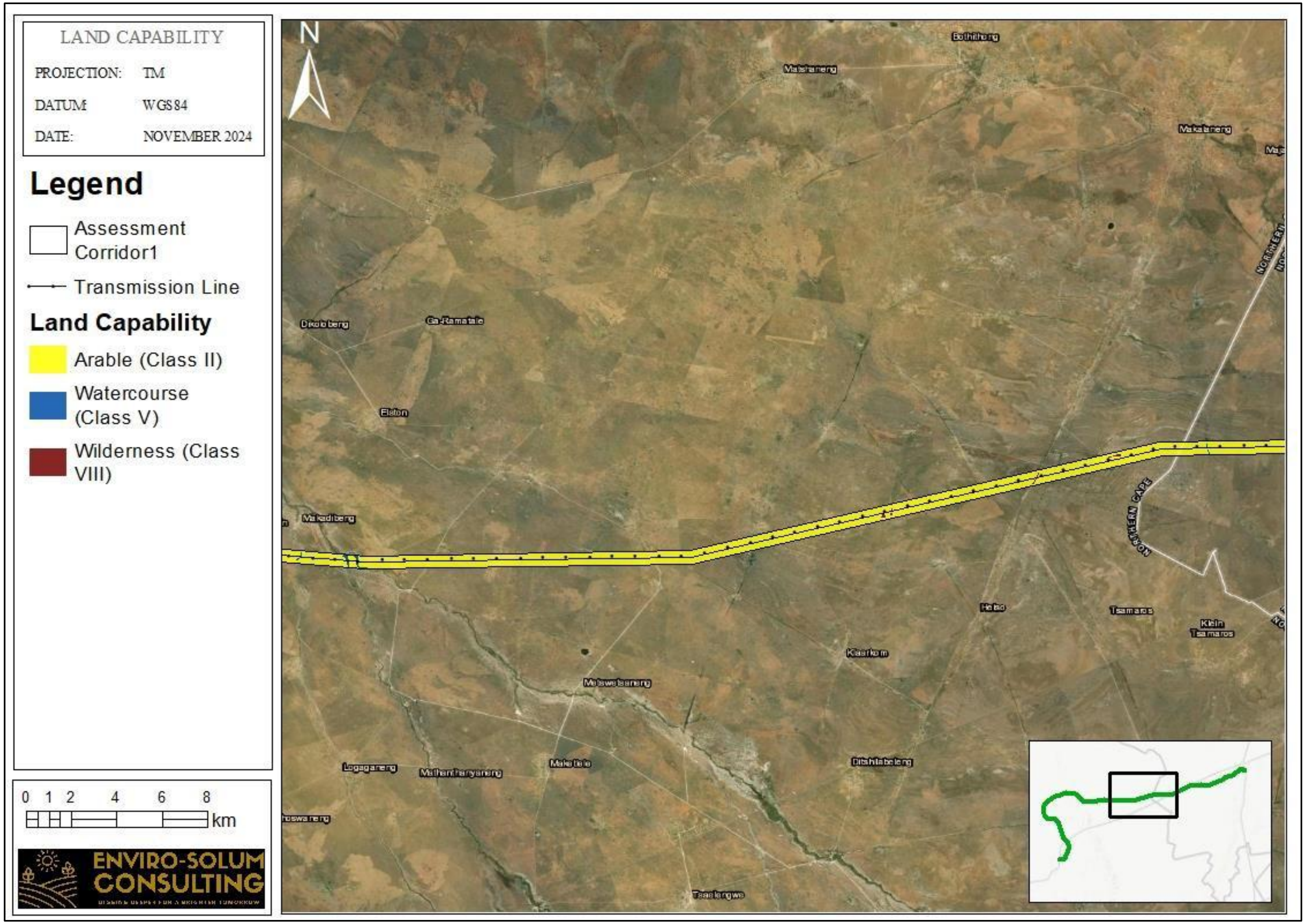


Figure 20: Map depicting land capability of soils within middle portion of the study area.

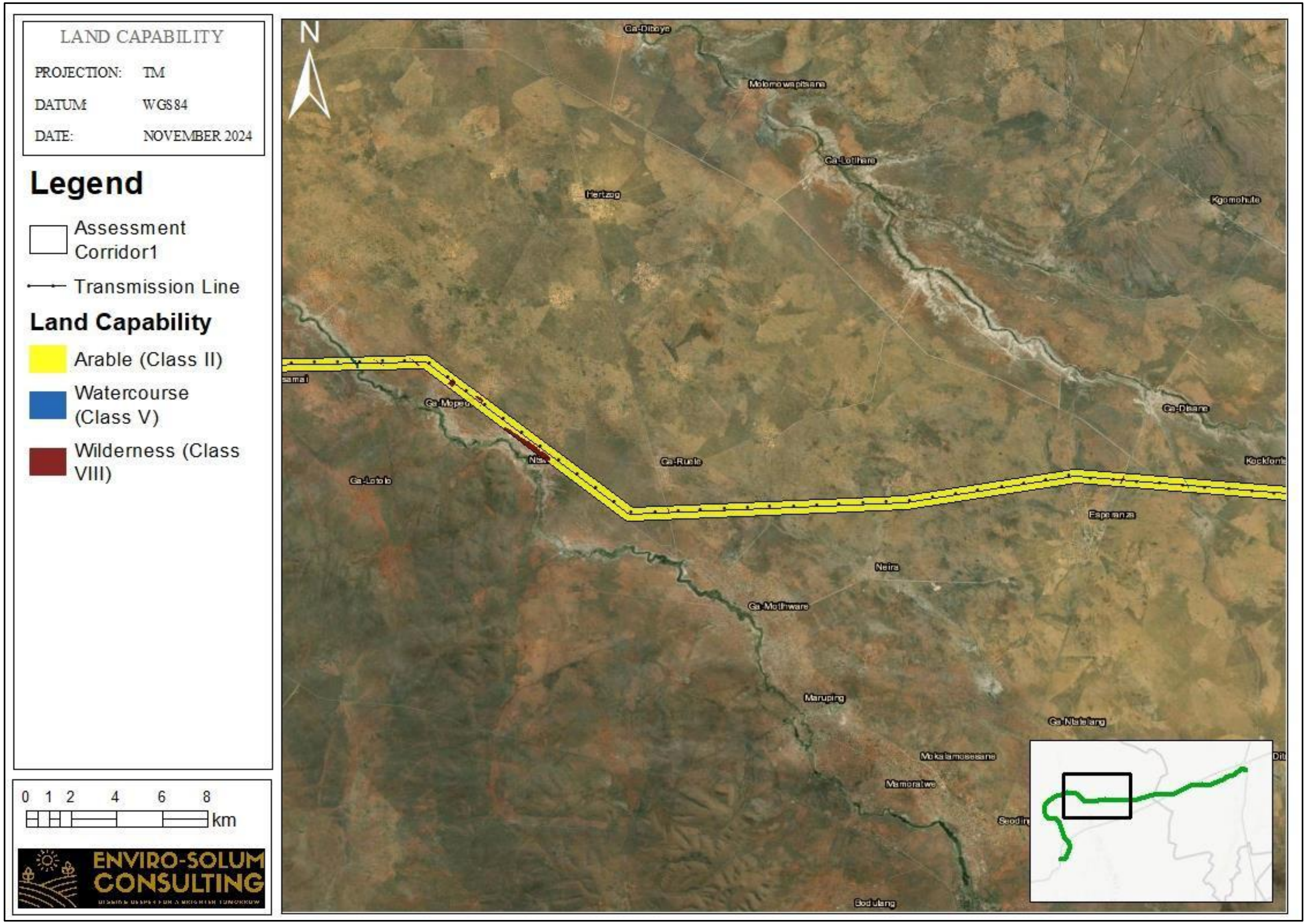


Figure 21: Map depicting land capability of soils within the upper eastern portion of the study area.

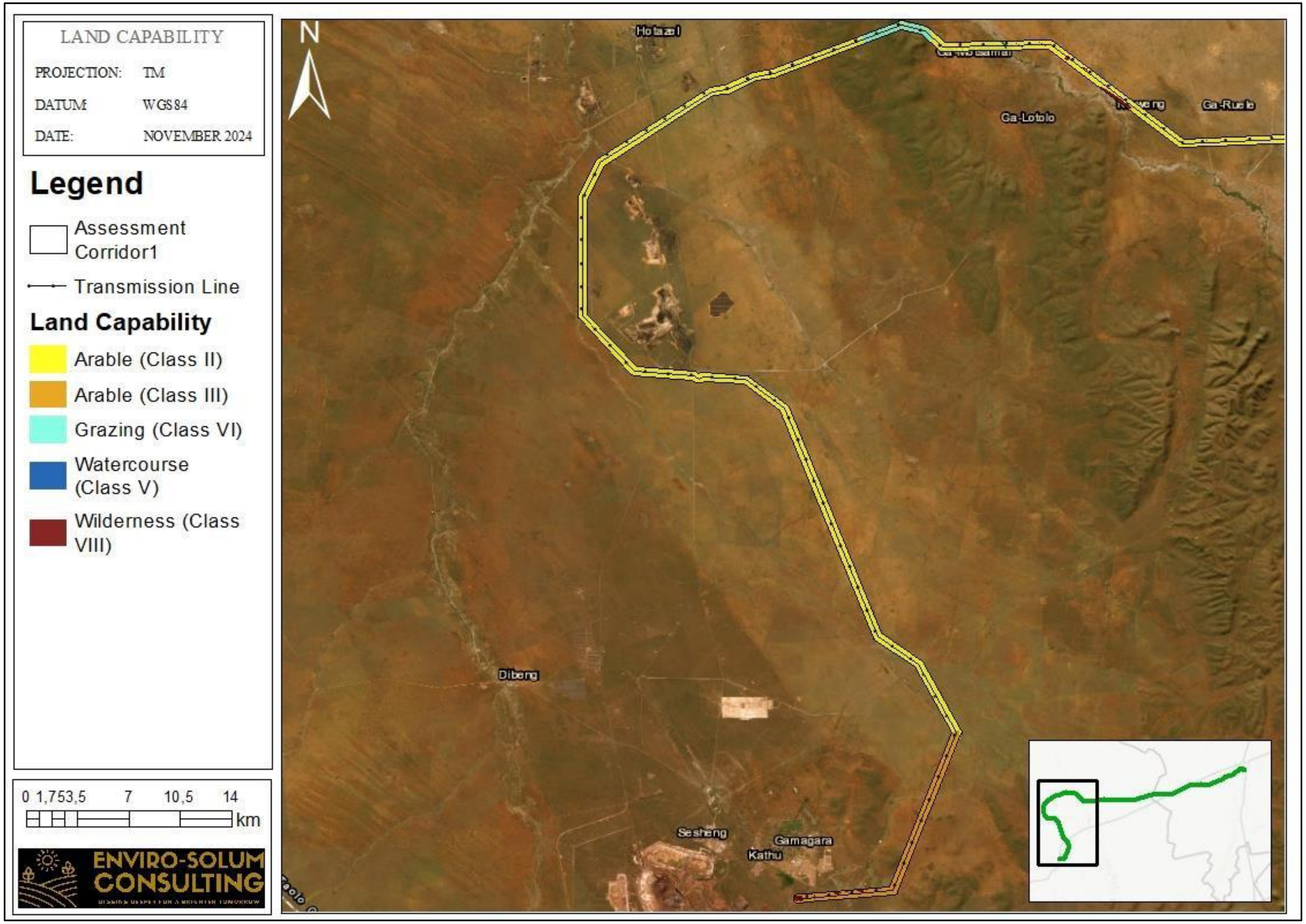


Figure 22: Map depicting land capability of soils within the lower eastern portion of the study area.

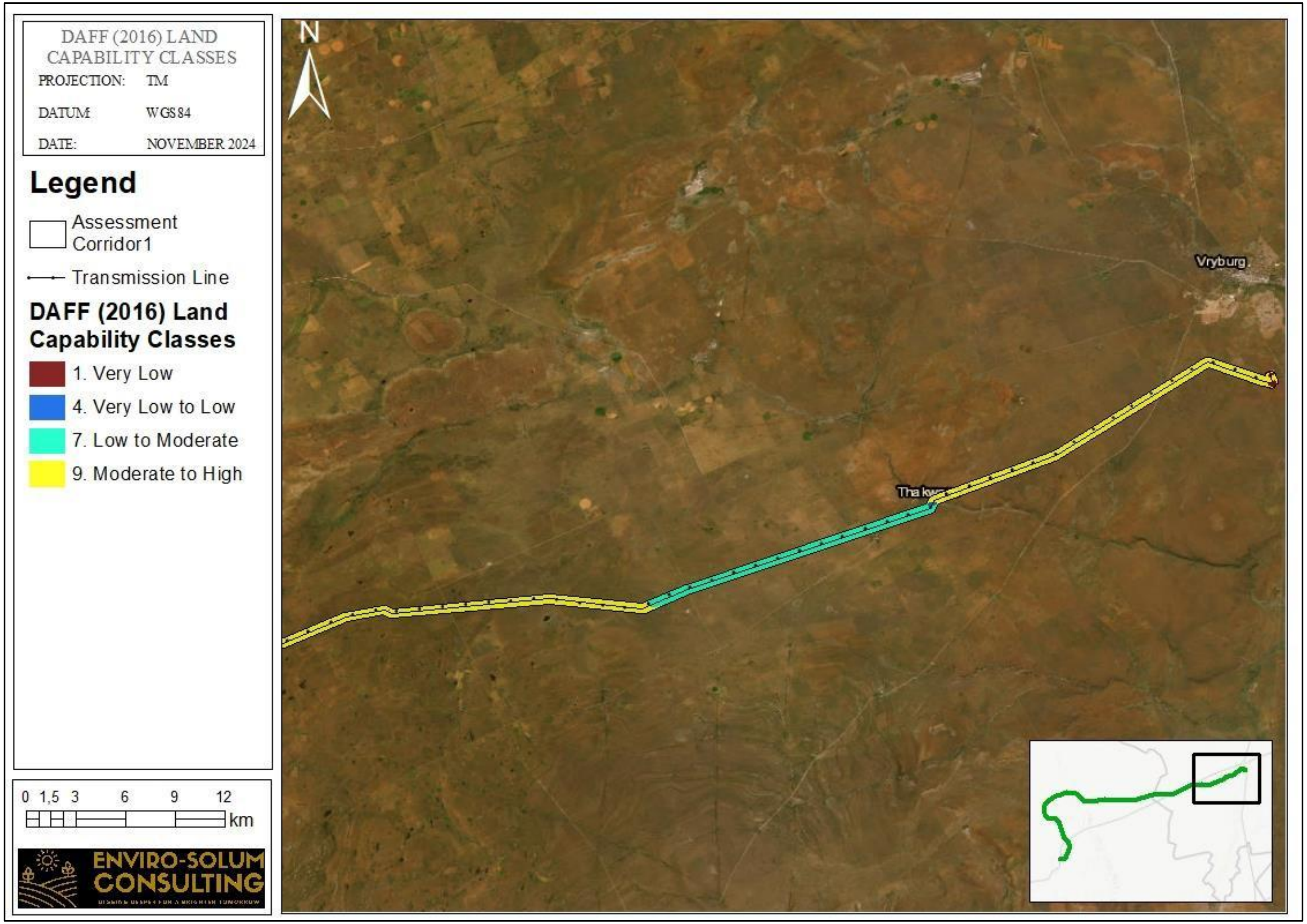


Figure 23: DAFF (2016) land capability classes associated with the eastern portion of the study area.

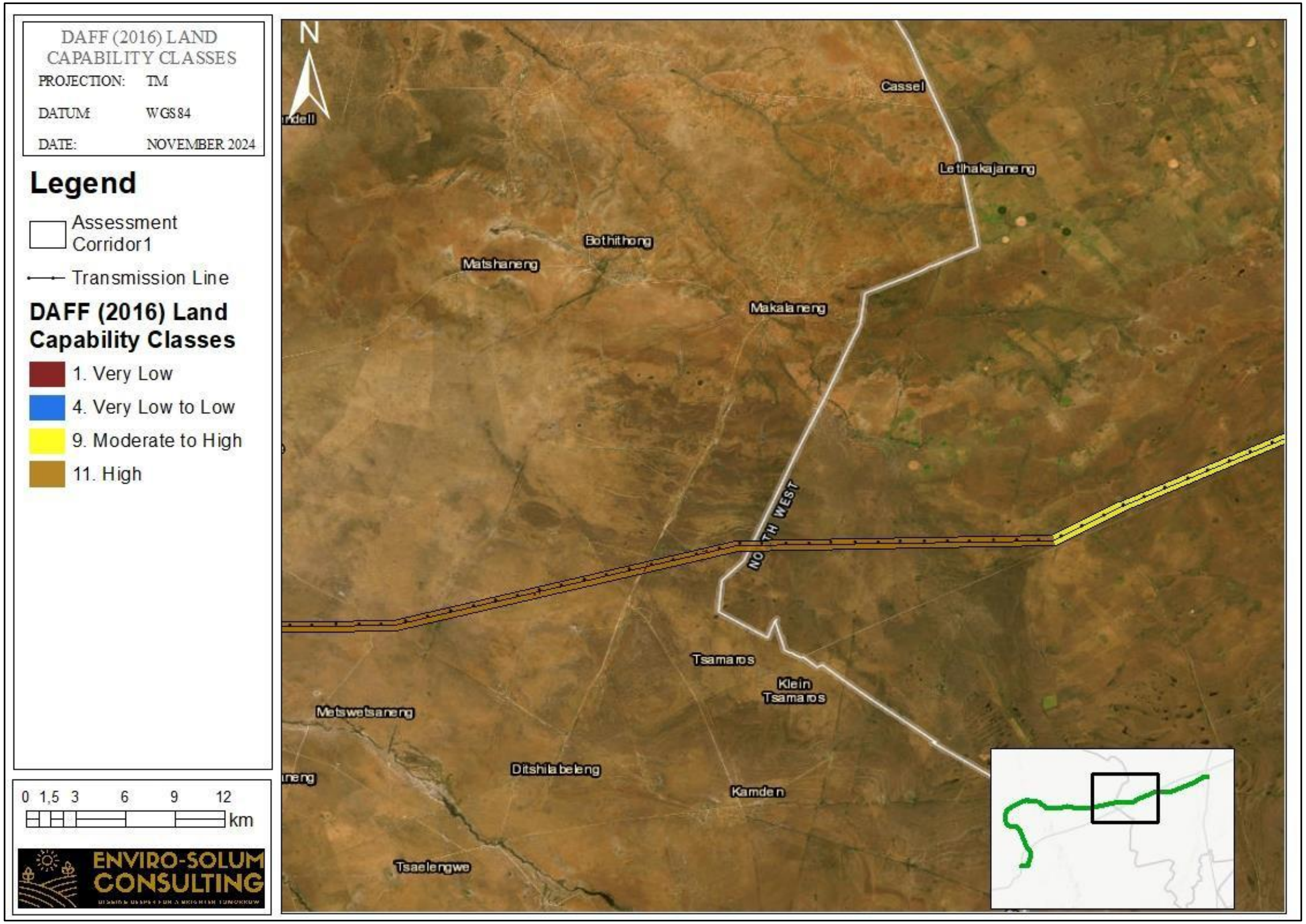


Figure 24: DAFF (2016) land capability classes associated with the mid-eastern portion of the study area.

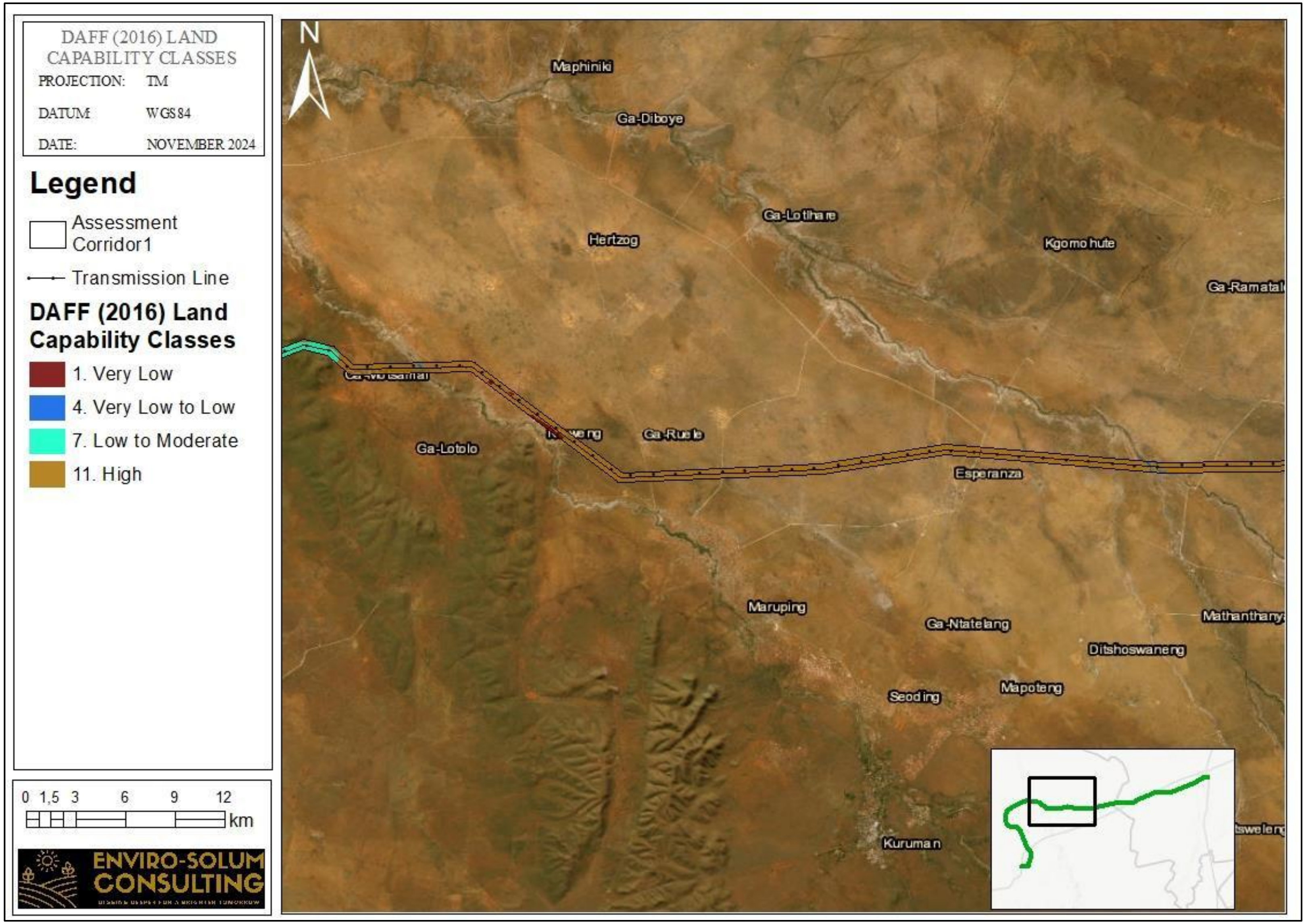


Figure 25: DAFF (2016) land capability classes associated with the upper western portion of the study area.

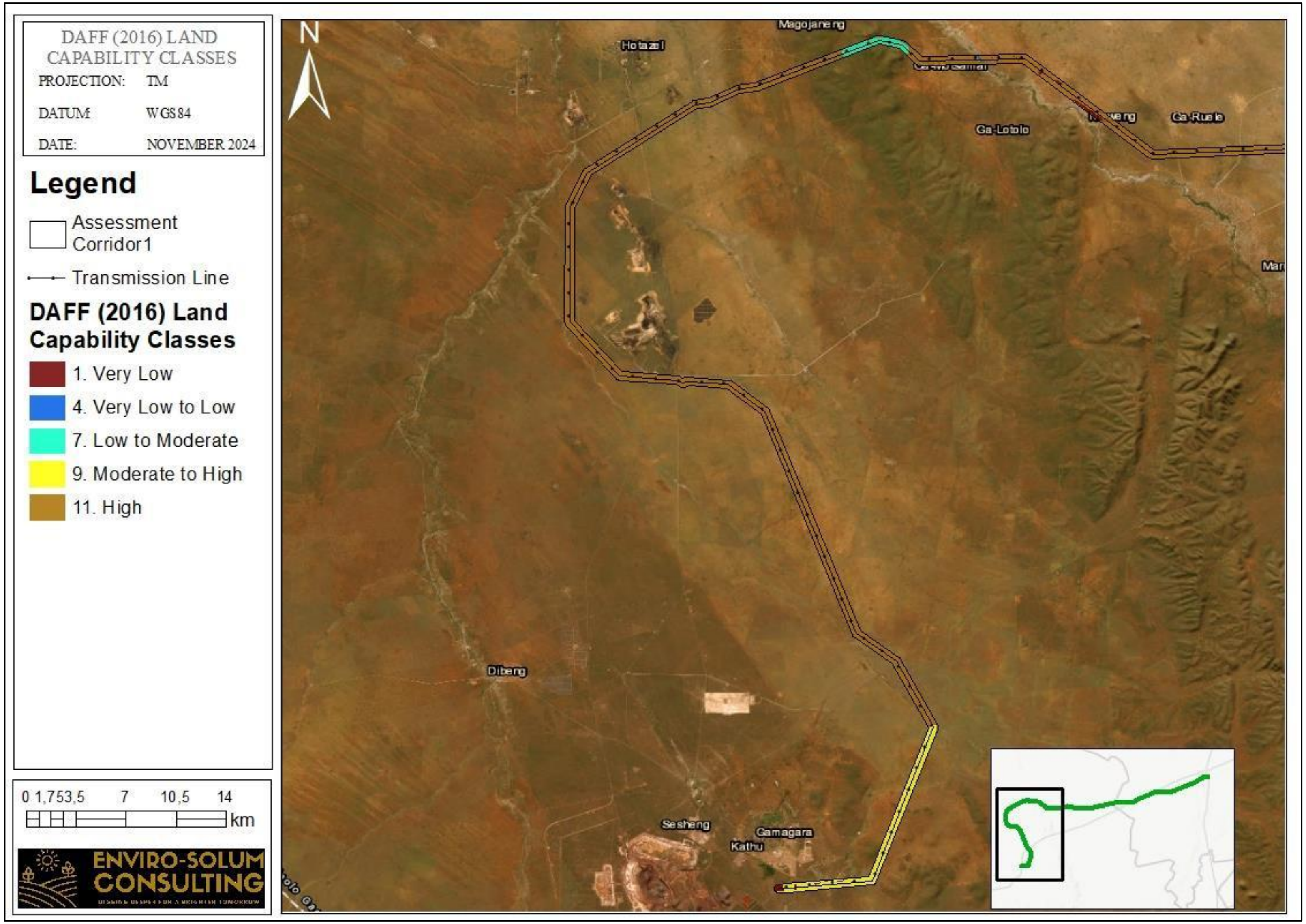


Figure 26: DAFF (2016) land capability classes associated with the lower western portion of the study area.

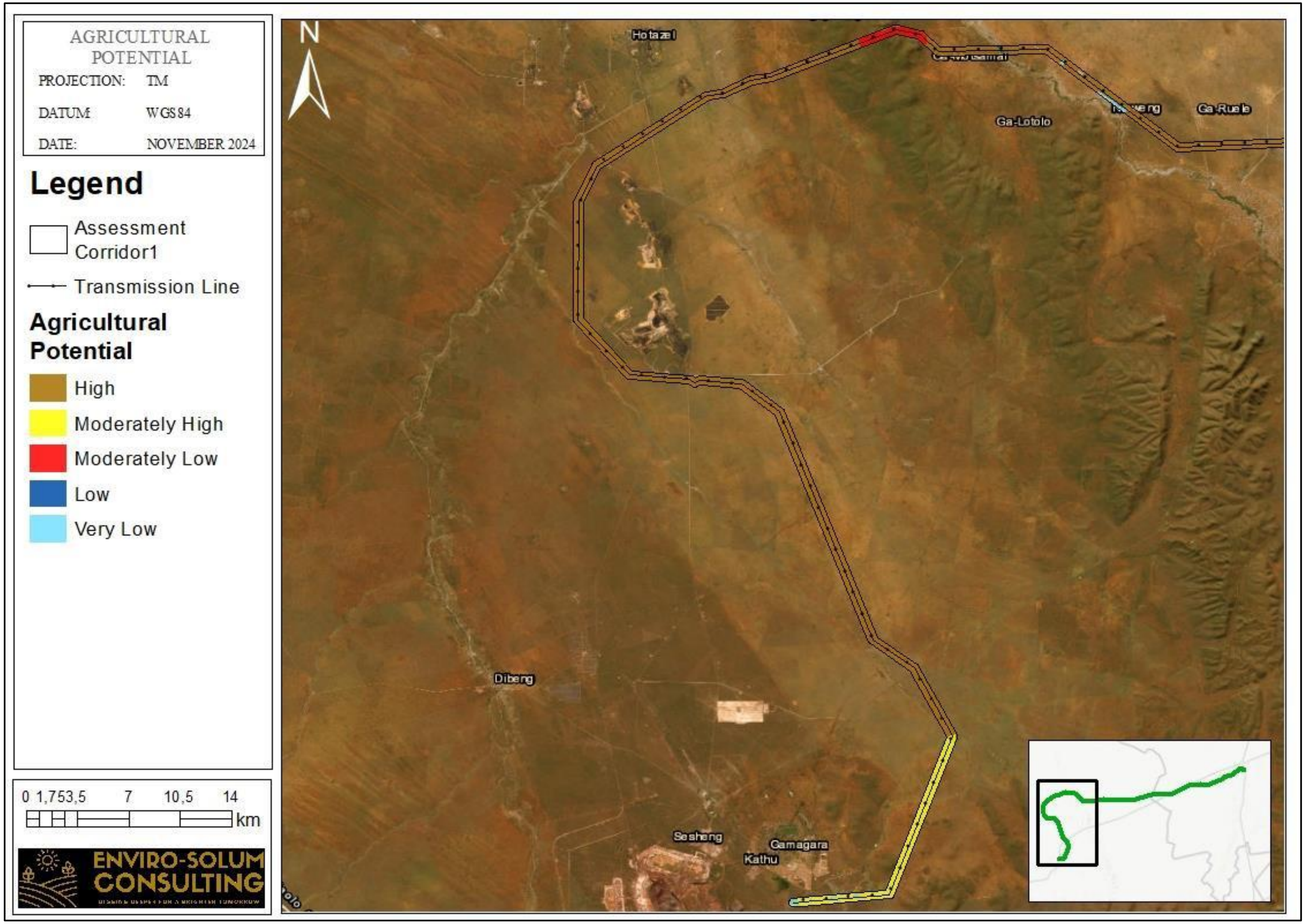


Figure 27: Agricultural potential for soils associated with the western portion of the study area.

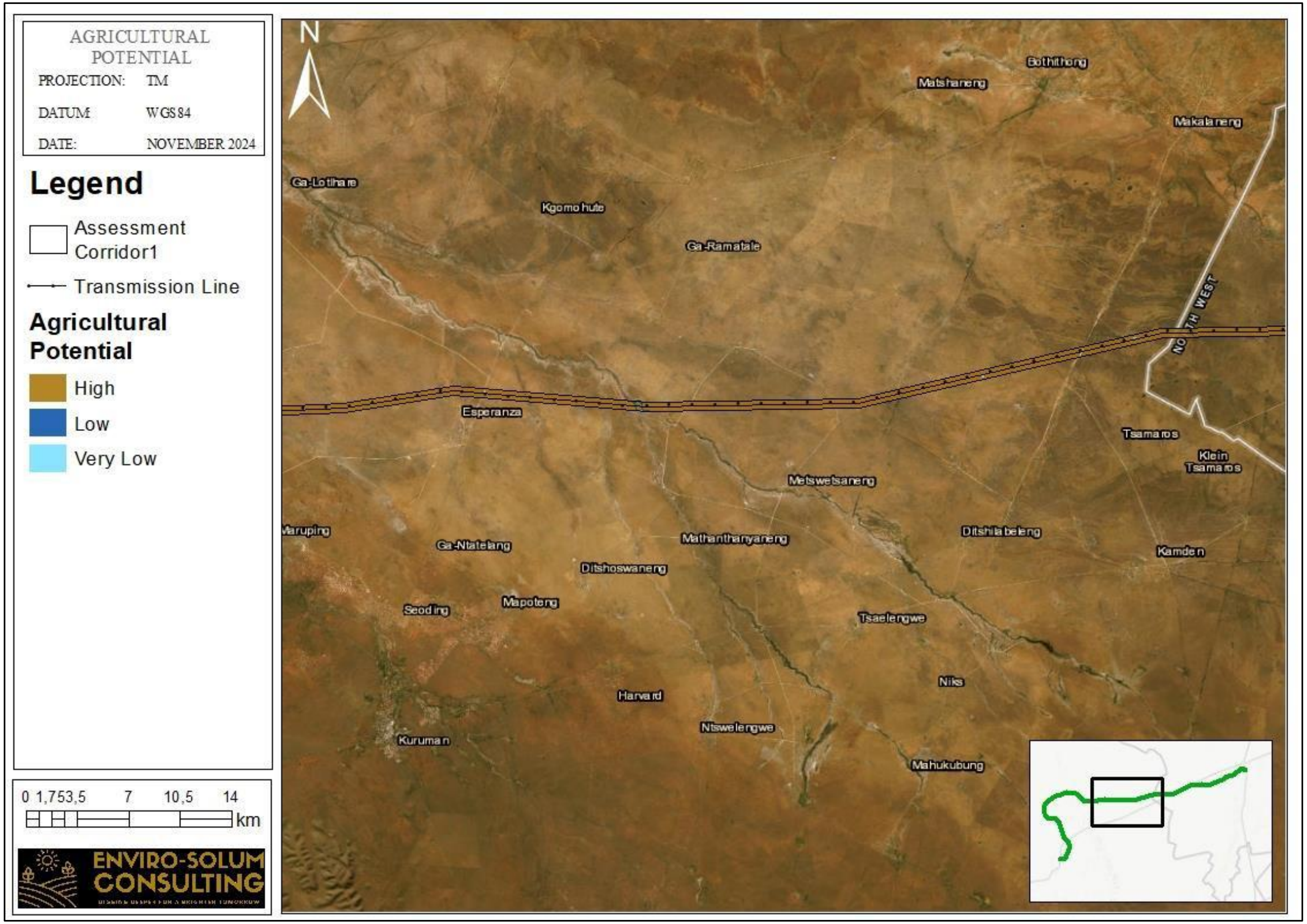


Figure 28: Agricultural potential for soils associated with the mid-western portion of the study area.

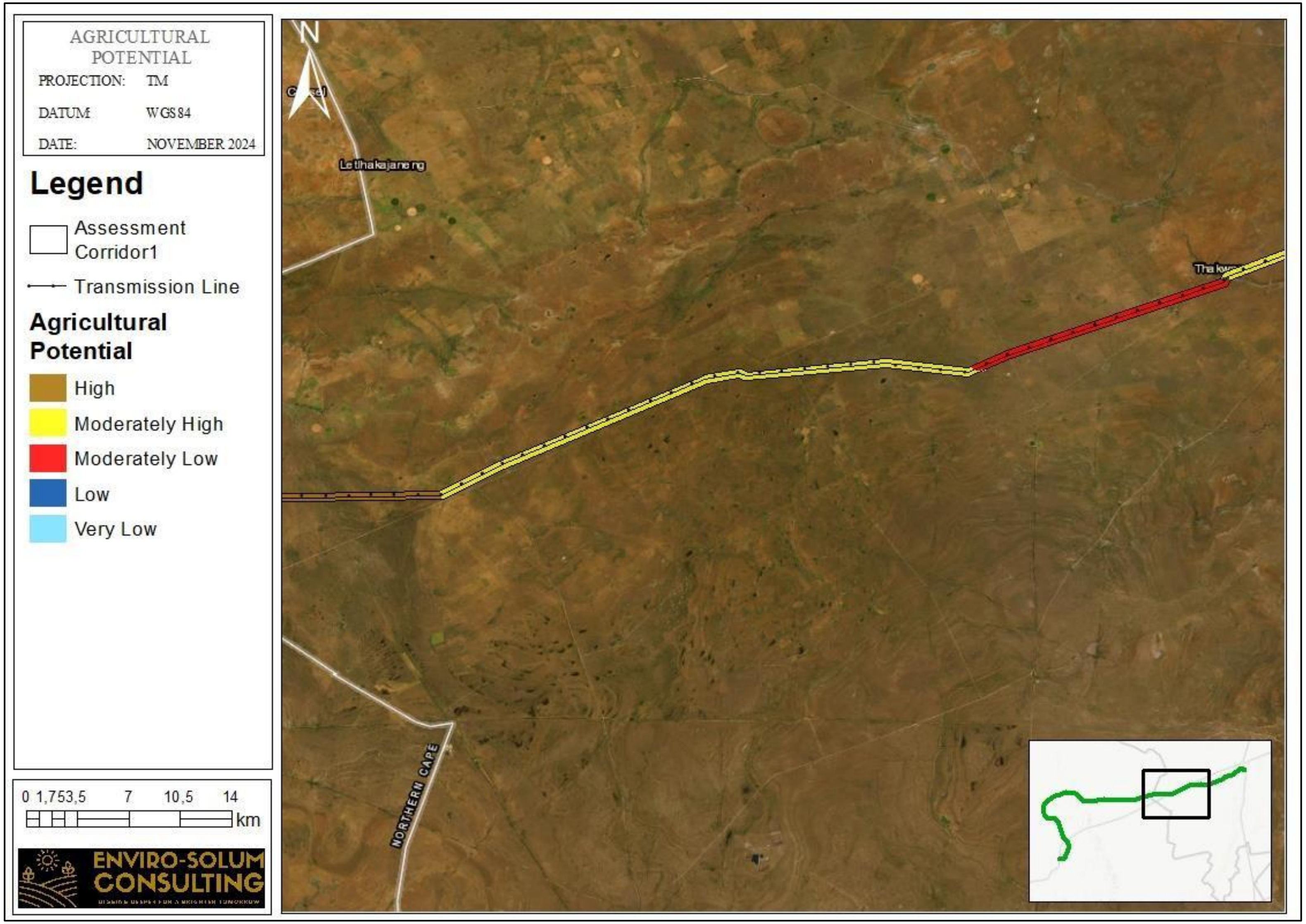


Figure 29: Agricultural potential for soils associated with the mid-eastern portion study area.

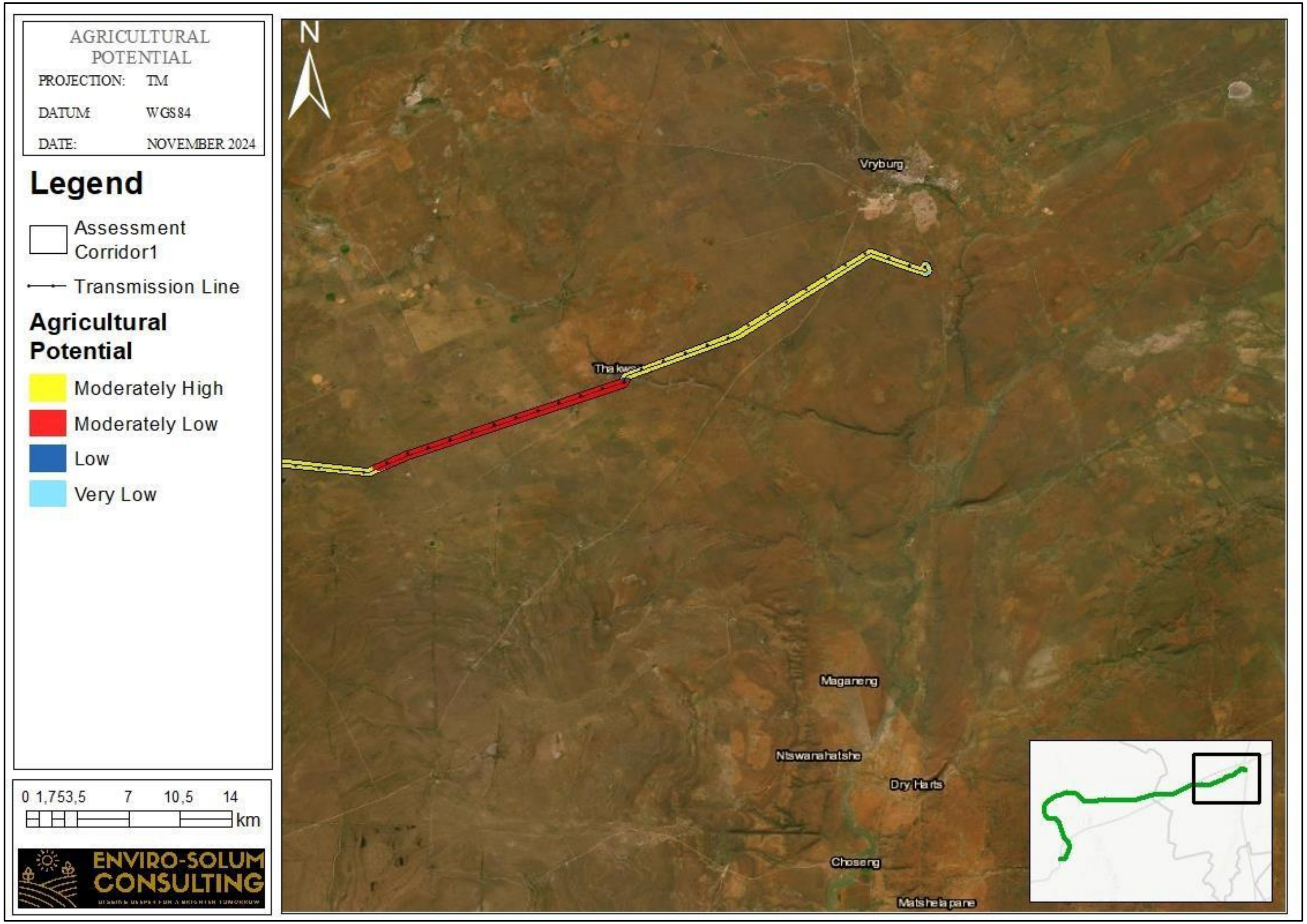


Figure 30: Agricultural potential for soils associated with the eastern portion of the study area.

# 5. IMPACT ASSESSMENT

It should be noted that an Agricultural Compliance Statement is not required to rate agricultural impacts using impact assessment tables formally.

Section 5.1 below presents the significance of the impacts that may occur due to the proposed activities and describes the mitigation required to limit the identified adverse impacts on the identified soils and the agro-ecosystem.

## 5.1 Impact Assessment Per Project Phase

### 5.1.1 Construction Phase

During the construction phase of the proposed powerline route, the soils are anticipated to be exposed to erosion, dust emission, potential soil contamination and loss of land capability impacts. The main envisaged activities include the following:

- Earthworks will comprise clearing plants from the surface and stripping topsoil (soil excavation) to prepare the foundation for the electrical pylons. These operations are the most disruptive to natural soil horizon distribution and will likely impact the current soil hydrological characteristics and soil functionality if not adequately mitigated;
- The regular operation of heavy machinery intensifies the risk of soil contamination by petroleum, oil, and grease;
- In addition, additional activities that will have an effect on the soil during this period include the management and storage of various types of waste and building materials. These activities have the potential to result in soil pollution if they are not managed in an environmentally responsible manner.

The disruption of original soil profiles and the natural sequence of soil horizons during earthmoving activities constitutes a significant measurable erosion deterioration. This alteration is particularly concerning due to the sandy composition of the soils in the area, which inherently makes them more susceptible to erosion. As a result, the likelihood of soil erosion increases, potentially compromising the integrity of the soil resource. The repercussions of this disturbance are primarily limited to the localised development footprint, meaning that the immediate impacts are confined within the boundaries of the construction site. However, if these disturbances are not effectively managed and mitigated, the ongoing erosion could lead to a medium significance level regarding the broader soil resource health and stability.

Soil chemical pollution, primarily resulting from the potential spillage of oil and fuel from vehicles, is categorised as a moderate degradation of the soil resource. If these spills are not effectively managed, their detrimental effects can extend beyond the immediate site boundaries, leading to localised contamination zones. Such pollution can disrupt soil chemistry, affect microbial activity, and ultimately compromise the soil's ability to support vegetation and sustain ecological balance. Proper prevention and remediation strategies are essential to mitigate these impacts and preserve soil integrity.

Soil compaction is anticipated to be a significant and measurable deterioration resulting from the frequent passage of heavy vehicles on the existing roads and any newly constructed access roads designed to facilitate access to the pylon positions. This process will cause a reduction in soil porosity and permeability, adversely affecting water infiltration, root growth, and overall soil health.

If effective mitigation measures are not implemented, the negative impacts of soil compaction will be outside the site boundary and construction sites. A medium consequence of these impacts on the soils can be anticipated, as this may lead to reduced agricultural productivity, altered drainage patterns, and potential disruptions to local ecosystems. Therefore, assessing and proactively addressing these impacts is essential to ensure sustainable land use and protect the site's agricultural integrity.

### 5.1.2 Operational Phase

The operational phase is a critical period that includes the proposed development's completion and ongoing management and maintenance. During this phase, various potential impacts can arise that may affect the surrounding environments and infrastructure.

One significant concern is runoff, which can occur due to precipitation and water drainage from the site. This runoff can lead to erosion, particularly in areas where vegetation has been removed or where soil has been disturbed. Erosion poses risks to the immediate vicinity and neighbouring ecosystems, as it can contribute to sedimentation in local waterways, affecting water quality and aquatic habitats. This impact can be reversible over time but localised within the site boundary. This impact is possible and will have medium significance if not managed.

Soil chemical pollution occurs when various contaminants seep into the subsurface layers of soil, particularly in areas where waste materials are stored or from maintenance vehicles that are leaking hazardous substances. This type of pollution is classified as a moderate threat to the quality and functionality of soil resources if effective remediation measures are not implemented. However, if appropriate mitigation strategies, such as containment, clean-up, and monitoring, are employed, the adverse effects of this pollution can be confined to a specific area within the site boundaries, thereby minimising its overall significance on the soil resource. When managed properly, this localised impact can ensure that the surrounding environment remains largely unaffected, preserving the integrity and productivity of the soil in the broader vicinity.

Moreover, the constant movement of maintenance vehicles and heavy machinery throughout the operational phase can have detrimental effects on the soil structure. This frequent traffic can disturb the topsoil and underlying layers, leading to soil compaction. Soil compaction diminishes the soil's ability to retain water and nutrients, ultimately impacting plant growth and the overall health of the landscape. This reversible impact over time will be localised within the site boundary and immediate surroundings with medium consequence and significance if not mitigated properly. If mitigated, the significance of the impact can be regarded as low.

Thus, operational phase necessitates careful planning and management to mitigate risks associated with runoff, soil disturbance, and waste management, ensuring the development site's long-term sustainability and environmental health.

The main envisaged operational activities that will impact on soil, land use and land capability include the following:

- General activities, including transport on access roads, will result in soil compaction or generation of runoff, respectively.
- Waste generation (non-mineral waste) and accidental spills and leaks may result in soil chemical pollution if not managed.

### 5.1.3 Closure and Decommissioning Phase

Decommissioning can be understood as the inverse of the construction phase, involving a systematic process that entails dismantling and removing most infrastructure. This phase closely mirrors the construction activities in reverse, as it requires careful planning and execution to ensure that all structures, systems, and equipment are safely taken down. Decommissioning typically begins with a thorough assessment of the existing facilities to identify which components need to be demolished and any hazardous materials that must be handled with caution. This involves a comprehensive inventory and evaluation of the infrastructure to develop a methodical approach to removal.

The main envisaged decommissioning activities that will impact on soil, land use and land capability include the following:

- Transport of materials away from the site. This will compact the soil of the existing roads and fuel and oil spills from vehicles may result in soil chemical pollution;
- Earthworks will include redistribution of inert waste materials to fill the ponds, ditches, and topsoil to increase the soil surface. These activities will not further impact land use and capability but may increase soil compaction; and
- Other activities in this phase that will impact soil are handling and storing materials and different kinds of waste generated and accidental spills and leaks with decommissioning activities. When not managed properly, these activities can potentially result in soil pollution.

### 5.2 Impact Statement and Screening Tool Sensitivity Verification

The study area, which encompasses a 300-meter assessment corridor, has been proposed as the route for the proposed powerline associated with the Kimberly Strengthening Phase 3 project. Based on inherent soil properties, the majority of the study area is dominated by arable soils (91.1%) due to the weak apedal structure, which favours root and water penetration at greater depths. However, these soils possess extremely low clay content. This deficiency directly impacts the soils' water-holding capacity, making them less viable for sustained agricultural activities, particularly under dryland farming conditions. While they could theoretically support some level of irrigation, the very low clay content significantly restricts this potential, as clay plays a key role in retaining moisture. Given the sandy composition of the soils, careful management and scheduling of water supply are imperative. Without a reliable and sufficient water source, the potential productivity of the area would be severely compromised, as these soils would struggle to maintain optimal moisture levels necessary for healthy crop growth.

Consequently, successful irrigation strategies must be implemented to maximise agricultural output. Considering the overall agricultural potential of the region, it appears to be more conducive to livestock farming rather than crop production. The hot and arid climate characteristics suggest that the land is primarily suited for practices such as game farming or cattle ranching, which are better aligned with the study area's environmental conditions and soil capabilities.

An agricultural impact refers to any significant change that affects the long-term ability of a particular land area to sustain agricultural production. Such alterations commonly arise when agricultural activities are restricted or eliminated in regions that are experiencing developmental changes, such as urbanisation or industrial expansion.

The proposed overhead powerline project is not anticipated to have a detrimental impact on the agricultural activities occurring within the study area, as it will not affect the future capacity of agricultural production in the study area. All existing agricultural operations, particularly those focused on cattle and game farming, will be able to proceed as they currently do without interruption or constraint beneath the powerline. However, it is important to consider that during both the construction and decommissioning phases of the powerline and pylons installation, there may be instances of topsoil loss and land degradation due to the necessary land disturbance. This could pose temporary challenges for land management and agricultural practices in the immediate vicinity. Project planners must implement appropriate mitigation strategies to minimise these impacts and ensure that the agricultural land can be restored to its original condition as efficiently as possible following construction activities.

The potential impact of the project can be effectively mitigated through the implementation of standard, generic measures inherent in the project's engineering design, as well as by adhering to standard best practices for construction sites, all of which are detailed in the Environmental Management Programme (EMPr) as contained within Part B-Section 1 and 2 of the generic EMPr and standards for powerlines and substations. The development of the powerline is anticipated to result in only minimal to no loss of future agricultural production potential. Therefore, the agricultural impact of the proposed powerlines is deemed to be of very low significance.

The proposed development will benefit the local community through job creation, skills development opportunities, and training, mainly during the construction phase, albeit for a short period. This will, in turn, assist in reducing poverty levels and indirectly strengthen the country's electricity supply.

The proposed development falls within the Strategic Transmissions Corridors (EGI) (see Figure 31), which identified five strategic transmission corridors important for planning electricity transmission and distribution infrastructure in South Africa. These corridors are essential for connecting high-voltage power and aid with strengthening the country's electricity grid. The proposed project is thus deemed critical from a broader perspective of the electricity supply in the country.

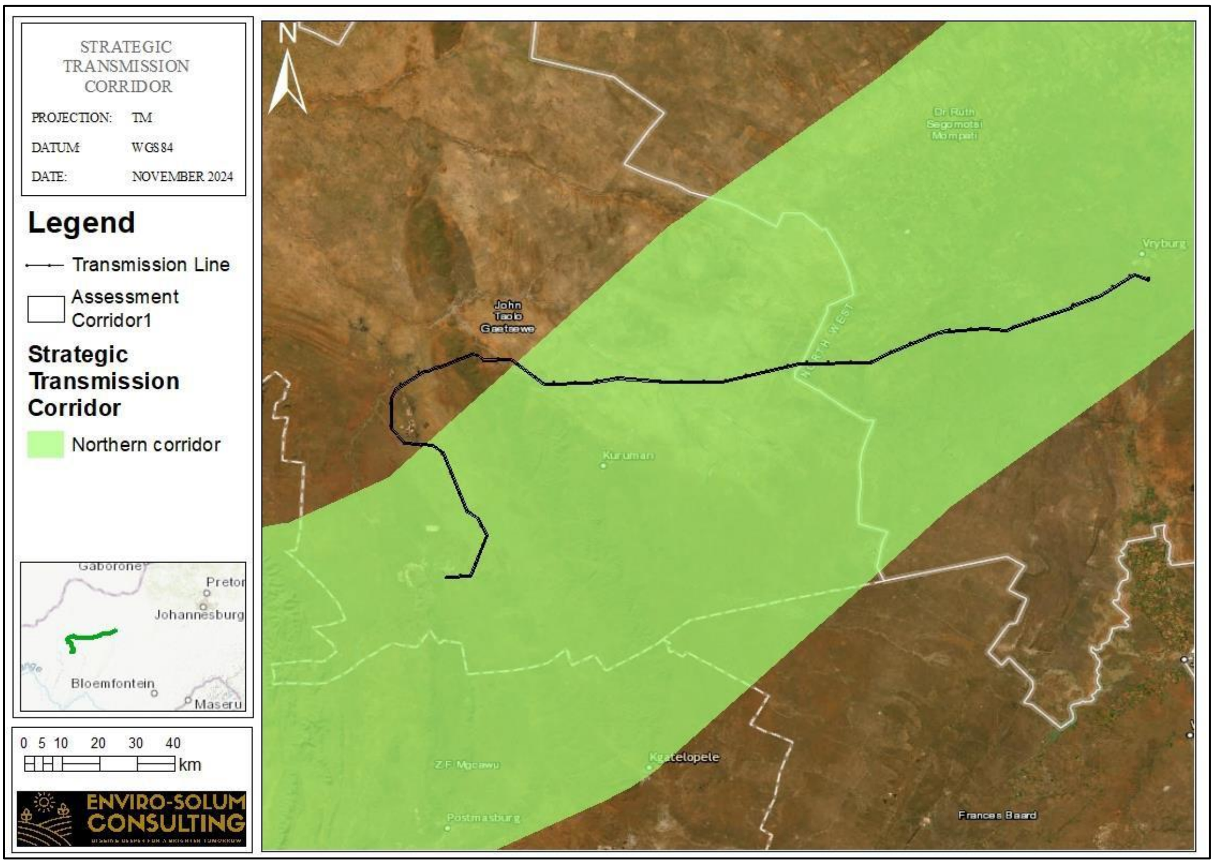


Figure 31: Strategic Transmission Corridor associated with the study area.

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation, the current use of the land and the environmental sensitivity of the site under consideration as identified by the national web-based environmental screening tool, must be confirmed by undertaking a site sensitivity verification.

The outcome of this site sensitivity verification is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

The allocated sensitivities for the agricultural theme are presented on Table 6 below.

Table 6: Summary of the screening tool vs specialist-assigned sensitivities.

| Study Area | Screening Tool Assigned Sensitivity | Verified Sensitivity | Reasoning for verification outcome verification |
|---|---|---|---|
| **Powerline Assessment Corridor** | High Sensitivity | Low Sensitivity | The study area is primarily characterised by arable soils (Class II and IV); however, its suitability for successful dryland agriculture is low due to climatic constraints and a lack of irrigation options. The region experiences erratic and very low rainfall, which is essential for dryland farming success. Without an irrigation scheme and a robust fertilisation program, the study area will be limited to grazing and wildlife uses. Furthermore, the high evaporation rate typical of the hot, dry climate will necessitate regular irrigation if crops are to be grown successfully. |

The specialist believes that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area is made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

### 5.2.1 Cumulative Impacts

The agricultural protocols require comprehensive evaluations for environmental approval to assess cumulative effects. The cumulative impact of a project refers to the total consequence it exerts when combined with the incremental effects of prior, ongoing, or anticipated future activities that will similarly influence the environment.

In the context of the proposed powerline, the cumulative impacts have been analysed and are deemed low significance. This is because agricultural activities can continue to operate effectively beneath the powerlines without significant disruption. Consequently, there is no expected net loss in future agricultural production resulting from this proposed development and the currently operating developments of a similar nature. Given this analysis, the proposed powerline development is considered for approval.

### 5.2.2 Micro Siting and Confirmation of Linear Activity

The agricultural protocol necessitates verifying the implementation of all practical measures through micro-siting to reduce the fragmentation and disturbance of agricultural activities. This involves carefully planning the location and layout of agricultural infrastructure and operations to minimise any negative impact on the surrounding agricultural activities. As previously discussed, micro-siting within the powerline will not significantly impact or disturb agriculture.

It has been verified that the land under the overhead power line, not occupied by other infrastructure, can be returned to its original agricultural productivity within two years of construction. However, it should be noted that the pylons will remain in place throughout the powerline's operational lifetime.

## 6 INTEGRATED MITIGATION MEASURES

The Environmental Impact Assessment (EIA) plays a crucial role in evaluating the potential environmental impacts of the proposed project. It is essential that the EIA thoroughly examines the environmental implications, taking into account both the impacts with and without mitigation measures. This comprehensive assessment is vital to effectively minimise any adverse effects on the soil resources in the area. Furthermore, it is imperative to adhere to the mitigation hierarchy, as illustrated in Figure 32, to ensure that the principles of the National Environmental Management Act (NEMA) are effectively applied.

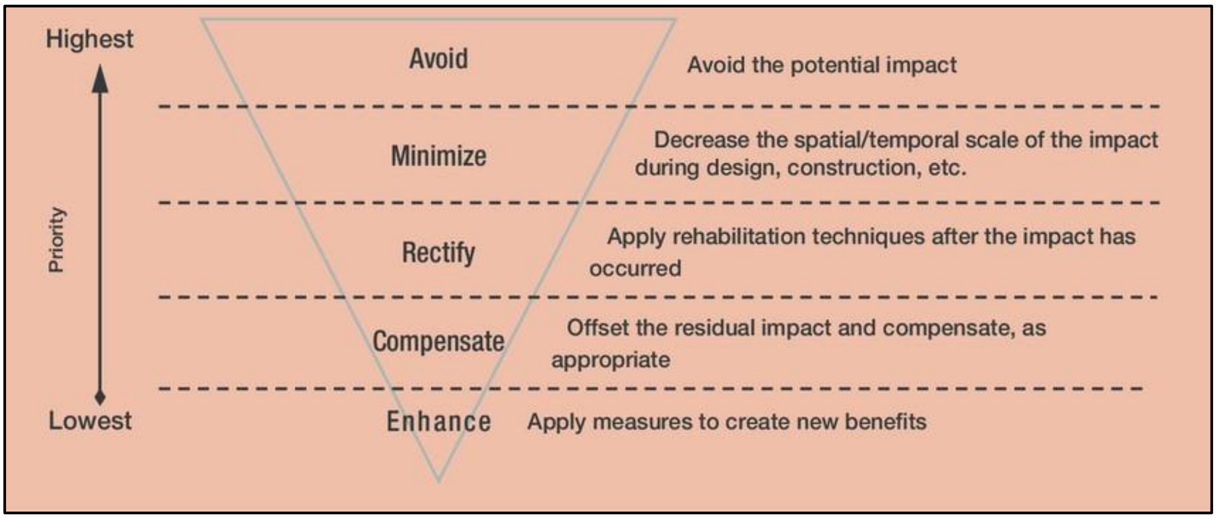


Figure 32: Mitigation hierarchy.

The principles of NEMA are critical for attaining sustainable development as they recognise the need to incorporate social, economic, and ecological factors into environmental decision-making processes. These principles are relevant to all decisions concerning the understanding and applying NEMA and other environmental management and protection regulations. Hence, the EIA needs to consider the NEMA principles.

### 6.1 Management of Loss of Land Capability

- Direct surface disturbance of the identified arable soils can be avoided where possible to minimise loss of arable soils;
- Avoid construction on active agricultural soils where feasible;
- Minimise the development footprint within the actively cultivated soils;
- The footprint areas should be lightly ripped to alleviate compaction;
- Limit removal of vegetation to demarcated areas only;
- Limit earthworks and vehicle movement to demarcated paths and areas.

### 6.2 Soil Compaction Management

- Soil Compaction is usually greatest when soils are moist, so soils should be stripped when moisture content is as low as possible;
- Heavy equipment movement over replaced soils must be minimised;
- Minimise compaction during smoothing of replaced soils by using dozers rather than graders; and
- Following placement, compacted soils must be ripped to full rooting depth (30cm as the bare minimum seedbed) to allow penetration of plant root.

### 6.3 Soil Contamination Management

- Contamination prevention measures must be addressed in the Environmental Management Programme (EMPr) for the proposed development, and this must be always implemented and made available and accessible to the contractors and construction crew conducting the works on site for reference;
- A spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans must also be compiled to guide the construction works;
- An emergency response contingency plan must be put in place to address clean-up measures must a spill and/or a leak occur, as well as preventative measures to prevent contamination; and
- Burying of any waste including rubble, domestic waste, empty containers on the site must be strictly prohibited and all construction rubble waste must be removed to an approved disposal site.

### 6.4 Soil Erosion and Dust Management

- Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces, must be re-vegetated or stabilised as soon as is practically possible;
- All excavation/construction vehicles must be in good condition and inspected regularly to ensure there are no chemical spills (diesel/oil) which will negatively impact the receiving environment;

- After the powerline installation, the ground must be seeded with an indigenous grass or other native cover;
- Vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when the erosive stormwater and wind are anticipated to be low whenever possible;
- Avoid vegetation clearance prior to periods of prolonged inactivity;
- All disturbed areas adjacent to the proposed development areas must be re-vegetated with an indigenous grass mix or vegetation mix, if necessary, to re-establish a protective cover, to minimise soil erosion;
- Temporary erosion control measures must be used to protect the disturbed soils during the construction phase until adequate vegetation has established.

# 7 CONCLUSION

Diges Group appointed Enviro-Solum Consulting to conduct a soil, land use, and land capability assessment as part of the Environmental Impact Assessment (EIA) for the proposed Kimberley Strengthening Phase 3 Project.

The proposed powerline route runs from the Ferrum substation near Kathu (Northern Cape), north to the Umntu substation near Hotazel (Northern Cape), and then east via the Mookodi substation near Vryburg (North West Province). The proposed Kimberly Strengthening Phase 3 project area (hereafter referred to as the study area) includes the Gamagara Local Municipality, Joe Morolong Local Municipality, Ga-Segonyana Local Municipality in the Northern Cape Province, and the Greater Taung Local Municipality and Naledi Local Municipality in the North West Province.

To account for the potential edge impacts of the proposed development, the powerline route was assigned a 300-meter evaluation corridor.

The study area is in the hot semi-arid climate zone, which is defined by hot, often extremely hot, summers and mild to cool winters with little to no precipitation. Hot semi-arid temperatures are most common along the edges of subtropical deserts. The western portion of the study region (mainly in the Northern Cape Province) experiences rainfall ranging from 201 to 400 mm. The eastern portion of the study region, primarily in the North West Province, experiences rainfall ranging from 401 to 600 mm. The study area can thus be defined as water-stressed. While the planting dates for rain-fed agriculture are limited under these conditions, a few suitable crops can produce high yields if planted on time.

The study area, which encompasses a 300-meter assessment corridor, has been proposed as the locality route for the proposed powerline associated with the Kimberly Strengthening Phase 3 project. Based on inherent soil properties, the majority of the study area is dominated by arable soils (91.1%) due to the weak apedal structure, which favours root and water penetration at greater depths. However, these soils possess extremely low clay content. This deficiency has a direct impact on the soils' water-holding capacity, making them less viable for sustained agricultural activities, particularly under dryland farming conditions. While they could theoretically support some level of irrigation, the very low clay content significantly restricts this potential, as clay plays a key role in retaining moisture. Given the sandy composition of the soils, careful management and scheduling of water supply are imperative. Without a reliable and sufficient water source, the potential productivity of the area would be severely compromised, as these soils would struggle to maintain optimal moisture levels necessary for healthy crop growth. Consequently, successful irrigation strategies must be implemented to maximise agricultural output. Considering the overall agricultural potential of the region, it appears to be more conducive to livestock farming rather than crop production. The hot and arid climate characteristics suggest that the land is primarily suited for practices such as game farming or cattle ranching, which are better aligned with the environmental conditions and soil capabilities of the study area.

An agricultural impact refers to any significant change that affects the long-term ability of a particular land area to sustain agricultural production. Such alterations commonly arise when agricultural activities are restricted or eliminated in regions that are experiencing developmental changes, such as urbanisation or industrial expansion.

The proposed overhead powerline project is not anticipated to have a detrimental impact on the agricultural activities occurring within the study area, as it will not affect the future capacity of agricultural production in the study area. All existing agricultural operations, particularly those focused on cattle and game farming, will be able to proceed as they currently do without interruption or constraint beneath the powerline. However, it is important to consider that during both the construction and decommissioning phases of the powerline and pylons installation, there may be instances of topsoil loss and land degradation due to the necessary land disturbance. This could pose temporary challenges for land management and agricultural practices in the immediate vicinity. It is crucial for project planners to implement appropriate mitigation strategies to minimise these impacts and ensure that the agricultural land can be restored to its original condition as efficiently as possible following construction activities.

It is the opinion of the specialist that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

## 8 REFERENCES

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## APPENDIX A: INDEMNITY

- This report is based on survey and assessment techniques limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data related to the site to be affected, *in situ* fieldwork, surveys, and assessments, and the specialist's best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions, and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of the study.
- Additional information may become known or available later in the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations, and conclusions at any stage must additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

TSetsipane

Tshiamo Setsipane
14 November 2024

**APPENDIX B: CURRICULUM VITAE OF SPECIALISTS**

**CURRICULUM VITAE OF TSHIAMO SETSIPANE**

## PROFESSIONAL EXPERIENCE

**Soil Science Consultant**

- Conducting Soil, Land Use and Land Capability Assessments:
    - Assess existing information for rainfall data and current land uses.
    - Conduct a desktop assessment within the study area using the digital satellite imagery and other suitable digital aids.
    - A soil classification survey and agricultural potential will be conducted within the proposed development area.
    - A soil classification survey and agricultural potential will be conducted within the proposed development area.
    - Provide recommended mitigation measures to implement to manage the anticipated impacts and to comply with the applicable legislations.
    - Compile a report on the findings of the assessment and presented in an electronic format.
- Conducting Hydropedological Impact Surveys:
    - Identify dominant hillslopes (from crest to stream) of the project area using terrain analysis.
    - Conduct a transect soil survey on each of the identified hillslope.
    - Hydrological behaviour of the identified hillslope described according to the identified hydropedological groups;
    - Graphical representation of the dominant and sub-dominant flowpaths at hillslope scale prior to development and post development.
    - The impact of the proposed development on the hydropedological behaviour described in a report format.
    - Quantification of hydropedological fluxes using the Soil and Water Analysis Tool (SWAT+) to determine the losses to the wetland systems though the proposed project
- Conducting Land Contamination Assessments and Soil Monitoring Assessments:
    - Assessments of historic and current storage of hazardous waste and materials on soils.
    - Topsoil stockpile quality assessment for future usage.
    - Monitoring programme to determine the dust suppression impact on soil chemical parameters.

## EDUCATION

- M.Sc. (Agric): Soil Science **01/2016– 03/2019**
    - Dissertation: Characterisation of hydropedological processes and properties of a sandstone and a tillite hillslope, Kwa-Zulu Natal, South Africa.
    - Graduated *Cum-Laude*.
- B.Sc. (Agric) Honours: Soil Science **01/2014 – 11/2014**
    - Majored in soil fertility, soil physics, soil geography and soil chemistry.
    - Research Project: Soil as an indicator of soil water regime.
- B.Sc. (Agric): Soil Science and Agrometeorology **2010 – 11/2013**
    - Majored in soil science and agrometeorology.
    - Minored in agronomy and plant pathology.

## PROFESSIONAL MEMBERSHIP AND AFFILIATION

- Professional Natural Scientist with South African Council for Natural Scientific Professions (SACNASP) Registered, 11/2015 – Current
- Member of the Soil Science Society of South Africa (SSSSA)
- Member, South African Soil Surveyors Organization (SASSO)
- Member of the South African Wetland Society (SAWS