AGRICULTURAL COMPLIANCE STATEMENT FOR THE PROPOSED UPGRADE OF NATIONAL ROUTE 1 SECTION 4 BETWEEN DOORNFONTEIN AND LAINGSBURG, WITHIN THE LAINGSBURG LOCAL MUNICIPALITY OF CENTRAL KAROO DISTRICT IN THE WESTERN CAPE PROVINCE.

PREPARED FOR: EARTHLINK ENVIRONMENTAL SERVICES

JULY 2024

DECLARATION OF INDEPENDENCE

I, **Lutendo Ndou**, declare that I:

- I act as the independent specialist in this application.
- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- all the particulars furnished by me in this form are true and correct; and
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B (2) of the National Environmental Management Act, 1998 (Act 107 of 1998).
- I realize that a false declaration is an offence in terms of Regulation 71 of NEMA and is punishable in terms of section 24F of the Act.

Signature

Document Control

Report status	**Draft for client review**	
Report title	Agricultural Compliance Statement for the proposed upgrade of National Route 1 Section 4 between Doornfontein and Laingsburg, within the Laingsburg Local Municipality of Central Karoo District in the Western Cape Province.	
Date	30 July 2024	
Author(s)	Lutendo Ndou (Pri. Sci. Nat) – 127690	
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EXECUTIVE SUMMARY

Matavha Environmental (Pty) Ltd was appointed by Earthlink Environmental Services on behalf of South African National Roads Agency SOC Limited to compile an Agricultural Impact Assessment Compliance Statement for the proposed road upgrade along the N1. The South African National Roads Agency SOC Limited is proposing to upgrade the existing carriageway capacity of the National Road 1 section between Doornfontein (km 63.0) and Laingsburg (km 81.7). The upgrade will include two bridges, eighty-six minor culverts, and eight major culverts. The objective and focus of this report are to assess whether the proposed upgrade activities will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether they should be approved or not

The main purpose of the Agricultural Compliance Statement is to ensure that the site's sensitivity to the proposed project from the perspective of agricultural cultivation and production is sufficiently considered. Also, the information provided in this report enables the Competent Authority to reach a sound conclusion on the impact of the project on the food production potential of the study area. The terms of reference for this study are therefore to fulfill the requirements of the “Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources” gazette on 20 March 2020 in GN 320 [in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998]. According to the DFFE screening tool the site area falls within medium sensitivity in terms of agriculture therefore the level of agricultural assessment required in terms of the protocol for sites of less than high sensitivity is an Agricultural Compliance Statement. A desktop study, including literature review and site visit, was conducted to determine the expected land and soil capacity of the study area.

Various data sources were also utilised to obtain available information of the site area. The desktop assessment was undertaken to determine the geology, topography, terrain, soil formation, land capability, as well as soil classification of the study area. The site was traversed on foot and a field investigation of existing soil and agricultural potential for the site was obtained in July 2024 (dry season). It was also the objective of the assessment to provide recommended mitigation measures and management practices to implement to comply with applicable articles of legislation. In terms of the baseline assessment, the general topography of the study area consists of a typical flat to undulating karoo landscape with scattered small hills to mountainous areas. The study area is within a relief value of 30 - 210m.

The portion of the N1 within which the road upgrade is proposed traverses land largely covered on natural and uncultivated land with minimal infrastructures. Prominent land uses in the surrounding areas include

guest houses, Laingsburg town, as well as road related infrastructure such as bridges. Laingsburg is influenced by the local steppe climate. The amount of rainfall remains low during the entire year. Köppen and Geiger classify this climate as BSk. The mean yearly temperature recorded in Laingsburg is 16.6 °C. Each year, there is an approximate 253 mm of precipitation that occurs. This location is in the southern region of the globe. According to the geological map the portion of the N1 road where the upgrade is proposed from Doornfontein (km63.0) the section is underlain by the Dwyka group formation. The Dwyka Group forms the lowermost and oldest deposit in the Karoo Supergroup basin. The geology changes along Klipwerf farm from Dwyka group to Prince Albert, Whitehill, Collingham, Vischkuil, Ripon, and Lainsburg Formations of the Ecca group. A small portion towards the Laingsburg town is underlain by the Fort Brown Formation.

According to the Soil and Terrain (SOTER) database and the geological map of South Africa, the study area is underlain by the Dwyka group formation, Prince Albert, Whitehill, Collingham, Vischkuil, Ripon, Lainsburg Formations of the Ecca group, as well as the Fort Brown Formation. Moreover, the soil within this study area falls within three classes, which are the association of classes 13 and 16: undifferentiated, shallow soils and land classes, freely drained structureless soils, and lithosols shallow soils on hard or weathering rock). These soils are characterised by high erodibility and have severe limitations for agricultural use since plant roots remain confined to a small volume of soil that cannot provide adequate anchorage, water, and nutrients. Lithosols have restricted soil depth and are associated with rockiness.

The study area has a C7 climatic capability with severely restricted choice of crops due to heat, cold and/or moisture stress. Moreover, according to the desktop assessment, the study area is regarded as having Non-arable, Grazing, woodland, or wildlife. (Class VII). Land in this class has very severe limitations that prohibit its use for cultivation and restrict its use primarily to grazing, woodland, or wildlife. Limitations are often more intense versions of those in Class VI, such as very steep slopes, severe erosion, or very shallow soils. These soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover. Therefore, the study area is regarded as low potential land (L7) with Severe limitations due to soil, slope, temperatures or rainfall.

Following the consideration of all the desktop, field assessment, and gathered data above, the area is considered to have low sensitivity to the proposed road upgrade in terms of agriculture. The land capability of the project assessment area is classified as non-arable, grazing, woodland, or wildlife (Class VII) with very low suitability of the study area for arable crop production. The proposed road upgrade activity is considered an acceptable project within the area of assessment. Considering that all the activities will take place as per the provided plans, it is confirmed that all reasonable measures have been taken to avoid or minimize fragmentation and disturbance of agricultural activities. It is my professional opinion that this application be considered favorably. The project is thus regarded as acceptable from an agricultural impact perspective.

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1. BACKGROUND

The South African National Roads Agency SOC Limited is proposing to upgrade the existing carriageway capacity of the National Road 1 section between Doornfontein (km 63.0) and Laingsburg (km 81.7). The upgrade will also include two bridges, eighty-six minor culverts, and eight major culverts in the Central Karoo District Municipality.

The major aspects of the proposed project are:

- Asphalt Surfacing with crushed stone base with a partial in situ reconstructed subbase for the section between km 63.0 and km 80.0,
- Asphalt surfacing with an asphalt base, with a cement stabilised subbase for the section between km 80.0 and km 81.7,
- New geometry for Section 1: Rural (km 63.0 – km 76.7): Dual carriageway and Section 2: “Pass” (km 76.7 – km 79.9): 4-lane configuration
- shoulder and 2.5m outside surfaced shoulder with an 8.6m median.
- New geometry for Section 3: Laingsburg Town (km 80.2 – km 81.4): 4-lane configuration reduced outside shoulders.
- New major intersections, minor intersections, access/ frontage roads, new or expanded borrow pits, and law enforcement areas

2. INTRODUCTION

Matavha Environmental (Pty) Ltd was appointed by Earthlink Environmental Services on behalf of South African National Roads Agency SOC Limited to compile an Agricultural Impact Assessment Compliance Statement (see terms of reference below) for the proposed road upgrade. This project is situated on National Road 1 section 4 between Doornfontein. (km 63.0) and Laingsburg (km 81.7), within the Laingsburg Local Municipality of Central Karoo District Municipality, in the Western Cape Province (See locality in Figure 1, below). The objective and focus of this report are to assess whether the proposed upgrade activities will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether they should be approved or not. The aim of the protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources (Government Notice No. 320 of 20 March 2020) is to preserve valuable agricultural land for agricultural production.

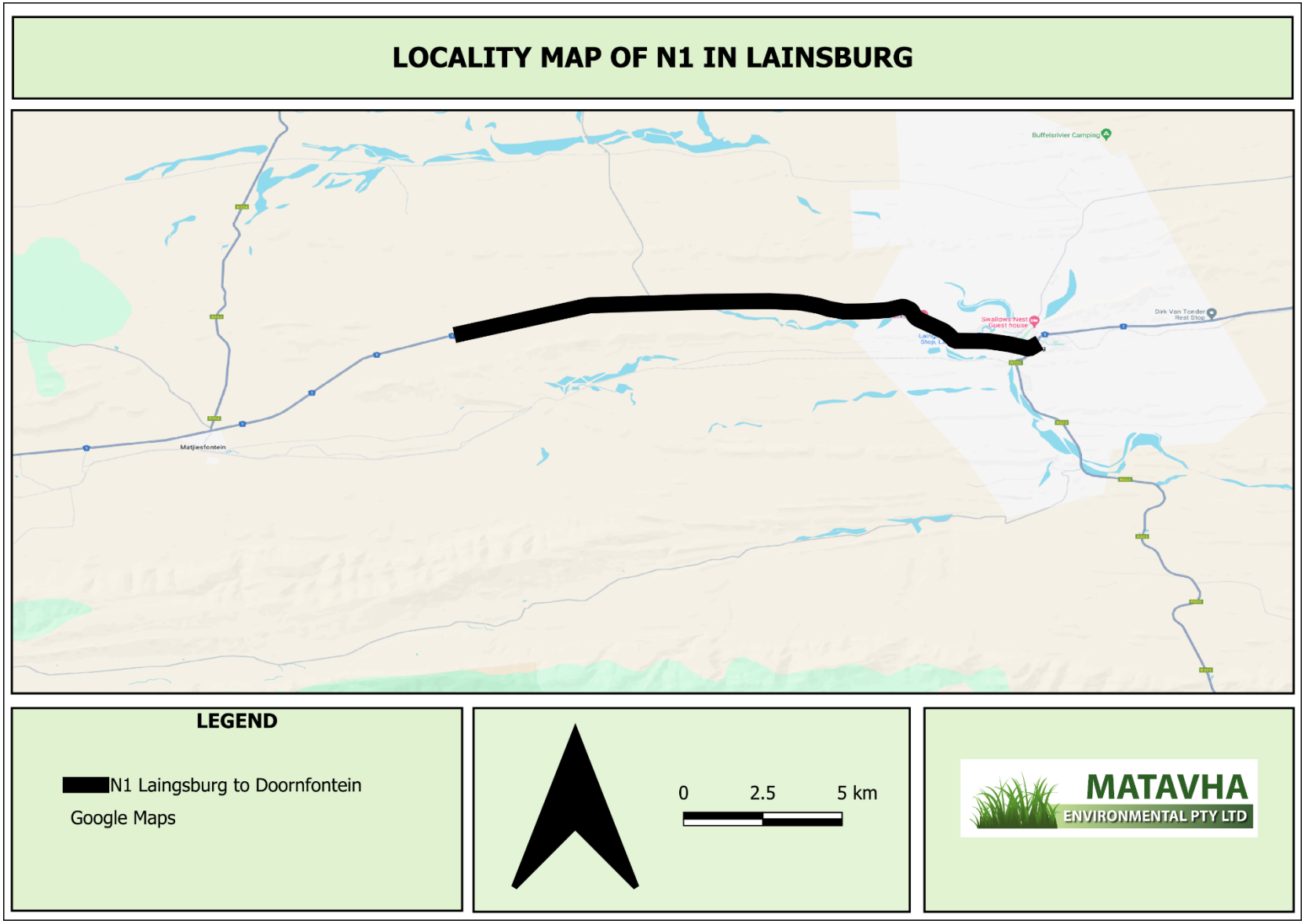


Figure 1: Locality Map of the proposed N1 section 4 road upgrade

3. PURPOSE AND OBJECTIVES

The overarching purpose of the Agricultural Compliance Statement is to ensure that the sensitivity of the site from the perspective of agricultural production to the proposed road upgrade project is sufficiently considered. Also, the information provided in this report, enables the Competent Authority to reach a sound conclusion on the impact of the proposed project on the food production potential of the study area. To meet this objective, site sensitivity verification must be conducted of which the results must meet the following objectives:

- It must confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.
- It must contain a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
- It must be submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations

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 project will have an unacceptable impact on the agricultural production capability of the site.

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

GNR 320 requirements of an Agricultural Compliance Statement (Low to Medium Sensitivity)	Reference in this report
3.1. The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP.	P2 & 3
3.2. The compliance statement must: 3.2.1. be applicable to the preferred site and proposed development footprint;	Section 1&2

3.2.2. confirm that the site is of "low" or "medium" sensitivity for agriculture; and Section 9.3	Section 6
3.2.3. indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.	Section 9.3
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 C
3.3.2. a signed statement of independence.	P2: Declaration of independence
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 6
3.3.4. confirmation from the specialist that all reasonable measures have been taken through micro- siting to avoid or minimize fragmentation and disturbance of agricultural activities;	Section 9&10
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 10
3.3.6. any conditions to which the statement is subjected;	Section 10
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;	N/A -The project is not a linear activity
3.3.8. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; and	
3.3.9. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data.	Section 8
3.4. A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	

4. TERMS OF REFERENCE AND SCOPE OF WORK

The terms of reference for this study are to fulfill the requirements of the "Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources" gazette on 20 March 2020 in GN 320 [in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998]. In addition to the requirements stipulated in GN320, the points below summaries the terms of reference and key components of the study.

- 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 project.
- Assess the spatial distribution of various soil types within the study area.
- Identify restrictive soil properties on land capability under prevailing conditions.
- Compile various maps depicting the on-site conditions, soil forms and land capability based on desktop review of existing data.
- Classify the dominant soil forms within the study area according to the South African Soil Classification System (Soil Classification Working Group, 2018).
- Compile various maps depicting the soil forms, land use and land capability within the study area based on the field assessment findings.
- Compile a report presenting the results of the desktop study and a description of the findings during the field assessment; and
- Provide recommended mitigation measures and management practices to implement in order to comply with applicable articles of legislation.

5. ENVIRONMENTAL LEGISLATION AND SOIL MANAGEMENT GUIDELINES APPLICABLE TO STUDY

The relevant environmental legislation pertaining to the soil/agricultural resources in South Africa is listed below, but is not limited to:

- The Constitution of the Republic of South Africa (Act 108 of 1996).
- Sub-division of Agricultural Land Act (Act 70 of 1970).
- Municipal Structures Act (Act 117 of 1998).
- Municipal Systems Act (Act 32 of 2000); and

- Spatial Planning and Land Use Management Act, 16 of 2013.

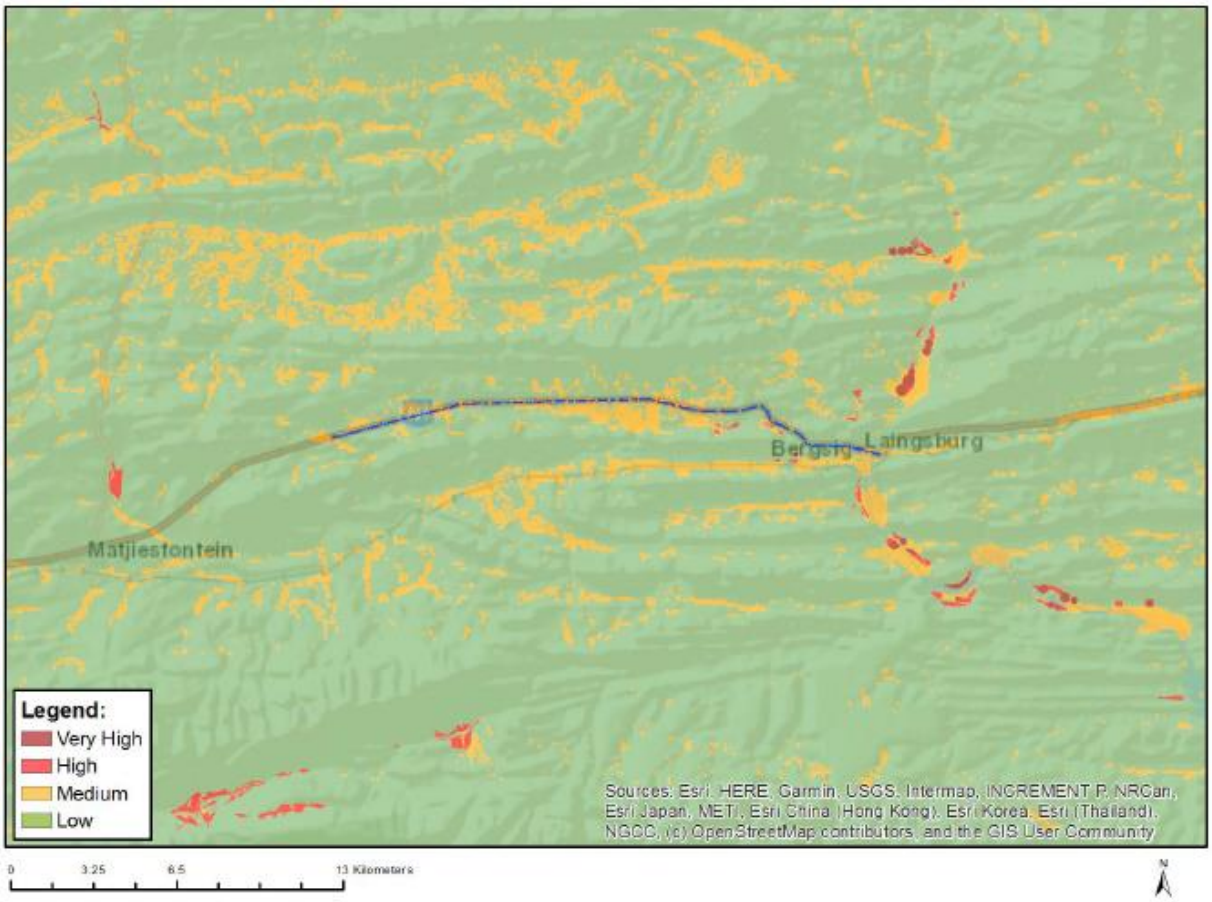
The above is supported by additional legislation that aims to manage the impact of developments and activities on the environment and the natural resource base of the country. Related legislation to this effect includes:

- Conservation of Agricultural Resources Act (Act 43 of 1983).
- Environment Conservation Act (Act 73 of 1989).
- National Environmental Management Act (Act 107 of 1998).
- The Mineral and Petroleum Resources Development Act 28 of 2002; and
- National Water Act (Act 36 of 1998).

6. SENSITIVITY ANALYSIS BASED ON THE ENVIRONMENTAL SCREENING TOOL

The combined Agricultural Sensitivity of the project area was determined using the National Environmental Screening Tool (www.screening.environment.gov.za) accessed on the 03rd of April 2024. 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). According to the DFFE screening tool the site area falls within medium sensitivity in terms of Agriculture (See Figure 2 below), therefore the level of agricultural assessment required in terms of the protocol for sites of less than high sensitivity is an Agricultural Compliance Statement. The DEA screening tool is a guideline, and it is up to the specialists to verify these results in the field. The site assessment results support this sensitivity rating.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

Figure 2: DFFE screening tool result for the agricultural sensitivity theme for the road upgrade project.

7. METHODOLOGY OF THE 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 the different steps that should be followed to gather information used for the compilation of the report. The methodology is in alignment with the requirements of GN320 and is outlined below.

7.1. DESKTOP ASSESSMENT

A desktop study, including literature review, was conducted to determine the expected land and soil capacity of the study area. Various data sources were utilised to obtain available information of the site area. The desktop assessment was undertaken to determine the geology, topography, terrain, soil formation, land capability, as well as soil classification of the study area.

The following data layers were assessed to determine whether the road upgrade activity could have an impact on important national & provincial features:

- Aerial imagery (Google EarthTM).
- Agricultural Geo-Referenced Information System (AGIS)
- Land Type Data (Land Type Survey Staff, 1972 - 2006).
- National land capability evaluation raster data layers (Department of Agriculture, Forestry and Fisheries, 2017).
- Quantum Geographic Information System (QGIS) and Topographical data.

7.2. FIELD ASSESSMENT

The site was traversed on foot and a field investigation of existing soil and agricultural potential for the site was obtained in July 2024 (dry season) by a qualified specialist. It was also the objective of the assessment to provide recommended mitigation measures and management practices to implement to comply with applicable articles of legislation.

Table 1: Typical arrangement of master horizons in soil profile

<table>
<tr><td rowspan="6">Soil</td><td rowspan="6">Zone in which soil processes are maximally expressed.</td><td colspan="4">Arrangement of master horizons</td></tr>
<tr><td rowspan="5">O-Organic</td><td rowspan="4">C- Regic sand (c), Stratified alluvium, (c), Man -Made Soil Deposit.</td><td>A</td><td colspan="2">Humic, Vertic, Melanic, Orthic</td></tr>
<tr><td>E</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>B</td></tr>
<tr><td>Red Apedal yellow Brown Apedal, Soft Plinthic, Hard Plinthic, Prismacutanic, Pedocutanic, Lithocutanic, Neoputanic, Nepcarbonate, Podzol, Podzol with plastic pan.</td><td rowspan="3">G-Horizon</td></tr>
<tr><td>C</td><td colspan="2">Dorbank, Soft Carbonate horizon, Hard Carbonate horizon, Saprolite, Unconsolidated without signs of wetness, Unconsolidated with signs of wetness, Unspecified material with signs of wetness.</td></tr>
<tr><td colspan="3">R-Hard Rock.</td></tr>
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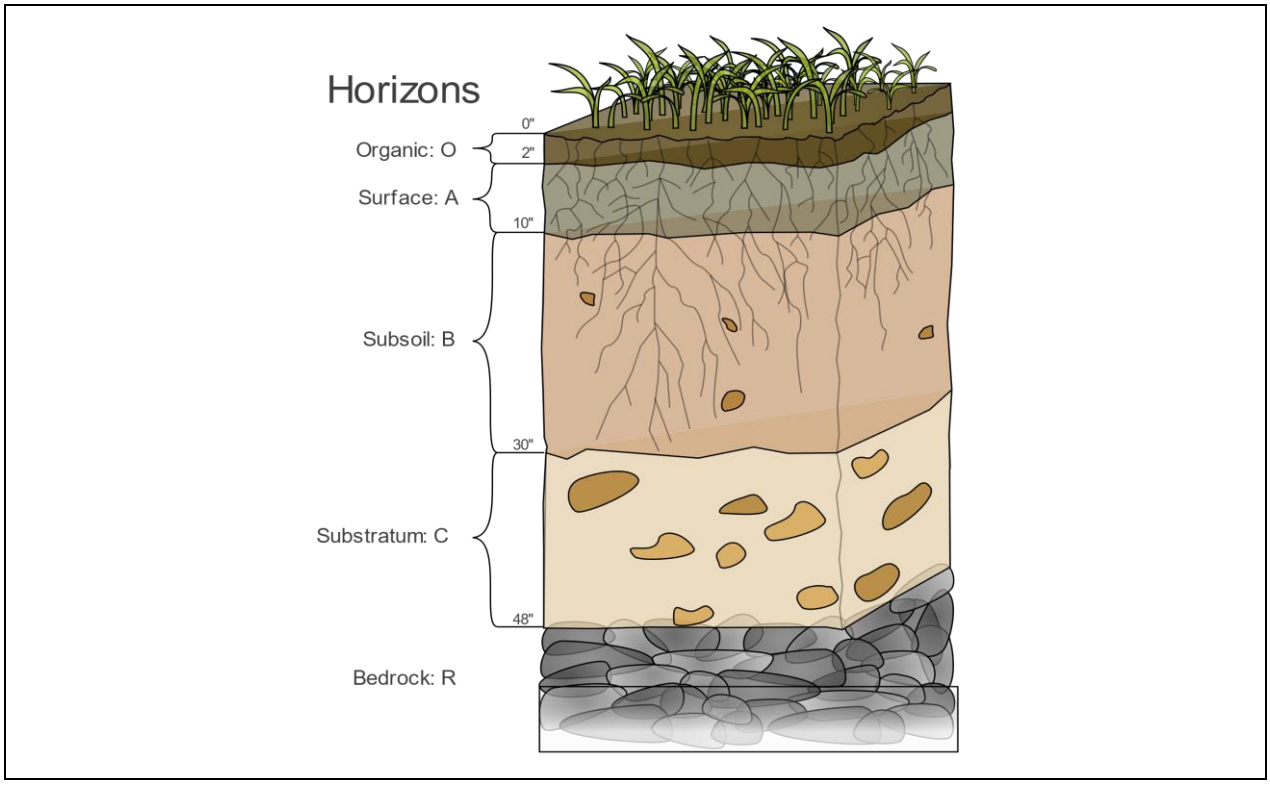

Figure 3: Schematic diagram of a conceptual presentation of a typical soil.

7.3. LAND CAPABILITY CLASSIFICATION

The potential of the land for use in specified ways or with specified management practices is referred to as capability (Davidson, 1992). Land capability is defined by the most intensive long-term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes (Smith, 2006). In South Africa, the availability of water is the primary limiting factor on the amount of land that can be used for agriculture. However, due to their inherent qualities, different soil types usually have varying land use capacities, even within similar climatic zones.

Land capability and agricultural potential is determined by a combination of soil, terrain, and climate features and is divided into eight (8) classes which may be divided into three (3) capability groups. Land that is allocated to any capability class has the potential for the use specified for that class and all classes below it. Table *2* shows how the land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006).

Table 2: Land capability classification (Scotney et al., 1987).

Land Capability Group	**Land Capability Class**	**Increased intensity of use**									**Limitations**
Arable	I	W	F	LG	MG	IG	LC	MC	IC	VIC	No or few limitations. Very high arable potential. Very low erosion hazard.
	II	W	F	LG	MG	IG	LC	MC	IC	-	Slight limitations. High arable potential. Low erosion hazard.
	III	W	F	LG	MG	IG	LC	MC	-	-	Moderate limitations. Some erosion hazards
	IV	W	F	LG	MG	IG	LC	-	-	-	Severe limitations. Low arable

Land Capability Group	Land Capability Class	Increased intensity of use									Limitations
											potential. High erosion hazard.
Grazing	V	W	-	LG	MG	-	-	-	-	-	Water course and land with wetness limitations.
	VI	W		LG	MG	-	-	-	-	-	Limitations preclude cultivation.
	VII	W	F	LG	-	-	-	-	-	-	Very severe limitations. Suitable only for natural vegetation.
Wildlife	VIII	W	-	-	-	-	-	-	-	-	Extremely severe limitations. Not suitable for grazing or afforestation.

W – Wildlife **F** – Forestry **LG** – Light Grazing **MG** – Moderate Grazing **IG** – Intensive Grazing **LC** – Light Cultivation **MC** – Moderate Cultivation **IC** – Intensive Cultivation. **VIC** – Very Intensive Cultivation

7.4. CLIMATE CAPABILITY CLASSIFICATION

Class IV soil may be cultivated under certain circumstances and management practices, while Land Classes V to VIII are not suitable for cultivation. Additionally, the climate capability is also measured on a scale of 1 to 8, as illustrated in Table *3* below. The land capability rating is therefore adjusted accordingly, depending on the prevailing climatic conditions as indicated by the respective climate capability rating. The expected impacts of the proposed land use on soil and land capability were assessed to inform the necessary mitigation measures.

Table 3: Climate Capability Classification (Scotney et al., 1987)

Climate Capability Class	Limitation Rating	Description
C1	None to slight	The local climate is favourable for good yield for a wide range of adapted crops throughout the year.
C2	Slight	Local climate is favourable for good yield for a wide range of adapted crops and a year-round growing season. Moisture stress and lower temperatures increase risk and decrease yields relative to C1.
C3	Slight to moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.
C4	Moderate	Moderately restricted growing season due to low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options more limited than C3.
C5	Moderate to severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may be grown at risk of some yield loss.
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops for which frequently experience yield loss.
C7	Severe to very severe	Severely restricted choice of crops due to heat, cold and/or moisture stress.
C8	Very severe	Very severely restricted choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss.

7.5. LAND POTENTIAL CLASSIFICATION

The land potential in South Africa is divided into 8 land potential which rates the land potential that is good for agricultural purposes. The land potential classes are determined by combining the land capability results and the climate capability of a region (Table *4*).

Table 4: Land potential classes

Land Potential	Description of land potential class
L1	Very high potential: No limitations. Appropriate contour protection must be implemented and inspected.
L2	High potential: Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	Good potential: Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	Moderate Potential: Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.
L5	Restricted potential: Regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall.
L6	Very restricted potential: Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L7	Low potential: Severe limitations due to soil, slope, temperatures or rainfall. Non-arable
L8	Very low potential: Very severe limitations due to soil, slope, temperatures or rainfall. Non- arable

7.6. SOIL CLASSIFICATION

The findings for the respective Soil Classes are as follows:

Class II: These soils are classified to have intensive cultivation land capability with an L3 (Good potential) land potential rating based on the C4 climatic classification. L3: Infrequent or moderate limitations due to soil, slope, temperature, or rainfall. Arable.

Class III: These soils are classified to have moderate cultivation land capability with an L3 (Good potential) land potential rating based on the C4 climatic classification. L3: Infrequent or moderate limitations due to soil, slope, temperature, or rainfall. Arable.

Class IV: These soils have a moderate cultivation / intensive grazing land capability with an L4 (Moderate potential) land potential rating based on the C4 climatic classification. L4: Moderate regular limitations due to soil, slope, temperature, or rainfall. Arable.

Class V: These soils have a wetland land capability as well as a wetland land potential rating. these classifications will remain wetland areas.

Class VI: These soils have a light cultivation / moderate grazing land capability with an L5 (Restricted potential) land potential rating based on the C4 climatic classification. L5: Moderate to severe limitations due to the soil, slope, temperature, or rainfall. Non-Arable as shown in Table 10 above.

8. STUDY GAPS, LIMITATIONS AND ASSUMPTIONS

- It is assumed that the exact layout and location of the project infrastructure may change but that it will remain within the project assessment zone.
- It is further assumed that the infrastructure components will remain as indicated and that the activities for the establishment and operation of the infrastructure are limited to that typical for a project of this nature.

9. RESULTS OF DESKTOP ANALYSIS & FIELD ASSESSMENT

9.1. TOPOGRAPHY

The general topography of the study area consists of a typical flat to undulating karoo landscape with scattered small hills to mountainous areas. The study area is within a relief value of 30 - 210m as indicated in Figure 4 below.

Figure 4: Showing the overview of the topography of the study area.

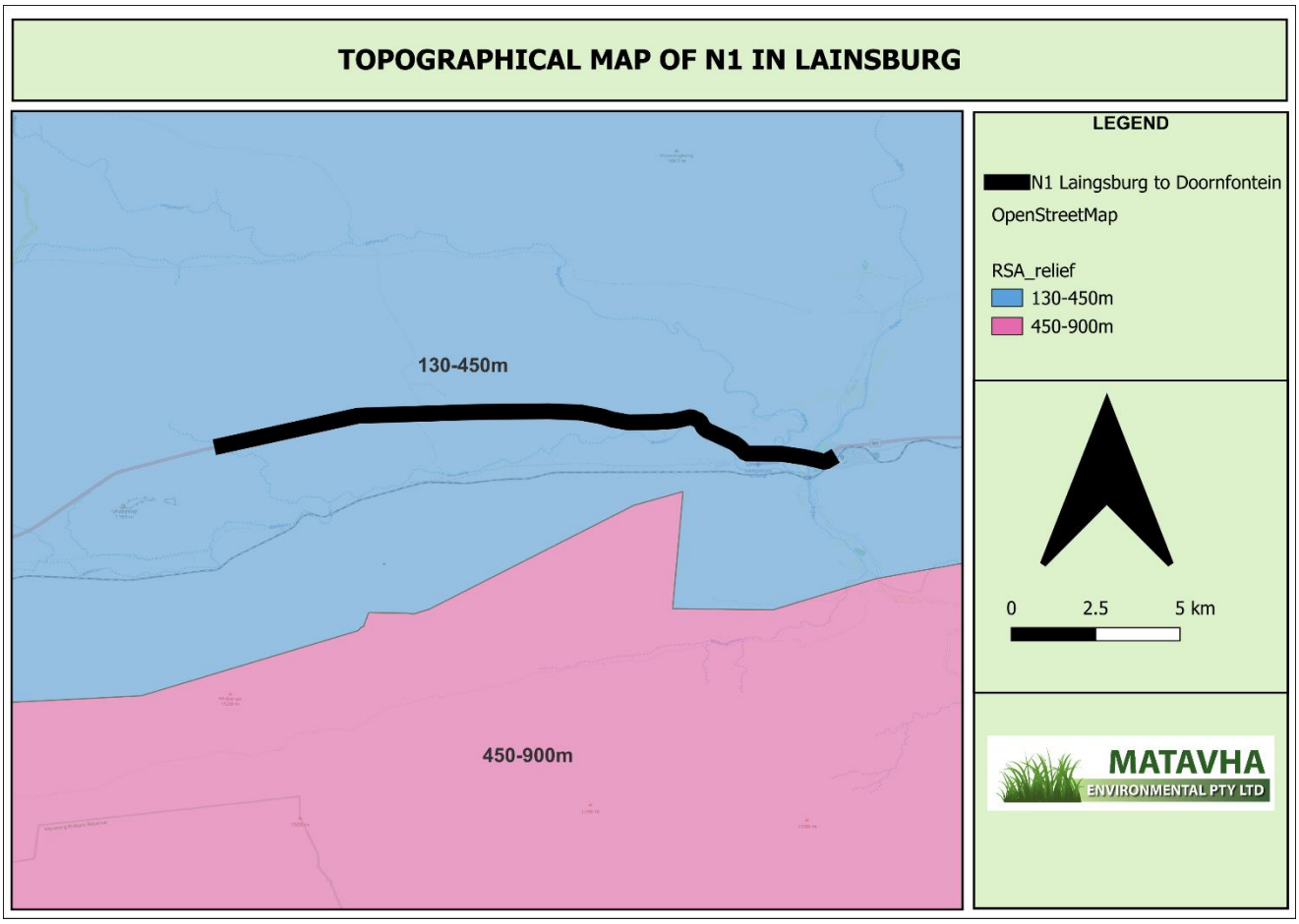

Figure 5: Topographical Map

9.2. LAND USE AND INFRASTRUCTURE

The portion of the N1 within which the road upgrade is proposed traverses largely covered on natural and uncultivated land with minimal infrastructures. Prominent land uses in the surrounding areas include guest houses, Laingsburg town, as well as road related infrastructure such as bridges as indicated below.

9.3. CLIMATE

Laingsburg is influenced by the local steppe climate. The amount of rainfall remains low during the entire year. Köppen and Geiger classify this climate as BSk. The mean yearly temperature recorded in Laingsburg is 16.6 °C. Each year, there is an approximate 253 mm of precipitation that occurs. This location is in the southern region of the globe.

The summer commences towards the conclusion of January and culminates by December. The months that constitute this season are referred to as December, January, February, March. The driest month is September, with 13 mm of rainfall. On average, the highest amount of rainfall occurs during March with a mean value of 29 mm. The warmest month of the year is February, with an average temperature of 22.3 °C. On average, the month of July is considered to be the coldest time of year with temperatures averaging around 10.3 °C. The difference in precipitation between the driest month and the wettest month is 16 mm. The average temperature across the seasons is 12.1 °C. The month with the most relative humidity is June (44.79 %). The month with the lowest amount of relative humidity is November (44.79 %). The month with the highest amount of rainfall is June (4.43 days), whereas the one with the lowest precipitation level is September (2.97). In the region of Laingsburg, it has been observed that December is the month which experiences maximum daily sunshine hours, with an average duration of approximately 11.35. The total number of sunlit hours during this period amounts to a staggering sum of about 351.79.

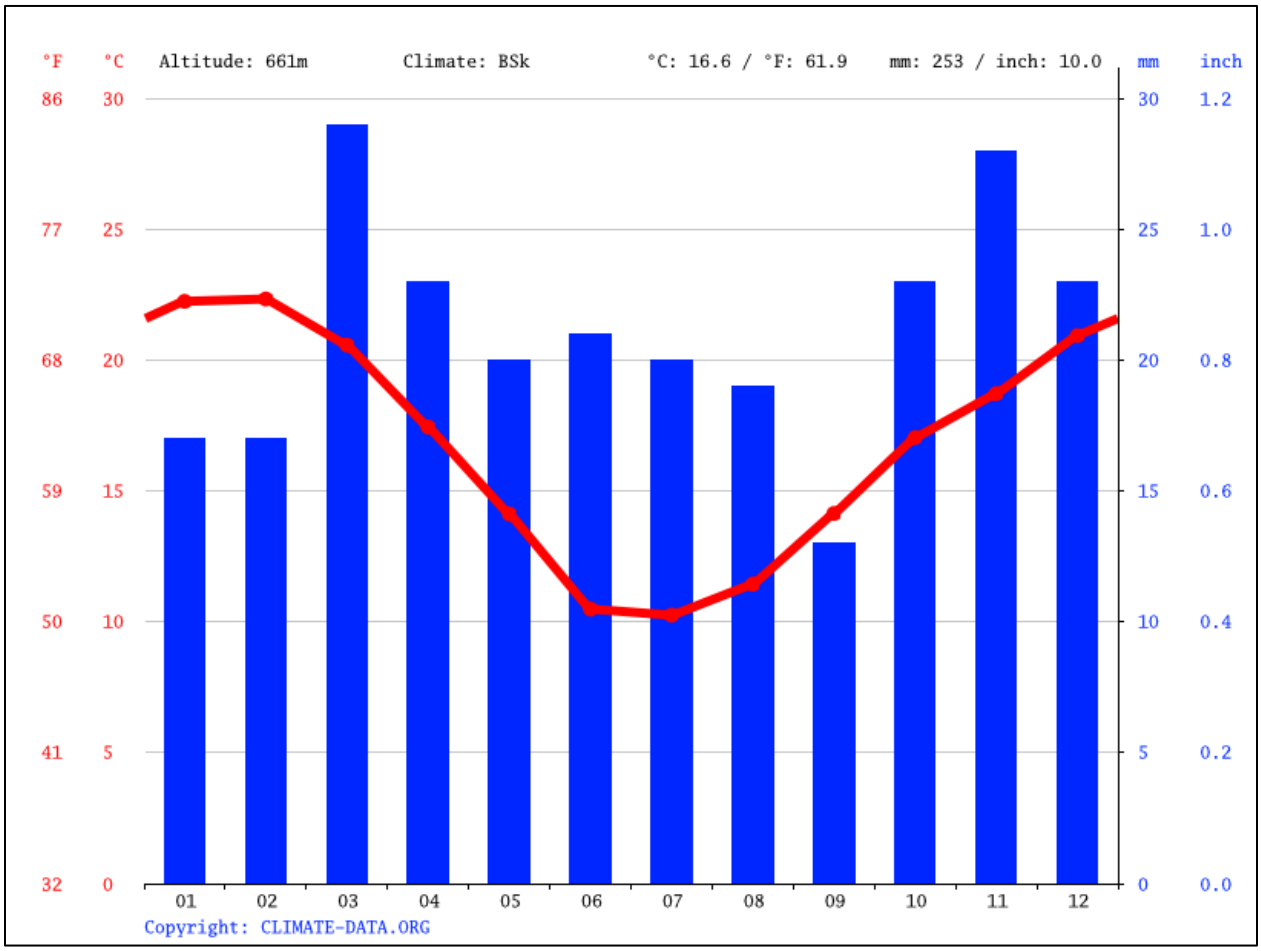

Figure 6: Climate graph.

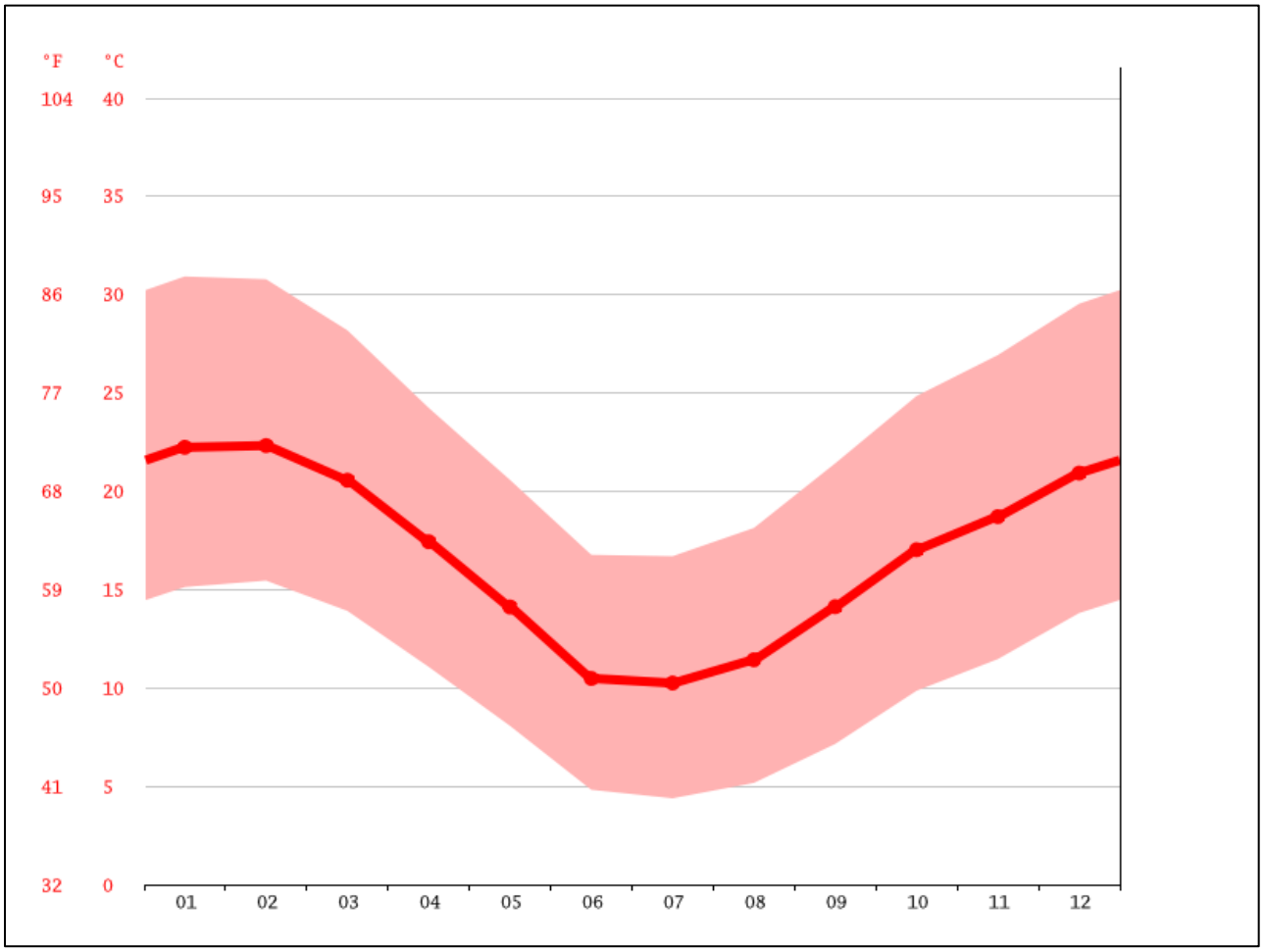

Figure 7: Temperature graph

9.4. Geology

According to the geological map the portion of the N1 road where the upgrade is proposed from Doornfontein (km63.0) the section is underlain by the Dwyka group formation. The Dwyka Group forms the lowermost and oldest deposit in the Karoo Supergroup basin. The geology changes along Klipwerf farm from Dwyka group to Prince Albert, Whitehill, Collingham, Vischkuil, Ripon, and Lainsburg Formations of the Ecca group. A small portion towards the Laingsburg town is underlain by the Fort Brown Formation.

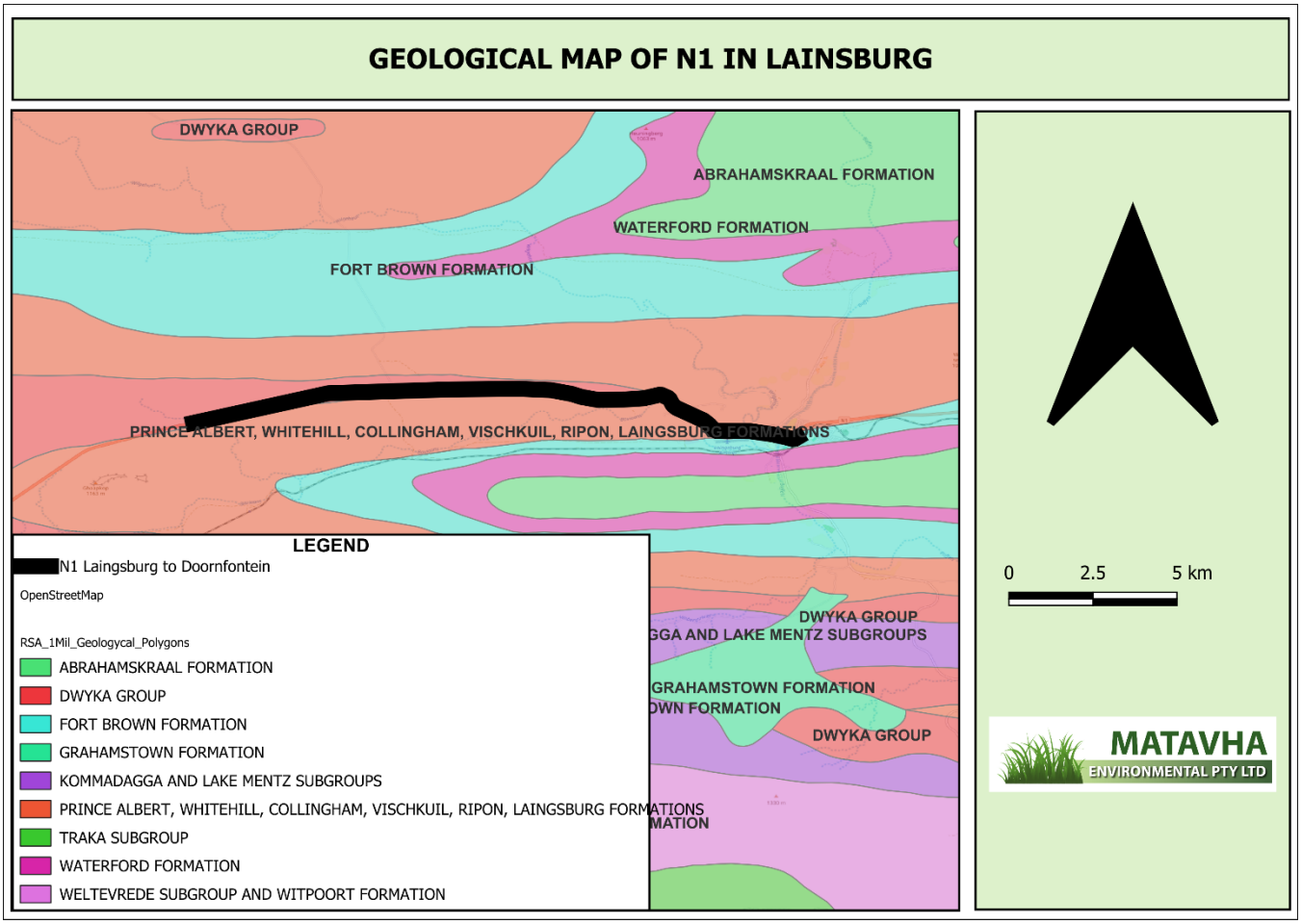

Figure 8: Geological Map

9.5. SOIL AND TERRAIN

According to the Soil and Terrain (SOTER) database and the geological map of South Africa, the study area is underlain by the Dwyka group formation, Prince Albert, Whitehill, Collingham, Vischkuil, Ripon, Lainsburg Formations of the Ecca group, as well as the Fort Brown Formation. (Figure 8, above). Moreover, the soil within this study area falls within three classes, which are the association of classes 13 and 16: undifferentiated, shallow soils and land classes, freely drained structureless soils, and lithosols shallow soils on hard or weathering rock), as indicated in Figure 9 below. These soils are characterised by high erodibility and have severe limitations for agricultural use since plant roots remain confined to a small volume of soil that cannot provide adequate anchorage, water, and nutrients. Lithosols have restricted soil depth and are associated with rockiness.

These soils are less than 450 mm deep, have clay contents between 15 % and 35 % , and are freely drained and structureless. Subsequently, they have excessive drainage and low natural fertility. Surface rock and rocky outcrops cover relatively large areas, and these soils have a low potential for arable agriculture. The dominating soil type is accounted for by the steep-hilly terrain along the study area.

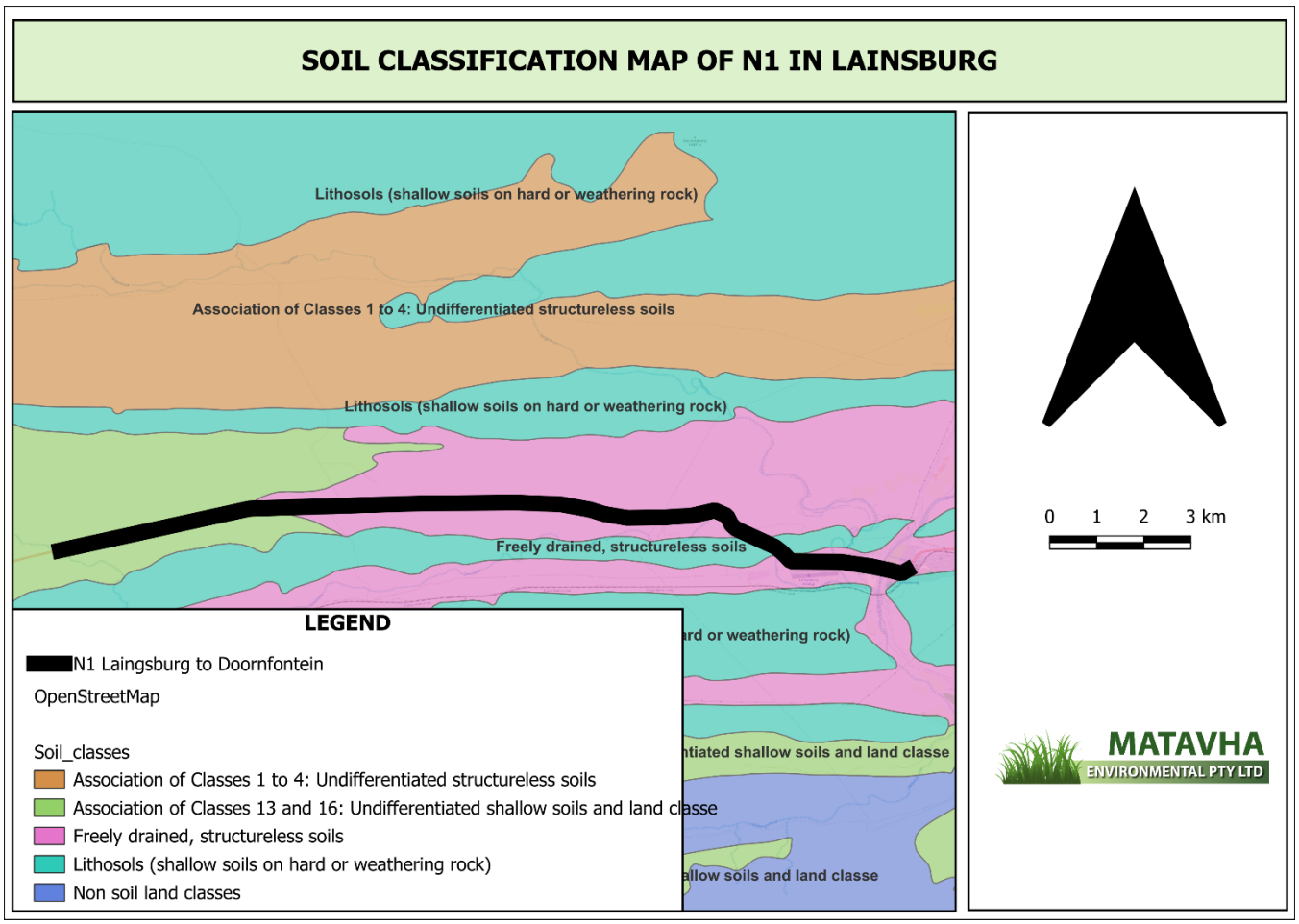

Figure 9: Soil classification Map

9.6. Land Capability

Agricultural land capability in South Africa is generally restricted by climatic conditions, mainly water availability. However, even within similar climatic zones, different soil types typically have different land use capabilities attributed to their inherent characteristics. High potential agricultural land is characterized by soil and terrain quality, a suitable growing season, and sufficient available moisture supply necessary for producing consistently high crop yields when managed and treated using the best possible farming practices (Scotney et al., 1987).

For this assessment, land capability was determined by considering observed limitations to land use arising from physical soil properties and prevailing climatic conditions. Consequently, Climate Capability, measured on a scale of 1 to 8 , was included in the agricultural potential classification. The study area has a C7 climatic capability with severely restricted choice of crops due to heat, cold and/or moisture stress. Moreover, according to the desktop assessment, the study area is regarded as having Non-arable, Grazing, woodland, or wildlife. (Class VII) see Figure 9. Land in this class has very severe limitations that prohibit its use for cultivation and restrict its use primarily to grazing, woodland, or wildlife. Limitations are often more intense versions of those in Class VI, such as very steep slopes, severe erosion, or very shallow soils. These soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover. Therefore, the study area is regarded as low potential land (L7) with Severe limitations due to soil, slope, temperatures or rainfall.

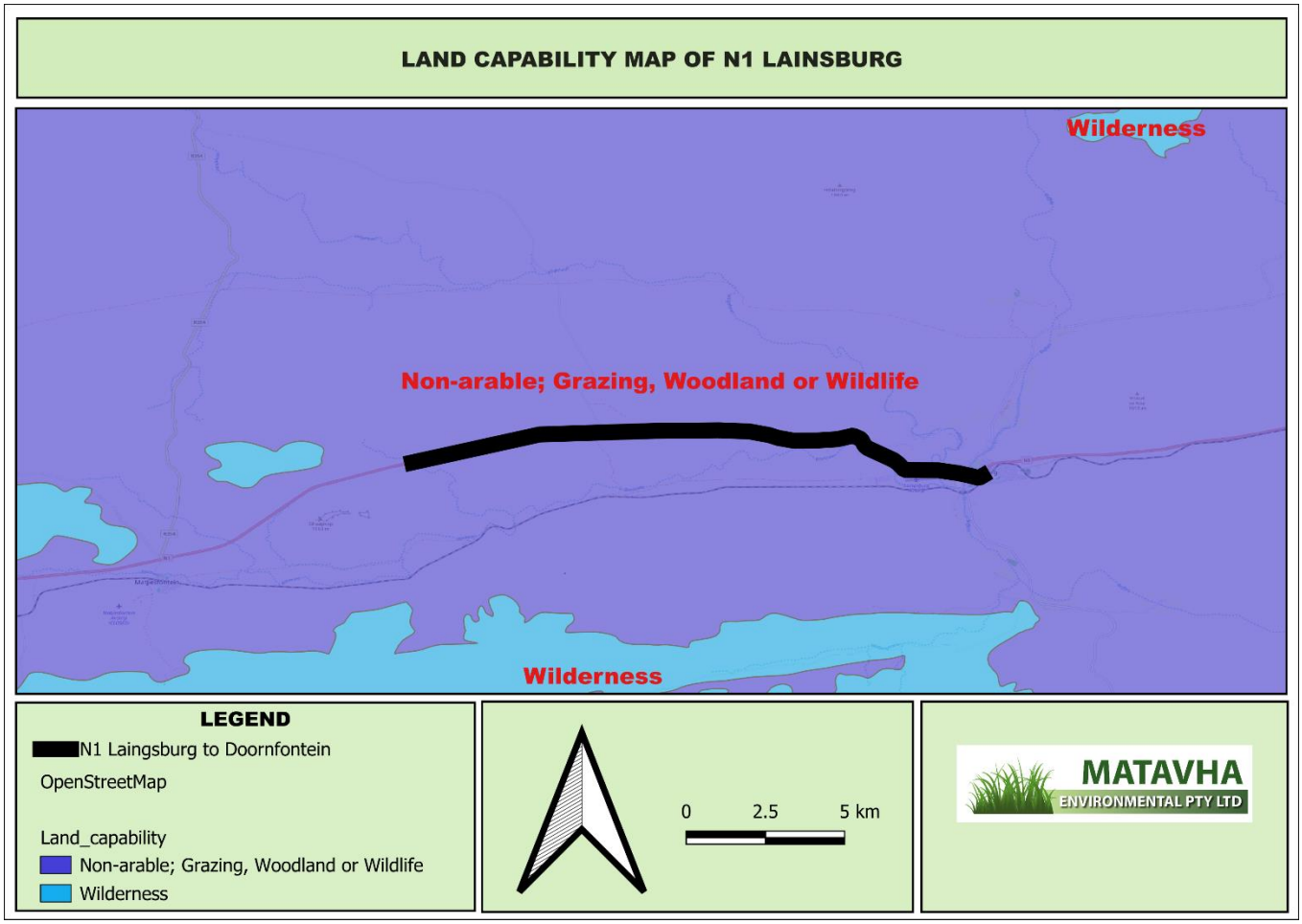

Figure 10: Land Capability Map

9.7. Sensitivity analysis

Following the consideration of all the desktop, field assessment, and gathered data above, the area is considered to have low sensitivity to the proposed road upgrade in terms of agriculture. The land capability of the project assessment area is classified as non-arable, grazing, woodland, or wildlife (Class VII) with very low suitability of the study area for arable crop production.

9.7.1. Key mitigation measures

- Progressive rehabilitation during the road upgrade must be constituted.
- The project surface footprint should be kept as small as possible.
- All vehicular traffic should be restricted to the designated road servitudes as far as practically possible.
- Topsoil stripping and stockpiling should not be conducted during wet periods, soil moisture should be below a pre-determined level.
- Proper soil contamination prevention measures must be applied throughout all the phases of the proposed activity.
- Rehabilitation of the disturbed areas should be prioritised.
- Regular monitoring of site activities and machinery must be undertaken to identify spills or leaks.
- An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and
- Spill kits (such as spill-sorb or a similar type of product) must be kept on site and used to clean up hydrocarbon spills in the event that they should occur.

10. ACCEPTABILITY STATEMENT

The proposed road upgrade activity is considered an acceptable project within the area of assessment. Considering that all the activities will take place as per the provided plans, I confirm that all reasonable measures have been taken to avoid or minimize fragmentation and disturbance of agricultural activities. It is my professional opinion that this application be considered favorably. The project is thus regarded as acceptable from an agricultural impact perspective.

APPENDIX C: DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALIST

Personal Details

Name: Mr. Lutendo Ndou

Profession: Senior Environmental Consultant

Date of Birth: 02 September 1994

Nationality: South Africa

Email Address: lutendo@matavha.com

Professional Registration: SACNASP, EAPASA, IAIAsa and GSSA

Education

- Bachelor of Earth Sciences (Honors) in Mining and Environmental Geology (University of Venda (completed)
- Master of Science in Environmental Geology of University of Free state (in progress)

Further Education

Period	Institution	Contents
2018	Secolo Consulting Training Services	Air Quality Management
2017	Dustwatch cc	Dust Monitoring
2020	ESRI	Geographic Information System (GIS)
2019	Knights of Safety Academy	ISO 14001:2015 - Environmental Management System Awareness
2020	Knights of Safety Academy	ISO 45001: 2018 - Occupational Health and Safety Management System Awareness
2022	St John College	Level 1 First Aid

Professional Experience

Period	Country	Employer	Position	Projects/Duties/ Leadership Experience
Apr 2022 – Present	South Africa	Matavha Environmental Pty Ltd	Lead Environmental Consultant.	• Responsible for environmental compliance and monitoring. • Conduct Environmental Audits and compilation of Environmental Audit Reports.
Sep 2021 – Apr 2022	South Africa	Mills and Otten	Environmental Scientist.	• Environmental Compliance Audit. • Land contamination assessment (Phase 1 and 2). • Ground water monitoring and drilling supervision. • Tank Excavation Assessment. • Post Vacuum enhanced remediation. • Preparation of site-specific health and safety documentation.
Apr 2021 – Sep 2021	South Africa	Matavha Environmental	Principal Consultant.	Lead Environmental Consultant. • Lead Geological/Engineering Geologist. • Lead Environmental Assessment Practitioner. • Public Participation Process consultant. • Compiling EMP, WULA, AEL and EIA. • Environmental Control Officer.
Jan 2020 – Apr 2021	South Africa	Joe Singh Group of Companies	Group Mine Environmental Officer	• Conduct daily, weekly, monthly and yearly Environmental Assessments. • Conduct Internal Environmental Audits, Water Use License Audit, GNR 704 audits and Legal Environmental Audits. • Inspect mine workings for complying with mining right and licenses. • Update Social Labor Plan (SLP). • Environmental Management Plan (EMP).
				• Liaise with community and Competent authorities.

Period	Country	Employer	Position	Projects/Duties/ Leadership Experience
				• Compile water and salt balance report. • Recommend remedial actions for environmental accidents and incidents. • Updating Environmental Liability Report.
				• Assisting in Compiling care and Maintenance plans.
				• Facilitating WULA, Sec 102 and sec 11 applications.
Apr 2017 – Jan 2020	South Africa	Muri Environmental Consulting and Waste Management Pty Ltd	Environmental Consultant	• Environmental Assessment Practitioner • Environmental Control Officer • Engineering Geologist

Areas of Expertise

- Environmental Impact Assessments
- Environmental Control Officer
- Engineering Geologist
- Wetland studies
- Public Liaison
- Water Use License Consultant
- Project Management

Language Skills

1- Poor 2-Fair, 3- Excellent,

Language	Speaking	Writing	Reading/ Understanding
Tshivenda	3	3	3
English	3	3	3
Zulu	3	1	1
Pedi/Sotho	3	1	1
Tswana	3	1	1
Xhosa	2	1	1