DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELE LOCAL MUNICIPALITY



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ACRONYM	DESCRIPTION
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries & Environmental
DWS	Department of Water and Sanitation
DMPR	Department of Mineral and Petroleum Resources
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GA	General Authorisation
HIA	Heritage Impact Assessment
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NFEPA	National Freshwater Priority Areas
NHRA	National Heritage Resources Act
NWA	National Water Act
PPP	Public Participation Process
S&EIR	Scoping & Environmental Impact Report
SANRAL	South African National Roads Agency SOC Limited
WMA	Water Management Area
WUA	Water Use Application
WULA	Water Use License Application

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EXECUTIVE SUMMARY

The South African National Roads Agency SOC Limited (SANRAL) proposes to improve approximately 32 km of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho. The proposed project is located within the Matatiele Local Municipality, under the Alfred Nzo District Municipality in the Eastern Cape Province. The project extends from approximately 30°16'9.06"S; 28°47'15.28"E to 30°7'46.58"S; 28°41'8.53"E. The proposed development involves upgrading the existing gravel road to a safer and more reliable, surfaced road. The upgrade is intended to improve road-user and pedestrian safety, access for local communities, public transport, agricultural activities and emergency services, as well as connectivity between Matatiele and the Qacha's Nek Border Post.

HHO Consulting Engineers (Pty) Ltd, on behalf of SANRAL, appointed Earthlink Environmental Services (Pty) Ltd as the Environmental Assessment Practitioner (EAP) to undertake and lodge the Environmental Authorisation (EA) and Water Use Authorisation application processes.

The proposed road upgrade includes the surfacing and widening of the existing road, improvements to the horizontal and vertical alignment, upgrading of stormwater drainage and culverts, installation of road markings, signage and safety barriers, and improvements to the Botsola, Kinira and Mafube river crossings. Construction activities will also include temporary traffic deviations, establishment of material stockpiles, vegetation clearance, geotechnical stabilisation, crushing and screening of construction material.

The assessment was undertaken in accordance with the National Environmental Management Act, 1998 (NEMA), the Environmental Impact Assessment Regulations, 2014, as amended, the National Water Act, 1998, and Appendix 1 of the EIA Regulations. The assessment considered the applicable legal and policy framework, need and desirability, project alternatives, receiving environment, public participation, specialist assessments, and the potential environmental and socio-economic impacts associated with the proposed development. The applicable listed activities include Activities 14, 19, 27 and 56 of Listing Notice 1 (Government Notice R983), as amended as amended by Government Notice R327 of 7 April 2017**,** and Activities 12(a)(ii), 14(ii)(a)(a)(i)(aa)(ff)(hh), 18(a)(i)(aa)(ee)(gg)(kk) and 23(ii)(a)(a)(i)(aa)(ee)(gg) of Listing Notice 3 (Government Notice R985), as amended as amended by Government Notice R324 of 7 April 2017.

The Environmental Screening Tool and specialist investigations identified several environmental sensitivities along the proposed route. These include wetlands, rivers, indigenous vegetation, agricultural and grazing land, and heritage and palaeontological resources. The assessment therefore considered the potential impacts of the proposed road upgrade on these sensitive features and identified measures to avoid, minimise, manage and rehabilitate affected areas. Specialist studies undertaken as part of the assessment included terrestrial biodiversity, wetland and aquatic assessment, agricultural assessment, heritage assessment, palaeontological assessment.

The main potential environmental impacts are expected during the construction phase and include impacts on wetlands and watercourses, vegetation and fauna, soil erosion and sedimentation, water and soil pollution, alien invasive vegetation, dust, noise, visual impacts, heritage and palaeontological resources, as well as potential social impacts such as in-migration, crime and disease. Temporary employment is expected to be a positive impact. These impacts can be managed through the recommended mitigation measures, environmental monitoring, pollution prevention, erosion and sediment control, and rehabilitation of disturbed areas.

The assessment further confirms that the project will provide several positive long-term benefits. These include improved road safety, improved access and mobility, better stormwater drainage, improved traffic flow, more reliable transport between Matatiele and the Qacha's Nek Border Post, and improved access for local communities, public transport, agricultural activities and emergency services

Overall Findings

Based on the findings of the environmental assessment and specialist studies, the proposed improvement of the R415 is considered environmentally acceptable, provided that the identified impacts are appropriately managed and all recommended mitigation, monitoring and rehabilitation measures are implemented. The assessment did not identify environmental constraints that constitute a fatal flaw to the proposed road upgrade. However, the identified wetlands, watercourses, indigenous vegetation, agricultural and grazing areas, heritage and palaeontological resources require appropriate protection and management during construction. Particular attention must be given to activities occurring near watercourses and other environmentally sensitive areas.

The proposed development requires Environmental Authorisation from the Department of Forestry, Fisheries and the Environment (DFFE) through the Basic Assessment process. Where activities trigger

water-use authorisation requirements, the necessary Water Use Authorisation from the Department of Water and Sanitation (DWS) must also be obtained before the relevant activities commence.

The overall acceptability of the project is therefore dependent on compliance with the applicable environmental legislation, conditions of Environmental Authorisation and Water Use Authorisation, the approved Environmental Management Programme (EMPr), and the recommendations contained in the specialist studies

Key Conditions and Recommendations

Should Environmental Authorisation be granted, the following key conditions and recommendations should be implemented:

- A suitably qualified Environmental Control Officer (ECO) should be appointed before construction starts to ensure that the EMPr and environmental requirements are followed and that any environmental issues are properly managed.
- All mitigation, management and monitoring measures contained in this Basic Assessment Report and the approved Environmental Management Programme (EMPr) must be implemented.
- Obtain the required Water Use Authorisation from DWS before undertaking activities requiring such authorisation.
- Ensure compliance with all conditions contained in the Environmental Authorisation, Water Use Authorisation and other applicable permits or approvals.
- Implement appropriate measures to protect wetlands, rivers, drainage features and other water resources from pollution, erosion and sedimentation.
- Implement appropriate dust, noise, waste and pollution-control measures during construction.
- Ensure that temporarily disturbed areas are appropriately rehabilitated following completion of construction activities.
- Continue engagement with affected communities and Interested and Affected Parties (I&APs) throughout project implementation.
- A 10-year validity period is requested for the Environmental Authorisation to allow sufficient time for implementation of the proposed project, should DFFE approve the application.

Overall, the proposed R415 upgrade is considered a necessary and beneficial infrastructure project that can be implemented without unacceptable environmental impacts, provided that the recommended mitigation measures, specialist recommendations, environmental management requirements and conditions of authorisation are strictly implemented and monitored throughout the project.

CHAPTER 1: PROJECT INTRODUCTION AND BACKGROUND

1.1 Introduction

The South African National Roads Agency SOC Limited (SANRAL) proposes to improve and upgrade approximately 32 km of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, within the Matatiele Local Municipality of the Alfred Nzo District Municipality in the Eastern Cape Province. The proposed project extends from approximately 30°16'9.06"S; 28°47'15.28"E to 30°7'46.58"S; 28°41'8.53"E. The project involves upgrading the existing gravel road to a safer, more reliable and surfaced road to improve road-user and pedestrian safety, access and mobility for local communities, public transport, agricultural activities and emergency services, as well as connectivity between Matatiele and the Qacha's Nek Border Post.

The project aims to improve the existing gravel R415 road to a surfaced road standard in order to improve road safety, accessibility, and mobility for local communities and road users. The upgraded route will provide safer and more reliable transport for pedestrians, public transport, agricultural activities, emergency services, and commercial traffic, while strengthening connectivity between South Africa and Lesotho.

The proposed upgrade is motivated by the poor condition of the existing gravel road, which is particularly affected by steep mountainous terrain and adverse weather conditions. The improvement of the R415 is expected to reduce travel times and vehicle operating costs, improve access to healthcare, education, and economic opportunities, and support regional trade, tourism, and socio-economic development. As a strategic cross-border transport corridor, the project also contributes to improved movement of goods and people between Matatiele and the Qacha's Nek Border Post.

Major aspects of the proposed project include the following:

- Upgrade of the existing gravel road to a surfaced standard,
- Relocation of affected existing services including telephone poles
- Road drainage improvements to SANRAL standards including the upgrade of bridges and culverts
- Botsola Bridge: The existing roadway embankment crossing the Botsola River is routinely flooded and will be raised to a higher level. The existing set of culverts is to be replaced by a new

bridge with a hydraulic capacity for 1:50 year flood events, as required by the upgraded Class 2 route classification.

- Kinira Bridge: The existing structure requires widening to conform to the proposed roadway profile. Two additional portals will be added.
- Mafube Bridge: The existing single-lane configuration is inadequate for the upgraded cross-section and will be replaced with a new structure that meets the new design requirements.
- Widening of the existing road cross section to 9.4m wide or more and additional climbing lanes
- Vertical and horizontal geometric improvements to SANRAL standards,
- Build Mechanically Stabilized Earth Walls (MSE) walls where the road cross section must be increased,
- New culverts to SANRAL standards
- 7m wide temporary surfaced deviation to accommodate two-way traffic during construction.
- Road marking and signage improvements to SANRAL standards
- Road restraint system improvements
- Traffic calming measures to improve vehicle and pedestrian safety
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare
- Geotechnical improvements to unstable cut and fill slopes
- Crushing and screening of material

The proposed R415 road improvement project is subject to the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. The project triggers Activities 14, 19, 27 and 56 of Listing Notice 1 (Government Notice R983), as amended by Government Notice R327 of 7 April 2017, and Activities 12(a)(ii), 14(ii)(a)(a)(i)(aa)(ff)(hh), 18(a)(i)(aa)(ee)(gg)(kk) and 23(ii)(a)(a)(i)(aa)(ee)(gg) of Listing Notice 3 (Government Notice R985), as amended by Government Notice R324 of 7 April 2017. The proposed activities therefore require Environmental Authorisation through a Basic Assessment process.

The Basic Assessment process is undertaken to identify and assess the potential environmental and socio-economic impacts of the proposed road upgrade before construction can begin. It includes an assessment of the receiving environment, consideration of reasonable project alternatives, specialist studies where required, and the identification of practical mitigation measures to avoid or reduce potential

impacts. The process also includes public participation, giving Interested and Affected Parties (I&APs) an opportunity to review the proposed development and provide comments before the Competent Authority makes a decision on the Environmental Authorisation application.

Table 1: Coordinates of the Road

Start Point	Middle Point	End Point
30°16'9.06"S; 28°47'15.28"E	30°11'46.64"S; 28°44'3.77"E	30° 7'46.58"S; 28°41'8.53"E

1.2 Project Locality

The project is situated on National Road R415, Section 1 between km 0.0 and km 32 between Matatiele and the Qacha's Nek Border Post with Lesotho, in the Eastern Cape Province within Alfred NZO District Municipality, Matatiele Local Municipality. The road R415 Starting point Coordinates are (30°16'9.06"S; 28°47'15.28"E), Middle point of the road (30°11'46.64"S; 28°44'3.77"E) and End point of the road (30° 7'46.58"S; 28°41'8.53"E)

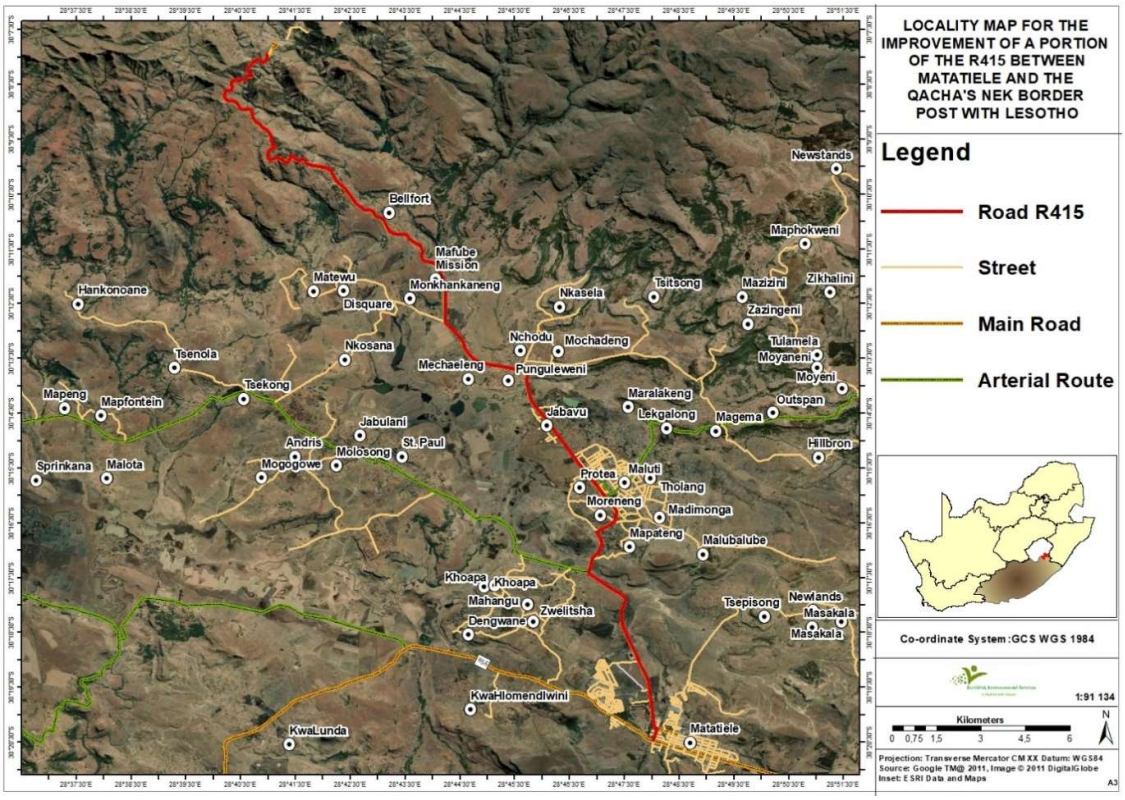


Figure 1: Locality Map of the Proposed R415 road to be improved.

1.3 Description of Property

Table 2: General Site Information

Province/s	Eastern Cape Province
District Municipality/ies	Alfred NZO District Municipality
Local Municipality/ies	Matatiele Local Municipality
Nearest Town/s	Maluti and Matatiele
Ward Numbers/ s	Ward 1,2,8 and 27
Farm name/s and number/s	• Portion 0 of farm 434 • Portion 0 of Farm Sibi 298 • Portion 0 of farm MONT PLAISIR 70 • Portion 1 MONT PLAISIR 70

	• Portion 0 of NQATSHA 33 • Portion 0 of Farm BRAMWELL54
Portion number/s	• Portion 0 of farm 434 • Portion 0 of Farm Sibi 298 • Portion 0 of farm MONT PLAISIR 70 • Portion 1 MONT PLAISIR 70 • Portion 0 of NQATSHA 33 • Portion 0 of Farm BRAMWELL54
21-digit Surveyor General code	• C09700000000043400000 • C09700000000029800000 • C09700000000007000000 • C09700000000007000001 • C09700000000003300000 • C09700000000005400000

1.4 Approach of the Study

1.4.1. Pre-application Consultation

A pre-application meeting was held on **Tuesday, 12 May 2026** with the Competent Authority, namely the Department of Forestry, Fisheries and the Environment (DFFE). The minutes of the meeting are appended to the Draft Basic Assessment Report (BAR).

1.4.2. Basic Assessment Study

A Basic Assessment (BA) study is the level of environmental assessment applied to activities listed in Listing Notices 1 and 3. This study is applied to activities that are considered less likely to have significant environmental impacts and, therefore, unlikely to require a detailed Environmental Impact Assessment (EIA) study. The Basic Assessment Report (BAR) is a more concise analysis of the environmental impacts of the proposed activity/development than a Scoping and EIA Report. The BAR aims to achieve the following:

- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed project;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Undertake an impact and risk assessment process inclusive of cumulative impacts (where applicable).

The focus being determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the project and the risk of impact of the proposed activity on these aspects to determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and the degree to which these impacts:

- Can be reversed;
- May cause irreplaceable loss of resources; and
- Can be avoided, managed or mitigated.

This BAR has been compiled in accordance with the stipulated requirements in Appendix 1 of GNR 982 of the EIA Regulations 2014 (as amended in 2017), which outlines the legislative BA process and requirements for assessment of outcomes, impacts and residual risks of the proposed development.

An Environmental Management Programme (EMPr) has been compiled according to Appendix 4 of GNR the EIA Regulations 2014 (as amended in 2017) for the construction and operational phases of the project. The EMPr has been compiled as a stand-alone document from the BAR and will be submitted to the DFFE along with the BAR. The EMPr provides the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

1.4.3. Structure of the BAR

The table below provides the requirements for a Basic Assessment report in terms of the NEMA EIA Regulations (Appendix 1) with reference to the relevant sections of this report where these requirements are addressed.

Table 3: Scope of assessment and content of Basic Assessment Report

Section	Content	Reference in report
A Basic Assessment Report (BAR) must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		

3 (1) (a)	details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Chapter 1 and Appendix H**
3 (1) (b)	the location of the activity, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	**Chapter 1**
3 (1) (c)	a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Chapter 1**
3 (1) (d)	a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure	**Chapter 1**
3 (1) (e)	a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and	**Chapter 2**

	instruments	
3 (1) (f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	**Chapter 3**
3 (1) (g)	a motivation for the preferred site, activity and technology alternative	**Chapter 4**
3 (1) (h)	a full description of the process followed to reach the proposed preferred alternative, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated. (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	**Chapter 4**

	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	
3 (1) (i)	(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures	**Chapter 7**
3 (1) (j)	(j) an assessment of each identified potentially significant impact and risk, including-	**Chapter 8**
	(i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	

	(vii) the degree to which the impact and risk can be avoided, managed or mitigated	
3 (1) (k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	**Chapter 4 and Chapter 7**
3 (1) (l)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	**Chapter 7**
3 (1) (m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr	**Appendix D**
3 (1) (n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	**Chapter 9**
3 (1) (o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	**-**
3 (1) (p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	**Chapter 9**
3 (1) (q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on	**Chapter 7 and Chapter 9**

	which the activity will be concluded, and the post construction monitoring requirements finalised	
3 (1) (r)	an undertaking under oath or affirmation by the EAP in relation to: the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs;	**Section 10**
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	**-**
3 (1) (s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	**-**
3 (1) (t)	any specific information that may be required by the competent authority	**-**
3 (1) (u)	any other matters required in terms of section 24(4)(a) and (b) of the Act	**-**

1.4.4. Specialist Assessment

Screening Tool Results

The screening report was generated from the Department of Forestry, Fisheries and the Environment (DFFE) national web environmental screening tool. According to the screening tool report, various specialist studies were identified and recommended to be undertaken as part of the environmental process.

Table 4: DFFE Screening tool Results

Theme	Very high sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			

Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme		X		
Terrestrial Biodiversity Theme	X			

Table 5: Themes and associated sensitivity as per the DFFE Screening Tool.

<table>
<tr><th>Theme</th><th>DFFE Screening</th><th>EAP Rating (Agree/ Disagree)</th><th>Motivation</th></tr>
<tr><td>Agriculture Theme</td><td>Very high sensitivity</td><td>High (Agree Agricultural compliance statement, has been undertaken and included in the Draft BAR)</td><td>The report generated from National web based environmental screening tool (screening tool) has classified the sensitivity of the R415 road to agricultural activities as Very high, while the sensitivity characteristics related to land capability are rated as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Subsistence_Farming_1</td></tr><tr><td>High</td><td>08. Moderate</td></tr><tr><td>High</td><td>09. Moderate-High</td></tr><tr><td>High</td><td>10. Moderate-High</td></tr><tr><td>Low</td><td>05. Low</td></tr><tr><td>Low</td><td>04. Low-Very low</td></tr><tr><td>Low</td><td>02. Very low</td></tr><tr><td>Low</td><td>03. Low-Very low</td></tr><tr><td>Medium</td><td>07. Low-Moderate</td></tr><tr><td>Medium</td><td>06. Low-Moderate</td></tr></table>The road transverse villages that rely on subsistence farming, domestic animals such as Sheep and cattle were observed grazing along the road.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>Although the road upgrade is temporary and is expected to have minimal impact on the surrounding agricultural activities, the upgrade of the R415 road is anticipated to provide long-term benefits to agricultural operations in the area.

An Agricultural Compliance Statement has been undertaken and included in the Draft BAR attached as Appendix C4.</td></tr>
<tr><td>Animal Species Theme</td><td>High sensitivity</td><td>Medium (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR)</td><td>The assessment of the Animal Theme revealed a high level of sensitivity, while the sensitivity features were rated as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Aves-Gyps coprotheres</td></tr><tr><td>High</td><td>Aves-Geronticus calvus</td></tr><tr><td>High</td><td>Aves-Balearica regulorum</td></tr><tr><td>Low</td><td>Subject to confirmation</td></tr><tr><td>Medium</td><td>Aves-Neotis denhami</td></tr><tr><td>Medium</td><td>Aves-Sagittarius serpentarius</td></tr><tr><td>Medium</td><td>Aves-Geronticus calvus</td></tr><tr><td>Medium</td><td>Mammalia-Ourebia ourebi ourebi</td></tr><tr><td>Medium</td><td>Invertebrate-Paracilacris lateralis</td></tr></table>During the preliminary onsite inspection, the EAP primarily observed various bird species and nests near the road.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>Given the current condition of the R415 road, which is operational, the planned road upgrade will occur on the existing gravel road and its reserve that will require clearance of vegetation.

A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR attached as Appendix C1.</td></tr>
<tr><td>Aquatic Biodiversity Theme</td><td>Very high sensitivity</td><td>High (Agree, the Aquatic and Wetland Delineation study has been undertaken, the road passes through wetlands)</td><td>The R415 road to be upgraded crosses wetlands and rivers which will be impacted by the proposed project. The road upgrade may impact the aquatic biodiversity. According to the screening sensitivity features as per below table:
Sensitivity Features:<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>Very High</td><td>CBA 2</td></tr><tr><td>Very High</td><td>ESA 1</td></tr><tr><td>Very High</td><td>Wetlands_Floodplain</td></tr><tr><td>Very High</td><td>FEPA Subcatchment</td></tr><tr><td>Very High</td><td>Rivers</td></tr><tr><td>Very High</td><td>SWSA (sw)_Southern Drakensberg</td></tr></table>An Aquatic and Wetland Delineation Study has been undertaken and included in the Draft BAR attached as Appendix C2.</td></tr>
<tr><td>Archaeological and Cultural Heritage Theme</td><td>Very high sensitivity</td><td>High (Agree, a study has been undertaken in terms of Section 38(1) of the</td><td>The DFFE screening tool indicates that the proposed R415 upgrade is located within areas of Very high heritage sites sensitivity as per below table.</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>National Heritage Resources Act of 1999, since the proposed development will exceed 5000m² in extent)</td>
<td>
Sensitivity Features:
<table>
<tr><th>Sensitivity</th><th>Feature(s)</th></tr>
<tr><td>High</td><td>Within 150m of a Grade IIIa Heritage site</td></tr>
<tr><td>Low</td><td>Low Sensitivity</td></tr>
<tr><td>Very High</td><td>Within 100m of an Ungraded Heritage site</td></tr>
</table>
The gravel road is already in existence and operational, the site has been previously cleared and disturbed.

A Heritage Impact Assessment study has been undertaken and included in the Draft BAR (attached as Appendix C3)
</td>
</tr>
<tr>
<td>Civil Aviation Theme</td>
<td>High sensitivity</td>
<td>Very Low (Disagree, not necessary to undertake a Civil Aviation study as upgrades will not impact Civil aviation)</td>
<td>
The DFFE screening tool has classified the civil aviation theme as follows:
Sensitivity Features:
<table>
<tr><th>Sensitivity</th><th>Feature(s)</th></tr>
<tr><td>High</td><td>Within 8 km of other civil aviation aerodrome</td></tr>
<tr><td>Low</td><td>Low sensitivity</td></tr>
<tr><td>Medium</td><td>Between 8 and 15 km of other civil aviation aerodrome</td></tr>
</table>
It is anticipated that this development will not pose any risks to civil aviation operations in the vicinity, and thus, it is expected that the road upgrade will not affect any civil aviation activities.

Consultation with the avian authority is ongoing.
</td>
</tr>
</table>

<table>
<tr><td>Defence Theme</td><td>Low sensitivity</td><td>Very Low (Disagree, the R415 road upgrade will not affect any defence operations)</td><td>The DFFE screening tool has classified the defence theme as having low sensitivity. There are no defence-related structures or zones on the site or in the vicinity of the site/R415 road to be improved.

Given the nature of the proposed project, which involves upgrading an existing gravel road, it is anticipated that the project will not have any impact on defence-related activities.

Consultation with the defence authority is ongoing.</td></tr>
<tr><td>Palaeontology Theme</td><td>Very High sensitivity</td><td>Medium (Agree, rocks identified which could be signs of palaeontology remains)</td><td>According to the National web based environmental screening tool (screening tool), The road to be upgraded is sensitivity is classified as per below table:
Sensitivity Features:<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Features with a High paleontological sensitivity</td></tr><tr><td>Medium</td><td>Features with a Medium paleontological sensitivity</td></tr><tr><td>Very High</td><td>Features with a Very High paleontological sensitivity</td></tr></table>Graves were identified very close to the road to be upgraded, and Rocks were identified which might be the indication of graves.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>According to the South African Heritage Resource Agency (SAHRIS) website, it was noted that the proposed upgrade is located within the high Palaeo sensitive area.

Palaeontological impact assessment has been undertaken and included in the Draft BAR, attached as Appendix C3</td></tr>
<tr><td>Plant Species Theme</td><td>High sensitivity</td><td>Medium (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR)</td><td>The DFFE screening report classifies the plant species theme as having the following sensitivity:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Erica cooperi var. cooperi</td></tr><tr><td>Low</td><td>Low Sensitivity</td></tr><tr><td>Medium</td><td>Sensitive species 215</td></tr><tr><td>Medium</td><td>Carex subinflata</td></tr><tr><td>Medium</td><td>Sensitive species 767</td></tr><tr><td>Medium</td><td>Sensitive species 148</td></tr><tr><td>Medium</td><td>Schizochilus bulbinella</td></tr><tr><td>Medium</td><td>Cotula paludosa</td></tr><tr><td>Medium</td><td>Erica cooperi var. cooperi</td></tr><tr><td>Medium</td><td>Sensitive species 535</td></tr><tr><td>Medium</td><td>Sensitive species 441</td></tr><tr><td>Medium</td><td>Sensitive species 1248</td></tr></table>
The site inspection revealed that the road is gravel and as much as it is operational and has already been disturbed and cleared, more clearing may be required. The site has a number of sensitive vegetation along the road such as Protea tree.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR, attached as Appendix C</td></tr>
<tr><td>Terrestrial Biodiversity Theme</td><td>Very High sensitivity</td><td>High (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR</td><td>The report generated from the National web based environmental screening tool (screening tool) categorized the sensitivity of the R514 road as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>Very High</td><td>CBA1</td></tr><tr><td>Very High</td><td>CBA2</td></tr><tr><td>Very High</td><td>ESA2</td></tr><tr><td>Very High</td><td>FEPA Subcatchment</td></tr><tr><td>Very High</td><td>SWSA (sw)_Southern Drakensberg</td></tr><tr><td>Very High</td><td>National Protected Area Expansion Strategy (NPAES)</td></tr><tr><td>Very High</td><td>CR_Mabela Sandy Grassland</td></tr><tr><td>Very High</td><td>EN_East Griqualand Grassland</td></tr></table>The EAP observed that the road's reserve has not been cleared or disturbed. During the site inspection, various animals, grass including birds were observed.

A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR, attached as Appendix C1.</td></tr>
</table>

In addition to the themes and associated specialist studies discussed above, the Environmental Screening Tool Report identified the following additional specialist assessments for consideration:

1. Landscape/Visual Impact Assessment
2. Noise Impact Assessment
3. Traffic Impact Assessment
4. Geotechnical Assessment
5. Socio-Economic Assessment
6. Ambient Air Quality Impact Assessment

The table below provides the motivation for each of these recommended specialist assessments, indicating whether the study will be undertaken as part of the Basic Assessment process and the reasons for its inclusion or exclusion.

Table 6: Specialist assessments identified as per the DFFE Screening Tool.

No	Proposed Specialist Assessment	Verification of Site Sensitivity and Motivation on The Need for Specialist Investigation	Specialist to be conducted (Yes or No)
1	Landscape/Visual Impact Assessment	It is not considered necessary to conduct a landscape/visual impact assessment for the proposed project, as it involves the improvement of an already existing gravel road. Any potential landscape or visual impacts and corresponding mitigation measures will be outlined in the Environmental Management Programme (EMPr).	No
2	Noise Impact Assessment	It is not expected that noise will be generated because of this project, which involves the upgrade of the R415 road.	No

		Any potential noise impacts and corresponding mitigation measures will be outlined in the Environmental Management Programme (EMPr) and will be short term limited to the construction phase.	
3	Traffic Impact Assessment	A traffic assessment was undertaken by the engineering team to inform the preliminary design of the project. No additional input is deemed necessary.	No
4	Geotechnical Assessment	A geotechnical assessment was undertaken by the engineering team to inform the design of structures along the proposed road upgrade section. There is no known geotechnical problem areas identified on this section of the route. No additional input is deemed necessary	No
5	Socio-Economic Assessment	The socio-economic impacts will be assessed further in the Basic Assessment Report. Any negative socio-economic impacts envisaged will be addressed in the EMPr. Lastly, as part of the Public Participation Process Interested and Affected parties (I&APs) will have the right to comment on the Draft Basic Assessment Report raising any concerns they might have in this regard, and their comments will be incorporated into the Final BAR by the Environmental Assessment Practitioner.	No
6	Ambient Air Quality Impact Assessment	The inclusion of an Ambient Air Quality Impact Assessment (AAQIA) as part of the Basic Assessment process for the proposed improvement of Road R415 is	Yes

		considered necessary due to the nature of the construction activities anticipated during the project. The proposed works will involve cutting of sandstone rock formations and crushing of material, both at the borrow pit area and adjacent to the rock cutting section along the road alignment. These activities are known to generate significant quantities of particulate matter (PM), particularly PM_{10} and $PM_{2.5}$, which may result in fugitive dust emissions that could impact nearby residential receptors, road users, and construction personnel.	

The BAR further incorporates the findings and recommendations of the following specialist studies:

- Biodiversity Impact Assessment compiled by Ntumbuluko Consulting Pty (Ltd) (Mr Tshuxekani Maluleke (SACNASP Reg. No. 120501)
- Wetland Delineation and Impact Assessment report compiled by Ntumbuluko Consulting Pty (Ltd) (Mr Tshuxekani Maluleke (SACNASP Reg. No. 120501)
- Agricultural Impact Assessment compiled by EnterpreBiz (Pty) Ltd (Mrs. Mahlatse Phala)
- Heritage Report including Paleontological Assessment compiled by Umlando: Archaeological Surveys and Heritage Management (Gavin Anderson) and (Dr Gideon Groenewald)
- Air Quality Impact Assessment Report compiled by Arundel Climate Advisor (Pty) Ltd

1.4.5. Other environmental authorisations, licences and permits.

In addition to Environmental Authorisation under NEMA, the proposed development may require the following environmental authorisations, permits and approvals.

1.4.5.1. National Water Act (Act No.36 of 1998)

According to the National Water Act (NWA), 1998 (Act No.36 of 1998), the proposed development requires a General Authorisation application as per the following water uses:

- Section 21(c): Impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse.

1.4.5.2. National Heritage Resources Act, 1999 (Act No. 25 of 1999)

According to the National Heritage Resources Act, 1999 (Act No. 25 of 1999): Heritage resources identified during the assessment must be managed in accordance with the Act. Should archaeological sites, graves, built heritage resources or other protected heritage resources be impacted

- The paleontological permits (for excavation or collection of fossil material) or approvals must be obtained from the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) before any disturbance takes place.

1.5 Details and Expertise of the EAP

Below are the details of the EAP, for the expertise of the EAP, please refer to Appendix G for a CV

Table 7: Details and Expertise of the EAP

Environmental Impact Assessment Practitioner	
Company	Earthlink Environmental Services
Project Team	Ms. Amukelani Khosa – EAP (Reg No: 2022/4943) Ms. Kgakile Mapoulo – Project Manager Mr Chauke Hlahla Wisdom- Candidate EAP
Email	kgakile@earthlinkenvironmental.co.za
Cell	071 878 8295
Physical Address	572 24th Rd, Withok Estates, Brakpan, 1541

1.6 Applicants Details

Table 8: Applicants Details

Contact Person	Mr. Mbulelo Peterson
Designation	Provincial Head
Email Address:	@nra.co.za
Telephone Number:	**Tel: +27 (0) 41 398 3201** Email: SongxabaN@nra.co.za
SANRAL Physical Address	**20 Shoreward Drive, Baywest, Gqeberha, Eastern Cape, 6025**

CHAPTER 2: LEGISLATIVE FRAMEWORK

This Chapter gives a general overview of the policy and legal framework in which the proposed Improvement of the R415 and related infrastructure would take place. It lists environmental laws and regulations that are relevant to this activity and that must be taken into account during the process of assessment. These laws and regulations may also be relevant to or have an impact on the proposed project.

2.1. The Constitution of South Africa (Act 108 of 1996)

Section 24 of the Constitution of South Africa No. 108 of 1996 states that "…everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that (c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development

2.2. National Environmental Management Act (Act 107 of 1998)

The NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by State Departments and to provide for matters connected therewith.

On 5 September 1997, the Minister of Environmental Affairs and Tourism had, under sections 26 and 28 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA), and with the concurrence of the Minister of Finance, promulgated Regulations in terms of Section 21 of the Act, GNR. 1182 GG No.18261, GNR. 1183 GG No. 8261, 1184 GG 18261 (as amended).

On 21 April 2006, the Minister of the Department of Water and Environmental Affairs [DWEA, now called the DFFE and the Department of Water and Sanitation (DWS) separately] promulgated Regulations in terms of Chapter 5 of the NEMA. When these Regulations came into effect on 3 July 2006, they replaced the EIA Regulations that were promulgated in terms of the ECA in 1997 and introduced new provisions for EIAs. Subsequently, the National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008) (NEMAA) was promulgated on 9 January 2009 and came into effect on 1 May 2009. The NEMAA made a number of significant amendments to the general provisions applicable to EIAs. On 18 June 2010, the Minister promulgated amended EIA Regulations in terms of Chapter 5 of NEMA. From the date of effect of these amended EIA Regulations, 2 August 2010, these amended EIA Regulations replaced the previous EIA Regulations that were promulgated on 21 April 2006.

In 2014 on 8 December, new EIA Regulations came into effect and replaced the previous EIA Regulations of 18 June 2010. The Regulations are as follows:

- GNR. 982 provides with the methodology and format which needs to be considered when conducting a Basic Assessment (BA) and S&EIR processes.
- GNR. 983 (Listing Notice 1) provides for activities which require a BA process to be followed.
- GNR. 984 (Listing Notice 2) provides for activities which require a S&EIR to be followed; and
- GNR. 985 (Listing Notice 3) also provides for activities which require a BA process to be followed.

The Minister of Environmental Affairs has again made amendments to the EIA Regulations, 2014, published under GNR. 982, GNR. 983, GNR. 984 and GNR. 985 of 4 December 2014, in terms of sections 24(5) and 44 of the NEMA through the promulgation of GNR. 324, GNR. 325, GNR. 326 and GNR. 327 of 07 April 2017.

The NEMA EIA Regulations define two broad processes for an EIA, namely: BA and S&EIR.

S&EIR is applicable to all projects likely to have significant environmental impacts due to their nature or extent, activities associated with potentially high levels of environmental degradation, or activities for which the impacts cannot be easily predicted.

BA is required for projects with less significant impacts or impacts that can easily be mitigated.

The project will entail the undertaking of the BA in terms of the EIA Regulations 2014, as amended; promulgated in terms of the NEMA as listed in GNR. 327 and GNR. 324. These activities are identified as actions that may not commence without an EA from the relevant competent authorities, in this case, the DFFE.

2.2.1. Listed and specified activities for the R415 Road improvement project

The listed activities associated with the project in respect of NEMA are provided in **Table 9** below whereas the listed activities associated with the project in respect of NWA are also provided. Based on the nature and extent of the listed activities, Earthlink on behalf of SANRAL will conduct separate EA and Water Use Application (WUA) applications.

Table 9: Triggered activities listed under GNR.327 (Listing Notice 1) and GNR.324 (Listing Notice 3)

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The proposed development will involve the temporary storage and handling of dangerous goods, including diesel, in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres during the construction phase. Therefore, Activity 14 of Listing Notice 1 is applicable to the proposed development.

19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from [(i)-a watercourse ~~(ii) the seashore; or~~ ~~(iii)the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or estuary, whichever distance is the greater –]but excluding where such infilling, depositing, dredging, excavation, removal or moving –~~ ~~a. will occur behind a development setback;~~ ~~b. is for maintenance purposes undertaken in accordance with a maintenance management plan; [or]~~ ~~c. falls within the ambit of activity 21 in this Notice, in which case that activity applies;~~ ~~d. occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or~~ ~~e. where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.~~	The proposed R415 road improvement project involves the widening of existing river bridges, construction of a new bridge and minor culverts within or crossing watercourses. The proposed works will require excavation, removal and/or movement of soil and other materials exceeding 10 cubic metres within watercourses. Therefore, Activity 19 of Listing Notice 1 is applicable to the proposed development and requires environmental authorisation.
27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or	The proposed development will require the clearance of stockpile areas and the clearing of vegetation outside the road reserve, covering an area of more than one hectare.

	(ii) maintenance purposes undertaken in accordance with a maintenance management plan.	
56	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilo meter - (i) where the existing reserve is wider than 13,5 meters	The proposed development includes the widening of an existing road by more than 6 metres within a road reserve wider than 13.5 metres. The widening is required to accommodate climbing lanes and surfaced shoulders. In addition, a temporary 6.5 m-wide deviation will be constructed to accommodate two-way traffic during the construction phase.
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
12(a)(ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. a. Eastern Cape ii. within critical biodiversity areas identified in bioregional plans	The proposed R415 road improvement project is located within areas identified as Critical Biodiversity Area (CBA) 2 and CBA 5 in the Eastern Cape. The proposed road improvement works will require the clearance of indigenous vegetation exceeding 300 square metres
14(ii) (a) (a) (i) (aa) (ff) (hh)	The development of -(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a	The proposed road improvement includes the construction of a new bridge and minor culverts within watercourses. The combined

	watercourse; ~~(b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse~~; a. Eastern Cape i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;	footprint of the proposed bridge and culvert works will exceed 10 m². The proposed activities are located within areas identified as CBA 2 and CBA 5, which are considered biodiversity-sensitive areas. In addition, the Wilfred Baur Nature Reserve, a protected area identified in terms of NEMPAA, is located within the Matatiele area and in close proximity to the road to be improved. These environmental sensitivities further support the inclusion of the activity in the Environmental Authorisation application.
18(a)(i)(aa)(ee)(gg)(kk)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre a. Eastern Cape i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (kk) A watercourse; or	A 6.5 m-wide temporary deviation will be required to accommodate two-way traffic during the construction phase. The proposed upgrading works are also located within areas identified as CBA 2 and CBA 5, indicating biodiversity sensitivity. In addition, the Wilfred Baur Nature Reserve, a protected area identified in terms of NEMPAA, is located within the Matatiele area and in close proximity to the road to be improved. These environmental sensitivities further support the inclusion of the activity in

		the Environmental Authorisation application.
23 (ii)(a)(a) (i) (aa) (ee) (gg)	The Expansion of- (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such [development] expansion occurs— (a) within a watercourse~~; (b) in front of a development setback adopted in the prescribed manner; or~~ (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. a. Eastern Cape i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;	The proposed road improvement involves the widening of river bridges, which will occur within Watercourses. The bridge widening will increase the existing physical footprint of the infrastructure and will exceed 10 m^2 The proposed upgrading works are also located within areas identified as CBA 2 and CBA 5, indicating biodiversity sensitivity. In addition, the Wilfred Baur Nature Reserve, a protected area identified in terms of NEMPAA, is located within the Matatiele area and in close proximity to the road to be improved. These environmental sensitivities further support the inclusion of the activity in the Environmental Authorisation application.

2.3. National Water Act (1998)

Water uses listed under Section 21 of the NWA will be triggered by the proposed project. The WUA Application is therefore being lodged with the relevant Regional DWS.

Water uses identified in terms of Section 21 of the NWA are as follows:

a) Impeding or diverting the flow of water in a watercourse.

b) Altering the bed, banks, course, or characteristics of a watercourse.

Due to water resources identified on the proposed site, the proposed development triggers Section (c) and (i) water uses listed in Section 21 of the NWA.

The NWA recognises that the entire ecosystem, and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the DWS. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i) of the NWA.

2.4. National Heritage Resource Act (NHRA) (Act 25 of 1999)

The National Heritage Resources Act's mission is to inspire communities to protect and preserve their heritage for the benefit of present and future generations. A Heritage Impact Assessment (HIA) was conducted to determine whether any heritage resources are located within the area of interest, in particular as per S38 (1).

2.5. National Environmental Management: Biodiversity Act (Act 10 OF 2004) (NEM: BA)

NEMBA was signed into law in mid-2004 and entered into effect on 1 September 2004. NEM: BA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. Certain activities, known as Restricted Activities, are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling.

2.6. The National biodiversity Framework (2017-2022)

The National Biodiversity Framework (NBF) is a requirement under Section 38 of the National Environmental Management: Biodiversity Act (Act 10 of 2004, hereafter referred to as the 'Biodiversity Act'). The NBF is a short to medium-term coordination tool that shows the alignment between the strategic objectives and outcomes identified in the National Biodiversity Strategy and Action Plan (NBSAP v.2, 2015) and other key national strategies, frameworks and systems that currently guide the work of the biodiversity sector and identifies mechanisms through which this work is coordinated. It also identifies a set of interventions or "acceleration measures" that can unlock or fast-track implementation of the NBSAP and indicates the relative

roles of the many agencies involved in implementing these activities. The purpose of the NBF is not to provide a comprehensive review of all work currently being undertaken in the biodiversity sector, nor to list all of the actions required to conserve and manage South Africa's biodiversity in support of sustainable development.

2.7. The Eastern Cape Conservation Plan (ECBCP, ver 2, 2019)

Eastern Cape Biodiversity Conservation Plan Handbook (ECBCP, 2019) adopted by the competent authority Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) Eastern Cape C-Plan) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. The (ECBCP, 2019) uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- Critical Biodiversity Area (CBA);
- Ecological Support Area (ESA);
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Habitat remaining (NNR)

2.8. Conservation of Agricultural Resource Act (Act 43 of 1983) (CARA)

This act regulates the utilization and protection of wetlands, soil conservation and all matters relating thereto; control and prevention of veld fires, control of weeds and invader plants, the prevention of water pollution resulting from farming practices and losses in biodiversity.

2.9. National Environmental Management: Protected Areas Act (NEMPAA; Act No. 57 of 2003)

To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

This act provides a list of the protected areas which may fall on, or within close proximity to the proposed development site

2.10. The National Forest Act (act no 84 of 1998) (NFA)

The main objective of the National Forests Act, 1998 is to promote the sustainable management and development of forests and to provide protection for certain forests and trees. This said protection is provided

through the protection of all natural forests (Section 7 (1), the protection of all trees declared to be protected in terms of section 12(1) of the Act, and the regulation of certain activities in a proclaimed State Forest (Section 23(1)(a) – (k)). It should be noted that there are other environmental legislation administered by other State Departments that also regulate natural resources. The Act is responsible for:

- Promoting the sustainable management and development of forests for the benefit of all;
- Creating the conditions necessary to restructure forestry in South Africa;
- Providing special measures for the protection of certain forests and protected trees;
- Promoting the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- Promoting community forestry; and
- Promoting greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

2.11. Convention on Biological Diversity

The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from commercial and other utilization of genetic resources. The agreement covers all ecosystems, species, and genetic resources.

2.12. Convention on the Conservation of Migratory Species of Wild Animals

The CMS, or the Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Parties to the CMS work together to conserve migratory species and their habitats by providing strict protection for the most endangered migratory species, by concluding regional multilateral agreements for the conservation and management of specific species or categories of species, and by undertaking co-operative research and conservation activities.

2.13. Convention on International Trade in Endangered Species of wild Fauna and Flora (Cites)

The CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Through its three appendices, the Convention accords varying degrees of protection to more than 30,000 plant and animal species.

2.14. The International Treaty on Plant Genetic Resources for Food and Agriculture

The objectives of the Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the

Convention on Biological Diversity, for sustainable agriculture and food security. The Treaty covers all plant genetic resources for food and agriculture, while it's Multilateral System of Access and Benefit-sharing covers a specific list of 64 crops and forages. The Treaty also includes provisions on Farmers' Rights.

2.15. Convention on Wetlands (popularly known as the ramsar convention)

The Ramsar Convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention covers all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.

2.16. World Heritage Convention (WHC)

The primary mission of the WHC is to identify and conserve the world's cultural and natural heritage, by drawing up a list of sites whose outstanding values should be preserved for all humanity and to ensure their protection through a closer co-operation among nations.

2.17. RAMSAR Convention

The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

2.18. International Plant Protection Convention (IPPC)

The IPPC aims to protect world plant resources, including cultivated and wild plants by preventing the introduction and spread of plant pests and promoting the appropriate measures for their control. The convention provides the mechanisms to develop the International Standards for Phytosanitary Measures (ISPMs), and to help countries to implement the ISPMs and the other obligations under the IPPC, by facilitating the national capacity development, national reporting and dispute settlement. The Secretariat of the IPPC is hosted by the Food and Agriculture Organization of the United Nations (FAO).

CHAPTER 3: NEED AND DESIRABILITY

This Chapter provides an overview of the need and desirability, and perceived benefits of the project.

The proposed improvement of the R415 between Matatiele and Qacha's Nek Border Post is both necessary and desirable due to the strategic importance of the route for regional mobility, socio-economic development, trade, tourism, and road safety. The existing road is largely gravel and in poor condition, making travel difficult, particularly during adverse weather conditions. The road traverses mountainous terrain and serves as an important cross-border link between South Africa and Lesotho.

The upgrading of the road will improve accessibility and connectivity between rural communities within the Matatiele Local Municipality and neighbouring areas in Lesotho. Improved road infrastructure will facilitate safer and more reliable transport for local residents, businesses, public transport operators, and emergency services. The current poor road conditions contribute to longer travel times, increased vehicle operating costs, and limited accessibility to social services such as healthcare, education, and commercial centres.

The project is also desirable from an economic perspective, as the route functions as an important regional trade and tourism corridor between South Africa and Lesotho. Upgrading the road will enhance cross-border movement of goods and people through the Qacha's Nek Border Post, thereby supporting local economic growth, tourism opportunities, and regional integration. Improved accessibility may further stimulate investment and create temporary employment opportunities during the construction phase, benefiting surrounding communities.

Furthermore, the transfer and planned upgrading of the route by SANRAL demonstrates the strategic importance of the corridor within the broader national road network. SANRAL has identified the route for improvement to enhance transport efficiency, improve road standards, and support long-term infrastructure development in the region.

CHAPTER 4: ALTERNATIVES CONSIDERED

In terms of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), alternatives refer to different ways of achieving the purpose and requirements of a proposed activity. These may include alternatives relating to the location, type of activity, design or layout, technology, operational aspects, and the option of not implementing the activity.

For the proposed R415 upgrade, the following alternatives were considered:

4.1. Location / Route Alternative

The project is specifically intended to improve the existing R415 between Matatiele and the Qacha's Nek Border Post. A new road alignment was not considered a reasonable or feasible alternative because it would require a new road reserve, additional land and would potentially result in greater environmental and social impacts. The use of the existing road alignment also allows the project to improve an established transport route.

4.2. Type of Activity

The proposed activity is the improvement of the existing gravel road to a surfaced road and improving the associated bridges, culverts, drainage and road safety infrastructure. Constructing a completely new road is not considered necessary because an existing road is already available and provides the required connection.

4.3. Design and Layout Alternatives

Different design requirements have been considered as part of the engineering design. The proposed road width, climbing lanes, bridge upgrades, culverts, drainage measures, MSE walls and slope improvements have been selected to address the existing road deficiencies and meet the required SANRAL standards.

Where possible, the design will be adjusted to suit the existing terrain and infrastructure and to minimise unnecessary disturbance outside the existing road reserve.

4.4. Technology Alternative

The project will use standard and commonly used construction methods for roads, bridges, culverts and drainage infrastructure. These methods are suitable for the proposed road upgrade and can be adapted to the existing site conditions.

Where necessary, alternative construction methods or technologies may be considered during the detailed design and construction phases, taking into account safety, environmental impacts, site conditions and practicality.

4.5. Operational Alternative

The improved R415 will continue to serve as a public road between Matatiele and the Qacha's Nek Border Post. No significant change in the operational use of the road is proposed. Temporary traffic deviations will be provided during construction where required to maintain access and traffic flow.

4.6. No-Go Alternative

The No-Go alternative assumes that the proposed R415 upgrade will not be implemented. Under this alternative, the existing road and associated infrastructure would remain in their current condition, subject to routine maintenance and repairs. The No-Go alternative would avoid the direct environmental impacts associated with construction, such as vegetation clearance, earthworks, construction waste, temporary traffic deviations and disturbance to river crossings. It would also avoid potential impacts on aquatic habitats, riparian vegetation and water quality that could arise during construction at the Botsola, Kinira and Mafube river crossings.

However, the No-Go alternative would also mean that the existing road deficiencies and environmental risks associated with the current infrastructure would remain. These include inadequate drainage infrastructure, flooding at the Botsola River crossing, and the existing limitations of the bridges, culverts and road surface. The following negative implications may therefore occur if the No-Go alternative is implemented:

- Loss of potential socio-economic benefits associated with the project, including temporary employment, skills development and local economic opportunities.
- Continued limitations of the existing road infrastructure and road safety conditions.
- Continued reliance on the existing drainage infrastructure, including culverts that may not provide the required hydraulic capacity.
- Continued risk of flooding and disruption to road users during heavy rainfall events, particularly at the Botsola River crossing.
- Loss of opportunities to improve transportation infrastructure and connectivity between Matatiele and the Qacha's Nek Border Post.
- Continued deterioration of the existing road and associated infrastructure if maintenance is insufficient.

The No-Go alternative would also have the following potential environmental benefits:

- Existing indigenous vegetation would remain largely undisturbed by construction activities.
- Existing habitats and biodiversity would not be directly disturbed by the proposed road upgrade.
- The existing landscape would remain unchanged, with no additional visual impacts associated with construction.
- No additional construction waste would be generated by the proposed project.
- There would be no construction-related alteration of the hydrology of the Botsola, Kinira and Mafube rivers.
- Potential construction-related impacts on aquatic habitats, riparian vegetation and aquatic species would be avoided.
- Potential construction-related sedimentation and pollution risks to the rivers would be avoided.
- Existing floodplain processes would not be directly altered by the proposed infrastructure works.

Overall, the No-Go alternative would avoid the environmental impacts associated with construction but would also mean that the existing road, drainage and infrastructure deficiencies remain unresolved. The No-Go alternative is therefore assessed as part of the environmental assessment to provide a comparison with the proposed upgrade.

CHAPTER 5: DESCRIPTION OF THE BASELINE ENVIRONMENT

5.1 Geology and Soils, Climate and Vegetation

5.1.1. Geology & Soils

The majority of the road alignment is underlain by mudstones and sandstones of the Beaufort Group within the Karoo Supergroup, with additional exposures of the Molteno, Elliot, and Clarens Formations occurring along the route. These sedimentary units typically give rise to well-drained soils with depths ranging from 500–800 mm and clay contents of 15–55%. Dominant soil forms associated with these parent materials include Hutton, Clovelly, and Oatsdale, while Shortlands soils occur where dolerite intrusions are present. The prevailing land types in these sections are Fa and Ac.

Towards the mountainous areas near the Lesotho border, the geology transitions to Clarens Formation sandstones, as well as sandstones, siltstones, and mudstones of the Elliot Formation, both belonging to the Stormberg Group of the Karoo Supergroup. These are overlain in places by the basaltic lava flows of the Drakensberg Group. Soils on the steep escarpment slopes are typically deep, fine-grained, and characteristic of land types Fa, Fb, and Ea, reflecting the high rainfall and erosional dynamics of the region.

The central portion of the road traverses areas underlain by Tarkastad Subgroup mudstones and sandstones in the east, with Molteno and Elliot Formation sandstones and minor mudstones occurring towards the west. These geological units form part of the broader Karoo Supergroup. In this section, the dominant soils are poorly drained, generally 200–300 mm deep, with clay contents below 15%. These are classified primarily as Katspruit and Longlands soil forms, with Oatsdale, Vimy, and Clovelly occurring in better-drained areas. The most common land types in this zone are Ia and Ca.

5.1.2. Climate

The region experiences predominantly summer rainfall, with a mean annual precipitation (MAP) of approximately 780 mm, ranging from 620–816 mm across the broader Matatiele area. Kokstad, the nearest long-term weather station, records an average of 88 rain days per year, with only three of these occurring during mid-winter (June–July). Rainfall is largely convective in nature, with thunderstorms accounting for approximately 45 rain days annually. Both mist and snow occur, although less frequently than in the Gd 4 Southern Drakensberg Highland Grassland, with Kokstad recording an average of 26 misty days per year.

Mean Annual temperature (MAT) ranges from 12.9–15.6°C, with an overall regional MAT of approximately 14.7°C. Moderately severe frost is common, occurring on roughly 30 days per year, particularly in valley bottoms and high-lying areas. Mean annual evaporation is relatively high, ranging between 1 457–1 723 mm (Camp 1999b), which contributes to seasonal moisture deficits despite the relatively high rainfall.

5.1.3. Vegetation and Landscape along the Road

5.1.3.1. East Griqualand Grassland

The bulk of the proposed road development falls within the East Griqualand Grassland (Gs 12) vegetation unit. This landscape is characterised by hilly terrain dominated by mesic grassland, with scattered bush clumps occurring in specific microhabitats. Moist or waterlogged sites typically support *Leucosidea sericea*, while drier or low-lying areas contain woody species such as *Diospyros lycioides, Vachellia (Acacia) karroo*, and *Ziziphus mucronata*. The vegetation unit spans parts of both the KwaZulu-Natal and Eastern Cape provinces, covering much of East Griqualand, with Kokstad and Matatiele forming its core centres.

It occurs across an altitudinal range of 920–1 740 m, supporting a cool, moist grassland system influenced by summer rainfall and frequent mist. Several endemic herbaceous species are associated with this unit, including *Alepidea duplidens, Berkheya griquana, Wahlenbergia dentata*, and *W. ingrata,* contributing to its high floristic value.

The East Griqualand Grassland is classified as Vulnerable, with a national conservation target of 23%, yet only 0.2% is formally protected within the Malekgonyane (Ongeluksnek) Wildlife Reserve and Mount Currie Nature Reserve. More than a quarter of the unit has been transformed through dryland cultivation (mainly maize), commercial forestry plantations, and expanding urban settlements. Invasive alien species, particularly Acacia dealbata and A. mearnsii, are encroaching into portions of the grassland, altering ecological processes and suppressing indigenous species recruitment. Erosion levels are generally low across the unit, with 31% of the area classified as low erosion risk, 30% as very low, and 30% as moderate, although localised erosion may occur on steeper slopes or in historically disturbed areas.

5.1.3.2 Gd 4 Southern Drakensberg Highland Grassland

The northern section of the road, extending towards the Qacha's Nek border, falls within the Gd 4 Southern Drakensberg Highland Grassland vegetation unit. This landscape comprises steeply sloping mountainous terrain on and below the summit of the Great Escarpment, supporting dense tussock grassland interspersed

with a dwarf-shrub component on exposed rocky areas. The grassland is dominated by species of Festuca, together with *Themeda triandra, Heteropogon contortus, Eragrostis racemosa, E. chloromelas, E. curvula, Elionurus muticus, Trachypogon spicatus, Andropogon appendiculatus, Harpochloa falx and Tristachya leucothrix*. This vegetation unit is distributed across the highest mountains and ridges of the Stormberg, from Molteno to the Dordrecht region, including the elevated Kraairivier valley near Barkly East and its tributaries. It also occurs along the steep head-valley slopes fringing the southern Drakensberg Escarpment, extending northwards from Indwe, Elliot, Ugie, Maclear and Mount Fletcher to Matatiele. From Ramatseliso Nek north of Matatiele, the upper boundary of this unit transitions into the Gd 7 uKhahlamba Basalt Grassland, while the Gd 4 unit continues along a series of high northwest–southeast-oriented ridges as far as the southeastern extension of the Giant's Castle buttress (KwaThabamnyana).

The vegetation occurs between 1 420–2 080 m, predominantly within the 1 720–1 840 m altitudinal band. The unit is classified as Least Threatened, with a conservation target of 27%, and approximately 9% is formally protected within the uKhahlamba Drakensberg Park and the Malekgonyane (Ongeluksnek) Wildlife Reserve. Transformation remains relatively limited, with just over 5% converted for cultivation, although scattered invasions of Acacia dealbata occur in some areas. Erosion levels are generally very low (57%), with smaller portions classified as low or moderate (13%).

5.1.2.3 Status Lesotho Highland Basalt Grassland (Gd 8)

At the northern tip of the road upgrade near the border post, the landscape transitions into the Gd 8 Lesotho Highland Basalt Grassland vegetation unit, a high-altitude system characterised by extensive plateaus and elevated ridges separated by deep valleys typical of the Maloti–Drakensberg region. Although steep valley slopes are common, major cliff faces occur only intermittently. Vegetation comprises a closed, short grassland matrix interspersed with patches of Passerina montana-dominated shrubland, with smaller shrubs such as *Chrysocoma ciliata* and *Pentzia cooperi* frequently abundant, particularly on warmer, disturbed slopes.

Species composition varies along the altitudinal gradient, with *Themeda triandra* more prominent at lower to mid-elevations and *Festuca caprina* dominating higher altitudes. Large, conspicuous patches of *Kniphofia caulescens* occur mainly in upper-altitude sponge areas (2 500–2 900 m), while *Merxmuellera macowanii* is typically associated with drainage lines and watercourses.

Although classified as Least Threatened with a national conservation target of 27%, only about 1% of this unit is formally protected within reserves such as Malekgonyane (Ongeluksnek), Golden Gate Highlands National Park, and Sehlabathebe National Park. Approximately 10% has been transformed, mainly through cultivation

at lower elevations, and the unit has been further impacted by major infrastructure such as the Katse and Mohale Dams. Grazing pressure is high under communal systems, particularly at lower altitudes, contributing to shrub encroachment, extensive erosion, and the loss of sensitive species such as *Aloe polyphylla*, which has been largely extirpated from accessible sites due to illegal collection.

5.1.2.4 Mabela Sandy Grassland

The proposed road alignment traverses the GS 13 Mabela Sandy Grassland vegetation unit, which is characterised by flat valley basins underlain by poorly drained, low-nutrient soils that support species-poor, sour, tussock-dominated grasslands lacking indigenous trees. The vegetation is typically dominated by unpalatable indicator species such as Sporobolus pyramidalis and Aristida junciformis, reflecting a system sensitive to disturbance and grazing pressure. This unit is distributed across the Cedarville Flats draining into the Umzimvubu River in the Cedarville–Matatiele region of southwestern KwaZulu-Natal, with smaller occurrences in the Simi and Ramohlakoana basins of the Kinira River Valley in the former Transkei, generally between 1 440–1 500 m (locally up to 1 550 m). Classified as Vulnerable, the unit has a conservation target of 23%, although only a very small portion is formally protected within the Malekgonyane (Ongeluksnek) Wildlife Reserve. More than 20% has already been transformed by maize cultivation and urban expansion, while remaining areas face ongoing threats from heavy selective grazing in communal rangelands, which promotes soil erosion and further degradation of the grassland structure.

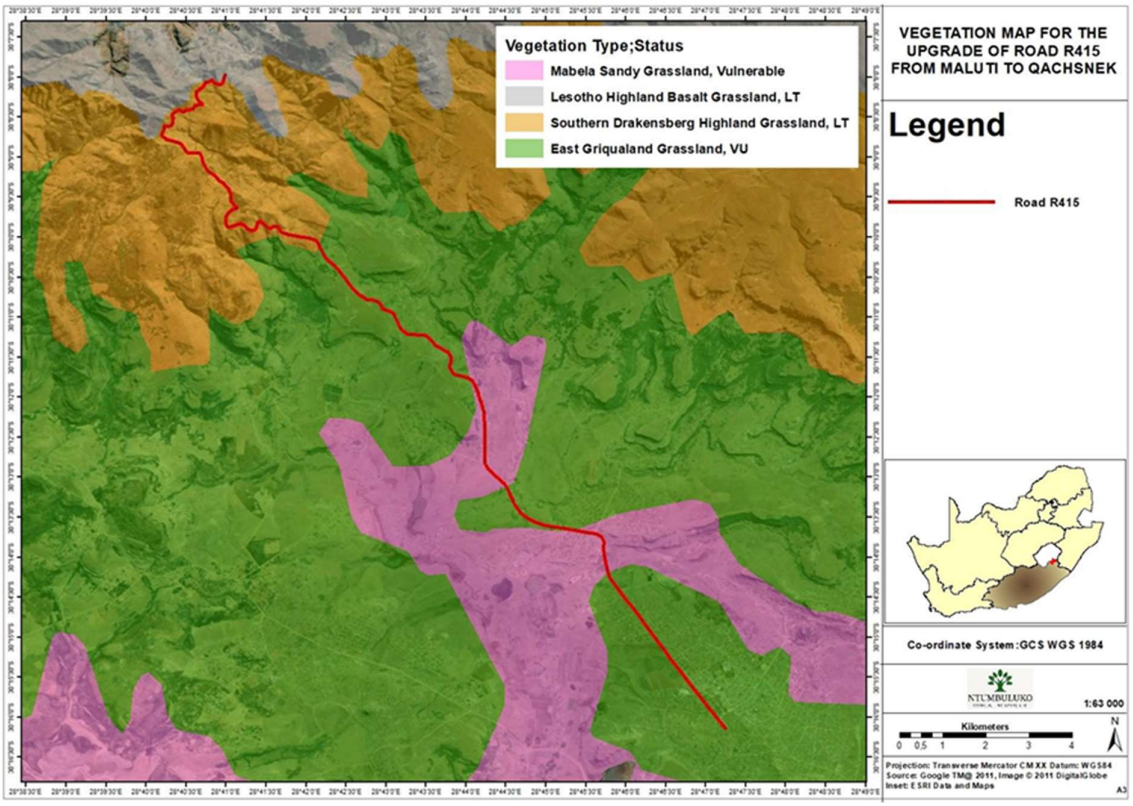


Figure 2: Vegetation Map of the proposed R415 Road

5.2. Socio Economic

The information presented in this section and pertaining to these aspects was obtained from the Matatiele Local Municipality Final Integrated Development Plan 2022-2027(2024-2025 Review).

5.2.1. Matatiele Local Municipality

Matatiele Local Municipality (MLM) is located in the Northern part of the Eastern Cape Province. It adjoins onto Elundini Municipality to the South West, Greater Kokstad Municipality (KZN) to the East, Umzimvubu Municipality to the South, and Lesotho to the North. Traversing the local municipality in an east-west direction is the R56 road, linking Matatiele with Kokstad to the east and Mount Fletcher to the west. This roadway links the Municipality with KwaZulu-Natal Province and parts of the Eastern Cape Province located south of Matatiele Municipality.

Matatiele Local Municipality is located in the Alfred Nzo District municipality in the Northern part of the Eastern Cape Province. Alfred Nzo District comprises of four local municipalities namely; Matatiele, Umzimvubu, Winnie Madikizela-Mandela and Ntabankulu Local Municipalities. The municipality borders local

municipalities of: Elundini Municipality to the South West, Greater Kokstad Municipality (KZN) to the East, and Umzimvubu Municipality to the South. The municipality also has cross border linkages with Lesotho to the North. (MLM IDP, 2018a). Important features of the spatial location and economy of the MLM identified are the following:

Land Area

Matatiele Local Municipality is the largest municipality in the district covering an area of approximately 4 352 km2, whereas the second largest municipality is Umzimvubu LM in the district covers an area of 2 506 km2. Thus, Matatiele LM constitutes 63.5% of the district's total land mass. Some of Matatiele LM's notable physical characteristics are:

- A steep, mountainous terrain, many valleys, and several open spaces,
- Poor road infrastructure and many gravel roads, and many foot paths, especially in the rural parts of the area,
- Its predominantly rural nature,
- Large tracts of agricultural land in the rural areas are under-utilised. Most of it is communal land – meaning that it is privately owned.
- Rivers are among the most significant natural sources of water.

Roads and Regional Access

The main regional road in the municipality is the R56 road which crosses through the municipality in an east-west direction. The road links Matatiele with Kokstad about 70 kilometres east of Matatiele town and Mount Fletcher situated 65 kilometres south west of Matatiele. The R56 road provides access between the Eastern Cape and KwaZulu-Natal provinces.

The R56 stretches across the Eastern Cape and KwaZulu-Natal provinces. It serves as the primary corridor in the region. Mount Frere and Mount Ayliff, which are the main towns of Umzimvubu Local Municipality, can be reached by travelling eastwards along this road and joining the N2 South Bound in Kokstad. Secondary to the N2, R56 serves as the main link between the Eastern Cape Province and KwaZulu-Natal Province. It was identified in the Provincial Spatial Development Plan (PSDP) - Eastern Cape as one of the Strategic Transport Routes. R56 is a multi-sectorial corridor as it facilitates access to agricultural zones in the Cedarville-Matatiele Area, tourism zones in the Ongeluksnek area and commerce and industry in Matatiele. It forms the basis for a road system that connects different parts of the municipal area. The municipality comprises of three urban centres, namely; Matatiele town, Cedarville and Maluti.

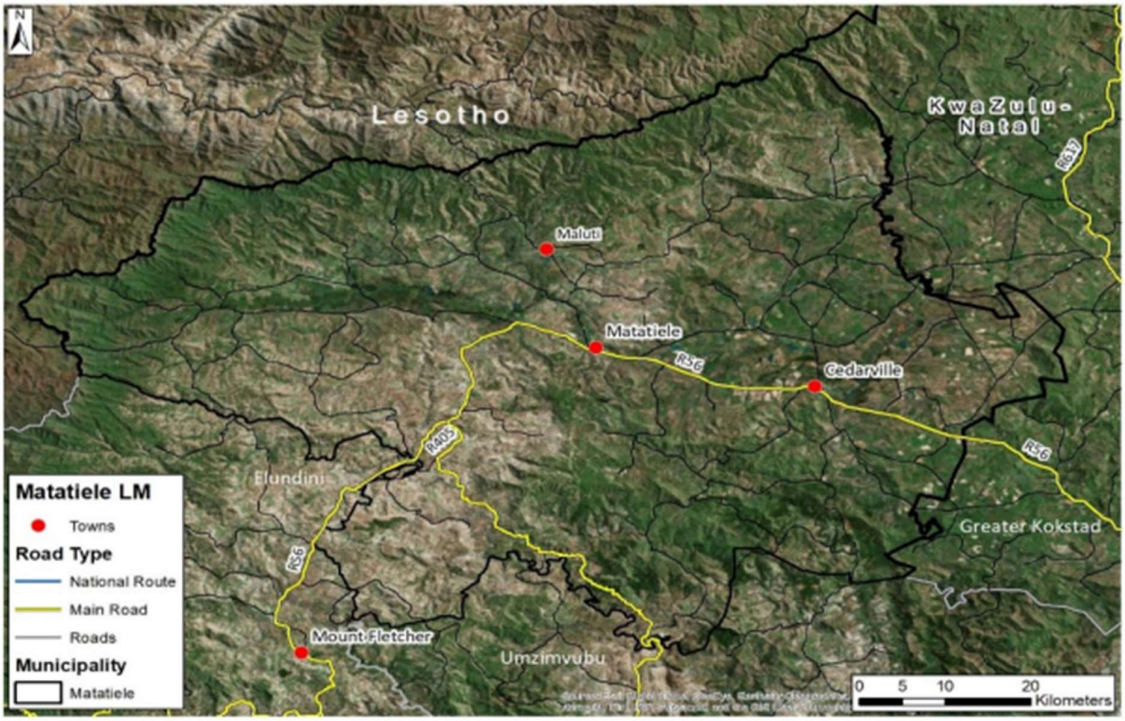


Figure 3: Major Towns within Matatiele and Roads leading to Matatiele Local Municipality

The town of Matatiele, is the main commercial node within MLM, situated at the foothills of the Drakensberg, at an altitude of 1 466 metres above sea level. The town is located at the junction of the Eastern Cape, KwaZulu-Natal and southern Lesotho. It has a valley that runs from east to west, known as the Cedarville Flats. It is dissected by the R56, which is a primary movement corridor

5.2.2. Demographic profile

5.2.2.1. Population size and Distribution

According to the 2022 Census results; Matatiele Local Municipality has a population size of 225 562 people, spread across 27 wards. This shows a slight increase in the population size over the years, since the 2011 census. A comparative demographical analysis demonstrates that Matatiele Local Municipality has the largest geographical size at 4352km2 within Alfred Nzo District Municipality. In terms of Population density, Matatiele local Municipality has a rather lower density (46.8 p/square kilometre) within ANDM.

Table 10: Population size. Source: STATSSA, Census 2022)

Province, district, Municipality	Census 2011 Males	Census 2011 Females	Census 2011 Total	Census 2022 Males	Census 2022 Females	Census 2022 Total	Growth rate	Area Size (km2)	Population density
Eastern Cape	3 089 701	3 472 353	6 562 053	3 424 042	3 806 162	7 230 204	0,9	168,966	39
Alfred Nzo District Municipality	366 488	434 857	801 344	439 455	497 006	936 462	1.5	10,731	74.7
Matatiele Local Municipality	93 675	110 168	203 843	105 977	119 585	**225 562**	1.0	**4,352**	**46.8**

5.2.2.2. Population groups

The majority of the population is African at 98.3%, while Coloured, Indian/Asian and White population groups, constitute 0,7%, 0.2% and 0.7% respectively. The majority of the population is mostly residing in rural villages around the towns of Matatiele, Maluti and Cedarville.

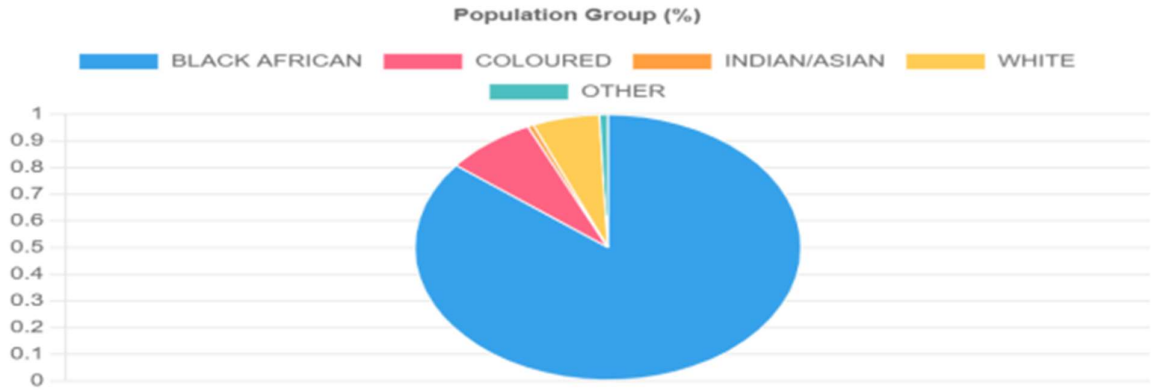


Figure 4: Population group STATSSA; 2022 Census results

5.2.2.3. Households

The households are distributed unevenly over 27 wards. The 2021 municipal demarcation has not affected changes in the geographical size of the municipality; however, the ward boundaries of some wards have changed, with some wards assigned new villages from other wards. Hence, the number of villages in each ward vary in size and number.

The household size has increased from 49 527 in 2011 to 55 757 in 2022, thereby resulting in an increase to the average household size from 3.9 in the previous Census to 4.0 according the Census 2022 results

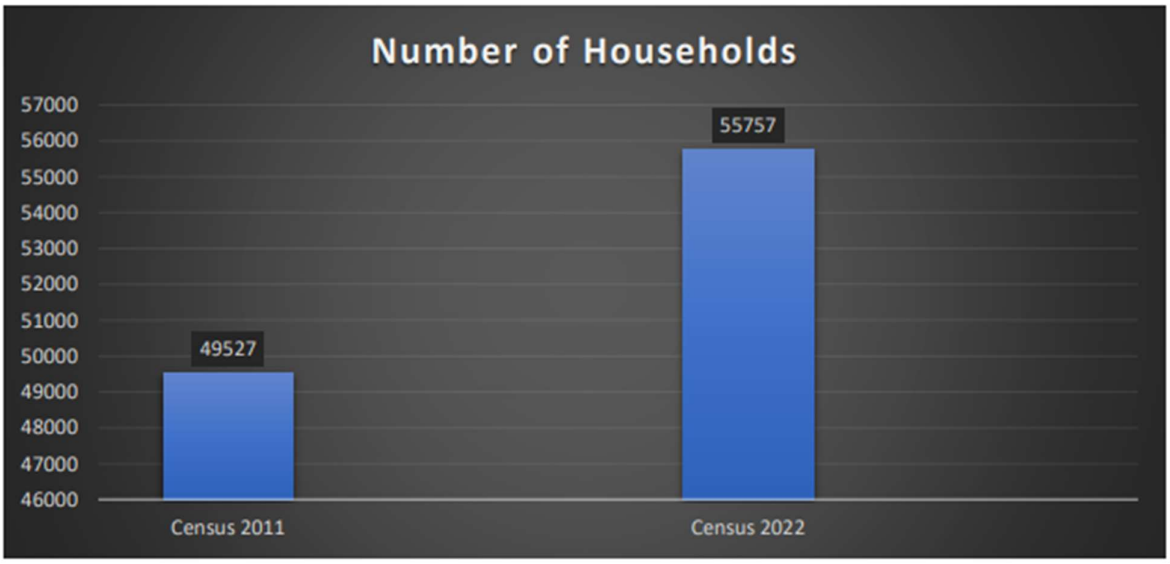


Figure 5: Total household STATSSA; 2022 Census results

5.2.2.4. Gender differentiation and Age distribution

53,1% of the population of Matatiele Local Municipality are females. There are more females than males (47,1%). This is not a unique case of MLM as this trend is also evident within the district, province and the country as a whole. The figure below shows the population for MLM.

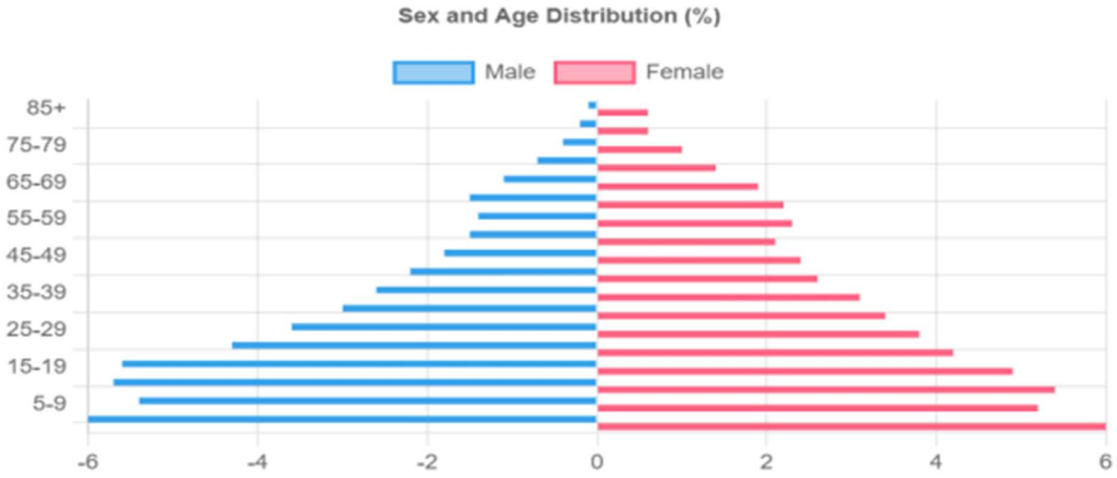


Figure 6: Gender Differentiation STATSSA; 2022 Census results

MLM generally has a large youthful population. The largest part of the population falls within the ages of 15 – 34. The majority of these young people are still in school. Females are more across the age groups with the exception of the 05 -14 age group.

5.2.2.5. Youth Population

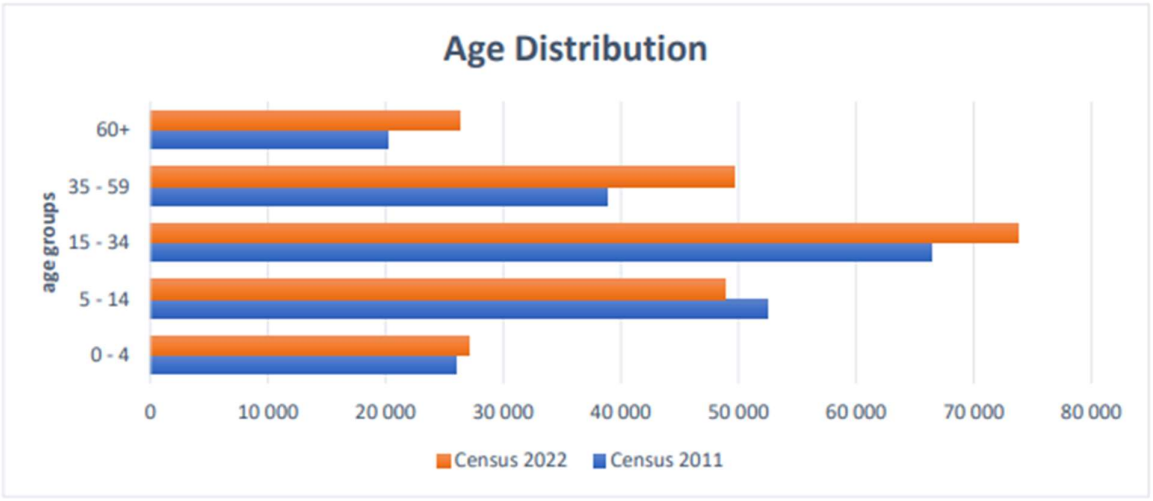


Figure 7: Youthful Populations STATSSA; 2022 Census results

Persons between the ages of 15 – 34 (youth) for the largest part of the population as shown by the age distribution graph above. In addition, there is a decline in the number of people between the ages of 5 – 14. There is an increase in the number of elderly persons (60+).

The majority of the population being youthful; it may be priority should be given by the Municipality, Sector Departments and other stakeholders to ensure that a large percentage of the budget is allocated to social development facilities and youth Empowerment initiatives in order to meet the needs of a youthful population and ensuring that people falling within this age acquire relevant skills. The development of skills, creation of more job opportunities is one of the key aspects of the developmental issues by the municipality in partnership with the sector departments and other stakeholders.

5.2.3. Socio-economic profile

5.2.3.1. Education Profile and Literacy Levels

Education shapes how people experience the social, political and economic conditions in society. Consequently, education is central to how we respond to the quest for human development and flourishing. The basic purpose of education is to provide children, youth and adults with a socializing experience that enables self-knowledge and develops personal and social attributes to engage with, change and contribute meaningfully to society.

Education and training are important to the future socio-economic dynamics of MLM, because through improved education provision, this enables empowerment of the population of Matatiele. Education attainment

is an important indicator of the environment for the development of the local economy and the huma resource capacity for business establishment and employment

One of the challenges within the municipality is the increasing number of school drop outs. This results in a large number of young people who do not complete high school.

The Census 2022 shows that there has been a 6.5% decline in the school attendance as per the figure below, however, it is important to note that this declining trend is also seen within the province and the district and that it is not exclusive to Matatiele

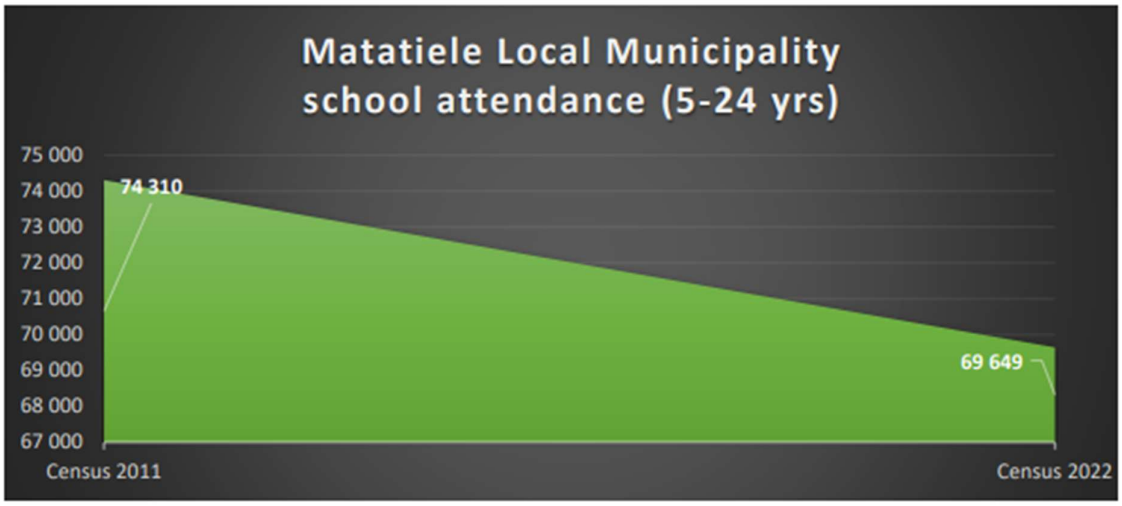


Figure 8: Youthful Population. STATSSA; 2022 Census results

The proportion of the working age population that is between the ages of 15 and 65 years who have obtained at least a matric or higher level of education in Matatiele is 58,4%. This is an increase of 3,8% in comparison to the 54,6% which was recorded in the 2011 Census.

The majority of learners in Matatiele are in primary and secondary school. Most matric graduates are required to leave the area and study in cities within the province and in other provinces. Furthermore, the small percentage of youth people enrolled in higher educational institutions could be attributed to poor financial backgrounds, in that most students after Matric do not have the financial means to further their studies.

Within the Matatiele Local municipality there is only one institution of higher learning, Ingwe TVET college which is in the Maluti area in ward 1. There is need for provision of tertiary institutions in the municipal area

5.2.3.2. Poverty Levels

In Matatiele Local Municipality, there are still large numbers of people living in poverty, however looking at the poverty trends for Matatiele Local Municipality, there seems to be a decline in the number of people living in poverty over the years.

The 2022 Census reveals that the dependency ratio for Matatiele Local municipality has improved: from 83.0 in 2011 to 71.2 in 2022.

Municipal planning recognizes the need to focus strongly on poverty alleviation mechanisms as well as job creation. The Matatiele Local Municipality has an Indigent support policy and a credible indigent register, with 12 006 households registered as of November 2023, with about 8142 households who are indigent not yet registered. The register is updated as and when new people need to be captured on an annual basis. The current indigent threshold income per household each month is two pension incomes per month. Currently the indigent support is in the form of free basic electricity, non-grid energy, and alternative energy and refuses removal. Indigent household also receive 6 kiloliters of water per Household and there is an adopted Indigents Support Policy.

CHAPTER 6: SPECIALIST FINDINGS

6.1. Biodiversity Impact Assessment

Earthlink Environmental Services appointed Ntumbuluko Consulting (Pty) Ltd to conduct the Terrestrial Biodiversity Impact Assessment for the proposed R415 project, the specialist report is attached as **Appendix C.**

6.1.1. Results of the Flora Assessment

General overview of the R415 between Matatiele and the Qacha's nek border post with Lesotho

Field verification undertaken on 21 March 2026 confirmed the presence of four vegetation units within the broader project landscape, aligning with the patterns indicated by national-scale vegetation maps. While these units are distinguishable at the landscape level, their expression within the immediate road verge and road reserve is notably subdued.

The vegetation along the R415 road and associated road reserve presents as structurally and compositionally homogenised, with limited differentiation between mapped units **(Figure 9**). This reflects the influence of long-term anthropogenic disturbance rather than an absence of underlying ecological diversity in the surrounding landscape. The muted expression of vegetation variation is strongly associated with the historic and ongoing use of the existing road and associated road reserve.

Although the route has existed since the late 1800s, its formal designation as the R415 is linked to the post-1994 national road reclassification process, with the most explicit legal declaration published in 2020. Over this extended operational period, the road reserve has been subjected to repeated disturbance, including vegetation clearing, slashing, grading, and the maintenance of drainage infrastructure (**Figure 9**). These activities have progressively altered the natural vegetation structure, resulting in a simplified and modified habitat state.

The majority of the proposed road traverses the East Griqualand Grassland (Gs 12) vegetation unit. This landscape is characterised by hilly terrain supporting mesic grassland, with scattered bush clumps occurring in localised microhabitats (**Figure 10**). In certain areas the road and associated reserve consists of Moist or waterlogged areas typically contain Leucosidea sericea (**Figure 11**), while drier or low-lying sites support woody species such as Diospyros lycioides, Vachellia (Acacia) karroo, and Ziziphus mucronata (**Figure 10**). These vegetation characteristics are clearly expressed within the adjacent land parcels; however, they are

largely absent within the road verge and associated servitude, where long-term disturbance has altered the natural vegetation structure.



Figure 9: Overview of the road with evidence of disturbance.



Figure 10: Overview of the indigenous vegetation adjacent the road servitude.



Figure 11: Vegetation observed along the waterlogged areas along the R415 road (30°14'10.38"S 28°45'45.83"E and 30°13'16.23"S 28°44'32.79"E).

Vegetation types recorded on site

The road servitude is predominantly characterised by secondary grassland resulting from prolonged road use, grazing pressure, and historical disturbance. Vegetation structure reflects a moderately degraded condition, with dominance by pioneer and disturbance-tolerant grass species. Along the adjacent mountain slopes toward the border pass, there is clear evidence of Acacia (*Vachellia/Senegalia)* species, occurring as scattered individuals and small clusters. These woody elements indicate localized encroachment within the broader grassland matrix. Several notable plant species observed within the servitude and surrounding areas are depicted below.

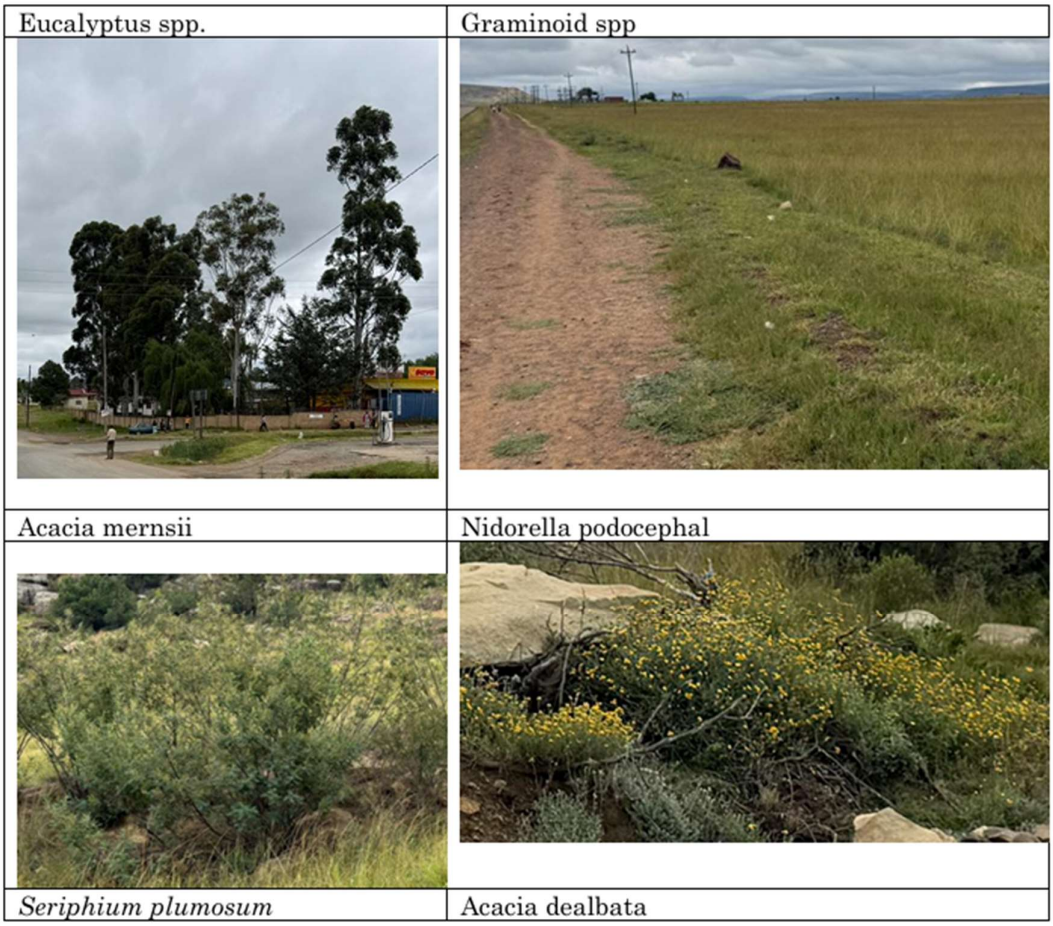


Figure 12: Plant Species observed along the road servitude

Ethnobotanical plant species

Ethnobotany/ Ethnoecology is a branch of botany that focuses on the use of plants for medicines, cultural and recreational purposes. The overexploitation of indigenous plants for ethnobotanical purposes can be detrimental to populations of those particular plant species, and the other species that depend on its existence for their survival. South Africa has a rich diversity of medicinal plants that not only have a global significance but also have a cultural and historical role (van Wyk *et al*. 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors (Mazid *et al*., 2012).

No plant species of recognised ethnobotanical or medicinal value were recorded along the road. This absence is consistent with the disturbed, secondary grassland condition resulting from prolonged road use and grazing pressure. In contrast, the areas adjacent to the servitude particularly along the

mountain slopes are more structurally intact and are likely to support a variety of medicinal and culturally utilised plant species characteristic of the Drakensberg Grassland region. Although these areas fall outside the direct impact zone, they form part of the broader ecological and socio-cultural landscape and should be acknowledged accordingly

Alien invasive species present on site

An "invasive species" is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy. According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

No invasive alien plant species were recorded within the surveyed 30 m road corridor (15 m on either side of the road). However, *Eucalyptus* spp. and *Acacia mearnsii* (Black Wattle) were observed within the broader vicinity of the road corridor within approximately 50 m of the proposed construction footprint. **Both taxa are listed as invasive alien species under NEMBA, with Acacia mearnsii classified as Category 2 and Eucalyptus species generally falling under Category 1b or 2, depending on the specific taxon and land-use context. Their presence in the surrounding landscape indicates existing alien plant pressure, which may increase the risk of further spread if construction activities disturb adjacent vegetation.**

Results of the Fauna Assessment

6.2.2.1. Amphibians

According on the IUCN Red List Spatial Data and Amphibian Map, 3 amphibian species are expected to occur within the area. None of these species are threatened.

Table 11: List of Herpetofuana species in the area.

Scientific name	Common name	Red list category

Sclerophrys pardalis	Eastern Leopard Toad	Least Concern
Hyperolius poweri complex	Eastern Coast Reed Frog	Not yet assessed
Cacosternum boettgeri	Boettger's Caco	Endangered

6.1.2.2. Reptiles

Based on the IUCN Red List Spatial Data and the Reptile MAP database, 53 reptile species are expected to occur within the area. Two (2) is regarded as threatened refer to the table below:

Table 12: Threatened reptile species that are expected to occur within the proposed project area.

#	Scientific name	Common name	Conservation Status	Endemism	Likelihood of Occurrence
1	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	NT	Near Endemic	Unconfirmed
2	*Cordylus cordylus*	Cape Girdled Lizard	Least Concern	-	High
3	*Chamaesaura anguina*	Cape Grass Lizard	Least Concern	-	High
4	*Pachydactylus spp*	Various Nama/Karoo Geckos	Least Concern (Varies by species)	-	High
5	*Dendroaspis angusticeps*	Eastern Green Mamba	Least Concern	Vulnerable Regionally	Moderate
6	*Cryptactites peringueyi*	Peringuey's Leaf-toed Gecko	Least Concern	-	High
7	*Bitis arietans*	Puff Adder	Least Concern	-	High
8	*Chersobius boulengeri*	Karoo Dwarf Tortoise	Near Threatened	-	High

No reptile species were recorded during the site inspection. This is not unusual for the region, as reptile detectability is typically low during brief, daytime surveys and is strongly influenced by weather conditions, season, and microhabitat availability. The disturbed nature of the road servitude characterised by compacted soils, regular human activity, and limited natural refugia further reduces the likelihood of encountering reptiles within the immediate development footprint.

However, the surrounding natural grassland and rocky slopes provide suitable habitat for common Drakensberg-associated reptile species, such as *Bradypodion dracomontanum* and occasional movement through the area cannot be ruled out.

6.1.2.3. Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 120 bird species have the potential to occur in the vicinity of the project area. Of the potential bird species, nine (9) species are listed as SCC either on a regional or global scale refer to the table below

Table 13: List of bird species of regional or global conservation importance that are expected to occur in the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Afrotis afra	Korhaan, Southern Black	VU	VU	Low
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Low
Circus maurus	Harrier, Black	EN	VU	Low
Coracias garrulus	Roller, European	NT	LC	Low
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	Low
Neotis ludwigii	Bustard,Ludwig's	EN	LC	Low
Phoenicopterus roseus	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	VU	Low
Gyps coprotheres	Cape Vulture	EN	VU	Moderate

6.1.1.1.1. Field investigation findings

The study area is located outside of any formally recognised Important Bird Area (IBA) and therefore does not fall within a priority avifaunal conservation zone. However, the broader landscape particularly the neighboring properties containing natural grassland and wetland habitat supports Medium to High avifaunal sensitivity, consistent with the ecological value of Drakensberg foothill systems.

A small number of common bird species were recorded during the site inspection, with most observations associated with the wetland and moist grassland patches present within the study area. Notably, Cattle Egrets (*Bubulcus ibis*) were observed foraging in close association with livestock (**Figure 13**), which is typical of their behaviour in pastoral landscapes. All avifaunal species recorded during the survey are classified as Least Concern by the IUCN and are considered common and widespread within the region.



Figure 13: Cattle egret observed onsite

No Species of Conservation Concern (SCC) were observed during the survey, and the disturbed nature of the road servitude limits the likelihood of SCC occurrence within the immediate development footprint. Nonetheless, the surrounding natural habitats may provide suitable foraging and movement corridors for a broader assemblage of grassland-associated bird species such as *Afrotis afra, Aquila verreauxii, Circus maurus, Coracias garrulus, Eupodotis vigorsii, Neotis ludwigii, Phoenicopterus roseus, Polemaetus bellicosus Gyps coprotheres.*

6.1.2.4. Mammals

The IUCN Red List Spatial Data lists 56 mammal species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Eight (8) of these expected species are regarded as threatened (**Table 14)**, five of these have a low likelihood of occurrence based on the lack of suitable habitat in the project area.

Table 14: Threatened mammal species that are expected to occur within proposed project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Hystrix africaeaustralis	Cape Porcupine	LC	LC	Low
Orycteropus afer	Aardvark	LC	LC	High
Sylvicapra grimmia	Common (Grey) Duiker	LC	LC	Hogh
Rhabdomys pumilio	Four-striped Grass Mouse	LC	LC	Moderate
Genetta tigrina	Large-spotted Genet	LC	LC	Low
Bunolagus monticularis	Riverine Rabbit	EN	CR	Low

Felis nigripe	Black-footed Cat	VU	VU	Low
Graphiurus ocularis	Spectacular Dormouse	NT	LC	Low
Leptailurus serval	Serval	NT	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa. The habitat in the project area is regarded as suitable for the species as such the likelihood of occurrence is rated as high.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. In the central part of the project area, mountainous habitat can be found that could be suitable. This species was confirmed present on site during the September 2021 assessment.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the project area and the likelihood of occurrence of this species is therefore considered to be moderate.

6.1.2.4.1. Field Investigation Findings

During the site inspection, multiple signs of medium-sized mammal activity were recorded within the study area. Evidence included grazing livestock (**Figure 14**). These observations indicate that the site and its surrounding natural veld provide suitable foraging habitat and movement corridors for these species. Their presence also reflects the broader ecological functioning of the area, particularly the availability of open grassland and shrubland patches that support small to medium herbivores.



Figure 14: Grazing livestock observed onsite

6.1.2.5. Invertebrates

Invertebrate diversity within the Middelburg (Eastern Cape) area is shaped by the region's semi-arid grassland and karoo-transition habitats, which support a range of soil-dwelling and surface-active species. Typical assemblages include ants, beetles, spiders, and other detritivores that play key roles in nutrient cycling and soil turnover. Although invertebrate activity is often cryptic, field observations commonly reveal burrows, surface tracks, and foraging signs that indicate a functioning micro-faunal community adapted to the area's seasonal temperature and moisture fluctuations. During the site, grasshopper and spider's species were observed onsite

6.1.2.5.1. Field investigation findings

No invertebrate species were observed along the road or within the associated road servitude during the site inspection. This is expected given the disturbed and compacted nature of the road verge, which offers limited microhabitat diversity and reduced floral resources for invertebrate assemblages. The ongoing grazing, trampling, and road maintenance activities further diminish the likelihood of encountering notable invertebrate taxa within the immediate development footprint.

However, it is acknowledged that the broader landscape, particularly the adjacent natural grassland and wetland areas are likely to support a more typical assemblage of grassland-associated invertebrates,

including pollinators, detritivores, and moisture-dependent taxa. No Species of Conservation Concern (SCC) or habitat features indicative of SCC invertebrates were recorded during the survey.

6.2. Aquatic and Wetland Delineation Study

Earthlink Environmental Services appointed Ntumbuluko Consulting (Pty) Ltd to conduct the Aquatic and wetland delineation study for the proposed project, the specialist report is attached as Appendix C.

6.2.2. Desktop Assessment

An examination of the National Freshwater Ecosystem Priority Areas (NFEPA) database was undertaken to assess the freshwater sensitivity of the study site. The analysis revealed a network of watercourses distributed throughout the proposed road servitude, many of which intersect or lie in close proximity to mapped proposed development.

The proposed road upgrade intersects multiple seasonal (non-perennial) watercourses, as well as a perennial system Kinira River) and their associated floodplain wetlands. These features were identified using NFEPA spatial data and subsequently verified during field survey. These wetlands and watercourses, some of which are non-perennial, form part of the broader hydrological network supporting the upper Mzimvubu catchment. Several of these features were directly observed during the site inspection conducted on 21 March 2026 (**Figure 15)**.

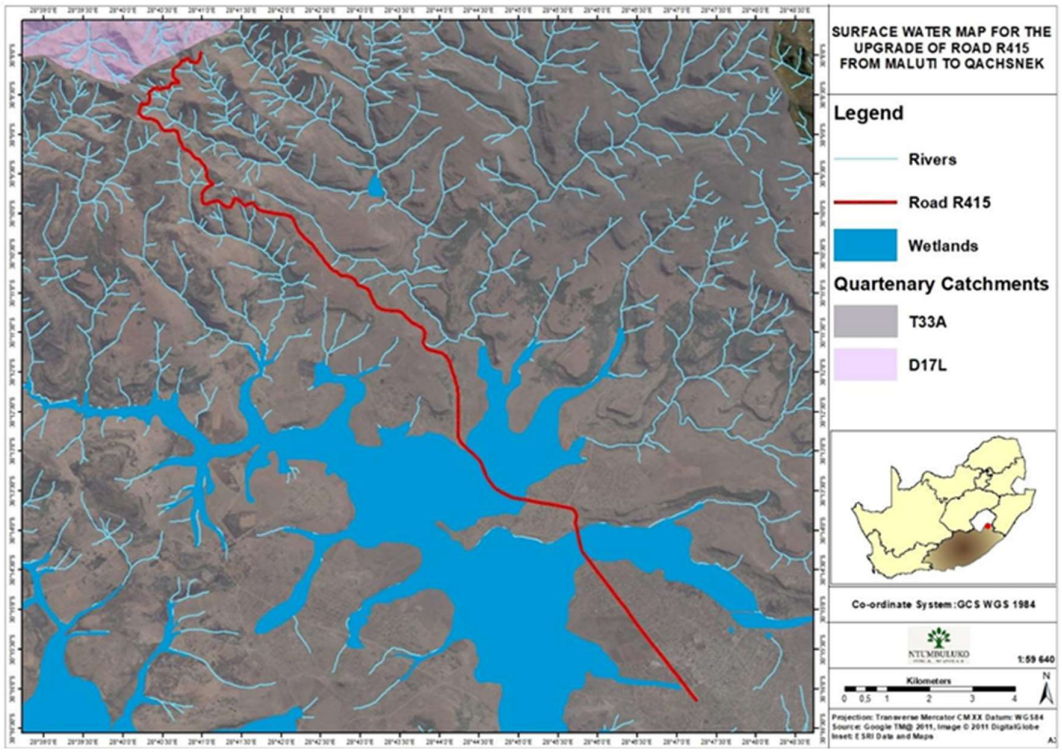


Figure 15: Wetland Delineation Map

6.2.1.1 Field Survey

The proposed development is situated within a mountainous terrain, predominantly characterised by a rural landscape with clear evidence of subsistence farming practices, communal grazing, and scattered homesteads (**Figure 16)**



Figure 16: Overview of the site.

During the site inspection, multiple watercourses were observed traversing the existing R415 road. These included several non-perennial streams that flow seasonally or in direct response to rainfall events, as well as a the Kinira river that maintain flow throughout the year. In addition, the river supports two large wetlands (floodplain). These aquatic systems form part of the broader hydrological network of the upper Mzimvubu catchment and play an important role in regulating local flow pathways, sediment transport, and ecological functioning (**Figure 17)**



Figure 17: Wetlands and watercourses observed onsite

In addition to these drainage features, several wetlands were identified within and adjacent to the road servitude. Some sections of the proposed alignment are located in close proximity to these freshwater ecosystems.

6.2.1.2 Wetland Features

Hydrological observations indicate the presence of seasonal and possibly perennial wetland features exhibiting saturated soils and standing water indicative of palustrine systems. Vegetation within these systems includes dominant hydrophytic species such as Sedges, confirmed in **Figure 18**. This species plays a critical role in stabilizing wetland margins, enhancing water quality through sediment filtration, and providing nesting and roosting habitat for a range of avifaunal species, including wetland-dependent birds.



Figure 18: Sedges observed onsite.

A perennial river was observed along the R415 road during the site inspection. This river forms an integral part of the local catchment system, contributing to surface water flow, groundwater recharge, and downstream hydrological connectivity (**Figure 19**). The river supports a thriving ecosystem, characterised by riparian vegetation, aquatic habitat diversity, and ecological processes essential for biodiversity conservation and water quality regulation. Its perennial nature indicates a consistent flow regime, which enhances its role in sustaining both natural ecosystems and rural livelihoods dependent on water access.



Figure 19: Active perennial river (Kinira river)

The riparian grasses, predominantly sedges, appear to be actively grazed by cattle, indicating ongoing livestock access and utilisation of the watercourse. Within the project area, three watercourse crossings exhibit clear evidence of sedimentation, litter, and diffuse pollution inputs. These conditions reflect the stream's role in supporting surrounding community livelihoods, while simultaneously raising concerns regarding water quality degradation, habitat disturbance, and cumulative pollution risks (**Figure 20**). Collectively, these observations highlight the need for integrated catchment management interventions, including invasive species control, protection and restoration of riparian buffer zones, and community-centred engagement strategies to balance ecological sustainability with local resource use.



Figure 20: Crossing observed with the study area

6.2.1.3. Terrain indicator

- The road alignment passes through mountainous and hilly terrain, with frequent changes in elevation.
- Slopes range from gentle inclines in plateau areas to steep escarpments, particularly near river valleys and coastal ridges.
- In certain sections, slope angles exceed 20–30 degrees, requiring engineered stabilization measures.

The over of the terrain is depicted in **Figure *21***



Figure 21: Overview of the slope of the road.

6.2.1.4. Soil wetness and soil form indicator

The watercourses onsite have water and support a host of hydrophytes and terrestrial plant species. Wetland areas were identified and mainly delineated according to the presence of hydric (wetland) soil types. Hydric soils are defined as those which show characteristics (redoximorphic features). The watercourses consist mainly of clay soils (**Figure 22)**



Figure 22: Soil Observed within one the watercourses**.**

6.2.1.5. Vegetation indicator

According to DWAF (2005), vegetation is considered a key component in the wetland delineation procedure and forms a central part of the wetland definition under the National Water Act (Act 36 of 1998). Specifically, the presence of hydrophytic vegetation is used to identify and classify wetland boundaries. However, the effective use of vegetation as a primary indicator relies on the assumption of an undisturbed ecological condition. In the case of the study site, significant anthropogenic disturbances were observed within the wetland systems, which complicate the reliability of vegetation as a standalone indicator.

These disturbances include:

- Subsistence farming activities within and adjacent to wetland zones
- The presence of rural households, contributing to informal land use and runoff
- Domestic use of watercourses, such as washing laundry, which introduces pollutants and alters vegetation structure

Despite these pressures, there was clear evidence of hydrophytic vegetation, particularly sedge species, which are obligate or facultative wetland indicators. Their presence reflects sustained soil saturation and provides strong support for classifying the area as a wetland (**Figure 23**).



Figure 23: Sedge observed onsite

6.2.1.6. Wetland Functional and Health Assessment

Wetland Ecological Importance and Sensitivity

The EIS and functions were calculated using the new draft DWA guidelines and model, as developed by M. Rountree, but not yet published. Information used form the SIBIS and VEGMAP products. A mean score between 0 and 4 is obtained, with 0 as the lowest and 4 as the highest score. No classification of the scores is given.

The watercourses onsite have an Ecological Importance and Sensitivity (EIS) score of 2.2 (**Table 15**). This is a value between 0 and 4, with 0 being very low and 4 very high. The rivers, therefore, have a Medium EIS score. It is regarded as being modified.

Table 15: EIS calculation of the wetland

ECOLOGICAL IMPORTANCE AND SENSITIVITY	SCORE (0-4)	CONFIDENCE (1-5)	MOTIVATION
Biodiversity support			
Presence of Red Data species	4.00	4.00	No known red data or protected species observed on site.
Populations of unique species	0.00	4.00	No unique plant or animal Populations were observed.

Migration/breeding/feeding sites	2.00	4.00	Though a few bird species were observed, few nests were present.
Landscape scale			
Protection status of the wetland	4.00	5.00	The wetland and surrounding area have been exposed to various agricultural practices.
Protection status of the vegetation type	4.00	5.00	The wetland/watercourses and surrounding area have been exposed to subsistence farming and housing developments surrounding the area.
Regional context of the ecological integrity	2.50	5.00	The wetland is in PES class D due to the large-scale degradation of the surrounding areas as well as the wetland area itself.
Size and rarity of the wetland type/s present	4.00	4.00	The wetland is not particularly rare and has no vulnerable ecosystem present.
Diversity of habitat types	1.00	5.00	The wetland has a low species diversity as well as habitat diversity. The wetland is dominated by a homogeneous stand of sedges.

6.2.1.7. Wetland Health and PES

It should be noted in **Table 16** by Kleynhans (1999) that if a score of less than 2 is attributed to any impact, the lowest rating, rather than the mean, is used to attribute PES class.

Table 16: PES classes (from Kleynhans 1999) indicating the interpretation of the mean scores to rate the PES category.

WITHIN GENERALLY ACCEPTABLE RANGE

Category	Score	Description
A	>4	Unmodified, or approximates natural condition and/or represents a natural condition due to successful rehabilitation process/program(s) which has occurred and/or are in the process of occurring.
B	>3 and 4	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged Moderately modified.
C	>2 and 3	Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	2	Largely modified. A large loss of natural habitats and basic Ecosystem functions has occurred.
OUTSIDE GENERAL ACCEPTABLE RANGE		
E	>0 and 2	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive Critically modified.
F	0	Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat

The wetland perennial rivers in the study area have EIS categories and EMC values as indicated in **Table 17**

Table 17: Summary of EIS onsite.

Wetland	Coordinates	EIS category	PES
Floodplain Wetland (Seasonal)	30°14'7.45"S 28°45'42.42"E	C	C
Kinira River (2 Bridges)	30°14'13.01"S 28°45'47.50"E	C	C
	30°13'11.71"S 28°44'32.65"E		

6.2.1.8. Wetland ecoservices

WET-EcoServices (Kotze *et al.* 2004) is a tool for evaluating the services provided by the watercourses (Rivers, allowing for more informed planning and decision-making. In general, the riverine wetland provides low-moderate ecosystem services (spider diagram right). Because of the destruction of natural vegetation and the resulting loss of habitat for insects and amphibians, it has a low species richness and biodiversity. (**Figure 24**)

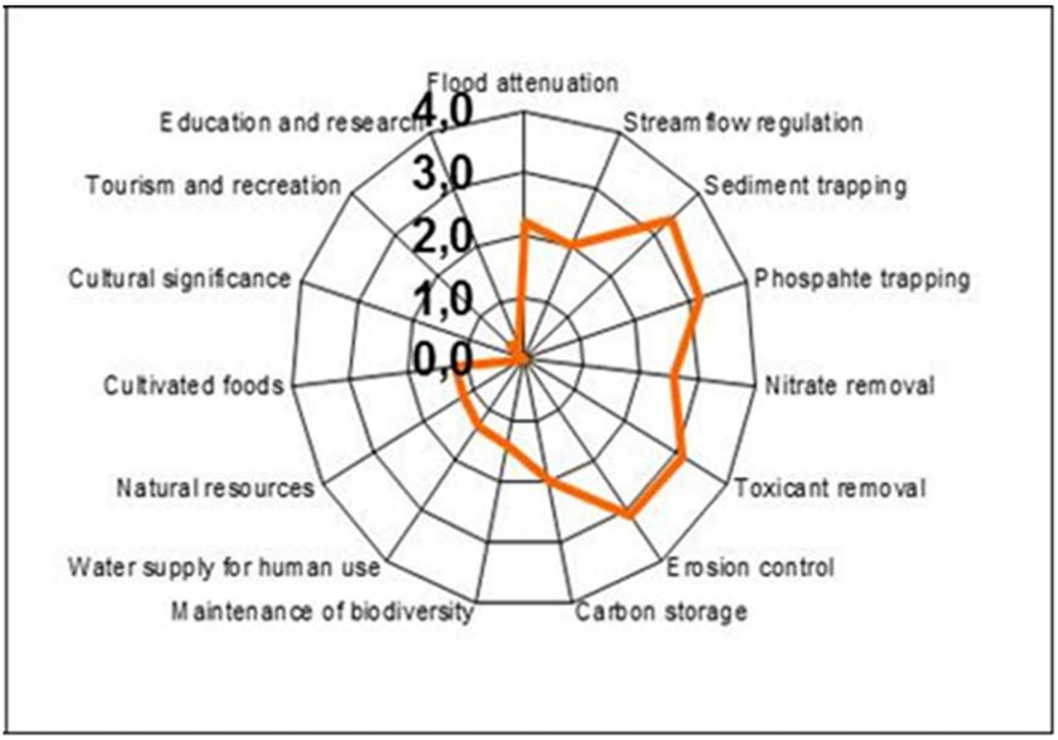


Figure 24: Eco services

6.2.1.9. Freshwater Aquatic Species

The freshwater habitats observed onsite, as illustrated in **Figure 25 ,** are predominantly characterised by terrestrial plant species occurring within and adjacent to the watercourse and associated wetlands. Hydrophytic vegetation was limited, with sedges representing the primary obligate and facultative wetland indicators present. Aquatic bird species were also recorded utilising these habitats, confirming the ecological functionality of the system despite disturbance. The watercourse and its margins support notable biological activity, particularly along the road servitude and bridge crossings, where concentrated surface flow has resulted in visible soil erosion and sediment deposition. These geomorphological signs further reflect active hydrological processes and contribute to the delineation and ecological interpretation of the wetland and aquatic features.



Figure 25: Typical Freshwater Habitat onsite.

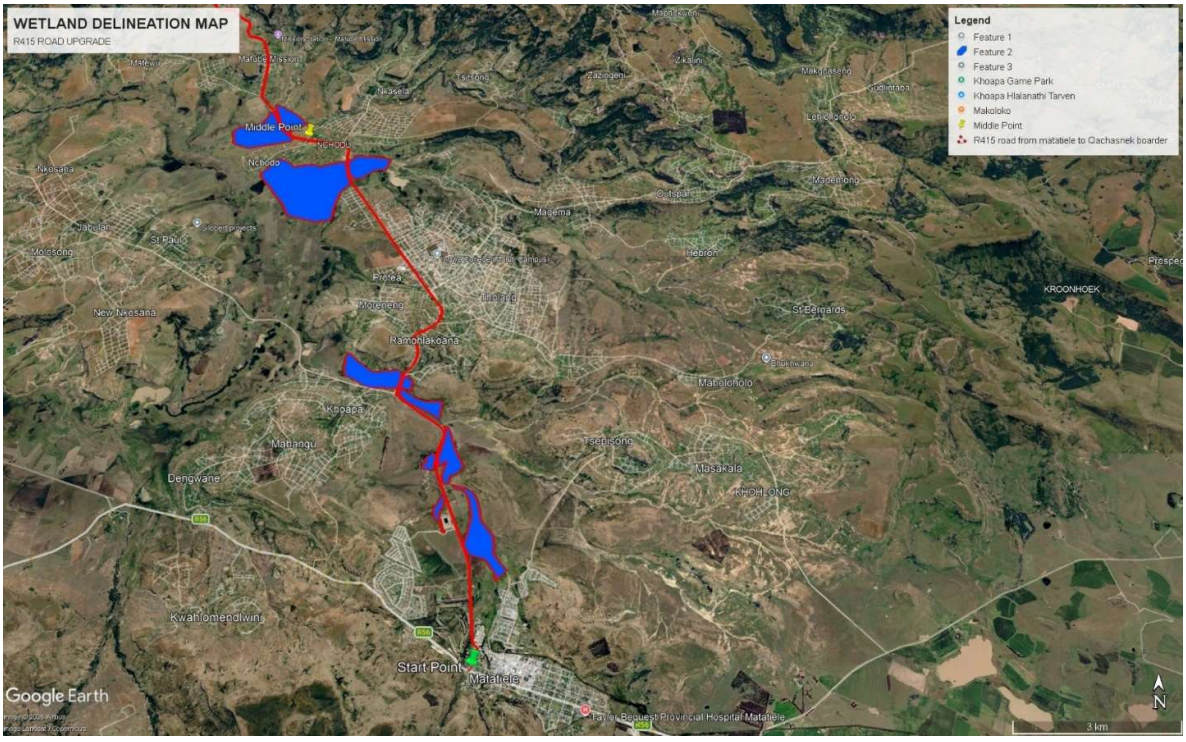


Figure 26: Wetland Delineation Map

6.3. Heritage impact Assessment

Earthlink Environmental Services appointed Umlando: Archaeological Surveys and Heritage Management to conduct the Heritage Impact Assessment and Palaeontological Assessment for the proposed project, the specialist report is attached as Appendix C

6.3.2. Results of the Heritage Assessment and Palaeontology

A heritage and palaeontological Phase 1 survey was undertaken for the proposed upgrade of the R415. Phase 1 heritage and palaeontological surveys were undertaken as both were in areas of high sensitivity. Archaeological sites were noted near the proposed upgrade and borrow pits, and the area was regarded as having high and very high palaeontological sensitivity.

The phase 1 archaeological and cultural heritage surveys noted that the borrow pits and road upgrade will not directly impact any of the recorded heritage sites. These sites occur 50m+ from the road and will not be affected.

A Palaeontological Phase 1 survey noted that there are several areas of (very) high sensitivity, and these yielded fossiliferous remains, these remains need to be excavated before road upgrade begins and will require a permit from Eastern Cape Provincial Heritage Resources Authority (ECPHRA).

The chances of heritage sites occurring within the study areas is very high. However, a Chance Find Protocol forms part of the EMPr. The chances of palaeontological sites occurring within the study areas is very high. Apart from onsite salvage excavations, and ongoing monitoring during construction is recommended. A Chance Find Protocol should also be implemented and forms part of the EMPr to ensure that any palaeontological resources uncovered during construction are appropriately managed

It is in our reasoned opinion that the activity be authorised provided the appropriate mitigation is undertaken. The confidence level of these finding is high.

6.4. Agricultural Compliance Statement

6.4.1. Agricultural and environmental site assessment

6.4.1.1. Identified Soil Characteristics

The study area comprises a range of soil types, including Gleysols, Cambisols, Regosols, and Leptosols/Lixisols, each with varying agricultural potential and sensitivity. Gleysols are associated with poorly drained and waterlogged conditions, typically occurring in low-lying or wetland areas. These soils are highly sensitive to disturbance due to their structure and moisture content. Cambisols exhibit moderate fertility and agricultural potential, supporting grazing and limited cultivation. Regosols are generally weakly developed and prone to erosion, while Leptosols and Lixisols are shallow and less fertile, with limited resilience to disturbance. Overall, the soils indicate moderate agricultural potential, with localized high sensitivity, particularly in poorly drained and erosion-prone areas.

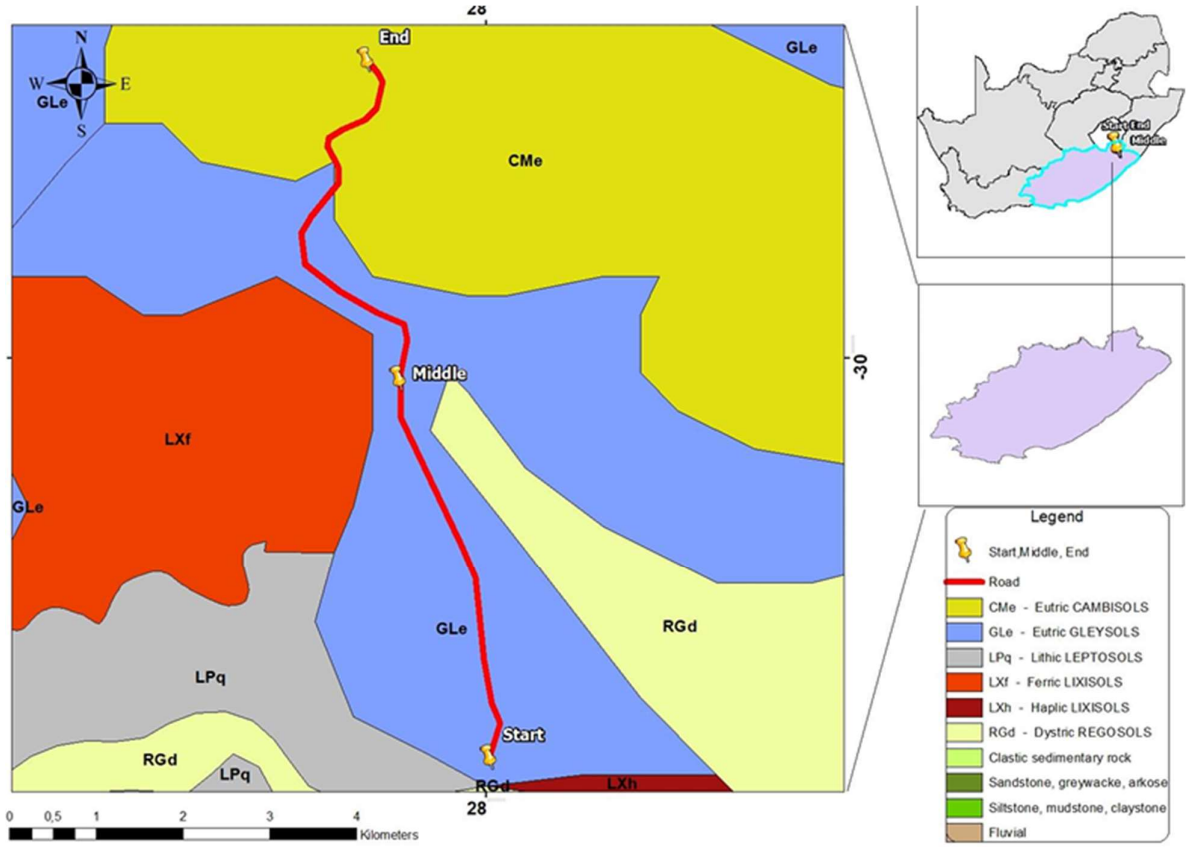


Figure 27: Soil map showing the distribution of soil types within the proposed development corridor.

6.4.1.2. Site Conditions and Vegetation

The study area is characterised by natural grassland vegetation interspersed with subsistence agricultural activities. The vegetation consists predominantly of mixed grass species typical of communal grazing systems, with variations in height reflecting grazing intensity and seasonal growth.

Livestock grazing, including sheep, was observed across the site, indicating active use of the land for communal grazing. Grazing pressure appears moderate, as vegetation cover remains largely intact, although localized trampling and disturbance are evident.

In addition, areas of subsistence crop production (e.g. maize fields) occur within the broader grassland matrix, demonstrating a mixed land-use system where crop production and livestock grazing coexist.

The terrain is gently undulating, and while vegetation generally contributes to soil stability, localized disturbed areas near the road reserve may be more susceptible to degradation if not properly managed.



Figure 28: Grazing area observed within the study area, illustrating communal livestock grazing practices.



Figure 29: Subsistence farming activity within the study area, showing cultivated land adjacent to grazing areas.

6.4.1.3. Road Infrastructure and Subsistence Farming

The study area is situated within a rural landscape characterised by dispersed settlements and subsistence agricultural practices. Existing infrastructure includes gravel roads, informal access routes, and overhead powerline networks, which support community connectivity and agricultural activities.

Livestock, particularly cattle, were observed grazing within and adjacent to the road reserve, confirming reliance on communal grazing systems. The interaction between livestock and road infrastructure highlights the importance of maintaining safe and continuous access for both agricultural and transport functions.

The road network is predominantly unsealed and informal, with visible signs of wear such as erosion, ponding, and poor drainage. These conditions may contribute to reduced accessibility and localised soil degradation.

Subsistence farming is evident through the presence of cultivated fields, including ploughed land, located near grazing areas and settlements. This reflects a mixed farming system, where crop production and livestock grazing are integrated and support local livelihoods.

The close relationship between infrastructure and agricultural land use highlights the interdependence of transport and farming systems within the study area.



Figure 30: Ploughed field within the study area, illustrating subsistence crop production practices and land preparation for cultivation.



Figure 31: Existing Road infrastructure, including gravel road conditions and associated and livestock along the road

The proposed upgrade of Road R415 between Matatiele and Maluti (km 0–10) is compatible with the surrounding agricultural environment.

The assessment confirms that the study area is characterised by a mixed land-use system, including communal grazing and subsistence farming, with moderate agricultural sensitivity and localized areas of higher sensitivity. Potential impacts associated with the development are expected to be temporary, localised, and of low to moderate significance, primarily during the construction phase.

These impacts can be effectively mitigated through the implementation of the recommended measures outlined in Section 9. With the application of these mitigation measures, the proposed development is not expected to result in significant long-term loss of agricultural land capability or productivity.

It is therefore recommended that the proposed development be authorised from an agricultural perspective, subject to the implementation of the recommended mitigation measures and ongoing monitoring where required.

CHAPTER 7: PUBLIC PARTICIPATION PROCESS

The Draft Basic Assessment Report (DBAR) is being subjected to a Public Participation Process (PPP) in accordance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and the Environmental Impact Assessment Regulations, 2014, as amended. The purpose of the PPP is to provide Interested and Affected Parties (I&APs), organs of state and other stakeholders with an opportunity to review the findings of the Draft BAR and submit comments before the application is finalised and submitted to the competent authority DFFE for decision-making.

7.1 The participation process that is being followed:

- Site notices were placed along the proposed road to be improved on 13 June 2026.
- The Public meetings were held as follows:
  - 17 June 2026 at Ramohlakoa Community Hall at 10:00 am.
  - 18 June 2026 at Maluti Civic Centre at 10:00 am.
  - 19 June 2026 at Mafube (Thabanatshoana A/A) at 10:00 am.
- The minutes of the public meetings and attendance registers are attached to the draft Basic Assessment Report
- A newspaper advertisement is being published in the informer local newspaper in **October 2026** to notify communities within the Matatiele Local Municipality of the availability of the DBAR. Proof will be attached to the Final BAR
- Notification emails, together with the Draft BAR, notification letter and comment sheets, are being sent to potential Interested and Affected Parties (I&APs) and relevant State Departments, inviting them to comment on the Draft BAR.
- The Draft BAR is being provided to Ward Councillors for distribution to community members for review and comment during the public review period in **October 2026.**

7.2 Public Participation During the 30-Day Review Period

The Draft Basic Assessment Report, including all supporting appendices, is being made available for a 30-day public review period from **October 2026** to **November 2026.**

During the review period:

- The Draft BAR is available on the Earthlink Environmental Services website (www.earthlinkenvironmental.co.za) and is also available on request from the Environmental Assessment Practitioner (EAP).
- Interested and Affected Parties are invited to submit written comments within the prescribed 30-day review period.
- All comments received from I&APs during the 30-day review period will be captured in a Comments and Response (C&R) Report. The C&R Report will include responses from the EIA project team and/or the project proponent and will be submitted to the Competent Authority together with the Final Basic Assessment Report.

7.3 Announcement of the decision

Following the decision by the Department of Forestry, Fisheries and the Environment (DFFE), Earthlink Environmental Services will ensure that all registered Interested and Affected Parties are notified of the outcome of the Environmental Authorisation application.

Notification of the decision will include:

- Notification emails to all registered Interested and Affected Parties informing them of the Environmental Authorisation decision.
- Information on where the Environmental Authorisation and the reasons for the decision may be accessed.
- Information on the right to appeal the decision, where applicable, in terms of the National Appeal Regulations, 2014 (GN R993), including the applicable appeal process and prescribed timeframes.

CHAPTER 8: IMPACTS ASSESSMENT METHODOLOGY

The main objective of this section is to provide independent and scientifically sound information on the impacts identified during the BA. Based on the requirements of the impact assessment, impacts identified, and issues and concerns raised are assessed with regard to their significance. The impact assessment is aimed at determining the impacts associated with the proposed development and the prescription of mitigation measures. Other impacts associated with the proposed development are discussed in detail in this section. The significance of the potential impacts is described in terms of their nature, extent, duration, intensity and probability.

8.1. Methodology Used.

The assessment of the potential environmental and social impacts was based on EarthLink's Environmental Services team's professional judgement, field observations, specialists input and desk-top analysis. The significance of potential impacts that may result from the proposed development was determined in order to assist decision-makers, specifically the DFFE.

The method of impact/risk rating has been adopted in order to enable the authorof the BAR to determine the overall impact of the proposed activities by collating the information at handinto a uniform rating matrix.

The following methodology has been applied to the prediction and assessment of impacts. Potential impacts have been rated in terms of the direct, indirect and cumulative nature of the impact:

- **Direct** impacts – are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable;
- **Indirect** impacts – of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity;
- **Cumulative** impacts – are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts ofindividual minor actions over a period of time and can include both direct and indirect impacts.

The significance of each potential impact, with and without the implementation of the proposed mitigation measures, will be assessed based on the following variables (evaluation components):

- Spatial extent – The size of the area that will be affected by the impact;
- Intensity (or Magnitude) – The anticipated severity of the impact;
- Duration – The timeframe during which the impact will be experienced;
- Probability – The probability of the impact occurring;
- Reversibility – The "reversibility" of the environmental impacts of the proposed development after project cessation or decommissioning; and
- Irreplaceability – The "irreplaceability" of natural characteristics in the area that may be impacted upon by the proposed development.

Using the criteria above, the impacts will further be assessed with the use of quantifiable values as described below:

values as described below:

Table 18: Evaluation of criteria, by means of quantitative ratings and descriptions

Criteria	Description	Quantitative Rating
Duration	Temporary (less than a year)	1
	Short term (1 to 6 years)	2
	Medium term (6 to 15 years)	3
	Long term (the impact will cease after the operational life of the activity)	4
	Permanent (mitigation will not occur in such a way or in such a time span than the impact can be considered transient)	5
Spatial extent	Site specific	1
	Local (less than 2 km from the site);	2
	Regional (within 30 km of the site)	3
	National (beyond Provincial boundaries and within National boundaries)	4
	International / Transboundary (Beyond National boundaries)	5
Intensity / Magnitude Applicable to Negative Impacts (at indicated spatial extent)	None (Biophysical and/or social functions and/or processes will remain unaltered)	0
	Very Low (Biophysical and/or social functions and/or processes might be negligibly altered)	2
	Low (Biophysical and/or social functions and/or processes might be slightly altered)	4
	Medium (Biophysical and/or social functions and/or processes might be notably altered)	6

	High (Biophysical and/or social functions and/or processes might be considerably altered)	8
	Very High (Biophysical and/or social functions and/or processes might be severely altered)	10
Intensity / Magnitude Applicable to Positive Impacts (at indicated spatial extent)	None (Biophysical and/or social functions and/or processes will remain unaltered)	0
	Very Low (Biophysical and/or social functions and/or processes might be negligibly enhanced)	2
	Low (Biophysical and/or social functions and/or processes might be slightly enhanced)	4
	Medium (Biophysical and/or social functions and/or processes might be notably enhanced)	6
	High (Biophysical and/or social functions and/or processes might be considerably enhanced)	8
	Very High (Biophysical and/or social functions and/or processes might be substantially enhanced)	10
Probability	Improbable (5% to no chance of occurring)	1
	Probable (5% - 25% chance of occurring)	2
	Medium Probability (25% - 75% chance of occurring)	3
	Highly probable (75% - 95% chance of occurring)	4
	Definite (greater than 95% chance of occurring)	5
Reversibility	No impact	0
	Impact will be reversible	1
	High potential that impact might be reversed	2
	Moderate potential that impact might be reversed	3
	Low potential that impact might be reversed	4
	Impact cannot be reversed	5
Irreplaceability	None	0
	Very low potential for loss of irreplaceable resources	1
	Low potential for loss of irreplaceable resources	2
	Moderate potential for loss of irreplaceable resources	3
	High potential for loss of irreplaceable resources.	4
	Definite loss of irreplaceable resources	5
CUMULATIVE impact	**High**: The activity is one of several similar pasts, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.	
	Medium: The activity is one of a few similar pasts, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socioeconomic resources of local, regional or national concern.	
	Low: The activity is localised and might have a negligible cumulative impact.	

None: No cumulative impact on the environment.

Once the evaluation components have been ranked for each impact, the significance of potential impacts are assessed (or calculated) using the following formula:

SP (significance points) = (intensity + duration + spatial extent + irreplaceable + reversibility) x probability.

The maximum value is 150 SP (significance points). The unmitigated and mitigated scenarios for each environmental impact was ranked as per the table below:

Table 19: Definition of significance ratings (positive and negative)

Significance Points	Environmental Significance	Description
125 – 150	**Very high (VH)**	An impact or high of very-high significance which could influence a decision about whether to proceed with the proposed project, regardless of available mitigation options.
100 – 124	High (H)	**Cumulative Impacts:** The activity is one of several similar pasts, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
75 – 99	Moderate-high (MH)	If left unmanaged, an impact of moderate-high significance could influence a decision about whether to proceed with the proposed project. Mitigation options should be re-evaluated.
40 – 74	Moderate (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether to proceed with the proposed project. **Cumulative Impacts:** The activity is one of a few similar pasts, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
<40	Low (L)	An impact of low significance is likely to contribute to positive decisions about whether to proceed with the proposed project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation. **Cumulative Impacts:**

Significance Points	Environmental Significance	Description
		The activity is localised and might have a negligible cumulative impact.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect and is likely to contribute to positive decisions about whether to proceed with the proposed project.

CHAPTER 9: ASSESSMENT OF ENVIRONMENTAL IMPACTS

A Basic Assessment Report (BAR must contain all the information that is necessary for a good understanding of the nature of issues identified during the BA process. The BAR must include a description of environmental issues and potential impacts, including cumulative impacts, mitigation measures that have been identified and other aspects as outlined in Appendix 4 of the NEMA EIA Regulations, 2014 as amended. This chapter also describes the environmental issues and impacts as identified during the BA Process for the proposed road upgrade. The proposed mitigation measures are discussed in this Chapter as well as well as in the EMPr attached as **Appendix D** of this report.

The main objective of this section is to provide independent and scientifically sound information on the impacts identified during the Basic Assessment (BA) Process. Based on the requirements of the impact assessment, impacts identified, and issues and concerns raised are assessed with regard to their significance. The impact assessment is aimed at determining the impacts associated with the proposed development and the prescription of mitigation measures. Other impacts associated with the proposed development are discussed in detail in this section. It must be highlighted that the Impact Assessment Methodology discussed in **Chapter 8** of this report was used to assess the identified impacts.

The impacts discussed in this section were identified by the Project Team (including specialists). The potential impacts identified and elaborated on in this chapter have been presented as follows:

- Theme 1: Impacts on the Biophysical Environment; and
- Theme 2: Impacts on the Human Environment.

For the purposes of this assessment, this impact assessment will only focus on the impacts that are likely to occur during the construction and operational phases of the proposed development based on the location of the site and the site sensitivities determined from desktop and field assessment.

9.1. Construction Phase

9.1.1. Impacts on the Biophysical Environment

9.1.1.1. Loss of species of special concern (SSC)

Description of Impact

Site clearance and removal of vegetation, increase human presence, machinery and vehicle operation could lead to a direct loss of species of special concern (SSC) such as *Boophone disticha* and *Hypoxis hemerocallidea*. Construction of infrastructure and access roads through sensitive habitat could also lead to a loss of potential SSC.

The loss of vegetation habitat on site will reduce the area available for fauna species. Since fauna have the ability to flee the area, the impacts on common animal species is not regarded as highly significant.

Cumulative impacts

(*Boophone disticha* and *Hypoxis hemerocallidea* amongst other SCC's have likely already been lost as a result of the existing development onsite. As such, the loss of SCC associated with the proposed activities will likely contribute to the cumulative loss of SCC within the region. However, if the mitigation measures are implemented and adhered to, this impact can be reduced to LOW significance.

Table 20: Impact associated with Loss of species of special concern (SSC)

		Significance without mitigation									Significance with mitigation								
Project Phase	**Nature of Impact**	**Magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**	**magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**
Construction phase	Negative	6	2	3	4	5	5	100	H	L	2	1	2	1	1	1	7	L	L

The proposed mitigation measures to avoid adverse impacts on the loss of species of special concern (SSC) is provided below:

- Minimise the impacted area and clear only what is required
- Restricting blasting and operation of machinery to daylight hours
- A botanical walkdown is recommended before commencing with the construction to search for SCC's (I.e (*Boophone disticha* and *Hypoxis hemerocallidea*). If populations of Vulnerable SCC are found, a permit must be obtained for their removal

9.1.1.2. Degradation and/or Destruction of wetlands habitats

Description of Impact

The clearing of vegetation from construction working servitudes through watercourses; the setting up of construction camps and storage areas; the movement of construction vehicles and personnel during bridge and culvert upgrade / demolition, road widening / realignment and stormwater infrastructure upgrade activities as well as the inappropriate storage or dumping of building material / concrete in areas surrounding the direct development footprint may result in the disturbance of wetland, riparian and instream habitat as well as in the compaction / disturbance of soils. This disturbance may also result in the proliferation of alien and invasive species within the surrounding watercourses

Table 21: Impact associated with degradation and /or destruction of wetlands habitats

		Significance without mitigation									Significance with mitigation								
Project Phase	**Nature of Impact**	**Magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**	**magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**
Construction phase	Negative	6	2	3	4	5	5	100	H	L	4	2	2	1	1	1	10	L	L

The proposed mitigation measures to avoid adverse impacts on the Degradation and/ or Destruction of wetland habitats is provided below:

- Any construction activities in or within the regulated zone of a water resource may only take place after the necessary water use license has been obtained.
- The wetland and buffer zones must be clearly demarcated on site prior to the commencement of construction and maintained as no-go areas for the duration of construction. Suitable, highly visible barriers, such as danger tape, temporary fencing, or equivalent approved barriers, must be used to prevent unauthorised access, disturbance, or encroachment into the wetland and buffer areas. See Figure 15 wetland map
- Strictly no vehicles, equipment or construction materials may enter the demarcated wetland area, and vehicles or machinery may not be refuelled within or near the wetland
- A well-designed storm water system must be put in place to avoid erosion into wetlands. Natural runoff from the natural terrestrial habitat surrounding the wetlands should however not be restricted unnecessarily.
- The use of potential pollutants (paint, chemicals, etc.) during construction and operational phases must be strictly controlled, with appropriate measures implemented to prevent spills and contamination, particularly within or near wetland buffer area

- Sanitary facilities must be made available to construction workers and sited away from wetland areas to prevent human waste entering the wetlands.
- If construction activities encroach on wetlands, the DEO shall monitor activities to ensure that the EMPr mitigation measures are implemented. The ECO shall oversee compliance, and a suitably qualified wetland/aquatic specialist shall be consulted if unforeseen impacts occur

9.1.1.3. Loss of indigenous Fauna and Flora Diversity Associated with wetlands

Description of Impact

The distribution of ecologically sensitive habitat along the road alignment and alternatives is not uniform, and the highest impact on faunal habitat will occur during the construction phase of the project, particularly at the realignment areas and the bridge and major culverts replacement areas. Site clearing associated with the road construction could lead to direct loss of habitat. Loss of habitat also means loss of food and nesting resources, cover and movement corridors, which could lead to the disappearance of the affected species from the area.

Cumulative impacts

The watercourses have already been modified as a result of surrounding land use activities, the previous road construction activities and the ongoing road maintenance activities. Considering that the proposed activities are to the existing road, with intended improvements to the hydraulic capacity of the structures at the road, and have limited widening at the aquatic features, one can expect that the cumulative impact of this project on the watercourses and wetlands will be of a NEGLIBIBLE to LOW significance. The cumulative impacts will largely take place during the construction phase. While these impacts to the freshwater ecosystems are each of a low significance it is essential that they be adequately mitigated to minimise the potential cumulative impacts.

Table 22: Impact associated with loss of indigenous fauna and flora diversity associated with wetlands

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	8	2	3	5	5	5	115	H	L	4	2	2	1	1	1	10	L	L

The proposed mitigation measures to avoid adverse impacts on the Loss of indigenous Fauna and Flora Diversity Associated with wetlands is provided below:

- Disturbance of natural wetland vegetation must be avoided at all costs.
- Alien and invasive vegetation control must be implemented throughout all development phases to prevent loss of habitat of indigenous fauna and flora.
- Movement of vehicles and construction workers within wetlands and buffer areas must be strictly prohibited. No harvesting of plants or animals is allowed.
- Include environmental awareness aspects into the site induction program to ensure all staff are aware of the location and importance of wetland habitats.
- Establish emergency response measures and a clearly defined chain of communication to rapidly deal with any unforeseen impacts to wetlands, e.g. spills.
- No stockpiling of materials may take place within wetland and watercourse areas and temporary construction camps and infrastructure should be located outside the wetland area.
- Design and implement a construction stormwater management plan that aims to minimise the concentration of flow and increase in flow velocity, as well as minimising sediment transport off site.
- Store and handle potentially polluting substance and waste in designated bunded facilities.
- Waste should be regularly removed from the construction site and disposed of in approved facilities.
- Locate temporary waste and hazardous substance storage facilities a minimum of 100m from any wetland edge
- Keep sufficient quantities of spill clean-up material on site.

9.1.1.4. Destruction, further loss of habitat and fragmentation of the vegetation community

Description of impact

The distribution of ecologically sensitive habitat along the road alignment and alternative is uniform, and the highest impact on faunal habitat will occur during the construction phase of the project, particularly at the realignment areas and the bridge and major culverts replacement areas. Site clearing associated with the road construction could lead to direct loss of habitat. Loss of habitat also means loss of food and nesting resources, cover and movement corridors, which could lead to the disappearance of the affected species from the area.

Table 23: Impacts associated with destruction, further loss of habitat and fragmentation of the vegetation community

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	10	4	3	5	5	4	108	H	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on the destruction, further loss and fragmentation of the vegetation community is provided below:

- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.
- . Rehabilitation of all disturbed areas must be prioritised immediately after construction activities are completed. All disturbed areas must be rehabilitated revegetated using indigenous plant and grass species that are endemic to the surrounding grassland vegetation types (East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland, and Mabela Sandy Grassland). Species used for rehabilitation should include, but not be limited to (Festuca, together with Themeda triandra, Heteropogon contortus, *Eragrostis racemosa*, *E. chloromelas*, *E. curvula*, *Elionurus muticus*, Trachypogon spicatus, Andropogon appendiculatus, *Harpochloa falx* and *Tristachya leucothrix*
- All construction activities must be restricted to Low and Medium Sensitivity Areas. High Sensitivity Areas, including wetlands, riparian areas, CBAs and areas adjacent to the Wilfred Baur Nature Reserve, must be treated as No-Go Areas unless authorised and demarcated by the ECO (see **Figure 32**).
- All construction/operational and access must make use of the existing roads as far as possible.
- All laydown areas, chemical toilets and temporary facilities must be restricted to Low and Medium Sensitivity Areas. High Sensitivity Areas, including wetlands, riparian areas, CBAs and areas adjacent to the Wilfred Baur Nature Reserve, must be treated as No-Go Areas as much as reasonably possible. Materials must be removed after construction/closure. (see **Figure 32**).
- Minimise the impacted area and clear only what is required
- Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation
- Employ stormwater management measures

9.1.1.5. Sedimentation and soil erosion

Description of impact

Excavations and vegetation clearing expose soil to environmental factors including rainfall and wind. The exposure to these factors will result in the removal of topsoil and the deposition of this sediment in the downslope watercourse system.

Table 24: Impact associated with sedimentation and soil erosion

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	10	4	3	5	5	4	108	H	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on sedimentation and soil erosion is provided below:

- Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place.
- Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. Erosion control measures must be employed where required.
- Riparian vegetation bordering on drainage lines, wetlands and rivers will be considered environmentally sensitive and should be protected as far as possible.
- If erosion has taken place, rehabilitation should commence as soon as possible.

9.1.1.6. Pollution of water resources and soils

Description of Impact

During construction phase of the project there will be pollution of water resources due to construction activities such as upgrading of major culverts, spillage of fuel and other harmful chemicals due to movement of construction vehicles.

Table 25: Impact associated with pollution of water resources

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	8	2	3	5	5	5	115	H	L	4	2	2	1	1	1	10	L	L

The proposed mitigation measures to avoid adverse impacts on pollution of water resources is provided below:

- Wetland areas must be clearly demarcated prior to the commencement of construction using visible marker posts, fencing or danger tape. The demarcated wetland areas must be identified as no-go areas and communicated to all construction personnel during site induction to prevent unauthorised access and disturbance. (see **Figure 15**).
- No washing of any equipment in close proximity to a watercourse is permitted.
- No releases of any substances that could be toxic to fauna or faunal habitats within the watercourses is permitted.
- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed, and the affected area rehabilitated immediately.
- Awareness is key to establishing good pollution prevention practices. Training programs must provide information on material handling and spill prevention and response, to better prepare employees in case of an emergency.
- Signs should also be placed at appropriate locations for good housekeeping practices including litter and pollution control.
- The proper storage and handling of hazardous substances (hydrocarbons and chemicals) needs to be ensured. All employees handling fuels and other hazardous materials are to be properly trained. Storage containers must be regularly inspected so as to prevent leaks.
- All contractors and employees should undergo induction which is to include a component of environmental awareness.

9.1.1.7. Introduction and spread of Alien Invasive vegetation

Description of impact

The moving of soil and vegetation results in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles. Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a watercourse, outcompete natural vegetation, and decreasing the natural biodiversity. Once in a system alien invasive plant can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users

Table 26: Impact associated with introduction and spread of alien invasive vegetation

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on alien invasive species is provided below:

- Ongoing alien plant control must be undertaken, particularly in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation.
- Herbicides, if used, must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden.
- Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas.
- After rehabilitation, re-vegetate any exposed surfaces and mulch re-vegetated areas.
- Select suitable indigenous wetland and terrestrial species to increase vegetation diversity, using species naturally occurring within the surrounding wetland and East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland and Mabela Sandy Grassland vegetation types, as the wetland occurs within Endangered and Vulnerable vegetation types and is currently dominated by homogeneous growth of Phragmites australis.

9.1.2. Impacts on the Human Environment

9.1.2.1. In-Migration

Description of Impact

During construction phase of the proposed improvement of R415 road there will be influx of job seekers from outside the Eastern Cape Province.

Table 27: Impact associated with In-migration

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on the In-migration is provided below

- Appoint as many workers from the local community as possible.
- Utilise established communication channels with community for awareness and information sharing.

9.1.2.2. Employment

Description of impact

The proposed development will have positive impact within Matatiele Local Municipality as suppliers of construction materials will experience economic growth during the construction phase. During the construction phase, the creation of skilled and semi-skilled jobs will be created. The use of local labour, as far as possible, is recommended as this would have positive impact on the local economy and would prevent influx of job seekers from outside the Eastern Cape Province. The impact is considered to be positive

Table 28: Impact associated with Employment

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE

Construction phase	Positive	10	4	3	5	5	4	108	H	L	10	4	3	5	5	4	108	H	L

The proposed mitigation measures to avoid adverse impacts on employment is provided below:

- No mitigation required, however, endeavour to use local construction companies/subcontractors as far as possible

9.1.2.3. Increased Crime

Description of Impact

Prior to and during construction there is likely to be an in-migration of people which may include criminal opportunists. The increase in human traffic (construction workers, job seekers, informal traders, etc.) on the road and near adjacent properties makes the movement of criminal opportunists easier. Furthermore, during the construction phase of the project boundary fences of residential or business properties may be compromised, either intentionally or unintentionally, making these properties particularly vulnerable to criminal activity. These factors may result in an increase in crime, particularly general theft, during the construction phase of the project. All the necessary measures should be put in place to reduce the possibility of criminal activity increasing in the area.

Table 29: Impact associated with increased crime

		Significance without mitigation									Significance with mitigation								
Project Phase	**Nature of Impact**	**Magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**	**magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on increased crime is provided below:

- Construction teams should be clearly identified by wearing uniforms and/or identification cards that should be exhibited in a visible place on their body.
- Action must be taken against any staff caught in criminal activities.
- Cooperation with local law enforcement agencies and community forums in the area.

- In the event of boundary fences being temporarily compromised alternative security measures should be put in place.

9.1.2.4. Increased Spread of diseases

Description of Impact

Any development which causes the migration of people has the potential to lead to the spread of disease. In the case of South Africa, the spread of HIV/AIDS as a result of project induced migration is particularly pertinent. Prior to and during the construction process there is likely to be an increase in the movement of people into and through the project area. This is inclusive of both people involved with the project (construction workers, truck drivers providing deliveries, etc.) as well as job seekers and criminal opportunists. The movement of people is likely to increase the likelihood of the spread of disease (in particular sexually transmitted infections and HIV and AIDS) either into the broader project area or alternatively from the project area to elsewhere. This is fuelled by the presence of incoming construction workers often increasing activities such as prostitution, with promiscuity often associated with groupings of construction workers. The most vulnerable sectors of the local population are those residing in low income and informal settlements and those already involved in prostitution.

Table 30: Impact associated with increased spread of diseases

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on spread of disease is provided below:

- An HIV/AIDS awareness/education component must be included in the induction programme for all personnel working on the proposed road upgrades.
- Conduct periodic awareness campaigns on HIV/AIDS and other communicable diseases during the construction phase.
- Encourage workers to make use of available local health services for testing, counselling, and treatment where required.

9.1.2.5. Noise Impact

Description of Impact

During the construction phase of the project there will be an increase in noise. Increased noise will result from activities associated with construction including the use of excavation machinery and jackhammers as well as potential blasting in some areas. The areas most likely to be negatively impacted on by an increase in noise are those where residential and/or business properties are situated close to the existing road reserve or where the proposed new road reserve extends close to such areas. Smaller communities along where the road upgrade will be in a residential area where it is believed that current traffic volumes are low. An increase in the traffic volumes on these roads is likely to have a significant increase in the current noise levels in the area. In addition, any plans to improve the condition of these roads will also result in an increase in noise for the adjacent residential properties.

It should be noted that while there will be a temporary increase in noise as a result of the construction activities, the receiving environment is already characterised by noise due the communities the road will transverse.

Table 31: Impact associated with noise impact

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse impacts on noise is provided below:

- On-site signage should be placed to alert the public to construction operations.
- The Contractor is required to take action to prevent workers from lingering and making noise disturbances in the vicinity.
- All construction plant and other equipment must be in a good working order to reduce possible noise pollution
- In areas where construction will be taking place near residential areas, residents must be informed in advance of construction activities that are expected to generate high levels of noise

- Avoid undertaking construction activities after daylight hours. In instances when this is not possible ensure that potentially affected parties are informed.
- If blasting is required ensure that potentially affected parties are informed prior to any blasting taking place.
- Noise complaints must be recorded and investigated, and reasonable measures must be implemented to address the complaints
- Construction vehicles and equipment must not be left idling when not in use.
- The use of hooters must be limited to emergencies and necessary safety warnings

9.1.2.6. Dust Impact

Description of impact

During the construction process there will be areas of exposed soil and building materials the presence of which will increase the likelihood of dust. In addition, there will also be an increase in vehicle emissions due to the presence of construction vehicles on site. During windy periods dust may be blown into nearby households and/or business properties becoming a nuisance impact reducing the quality of the living environment and affecting cleanliness and health. Likewise, an increase in vehicle emissions as a result of construction vehicles will reduce the air quality for surrounding landowners and people utilising areas adjacent to the where construction is taking place.

It should however be noted that the level of dust within and around the construction site will be temporary and sporadic in nature with it only occurring during the construction process and during times of strong wind.

Table 32: Impact associated with dust impact

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to minimise adverse impacts associated with dust are provided below

- Implement dust suppression measures in all areas affected by construction activities and where dust will be generated, especially close to residential and other sensitive areas. Dust suppression must also be undertaken during windy and dry weather conditions.
- Speed restriction of no more than 40km/h must be implemented for all construction vehicles within the construction site.
- Heavy vehicles and machinery should be serviced regularly to minimise exhaust fume pollution.
- Soil stockpiles shall be appropriately located, managed and stabilised to minimise wind-blown dust, with wetting or other suitable dust-suppression measures implemented where necessary.
- Existing vegetation cover shall be retained for as long as practicable and vegetation clearance shall be limited to the minimum area required for construction, in order to minimise exposed surfaces and reduce wind-blown dust and erosion

9.1.2.7. Visual Impact

Description of Impact

There will be a temporary impact on the aesthetic nature of the area due to construction activities. Changes in the aesthetic nature of the area will be caused by the temporary presence of infrastructure and materials associated with construction sites such as, construction vehicles, stockpiles, construction workers and equipment. Households and/or business properties in close proximity to the existing road reserve or close to the proposed new road reserve are most likely to be affected. It should however be noted that the impact is temporary in nature and is not considered of major significance as the majority of the construction activities will be taking place within an already transformed environment.

Table 33:Impact associated with visual impact

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	6	1	3	2	2	3	42	M	L	4	2	3	1	1	2	22	L	L

The proposed mitigation measures to avoid adverse visual impacts is provided below:

The proposed mitigation measures to minimise adverse visual impacts are provided below:

- Should overtime/night work be authorised, the Contractor shall be responsible to ensure that lighting does not cause undue disturbance to neighbouring residents. In this situation low flux and frequency lighting shall be utilised
- Dust levels must be kept down by regularly wetting dirt roads and exposed soil areas inside the site.
- Clearly demarcate the construction site to limit the area of disturbance.
- Remove all waste, including cleared vegetation from site as soon as possible unless the material will be reused on site. A dedicated area for the placement of waste that will either be removed or reused must be identified and demarcated.
- Domestic waste generated from the site camp must be kept in labelled bins with lids and be disposed of at a registered or municipal landfill. Proof of the disposal must be kept.
- Ensure that 'good housekeeping 'is practiced throughout construction site
- Road cuts, embankments and other disturbed areas must be stabilised and rehabilitated as soon as practicable after construction using indigenous vegetation and plant species similar to those naturally occurring in the surrounding area (surrounding grassland vegetation types: East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland, and Mabela Sandy Grassland). Where practicable, rock cuts should be shaped and rehabilitated to blend with the surrounding landscape.

9.1.2.8. Heritage Impact

Description of impact

A heritage and palaeontological Phase 1 survey was undertaken for the proposed upgrade of the R415 and two borrow pits. Phase 1 heritage and palaeontological surveys were undertaken as both were in areas of high sensitivity. Archaeological sites were noted near the proposed upgrade and borrow pits, and the area was regarded as having high and very high palaeontological sensitivity. The phase 1 archaeological and cultural heritage surveys noted that the borrow pits and road upgrade will not directly impact any of the recorded heritage sites. These sites occur 50m+ from the road and will not be affected

Cumulative Impacts

The cumulative impacts on heritage resources are expected to be very low due to the fact that very limited to no known heritage resources are located within the proposed project footprint.

Table 34: Impact associated with Heritage Impact

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	2	2	3	1	2	2	20	L	L	2	1	1	1	1	1	6	L	L

The proposed mitigation measures to avoid adverse impacts on Heritage is provided below:

- The Contractor and all construction personnel must be informed of the location of known heritage resources and instructed to avoid unnecessary disturbance of these areas.
- Known heritage resources identified during the specialist assessment must be clearly identified and protected from construction-related activities.
- The Contractor and construction personnel must be made aware of the possibility of encountering previously unidentified archaeological, cultural or burial resources during excavation and other ground-disturbing activities.
- The ECO must monitor ground-disturbing activities, particularly excavation, trenching, drilling, blasting, clearing and removal of overburden, for possible heritage resources.
- Should any archaeological artefacts, cultural material, structures or other potential heritage resources be uncovered during construction, work in the immediate area must cease immediately and the ECO must be notified.
- The affected area must be demarcated as a temporary no-go area until it has been inspected by a suitably qualified heritage specialist.
- All heritage discoveries must be reported to the relevant heritage practitioner and/or heritage authority for assessment and advice on the appropriate mitigation measures.
- No heritage material may be removed, damaged, collected or disturbed without the necessary assessment and authorisation.
- Should any graves or human remains be uncovered during construction, all work in the affected area must cease immediately. The ECO must ensure that the appropriate heritage authority, including the Eastern Cape Provincial Heritage Resources Authority (ECPHRA), and the South African Police Service (SAPS) are notified, as applicable.
- The ECO must provide induction and/or training to the Contractor and construction workers on the identification of potential archaeological, cultural and burial resources and the procedures to be followed in the event of a discovery.

- A Heritage Chance Find Procedure must be provided to the Contractor and ECO for implementation throughout the construction phase. (**Appendix H** of this BAR)

9.1.2.9. Paleontological Resources

A Palaeontological Phase 1 survey noted that there are several areas of (very) high sensitivity, and these yielded fossiliferous remains, these remains need to be excavated before road upgrade begins and will require a permit from ECPHRA/SAHRA.

Cumulative Impacts

The cumulative impact on Paleontological resources is expected to be high due to the fact that there is high sensitivity in the proposed project area.

Table 35: Impact associated with Palaeontology Resource

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	10	4	3	5	5	4	108	H	L	6	1	3	2	2	3	42	M	L

The proposed mitigation measures to avoid adverse impacts on Palaeontology is provided below:

- A Fossil Chance Find Protocol must be included in the EMPr. If fossils are discovered during excavation, work must stop and a suitably qualified palaeontologist must be contacted to assess and advise on the appropriate mitigation, including rescue where required.
- A field survey must be undertaken in accordance with the applicable SAHRA protocol if fossils are discovered during construction.
- The ECO must provide induction and/or training to the Contractor and construction workers on identifying potential archaeological, cultural, burial and fossil resources and the procedures to follow in the event of a discovery.
- A suitably qualified palaeontologist must undertake any required field investigation, recording, sampling and/or rescue of identified fossil resources before construction proceeds in affected areas.

- Where required, the necessary permits or approvals from the relevant heritage authority must be obtained before the excavation, collection, removal or disturbance of palaeontological resources.
- The ECO must monitor ground-disturbing activities, including vegetation clearing, excavation, drilling, blasting, trenching, foundation works and removal of overburden, for exposed fossil material.
- Special care must be taken during excavation and removal of overburden, as fossiliferous material may occur beneath the surface.
- The affected area must be cordoned off and treated as a temporary No-Go Area until inspected by a suitably qualified palaeontologist.
- The ECO and Contractor must immediately notify the relevant heritage authority and palaeontological specialist of any fossil discovery.
- The palaeontologist must assess the discovery and determine the appropriate mitigation, which may include recording, excavation, collection, sampling or other measures.
- Construction may only resume once the palaeontologist and relevant heritage authority have confirmed that the required mitigation has been completed and/or that work may proceed.
- All palaeontological finds, specialist interventions and mitigation measures must be documented and included in the ECO monitoring reports and project environmental records.
- Workers must not collect, move, damage or remove fossils from the site for personal use.

9.1.2.10. Disturbance of protected areas and cultural significant initiation sites

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	2	2	3	1	2	2	20	L	L	2	1	1	1	1	1	6	L	L

The proposed mitigation measures to avoid disturbance to protected areas and impacts on culturally significant sites are provided below:

- Clearly mark the Wilfred Bauer Nature Reserve and culturally significant initiation sites as highly sensitive areas prior to construction to prevent inadvertent disturbance
- No construction activities, storage of materials, parking of vehicles or temporary facilities shall occur within these areas unless authorised.

- Restrict access to approved routes.
- Brief all workers on the sensitivity of these areas and applicable restrictions.
- Report any unauthorised access, damage or disturbance immediately to the DEO, ECO and Engineer.

9.1.2.11. Air Quality

Description of impact

Deterioration of ambient air quality due to fugitive dust generated during vegetation clearance, road cutting and widening, sandstone excavation, blasting, crushing and screening, loading, stockpiling, borrow-pit activities and vehicle movement on unpaved haul roads. Dust may affect nearby communities, homesteads, wetlands, watercourses, road users and other sensitive receptors.

Table 36: Impact associated with air quality

		Significance without mitigation									Significance with mitigation								
Project Phase	Nature of Impact	Magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE	magnitude	Duration	Extent	Irreplaceable	Reversibility	Probability	TOTAL (SP)	Significance	CUMULATIVE
Construction phase	Negative	10	4	3	5	5	4	108	H	L	6	1	3	2	2	3	42	M	L

The proposed mitigation measures to avoid air quality impacts are provided below:

- Implement the Fugitive Dust Management Plan (FDMP) before vegetation clearance or bulk earthworks commence.
- Schedule blasting under suitable wind conditions and do not blast where wind direction and speed are likely to transport dust towards sensitive receptors.
- Provide silica-awareness training/toolbox talks to workers and implement appropriate occupational hygiene measures, including fit-tested respiratory protection and medical surveillance where required.
- Maintain a dust and air-quality complaints register and investigate complaints within 24 hours.
- No dry sandstone cutting, drilling, grinding or crushing may occur without engineering dust controls and written approval by the ECO and Engineer.

- The crusher may not operate unless water sprays or equivalent controls are functioning at the crusher inlet/outlet, screens and transfer points.
- Dust fall monitoring buckets must be installed at the approved receptor network before high dust works commence and monitored monthly.
- If the quartz content of sandstone or aggregate is elevated, a silica-specific monitoring programme must be implemented, including respirable dust/Respirable Crystalline Silica (RCS) sampling for workers and near-field receptors as advised by the specialist.
- Haul roads must be watered or chemically suppressed, and a maximum speed of 30 km/h must be enforced on unpaved haul roads.
- Where wind speeds are ≥6 m/s and conditions are dry, increase dust suppression measures and suspend or reduce high-dust activities where dust is being transported towards sensitive receptors.
- Loads transported by haul trucks must be covered to prevent dust emissions and track-out onto public roads must be prevented
- Stockpiles must be appropriately managed through wetting, covering or stabilisation, and must be located away from wetlands and watercourses.

9.2. Operational Phase Impacts

9.2.1. Impact on the Biophysical Environment

9.2.1.1. Impact of freshwater sources

Description of impact

Potential longer-term impacts on freshwater ecosystems in the drainage lines crossed by the road during the operational phase could result from ongoing maintenance work as well as the potential for erosion and establishment of invasive alien vegetation in disturbed areas. In addition, there could also be a longer-term impedance of flow should any debris block the culvert crossing structures.

Cumulative Impact

Longer term impacts on freshwater features linked to maintenance activities are considered to be limited and of very low significance. Impacts on water quality impacts on the watercourses and wetland areas could be expected during the operational phase as a result of contaminated runoff from the road. This is

considered to be a low risk as the road is already in existence and the watercourses have seasonal to ephemeral flow characteristics.

Table 37: Impact associated with freshwater sources

		Significance without mitigation									Significance with mitigation								
Project Phase	**Nature of Impact**	**Magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**	**magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**
Construction phase	Negative	6	4	3	0	1	2	28	L	L	2	1	1	0	1	1	5	L	L

The proposed mitigation measures to avoid adverse impacts on the freshwater resource is provided below

- During routine road maintenance operations, clear all channels located upstream of the road crossings of any debris and sediment build-up, particularly at the culverts and bridge structures where flows may be impeded; and
- Remove any invasive alien plants occurring in the road reserve on an ongoing basis.

9.2.1.2. Increased Impervious area (Hardened Surfaces

Description of impact

An increase in hardened surfaces may increase stormwater runoff resulting in increased erosion of nearby areas and impacting on nearby watercourses.

Table 38: Impact associated with increased impervious area

		Significance without mitigation									Significance with mitigation								
Project Phase	**Nature of Impact**	**Magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**	**magnitude**	**Duration**	**Extent**	**Irreplaceable**	**Reversibility**	**Probability**	**TOTAL (SP)**	**Significance**	**CUMULATIVE**
Construction phase	Negative	8	2	3	1	2	3	48	M	L	2	2	3	1	1	1	9	L	L

The proposed mitigation measures to avoid or minimise adverse impacts associated with the increase in impervious areas are provided below.

- Stormwater runoff generated by the road upgrade must be appropriately managed and attenuated to reduce flow velocities and prevent uncontrolled discharge and erosion towards the stream. The stormwater management and attenuation measures, including their location and design, must be confirmed by the suitably qualified stormwater/civil engineer. Direct discharge of concentrated stormwater into the stream must be avoided.
- Address increased runoff volumes at source.
- Disturbed area in the watercourse as a result of road upgrade must be rehabilitated as soon as soon as possible and not left until the end to be rehabilitated (progressive rehabilitation).
- Bank erosion must be monitored at regular intervals during the operational phase in order to assess whether further riverbank protection/stabilisation works are required.
- Ensure the stream banks are well maintained and vegetated to prevent any scouring of the supporting structures.
- The grass must be allowed to lengthen and thicken naturally to facilitate reduction in runoff velocity and volume, increase sediment deposition within the buffer zone and increase infiltration of stormwater.
- Areas sensitive to erosion must be identified and monitored to ensure that erosion risks are minimised.
- Watercourse crossings must be regularly checked to ensure they are not being degraded or causing degradation and that, openings (under or at a culvert opening) are kept clear to avoid impeding flows to downstream areas.
- Stockpiled topsoil must be replaced following construction activities and be shaped to match the natural topography of the site. All stripped topsoil MUST be appropriately replaced on the site.

9.2. Decommissioning Phase

At present it is not anticipated that the R415 road upgrade will ever be decommissioned in its entirety. Ongoing maintenance and upgrades, where necessary, will be carried out. In the unlikely event that decommissioning is necessary it is recommended that a detailed decommissioning strategy and rehabilitation plan is prepared and implemented

9.3. No-Go Impact Option

The No-Go alternative is the option of not proceeding with the proposed project, which would result in the status quo remaining and the limited negative biophysical impacts would not take place. The failure to

upgrade the road as required would, however, result in the road section not conforming to the required SANRAL standards to accommodate future increases in traffic volumes, especially heavy vehicle traffic.

In relation to road safety, the key implication of the No-Go alternative is that the advantages to all road users as a result of the widening of the road and associated infrastructures along the rod would not be realised. The short-term benefits of local employment creation and participation in the local economy by the contractor would also not accrue to the local community under the No-Go alternative.

Pursuit of the No-Go Option would be counter to the Duty of Care with respect to road safety, ensuring the integrity and availability of well-functioning regional road transport infrastructure. The No-Go Option is not considered to be a feasible or desirable alternative and would hold no benefits to society.

9.4. Environmental Impact Statement

The proposed R415 road upgrade will mainly take place within the existing road reserve and areas that have already been modified by the existing road, agricultural activities and other land uses. However, construction activities such as vegetation clearance, earthworks, excavation, road widening, bridge and culvert construction, stockpiling and slope stabilisation may result in temporary and permanent impacts on the surrounding environment. The assessment identified impacts relating mainly to biodiversity, water resources, soil and erosion, heritage and palaeontology, dust and noise, and the socio-economic environment.

Overall summary of Impacts related to construction and operational phase

Table 39: Overall impacts of Construction phase

Potential aspect/impact	Significance before mitigation	Key mitigation measures	Significance after mitigation/ Residual impact
Loss of species of special concern (SSC)	High	Limit vegetation clearance to the approved footprint	Low
Degradation and/or destruction of wetlands habitats	High	Demarcate wetlands and buffers as no-go areas, prevent encroachment, restrict activities to the approved footprint and rehabilitate disturbed areas.	Low
Loss of indigenous fauna and flora diversity associated with wetlands	High	Protect wetland habitats and buffers; minimise vegetation clearance, implement ecological monitoring and rehabilitation.	Low

Potential aspect/impact	Significance before mitigation	Key mitigation measures	Significance after mitigation/ Residual impact
Destruction, further loss of habitat and fragmentation of the vegetation community	High	Minimise the construction footprint; retain vegetation where practicable; prohibit unnecessary clearing; progressively rehabilitate disturbed areas.	Low
Sedimentation and soil erosion	High	protecting riparian vegetation, stabilising exposed soils, and promptly rehabilitating any areas affected by erosion.	Low
Pollution of water resources and soils	High	Protect wetlands by clearly marking no-go areas, preventing pollution and equipment washing near watercourses, managing hazardous substances properly, and ensuring workers are trained in spill prevention and environmental awareness.	Low
Introduction and spread of alien invasive vegetation	Moderate	Control invasive alien plants, avoid herbicide use near wetlands, and restore disturbed areas with suitable indigenous vegetation to support natural habitat recovery	Low
In-migration	Moderate	Prioritise local employment where feasible; communicate employment opportunities transparently; engage affected communities through the liaison process.	Low
Employment	High (+)	Maximise local employment and procurement opportunities where feasible; provide skills development and training opportunities.	High (+)
Increased Crime	Moderate	Maintain good site security by clearly identifying workers, addressing criminal behaviour, working with local law enforcement and communities, and securing any temporarily compromised boundaries.	Low
Increased spread of diseases	Moderate	Implement HIV/AIDS and communicable disease awareness through induction, periodic campaigns, and promotion of access to local health services.	Low
Noise Impact	Moderate	Manage construction noise through well-maintained equipment, restricted working hours, prior notification of	Low

Potential aspect/impact	Significance before mitigation	Key mitigation measures	Significance after mitigation/ Residual impact
		affected parties, controlled blasting, limited idling and hooting, and prompt response to noise complaints	
Dust Impact	Moderate	Implement dust suppression, control vehicle speeds, manage stockpiles and exposed surfaces, and monitor dust emissions.	Low
Visual Impact	Moderate	Maintain an orderly site, minimise vegetation clearance, manage stockpiles and temporary facilities, and progressively rehabilitate disturbed areas.	Low
Heritage Impact	Low	Protect identified heritage resources; remain within the approved footprint; implement a chance-find procedure; stop work and notify the relevant authority if heritage resources are discovered.	Low
Palaeontological Resources	High	Implement the recommendations of the palaeontological assessment; apply a chance-find procedure; undertake specialist monitoring where required; stop work and notify the relevant specialist/authority if significant fossils are discovered.	Medium
Air Quality	High	Implement the Fugitive Dust Management Plan and maintain effective dust suppression and control measures for construction activities, haul roads and material handling.	Medium
Disturbance of protected areas and cultural significance initiation sites	Low	Clearly demarcate sensitive areas; maintain them as no-go areas; restrict activities to the approved footprint; prevent unauthorised access and disturbance.	Low

Physical Environment

The main potential impacts on the physical environment during construction include soil disturbance and erosion, sedimentation of watercourses, dust generation, noise, vegetation clearance and disturbance of sensitive areas. These impacts are expected to be largely localised and can be reduced through appropriate construction management and mitigation measures.

Activities near watercourses, including the construction and upgrading of the Botsola, Kinira and Mafube bridge structures and associated culverts, may temporarily affect water quality and aquatic environments through increased sedimentation, accidental spills and disturbance of watercourse banks. Construction activities within or near watercourses must therefore be carefully managed, with appropriate erosion and sediment-control measures implemented and the requirements of the applicable Water Use Authorisation adhered to.

Vegetation clearance associated with road widening, construction areas, temporary deviations, stockpile areas and other ancillary works may result in the loss or disturbance of natural vegetation. Vegetation clearance shall be limited to the approved construction footprint and shall only be undertaken where necessary for the authorised activities. The Environmental Control Officer (ECO) shall ensure that approved construction areas are clearly demarcated prior to vegetation clearance, and that unnecessary removal of vegetation is avoided. Existing vegetation shall be retained for as long as practicable to minimise exposed surfaces, erosion and dust generation.

The project area also contains areas of high and very high palaeontological sensitivity. Construction activities involving excavation and earthworks may therefore result in the disturbance or destruction of fossil material. The recommendations of the palaeontological specialist assessment must be implemented, including obtaining the required permit where fossil excavation or collection is necessary and implementing a chance-find procedure during construction.

Heritage resources, including archaeological resources and graves, may also be affected if they occur within areas to be disturbed by construction. No heritage resource may be disturbed without the required approval or permit from the relevant heritage authority. If previously unidentified graves, archaeological material or other heritage resources are discovered during construction, work in the immediate area must cease and the appropriate heritage specialist and authority must be notified.

The Social Environment

Construction activities will have temporary impacts on surrounding communities and road users. These may include increased construction traffic, temporary disruptions to access, noise, dust, visual disturbance and safety risks to pedestrians and motorists. There may also be temporary disruptions to normal traffic flow while construction takes place. Appropriate traffic accommodation measures, warning signage, speed controls, pedestrian management and safe access to properties and community facilities will therefore be maintained throughout the construction period.

Construction noise will mainly be associated with earthworks, construction vehicles, crushing and screening activities and other construction equipment. These impacts are expected to be temporary and will be managed through appropriate working hours, proper maintenance of equipment and the implementation of the mitigation measures contained in the EMPr. Particular attention will be given to areas where construction activities occur close to residential properties and other sensitive receptors.

The public participation Process (PPP) was also conducted. The **PPP** provided Interested and Affected Parties (I&APs), community members, Ward Councillors, and other stakeholders with an opportunity to receive information about the proposed project and raise concerns or provide comments. Public participation meetings were held as follows:

- **17 June 2026** at Ramohlakoana Community Hall at 10:00;
- **18 June 2026** at Maluti Civic Centre at 10:00; and
- **19 June 2026** at Mafube (Thabanatshoana A/A) at 10:00.

Site notices were placed at prominent locations along the proposed road to inform affected communities and other interested parties about the proposed development and the public meetings. A notice is also being published in the Informer local newspaper to inform the public about the availability of the Draft BAR for review and comment.

The border management authorities have also been included in the stakeholder notification process due to the location of the proposed road in the vicinity of the Qacha's Nek Border Post. Notification emails, together with the Draft BAR, notification letter and comment sheets, are being distributed to relevant State Departments, Ward Councillors, community representatives and other identified stakeholders, including the relevant border management authorities, for review and comment.

All comments received during the public review period will be recorded and responded to in the Comments and Responses Report and will be considered in the finalisation of the Basic Assessment Report.

Economic Environment

The proposed project is expected to have positive socio-economic impacts, particularly during construction through the creation of temporary employment opportunities for skilled and unskilled

workers. Local businesses may also benefit from increased demand for goods and services during the construction period.

During the operational phase, the upgraded surfaced road is expected to provide safer and more reliable movement between Matatiele and the Qacha's Nek Border Post. Improvements to the road surface, drainage, bridges, road geometry and traffic safety measures are expected to improve accessibility for communities, public transport, agricultural activities, businesses and emergency services. The improved road may also support cross-border trade and tourism and improve access to employment, education, healthcare and other services.

Opinion of the EAP:

Based on the findings of the Basic Assessment process, including the specialist studies undertaken, the assessment of environmental sensitivities, the identification and evaluation of potential impacts, and consideration of the proposed mitigation and management measures, it is the professional opinion of the Environmental Assessment Practitioner (EAP) that:

- The proposed improvement of the R415 road and associated infrastructure is considered environmentally acceptable, provided that the mitigation measures, specialist recommendations and management actions outlined in the BAR and EMPr are fully implemented and maintained throughout the project lifecycle.
- The specialist studies found that the proposed R415 road improvements are largely within an existing, already disturbed road corridor. However, sensitive features such as wetlands, water resources, remaining natural vegetation within or near the road corridor. No fatal flaws were identified, provided that these sensitive areas are protected and the recommended mitigation, monitoring and rehabilitation measures are properly implemented.
- The potential negative environmental impacts associated with the construction and operational phases, including vegetation clearance, loss of Species of Conservation Concern, disturbance of wetland and water resources, soil erosion and sedimentation, pollution, alien invasive species, dust, air quality, noise, heritage and palaeontological resources, can be appropriately managed through implementation of the EMPr, specialist recommendations and applicable environmental authorisations, permits and licences.
- The proposed R415 road project is expected to provide longer-term positive socio-economic benefits through improved road safety, accessibility, mobility and connectivity between Matatiele

and the Qacha's Nek Border Post. The project is also expected to provide temporary employment opportunities and support local economic activity during the construction phase.

In view of the above, it is recommended that Environmental Authorisation be granted for the proposed R415 road project and associated infrastructure, subject to compliance with the conditions of the Environmental Authorisation, the approved EMPr, specialist recommendations, applicable water use authorisations and all other relevant statutory requirements.

The proposed project can be implemented while maintaining an acceptable level of environmental protection, provided that the mitigation, monitoring, rehabilitation and compliance measures specified in the BAR and EMPr are effectively implemented throughout the construction and operational phases.

Should a favourable decision be issued, it is recommended that the Environmental Authorisation be granted for a validity period sufficient to allow implementation of the authorised activities, subject to the applicable regulatory requirements and conditions of authorisation.

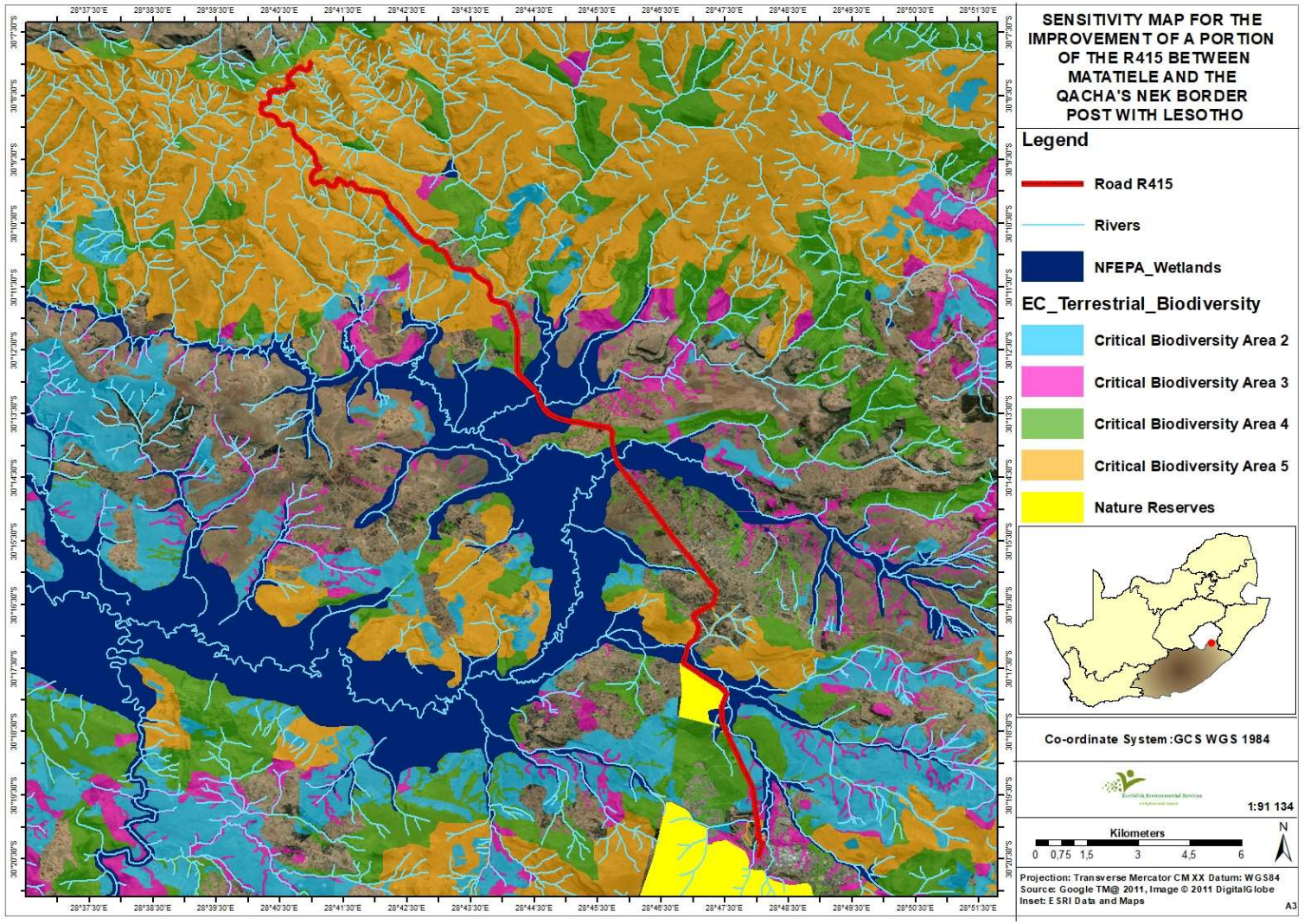


Figure 32: Sensitivity Map

CHAPTER 10: CONCLUSIONS AND RECOMMENDATIONS

The Basic Assessment Process for the proposed project has been undertaken in accordance with EIA Regulations published in Government Notice 324-327 of 4 as amended in 2017, in terms of the National Environmental Management Act (NEMA; No107 of 1998). The Basic Assessment Process is aimed at ensuring informed decision-making and environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA (No 107 of 1998), the commitment to sustainable development is evident in the provision that "development must be socially, environmentally and economically sustainable and requires the consideration of all relevant factors".

NEMA also imposes a duty of care, which places a positive obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act 108 of 1996) should be anticipated and prevented, and where they cannot be altogether prevented, they must be minimised and remedied in terms of "reasonable measures".

Based on the findings of the environmental assessment and specialist studies, the proposed improvement of the R415 is considered environmentally acceptable, provided that the identified impacts are appropriately managed and all recommended mitigation, monitoring and rehabilitation measures are implemented. The assessment did not identify environmental constraints that constitute a fatal flaw to the proposed road upgrade. However, the identified wetlands, watercourses, indigenous vegetation, agricultural and grazing areas, heritage and palaeontological resources require appropriate protection and management during construction. Particular attention must be given to activities occurring near watercourses and other environmentally sensitive areas. The EAP is of the opinion that the proposed project **may be authorised**

Should Environmental Authorisation be granted, the following key conditions and recommendations should be implemented:

- A suitably qualified Environmental Control Officer (ECO) should be appointed before construction starts to ensure that the EMPr and environmental requirements are followed and that any environmental issues are properly managed.

- All mitigation, management and monitoring measures contained in this Basic Assessment Report and the approved Environmental Management Programme (EMPr) must be implemented.
- Obtain the required Water Use Authorisation from DWS before undertaking activities requiring such authorisation.
- Ensure compliance with all conditions contained in the Environmental Authorisation, Water Use Authorisation and other applicable permits or approvals.
- Implement appropriate measures to protect wetlands, rivers, drainage features and other water resources from pollution, erosion and sedimentation.
- Implement appropriate dust, noise, waste and pollution-control measures during construction.
- Ensure that temporarily disturbed areas are appropriately rehabilitated following completion of construction activities.
- Continue engagement with affected communities and Interested and Affected Parties (I&APs) throughout project implementation.
- A 10-year validity period is requested for the Environmental Authorisation to allow sufficient time for implementation of the proposed project, should DFFE approve the application.

CHAPTER 11: UNDERTAKING BY THE EAP

I, **Amukelani Khosa** the EAP responsible for compiling this report, undertake that:
The information provided in this report is correct. Comments that will be received during the review of the Draft Basic Assessment Report will be correctly recorded and reported herein.

It must however be noted that this Draft Basic Assessment Report is being subjected to PPP for commenting by the general public and state departments in parallel with the submission of the application forms to DFFE. Comments and objections received from stakeholders will be recorded accordingly.

Signature of the EAP_____ **DATE:** _

CHAPTER 12: REFERENCES

1. AGRICULTURAL COMPLIANCE STATAMENT (2026). EnterpreBiz (Pty) Ltd
2. AQUATIC IMPACT ASSESSMENT (2026). Ntumbuluko Consulting Pty Ltd
3. HERITAGE IMPACT ASSESSMENT AND PALAEONTOLOGICAL IMPACT ASSESSMENT (2026). Umlando: Archaeological Surveys and Heritage Management
4. MTATIELE LOCALITY MUNICIPALITY: INTEGRATED Development plan (IDP) REVIW (2022/2027)
5. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT (2026). Ntumbuluko Consulting Pty Ltd

APPENDICES

APPENDIX A: SITE PLAN (S)

APPENDIX B: SITE PHOTOGRAPHS

APPENDIX C: SPECIALIST STUDIES

Appendix C1: Terrestrial Biodiversity Impact Assessment

Appendix C2: Aquatic and Wetland Delineation Study

Appendix C3: Heritage Impact Assessment and Paleontological Impact Assessment

Appendix C4: Agricultural Compliance Statement

Appendix C5: Air Quality Impact Assessment

APPENDIX D: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

APPENDIX E: PUBLIC PARTICIPATION REPORT

Appendix E1: Proof of Site Notice **(To be Attached to the Final BAR**)

Appendix E2: Written Notice Issued **(To be Attached to the Final BAR**)

Appendix E3: Proof of Advertisement **(To be Attached to the Final BAR**)

Appendix E4: Communication with I&APs **(To be Attached to the Final BAR**)

Appendix E5: Minutes of any Public and/or Stakeholder meetings **(Attached)**

Appendix E6: Comments and Response Report **(To be Attached to the Final BAR**)

Appendix E7: Comments from I&APs on BAR **(To be Attached to the Final BAR**)

Appendix E8: Comments from I&APs on amended BAR **(To be Attached to the Final BAR**)

Appendix E9: Interested and Affected Party Register **(To be Attached to the Final BAR**)

APPENDIX F: AUTHORITY CORRESPONDENCE

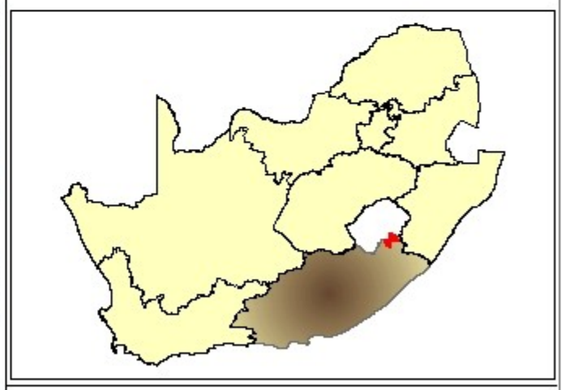
APPENDIX G: DETAILS OF EAP

APPENDIX H: OTHER INFORMATION

LOCALITY MAP FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO

Legend

- Road R415
- Street
- Main Road
- Arterial Route



Co-ordinate System: GCS WGS 1984

1:91 134

Kilometers

0 0,75 1,5 3 4,5 6

N

Projection: Transverse Mercator CM XX Datum: WGS84
Source: Google TM@ 2011, Image © 2011 DigitalGlobe
Inset: ESRI Data and Maps

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28°37'30"E 28°38'30"E 28°39'30"E 28°40'30"E 28°41'30"E 28°42'30"E 28°43'30"E 28°44'30"E 28°45'30"E 28°46'30"E 28°47'30"E 28°48'30"E 28°49'30"E 28°50'30"E 28°51'30"E

30°7'30"S 30°8'30"S 30°9'30"S 30°10'30"S 30°11'30"S 30°12'30"S 30°13'30"S 30°14'30"S 30°15'30"S 30°16'30"S 30°17'30"S 30°18'30"S 30°19'30"S 30°20'30"S

Bellfort
Mafube Mission
Monkhankaneng
Matewu
Disquare
Hankonoane
Nkosana
Tsenola
Tsekong
Mapeng
Mapfontein
Jabulani
Andris
Molosong
St. Paul
Mogogowe
Sprinkana
Malota
Mechaeleng
Punguleweni
Nchodu
Mochadeng
Nkasela
Tsitsong
Mazizini
Zikhalini
Zazingeni
Maphokweni
Newstands
Tulamela
Moyaneni
Moyeni
Outspan
Magema
Lekgalong
Maralakeng
Jabavu
Hillbron
Protea
Maluti
Tholang
Moreneng
Madimonga
Mapateng
Malubalube
Khoapa
Khoapa
Mahangu
Zwelitsha
Dengwane
Tsepisong
Newlands
Masakala
Masakala
R56
KwaHlomendlwini
KwaLunda
Matatiele

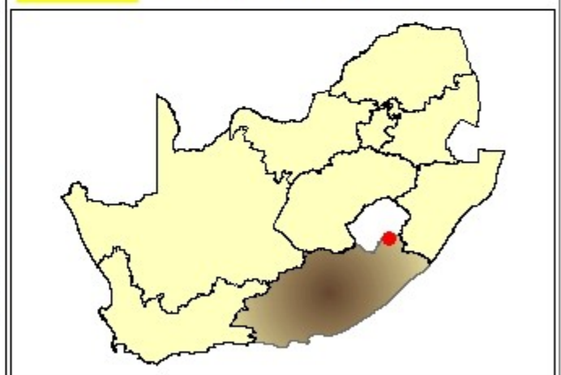
SENSITIVITY MAP FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO

Legend

- Road R415
- Rivers
- NFEPA_Wetlands

EC_Terrestrial_Biodiversity

- Critical Biodiversity Area 2
- Critical Biodiversity Area 3
- Critical Biodiversity Area 4
- Critical Biodiversity Area 5
- Nature Reserves



Co-ordinate System: GCS WGS 1984

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Kilometers

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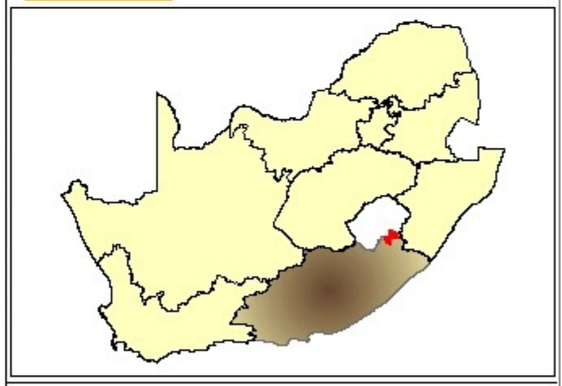
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Source: Google TM@ 2011, Image © 2011 DigitalGlobe
Inset: ESRI Data and Maps

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LAND-USE MAP FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO

Legend

- Road R415
- Street
- Main Road
- Arterial Route
- Woodland
- Cultivated Land
- Low Urban Density



Co-ordinate System: GCS WGS 1984

1:91 306

Kilometers

0 0,75 1,5 3 4,5 6

N

Projection: Transverse Mercator CM XX Datum: WGS84
Source: Google TM@ 2011, Image © 2011 DigitalGlobe
Inset: E SRI Data and Maps

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Bellfort
Mafube Mission
Monkhankaneng
Matewu
Disquare
Hankonoane
Nkosana
Tsenola
Mapeng
Mapfontein
Tsekong
Jabulani
Andris
Molosong
St. Paul
Mogogowe
Sprinkana
Malota
Mechaeleng
Punguleweni
Nchodu
Mochadeng
Nkasela
Tsitsong
Mazizini
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Zazingeni
Maphokweni
Newstands
Tulamela
Moyaneni
Moyeni
Outspan
Maralakeng
Lekgalong
Magema
Hillbron
Jabavu
Protea
Maluti
Tholang
Moreneng
Madimonga
Mapateng
Malubalube
Khoapa
Khoapa
Mahangu
Zwelitsha
Dengwane
Tsepisong
Newlands
Masakala
Masakala
KwaHlomendlwini
KwaLunda
Matatiele
R56

PHOTO PLATE: R415 ROAD PHOTOGRAPHS









PHOTO PLATE: R415 ROAD PHOTOGRAPHS









PHOTO PLATE: R415 ROAD PHOTOGRAPHS









TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELA LOCAL MUNICIPALITY.



PRODUCED BY:

PRODUCED BY:	ENVIRONMENTAL ASSESSMENT PRACTITIONER	PRODUCED FOR:
 Physical Address: **5 13th Avenue, Fairlands, Randburg 2170** Mobile Number: **071 2082 364**Email: **info@ntumbulukoconsulting.co.za**	Earthlink Environmental Services	 South African National Roads Agency SOC Limited

AUGUST 2026

DOCUMENT CONTROL RECORD

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eMail: ntumbulukoconsulting.co.za

DOCUMENT CONTROL	
Document Title	TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELA LOCAL MUNICIPALITY.
Consulting Firm	Ntumbuluko Consulting (Pty) Ltd
Employer	THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD OR SANRAL
Environmental Assessment Practitioner	EARTHLINK ENVIRONMENTAL SERVICES (PTY) LTD

INTERNAL APPROVAL			
Prepared by	Tshuxekani Maluleke	**Checked By:**	Amukelani Khosa
Signature		**Signature**	
Title	Biodiversity and Wetland Specialist	**Title**	
Date	27 August 2026	**Date**	27 August 2026
CLIENT/ EMPLOYER APPROVAL			
Department 1	Kgakile Mapoulo	**Department 2**	
Signature		**Signature**	
Date		**Date**	

REVISION DETAILS					
Rev	**Date**	**Revision Description**	**Prepared by**	**Checked by**	**Approved By**
0.0	31 March 2026	Draft Terrestrial Biodiversity Report	T Maluleke		
0.1	21 May 2026	Draft Terrestrial Biodiversity Report	T Maluleke		
0.2	27 August 2026	Terrestrial Biodiversity Report	T Maluleke		
Version		0.1			

CONDITIONS RELATING TO THIS REPORT

DECLARATION OF INTEREST

Ntumbuluko Consulting Pty (Ltd) has no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Ntumbuluko Consulting Pty (Ltd) is not a subsidiary, legally or financially of the proponent. The study was undertaken by Mr Tshuxekani Maluleke, he is a registered Natural Scientists with the following details:

Specialist Name	Tshuxekani Maluleke (Wetland and Biodiversity Specialist)
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2017 Environmental Impact Assessment (EIA) Regulations, that: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity;

	• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.
Signature	
Date	2026/08/27

QUALIFICATIONS

SPECIALIST	QUALIFICATION
Mr Tshuxekani Maluleke (SACNASP Reg. No. 120501)	MSc Environmental Sciences (Wits University) BSc Hons Zoology (University of Limpopo) BSc Hons Animal, Plant and Environmental Sciences (Wits University)

INDEMNITY

Although Ntumbuluko Consulting Pty (Ltd) exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Ntumbuluko Consulting Pty (Ltd) and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. Ntumbuluko Consulting Pty (Ltd) accepts no liability, and the client indemnifies Ntumbuluko Consulting Pty (Ltd) and its directors, managers, agents, and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly, by Ntumbuluko Consulting Pty (Ltd) and by the use of this document.

EXECUTIVE SUMMARY

Ntumbuluko Consulting (Pty) Ltd was appointed by Earthlink Environmental Services (Pty) Ltd, on behalf of the South African National Roads Agency SOC Ltd (SANRAL), to undertake a Terrestrial Biodiversity Impact Assessment for the proposed improvement of a portion of the R415 between Matatiele and the Qacha's Nek Border Post in the Eastern Cape Province. The assessment aims to characterise the terrestrial environment within the project area, identify sensitive ecological receptors, and evaluate potential impacts associated with the proposed road upgrade. A field survey was conducted on 21 March 2026, towards the end of the wet season, providing good visibility of most grassland species. While some early-season or condition-specific plants may not have been detectable, the available data are sufficient to describe the biodiversity features within the footprint. As the development will remain strictly confined to the existing road reserve, no follow-up seasonal survey is required.

The R415 traverses four mapped vegetation units, with the majority of the road falling within the Vulnerable East Griqualand Grassland (Gs12). Field verification confirmed that long-term disturbance, grazing pressure, and road maintenance have resulted in secondary, moderately degraded grassland dominated by pioneer and disturbance-tolerant species. More intact vegetation occurs beyond the road reserve, particularly along the adjacent mountain slopes. No plant species of medicinal or ethnobotanical value were recorded within the disturbed servitude.

Spatial analysis indicates that the route intersects Critical Biodiversity Area 5 (CBA 5) and CBA 2 and crosses two major wetlands associated with a perennial watercourse, elevating ecological sensitivity along portions of the alignment. Several sections of the road run immediately adjacent to a designated nature reserve, increasing the risk of edge effects, faunal disturbance, habitat encroachment, and the spread of alien invasive species. Although no invasive alien plants were recorded within the servitude, Eucalyptus spp. and Acacia mearnsii were observed nearby and require monitoring.

Faunal observations were limited to common bird species, livestock, and signs of generalist mammals, consistent with the disturbed nature of the road verge. No reptiles or invertebrates were recorded during the survey. Some loss of remaining natural habitat within the road servitude is anticipated due to construction activities. To minimise impacts, all works must remain strictly within the existing road reserve, with no-go areas clearly demarcated and sensitive sections, particularly wetlands and areas adjacent to the

nature reserve managed under the supervision of a qualified ecologist. The sensitivity mapping developed for this assessment should guide construction planning, with heightened caution required in the mountainous sections near the border pass where ecological sensitivity is elevated.

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DEFINITIONS

Alien animal	(a) Any live vertebrate, including a bird and a reptile, but excluding a fish, belonging to a species or subspecies that is not a recognised domestic species and the natural habitat of which is not in the Republic; or (b) The egg of such vertebrate.
Biodiversity	Means the diversity of animals, plants or other organisms, including the diversity of animals, plants or other organisms found within and between— (a) Ecosystems; (b) Habitats; (c) The ecological complexes of which these systems and habitats are part; and (d) Species.
CITES	Means the Convention on International Trade in Endangered Species of Wild Fauna and Flora;
Endangered Species	Means a species is endangered when it is facing a very high risk of extinction in the wild in the near future and includes— (*a*) Any living or dead specimen of such a species; or (*b*) Any egg, skin, bone, feather, seed, flower or any other part or derivative of such a species.
Environment	Means the surroundings within which humans exist and that are made up of— (*a*) The land, water and atmosphere of the earth; (*b*) Microorganisms, plant and animal life; (*c*) Any part or combination of (*a*) and (*b*) and the interrelationships amongst and between them; and (*d*) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;
Indigenous plant	(*a*) Means any living or dead plant which is indigenous to the Republic, whether artificially propagated or in its wild state; and

	(*b*) Includes the flower, pollen, seed, cone, fruit, bulb, tuber, stem or root or any other part or derivative of such plant but does not include a plant declared a weed in terms of any legislation.
Protected area	Means— (*a*) A provincial nature reserves; (*b*) A site of ecological importance; (*c*) A protected environment; (*d*) A private nature reserves; or (*e*) A resource use area.
Protected environment	Means an area declared a Protected Environment or Private Nature Reserve in terms of section 21 (1) (*a*).
Rare species	Means a species of fauna and flora referred to in section 68 (*a*) (ii), and includes— (*a*) any living or dead specimen of such a species; or (*e*) any egg, skin, bone, feather, seed, flower or any other part or derivative of such a species.

1. INTRODUCTION AND PROJECT DESCRIPTION

1.1 INTRODUCTION

Ntumbuluko Consulting (Pty) Ltd, was appointed by Earthlink Environmental Services (Pty) Ltd on behalf of The South African National Roads agency SOC LTD (SANRAL) to conduct a terrestrial biodiversity impact assessment for the proposed improvement of a portion of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, In the Eastern Cape Province within Alfred Nzo District Municipality, Matatiela Local Municipality.

The purpose of this study is to describe and characterise the terrestrial environment, including the habitats and species occurring within the project area. A field survey was undertaken on 21 March 2026, towards the end of the rainy season. The assessment covered the full extent of the R415 road servitude, as well as adjacent areas that may be affected during the construction and operational phases.

Identification and description of habitats and sensitive receptors were recorded across the project area and potential impacts on terrestrial biodiversity receptors were assessed. The findings and recommendations of this report should inform the Environmental Assessment Practitioner (EAP) and regulatory authorities to make informed decisions as to the ecological viability of the proposed development.

1.2 PROJECT DESCRIPTION

South African National Road Agency SOC Limited (SANRAL) proposes to upgrade Road R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, In the Eastern Cape Province within Alfred Nzo District Municipality, Matatiela Local Municipality. The project is situated on National Road R415, Section 1 between km 0 and km 32. The major aspects of this project include the following:

Matatiele to Qachas Nek Border post:

- Improve the road cross drainage along a section of the R415 (Bosola flood plain)
- upgrade the existing road to surface standard,
- relocation of existing services
- new prestressed bridge,
- general widening of the existing road cross section for climbing lanes and surfaced shoulders,

- vertical and horizontal geometric improvements,
- widening of existing river bridge and some major and minor culverts,
- 6.5m wide temporary deviation to accommodate two-way traffic during construction.
- Opening of 2 potential borrow pits.
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare.

1.3 STUDY AREA

The South African National Roads Agency Soc Ltd (SANRAL) proposes to upgrade of the R415 Road between Matatiele and the Qacha's Nek Border Post in the Eastern Cape Province, in the Eastern Cape Province within Alfred NZO District Municipality, Matatiela Local Municipality (**Figure 1-1**). The road R415 Starting point Coordinates are (30°20'28.65"S 28°48'1.12"E), Middle point of the road (30°13'36.61"S 28°45'3.93"E) and End point of the road (30° 7'57.15"S 28°41'0.06"E).

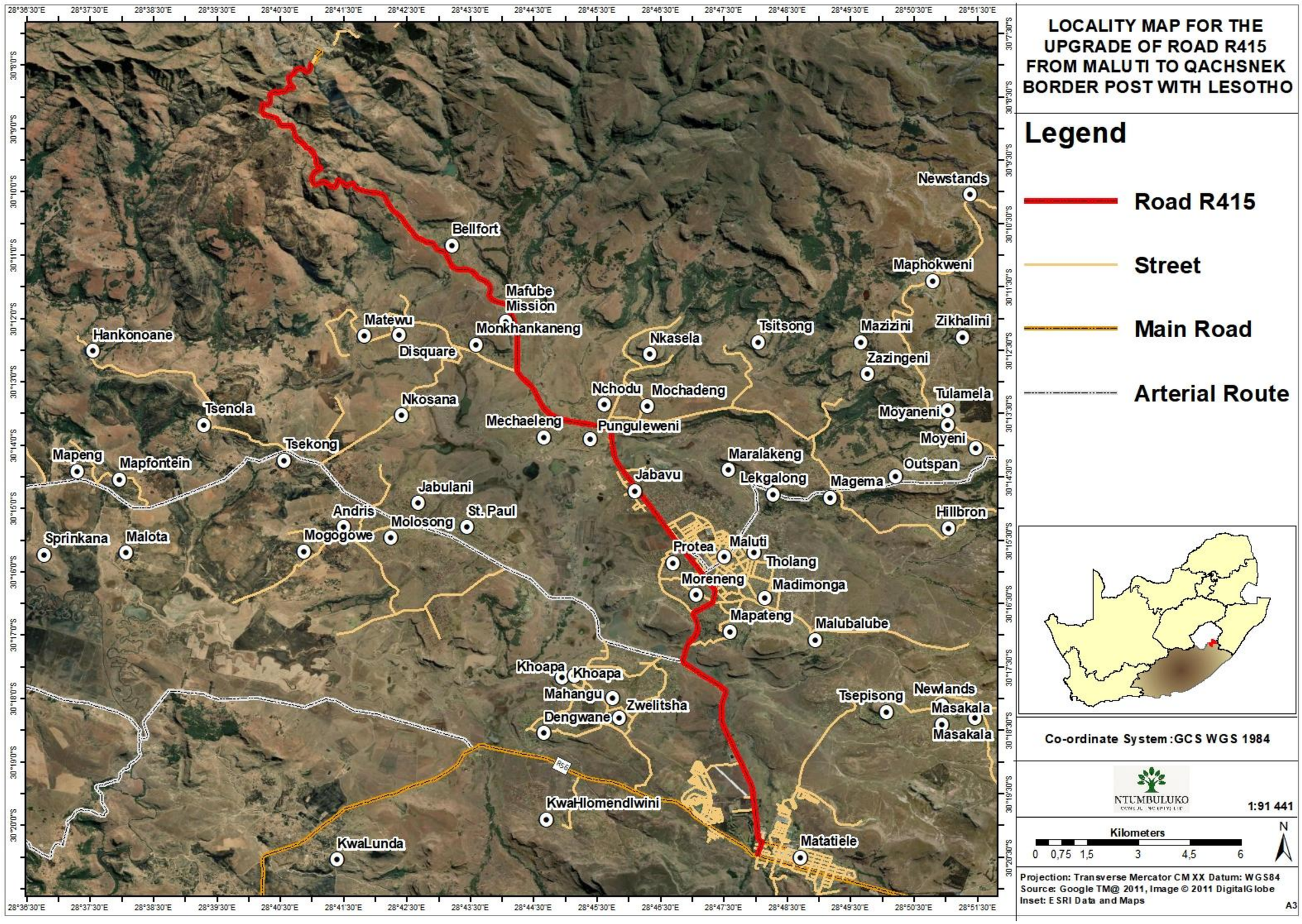


Figure 1-1:Locality Map

1.4 SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements. As per the results of the Screening Report generated for the proposed data centre the terrestrial biodiversity theme sensitivity is classified as "Very High" (**Figure 1-2**).

Due to the "Very High" sensitivity rating of the site, a full Terrestrial Biodiversity Specialist Assessment (this report) has been undertaken as part of the Environmental Basic Assessment Process for the proposed road upgrade.

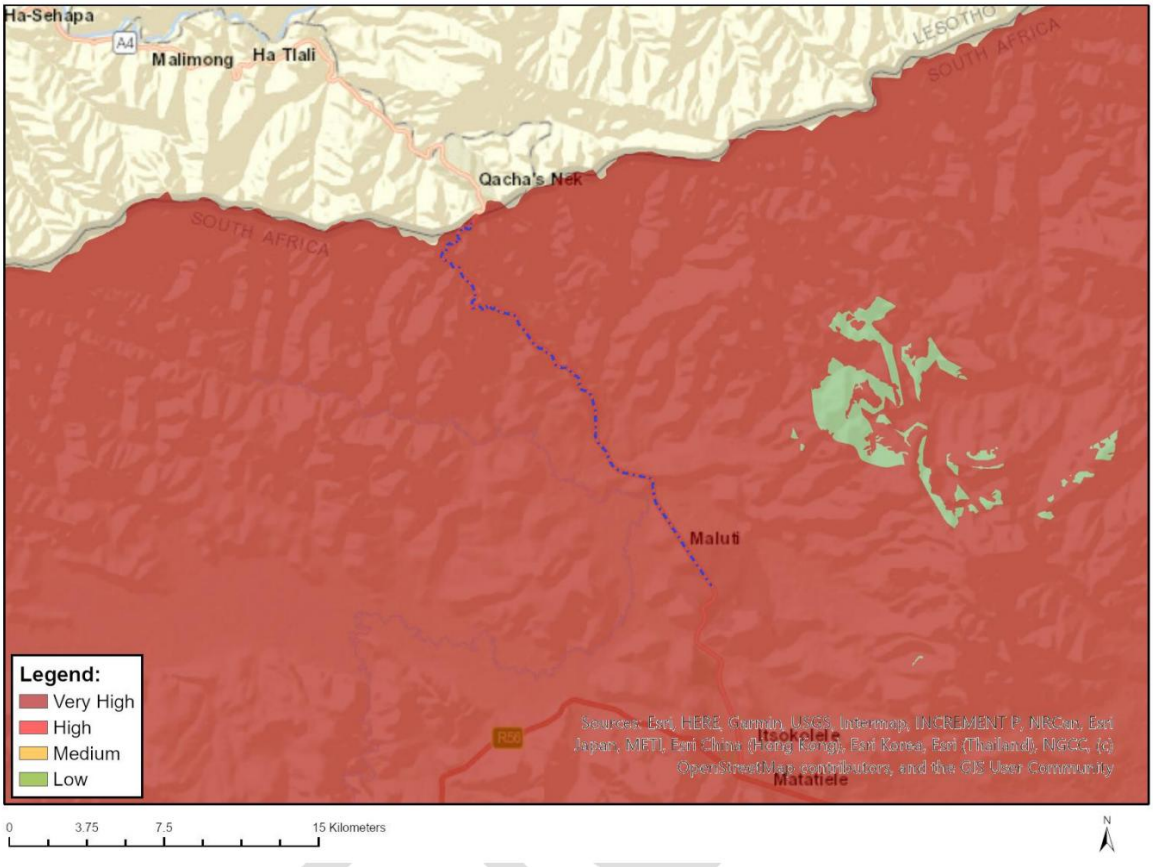


Figure 1-2: Map of relative terrestrial biodiversity theme sensitivity

1.5 TERMS OF REFERENCE AND OBJECTIVES

Ntumbuluko Consulting (Pty) Ltd has been appointed to undertake the following specialist functions:

- Describe and map the vegetation types in the study area.
- Describe the biodiversity and ecological state of each vegetation unit.
- Identify plant and animal species of conservation concern (Red Data List, PNCO and TOPS lists). In the case of the fauna, this was done at a desktop level.
- Identify alien plant species, assess the invasive potential and recommend management procedures.
- Assess the potential impacts of the proposed project on both the fauna and flora.
- Provide mitigation measures, rehabilitation process and/or vegetation removal procedures that would reduce the potential impacts of the developments on biodiversity.

1.6 SCOPE OF STUDY

1.6.1 FLORAL STUDY:

- Identify sensitive vegetation types and critical biodiversity areas on site.
- Identify Critical Biodiversity and Ecological Support Areas onsite.
- Describe the potential direct, indirect and cumulative negative and positive impacts of the proposed activity on the vegetation species during construction, operation and decommissioning phases of the project.
- Provide monitoring requirements, mitigation measures and recommendations.

1.6.2 FAUNAL STUDY:

- Describe the existing micro-habitats, and the species associated with those habitats.
- Provide a description of species composition and conservation status in terms of protected, endangered or vulnerable faunal species.
    - This description will include species which are likely to occur within, traverse across or forage within the proposed project area, as well as species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development.

1.7 LIMITATIONS AND ASSUMPTIONS

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- The report is based on a project description received from the client.
- The study was done during the wet season and thus a follow-up is not necessary.
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development.
- Some areas of the study site were not accessible during the day of the site inspection.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

2. REPORT LEGISLATIVE FRAMEWORK

In accordance with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, as set out in Government Notice 320 published under NEMA on 20 March 2020 , titled "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 National Environmental Management Act, 1998, when applying for Environmental Authorisation", section 3, subsection 1, the following applies:

- Where an applicant proposes an activity falling within the scope of the protocol on a site identified by the national screening tool as having Very High terrestrial biodiversity sensitivity, a Terrestrial Biodiversity Specialist Assessment is required; however,
- If the site sensitivity verification—based on both desktop analysis and field investigation—indicates that the actual sensitivity is Low, then a Terrestrial Biodiversity Compliance Statement may be submitted instead.

The site sensitivity verification undertaken for this project, incorporating both desktop review and field survey, confirmed that the proposed road upgrade is predominantly characterised by Very High to High terrestrial biodiversity sensitivity.

As per sections 2 and 3 of the protocol discussed above, a Terrestrial Biodiversity Impact Assessment must contain the information as presented in **Table 2-1** below.

Table 2-1: Requirements of a Terrestrial Biodiversity Assessment Report.

	Specialist Report Requirements According to GNR 320.	Chapter
	Terrestrial Biodiversity	
3.1	The **Terrestrial Biodiversity Specialist** Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page I-V
3.1.2	A signed statement of independence by the specialist;	Page I-V
3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Chapter 1 Page 1

3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 4
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 4
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 5.5
3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 7
3.1.8	Any direct, indirect, and cumulative impacts of the proposed development;	Chapter 7
3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 7
3.1.10	The degree to which the impacts and risks can be reversed;	Chapter 7
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	Chapter 7
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 7
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, iXf it should receive approval or not; and	Chapter 9
3.1.15	Any conditions to which this statement is subjected.	Chapters 8.9 and 10
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	N/A
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	N/A

A signed copy of the Terrestrial Biodiversity Report must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

3. LEGAL FRAMEWORK

The following national and provincial legislative guidelines and requirements were followed as part of this study:

3.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO 107 OF 1998) (NEMA) AS AMENDED

This Act embraces all three (3) fields of environmental concern namely: resource conservation and exploitation; pollution control and waste management; and land-use planning and development. The environmental management principles include the duty of care for wetlands and special attention is given to management and planning procedures. NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (ACT NO 10 OF 2004) (NEM: BA)

NEMBA was signed into law in mid-2004 and entered into effect on 1 September 2004. NEM: BA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities. Certain activities, known as Restricted Activities, are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling.

3.3 THE NATIONAL BIODIVERSITY FRAMEWORK (2017-2022)

The National Biodiversity Framework (NBF) is a requirement under Section 38 of the National Environmental Management: Biodiversity Act (Act 10 of 2004, hereafter referred to as the 'Biodiversity Act'). The NBF is a short to medium-term coordination tool that shows the alignment between the strategic objectives and outcomes identified in the National Biodiversity Strategy and Action Plan (NBSAP v.2, 2015) and other key national strategies, frameworks and systems that currently guide the work of the biodiversity sector and identifies mechanisms through which this work is coordinated. It also identifies

a set of interventions or "acceleration measures" that can unlock or fast-track implementation of the NBSAP and indicates the relative roles of the many agencies involved in implementing these activities. The purpose of the NBF is not to provide a comprehensive review of all work currently being undertaken in the biodiversity sector, nor to list all of the actions required to conserve and manage South Africa's biodiversity in support of sustainable development.

3.4 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO 43 OF 1983) (CARA):

This act regulates the utilization and protection of wetlands, soil conservation and all matters relating thereto; control and prevention of veld fires, control of weeds and invader plants, the prevention of water pollution resulting from farming practices and losses in biodiversity.

3.5 EASTERN CAPE CONSERVATION PLAN (ECBCP, VER 2, 2019)

Eastern Cape Biodiversity Conservation Plan Handbook (ECBCP, 2019) adopted by the competent authority Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) Eastern Cape C-Plan) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. The (ECBCP, 2019) uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- Critical Biodiversity Area (CBA);
- Ecological Support Area (ESA);
- Other Natural Area (ONA);
- Protected Area (PA); and
- No Natural Habitat remaining (NNR)

3.6 THE NATIONAL FOREST ACT (ACT NO 84 OF 1998) (NFA)

The main objective of the National Forests Act, 1998 is to promote the sustainable management and development of forests and to provide protection for certain forests and trees. This said protection is provided through the protection of all natural forests (Section 7 (1), the protection of all trees declared to be protected in terms of section 12(1) of the Act, and the regulation of certain activities in a proclaimed State Forest (Section 23(1)(a)

– (k)). It should be noted that there are other environmental legislation administered by other State Departments that also regulate natural resources. The Act is responsible for:

- Promotes the sustainable management and development of forests for the benefit of all;
- Creates the conditions necessary to restructure forestry in South Africa;
- Provide special measures for the protection of certain forests and protected trees;
- Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes;
- Promotes community forestry; and
- Promotes greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

3.7 CONVENTION ON BIOLOGICAL DIVERSITY

The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from commercial and other utilization of genetic resources. The agreement covers all ecosystems, species, and genetic resources.

3.8 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Through its three appendices, the Convention accords varying degrees of protection to more than 30,000 plant and animal species.

3.9 CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

The CMS, or the Bonn Convention aims to conserve terrestrial, marine and avian migratory species throughout their range. Parties to the CMS work together to conserve migratory species and their habitats by providing strict protection for the most endangered migratory species, by concluding regional multilateral agreements for the

conservation and management of specific species or categories of species, and by undertaking co-operative research and conservation activities.

3.10 THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

The objectives of the Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security. The Treaty covers all plant genetic resources for food and agriculture, while it's Multilateral System of Access and Benefit-sharing covers a specific list of 64 crops and forages. The Treaty also includes provisions on Farmers' Rights.

3.11 2.CONVENTION ON WETLANDS (POPULARLY KNOWN AS THE RAMSAR CONVENTION)

The Ramsar Convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention covers all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.

3.12 WORLD HERITAGE CONVENTION (WHC)

The primary mission of the WHC is to identify and conserve the world's cultural and natural heritage, by drawing up a list of sites whose outstanding values should be preserved for all humanity and to ensure their protection through a closer co-operation among nations.

3.13 RAMSAR CONVENTION

The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is the only global environmental treaty that deals

with a particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

3.14 INTERNATIONAL PLANT PROTECTION CONVENTION (IPPC)

The IPPC aims to protect world plant resources, including cultivated and wild plants by preventing the introduction and spread of plant pests and promoting the appropriate measures for their control. The convention provides the mechanisms to develop the International Standards for Phytosanitary Measures (ISPMs), and to help countries to implement the ISPMs and the other obligations under the IPPC, by facilitating the national capacity development, national reporting and dispute settlement. The Secretariat of the IPPC is hosted by the Food and Agriculture Organization of the United Nations (FAO).

3.15 NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways. Of specific importance to this application is Section 19 of the NWA, which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices.

Regulations GN 704 dated June 1999 under the NWA, 1998 (Act 36 of 1998) stipulates that no development activities may take place within the 1:100 year floodline of a watercourse, or within 100 m of the watercourse, whichever is the furthest.

Regulations GN 509 dated August 2016 under the Section 21 c and i water uses of the NWA, 1998 (Act No 36 of 1998) stipulates the:

"Extent of a watercourse" as:

(a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam.

"Regulated area of a watercourse" for section 21(c) or (i) of the Act water uses in terms of this Notice means:

(a) The outer edge of the 1 in 100-year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
(b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
(c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

3.16 NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREA (NFEPA) STATUS

In an attempt to better conserve aquatic ecosystems, South Africa has recently categorised its river systems according to set ecological criteria (i.e. ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al. 2011) The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel et al. 2011).

4. TERRESTRIAL BIOSIVERSITY METHODOLOGY

4.1 THE ASSESSMENT

A site inspection was undertaken on the **21st of March 2026** to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify fauna and flora species associated with the proposed project activities. The site inspection also served to identify potential impacts of the proposed development, and its impacts on the surrounding ecological environment.

In addition to the site visit, key resources that were consulted include the following:

- South African Vegetation Map (SA VEGMAP) (Mucina et al., 2018);
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011/14);
- The National Environmental Management: Biodiversity Act (NEM:BA), 2004: List of Threatened Ecosystems (2011); and
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species (2005).

4.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential Species of Conservation Concern (SCC) has to be obtained to develop a list of 'Species of Concern'. These species are those that may be impacted significantly by the proposed activity. In general, these will be species that are already known to be threatened or at risk, or those that have restricted distributions (endemics) with a portion of their known range falling within the study area i.e. strict endemic and near endemic species. Species that are afforded special protection, notably those that are protected by NEM:BA (Act No. 10 of 2004).

4.3 SAMPLING PROTOCOL

The study site was visually surveyed to evaluate vegetation composition, and faunal assemblages and to provide detailed information on the plant communities present. The aim of the site inspection was to characterise and describe each fauna and flora community within the study site as well as identify areas of high sensitivity and SCC. Prior to the site visit, sampling locations representative of each vegetation type were identified. At these sampling locations, vegetation types within the study area were assessed and surveyed using plant identification guides and other published literature. Vegetation communities were then described according to the dominant set of species recorded from each type. These were mapped and assigned a sensitivity score using the methodology outlined in Species Environmental Assessment Guideline Document.

4.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) was established in order to "provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before." The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic

contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SANBI Vegetation map informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP project has two main aims:

1. To determine the variation in and units of Southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
2. To compile a vegetation map- The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason, the collective expertise of vegetation scientists from various universities and state departments were harnessedto make this project as comprehensive as possible.

The map and accompanying book describes each vegetation type in detail, along with the most important species, including endemic species and those that are biogeographically important.

The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

4.5 SENSITIVITY ASSESSMENT

The Species Environmental Assessment guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (**Table 4-1**). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 4-1: Criteria for establishing Site Ecological importance and description of criteria.

CRITERIA	DESCRIPTION

Conservation Importance (CI)	The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range- restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.
Functional Integrity (FI)	A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and theFunctional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and ReceptorResilience (RR)	

4.6 TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

4.6.1 IMPACT RATING METHODOLOGY

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardized rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements of the NEMA EIA Regulations (2014 and subsequent 2017 amendments).

The potential impacts of the proposed establishment of a Borrow pit, existing land uses and the available alternatives sites were rated using a clearly defined rating scale. The significance rating formula is as follows:

Significance = Consequence x Probability

Where

Consequence = Type of Impact x (Intensity + Spatial Scale + Duration)

And

Probability = Likelihood of an Impact Occurring

In addition, the formula for calculating consequence:

Type of Impact = +1 (Positive Impact) or -1 (Negative Impact)

The weight assigned to the various parameters for positive and impacts to biodiversity is provided for in the formula and is presented in **Table 4-2**. The probability consequence matrix is displayed in **Table *4-3***, with the impact significance rating described in **Table 4-4**.

Table 4-2: Biodiversity Impact Assessment Parameter Ratings.

RATING	INTENSITY		SPATIAL SCALE	DURATION	PROBABILITY
	Negative Impacts (Type of Impact = -1)	**Positive Impacts (Type of Impact = +1)**			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Noticeable, on-going social and environmental benefits which have improved the livelihoods and living standards of the local community in general and the environmental features.	International The effect will occur across international borders.	Permanent: No Mitigation The impact will remain long after the life of the Project.	Certain/ Definite. There are sound scientific reasons to expect that the impact will definitely occur.
6	Significant impact on highly valued species, habitat or ecosystem. Irreparable damage to highly valued items of	Great improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of a Project.	Almost certain/Highly probable It is most likely that the impact will occur.

	cultural significance or breakdown of social order.	the receiving environment.			
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment.	Province/ Region Will affect the entire province or region.	Project Life The impact will cease after the operational life span of the project	Likely The impact may occur.
4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense social benefits to some people. Average to intense environmental enhancements.	Municipal Area Will affect the whole municipal area.	Long term 6-15 years.	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting	Average, on-going positive benefits, not	Local	Medium term 1-5 years.	Unlikely

	ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of cultural significance.	widespread but felt by some.	Extending across the site and to nearby settlements.		Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by very few of population.	Limited Limited to the site and its immediate surroundings.	Short term Less than 1 year.	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures.

1	Limited damage to minimal area of low significance that will have no impact on the environment. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level social and environmental benefits felt by very few of the population.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month.	Highly unlikely/None Expected never to happen.

Table 4-3: Probability Consequence Matrix.

	Significance

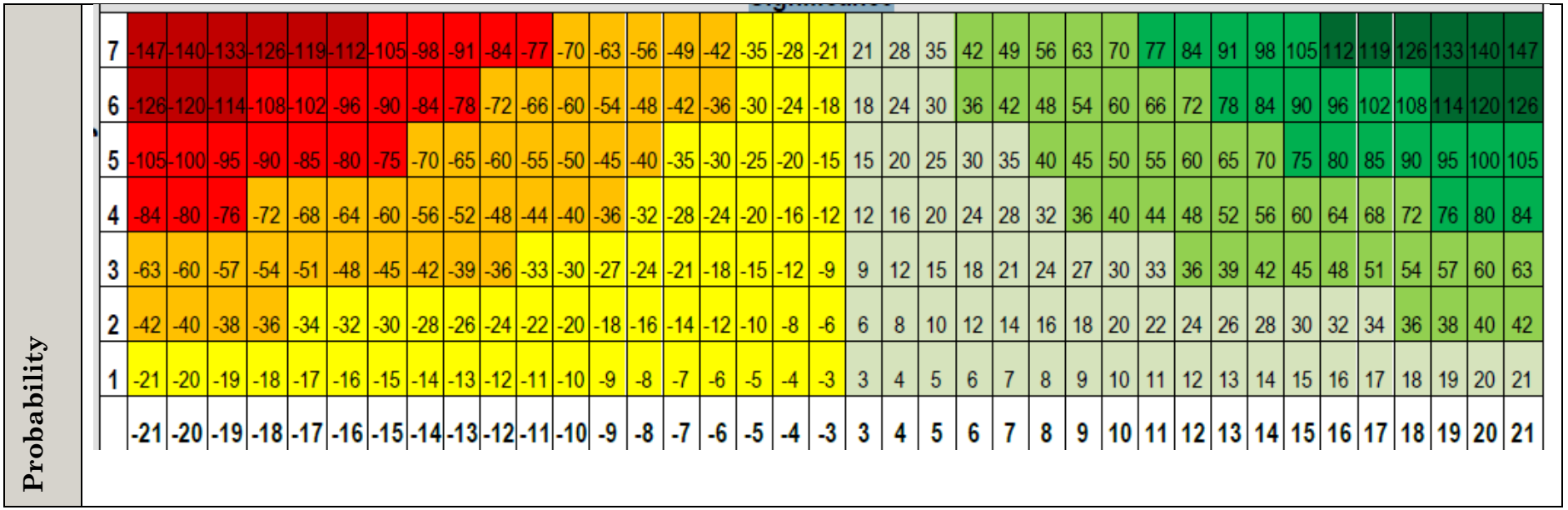


Table 4-4: Significance Threshold Limits.

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	

Score	Description	Rating
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment.	
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	

5. SITE CHARACTERISTICS

5.1 GEOLOGY & SOILS

The majority of the road alignment is underlain by mudstones and sandstones of the Beaufort Group within the Karoo Supergroup, with additional exposures of the Molteno, Elliot, and Clarens Formations occurring along the route. These sedimentary units typically give rise to well-drained soils with depths ranging from 500–800 mm and clay contents of 15–55%. Dominant soil forms associated with these parent materials include Hutton, Clovelly, and Oatsdale, while Shortlands soils occur where dolerite intrusions are present. The prevailing land types in these sections are Fa and Ac.

Towards the mountainous areas near the Lesotho border, the geology transitions to Clarens Formation sandstones, as well as sandstones, siltstones, and mudstones of the Elliot Formation, both belonging to the Stormberg Group of the Karoo Supergroup. These are overlain in places by the basaltic lava flows of the Drakensberg Group. Soils on the steep escarpment slopes are typically deep, fine-grained, and characteristic of land types Fa, Fb, and Ea, reflecting the high rainfall and erosional dynamics of the region.

The central portion of the road traverses areas underlain by Tarkastad Subgroup mudstones and sandstones in the east, with Molteno and Elliot Formation sandstones and minor mudstones occurring towards the west. These geological units form part of the broader Karoo Supergroup. In this section, the dominant soils are poorly drained, generally 200–300 mm deep, with clay contents below 15%. These are classified primarily as Katspruit and Longlands soil forms, with Oatsdale, Vimy, and Clovelly occurring in better-drained areas. The most common land types in this zone are Ia and Ca.

5.2 CLIMATE

The region experiences predominantly summer rainfall, with a mean annual precipitation (MAP) of approximately 780 mm, ranging from 620–816 mm across the broader Matatiele area. Kokstad, the nearest long-term weather station, records an average of 88 rain days per year, with only three of these occurring during mid-winter (June–July). Rainfall is largely convective in nature, with thunderstorms accounting for approximately 45 rain days annually. Both mist and snow occur, although less frequently than in the Gd 4 Southern Drakensberg Highland Grassland, with Kokstad recording an average of 26 misty days per year.

Mean Annual temperature (MAT) ranges from 12.9–15.6°C, with an overall regional MAT of approximately 14.7°C. Moderately severe frost is common, occurring on roughly 30 days per year, particularly in valley bottoms and high-lying areas. Mean annual evaporation is relatively high, ranging between 1 457–1 723 mm (Camp 1999b), which contributes to seasonal moisture deficits despite the relatively high rainfall.

5.3 VEGETATION & LANDSCAPE ALONG ROAD

5.3.1 East Griqualand Grassland

The bulk of the existing R415 Road falls within the East Griqualand Grassland (Gs 12) vegetation unit. This landscape is characterised by hilly terrain dominated by mesic grassland, with scattered bush clumps occurring in specific microhabitats. Moist or waterlogged sites typically support *Leucosidea sericea*, while drier or low-lying areas contain woody species such as *Diospyros lycioides*, Vachellia (Acacia) karroo, and *Ziziphus mucronata*. The vegetation unit spans parts of both the KwaZulu-Natal and Eastern Cape provinces, covering much of East Griqualand, with Kokstad and Matatiele forming its core centres.

It occurs across an altitudinal range of 920–1 740 m, supporting a cool, moist grassland system influenced by summer rainfall and frequent mist. Several endemic herbaceous species are associated with this unit, including *Alepidea duplidens*, Berkheya griquana, Wahlenbergia dentata, and *W. ingrata*, contributing to its high floristic value.

The East Griqualand Grassland is classified as Vulnerable, with a national conservation target of 23%, yet only 0.2% is formally protected within the Malekgonyane (Ongeluksnek) Wildlife Reserve and Mount Currie Nature Reserve. More than a quarter of the unit has been transformed through dryland cultivation (mainly maize), commercial forestry plantations, and expanding urban settlements. Invasive alien species, particularly Acacia dealbata and A. mearnsii, are encroaching into portions of the grassland, altering ecological processes and suppressing indigenous species recruitment. Erosion levels are generally low across the unit, with 31% of the area classified as low erosion risk, 30% as very low, and 30% as moderate, although localised erosion may occur on steeper slopes or in historically disturbed areas.

5.3.2 Gd 4 Southern Drakensberg Highland Grassland

The northern section of the road, extending towards the Qacha's Nek border, falls within the Gd 4 Southern Drakensberg Highland Grassland vegetation unit. This landscape comprises steeply sloping mountainous terrain on and below the summit of the Great Escarpment, supporting dense tussock grassland interspersed with a dwarf-shrub component on exposed rocky areas. The grassland is dominated by species of *Festuca*, together with *Themeda triandra*, *Heteropogon contortus*, *Eragrostis racemosa*, *E. chloromelas*, *E. curvula*, *Elionurus muticus, Trachypogon spicatus, Andropogon appendiculatus, Harpochloa falx* and *Tristachya leucothrix*. This vegetation unit is distributed across the highest mountains and ridges of the Stormberg, from Molteno to the Dordrecht region, including the elevated Kraairivier valley near Barkly East and its tributaries.

It also occurs along the steep head-valley slopes fringing the southern Drakensberg Escarpment, extending northwards from Indwe, Elliot, Ugie, Maclear and Mount Fletcher to Matatiele. From Ramatseliso Nek north of Matatiele, the upper boundary of this unit transitions into the Gd 7 uKhahlamba Basalt Grassland, while the Gd 4 unit continues along a series of high northwest–southeast-oriented ridges as far as the southeastern extension of the Giant's Castle buttress (KwaThabamnyana).

The vegetation occurs between 1 420–2 080 m, predominantly within the 1 720–1 840 m altitudinal band. The unit is classified as Least Threatened, with a conservation target of 27%, and approximately 9% is formally protected within the uKhahlamba Drakensberg Park and the Malekgonyane (Ongeluksnek) Wildlife Reserve. Transformation remains relatively limited, with just over 5% converted for cultivation, although scattered invasions of Acacia dealbata occur in some areas. Erosion levels are generally very low (57%), with smaller portions classified as low or moderate (13%).

5.3.3 Lesotho Highland Baslat Grassland (Gd 8)

At the northern tip of the road upgrade near the border post, the landscape transitions into the Gd 8 Lesotho Highland Basalt Grassland vegetation unit, a high-altitude system characterised by extensive plateaus and elevated ridges separated by deep valleys typical of the Maloti–Drakensberg region. Although steep valley slopes are common, major cliff faces occur only intermittently. Vegetation comprises a closed, short grassland matrix interspersed with patches of *Passerina montana*-dominated shrubland, with smaller

shrubs such as *Chrysocoma ciliata* and *Pentzia cooperi* frequently abundant, particularly on warmer, disturbed slopes.

Species composition varies along the altitudinal gradient, with *Themeda triandra* more prominent at lower to mid-elevations and *Festuca caprina* dominating higher altitudes. Large, conspicuous patches of *Kniphofia caulescens* occur mainly in upper-altitude sponge areas (2 500–2 900 m), while *Merxmuellera macowanii* is typically associated with drainage lines and watercourses.

Although classified as Least Threatened with a national conservation target of 27%, only about 1% of this unit is formally protected within reserves such as Malekgonyane (Ongeluksnek), Golden Gate Highlands National Park, and Sehlabathebe National Park. Approximately 10% has been transformed, mainly through cultivation at lower elevations, and the unit has been further impacted by major infrastructure such as the Katse and Mohale Dams. Grazing pressure is high under communal systems, particularly at lower altitudes, contributing to shrub encroachment, extensive erosion, and the loss of sensitive species such as *Aloe polyphylla*, which has been largely extirpated from accessible sites due to illegal collection.

5.3.4 Mabela Sandy Grassland

The proposed road upgrade traverses the GS 13 Mabela Sandy Grassland vegetation unit, which is characterised by flat valley basins underlain by poorly drained, low-nutrient soils that support species-poor, sour, tussock-dominated grasslands lacking indigenous trees. The vegetation is typically dominated by unpalatable indicator species such as *Sporobolus pyramidalis* and *Aristida junciformis*, reflecting a system sensitive to disturbance and grazing pressure. This unit is distributed across the Cedarville Flats draining into the Umzimvubu River in the Cedarville–Matatiele region of southwestern KwaZulu-Natal, with smaller occurrences in the Simi and Ramohlakoana basins of the Kinira River Valley in the former Transkei, generally between 1 440–1 500 m (locally up to 1 550 m). Classified as Vulnerable, the unit has a conservation target of 23%, although only a very small portion is formally protected within the Malekgonyane (Ongeluksnek) Wildlife Reserve. More than 20% has already been transformed by maize cultivation and urban expansion, while remaining areas face ongoing threats from heavy selective grazing in communal rangelands, which promotes soil erosion and further degradation of the grassland structure.

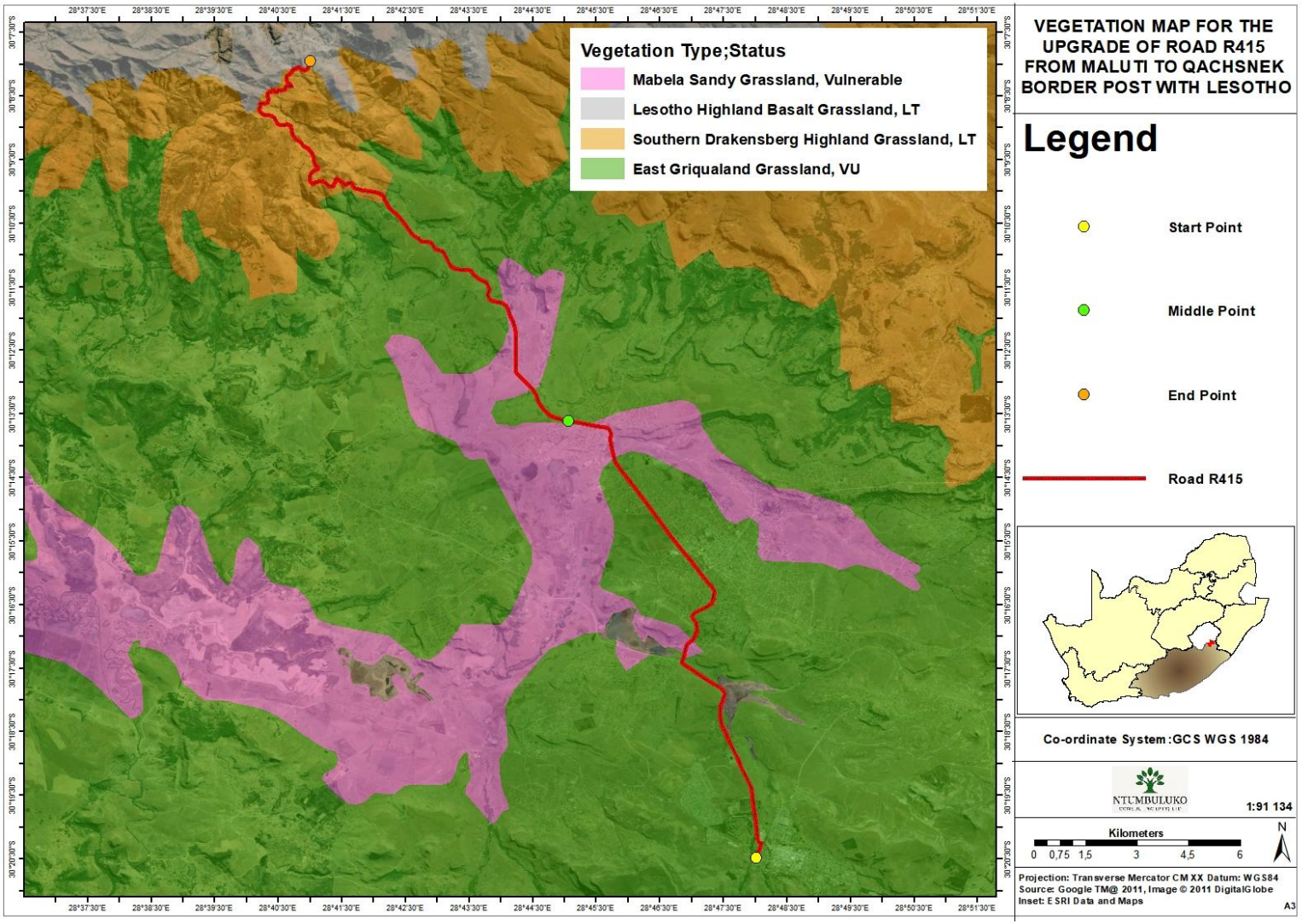


Figure 5-1:Vegetation Map

5.4 IMPORTANT TAXA ASSOCIATED WITH THE STUDY SITE

Table 5-1: Important Taxa within the within the study site (Mucina and Rutherford 2006)

PLANT FORM	SPECIES
Gs 12 East Griqualand Grassland	
Graminoids	*Alloteropsis semialata subsp. eckloniana (d), Aristida congesta (d), A. junciformis subsp. galpinii (d), Brachiaria serrata (d), Digitaria tricholaenoides (d), Elionurus muticus (d), Eragrostis chloromelas (d), E. plana (d), E. racemosa (d), Harpochloa falx (d), Heteropogon contortus (d), Hyparrhenia hirta (d), Melinis nerviglumis (d), Microchloa caffra (d), Paspalum dilatatum (d), Sporobolus africanus (d), Themeda triandra (d), Tristachya leucothrix (d), Abildgaardia ovata, Andropogon appendiculatus, Cynodon incompletus, Cyperus obtusiflorus var. obtusiflorus, Digitaria ternata, Eragrostis capensis, Eulalia villosa, Hemarthria altissima, Setaria nigrirostris, Trachypogon spicatus, Urochloa panicoides.*
Herbs	*Acanthospermum aust¬rale, Centella asiatica, Conyza podocephala, Haplocarpha scaposa, Helichrysum herbaceum, H. nudifolium var. pilosellum, Hermannia depressa, Hibiscus aethiopicus var. ovatus, Ipomoea crassipes, Kohautia amatymbica, Lessertia harveyana, Pentanisia prunelloides subsp. latifolia, Rhynchosia effusa, Senecio retrorsus, Stachys aethiopica, Tolpis capensis, Vernonia natalensis.*
Herbaceous Climber	*Rhynchosia totta.*
Geophytic Herbs	*Cheilanthes deltoidea, C. hirta, Haemanthus humilis subsp. hirsutus, Ledebouria sandersonii, Rhodohypoxis baurii var. baurii, Watsonia pillansii, Zantedeschia albomaculata subsp. albomaculata.*
Low Shrubs	*Anthospermum rigidum subsp. pumilum (d), Chaetacanthus setiger, Erica caffrorum var. caffrorum, Felicia filifolia subsp. filifolia, F. muricata, Helichrysum dregeanum, Rubus rigidus. Succulent Shrub: Euphorbia clavarioides var. clavarioides.*
Gd 4 Southern Drakensberg Highland Grassland	
Graminoid	*: Alloteropsis semialata subsp. eckloniana (d), Aristida junciformis subsp. galpinii (d), Catalepis gracilis (d), Diheteropogon filifolius (d), Eragrostis caesia (d), E. chloromelas (d), E. planiculmis (d), E. racemosa (d), Festuca caprina (d), Microchloa caffra (d), Monocymbium ceresiiforme (d), Pennisetum sphacelatum (d), Rendlia altera (d), Themeda triandra (d), Trachypogon spicatus (d), Tristachya leucothrix (d), Agrostis lachnantha,*

	Andropogon appendiculatus, Aristida diffusa, Cymbopogon pospischilii, Elionurus muticus, Eragrostis capensis, E. curvula, E. plana, Festuca scabra, Fingerhuthia sesleriiformis, Harpochloa falx, Helictotrichon turgidulum, Heteropogon contortus, Juncus exsertus subsp. exsertus, Koeleria capensis, Pentaschistis cirrhulosa, P. microphylla, Poa binata, Schoenoxiphium sparteum, Sporobolus centrifugus.
Herbs	*Ajuga ophrydis, Aster bakerianus, Euphorbia epicyparissias, Galium capense subsp. capense, Gazania krebsiana subsp. krebsiana, Haplocarpha scaposa, Hebenstretia dentata, Helichrysum chionosphaerum, H. nudifolium var. pilosellum, H. rugulosum, H. umbraculigerum, Kohautia amatymbica, Lactuca inermis, Lasiospermum bipinnatum, Lobelia erinus, L. flaccida, L. vanreenensis, Pentanisia prunelloides subsp. latifolia, Psammotropha mucronata var. foliosa, Rumex lanceolatus, Salvia stenophylla, Selago densiflora, S. galpinii, Senecio asperulus, S. erubescens var. crepidifolius, Tolpis capensis, Trifolium burchellianum subsp. burchellianum, Wahlenbergia cuspidata, W. stellarioides.*
Geophytic Herbs	*Cheilanthes hirta, Corycium dracomontanum, Disa fragrans subsp. fragrans, Disperis oxyglossa, Drimia macrocentra, Eriospermum ornithogaloides, Geum capense, Hypoxis rigidula var. pilosissima.*
Herbaceous Climber	*Rhynchosia totta.*
Low Shrubs	*Chrysocoma ciliata, Erica caffrorum var. caffrorum, Euryops candollei, Felicia filifolia subsp. filifolia, F. muricata, Helichrysum asperum var. albidulum, H. splendidum, H. trilineatum, Passerina montivagus, Pentzia cooperi, Rubus ludwigii subsp. ludwigii, Selago albida, S. saxatilis, Senecio burchellii.*
Gd 8 Lesotho Highland Basalt Grassland	
Graminoids	*Bulbostylis humilis (d), Cymbopogon dieterlenii (d), Elionurus muticus (d), Eragrostis curvula (d), Festuca caprina (d), Harpochloa falx (d), Koeleria capensis (d), Merxmuellera disticha (d), Pentaschistis oreodoxa (d), Poa binata (d), Scirpus falsus (d), Aristida junciformis subsp. galpinii, Carex glomerabilis, Cymbopogon marginatus, Eragrostis caesia, Helictotrichon turgidulum, Luzula africana, Merxmuellera drakensbergensis, Rendlia altera.*
Herbs	*Helichrysum subglomeratum (d), Anthospermum herbaceum, Cerastium arabidis, Cotula hispida, Dimorphotheca jucunda, Haplocarpha scaposa, Helichrysum acutatum, H. cerastioides, H. setigerum, Senecio asperulus,*

	Silene burchellii, Trifolium burchellianum subsp. burchellianum, Ursinia montana, Zaluzianskya microsiphon.
Geophytic Herbs:	*Disa sankeyi, D. tysonii, Geum capense, Moraea modesta, Oxalis depressa, Rhodohypoxis baurii var. baurii, R. baurii var. confecta, R. baurii var. platypetala, Satyrium longicauda.*
Succulent Herb	*Crassula peploides*
Semiparasitic Herb	*Thesium nigrum.*
Low Shrub	*Euphorbia striata, Hebenstretia dura, Helichrysum infaustum, H. odoratissimum, H. sessile, H. sutherlandii, Pentzia cooperi.*
Succulent Shrub	*Delosperma crassuloides.*
Gs 13 Mabela Sandy Grassland	
Graminoids	*Abildgaardia ovata (d), Andropogon eucomus (d), Cynodon dactylon (d), C. incompletus (d), Elionurus muticus (d), Eragrostis patentissima (d), Heteropogon contortus (d), Paspalum distichum (d), Pennisetum clandestinum (d), Setaria sphacelata (d), Sporobolus pyramidalis (d), Themeda triandra (d), Tristachya leucothrix (d), Aristida bipartita, A. congesta, A. junciformis subsp. galpinii, Brachiaria eruciformis, B. serrata, Cymbopogon pospischilii, Digitaria argyrograpta, D. monodactyla, D. ternata, D. tricholaenoides, Ehrharta calycina, Eragrostis capensis, E. chloromelas, E. gummiflua, E. plana, E. racemosa, Harpochloa falx, Hyparrhenia hirta, Imperata cylindrica, Microchloa caffra, Pennisetum thunbergii, Setaria nigrirostris, Sporobolus discosporus, Stipagrostis zeyheri subsp. sericans, Tragus racemosus, Trichoneura grandiglumis.*
Herbs	*Acanthospermum australe, Monopsis decipiens, Psammotropha mucronata var. foliosa*
Geophytic Herbs	*Bulbine narcissifolia, Zantedeschia albomaculata subsp. albomaculata.*
Geoxylic Suffrutex	*Elephantorrhiza elephantina*

5.5 EASTERN CAPE CONSERVATION PLAN (ECBCP, Ver 2, 2019)

According to the Eastern Cape Biodiversity Conservation Plan (ECBCP, Version 2, 2019), adopted by the competent authority, the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), all land within the province is systematically classified based on its importance for achieving provincial biodiversity conservation targets. The ECBCP uses five primary categories to guide land-use planning and environmental decision-making: Critical Biodiversity Areas (CBA), Ecological

Support Areas (ESA), Other Natural Areas (ONA), Protected Areas (PA) and No Natural Habitat Remaining (NNR). These categories reflect the ecological value, sensitivity, and functional role of each landscape unit, and are directly used by DEDEAT to determine the level of acceptable transformation and the need for biodiversity safeguards during development.

Spatial analysis of the proposed road upgrade indicates that more than 50% of the road falls within a Critical Biodiversity Area 5 (CBA 5), which represents land essential for maintaining biodiversity pattern and ecological processes at a provincial scale. The route also intersects two sections of CBA 2, highlighting areas of even higher conservation priority where natural habitat is required to remain largely intact to meet conservation targets (Figure 5-2).

In addition, the road crosses or lies adjacent to several NFEPA-mapped wetlands, which are recognised as nationally important freshwater ecosystems and contribute to regional hydrological functioning. When viewed at a broader landscape scale, the entire project footprint is situated within a CBA3 zone, indicating that the surrounding landscape plays a key role in supporting ecological connectivity, wetland integrity, and the persistence of threatened grassland ecosystems in the Matatiele region (Figure 5-2). Development within CBAs is generally discouraged unless no reasonable alternatives exist, and where unavoidable, strict mitigation, rehabilitation, and impact-avoidance measures are required to maintain ecological functioning.

The R415 road traverses an area immediately adjacent to a designated nature reserve (Khoapa Game Park), with sections of the proposed upgrade occurring along the reserve boundary. This proximity increases the ecological sensitivity of the receiving environment, particularly with respect to edge effects, disturbance to faunal movement, potential encroachment into protected habitat, and the introduction of alien invasive species. Although the project remains within the existing road reserve, the adjacency to a protected area necessitates enhanced mitigation measures, strict demarcation of no-go zones, and careful management of construction activities to avoid direct or indirect impacts on the reserve.

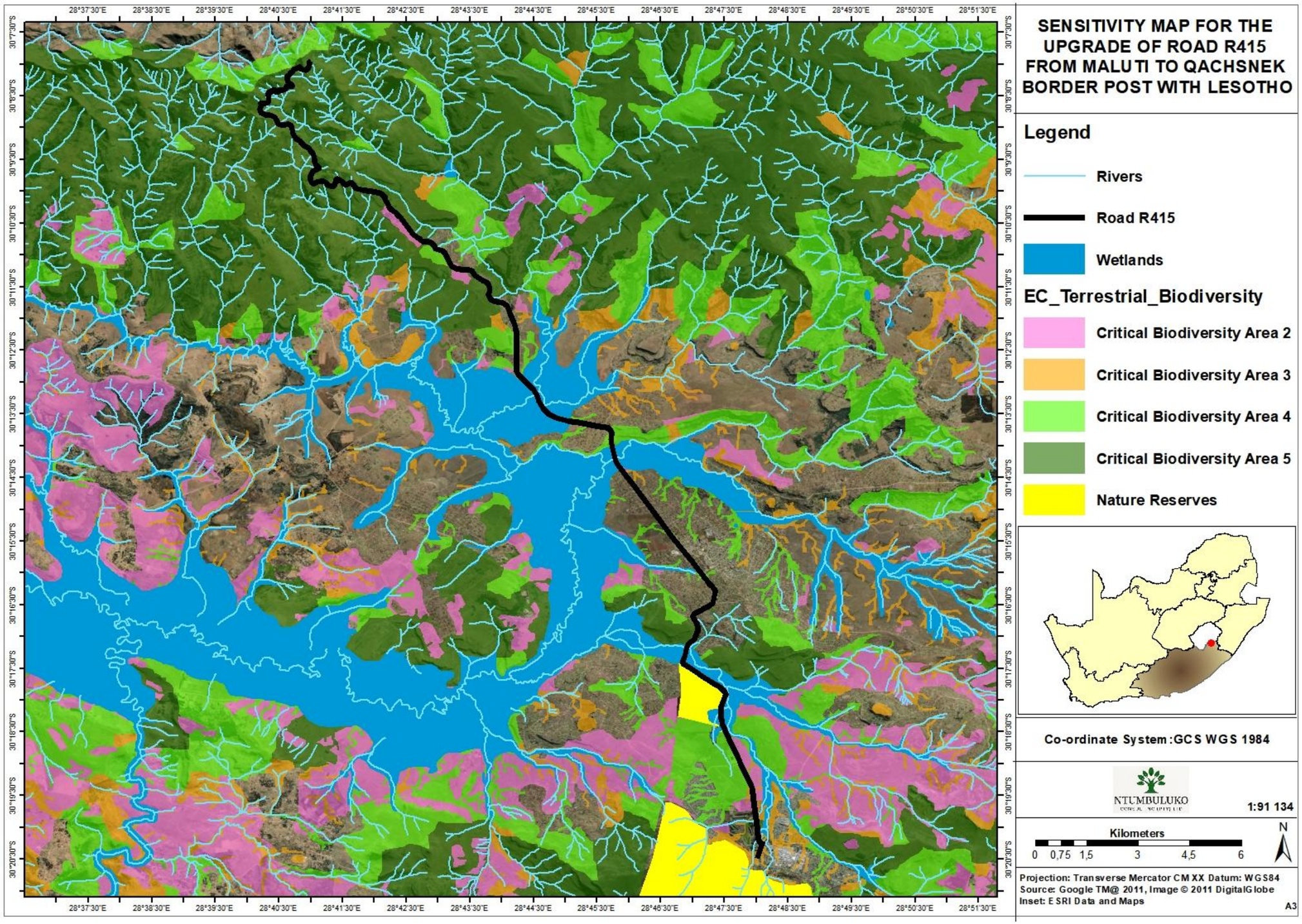


Figure 5-2: Sensitivity Map.

6. RESULTS

6.1 GENERAL OVERVIEW OF THE R415 BETWEEN MALUTI AND THE QACHA'S NEK BORDER POST WITH LESOTHO,

Field verification undertaken on 21 March 2026 confirmed the presence of four vegetation units within the broader project landscape, aligning with the patterns indicated by national-scale vegetation maps. While these units are distinguishable at the landscape level, their expression within the immediate road verge and road reserve is notably subdued.

The vegetation along the existing road and associated servitude presents as structurally and compositionally homogenised, with limited differentiation between mapped units (**Figure 6-1**). This reflects the influence of long-term anthropogenic disturbance rather than an absence of underlying ecological diversity in the surrounding landscape. The muted expression of vegetation variation is strongly associated with the historic and ongoing use of the road and its associated road reserve.

Although the road has existed since the late 1800s, its formal designation as the R415 is linked to the post-1994 national road reclassification process, with the most explicit legal declaration published in 2020. Over this extended operational period, the road and associate road reserve has been subjected to repeated disturbance, including vegetation clearing, slashing, grading, and the maintenance of drainage infrastructure (**Figure 6-1**). These activities have progressively altered the natural vegetation structure, resulting in a simplified and modified habitat state.

The majority of the proposed upgrade will take place within the East Griqualand Grassland (Gs 12) vegetation unit. This landscape is characterised by hilly terrain supporting mesic grassland, with scattered bush clumps occurring in localised microhabitats (**Figure 6-2**). In certain areas the road and associated reserve consists of Moist or waterlogged areas typically contain *Leucosidea sericea* (**Figure 6-3**), while drier or low-lying sites support woody species such as *Diospyros lycioides*, *Vachellia (Acacia) karroo*, and *Ziziphus mucronata* (**Figure 6-2**). These vegetation characteristics are clearly expressed within the adjacent land parcels; however, they are largely absent within the road and associated road reserve, where long-term disturbance has altered the natural vegetation structure.



Figure 6-1:Overview of the road with evidence of disturbance.



Figure 6-2: Overview of the indigenous vegetation adjacent the road servitude.



Figure 6-3; Vegetation observed along the waterlogged areas along the R415 road (30°14'10.38"S 28°45'45.83"E and 30°13'16.23"S 28°44'32.79"E).

6.2 GENERAL OVERVIEW OF THE R415 SECTION 1 (CH 6500 TO 6900)

The road is generally surrounded by wetland habitat, with extensive stands of Phragmites australis particularly prominent on the eastern and south-eastern sides of the road. From a terrestrial perspective, the road and its reserve have been significantly transformed by long-term road use, maintenance activities, and associated disturbance (**Figure 6-4**). The adjacent terrestrial areas support predominantly grass species, which were observed along the northern side of the road below the mountain slopes and within portions of the road reserve. These vegetation patterns reflect a landscape where wetland habitat dominates the immediate surroundings, while the terrestrial zone has been altered and simplified due to ongoing anthropogenic pressures.

The broader landscape is characterised by hilly terrain supporting mesic grassland, with scattered bush clumps occurring in localised microhabitats (**Figure 6-5**). Moist or waterlogged areas within the road reserve and adjacent land parcels typically support *Phragmites Australis* (**Figure 6-6**), while drier or low-lying sites are expected to contain woody species such as *Diospyros lycioides*, *Vachellia (Acacia*) karroo, and *Ziziphus mucronata*. However, these woody species were not recorded along the development footprint (existing road and associated road reserve), where vegetation is dominated almost entirely by grasses. Although these vegetation patterns are evident in the surrounding land parcels, they are largely absent within the existing road, where long-term disturbance has altered the natural vegetation structure and reduced ecological integrity.



Figure 6-4:Overview of the road with evidence of the grassland.



Figure 6-5: Overview of the indigenous vegetation adjacent the road and associated road reserve.



Figure 6-6; Vegetation observed along the waterlogged areas along the R415 road.

6.3 VEGETATION TYPES RECORDED ON SITE

The road servitude is predominantly characterised by secondary grassland resulting from prolonged road use, grazing pressure, and historical disturbance. Vegetation structure reflects a moderately degraded condition, with dominance by pioneer and disturbance-tolerant grass species. Along the adjacent mountain slopes toward the border pass, there is clear evidence of Acacia (*Vachellia/Senegalia*) species, occurring as scattered individuals and small clusters. These woody elements indicate localized encroachment within the broader grassland matrix. Several notable plant species observed within the servitude and surrounding areas are depicted below.

Table 6-1: Plant Species observed along the road servitude.

Eucalyptus spp.	Graminoid spp
	
Acacia mernsii	Nidorella podocephal
	

Additionally, the road reserve is predominantly characterised by secondary grassland that has developed as a result of prolonged road use, grazing pressure, and historical disturbance. The vegetation structure reflects a moderately degraded ecological condition, with a clear dominance of pioneer and disturbance-tolerant grass species, including the widespread ruderal species *Bidens Pilosa* (**Figure 6-7**). These patterns are typical of long-term anthropogenic disturbance within road reserves, where repeated soil compaction, edge effects, and ongoing maintenance activities suppress the establishment of more sensitive or late-successional grassland species.

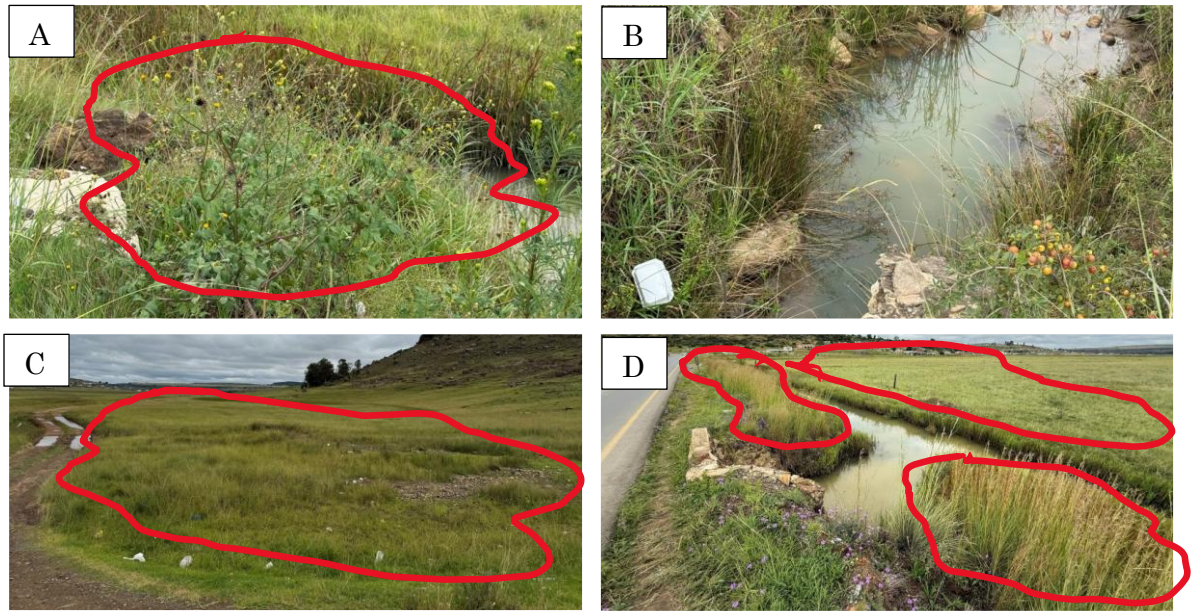


Figure 6-7: Plant Species observed along the road servitude including (A: *Bidens Pilosa*, B-C: Pioneer grass species and D: *Hyparrhenia hirta*).

6.4 ETHNOBOTANICAL PLANT SPECIES

Ethnobotany/ Ethnoecology is a branch of botany that focuses on the use of plants for medicines, cultural and recreational purposes. The overexploitation of indigenous plants for ethnobotanical purposes can be detrimental to populations of those particular plant species, and the other species that depend on its existence for their survival. South Africa has a rich diversity of medicinal plants that not only have a global significance but also have a cultural and historical role (van Wyk *et al.* 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors (Mazid *et al.*, 2012).

No plant species of recognised ethnobotanical or medicinal value were recorded within the development footprint (existing road and associated road reseve). This absence is consistent with the disturbed, secondary grassland condition resulting from prolonged road use and grazing pressure. In contrast, the areas adjacent to the existing road particularly along the mountain slopes are more structurally intact and are likely to support a variety of medicinal and culturally utilised plant species characteristic of the Drakensberg Grassland region. Although these areas fall outside the direct impact zone, they form part

of the broader ecological and socio-cultural landscape and should be acknowledged accordingly.

6.5 ALIEN INVASIVE SPECIES PRESENT ON SITE

An "invasive species" is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

No invasive alien plant species were recorded along the road during the site survey. However, *Eucalyptus* spp. and *Acacia mearnsii* (Black Wattle) were observed in the broader vicinity of the existing road. Both taxa are listed as invasive alien species under NEMBA, with *Acacia mearnsii* classified as Category 2 and *Eucalyptus* species generally falling under Category 1b or 2, depending on the specific taxon and land-use context. Their presence in the surrounding landscape indicates existing alien plant pressure, which may increase the risk of further spread if construction activities disturb adjacent vegetation.

6.6 FAUNAL ASSESSMENT

6.6.1 Amphibians

According on the IUCN Red List Spatial Data and AmphibianMap, 3 amphibian species are expected to occur within the area. None of these species are threatened.

Table 6-2: List of Herpetofuana species in the area.

Species Name	Common Name	Conservation Status
Sclerophrys pardalis	Eastern Leopard Toad	Least Concern
Hyperolius poweri complex	Eastern Coast Reed Frog	Not yet assessed
Cacosternum boettgeri	Boettger's Caco	Endangered

6.6.2 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 53 reptile species are expected to occur within the area. One (1) is regarded as threatened (**Table 6-3**).

Table 6-3: Threatened reptile species that are expected to occur within the proposed project area.

#	Scientific name	Common name	Conservation Status	Endemism	Likelihood of Occurrence
1	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	NT	Near-Endemic	Unconfirmed
2	*Cordylus cordylus*	Cape Girdled Lizard	Least Concern	-	High
3	*Chamaesaura anguina*	Cape Grass Lizard	Least Concern	-	High
4	*Pachydactylus spp*	Various Nama/Karoo Geckos	Least Concern (varies by species)	-	High
5	*Dendroaspis angusticeps*	Eastern Green Mamba	Least Concern	Vulnerable regionally)	Moderate
6	*Cryptactites peringueyi*	Peringuey's Leaf-toed Gecko	Least Concern	-	High
7	*Bitis arietans*	Puff Adder	Least Concern	-	High
8	*Chersobius boulengeri*	Karoo Dwarf Tortoise	Near Threatened	-	High

No reptile species were recorded during the site inspection. This is not unusual for the region, as reptile detectability is typically low during brief, daytime surveys and is

strongly influenced by weather conditions, season, and microhabitat availability. The disturbed nature of the road servitude characterised by compacted soils, regular human activity, and limited natural refugia further reduces the likelihood of encountering reptiles within the immediate development footprint.

However, the surrounding natural grassland and rocky slopes provide suitable habitat for common Drakensberg-associated reptile species, and occasional movement through the area cannot be ruled out.

6.7 AVIFUANA

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 120 bird species have the potential to occur in the vicinity of the project area. Of the potential bird species, nine (9) species are listed as SCC either on a regional or global scale (**Table 6-4**).

Table 6-4: List of bird species of regional or global conservation importance that are expected to occur in the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Afrotis afra	Korhaan, Southern Black	VU	VU	Low
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Low
Circus maurus	Harrier, Black	EN	VU	Low
Coracias garrulus	Roller, European	NT	LC	Low
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	Low
Neotis ludwigii	Bustard, Ludwig's	EN	LC	Low
Phoenicopterus roseus	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	VU	Low
Gyps coprotheres	Cape Vulture	EN	VU	Moderate

6.7.1 FIELD INVESTIGATION FINDINGS

The study area is located outside of any formally recognised Important Bird Area (IBA) and, therefore does not fall within a priority avifaunal conservation zone. However, the broader landscape particularly the neighboring properties containing natural grassland

and wetland habitat supports Medium to High avifaunal sensitivity, consistent with the ecological value of Drakensberg foothill systems.

A small number of common bird species were recorded during the site inspection, with most observations associated with the wetland and moist grassland patches present within the study area. Notably, Cattle Egrets (*Bubulcus ibis*) were observed foraging in close association with livestock (**Figure 6-8**), which is typical of their behaviour in pastoral landscapes. All avifaunal species recorded during the survey are classified as Least Concern by the IUCN and are considered common and widespread within the region.



Figure 6-8: Cattle egret observed onsite

No Species of Conservation Concern (SCC) were observed during the survey, and the disturbed nature of the road servitude limits the likelihood of SCC occurrence within the immediate development footprint. Nonetheless, the surrounding natural habitats may provide suitable foraging and movement corridors for a broader assemblage of grassland-associated bird species.

6.8 Mammals

The IUCN Red List Spatial Data lists 56 mammal species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Eight (8) of these expected species are regarded as threatened (**Table 6-5**), five of these have a low likelihood of occurrence based on the lack of suitable habitat in the project area.

Table 6-5; Threatened mammal species that are expected to occur within proposed project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	

Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Hystrix africaeaustralis	Cape Porcupine	LC	LC	Low
Orycteropus afer	Aardvark	LC	LC	High
Sylvicapra grimmia	Common (Grey) Duiker	LC	LC	High
Rhabdomys pumilio	Four-striped Grass Mouse	LC	LC	Moderate
Genetta tigrina	Large-spotted Genet	LC	LC	Low
Bunolagus monticularis	Riverine Rabbit	EN	CR	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Graphiurus ocularis	Spectacular Dormouse	NT	LC	Low
Leptailurus serval	Serval	NT	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa. The habitat in the project area is regarded as suitable for the species as such the likelihood of occurrence is rated as high.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. In the central part of the project area, mountainous habitat can be found that could be suitable. This species was confirmed present on site during the September 2021 assessment.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its

secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the project area and the likelihood of occurrence of this species is therefore considered to be moderate.

6.8.1 Field Investigation Findings

During the site inspection, multiple signs of medium-sized mammal activity were recorded within the study area. Evidence included grazing livestock(**Figure 6-9**). These observations indicate that the site and its surrounding natural veld provide suitable foraging habitat and movement corridors for these species. Their presence also reflects the broader ecological functioning of the area, particularly the availability of open grassland and shrubland patches that support small to medium herbivores.



Figure 6-9: Grazing livestock observed onsite.

6.9 INVERTEBRATES

Invertebrate diversity within the Matatiele area is shaped by the region's semi-arid grassland and karoo-transition habitats, which support a range of soil-dwelling and surface-active species. Typical assemblages include ants, beetles, spiders, and other detritivores that play key roles in nutrient cycling and soil turnover. Although invertebrate activity is often cryptic, field observations commonly reveal burrows, surface tracks, and foraging signs that indicate a functioning micro-faunal community adapted to the area's seasonal temperature and moisture fluctuations. **During the site, grasshopper and spiders species were observed onsite**.

6.9.1 Field Investigation Findings

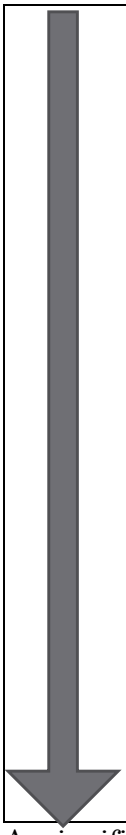
No invertebrate species were observed along the road or within the associated road servitude during the site inspection. This is expected given the disturbed and compacted nature of the road verge, which offers limited microhabitat diversity and reduced floral resources for invertebrate assemblages. The ongoing grazing, trampling, and road maintenance activities further diminish the likelihood of encountering notable invertebrate taxa within the immediate development footprint.

However, it is acknowledged that the broader landscape, particularly the adjacent natural grassland and wetland areas are likely to support a more typical assemblage of grassland-associated invertebrates, including pollinators, detritivores, and moisture-dependent taxa. No Species of Conservation Concern (SCC) or habitat features indicative of SCC invertebrates were recorded during the survey.

7. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

The impact assessment is aimed predicting potential impacts of the proposed projects. Impact assessment strives to avoid damage, loss of ecosystems services, and where they cannot be avoided, to reduce and mitigate these impacts (DEA, 2013). Offsets to compensate for loss of habitat are regarded as a last resort, after all efforts have been made to avoid, reduce and mitigate. The mitigation hierarchy is represented in **Table 7-1**.

Table 7-1: Mitigation hierarchy of impacts.

	**Avoid or prevent**	Refers to considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts, the activity should not take place. In such cases, it is unlikely to be possible or appropriate to rely on the other steps in the mitigation.
	Minimise	Refers to considering alternatives in the project location, sitting, scale, layout, technology and phasing that would minimise impacts on biodiversity, associated ecosystem services. In cases where there are environmental constraints, every effort should be made to minimise impacts.
	Rehabilitate	Refers to rehabilitation of areas where impacts are unavoidable, and measures are provided to return impacted areas to near natural state or an agreed land use after mine closure. Rehabilitation can, however, fall short of replicating the diversity and complexity of natural systems.
	Offset	Refers to measures over and above rehabilitation to compensate for the residual negative impacts on biodiversity after every effort has been made to minimise and then rehabilitate the impacts. Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity.

A significant portion of the road servitude with the remaining natural habitat is anticipated to be lost due to the proposed construction and associated activities. The impact of the proposed activity will involve a loss of habitat for both flora and fauna (**Table *7-2***).

7.1 GENERAL IMPACT ASSESSMENT

Table 7-2: Assessment of impacts associated with the proposed development.

CONSTRUCTION PHASE

IMPACT 1: LOSS OF VEGETATION (Approximately 30 hectares)
Cause and Comment ***Direct Impact*** The clearing of land for the construction will result in the loss of vegetation. However, vegetation clearance will only be restricted to the road servitude. Therefore, the clearance of vegetation required for the required soil material is likely to impact on the extent and long-term conservation of this vegetation type units onsite. The overall significance of the project activities at this site, provided the recommended mitigation measures are implemented, would be moderate negative. ***Cumulative Impact*** The bulk of the vegetation is still intact, with evidence of disturbance along certain sections of the road. The proposed development will have a negative impact on the vegetation onsite. The additional loss of vegetation as a consequence of the proposed development will therefore have a High cumulative impact. ***No-Go Alternative*** If the project does not go ahead, the current impacts associated with grazing will continue. However, these are relatively minor within the proposed site and as such, the No-go Alternative is classified as **low negative**.

Mitigation Measures:

- Construction vehicles and machinery must not encroach into identified 'sensitive' areas or areas outside the project footprint. Refer to **Figure *5-2***.
- Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).
- Only indigenous species must be used for rehabilitation. (Refer to **Table 5-1** for the full list of indigenous species).
- Lay down areas must not be located within any watercourses or drainage lines. Refer to **Error! Reference source not found.**
- Employees must be prohibited from making open fires during the construction phase.

- The Alien Invasive Management Plan should be compiled and implemented.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Available Site	Direct	Permanent	Study-Area	Moderate	Definite	**MODERATE (-)**	Reversible	Resource will be partly lost	Achievable	**MODERATE (-)**
Cumulative	Cumulative	Long-Term	Study-Area	Slight	Possible	**LOW (-)**	It is difficult to implement mitigation measures specific to the cumulative impacts as the applicant only has jurisdiction over their development and not over other developments or farming activities in the area.			**N/A**

							However, it is imperative that the applicant implement the mitigation measures listed above for the direct impacts.	
No-Go	Direct	Short-Term	Localised	Moderate	Probable	**LOW (-)**	**N/A**	

IMPACT 2: LOSS OF PLANT SPECIES OF CONSERVATION CONCERN

Cause and Comment

Direct Impact

The permanent loss of plant species of conservation (I.e *Boophone disticha and Hypoxis hemerocallidea*) may occur Some of these are restricted range species with small Areas of Extent. The severity of the impact will be of high significance if a population of one or more of these species is affected. However, if populations of these species are avoided by the careful placement of infrastructure, the impact can be reduced to moderate significance.

Cumulative Impact

(*Boophone disticha and Hypoxis hemerocallidea* amongst other SCC's have likely already been lost as a result of the existing development onsite. As such, the loss of SCC associated with the proposed activities will likely contribute to the cumulative loss of SCC within the region. However, if the mitigation measures as described in this report are implemented and adhered to, thisimpact can be reduced to moderate negative.

No-Go Alternative

The No-go alternative will not require the clearance of vegetation and will therefore not result in the loss of plant SCC. The no-go alternative is therefore **negligible**.

Mitigation Measures:

- A botanical walkdown is recommended before commencing with the construction to search for SCC's (I.e (*Boophone disticha and Hypoxis hemerocallidea*)Refer to **Error! Reference source not found.** for full list of SCC's). If populations of Vulnerable SCC are found, a permit must be obtained for their relocation to a similar habitat type within the site where they will not be disturbed.

Significance Assessment:

Impact	Nature	Duration	Extent	Severity	Likelihood	Significance Before Mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Significance After Mitigation
Both Layout Alternatives	Direct	Permanent	Study-Area	Severe	Definite	**HIGH (-)**	Reversible	Resource willbe partly lost	Achievable	**MODERATE (-)**
Cumulative	Cumulative	Long-Term	Study-Area	Severe	May Occur	**HIGH (-)**	Reversible	Resource willbe partly lost	Achievable	**MODERATE (-)**
No-Go	N/A					**NEGLIGIBLE**	**N/A**			

OPERATIONAL PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur. In addition, vehicular transport through the site may increase the risk of roadkill of fauna species that occur (**Table *7-3***).

Table 7-3: Loss of habitat during operation phase.

Loss of habitat					
Phase	**Operational**				
Criteria	**Details / Discussion**				
Description of impact	• Establishment of alien plant species in disturbed areas				
Mitigation required	• Manage alien invasive species establishment continually through chemical or mechanical removal. • Reinstate vegetation cover through concurrent rehabilitation • Erect signage to control the speed limit for trucks and other vehicles moving through the site				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)
Post Mitigation	Limited (1)	Minor (2)	Short-term (3-5 years) (3)	Likely (4)	Minor (negative) (24)

DECOMMISSIONING PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion is, however expected to occur as vehicles and machinery move throughout the site and disturb the soil (**Table *7-4***).

Table 7-4: Loss of habitat during decommissioning.

Loss of habitat	
Phase	**Decommissioning**
Criteria	**Details / Discussion**

Description of impact	• Removal infrastructure and equipment • Disturbance of the soil • Vehicle operation				
Mitigation required	• Minimise the impacted area and revegetate with indigenous where disturbed • Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation • Employ stormwater management measures				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***
Pre-Mitigation	Very Significant (7)	National (6)	Permanent (6)	Likely (6)	Major (negative) (115)
Post Mitigation	Significant (6)	National (6)	Short-term (3-5 years) (3)	Likely (6)	Minor (negative) (90)

POST CLOSURE PHASE

No direct loss of habitat is expected during this phase of the project. Alien plant invasion should be monitored for up to three years after closure (**Table 7-5**).

Table 7-5: Loss of habitat during post-closure phase.

Loss of habitat					
Phase	**Post-closure**				
Criteria	**Details / Discussion**				
Description of impact	• On-going establishment of alien plant species in disturbed areas				
Mitigation required	• Manage alien invasive species establishment continually through chemical or mechanical removal. • Revegetation of the site where previously disturbed.				
Parameters	***Intensity***	***Spatial scale***	***Duration***	***Probability***	***Significance***

Pre-Mitigation	Serious (4)	Limited (2)	Short-term (3-5 years) (3)	Likely (6)	Major (negative) (54)
Post Mitigation	Limited (1)	Minor (2)	Short-term (3-5 years) (3)	Likely (4)	Minor (negative) (24)

8. IMPACT STATEMENT, CONCLUSIONS AND RECOMMENDATIONS

The site inspection was conducted toward the end of the wet season, and while this timing allowed for good visibility of most grassland species, it is possible that certain plants, particularly those that flower earlier in the season or under specific environmental conditions may have been missed. However, because the proposed development will remain strictly confined to the existing road and associated servitude, a follow-up seasonal survey is not required. The available field data are sufficient to characterise the biodiversity features within the footprint and to inform the sensitivity mapping for the project.

This Terrestrial Biodiversity Impact Assessment was undertaken for the proposed improvement of a portion of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho. The road traverses four mapped vegetation units, although the majority of the alignment falls within the East Griqualand Grassland (Gs12) vegetation type, which is classified as Vulnerable. The remaining vegetation units intersected by the route are classified as Least Threatened.

Field verification conducted on 21 March 2026 confirmed the presence of four vegetation units within the broader landscape, consistent with national-scale vegetation maps. While these units are distinguishable at the landscape level, their expression within the immediate road verge and road reserve is subdued due to long-term anthropogenic disturbance. The vegetation along the R415 road and associated road reserve is structurally and compositionally homogenised, reflecting historical and ongoing road use, grazing pressure, and soil disturbance. Beyond the road reserve, the vegetation units become more clearly expressed and ecologically intact.

The road servitude is dominated by secondary grassland, characterised by pioneer and disturbance-tolerant grass species. Vegetation structure reflects a moderately degraded condition. Along the adjacent mountain slopes toward the border pass, scattered individuals and small clusters of Acacia (*Vachellia/Senegalia*) species were recorded, indicating localised woody encroachment within the broader grassland matrix.

No plant species of recognised ethnobotanical or medicinal value were recorded within the development footprint. This is expected given the disturbed condition of the servitude. However, the more intact areas adjacent to the road reserve particularly the mountain

slopes are likely to support a range of culturally utilised and medicinal species typical of the Drakensberg Grassland region. These areas fall outside the direct impact zone but form part of the broader ecological and socio-cultural landscape.

Spatial analysis indicates that the proposed R415 road upgrade traverses portions of Critical Biodiversity Area 5 (CBA 5) and CBA 2, highlighting the ecological importance of strictly confining all construction activities to the existing road reserve to prevent unnecessary loss of natural habitat. The road alignment also crosses two major wetlands that are closely associated with a perennial watercourse, further elevating the sensitivity of the receiving environment.

In addition, the R415 alignment occurs immediately adjacent to a designated nature reserve, with several sections running along the reserve boundary. This proximity increases ecological vulnerability, particularly in relation to edge effects, disturbance to faunal movement, potential encroachment into protected habitats, and the spread of alien invasive species. Although the project remains within the established road servitude, its adjacency to a protected area necessitates enhanced mitigation measures, strict demarcation of no-go zones, and careful management of construction activities to avoid both direct and indirect impacts on the reserve.

No invasive alien plant species were recorded within the road servitude during the site survey. However, *Eucalyptus* spp. and *Acacia mearnsii* (Black Wattle) were observed in the broader vicinity and should be monitored to prevent further spread.

No reptile species were recorded during the site inspection, which is not unusual given the brief survey duration, prevailing weather conditions, and limited microhabitat availability within the disturbed road verge. A small number of common bird species were observed, primarily associated with wetland and moist grassland patches. Cattle Egrets (*Bubulcus ibis*) were noted foraging alongside livestock. All avifaunal species recorded are classified as Least Concern and are common and widespread in the region.

Evidence of medium-sized mammal activity was recorded, including grazing livestock. These observations indicate that the surrounding natural veld provides suitable foraging habitat and movement corridors for generalist mammal species. No invertebrate species were observed within the road servitude, which is consistent with the disturbed and compacted nature of the footprint.

A significant portion of the remaining natural habitat within the road servitude is expected to be lost due to the proposed construction activities. This will result in the loss of habitat for both flora and fauna within the immediate footprint. To minimise impacts, the expansion of the road must remain strictly confined to the existing road reserve, thereby avoiding sensitive areas outside the servitude.

The sensitivity maps developed for this assessment should be used to guide the identification of no-go areas, and all activities in sensitive zones must be undertaken under the supervision of a qualified ecologist. The contractor must exercise heightened caution when working in the mountainous sections near Laingsburg, where ecological sensitivity is elevated.

9. STATEMENT AND OPINION OF THE SPECIALIST

The proposed upgrade of the R415 will be confined to the existing road reserve, limiting new habitat disturbance. The entire road is dominated by secondary, moderately degraded grassland with low ecological sensitivity and no recorded Species of Conservation Concern. Although sections of the alignment fall within CBA 5 and CBA 2, the degraded condition of the servitude means ecological function will not be compromised if the footprint is not expanded.

In line with NEMA Section 2 principles, the activity avoids unnecessary environmental harm, allows for impact minimisation, and supports sustainable development. The assessment also confirms compliance with NEMBA, as no Threatened or Protected Species (TOPS) or listed invasive species occur within the footprint, and no NEMBA permits are triggered.

With strict adherence to footprint control, ecological supervision, and the recommended mitigation measures, the project is considered environmentally feasible and consistent with both NEMA and NEMBA requirements.

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AQUATIC AND WETLAND DELINEATION STUDY FOR THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELA LOCAL MUNICIPALITY.





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AUGUST 2026

CONDITIONS RELATING TO THIS REPORT

DECLARATION OF INTEREST

Ntumbuluko Consulting Pty (Ltd) has no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Ntumbuluko Consulting Pty (Ltd) is not a subsidiary, legally or financially of the proponent. The study was undertaken by Mr Tshuxekani Maluleke, he is a registered Natural Scientists with the following details:

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27 August 2026

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LIST OF ABBREVIATIONS AND ACCRONYMS

BGIS: Biodiversity Geographic Information System

DEM: Digital Elevation Model

DWAF: Department of Water Affairs and Forestry

DWS: Department of Water Affairs and Sanitation

EA: Environmental Authorisation

EIS: Ecological Importance and Sensitivity

EMPr: Environmental Management Program

GIS: Geographic Information System

HGM: Hydrogeomorphic

NFEPA: National Freshwater Priority Area

NWA: National Water Act (Act no 36 of 1998)

PES: Present Ecological Status

QDS: Quarter Degree Square

SANBI: South African National Biodiversity Institute

TWQRs: Target Water Quality Ranges

WMA: Water Management Areas

WUL: Water Use Licence

TERMS OF REFERENCE

Ntumbuluko Consulting Pty (Ltd) was requested to conduct a wetland delineation of the wetland/s present on the study sites. This report includes the delineation and provides an assessment on the ecological state of these areas.

1. INTRODUCTION

Ntumbuluko Consulting (Pty) Ltd has been appointed by Earthlink Environmental Services (Pty) Ltd on behalf of the South African National Roads Agency SOC Ltd or SANRAL to conduct an Aquatic and wetland impact assessment of the proposed improvement of a portion of the R415 between Matatiele and the Qacha's Nek Border Post in the Eastern Cape Province. This investigation was undertaken as a component of the Environmental Impact Assessment (EIA) and the associated Environmental Management Plan (EMP). The report presents the findings of a wetland assessment and delineation, based on fieldwork conducted on **21 March 2026**.

The aquatic and wetland survey focused on a portion of the R415 between Matatiele and the Qacha's Nek Border Post in the Eastern Cape Province, specifically assessing the road servitude and the adjacent areas where the road intersects or influences wetland, riparian, and drainage features.

2. BACKGROUND

South African National Road Agency SOC Limited (SANRAL) proposes to upgrade Road R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, In the Eastern Cape Province within Alfred Nzo District Municipality, Matatiela Local Municipality. The project is situated on National Road R415, Section 1 between km 0 and km 32. The major aspects of this project include the following:

Matatiele to Qachas Nek Border post:

- Improve the road cross drainage along a section of the R415 (Bosola flood plain)
- upgrade the existing road to surface standard,
- relocation of existing services
- new prestressed bridge,
- general widening of the existing road cross section for climbing lanes and surfaced shoulders,
- vertical and horizontal geometric improvements,
- widening of existing river bridge and some major and minor culverts,

- 6.5m wide temporary deviation to accommodate two-way traffic during construction.
- Opening of 2 potential borrow pits.
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare.

3. SITE LOCATION

The South African National Roads Agency Soc Ltd (SANRAL) proposes to upgrade of the R415 Road between Matatiele and the Qacha's Nek Border Post in the Eastern Cape Province, in the Eastern Cape Province within Alfred NZO District Municipality, Matatiela Local Municipality (**Figure 3-1**). The road R415 Starting point Coordinates are (30°20'28.65"S 28°48'1.12"E), Middle point of the road (30°13'36.61"S 28°45'3.93"E) and End point of the road (30° 7'57.15"S 28°41'0.06"E).

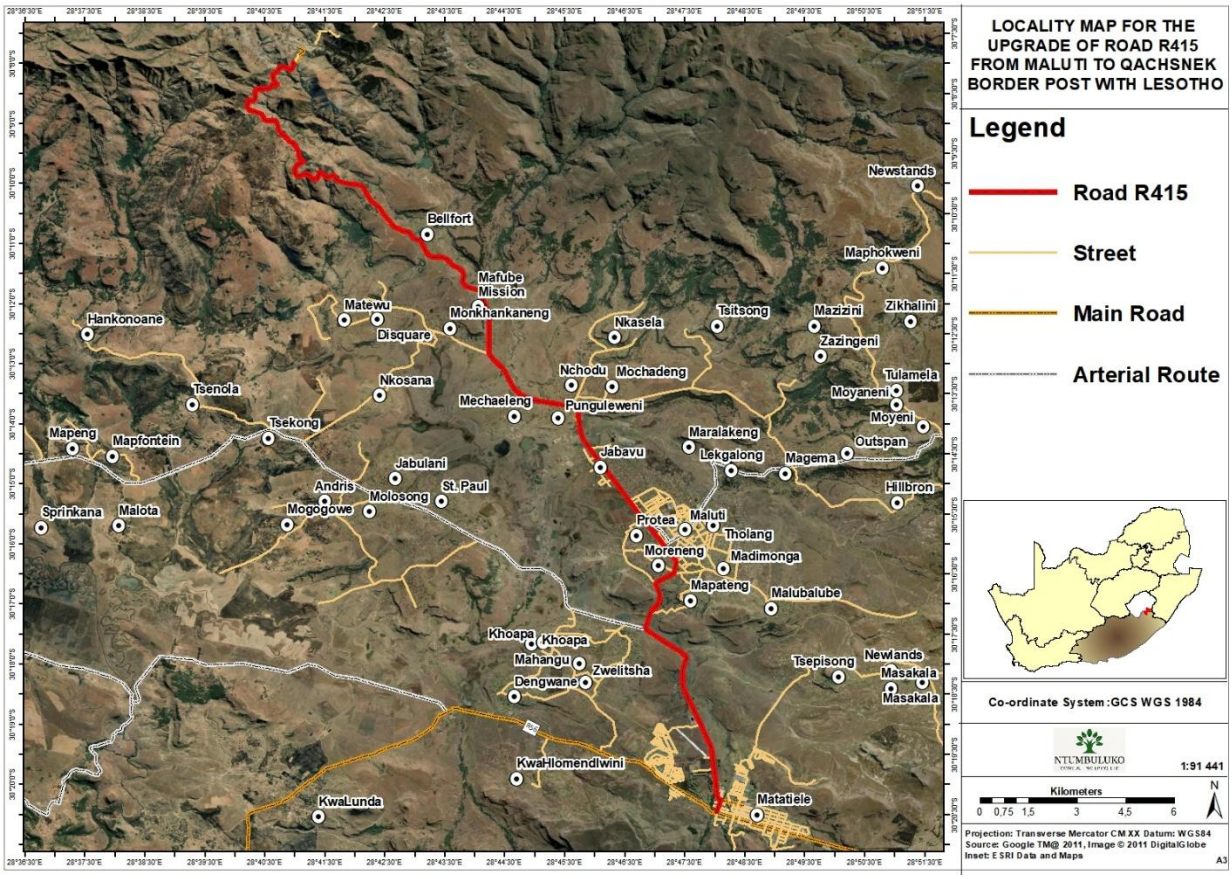


Figure 3-1: Locality Map

4. LEGAL FRAMEWORK

4.1 National Environmental Management Act (Act No. 107 of 1998)

The EIA Regulations, promulgated under NEMA, focus primarily on creating a framework for co-operative environmental governance. NEMA provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by State Departments and to provide for matters connected therewith.

4.2 National Waste Act, 2008 (Act No. 59 of 2008)

The NEMWA aims at promoting sustainable waste management practices through the implementation of "Integrated Waste Management Planning", where "Integrated Waste Management Planning is viewed as a holistic approach of managing waste, aimed at optimising waste management practises to ensure that the implementation thereof yields practical solutions that are environmentally, economically and socially sustainable and acceptable to the public and all relevant spheres of government".

4.3 National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways. Of specific importance to this application is Section 19 of the NWA, which states that an owner of land, a person in control of land or a person who occupies or uses the land which thereby causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring and must therefore comply with any prescribed waste standard or management practices.

Regulations GN 704 dated June 1999 under the NWA, 1998 (Act 36 of 1998) stipulates that no development activities may take place within the 1:100-year floodline of a watercourse, or within 100 m of the watercourse, whichever is the furthest.

Regulations GN 509 dated August 2016 under the Section 21 c and i water uses of the NWA, 1998 (Act No 36 of 1998) stipulates the:

"Extent of a watercourse" as:

(a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam.

"Regulated area of a watercourse" for section 21(c) or (i) of the Act water uses in terms of this Notice means:

(a) The outer edge of the 1 in 100-year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
(b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
(c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

4.4 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.

5. SCOPE OF WORK

5.1 Wetland Delineation and Assessment

The scope of work entailed the following:

- Field visit to delineate the outer boundary of wetland/riparian habitats within a 500 m buffer from the existing R415 road according to the methods contained in the manual 'A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas' (DWAF, 2005);

- Assess and describe the health of any wetland units identified, through evaluation of indicators based on geomorphology, hydrology and vegetation as per the WET-Health methods;
- Assess and describe the Ecological Services, Importance and Sensitivity (EIS) of any wetlands identified on site;
- Identify potential negative impacts on the wetland(s) within the entire study site and assess the significance of these impacts;
- Provide recommended mitigation measures for the identified impacts in order to avert or lower the significance of the negative impacts.

6. ASSUMPTIONS AND LIMITATIONS

- In order to obtain a comprehensive understanding of the dynamics of the wetland habitats of the study area, surveys should ideally have been replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible and this survey was conducted in one season during a once-off site visit.
- Data collection in this study relied heavily on data from representative, homogenous wetland sections, as well as general observations, analysis of satellite imagery from the past until the present, generic data and a desktop analysis.
- No formal water quality or aquatic faunal assessments (e.g., SASS 5) were conducted as part of this study. All comments on these subjects were made from estimations of the current, visible situation in the field.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

7. METHODOLOGY

7.1 Wetland Assessment

For the purpose of this assessment, wetlands are considered as those ecosystems defined by the National Water Act No. 36 of 1998 as:

"Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

7.1.1 Desktop Assessment

Examination of the National Freshwater Ecosystem Priority Areas (NFEPA)'s databases were undertaken for the project. The NFEPA project aims to produce maps which provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or FEPAs. FEPAs are determined through a process of systematic biodiversity planning and involved collaboration of over 100 freshwater researchers and practitioners. They are identified based on a range of criteria dealing with the maintenance of key ecological processes and the conservation of ecosystem types and species associated with rivers, wetlands and estuaries (MacFarlane et al., 2009).

The assessment of the study site involved the investigation of aerial photography, GIS databases including the NFEPA and South African National Wetland maps as well as literature reviews of the study site in order to determine the likelihood of wetland areas within this site.

7.1.2 Field Assessment

The wetland delineation was conducted as per the procedures described in 'A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas – Edition 1' (Department of Water Affairs, 2005) (**Figure 7-1**). This document requires the delineator to give consideration to four indicators in order to find the outer edge of the wetland zone:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur.
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation. Signs of wetness are characterised by a variety of aspects. These include marked variations in the colours of various soil components, known as mottling; a gleyed soil matrix or the presence of Mn/Fe concretions. It should be noted that the presence of signs of

wetness within a soil profile is sufficient to classify an area as a wetland area despite the lack of other indicators.

In assessing whether an area is a wetland, the boundary of a wetland or a non- wetland area should be considered to be the point where the above indicators are no longer present. An understanding of the hydrological processes active within the area is also considered important when undertaking a wetland assessment. Indicators should be 'combined' to determine whether an area is a wetland, to delineate the boundary of that wetland and to assess its level of functionality and health.

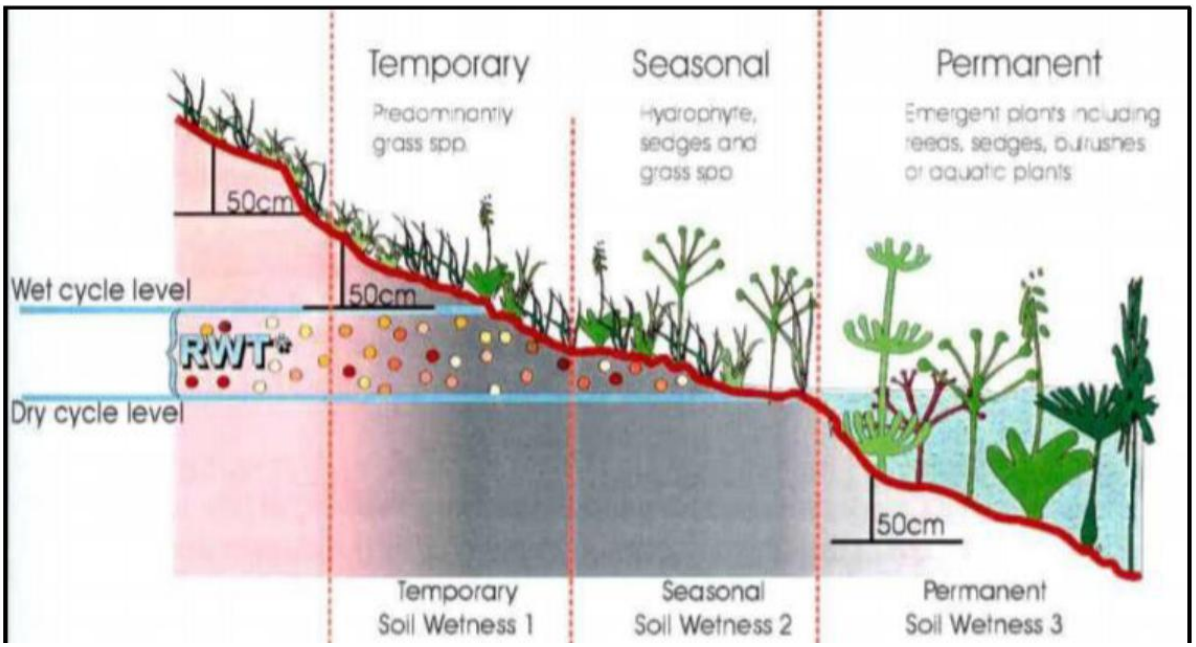


Figure 7-1: Different zones of wetness found in wetlands, indicating how the soil wetness and vegetation indicators change (DWAF, 2005).

7.1.3Wetland Functionality and Health

Wetlands within the study area serve to improve habitat within and potentially downstream of the study area through the provision of various ecosystem services. Many of these functional benefits contribute directly or indirectly to increased biodiversity within the transformed study area as well as downstream of the study area through provision and maintenance of appropriate habitat and associated ecological processes (**Table 7-1**).

Table 7-1: Ecosystem services provided by wetlands (Kotze et al, 2008).

Ecosystem services supplied by wetlands	Indirect benefits	Regulating and supporting benefits	Flood attenuation		The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream.
			Streamflow regulation		Sustaining streamflow during low flow periods.
			Water quality enhanced benefits	Sediment trapping	The trapping and retention in the wetland of sediment carried by runoff waters
				Phosphate assimilation	Removal by the wetland of phosphates carried by runoff waters.
				Nitrate assimilation	Removal by the wetland of nitrates carried by runoff waters.
				Toxicant assimilation	Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff waters.
				Erosion control	Controlling of erosion at the wetland site, principally through the protection provided by vegetation.
			Carbon storage		The trapping of carbon by the wetland, principally as soil organic matter.
	Biodiversity Maintenance				Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity of the surrounding area.
	Direct benefits	Provisioning benefits	Provision of water for human use		The provision of water extracted directly from the wetland for domestic, agriculture or other purposes.
			Provision of harvestable resources		The provision of natural resources from the wetland, including livestock grazing, craft plants, fish, etc.
			Provision of cultivated foods		The provision of areas in the wetland favourable for the cultivation of foods.
		Cultural benefits	Cultural heritage		Places of special cultural significance in the wetland, e.g., for baptisms or harvesting of culturally significant plants.
			Tourism and recreation		Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife.
	Education and research				Sites of value in the wetland for education or research.

An indication of the functions and ecosystem services provided by wetlands can be assessed through the WET- Ecoservices manual (Kotze et al., 2008) and are based on a number of characteristics that are relevant to the particular benefit provided by the wetland. A Level 2 WET-Ecoservices assessment was undertaken for the wetlands occurring on site. A Level 2 assessment is the highest form of WET-Ecoservices assessment that can be undertaken and involves an on-site and desktop assessment.

Each wetland's ability to contribute to ecosystem services within the study area is further dependant on the particular wetland's Present Ecological State (PES) in relation to a benchmark or reference condition. A Level 2 Wetland Health assessment was conducted on the wetlands delineated as per the procedures described in 'Wet- Health: A technique

for rapidly assessing wetland health' (MacFarlane et al., 2009). This document assesses the health status of a wetland through evaluation of three main factors –

Hydrology: defined as the distribution and movement of water through a wetland and its soils.

Geomorphology: defined as the distribution and retention patterns of sediment within the wetland.

Vegetation: defined as the vegetation structural and compositional state.

The WET-Health tool evaluates the extent to which anthropogenic changes have impacted upon wetland functioning or condition through assessment of the above-mentioned three factors. Scores range from 0 indicating no impact to a maximum of 10 which would imply that impacts had completely destroyed the functioning of a particular component of the wetland. Impact scores obtained for each of the modules reflect the degree of change from natural reference conditions (**Table *7-2***).

Table 7-2: Guideline for interpreting the magnitude of impacts on wetland integrity.

IMPACT CATEGORY	DESCRIPTION	RANGE
None	No discernible modification or the modification is such that it has no impact on wetland integrity.	0 – 0.9
Small	Although identifiable, the impact of this modification on wetland integrity is small.	1 – 1.9
Moderate	The impact of this modification on wetland integrity is clearly identifiable, but limited.	2 – 3.9
Large	The modification has a clearly detrimental impact on wetland integrity. Approximately 50% of wetland integrity has been lost.	4 – 5.9
Serious	The modification has a clearly adverse effect on this component of habitat integrity. Well in excess of 50% of the wetland integrity has been lost.	6 – 7.9
Critical	The modification is present in such a way that the ecosystem processes of this component of wetland health are totally / almost totally destroyed.	8– 10

The tool evaluates the health of the wetland and is determined by a score known as the Present Ecological Score. The health assessments for the hydrology, geomorphology and vegetation components were then represented by the Present Ecological State (PES) categories. The PES categories are divided into six units (A-F) based on a gradient from

"unmodified/natural" (Category A) to "severe/complete deviation from natural" (Category F) as depicted in **Table 7-3**.

Table 7-3: Health categories used by WET-Health for describing the integrity of wetlands.

DESCRIPTION	IMPACT SCORE	HEALTH CATEGORY
Unmodified, natural.	0 – 1.0	A
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.1 - 2.0	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2.1 - 4.0	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4.1 - 6.0	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6.1 - 8.0	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.1 - 10.0	F

Since hydrology, geomorphology and vegetation are interlinked their scores have been aggregated to obtain an overall PES health score using the following formula (MacFarlane et al., 2009):

Health = ((Hydrology score) x3 + (Geomorphology score) x2 + (Vegetation score) x2)) ÷ 7

This gives a score ranging from 0 (pristine) to 10 (critically impacted in all respects). Hydrology is weighted by a factor of 3 since it is considered to have the greatest contribution to wetland health. Due to differences in the pattern of water flow through various hydro-geomorphic (HGM) types (**Figure *7-2***), the tool requires that the wetland is divided into distinct HGM units at the outset. Ecosystem services for each HGM unit are then assessed separately.

Each HGM unit is discussed on the following pages in more detail in terms of the functional integrity, Present Ecological Score and the impacts which affect these.

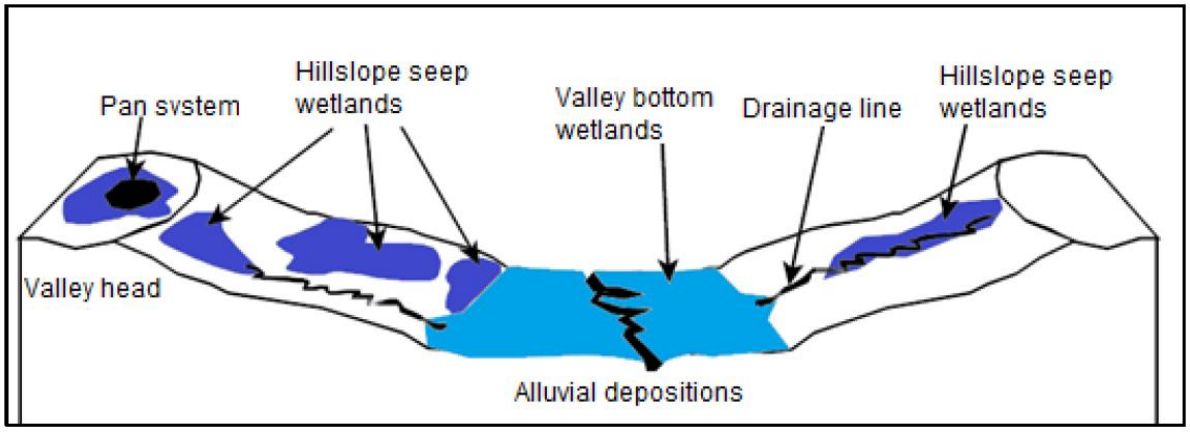


Figure 7-2: Diagrammatic representation of common wetland systems identified in Southern Africa (based on Kotze et al., 2008).

7.2 Risk Assessment to Watercourses

The risk assessment was conducted in accordance with the DWS risk-based water use authorisation approach and delegation guidelines.

The matrix assesses impacts in terms of consequence and likelihood. Consequence is calculated based on the following formula:

Consequence = Severity + Spatial Scale + Duration

Whereas likelihood is calculated as:

Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection.

Significance is calculated as:

Significance \Risk= Consequence x Likelihood.

Each metric of the severity (flow regime, water quality, geomorphology, biota and habitat) and spatial scale, duration, frequency of the activity, frequency of the incident/impact and detection are rated to a 1 to 5 scale (GNR 509, of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as Defined in Section 21(C) or Section 21(I), 2016). The score is then placed into one of the three classes, with low risks to the watercourse will qualify for a General Authorisation (GA). Medium and high-risk activities will require a Section 21(C) and (I) water use licence as per the National Water Act of 1998 (**Table *7-4***).

Table 7-4: Significance of the Section 21 C and I ratings matrix as prescribed by the National Water Act 1998 (Act No. 36).

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

8. ENVIRONMENTAL BASELINE INFORMATION

8.1 GEOLOGY & SOILS

The majority of the road alignment is underlain by mudstones and sandstones of the Beaufort Group within the Karoo Supergroup, with additional exposures of the Molteno, Elliot, and Clarens Formations occurring along the route. These sedimentary units typically give rise to well-drained soils with depths ranging from 500–800 mm and clay contents of 15–55%. Dominant soil forms associated with these parent materials include Hutton, Clovelly, and Oatsdale, while Shortlands soils occur where dolerite intrusions are present. The prevailing land types in these sections are Fa and Ac.

Towards the mountainous areas near the Lesotho border, the geology transitions to Clarens Formation sandstones, as well as sandstones, siltstones, and mudstones of the Elliot Formation, both belonging to the Stormberg Group of the Karoo Supergroup. These are overlain in places by the basaltic lava flows of the Drakensberg Group. Soils on the steep escarpment slopes are typically deep, fine-grained, and characteristic of land types Fa, Fb, and Ea, reflecting the high rainfall and erosional dynamics of the region.

The central portion of the road traverses areas underlain by Tarkastad Subgroup mudstones and sandstones in the east, with Molteno and Elliot Formation sandstones and minor mudstones occurring towards the west. These geological units form part of the broader Karoo Supergroup. In this section, the dominant soils are poorly drained, generally 200–300 mm deep, with clay contents below 15%. These are classified primarily as Katspruit and Longlands soil forms, with Oatsdale, Vimy, and Clovelly occurring in better-drained areas. The most common land types in this zone are Ia and Ca.

8.2 CLIMATE

The region experiences predominantly summer rainfall, with a mean annual precipitation (MAP) of approximately 780 mm, ranging from 620–816 mm across the broader Matatiele area. Kokstad, the nearest long-term weather station, records an average of 88 rain days per year, with only three of these occurring during mid-winter (June–July). Rainfall is largely convective in nature, with thunderstorms accounting for approximately 45 rain days annually. Both mist and snow occur, although less frequently than in the Gd 4 Southern Drakensberg Highland Grassland, with Kokstad recording an average of 26 misty days per year.

Mean annual temperature (MAT) ranges from 12.9–15.6°C, with an overall regional MAT of approximately 14.7°C. Moderately severe frost is common, occurring on roughly 30 days per year, particularly in valley bottoms and high-lying areas. Mean annual evaporation is relatively high, ranging between 1 457–1 723 mm (Camp 1999b), which contributes to seasonal moisture deficits despite the relatively high rainfall.

8.3 EASTERN CAPE CONSERVATION PLAN (ECBCP, Ver 2, 2019)

According to the Eastern Cape Biodiversity Conservation Plan (ECBCP, Version 2, 2019), adopted by the competent authority, the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), all land within the province is systematically classified based on its importance for achieving provincial biodiversity conservation targets. The ECBCP uses five primary categories to guide land-use planning and environmental decision-making: Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA), Protected Areas (PA) and No Natural Habitat Remaining (NNR). These categories reflect the ecological value, sensitivity, and functional role of each landscape unit, and are directly used by DEDEAT to determine the level of acceptable transformation and the need for biodiversity safeguards during development.

Spatial analysis of the proposed road upgrade indicates that more than 50% of the alignment falls within a Critical Biodiversity Area 5 (CBA 5), which represents land essential for maintaining biodiversity pattern and ecological processes at a provincial scale. The route also intersects two sections of CBA 2, highlighting areas of even higher conservation priority where natural habitat is required to remain largely intact to meet conservation targets (Figure 8-1).

In addition, the alignment crosses or lies adjacent to several NFEPA-mapped wetlands, which are recognised as nationally important freshwater ecosystems and contribute to regional hydrological functioning (Figure 8-1).

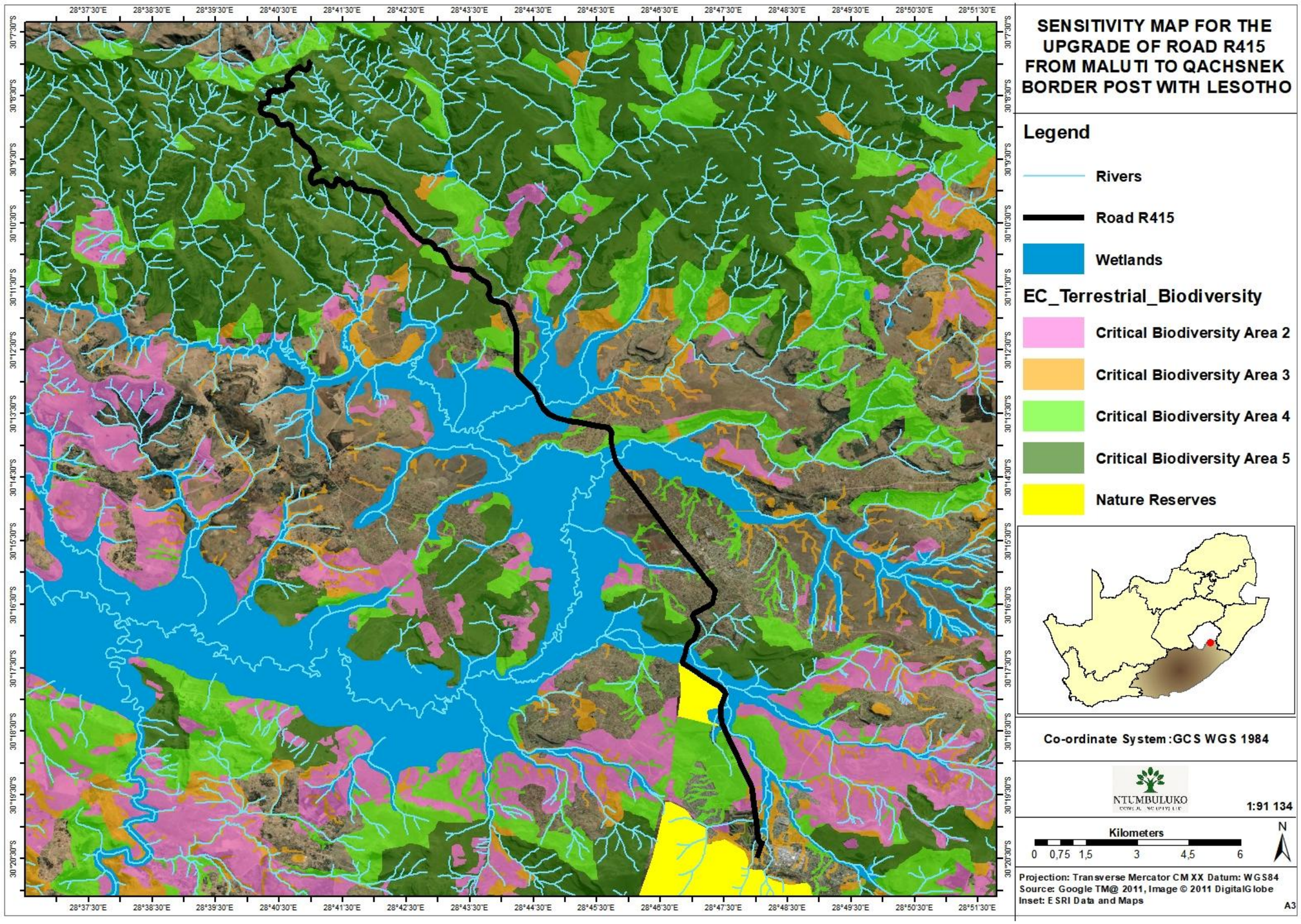


Figure 8-1: Sensitivity Map.

8.4 SURFACE HYDROLOGY

The aquatic sensitivity of the proposed site is classified as **VERY HIGH** in the Screening Report, which was confirmed to be "Very High" due to the watercourses within 500m of the road upgrade (**Figure 8-2**). The National Freshwater Ecosystems Priority Areas (NFEPA) identifies important wetlands in South Africa (**Figure *8-3***). The National Freshwater Ecosystem Priority Areas (NFEPA) framework identifies strategically important freshwater ecosystems across South Africa, including rivers, wetlands, and catchments that are critical for maintaining ecological integrity and water resource sustainability.

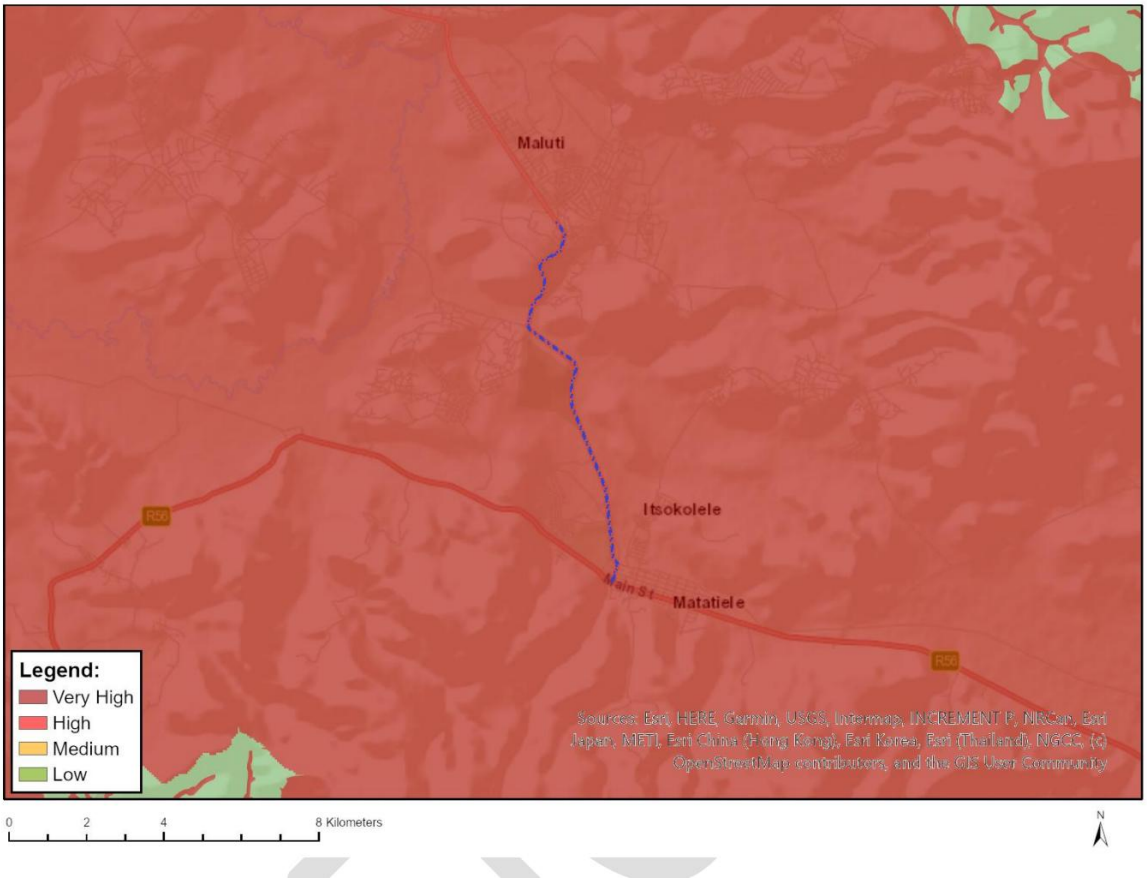


Figure 8-2: Map of relative aquatic biodiversity theme sensitivity

The study area is located within the Mzimvubu to Keiskamma Water Management Area (WMA), falling specifically under the Mzimvubu Sub-Water Management Area. This region is widely recognised for its high ecological integrity, steep catchment gradients, and sensitive hydrological networks that play a critical role in sustaining downstream river systems (**Figure 8-3**). The proposed road upgrade traverses the upper portion of quaternary catchment T33A, which forms part of the headwater catchments feeding the

Mzimvubu River. These headwater systems are particularly important for maintaining baseflows, sediment regulation, and the ecological functioning of wetlands and riparian zones within the broader landscape.

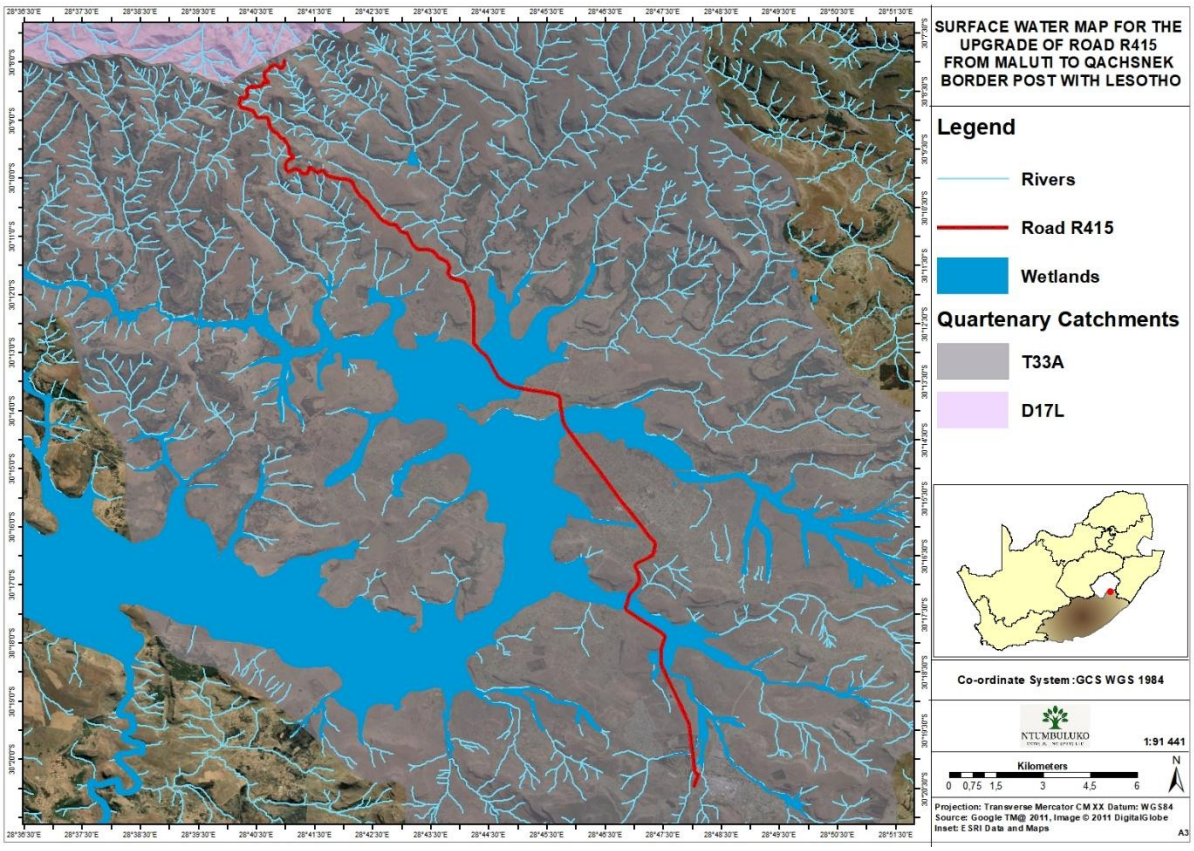


Figure 8-3:Surface Water Map.

8.4.1Overview of the Quaternary Catchments T33A

These catchments form part of the Mzimvubu to Keiskamma Water Management Area (WMA), specifically within the Mzimvubu Sub-Water Management Area, a region known for its ecological sensitivity, high rainfall, and complex terrain. T33A forms part of the upper catchments of the Mzimvubu River system, within the Mzimvubu to Keiskamma Water Management Area. Quaternary Catchment T33A plays an important hydrological role as a headwater catchment, sustaining downstream flows, regulating sediment movement, and supporting the ecological functioning of the Mzimvubu River system. The catchment is characterised by steep to moderately sloping terrain typical of the Drakensberg foothills, which promotes rapid surface runoff and increases erosion risk where vegetation cover is disturbed. The area receives summer-dominant rainfall, resulting in the formation of seasonal wetlands, hillslope seepage zones, and numerous small drainage lines that respond quickly to rainfall events. T33A supports a network of

non-perennial streams, hillslope seep wetlands, valley-bottom wetlands, and shallow depressional features, all of which rely on intact soils and vegetation for hydrological stability and are sensitive to disturbance. Much of the catchment retains moderate to high ecological integrity, with natural grassland cover contributing to infiltration, baseflow maintenance, and wetland functioning. However, the catchment is subject to several land-use pressures, including subsistence agriculture, livestock grazing, rural settlement expansion, and road infrastructure, which collectively increase erosion potential, alter runoff patterns, and degrade wetland margins if not properly managed.

These catchments are integral to maintaining hydrological connectivity, wetland functionality, and ecosystem services in the region (**Figure 8-4**).

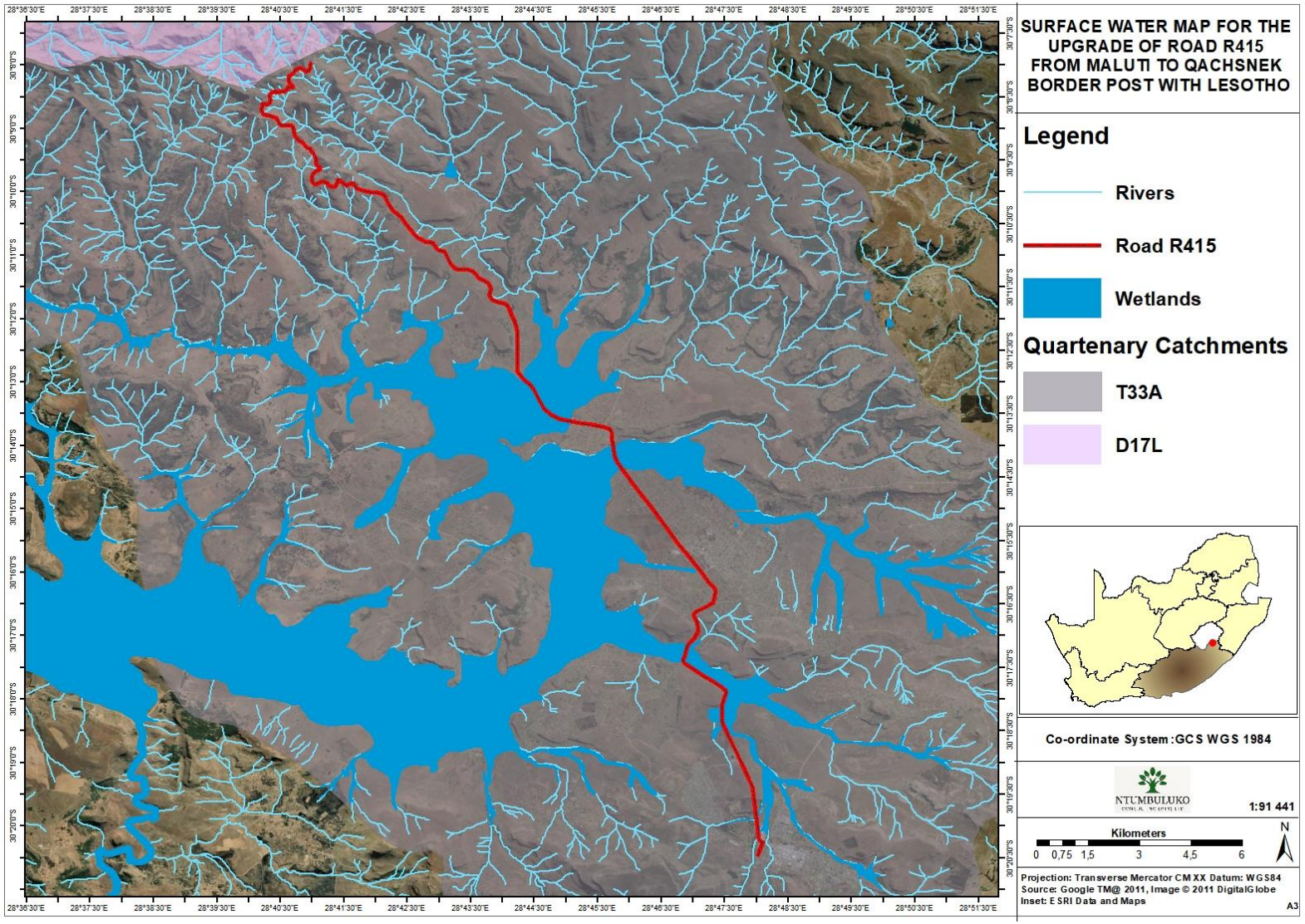


Figure 8-4: Surface Water Map 1.

9. WETLAND DELINEATION RESULTS

This section provides the findings of the various methodologies utilised during the wetland assessment.

9.1 DESKTOP ASSESSMENT

An examination of the National Freshwater Ecosystem Priority Areas (NFEPA) database was undertaken to assess the freshwater sensitivity of the study site. The analysis revealed a network of watercourses distributed throughout the proposed road servitude, many of which intersect or lie in close proximity to mapped proposed development.

The proposed road upgrade intersects multiple seasonal (non-perennial) watercourses, as well as a perennial system Kinira River) and their associated floodplain wetlands. These features were identified using NFEPA spatial data and subsequently verified during field survey. These wetlands and watercourses, some of which are non-perennial, form part of the broader hydrological network supporting the upper Mzimvubu catchment. Several of these features were directly observed during the site inspection conducted on 21 March 2026 (**Figure 9-1**).

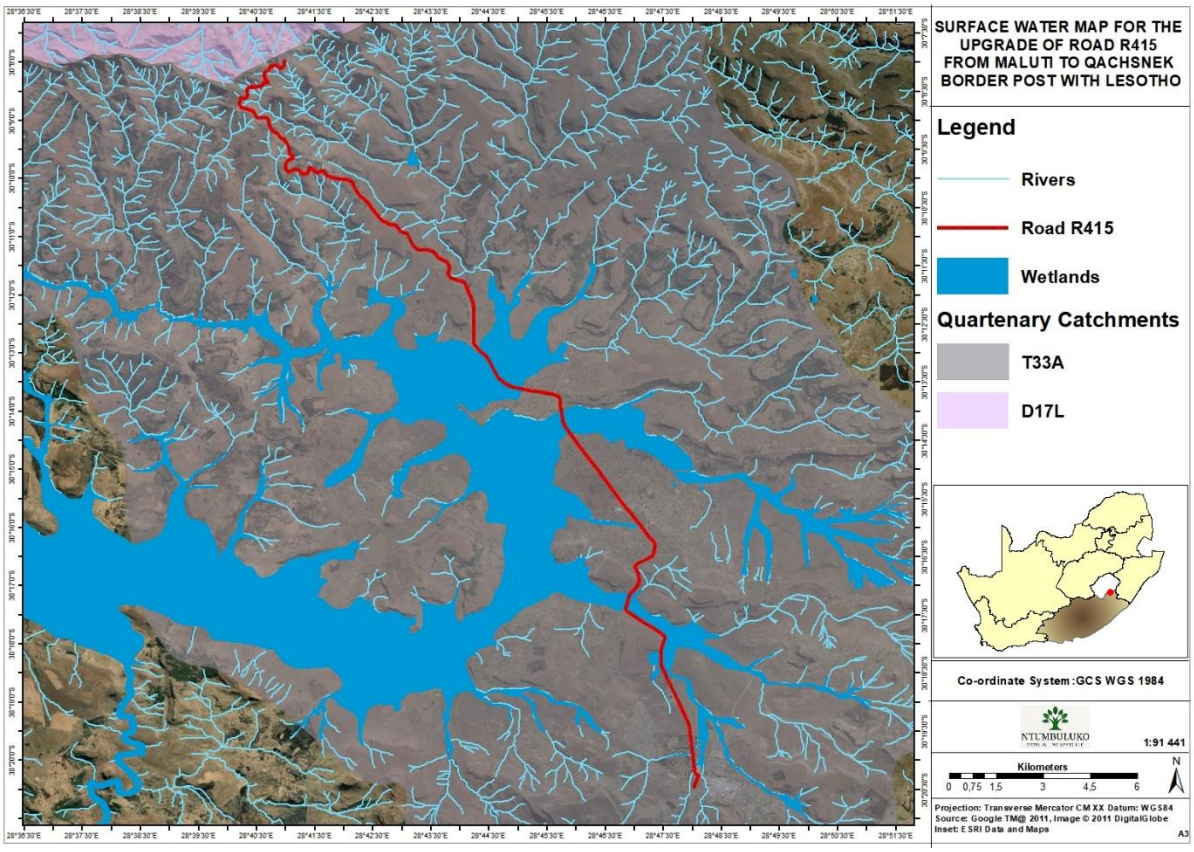


Figure 9-1: Wetland Delineation Map

9.2 FIELD SURVEY

The proposed development is situated within a mountainous terrain, predominantly characterised by a rural landscape with clear evidence of subsistence farming practices, communal grazing, and scattered homesteads (**Figure 9-2**).



Figure 9-2: Overview of the site.

During the site inspection, multiple watercourses were observed traversing the existing R415 road. These included several non-perennial streams that flow seasonally or in direct response to rainfall events, as well as a the Kinira river that maintain flow throughout the year. In addition, the river supports two large wetlands (floodplain). These aquatic systems form part of the broader hydrological network of the upper Mzimvubu catchment and play an important role in regulating local flow pathways, sediment transport, and ecological functioning (**Figure 9-3**).



Figure 9-3: Wetlands and watercourses observed onsite.

Field observations conducted along R415 Section 1 (Chainage 6500–6900) confirm that this approximately 400 m stretch of the road is situated entirely within a wetland system. The existing tarred road platform bisects the wetland, with residential and informal development occurring along the southern edge of the road section and portions of the north-eastern side (**Figure 9-4**). The placement of the road within the wetland has resulted in visible hydrological alteration, including disrupted surface flow pathways, localised ponding, and changes in soil saturation patterns. These conditions were clearly evident during the site inspection and reflect long-term modification of wetland functioning associated with the road embankment and adjacent land-use activities (**Figure 9-4**).



Figure 9-4: Overview of the R415 Section 1 Ch 6500 and 6900 with evidence of development/ disturbance.

During the site inspection, the Botsola River and its associated wetland system were clearly observed along this section of the R415. To facilitate the movement of water across the wetland, the existing road has been fitted with several culverts that connect the wetland system on either side of the road. Evidence of active surface flow within the watercourse, as well as localised ponding throughout the approximately 400 m stretch, was recorded during the assessment. These hydrological conditions confirm the presence of a functioning aquatic system, sustained by both the perennial flows of the Botsola River and the accumulation of rainfall within the wetland landscape (**Figure 9-5**).



Figure 9-5: Wetlands and watercourses observed onsite.

9.2.1WETLAND FEATURES

Hydrological observations indicate the presence of seasonal and possibly perennial wetland features exhibiting saturated soils and standing water indicative of palustrine systems. Vegetation within these systems includes dominant hydrophytic species such as Sedges, confirmed in **Figure 9-6**. This species plays a critical role in stabilizing wetland margins, enhancing water quality through sediment filtration, and providing nesting and roosting habitat for a range of avifaunal species, including wetland-dependent birds.



Figure 9-6: Sedges observed onsite.

A perennial river was observed along the R415 road during the site inspection. This river forms an integral part of the local catchment system, contributing to surface water flow, groundwater recharge, and downstream hydrological connectivity (**Figure 9-7**). The river supports a thriving ecosystem, characterised by riparian vegetation, aquatic habitat diversity, and ecological processes essential for biodiversity conservation and water quality regulation. Its perennial nature indicates a consistent flow regime, which enhances its role in sustaining both natural ecosystems and rural livelihoods dependent on water access.



Figure 9-7: Active perennial river (Kinira river).

The riparian grasses, predominantly sedges, appear to be actively grazed by cattle, indicating ongoing livestock access and utilisation of the watercourse. Within the project footprint, three watercourse crossings exhibit clear evidence of sedimentation, litter, and diffuse pollution inputs. These conditions reflect the stream's role in supporting surrounding community livelihoods, while simultaneously raising concerns regarding water quality degradation, habitat disturbance, and cumulative pollution risks (**Figure 9-8**). Collectively, these observations highlight the need for integrated catchment management interventions, including invasive species control, protection and restoration of riparian buffer zones, and community-centred engagement strategies to balance ecological sustainability with local resource use.



Figure 9-8: Crossing observed with the study area.

Additionally, the presence of seasonal and perennial wetland features exhibiting saturated soils and standing water indicative of palustrine systems were observed along the road. Vegetation within these systems includes dominant hydrophytic species such as Phragmites australis (common reed), confirmed in **Figure 9-9**. This species plays a critical role in stabilizing wetland margins, enhancing water quality through sediment filtration, and providing nesting and roosting habitat for a range of avifaunal species, including wetland-dependent birds.



Figure 9-9: Reeds observed within one of site.

The Botsola River was observed to be flowing during the site inspection, with clear evidence of sedimentation within the watercourse. This river forms an integral component of the local catchment system, contributing to surface water flow, groundwater recharge, and downstream hydrological connectivity (**Figure 9-10**). The system supports a functioning aquatic ecosystem characterised by riparian vegetation, diverse aquatic habitats, and ecological processes that play a critical role in biodiversity conservation and water-quality regulation. Its perennial nature reflects a consistent flow regime, which enhances its importance in sustaining both natural ecological functioning and the rural communities that rely on the river for water access and associated ecosystem services.



Figure 9-10: Active perennial river (Botsola).

9.2.2 Terrain indicator

- The road alignment passes through mountainous and hilly terrain, with frequent changes in elevation.
- Slopes range from gentle inclines in plateau areas to steep escarpments, particularly near river valleys and coastal ridges.
- In certain sections, slope angles exceed 20–30 degrees, requiring engineered stabilization measures.

The over of the terrain is depicted in **Figure 9-11.**



Figure 9-11: Overview of the slope of the road.

9.2.3 Soil wetness and soil form indicator

The watercourses onsite have water and support a host of hydrophytes and terrestrial plant species. Wetland areas were identified and mainly delineated according to the presence of hydric (wetland) soil types. Hydric soils are defined as those which show characteristics (redoximorphic features). The watercourses consist mainly of clay soils (**Figure 9-12**).



Figure 9-12:Soil Observed within one the watercourses.

9.2.4 Vegetation indicator

According to DWAF (2005), vegetation is considered a key component in the wetland delineation procedure and forms a central part of the wetland definition under the National Water Act (Act 36 of 1998). Specifically, the presence of hydrophytic vegetation is used to identify and classify wetland boundaries. However, the effective use of vegetation as a primary indicator relies on the assumption of an undisturbed ecological condition. In the case of the study site, significant anthropogenic disturbances were observed within the wetland systems, which complicate the reliability of vegetation as a standalone indicator.

These disturbances include:

- Subsistence farming activities within and adjacent to wetland zones
- The presence of rural households, contributing to informal land use and runoff
- Domestic use of watercourses, such as washing laundry, which introduces pollutants and alters vegetation structure

Despite these pressures, there was clear evidence of hydrophytic vegetation, particularly sedge and Phragmite species, which are obligate or facultative wetland indicators. Their presence reflects sustained soil saturation and provides strong support for classifying the area as a wetland (**Figure 9-13**).



Figure 9-13: Sedge observed onsite.



Figure 9-14: Phragmite species observed onsite.

9.3 Wetland Functional and Health Assessment

9.3.1 Wetland Ecological Importance and Sensitivity

The EIS and functions were calculated using the new draft DWA guidelines and model, as developed by M. Rountree, but not yet published. Information used form the SIBIS and VEGMAP products. A mean score between 0 and 4 is obtained, with 0 as the lowest and 4 as the highest score. No classification of the scores is given.

The watercourses onsite have an Ecological Importance and Sensitivity (EIS) score of 2.2 (**Table *9-1***). This is a value between 0 and 4, with 0 being very low and 4 very high. The rivers, therefore, have a Medium EIS score. It is regarded as being modified.

Table 9-1: EIS calculation of the wetland

ECOLOGICAL IMPORTANCE AND SENSITIVITY	SCORE (0-4)	CONFIDENCE (1-5)	MOTIVATION
Biodiversity support			
Presence of Red Data species	4.00	4.00	No known red data or protected species observed on site.
Populations of unique species	0.00	4.00	No unique plant or animal populations were observed.
Migration/breeding/feeding sites	2.00	4.00	Though a few bird species were observed, few nests were present.
Landscape scale			
Protection status of the wetland	4.00	5.00	The wetland/watercourses and surrounding area have been exposed to subsistence farming and housing developments surrounding the area.
Protection status of the vegetation type	4.00	5.00	The wetland is located in an Endangered and Vulnerable vegetation types. Although dominated by Phragmites it is very homogeneous.
Regional context of the ecological integrity	2.5	5.00	The wetland is in PES class D due to the large-scale degradation of the surrounding areas as well as the wetland area itself.

Size and rarity of the wetland type/s present	4.00	5.00	The wetland is not particularly rare and has no vulnerable ecosystem present.
Diversity of habitat types	1.00	5.00	The wetland has a low species diversity as well as habitat diversity. The wetland is dominated by a homogeneous stand of sedges.

9.3.2Wetland Health and PES

It should be noted in **Table *9-2*** by Kleynhans (1999) that if a score of less than 2 is attributed to any impact, the lowest rating, rather than the mean, is used to attribute PES class.

Table 9-2:PES classes (from Kleynhans 1999) indicating the interpretation of the mean scores to rate the PES category.

WITHIN GENERALLY ACCEPTABLE RANGE		
Category	**Score**	**Description**
A	>4	Unmodified, or approximates natural condition and/or represents a natural condition due to successful rehabilitation process/program(s) which has occurred and/or are in the process of occurring.
B	>3 and 4	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged Moderately modified.
C	>2 and 3	Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	2	Largely modified. A large loss of natural habitats and basic Ecosystem functions has occurred.
OUTSIDE GENERAL ACCEPTABLE RANGE		
E	>0 and 2	Seriously modified. The losses of natural habitats and basic ecosystem functions are extensive Critically modified.

F	0	Modifications have reached a critical level, and the system has been modified completely with an almost complete loss of natural habitat

The wetland perennial rivers in the study area have EIS categories and EMC values as indicated in **Table 9-3**.

Table 9-3: Summary of EIS onsite.

Wetland	Coordinates	EIS category	PES
Floodplain Wetland (Seasonal)	30°14'7.45"S 28°45'42.42"E	C	C
Botsola River and associated Floodplain	30°17'20.57"S 28°46'51.44"	C	C
Kinira River (2 Bridges)	30°14'13.01"S 28°45'47.50"E	C	C
	30°13'11.71"S 28°44'32.65"E		

9.3.3Wetland ecoservices

WET-EcoServices (Kotze et al. 2004) is a tool for evaluating the services provided by the watercourses (Rivers, allowing for more informed planning and decision-making. In general, the riverine wetland provides low-moderate ecosystem services (spider diagram right). Because of the destruction of natural vegetation and the resulting loss of habitat for insects and amphibians, it has a low species richness and biodiversity. (See **Figure 9-15**).

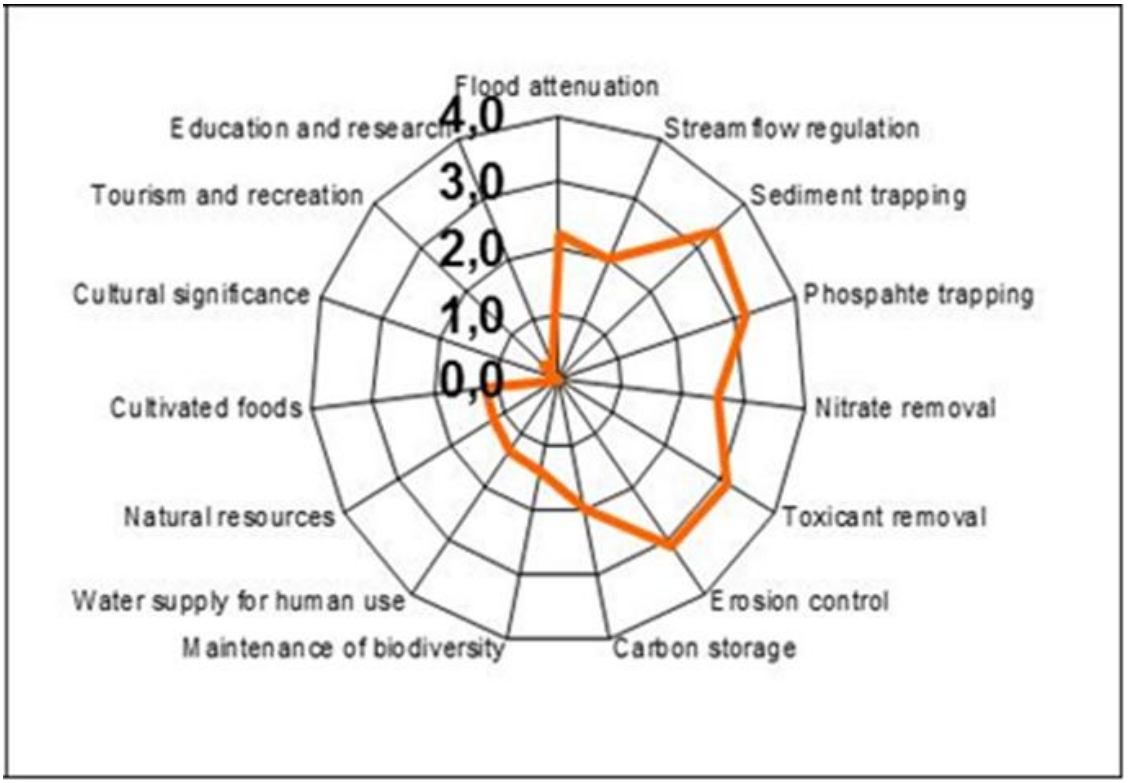


Figure 9-15: Eco services

9.3.4 Freshwater Aquatic Species

The freshwater habitats observed onsite, as illustrated in **Figure 9–16**, are predominantly characterised by terrestrial plant species occurring within and adjacent to the watercourse and associated wetlands. Hydrophytic vegetation was limited, with sedges representing the primary obligate and facultative wetland indicators present. Aquatic bird species were also recorded utilising these habitats, confirming the ecological functionality of the system despite disturbance. The watercourse and its margins support notable biological activity, particularly along the road servitude and bridge crossings, where concentrated surface flow has resulted in visible soil erosion and sediment deposition. These geomorphological signs further reflect active hydrological processes and contribute to the delineation and ecological interpretation of the wetland and aquatic features.









Figure 9-16:Typical Freshwater Habitat onsite.

10. RISK ASSESSMENT OF DELINEATED WETLAND

The following impact assessment is supplied, the assessment was conducted only for existing degradation of the study site by the existing R415 Road site with the focus on aquatic habitats. From the assessments it is clear that impacts can be expected from the proposed activities (**Table 10-1**).

Table 10-1: Impact 1-Degradation and / or destruction of Freshwater habitats.

Impact Name	**1. Degradation and/or destruction of wetland habitats.**				
Alternative	**Proposal**				
Phase	**All phases**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	1	1
Extent of Impact	1	1	Reversibility ofImpact	2	1
Duration ofImpact	2	1	Probability	3	2
Environmental Risk (Pre-mitigation)					-4.50
Mitigation Measures					

In terms of section 19 of the NWA (1998), owners / managers / people occupying land on which any activity orprocess undertaken which causes or is likely to cause pollution or degradation of a water resource must take all reasonable measures to prevent any such disturbance from occurring, continuing or recurring. These measures may include measures to (inter alia):

- Cease, modify, or control any act or process causing the pollution/degradation.
- Comply with any prescribed waste standard or management practice.
- Contain or prevent the movement of pollutants or the source of degradation.
- Remedy the effects of pollution/degradation.
- Remedy the effects of any disturbance to the bed and banks of a watercourse/wetland.

According to the NWA (1998) part of the definition of pollution of water resources states that any physical alterations to a water resource, for example the excavation of a wetland / stream or changes to the morphology of such a water resource may be considered to be pollution. Activities which cause an alteration to the biological properties of a wetland, i.e. the fauna and flora contained within and supported by that water resource are therefore also considered to be a form of pollution.

Any construction activities in or within a delineated buffer zone of a water resource may only take place

afterthe necessary water use license has been obtained.

Where wetlands may be encroached upon by proposed activities, the edge of the wetland must be clearly demarcated in the field with pegs or poles that will last for the duration of the construction phase, color-codedas follows:

• RED – Indicating the edge of the wetland (Note: This includes the permanent, seasonal and temporal zonesof wetlands, or parts thereof; and no vehicles or building materials are allowed in this zone). These should beput along the entire length of the site.

• ORANGE – Indicating the edge of the buffer zone.

Construction machinery and associated vehicles may not be allowed to enter wetlands. Strictly no re-fueling ofvehicles or machinery should be allowed to take place in any area close to a wetland.

During and after construction areas of exposed soil can easily erode and subsequently end up in the wetlands. A well-designed storm water system must be put in place to avoid erosion into wetlands. Natural runoff from the natural terrestrial habitat surrounding the wetlands should, however, not be restricted unnecessarily.

The use of potential pollutants (painting, chemicals, etc.) during construction and operational phases must be strictly controlled and a high quality of management and supervision concerning such materials must be enforced, especially close to wetland buffer zone areas.

Sanitary facilities must be made available to construction workers to prevent urine and human waste enteringthe wetlands.

If at any point construction activities encroach on wetlands, it is strongly advised that a wetland/aquaticspecialist is appointed during all phases to monitor impacts and related mitigation measures regardingwetland habitats.

Environmental Risk (Post-mitigation)	-2.00
Degree of confidence in impact prediction:	High
Impact Prioritisation	
Public Response	1
Low: Issue not raised in public responses	
Cumulative Impacts	2
Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it isprobable that the impact will result in spatial and temporal cumulative change.	
Degree of potential irreplaceable loss of resources	1
The impact is unlikely to result in irreplaceable loss of resources.	
Prioritisation Factor	1.17
Final Significance	-2.33

Table 10-2: Impact 2-Loss of indigenous fauna and flora diversity associated with watercourses.

Impact Name	**2. Loss of indigenous fauna and flora diversity associated with wetlands.**				
Alternative	**Proposal**				
Phase	**All phases**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	2	1
Extent of Impact	2	1	Reversibility ofImpact	4	2
Duration ofImpact	2	2	Probability	2	1
Environmental Risk (Pre-mitigation)					-5.00
Mitigation Measures					
Destruction of natural wetland vegetation must be avoided at all costs. Special attention should be paid to alien and invasive control within the whole study area. Alien and invasivevegetation control should take place throughout all development phases to prevent loss of habitat of indigenous fauna and flora. Movement of vehicles and construction workers in wetlands and buffer zones should be strictly prohibited. No harvesting of plants or animals should be allowed. Any specimens of protected plant species known to occur in the wetlands and the delineated buffer zone and may potentially be impacted by the construction activities, are to be fenced off for the duration of the activity. Conservation of this specie and their natural habitat must be a high priority. If at any point construction activities encroach on wetlands, it is strongly advised that a wetland/aquatic. specialist is appointed during all phases to monitor impacts and related mitigation measures regarding wetland habitats. Red Data listed and protected species as well as sensitive habitats related to wetlands should be strictly monitored. Any conservation recommendations and measures that aim to mitigate the impacts of this development must also be monitored by such a specialist during the construction, operational and decommissioning phases.					
Environmental Risk (Post-mitigation)					-1.50
Degree of confidence in impact prediction:					High
Impact Prioritisation					
Public Response					1

Low: Issue not raised in public responses	
Cumulative Impacts	2
Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.	
Degree of potential irreplaceable loss of resources	2
The impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value(services and/or functions) of these resources is limited.	
Prioritisation Factor	1.33
Final Significance	-2.00

Vegetation clearing has occurred and resulted increased turbidity and sedimentation in the watercourse as well as altered flow patterns. The machinery used has a risk of hydrocarbon spills into the watercourse. There are impacts on the flow patterns to the watercourse.

This report highlights the findings for a one site survey, limiting the confidence for the risk assessment in the Tables **10-1 and 10-2 above**.

Operational Phase

Increased sedimentation may occur as a result from the runoff from the road upgrade. This has the potential to change habitat structure within the receiving environment, and this will in turn result in changes in ecosystem function. Changes in habitat structure due to sedimentation would result in changes in the species composition.

Water quality impairment has the potential to change ecosystem function, change community structure as species sensitive to water quality impairment are eliminated and tolerant species increase in number, this results in a loss of biodiversity of sensitive species.

Invasive alien plants have far-reaching detrimental effects on native biota and have been widely accepted as being a leading cause of biodiversity loss. They typically have rapid reproductive turnover and are able to outcompete native species for environmental resources, alter soil stability, and promote erosion, change litter accumulation and soil properties. In addition, certain alien plants exacerbate soil erosion whilst others contribute to a reduction in stream flow thereby potentially increasing sediment inputs and altering natural hydrology of receiving watercourses. These impacts negatively affect areas that are largely natural (with low existing weed levels) greater than for areas

already characterised by dense infestations of alien plants with low indigenous plant diversity (Macfarlane *et al*., 2014).

10.1.1 Sedimentation and soil erosion

Soil erosion will result in the deposition of sediment into the freshwater system, posing a risk to the downstream catchment geomorphological/functional integrity. Subsequent impacts that are likely to result are:

- sedimentation of the watercourse that will be destructive to many faunal species affecting their habitat; breeding and feeding cycles.

Local site factors such as soil erodibility, vegetation cover, gradient of local slopes and regional rainfall/runoff intensity will affect the probability and intensity of erosion impacts (Macfarlane *et al*., 2014). Typical results of erosion & sedimentation on water resources may include:

- Localised scouring at stormwater discharge points into watercourses
- Deposition of large masses of sediment downstream causing localised channel braiding, instability of the riverbanks and alterations in water distribution.

10.1.2 Pollution of water resources and soil

Changes to the water quality will result in changes to the ecosystem structure and function as well as a potential loss of biodiversity. Water quality pollution leads to modification of the species composition where sensitive species are lost and organisms tolerant to environmental changes dominate the community structure. Any substances entering and polluting watercourses will directly impact downstream ecology through surface runoff during rainfall events, or subsurface water movement, particularly during the wetter summer months.

Contaminants such as hydrocarbons, solids, pathogens and hazardous materials may enter watercourses (examples include petrol/diesel, oil/grease, paint, cement/concrete and other hazardous substances). These contaminants negatively affect aquatic ecosystems including sensitive or intolerant species of flora and fauna. Where significant changes in water quality occur, this will ultimately result in a shift in aquatic species composition, favouring more tolerant species, and potentially resulting in the localised exclusion of sensitive species. Water quality monitoring must be implemented to ensure sustainable management of water sources within that area. Sudden drastic changes in water quality can also have chronic effects on aquatic biota leading to localised extinctions.

Deterioration in water quality will also affect its suitability for human domestic/agricultural use and have far reaching impacts for local communities who may rely on rivers as water supply (Macfarlane et al., 2014).

10.1.3 Alien Invasive Species

There are alien invasive plant species currently present along the Road. Any ground disturbance provides an opportunity for alien invasive plant species to spread and for new species to establish themselves in the areas. Alien invader plant species pose an ecological threat as they alter habitat structure, lower biodiversity (both number and "quality" of species), change nutrient cycling and productivity, and modify food webs (Zedler & Kercher, 2004). Such changes on the ecology of the riparian habitat have/will have a detrimental impact on its ability to maintain both floral and faunal biodiversity. Invasive alien plant species, particularly woody species, have much increased water usage compared with indigenous vegetation. Many alien invasive plant species are particularly found in riparian ecosystems and their invasion results in the destruction of indigenous species; increased inflammable biomass (high fire intensity); erosion; clogging of waterways such as small streams and drainage channels causing decreased river flows and incision of riverbeds and banks. This results in an overall impact on the hydrological functioning of the system.

10.1.4 Mitigation

The proposed upgrading of the road will have negative effects on the environment. The following mitigation measures may reduce the severity of impacts:

- Rehabilitation of the disturbed areas;
- Minimising pollutants entering the watercourse;
- Implement a programme for the clearing/eradication of alien species including long term control of such species;
- Wetland monitoring and biomonitoring must take place bi-annually.

Sedimentation and soil erosion

Mitigation options

- Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place.
- Exposed soils must be rehabilitated as soon as practically possible to limit the risk of erosion. Erosion control measures must be employed where required.

- Riparian vegetation bordering on drainage lines, wetlands and rivers will be considered environmentally sensitive and impacts on these habitats should be avoided.
- If erosion has taken place, rehabilitation will commence as soon as possible.

Pollution of water resources and soil

Mitigation options

- Demarcate wetland areas to avoid unauthorised access.
- No washing of any equipment in close proximity to a watercourse is permitted.
- No releases of any substances that could be toxic to fauna or faunal habitats within the channels or any watercourses is permitted.
- Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly drained and disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed, and the affected area rehabilitated immediately.
- Education of workers is key to establishing good pollution prevention practices. Training programs must provide information on material handling and spill prevention and response, to better prepare employees in case of an emergency.
- Signs should also be placed at appropriate locations to remind workers of good housekeeping practices including litter and pollution control.
- The proper storage and handling of hazardous substances (hydrocarbons and chemicals) need to be ensured. All employees handling fuels and other hazardous materials are to be properly trained. Storage containers must be regularly inspected so as to prevent leaks.
- All contractors and employees should undergo induction which is to include a component of environmental awareness.

Alien Invasive Species

Mitigation Options

- Ongoing alien plant control must be undertaken, particularly in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation.

- Herbicides must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden.
- Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas.
- After rehabilitation, re-vegetate any exposed surfaces and mulch re-vegetated areas.
- Select appropriate species for wetland and terrestrial areas and ensure species diversity is enhanced, with species commonly found in the natural wetland area.

10.2 ASSESSMENT OF THE NO-GO ALTERNATIVE

Currently there is no proposal from a wetland point of view of a no-go alternative, Since the road is already in existence.

10.3 MONITORING REQUIREMENTS

Given the sensitivity of the wetland system onsite, it is strongly recommended that a wetland and aquatic specialist be appointed during the construction phase to monitor potential impacts and the effectiveness of mitigation measures. This oversight should specifically address risks to wetland hydrology, water quality, and the associated faunal and floral assemblages that depend on this habitat.

11. FINAL COMMENTS

The proposed road upgrade intersects a range of sensitive freshwater ecosystems within the Mzimvubu to Keiskamma Water Management Area (WMA), specifically the Mzimvubu Sub-Water Management Area. The alignment crosses several seasonal (non-perennial) watercourses and one perennial system, the Kinira River, as well as their associated floodplain wetlands. Additional wetland features occur adjacent to the watercourse, supporting ecologically significant hydrophytic vegetation and contributing to regional biodiversity, hydrological connectivity, and the delivery of key ecosystem services.

The presence of these freshwater features highlights the ecological sensitivity of the project area and necessitates a rigorous approach to site-specific wetland delineation, hydrological impact assessment, and mitigation planning. These requirements align with national and provincial regulatory frameworks, including the National Water Act (1998), NFEPA guidelines, and the Eastern Cape Biodiversity Conservation Plan (ECBCP).

Although construction activities have the potential to impact these habitats, particularly through sedimentation, alteration of flow regimes, and loss of wetland or riparian vegetation such risks can be effectively managed through informed engineering design, appropriate timing of works, and the implementation of best-practice environmental safeguards. Given the constraints of the existing road reserve and the strategic importance of the route for regional connectivity, a no-go alternative is not feasible from a wetland-avoidance perspective. Accordingly, the continuous involvement of a suitably qualified wetland or aquatic specialist throughout the planning, construction, and post-construction phases is essential to ensure ecological integrity, regulatory compliance, and the long-term sustainability of the freshwater systems within the development footprint.

12. RECOMMENDATIONS

- Include environmental awareness aspects into the site induction program to ensure all staff are aware of the location and importance of wetland habitats.
- Establish emergency response measures and a clearly defined chain of communication to rapidly deal with any unforeseen impacts to wetlands, e.g. spills.
- No stockpiling of material may take place within the wetland/watercourse areas and temporary construction camps, and infrastructure should also be located outside the wetland footprint.
- Regular cleaning up of the wetland areas should be undertaken to remove litter.
- Design and implement a construction stormwater management plan that aims to minimise the concentration of flow and increase in flow velocity, as well as minimising sediment transport off site.
- Where practically possible, the major earthworks should be undertaken during the dry season (roughly from April to August) to limit erosion due to rainfall runoff.
- Store and handle potentially polluting substances and waste in designated, bunded facilities.
- Waste should be regularly removed from the construction site by suitably equipped and qualified operators and disposed of in approved facilities.
- Locate temporary waste and hazardous substance storage facilities a minimum of 100m from any wetland edge.
- Keep sufficient quantities of spill clean-up materials on site.

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HERITAGE IMPACT ASSESSMENT OF THE IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO.

FOR EARTHLINK ENVIRONMENTAL SERVICES

DATE: 15 APRIL 2026
Revised: 23 APRIL 2026

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EXECUTIVE SUMMARY

The HIA evaluates the potential heritage and archaeological impacts of the proposed R415 road upgrade and associated borrow pits.
The assessment covers both heritage (archaeological, cultural, historical) and palaeontological resources.

The assessment is guided by the National Heritage Resources Act of 1999, which protects sites of cultural, historical, and scientific significance.

The methodology included desktop studies, field surveys, and consultation of heritage databases and maps.

Heritage Sites:

No heritage sites will be directly impacted by the proposed road upgrade or borrow pits. All identified sites are at least 50 meters from the development footprint. Notable sites in the area include rock art sites (Sandstone Koppie, Mdibo), a memorial, a cemetery, and a stone tool scatter.

Palaeontological Sensitivity:

The area is of high to very high palaeontological sensitivity, with significant fossil finds including well-preserved dinosaur skeletons and fossilized plant material. The discovery of two small dinosaur skeletons is of exceptional scientific value and requires mitigation (excavation and permitting) before construction. Permits are required by the developer and palaeontologist to undertake salvage and demolition activity.

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Heritage Impact:

No significant negative impacts on archaeological or cultural heritage are expected if the recommended protocols are followed.

Palaeontological Impact:

Potential for very high negative impact if fossils are not mitigated before construction. Conversely, proper mitigation (excavation and removal) will result in a very high positive impact for science.

A "Chance Find Protocol" must be implemented as part of the Environmental Management Programme (EMPr) to address any unexpected discoveries during construction.

Permits are required for the excavation and removal of significant fossils. Temporary barriers are recommended to protect the cemetery during construction.

The project can proceed provided all mitigation measures and protocols are strictly followed.

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Abbreviations

EIA	Early Iron Age
ESA	Early Stone Age
HIA	Heritage Impact Assessment
HP	Historical Period
IIA	Indeterminate Iron Age
ISA	Indeterminate Stone Age
KZNARI	KwaZulu-Natal Amafa & Research Institute
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency

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INTRODUCTION

Pending info

The major aspects of this project include the following:

Matatiele to Qachas Nek Border post:

- Improve the road cross drainage along a section of the R415 (Bosola flood plain) – **location to be confirmed for final report**
- upgrade the existing road to surface standard,
- relocation of existing services **location to be confirmed for final report**
- new prestressed bridge, **location to be confirmed for final report**
- general widening of the existing road cross section for climbing lanes and surfaced shoulders, **location to be confirmed for final report**
- vertical and horizontal geometric improvements, **location to be confirmed for final report**
- widening of existing river bridge and some major and minor culverts, **location to be confirmed for final report**
- 6.5m wide temporary deviation to accommodate two-way traffic during construction. **location to be confirmed for final report**
- Opening of 2 potential borrow pits.
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare. **location to be confirmed for final report**

Umlando was requested to undertake the study for this proposed development as the initial surveys had covered these areas. Figures 1 – 6 show the location of the development.

ASSUMPTIONS AND LIMITIATIONS

- The footprint of the proposed development will remain within the site boundary provided to Umlando by the client.

- The site falls in the general pattern of archaeological scatters noted from previous archaeological and heritage surveys.
- The survey cannot locate subsurface features that do not leave visible marks observable from aerial photographs.

SCOPE OF WORK

- Assess heritage sites in terms of significance.
- Provide a management plan for each site.

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FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

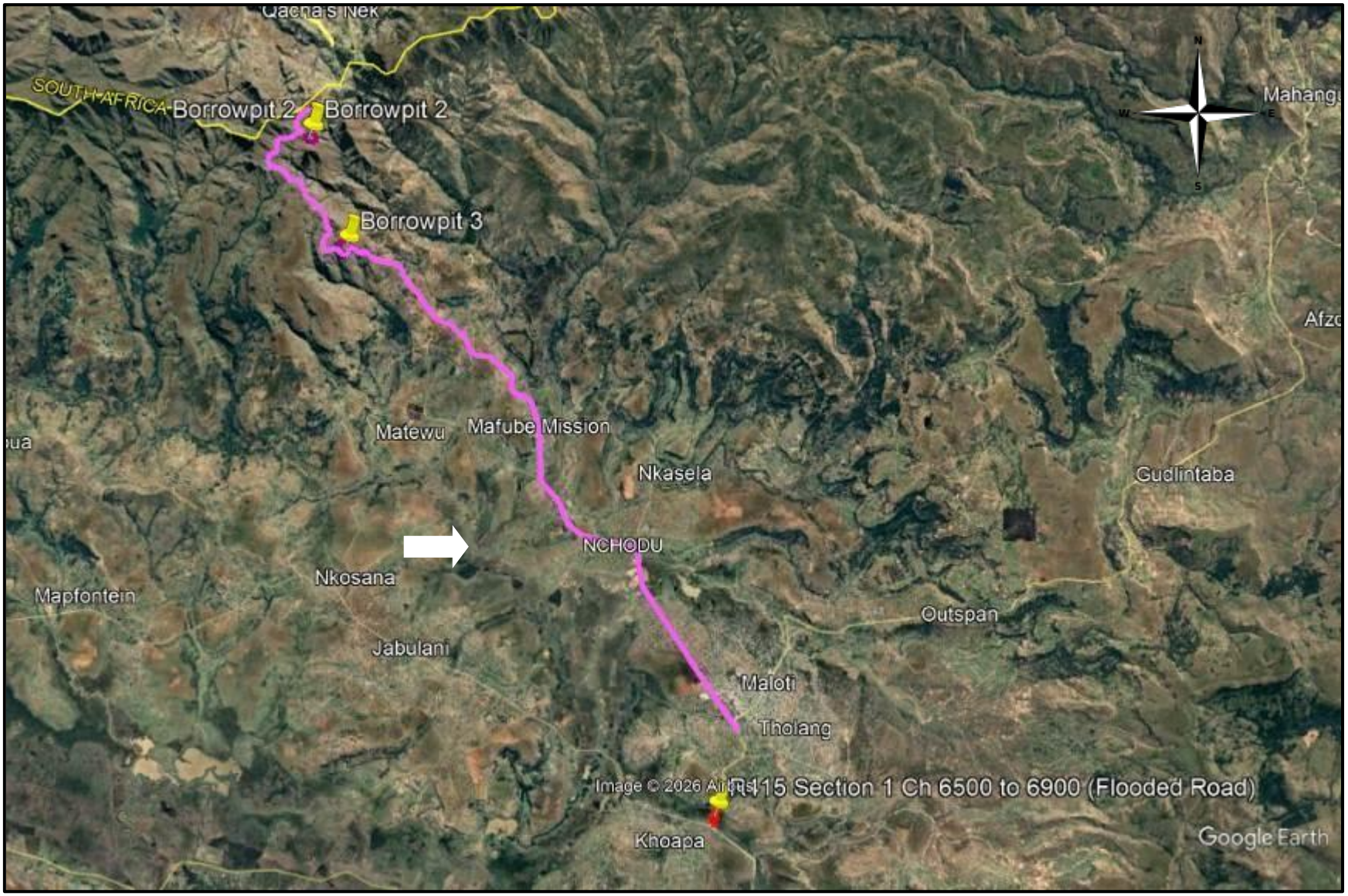


FIG. 2: AERIAL OVERVIEW OF THE STUDY AREA OF THE R415 & BORROW PITS



FIG. 3: AERIAL OVERVIEW OF THE R415 SOUTH OF BORROW PIT 3

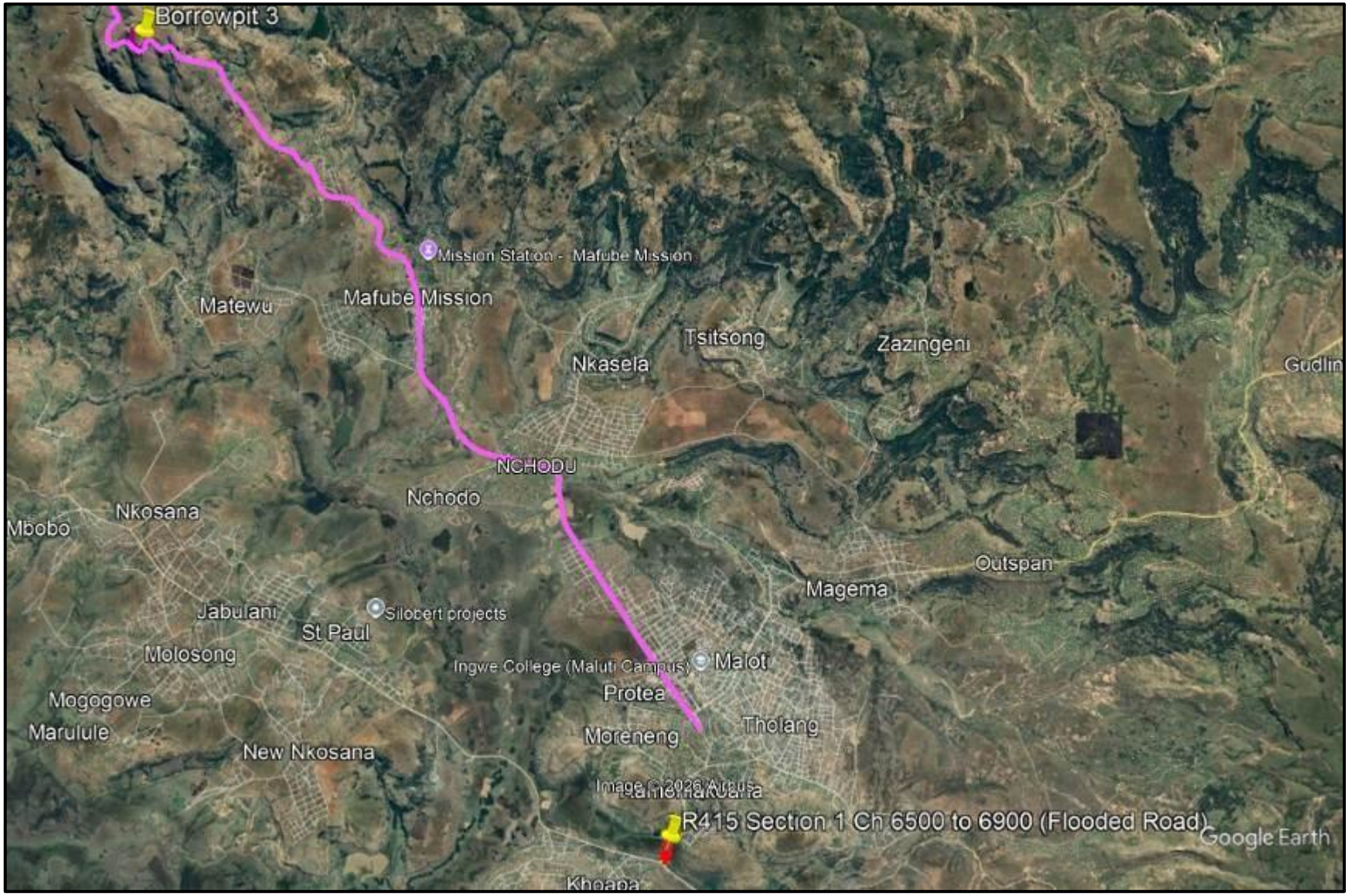


FIG. 4: 1:50 000 TOPOGRAPHCIAL MAP OF THE BORROW PITS 1 AND 2

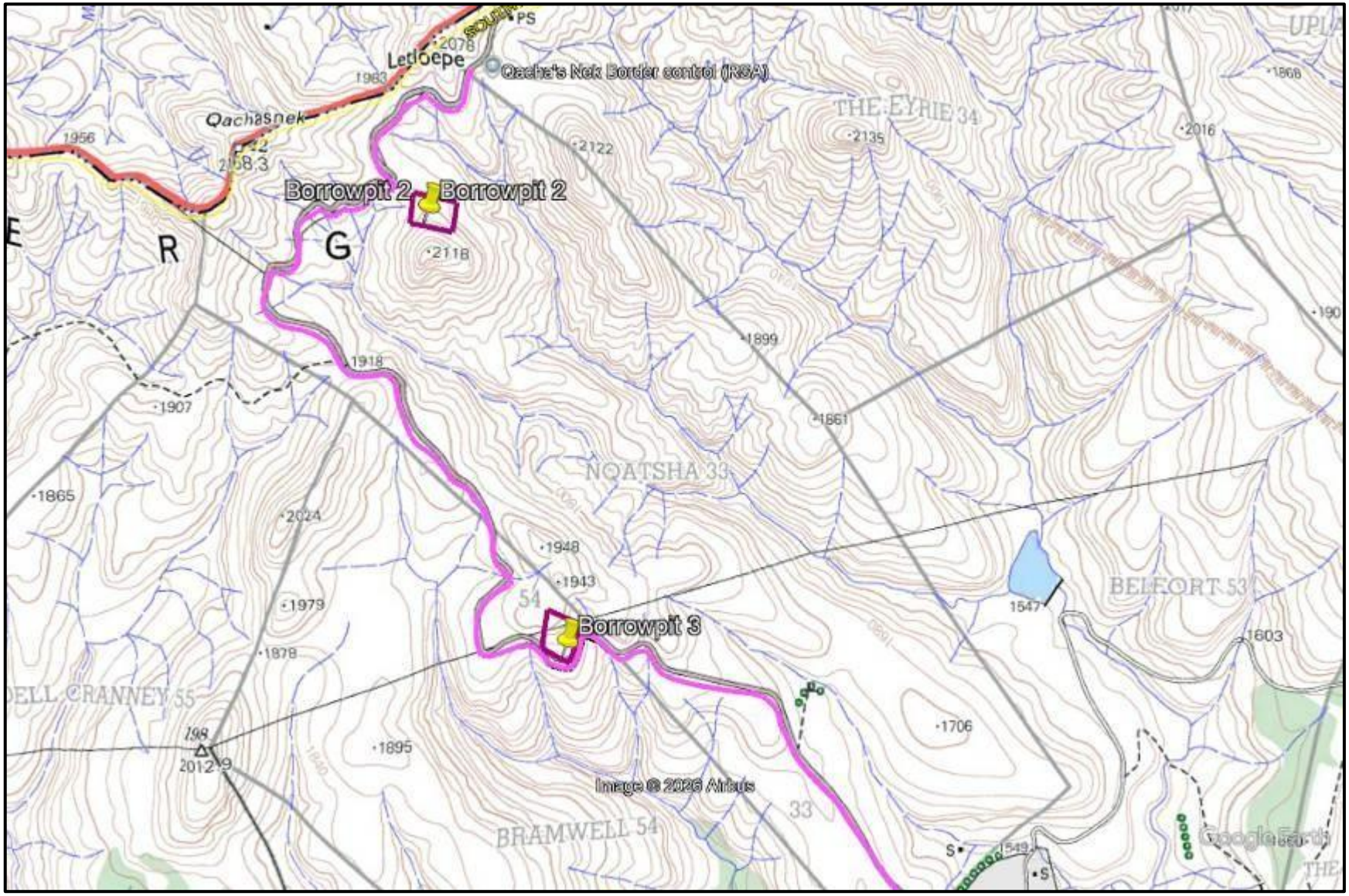
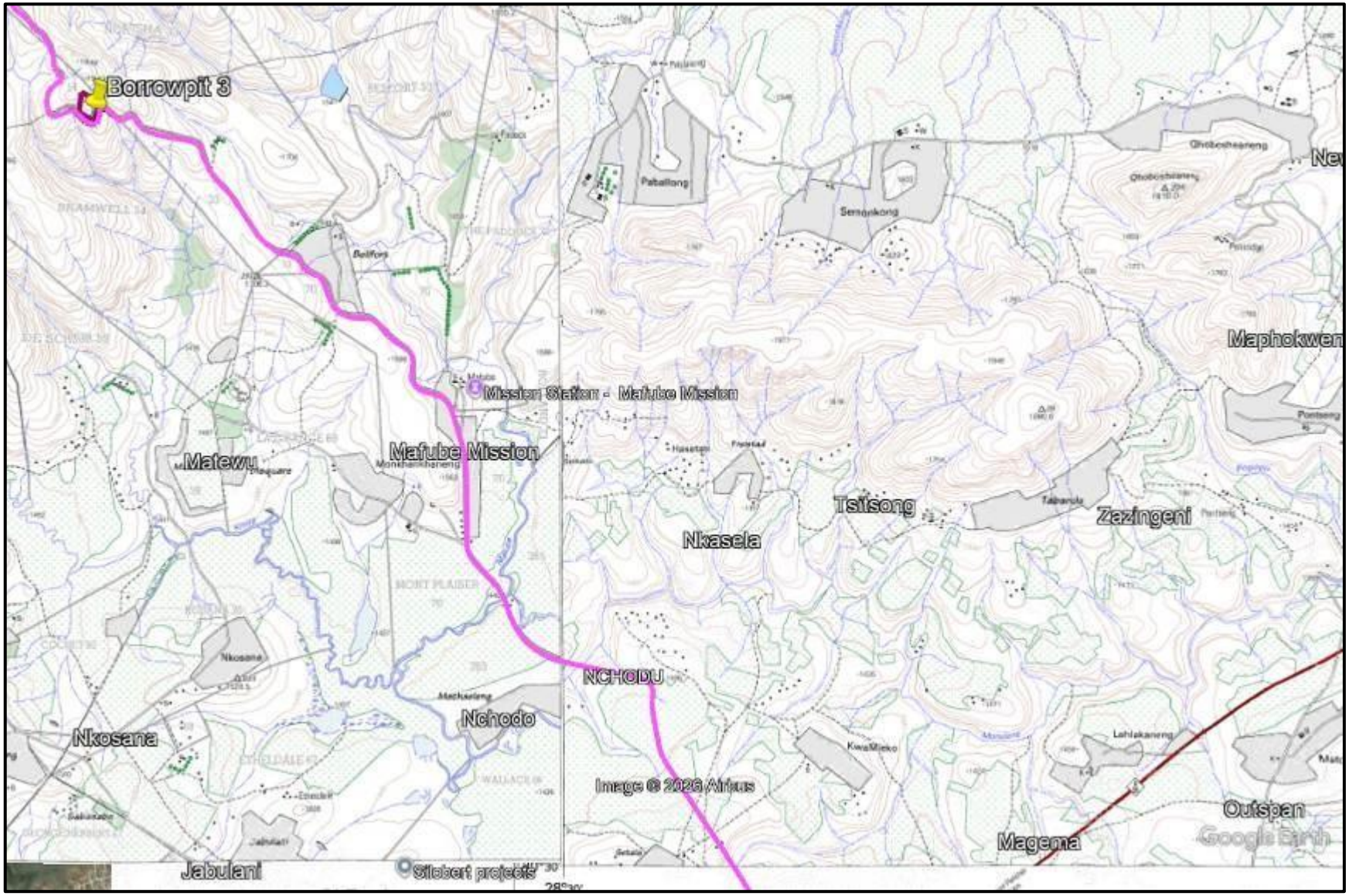


FIG. 5: 1:50 000 TOPOGRAPHCIAL MAP OF THE SOUTHERN SECTION



NATIONAL HERITAGE RESOURCES ACT OF 1999

The National Heritage Resources Act of 1999 (pp 12-14) protects a variety of heritage resources. This are resources are defined as follows:

1. **"**For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
2. Without limiting the generality of subsection (1), the national estate may include—
   - 2.1. Places, buildings, structures and equipment of cultural significance;
   - 2.2. Places to which oral traditions are attached or which are associated with living heritage;
   - 2.3. Historical settlements and townscapes;
   - 2.4. Landscapes and natural features of cultural significance;
   - 2.5. Geological sites of scientific or cultural importance;
   - 2.6. Archaeological and palaeontological sites;
   - 2.7. Graves and burial grounds, including—
     - 2.7.1. Ancestral graves;
     - 2.7.2. Royal graves and graves of traditional leaders;
     - 2.7.3. Graves of victims of conflict;
     - 2.7.4. Graves of individuals designated by the Minister by notice in the Gazette;
     - 2.7.5. Historical graves and cemeteries; and
     - 2.7.6. Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
3. Sites of significance relating to the history of slavery in South Africa;
   - 3.1. Movable objects, including—
4. Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
   - 4.1. Objects to which oral traditions are attached or which are associated with living heritage;

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4.2. Ethnographic art and objects;

4.3. Military objects;

4.4. objects of decorative or fine art;

4.5. Objects of scientific or technological interest; and

4.6. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

5. Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

5.1. Its importance in the community, or pattern of South Africa's history;

5.2. Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;

5.3. Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;

5.4. Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;

5.5. Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

5.6. Its importance in demonstrating a high degree of creative or technical achievement at a particular period;

5.7. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;

5.8. Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and

5.9. sites of significance relating to the history of slavery in South Africa"

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METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. These databases contain archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording center, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features, and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Defining significance

Heritage sites vary according to significance, and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

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These criteria are:

1. State of preservation of:

1.1. Organic remains:

1.1.1. Faunal

1.1.2. Botanical

1.2. Rock art

1.3. Walling

1.4. Presence of a cultural deposit

1.5. Features:

1.5.1. Ash Features

1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

3. Features of the site:

3.1. Are there any unusual, unique or rare artefacts or images at the site?

3.2. Is it a type site?

3.3. Does the site have a very good example of a specific time period, feature, or artefact?

4. Research:

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?

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5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. Archaeological Experience:

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects but need to be tested prior to any conclusions.

7. Educational:

7.1. Does the site have the potential to be used as an educational instrument?

7.2. Does the site have the potential to become a tourist attraction?

7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. Other Heritage Significance:

8.1. Palaeontological sites

8.2. Historical buildings

8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites

8.4. Graves and/or community cemeteries

8.5. Living Heritage Sites

8.6. Cultural Landscapes, that include old trees, hills, mountains, rivers, etc. related to cultural or historical experiences.

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The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts. Table 1 lists the grading system.

TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES

SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION

High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	
High / Medium Significance	Generally Protected A		Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C		On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction

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RESULTS

SITE SENSITIVITY SCREENING

No Site Sensitivity Screening was undertaken.

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. Fig. 6 and Fig. 7 show known heritage sites in the general area. These are mostly San Rock art and Late Stone Age site of varying degrees of significance. No sites have been recorded within 800m of either of the borrow pits or R4156 Section 1.

Fig. 8 shows known heritage survey applications. Three occur near the study areas; however, these were for noting, and not proper surveys. One survey (Anderson and Anderson 2025) is not on SARHIS yet, and this covered the area of the R415 Section 1.

Late Iron Age sites do occur from the 1500s up to the 1820s and these would have been associated with the now amaXhosa, AmaZulu and BaSotho people. After the *Mfecane,* the area was supposed to have been an empty 'No-Mans Land' according to the British Government, and the land was given to Adam Kok and the East Griquas in the 1860s. By 1874, the Cape Mounted Riflemen was established to brings British law and order to the area as it was assumed to be a centre for cattle rustling and gun smuggling.

Fig. 9 and 10 show the Surveyor General Diagrams for Nqatsha 33 and Bramwell 54, respectively. These diagrams show that the farms were officially colonised by white settlers from 1886 onwards. Although several of the Griqua had sold their farms to white settlers closer to Kokstad. Part of the R415 was above the R415 in 1887 and remnants of it as still visible on Google Earth.

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FIG. 6: LOCATION OF KNOWN HERITAGE SITES NEAR THE BORROW PITS

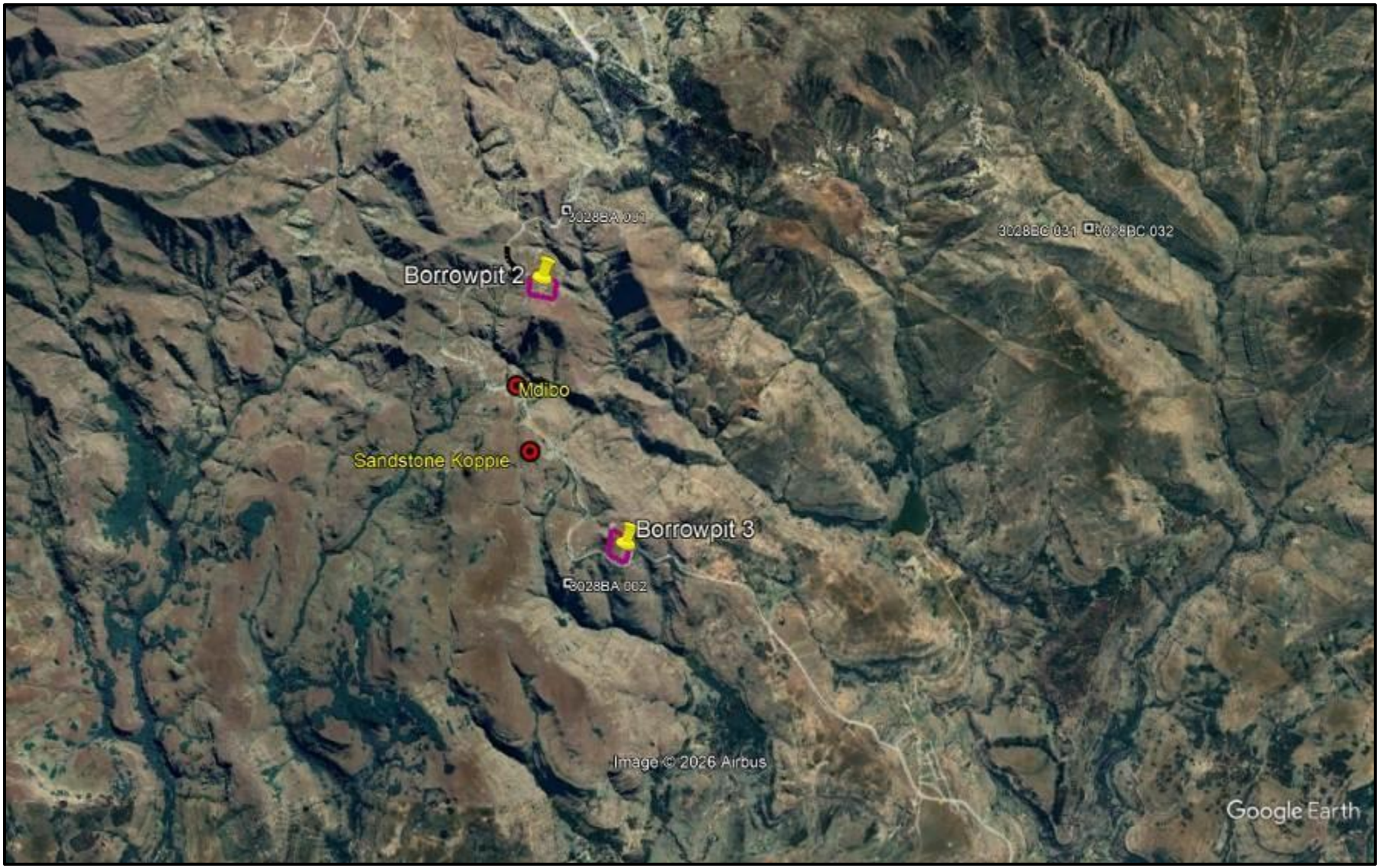


FIG. 7: LOCATION OF KNOWN HERITAGE SITES NEAR THE R415

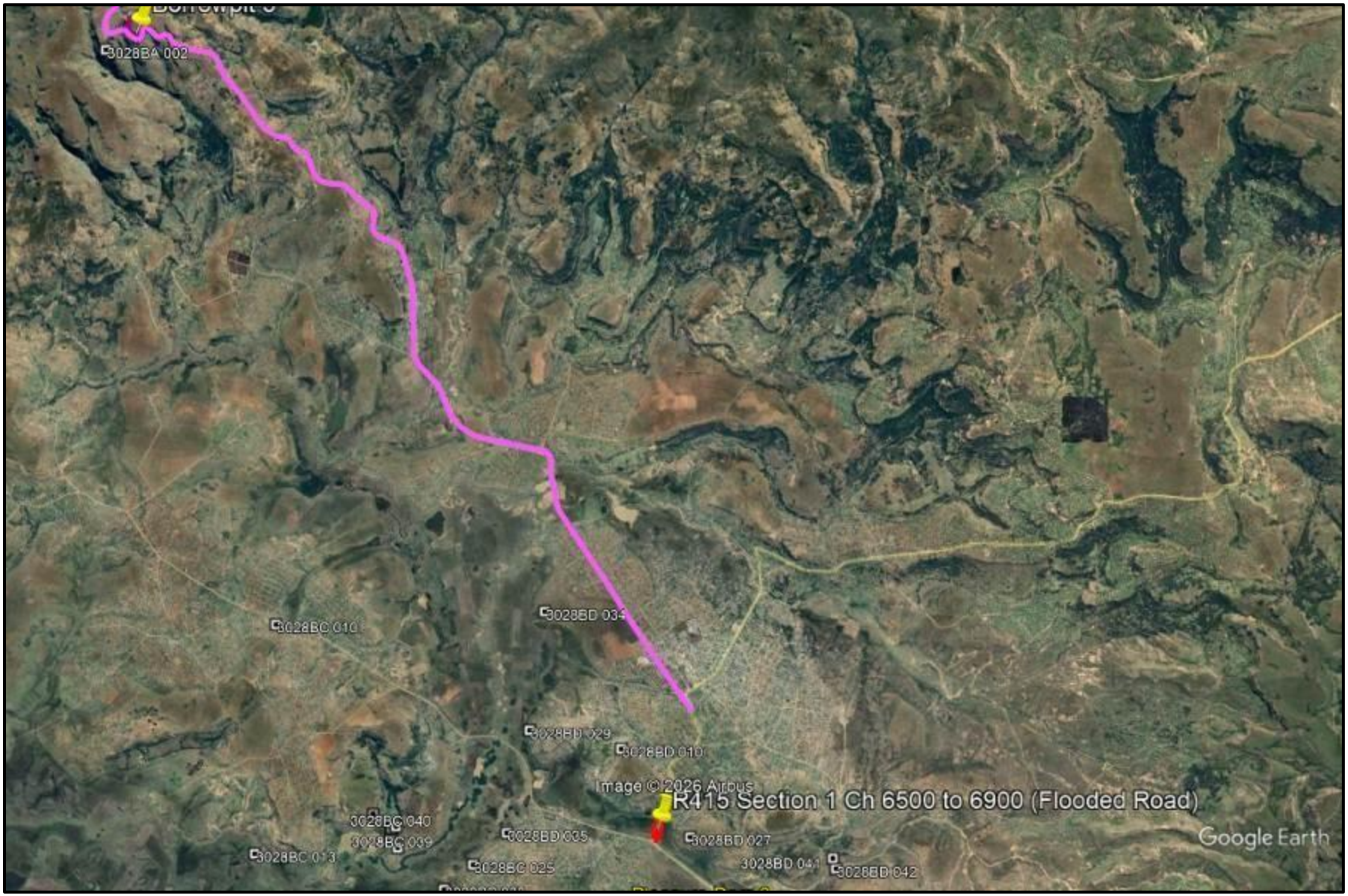


FIG. 8: PREVIOUS HERITAGE SURVEYS IN THE GENERAL STUDY AREA IN



FIG. 9 SURVEYOR GENERAL DIAGRAM FOR NQATSHA (1886)

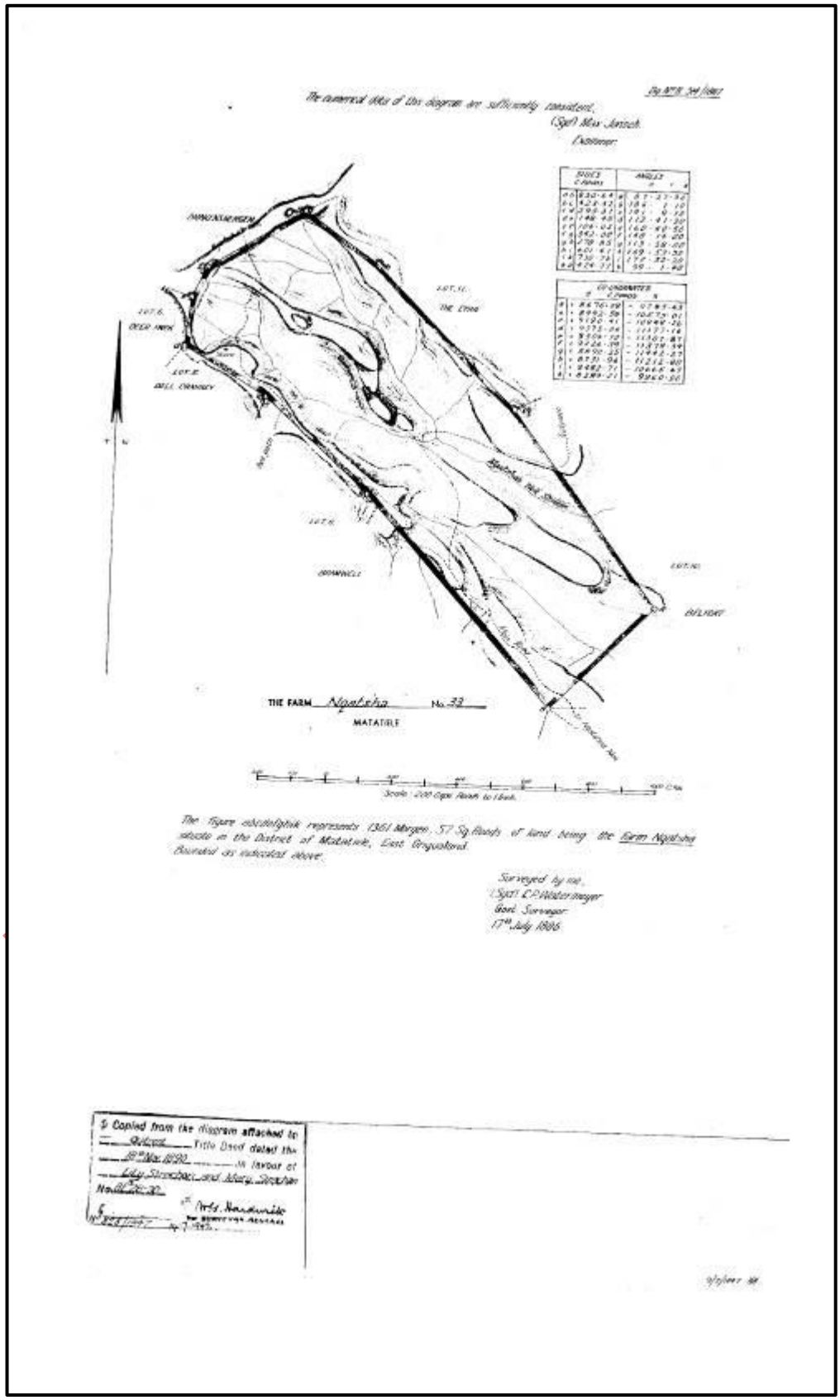
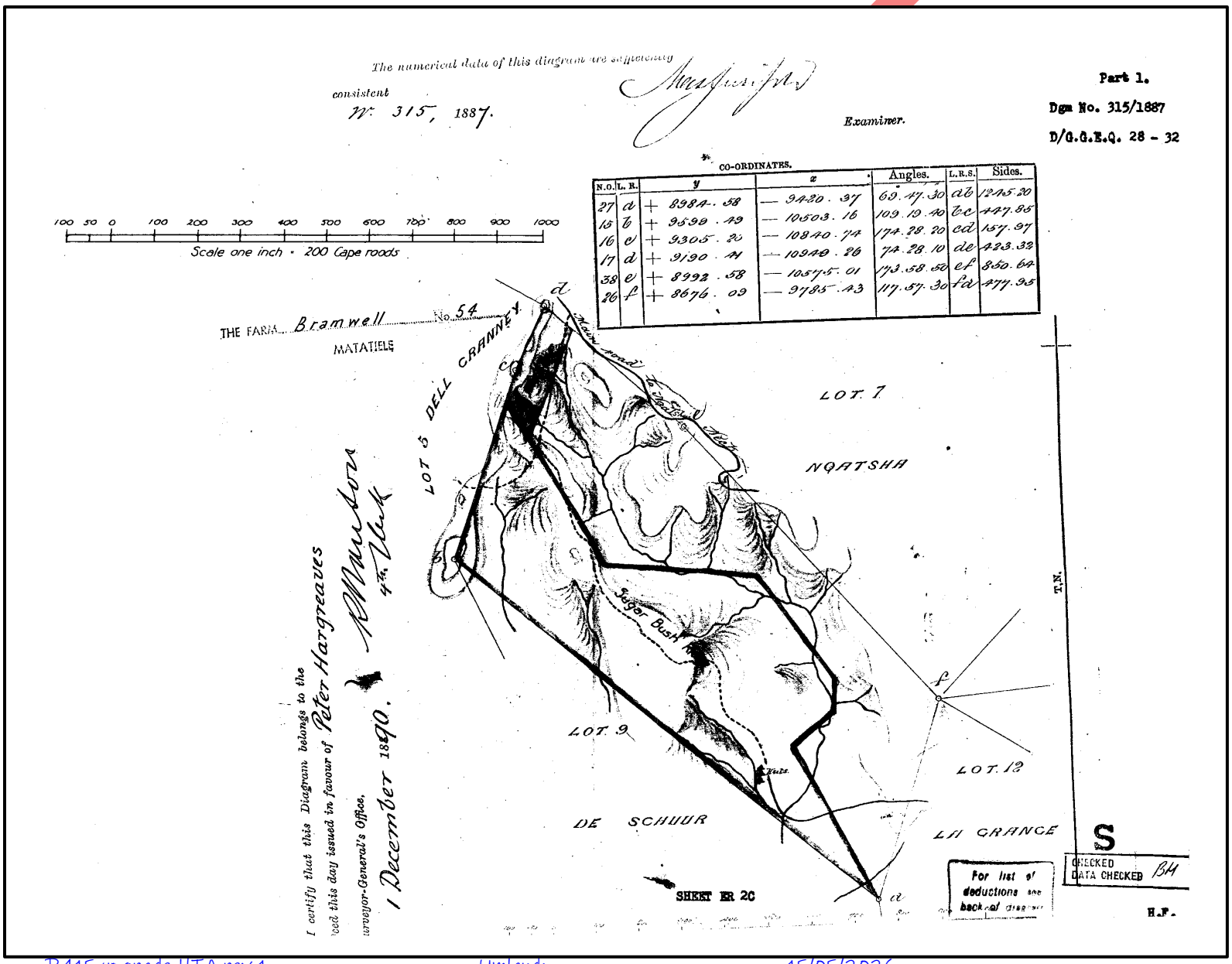


FIG. 10 SURVEYOR GENERAL DIAGRAM FOR NQATSHA (1890)



N.O.	L. R.	y	x	Angles.	L.R.S.	Sides.
27	a	+ 8984.58	— 9420.37	° ′ ″ 65.47.30	ab	1245.20
15	b	+ 9599.49	— 10503.16	109.19.40	bc	427.85
16	c	+ 9305.20	— 10840.74	174.28.20	cd	157.97
17	d	+ 9190.41	— 10949.26	74.28.10	de	423.32
38	e	+ 8992.58	— 10575.01	173.58.50	ef	850.64
26	f	+ 8676.09	— 9785.43	117.57.30	fa	477.95

The Mafube Mission occurs ~300m from the R415. It is currently a ruin from a 19th century mission.

The general area has a very rich and diverse history and would have an overall high sensitivity rating.

FIELD SURVEY

PALAEONTOLOGICAL SENSITIVITY

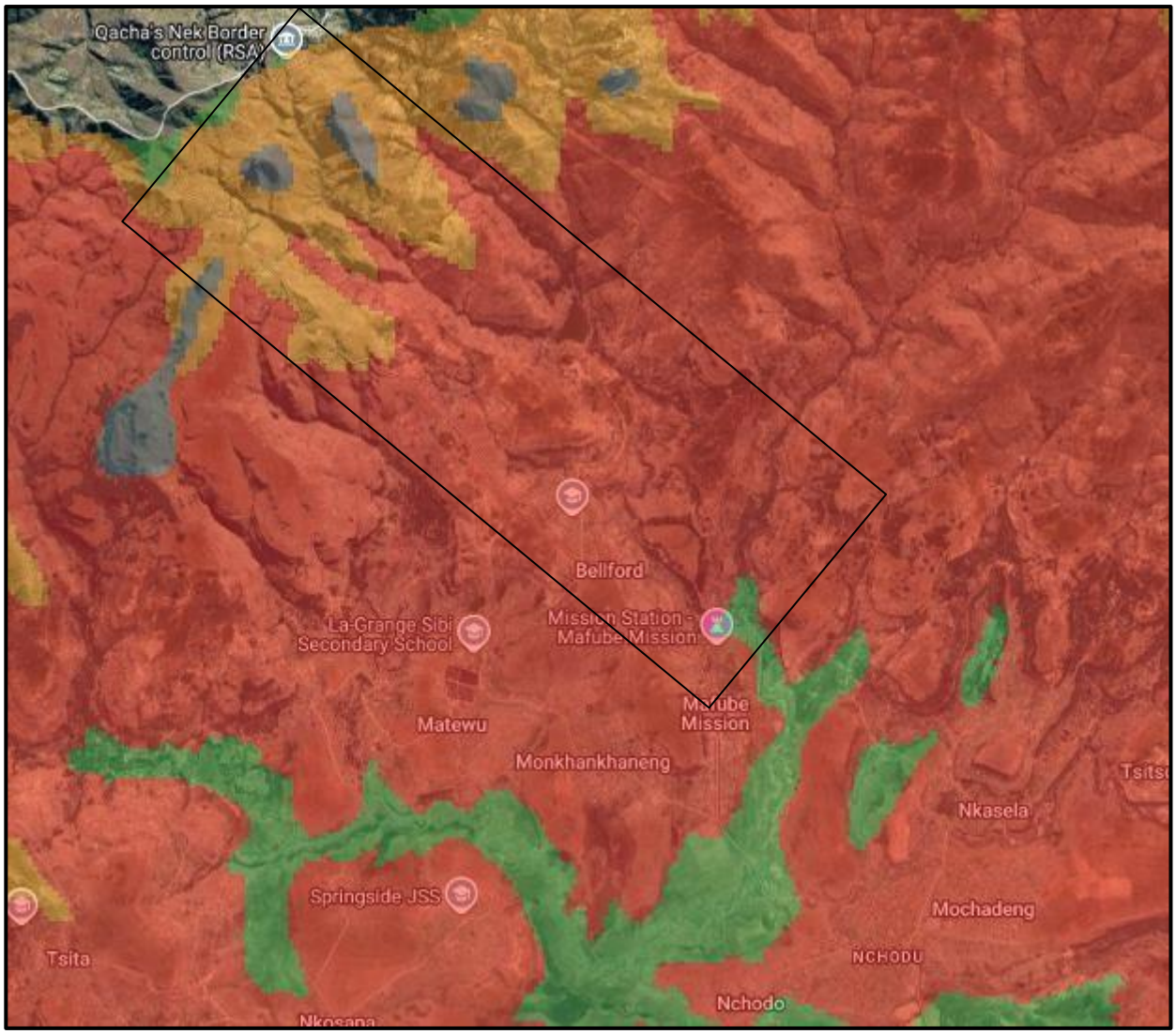
The area is mostly in an area of high and very high palaeontological sensitivity (fig. 11). Dr Gideon Gronewald undertook a Phase 1 survey of the proposed borrow pits and road upgrade.

The geology underlying the project area for the upgrading of the R415 route between Maloti and the Cacha's Nek border post, comprises of Palaeozoic to Cenozoic aged sedimentary rocks of the Karoo Supergroup, as well as Quaternary alluvial deposits. The study area is underlain by deeply weathered sandstone and shale of the Molteno, Elliot, Clarens and Drakensberg Formations of the Strormberg Group, Karoo Supergroup. The wealth of fossil data from the Karoo Supergroup is universally well-known.

The discovery of uniquely sensitive fossilized remains of vertebrate animals in the *Elliot Formation* during this Phase 1 PIA study, necessitated very urgent action and the author immediately initiated the process of application for a collection and destruction permit on behalf of the developer. The highly fragile fossilised remains must be collected and the curator at the National Museum in Bloemfontein, where it preferably will be curated for further studies, indicated a preliminary interest in assisting with the professional excavation as well as safe-keeping of the fossils.

Site specific assessments confirm the variations from very high to very low sensitivity of the areas proposed for upgrading of the road infrastructure due to flooding as well as two specific borrow pits. Table 2 summarises the finds.

FIG. 11: PALAEONTOLOGICAL SENSITIVITY MAP



COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds are required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required

WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

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TABLE 1 PHOTOGRAPHIC RECORDINGS IN THE STUDY AREA FOR THE R415 ROUTE UPGRADE (SEE FIGURE 8)

Photo	(GPS station) Coordinates	Comments	Photographic Record
MATF 1	30.2876 60° S 28.7816 23° E	Typical wetland in the floodplain of the Botsola River at the road crossing where flooding of the road must be addressed. No fossils was observed	
MATF 2	30.2596 10° S 28.7801 43° E	Deep Hutton Form soils on the Molteno Formation sandstone. No fossils were observed.	
MATF 3	30.2373 35° S 28.7632 61° E	Deep alluvium on the banks of the Kinra River and associated water ways. No fossils were observed in the alluvium.	
MATF 3	30.2373 35° S 28.7632 61° E	Deep alluvium on the banks of the Kinra River and associated water ways. No fossils were observed in the alluvium..	
MATF 4	30.2355 57° S 28.7626 74° E	Extensive wetlands on the floodplains of the Kinra River. All indications are that this section of the road is well above the flood level of the river. No fossils were expected and no fossils observed	
MATF 5	30.2308 67° S 28.7621 27° E	Fossils of “horsetail” like ferns *Equisetaceae* in the Molteno Formation. These packs of leaves resemble the fossils attributed to the *Heidiphyllum* thickets (MacRae, 1999)*(page 162)*	

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MATF 5	30.2308 67° S 28.7621 27° E	Khaki coloured mudstone of the Molteno Formation with mats of plants fossils	
MATF 5	30.2308 67° S 28.7621 27° E	Thin, highly significant coal beds in the Molteno Formation	
MATF 6	30.2285 86° S 28.7612 53° E	Old graveyard. Not directly in the line of the upgrading but must be avoided	
MATF 6	30.2285 86° S 28.7612 53° E	Flintstone. Artefact associated with hornfels outcrops along a dolerite dyke	
MATF 6	30.2285 86° S 28.7612 53° E	Outcrop of very coarse-grained sandstone of the Molteno Formation, overlying a grey-coloured laminated shale with plant fossils	
MATF 6	30.2285 86° S 28.7612 53° E	Deep (>1,5m) red coloured Hutton form soils on coarse-grained sandstone of the Molteno Formation. No fossils observed.	

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MATF 7	30.2219 78° S 28.7432 80° E	Alluvial deposits of the local streams, filling very extensive valley floor elements in the landscape. No fossils observed	
MATF 8	30.2043 00° S 28.7373 15° E	Grey and red-coloured mudstone in the Molteno Formation. No fossils observed.	
MATF 9	30.1957 02° S 28.7329 48° E	Deep sandy Hutton and Westleigh soil on Molteno sandstone and mudstone	
MATF 10	30.1869 80° S 28.7224 46° E	Deep clay-rich loam Westleigh soil on mudstone of the Elliot Formation	
MATF 11	30.1817 26° S 28.7101 05°	Dolerite dyke mined. Outcrops of red mudstone of the Elliot Formation. No fossils observed.	
MATF 12	30.1747 87° S 28.7077 68° E	Deep clay-rich loam Westleigh soil on mudstone of the Elliot Formation. No fossils observed	

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MATF 13	30.1697 62° S 28.7034 79° E	Maroon coloured mudstone of the Elliot Formation. Fossils of *Massospondylus*, with indication of severe damage due to drying out of bones in the sun. Indication of harsh palaeon-environments	
MATF 14	30.1696 81° S 28.7032 14° E	Sun burnt fossilised dinosaur bone in the mudstones of the Elliot Formation	
MATF 15	30.1661 93° S 28.6964 89° E	Typical outcrop of maroon coloured mudstone of the Elliot Formation.	
MATF 15	30.1661 93° S 28.6964 89° E	Unidentified siliceous concretion – possible rhizome in the Elliot siltstone on site	
MATF 16	30.1653 07° S 28.6949 08° E	Typical landscape on the middle slopes with shallow soils on the Elliot Formation. Casts of burrows and several concretions resembling trace fossils	
MATF 16	30.1653 07° S 28.6949 08° E	Burrows resembling *Scholithos-like* structures in the sandy substrate of the Elliot Formation	
MATF 17	30.1643 92° S 28.6935 10° E	Outcrops of the Elliot Formation in the study area. The road upgrade will cut into the mudstones of this formation and allow for unique opportunities to find fossils	

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MATF 17	30.1643 92° S 28.6935 10° E	Massive siltstone of the Elliot Formation. Casts of vertebrate burrows.	
MATF 17	30.1643 92° S 28.6935 10° E	Cast of vertebrate burrow in the siltstone of the upper Elliot Formation.	
MATF 18	30.1648 90° S 28.6924 58° E	Sandstone of the lower Clarens Formation. No fossils were observed	
MATF 19	30.1648 95° S 28.6877 80° E	Resistant quartzitic sandstone with basaltic inter-bedding and indications of a “gas-rich” intrusion of magma into the Clarens Formation. Entire area of proposed borrow pit no3 underlain by this rock type, no fossils observed.	
MATF 19	30.1648 95° S 28.6877 80° E	Resistant quartzitic sandstone with basaltic inter-bedding and indications of a “gas-rich” intrusion of magma into the Clarens Formation. Entire area of proposed borrow pit no3 underlain by this rock type, no fossils observed.	

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MATF 20	30.1638 02° S 28.6865 18° E	Deeply weathered, fossil-rich clay deposit at the base of the Clarens Formation, with rich plant fossil layers, albeit not identified due to extreme state of carbonization. Very high groundwater tables and extremely dispersive and expansive rock formation.		
MATF 21	30.1642 01° S 28.6837 72° E	Enigmatic small-scale (4mm) burrows and trace fossils in a specific layer of red coloured fine-grained, laminated sandstone in the lower Clarens Formation. burrowing resembles present day termite burrows and the structures are randomly spaced and cut at random angles into the sandstone..		

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MATF 22	30.1623 65° S 28.6833 44° E	Fine-grained red to light-grey siltstone with enigmatic trace-fossils as described at MATF21 above.	
MATF 23	30.1613 44° S 28.6840 33° E	Pyroclastic material (P) associated with volcanic activity in the upper Clarens Formation (Jurassic).	
MATF 24	30.1542 89° S 28.6813 73° E	General view of the upper Clarens Formation and basaltic lava of the Drakensberg Formation.	
MATF 25	30.1491 97° S 28.6758 95° E	Fine-grained sandstone and pinkish-red coloured siltstone of the Clarens Formation. Outcrops are difficult to assess but it is highly likely that significant fossils will be present in these sedimentary rocks.	
MATF 26	30.1435 46° S 28.6703 66° E	General view of the upper Clarens Formation and basaltic lava of the Drakensberg Formation.	
MATF 27	30.1404 71° S 28.6800 94° E	Outcrops of mudstone and sandstone of the upper Clarens Formation and first lava layers of the Drakensberg Formation at the site of borrow pit no 2. No fossils observed	

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MATF 27	30.1404 71° S 28.6800 94° E	Pillow lava layers at the base of the Drakensberg Formation. Indicating outflow of lava into water bodies.	
MATF 27	30.1404 71° S 28.6800 94° E	Pyroclastic flows associated with first lave flows and volcanic eruptions.	
MATF 28	30.1341 23° S 28.6801 08° E	Red and pinkish-red coloured mudstone and siltstone of the upper Clarens Formation .	
MATF 29	30.1343 99° S 28.6810 86° E	Very well preserved fossil bones of a vertebrate in the pinkish coloured siltstone of the Clarens Formation. Preliminary investigation indicates that most of the fossil is still in situ and must be collected before any further construction takes place at this site	
MATF 29	30.1343 99° S 28.6810 86° E	Very well preserved fossil bones of a second vertebrate in the pinkish coloured siltstone of the Clarens Formation. Preliminary investigation indicates that most of the fossil is still in situ and must be collected before any further construction takes place at this site	

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MATF 30	30.1344 88° S 28.6826 36° E	Very shallow soils on outcrops of fine-grained pinkish-red sandstone and siltstone of the Clarens Formation. No fossils were observed but more time is needed to investigate this site.	

Some of these fossils have very high significance and permits to excavate and destroy will be required.

HERITAGE SURVEY

The heritage survey was undertaken on the 8 April 2026. Ground visibility was very good and access to sites was easy. Table 3 lists the recorded sites and location of the borrow pits.

TABLE 3: LOCATION OF RECORDED SITES & BORROW PITS

Name	Latitude	Longitude	comment
Borrow Pit 2	30.140448	28.680636	No sites
Borrow Pit 3	30.164547	28.688745	No sites
3028BA 001	-30.133333	28.683333	Estimated location of rock art site
3028BA 002	-30.166667	28.683333	Stone tool scatter
Mdibo	30.148867	28.678133	Rock art and deposit. Will not be affected
Sandstone Koppie	30.154767	28.679533	Rock art and deposit. Will not be affected
Memorial	30.165443	28.683226	Will not be affected
Cemetery	30.228637	28.762438	Will not be affected

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BORROW PIT 2

Borrow pit 2 will be an extension of an existing borrow pit/quarry. The southern half of the Borrow Pit has several small overhangs that would be ideal for San rock art. These overhangs, and those within 100m of the border were surveyed (fig. 12). All the overhangs consist of very friable sandstone geological deposits, and any potential art has now eroded. No archaeological deposit nor artefacts were found on the floor of the overhangs, suggesting that there were not used for human occupation.

No further heritage mitigation is required as there are no sites.

BORROW PIT 3

Borrow Pit 3 is located on a slope filled with Sugarbush proteas (*Protea repens*) with a few boulders (fig. 13). The 1886 Surveyor General Diagram notes a Sugarbush Road just below the Borrow Pit! No overhangs or small shelters occur within the boundaries of this borrow pit. No archaeological deposit nor artefacts were found.

No further heritage mitigation is required as there are no sites

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FIG. 12: BORROW PIT 2

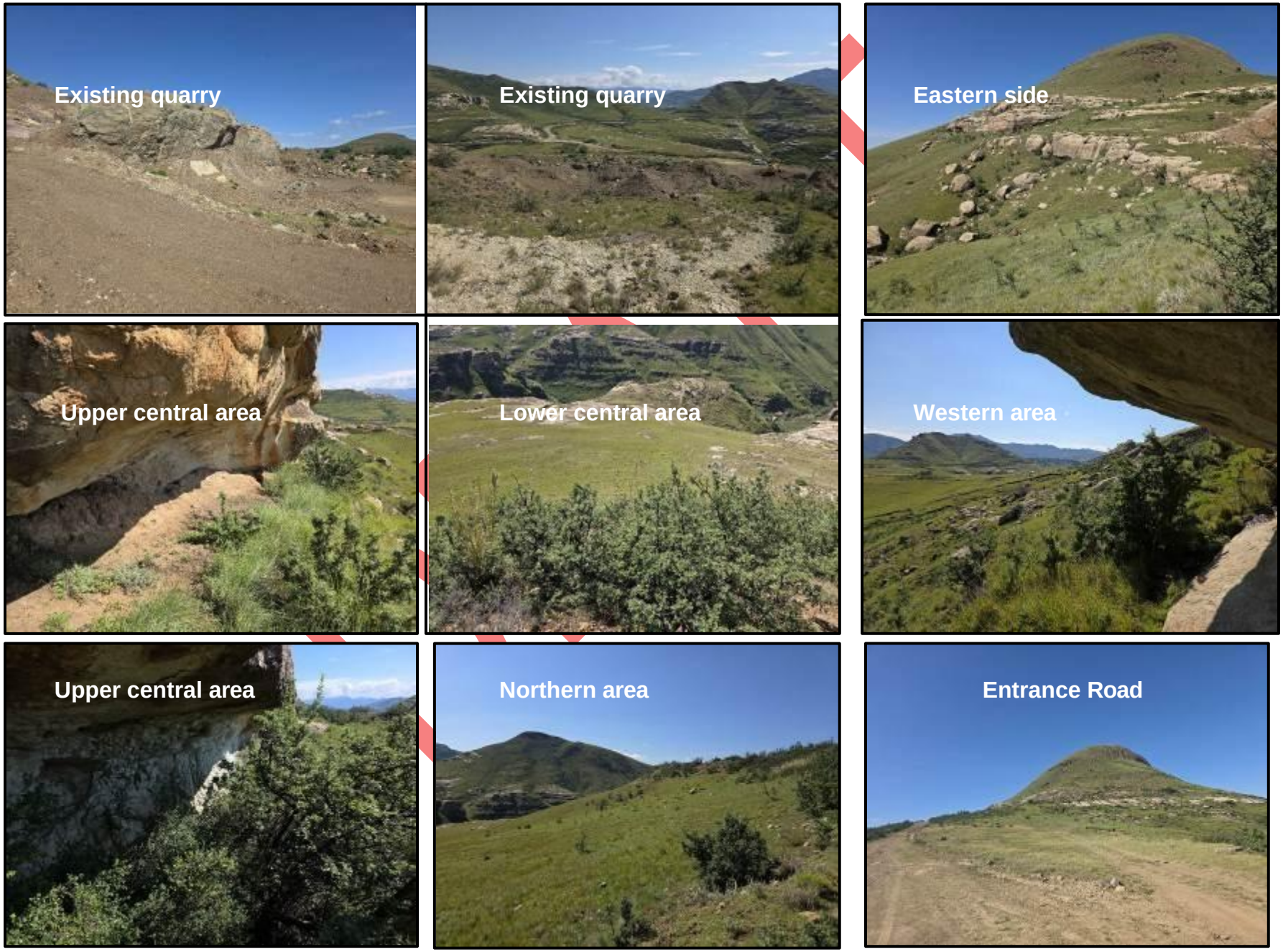


Fig. 13 BORROW PIT 3



SANDSTONE KOPPIE

The rock art site Sandstone Koppie occurs between Borrow Pit 2 and Borrow Pit 3 (fig. 14). This was visited to get an understanding of local sandstone weathering and preservation of the art. Sandstone Koppie had poorly preserved red paintings of humans and animals. The site was recorded by Biggs in 1975. He notes the following.

- "Damaged and smoked by human occupation
- Remains of rhebuck, eland and human activities" (F Prins database)

Several of the male humans have quivers.

There is a potential archaeological deposit at the back of the shelter.

Significance: The site is of medium significance despite the poor preservation of art images.

Mitigation: No further mitigation is required as the site will not be affected.

SAHRA Rating: N/A

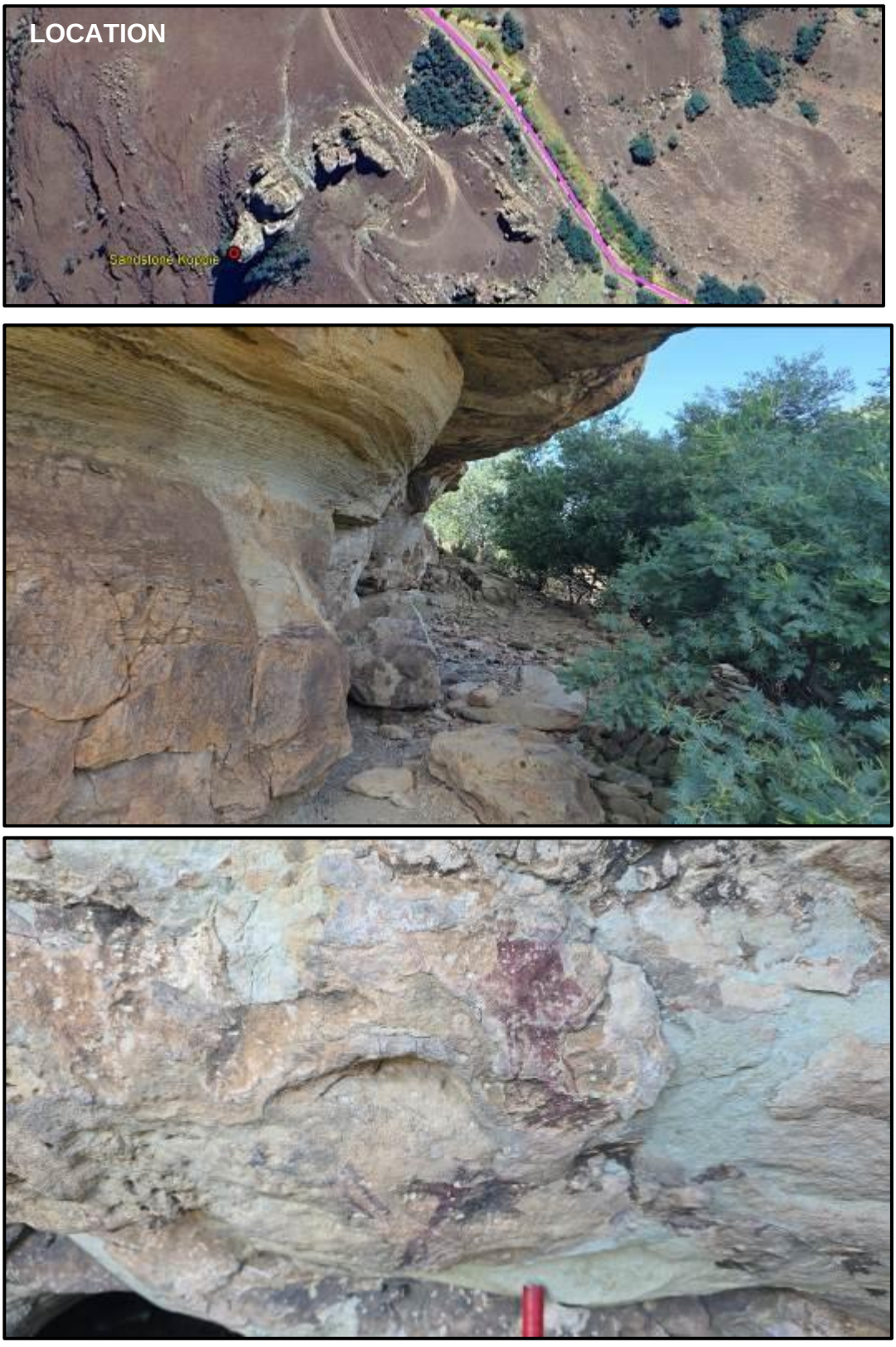
MDIBO

Mdibo was recorded by Biggs in 2006 (F Prins database). He notes:

- "Very good, but the site is being used as a goat kraal (Mdibo), and very good and interesting paintings are in serious danger.
- Mythical animal chasing human both in white. Very good rhebuck. Human activity in excellent detail. Three sitting humans in excellent detail. Other panels of human activities worth a visit."

The site was not surveyed as it was inhabited by people when I did the survey. There was no secure location to park the vehicle as it was on a narrow part of the road. The overhang is visible from the road (fig. 15).

FIG. 14: SANDSTONE KOPPIE



Significance: The site is of high significance due to the art and archaeological deposit.

Mitigation: No further mitigation is required as the site will not be affected.

SAHRA Rating: 3A

FIG. 15: APPROXIMATE LCOATION OF MDIBO SHELTER



MEMORIAL

A memorial to Tshidi Lefatsa (1980 – 2019) is located ~400m west of Borrow Pit 3. The memorial is in SeSotho and commemorates her and the place where she was murdered in2019. The memorial will not be affected.

Significance: The site is of medium significance as it is a memorial and not an actual grave.

Mitigation: No further mitigation is required as the site will not be affected.

SAHRA Rating: N/A

FIG. 16: THSIDI LEFATSA MEMORIAL



3028BA 001

There are no details about the site in the KZN Museum database, apart from that it was recorded by P Vinnicombe in 1979s and featured in her 1976 book. Woodhouse (1970) also refers to this site. The KZN Museum site records describe the site as follows:

"Painting description from redrawings: NM A60: Ink redrawing, published in People of the eland fig 18, p32. Three seated figures with arrows, bows, bags, quivers and a cloak. A244: painted redrawing, not published. White rhebuck with horns and hooves clearly defined, 2 other rhebuck, 2 small humans, 1 large human with white stripes on legs and body, bending forward, 2 seated kaross-clad figures back-to-back."

While the site is of significance it is not in the correct location. The stie records note the problem with the location of the site: The location is in "East Griqualand, near Lesotho border at Qacha's Nek. This was not part of Pat Vinnicombe's project area, so she has not catalogued the site. I am not certain where the site is. Her caption in People of the Eland places Natal Museum Rock Art catalogue A60 redrawing at S30 08, E28 41, but her map has sites 11 and 12 marked at Qacha's Nek village about S30 07, E28 42 in Lesotho. If additional plotted maps are found the position of this or these sites may be determined."

The site was thus not surveyed as it was not in the correct location. Fig 17 shows its current incorrect location

Significance: The site appears to have significant rock art images however these need to be confirmed.

Mitigation: it is highly unlikely that the road upgrade will affect the site. It is highly unlikely that the site would occur within 50m of the road, given the terrain. No further mitigation is required.

SAHRA Rating: Pending.

FIG. 17: CURRENT LOCATION OF 3028BA 001



3028BA 002

Recorded by Kirk in 1962 who notes that “the material lay [45cm] below surface. Late MSA and LSA.”

The site is an open scatter of artefacts. However, the records state that this an approximate location and that the site is ~6.4 kilometers from Quachas Neck towards Matatiele.

I walked the little plateaux where the site was marked and no artefacts were noted. The si9te is located behind the signboard in fig. 16.

Significance: The site is of low significance.

Mitigation: The site will not be affected. No further mitigation is required.

SAHRA Rating: 3C

CEMETERY 1

A large cemetery is located near the road at waypoint MATF4 (fig. 18). The cemetery is ~50m from the road and a perennial stream occurs between the cemetery and the road and acts as a natural buffer.

Significance: The site is of low significance.

Mitigation: The site will not be affected by the road upgrade. Temporary high visibility barriers should be placed between the edge of the road footprint and the river

SAHRA Rating: 3C

FIG. 18: CEMETERY



MANAGEMENT PLAN

The chances of heritage sites and/or artefacts being affected by the road upgrade and borrow pits is very low. No further mitigation is required. However, a Chance Find Protocol will be initiated and needs to form part of the EMPr.

The chances of palaeontological material being affected by the road upgrade and borrow pits is very high. Further mitigation is required.

- The PEM and ECO's must be informed of the fact that a very high rating for Palaeontological Sensitivity is allocated to the areas underlain by rocks of the Karoo Supergroup. A medium sensitivity is however, allocated to the areas underlain by alluvium.
- This "Chance Find Protocol" must be included in the EMPr of the Project and a reasonable budget must be allocated to ensure compliance with the legal responsibility of the developer in terms of the proper conservation of and storage of Palaeontological Heritage.
- ECPHRA/SAHRA must be informed of the content of this "Chance Find Protocol".
- **Following the Phase 1 survey, it is the professional opinion of Dr Gideon Groenewald, accredited palaeontologist, that FURTHER MITIGATION for Palaeontological Heritage is compulsory, specifically where parts of the development is underlain by rocks of the Stormberg Group.**
- Recommended action is to engage with a suitably qualified palaeontologist (member of PSSA) to be on standby during the time of excavation. In the highly likely event of recording of significant fossils, the ECO must inform the appointed palaeontologist and arrange for formal engagement and a site visit.
- **It is the professional opinion of Dr Gideon Groenewald that, on the proviso that these mitigation measures are adhere to, there is no reason why ECPHRA/SAHRA cannot approve the continuation of this project.**

SIGNIFICANCE OF IMPACTS

No impacts are envisaged for archaeology and cultural heritage.

Palaeontological impacts are expected. The impact will be very high negative if no mitigation is done during construction; however, the impact will be very high positive if mitigation is done and the fossils are removed prior to the start of construction.

CONCLUSION

A heritage and palaeontological Phase 1 survey was undertaken for the proposed upgrade of the R415 and two borrow pits. Phase 1 heritage and palaeontological surveys were undertaken as both were in areas of high sensitivity. Archaeological sites were noted near the proposed upgrade and borrow pits, and the area was regarded as having high and very high palaeontological sensitivity.

The phase 1 archaeological and cultural heritage surveys noted that the borrow pits and road upgrade will not directly impact any of the recorded heritage sites. These sites occur 50m+ from the road and will not be affected.

A Palaeontological Phase 1 survey noted that there are several areas of (very) high sensitivity, and these yielded fossiliferous remains, these remains need to be excavated before road upgrade begins and will require a permit from KZNARI.

The chances of heritage sites occurring within the study areas is very high However, a Chance Find Protocol will be initiated and needs to form part of the EMPr. The chances of palaeontological sites occurring within the study areas is very high. Apart from onsite salvage excavations, and ongoing Chance Find

Protocol is required. A Chance Find Protocol will be initiated and needs to form part of the EMPr.

It is in our reasoned opinion that the activity be authorised provided the appropriate mitigation is undertaken. The confidence level of these finding is high.

REFERENCES

Maps:

3028BA Quachas NEK

3028BD Matatiele

Database

KZN Museum

SAHRA

Umlando

Prins, F.

EXPERIENCE OF THE HERITAGE CONSULTANT

Gavin Anderson has a M. Phil (in archaeology and social psychology) degree from the University of Cape Town. Gavin has been working as a professional archaeologist and heritage impact assessor since 1995. He joined the South African Archaeology Association – CRM Section in 1998 that then became the Association of Southern African Professional Archaeologists. Gavin is rated as a Principal Investigator with expertise status in Rock Art, Stone Age, and Iron Age studies. In addition to this, he was worked on both West and East Coast shell middens, Anglo-Boer War sites, and Historical Period sites.

DECLARATION OF INDEPENDENCE

I, Gavin Anderson, declare that I am an independent specialist consultant and have no financial, personal, or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



Gavin Anderson
Archaeologist/Heritage Impact Assessor

APPENDIX A

PIA REPORT

PALAEONTOLOGICAL IMPACT ASSESSMENT (PIA) FOR

the upgrading of the R415 road from Maluti Village to Qacha's Nek Border Post, Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province.

FOR

Earthlink Environmental Services



Lesothosauru

DATE: 15 April 2026

Scientific Specialist

Dr Gideon Groenewald, Hon Research Fellow ESI Wits University

Cell: 078 713 6377

EXECUTIVE SUMMARY

Dr Gideon Groenewald was appointed by **Earthlink Environmental Services to under**take a Phase 1 Palaeontological Assessment Survey for **the planning of the upgrading of the R415 Route between Maluti Village and the Qacha's Nek Border Post in the Matatiele Local Municipality, Alfred Nzo District Municipality.**

This study also refers to two specific areas earmarked for the development of borrow pits.

This study forms an integral part of the Palaeontological Impact Assessment for the activities related to the upgrading of the R415 route and the area of focus for this specific study is the peri-urban as well as rural farmland areas to the northwest of Matatiele.

This Phase 1 Survey is done to prepare a "Chance Find Protocol" (CFP) document to assist with possible future field visits and to complete a Phase 2 PIA (if required) since large parts of the development site is underlain by geological formations with an inferred very high sensitivity for Palaeontological Heritage.

The geology underlying the project area for the upgrading of the R415 route between Maloti and the Cacha's Nek border post, Matatiele **Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province**, comprises Palaeozoic to Cenozoic aged sedimentary rocks of the Karoo Supergroup, as well as Quaternary alluvial deposits.

The study site is underlain by deeply weathered sandstone and shale of the Molteno, Elliot, Clarens and Drakensberg Formations of the Strormberg Group, Karoo Supergroup. The wealth of fossil data from the Karoo Supergroup is universally well-known.

It is, however important to note that, although a very high sensitivity rating is allocated to areas underlain by rocks of the Karoo Supergroup (SAHRIS database), the actual impact per site of excavation might be limited. Although it is imperative to indicate the very high sensitivity on the initial maps, the *modus operandi* of the project palaeontologist, when appointed, must be to train the ECO and team members to adhere to the "Chance Find Protocol"

recommendation. The full-time presence of a professional palaeontologist would be preferred during initial excavation into the areas allocated a red colour on the sensitivity maps for the R415 route areas. It might, however, be much less expensive to train the environmental officers to know what to look for during excavation and inform the palaeontologist of a significant find immediately. Fossils recorded during excavation on site, must be curated and moved to the institute indicated by ECPHRA/SAHRA.

The discovery of uniquely sensitive fossilized remains of vertebrate animals in the *Elliot Formation* during this Phase 1 PIA study, necessitated very urgent action and the author immediately initiated the process of application for a collection and destruction permit on behalf of the developer. The highly fragile fossilised remains must be collected and the curator at the National Museum in Bloemfontein, where it preferably will be curated for further studies, indicated a preliminary interest in assisting with the professional excavation as well as safe-keeping of the fossils.

It is however imperative to note that the final instructions from the responsible regional Authority (ECPHRA) must be adhered to for this project. (*Please refer to Ayanda Mncwabe-Mama*: ayanda.mncwabe-mama@ecsrac.gov.za).

Recommendations

- The EAP and developer must be informed that significant areas are underlain by rocks with a very high sensitivity for palaeontological heritage. **Following the site visits on Wednesday 1 April 2026, it is the professional opinion of Dr Gideon Groenewald, accredited palaeontologist, that the chance-find of significant fossils in several sections of the R415 Route Project is very high.**
- The appointed palaeontologist will be responsible for the formal application for a collection and/or destruction permit on behalf of the developer. It remains of critical importance that the incentives given in the CFP (attached) are followed.
- The project will require a formal “Chance Find Protocol” that will have to be upgraded during the construction phases of the project. (The Chance Find Protocol document is attached to this report).
- **Without mitigation** the project will have a **very high negative impact** on palaeontological heritage. **With mitigation** (see CFP attached) the

project will have a **very high positive** impact on Global palaeontological heritage, mainly because excavations of more than 300mm deep will expose new bedrock that would never have been exposed for thousands of years.

- Recommendations for palaeontological monitoring and mitigation (CFP Document attached) will have to be incorporated into the EMPr for approval by ECPHRA/SAHRA.
- It is recommended that, with the mitigations proposed, there are no reasons why this project cannot be implemented.

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INTRODUCTION

Dr Gideon Groenewald was appointed by **Earthlink Environmental Services to under**take a Phase 1 Palaeontological Assessment Survey for **the planning of the upgrading of the R415 Route between Maluti Village and the Qacha's Nek Border Post in the Matatiele Local Municipality, Alfred Nzo District Municipality.**

This study also refers to two specific areas earmarked for the development of borrow pits.

This study forms an integral part of the Palaeontological Impact Assessment for the activities related to the upgrading of the R415 route and the area of focus for this specific study is the peri-urban as well as rural farmland areas to the northwest of Matatiele.

This Phase 1 Survey is done to prepare a "Chance Find Protocol" (CFP) document to assist with possible future field visits and to complete a Phase 2 PIA (if required) since large parts of the development site is underlain by geological formations with an inferred very high sensitivity for Palaeontological Heritage. (Almond and Pether, 2008; Groenewald, 2014, 2012; Groenewald et al., 2014).

The aims of this independent assessment of the Palaeontological Heritage is to:

a. Review findings of previous Paleontological studies in the same area

b. Record new palaeontological finds during the Phase 1 Impact Assessment

Modus operandi

- *Review documentation of existing PIA studies of the area*
- *Review reality of the palaeontology of the site*
- *Phase 1 PIA site investigation and PIA Report with recommendations – GIS mapping of palaeontological sensitivity - **first deliverable***
- *Inclusion of a "Chance Find Protocol" (CFP) document to assist the EAP and the ECO with operational management issues regarding possible impact on palaeontological heritage – **secondary deliverable***

Summary of Project Parameters as per ToR's

Client name: **Earthlink Environmental Services**

Site name: **R415 Route, Alfred Nzo District Municipality**

Property description: **R415 Route, Matatiele Local Municipality, Alfred Nzo District Municipality**

Project title: **Proposed upgrading of the R415 route in the Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province**

Legal Requirements

This Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999 (revised 2017). In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; and
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

Aims and Methodology

A Phase 1 site investigation is often the only opportunity to record the fossil heritage within the development footprint. These records are very important to understand the past and form an important part of South Africa's National Estate.

Following the "*SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports*" the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;

- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

Prior to a field investigation, a preliminary assessment (desktop study) of the topography and geology of the study area was made using appropriate 1:250 000 geological information (3028 Kokstad) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc.) were identified within the study area and the known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

Priority palaeontological areas are identified within the development footprint to focus the field investigator's time and resources. The aim of the desktop survey is to document any exposed fossil material and to assess the palaeontological potential of the region in terms of the type and extent of rock outcrop in the area.

The likely impact of the project on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 below.

Table 2 Palaeontological sensitivity analysis outcome classification

PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of (Almond et al., 2009; Almond and Pether, 2009, 2008; Groenewald et al., 2014)

RED	Very high palaeontological sensitivity/ vulnerability. Development will most likely have a very significant impact on the palaeontological heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, Phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and Phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
ORANGE	High palaeontological sensitivity/ vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and Phase I palaeontological impact assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
GREEN	Moderate palaeontological sensitivity/ vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example, areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the palaeontological heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and Phase I PIA (ground proofing of desktop survey) recommended.
BLUE	Low palaeontological sensitivity/ vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in larger alluvium deposits. At least one site visit by a competent palaeontologist is compulsory. Collection of a representative sample of potential fossiliferous material is recommended.

GREY	Very low palaeontological sensitivity/ vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during intrusion of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits. At least one site visit by a suitably qualified palaeontologist is recommended.

Rocks with very high palaeontological sensitivity are present within the development footprint and palaeontological mitigation measures must be incorporated into the Environmental Management Plan (EMP) for this project. The 1:250 000 scale vector maps obtained from the Council for Geoscience indicates some of the formations underlying the area applicable to this report as being relatively simple sandstone and mudstone deposits of the Stormberg Group and dolerite of the Karoo Supergroup (Bordy et al., 2020a; Bordy and Eriksson, 2015; Johnson et al., 2009).

The study area is characterised by an undulating landscape of highly modified Anthropogenic development (agricultural areas, rural villages) interconnected by areas of lessor human development associated with the grassland underlain by the Karoo Supergroup. Most of the younger geology is associated with Cenozoic aged palaeo-land surfaces and river terraces.

Field work during this survey as well as literature surveys indicated that the rock units that will be exposed most of the time is the potentially fossiliferous Stormberg Group of the Karoo Supergroup (Johnson et al., 2009; MacRae, 1999; McCarthy and Rubidge, 2005; Anderson and Anderson, 1984; Bordy et al.,

2020a; Bordy and Eriksson, 2015; Smith et al., 2020; McPhee et al., 2018; Viglietti et al., 2020; Chapelle et al., 2025)

Scope and Limitations of the Phase 1 Investigation

The scope of a Phase 1 Investigation includes:

- an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units;
- a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports;
- data on the project provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged); where feasible, location and examination of any fossil collections from the study area (e.g. museums); and
- an on-site investigation to assess the identified palaeontological sensitive areas within the development footprint/ study area, including a formal palaeontological collection if fossils are of collectable quality. The investigation focuses on the bedrock exposure where excavations would most probably require palaeontological monitoring.

The results of the field investigation are used to predict the potential of buried fossil heritage within the development footprint. In some investigations, (as in this study), this involves the examination of similar accessible bedrock exposures, such as road cuttings and quarries, along roads that run parallel to or across the development footprint.

Summary of the proposed development

The development entails the formal upgrading of the R415 route between Maloti and the Cacha's Nek border post, with possible development of two borrow pits and special interventions at one wetland crossing.

Locality and Project Site Description

The study area for this report is limited to the R415 Route and the sites of the two borrow pits for supply of road making materials in the Matatiele **Local Municipality, Alfred Nzo District Municipality**, Eastern Cape Province (Figure 1). The rural hinterland is selectively developed for peri-urben and village development, agricultural activities (grazing land) and scattered rural houses.

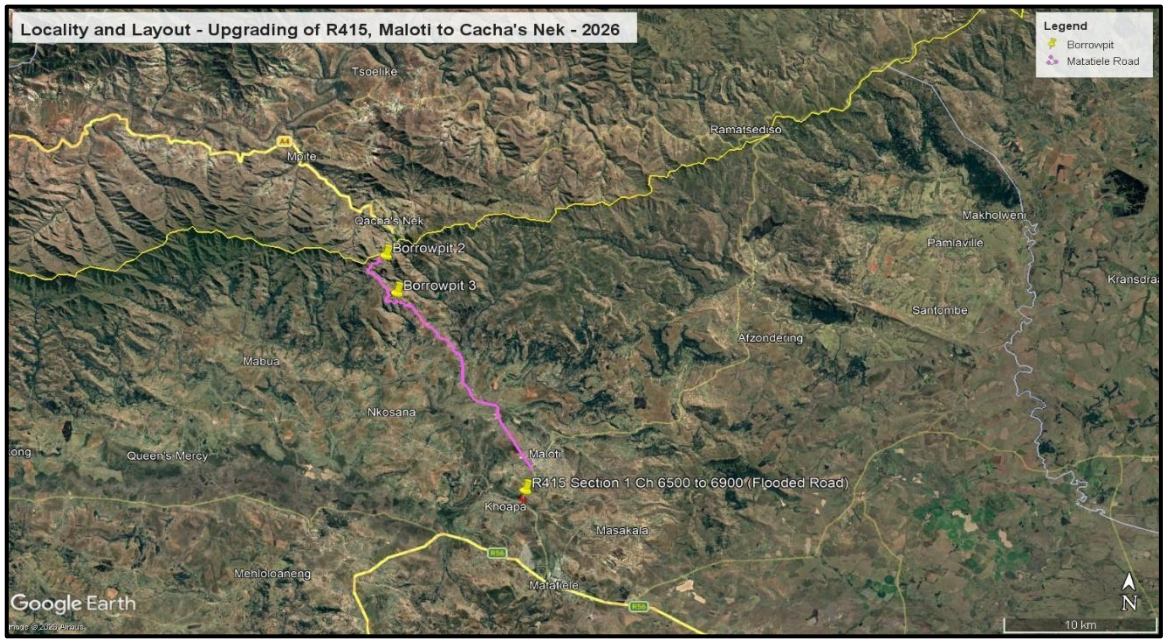


Figure 1 Locality and layout of the R415 route and special development sites

The landscape is defined by the typically open rolling hills and grazing lands underlain by Stormberg Group sandstone, mudstone and basalts. Local hills are typically formed by outcrops of Karoo aged dolerite. Rivers are mostly perennial and only flows strongly during high rainfall events in the summer rainfall season or during winter months when the Drakensberg receive heavy snowfalls.

The project can be defined as a typical large linear development with a few point interventions associated borrow pit infrastructure. Moving of equipment and transport of all materials will be along existing and/or newly developed roads.

This Phase 1 Palaeontological impact survey aims to provide the decision making authorities (ECPHRA/SAHRA) with a general summary of the geology and palaeontology of the development site, with indications of how the specific development phases will have to be assessed in more detail, once the actual layouts are established.

It is important that the EAP as well as the developer understand the *modus operandi* of Palaeontolotgical Impact assessments in relatively large projects. The professional palaeontologist will indicate a very high sensitivity for palaeontological heritage in rock units where there is a very high likelihood of finding significant fossil remains (in this case fossils of invertebrates, vertebrates, plant fossils and trace fossils of Triassic age) in an exposed rock outcrop area of 100m^2 or basically 20m x 5m. During fieldwork, this scenario was duplicated and the existing road reserve was scanned for outcrops of fossiliferous rocks. Where significant evidence for fossis are recorded in outcrop areas of 100m^2, the rock unit is mapped as “very highly sensitive” because it is **very highly likely** that an excavation for the clearing of vegetation to develop any infrastructure, will expose significant fossils. If this is proven, the palaeontologist must train the ECO and dedicated members of the technical team of the contractor, to recognise “**significant” fossils**. (*Significant fossils are the remains of vertebrates, invertebrates, plants and trace-fossils, that are uniquely well preserved and the judgement is subjective, with a very strong element of personal observation by the ECO*). The ECO and Resident Engineer will then communicate an urgent call

to the **appointed palaeontologist** to come onto site to collect/remove/sample the fossils. In the case of well-defined fossils observed, the appointed palaeontologist must apply for a destruction permit on behalf of the developer.

It will be impractical and too expensive to employ a full-time professional palaeontologist to "wait and see" on the construction site. The aim of a well-planned "Chance Find Protocol" (which must be part of the EMPr of this project) will be to recover fossils without causing "standing time". If this process is well-planned, no un-planned standing time needs to be generated as a result of palaeontological heritage discoveries.

GEOLOGY

The project area is underlain by rocks of the Palaeozoic aged Karoo Supergroup that includes the Triassic aged, fossil rich Stormberg Group, Jurassic aged dolerite and younger covers of Quaternary alluvium (Figure 2).

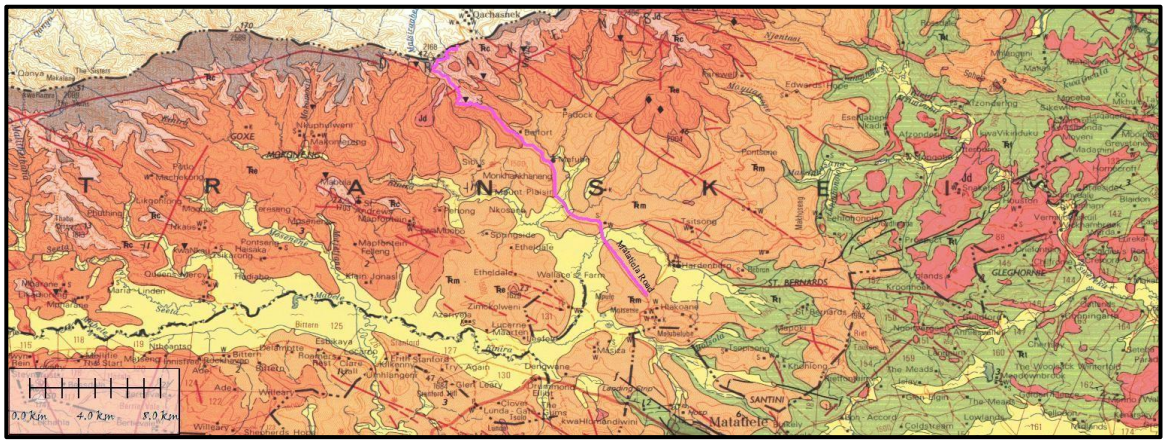


Figure 2 The study areas are underlain by rocks of the Molteno, Elliot, Clarens and Drakensberg Formations of Stormberg Group, Karoo Supergroup, as well as Karoo dolerite. River valleys are underlain by alluvium

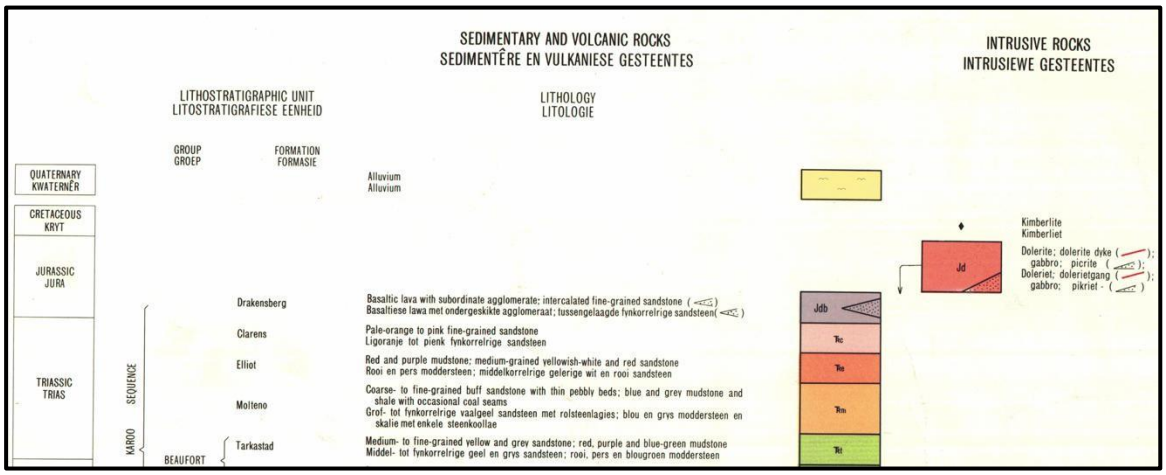


Figure 3 Geological legend for Figure 2

Karoo Supergroup

Field work during this survey as well as literature surveys indicated that the rock units that will be exposed most of the time is the potentially fossils rich rocks of the Karoo Supergroup, with potential exposure of the fossiliferous Molteno, Elliot, Clarens and Drakensberg Formations, a well-known rock sequence of the Stormberg Group that contains highly significant palaeontological heritage (Groenewald et al., 2014; Groenewald, 1996; Johnson et al., 2009; MacRae, 1999; McCarthy and Rubidge, 2005; Rubidge (ed), 1995; Smith et al., 2020).

The Stormberg Group

Stormberg Group mudstones and sandstones form the foothills of the Drakensberg Escarpment. The red, green and purple coloured mudstones which characterize this group were deposited in a steadily drying swampland (Johnson et al., 2009; MacRae, 1999; McCarthy and Rubidge, 2005).

Geology of the Stormberg Group in the Study Area

SACS (South African Committee for Stratigraphy) still needs to publish a formal note on the lithostratigraphy of the Escarpment at Matatiele. The most recent formal academic study of the complete section forms part of an overview of the Karoo Supergroup (Bordy and Groenewald, 2026).

The Stormberg Group is subdivided into a lower Molteno Formation, dominated by braided fluvial environments. The Molteno Formation is overlain by the Elliot (playa lake and meandering river environments), the Clarens Formation (Aeolian sandstone), terminating in the Drakensberg Formation (basaltic lava). Correlation of these units from the Southern Karoo Basin into this northern part of the basin is contained in a comprehensive regional study of the Upper Karoo Supergroup (Bordy and Groenewald, 2026)

Karoo Dolerite

Jurassic aged Karoo Dolerite represents the intrusion of very large volumes of basaltic lava during a Jurassic aged Large Igneous Province (LIPS) event (Groenewald, 2024).

Alluvium

The valley floors are mostly filled with Quaternary aged alluvium.

PALAEONTOLOGY

Karoo Supergoup

The Karoo Supergroup is renowned for the globally significant palaeontological heritage of fossils as well as trace fossils that are preserved in the sedimentary rock sequence (Bordy and Groenewald, 2026; Catuneanu et al., 2005; Chapelle et al., 2025; Groenewald et al., 2023; Groenewald D.P., Day O.D., Cameron R. P-C. and Rubidge B.S., 2022; Johnson et al., 2009; MacRae, 1999; Marchetti et al., 2019; Mason and Christie, 1986; McCarthy and Rubidge, 2005; Ronchi et al., 2023; Viglietti et al., 2017).

The study area is specifically underlain by the very productive Stormberg Group that is divided into the Molteno, Elliot, Clarens and Drakensberg Formations.

Stromberg Group

These Triassic to Jurassic aged rocks record known extinction events and also some of the best known examples of dinosaur eggs with embryos (Chapelle et al., 2025).

The Stormberg Group is well-known for its richness in fossils of vertebrates and also includes several recordings of unique vertebrate burrows.(Bordy and Groenewald, 2026; Chapelle et al., 2025; McPhee et al., 2018; Viglietti et al., 2020).

The Molteno Formation (Trm)

This sequence of sediments is rated as some of the most productive deposits of Mesozoic plant fossils of *Dicroidium* assemblages in the world. At their peak development during the Late Triassic these seed ferns inhabited a variety of ecological niches, including riverine forests, wetlands and open woodland. The open woodland was dominated by cycadeoids, ginkos and conifers. Rich assemblages of insects are also recorded from these sequences. A rich plethora of early gymnosperms are also recorded from outcrops in KwaZulu-Natal, notably Little Switzerland, Kannaskop, Umkomaas and Bird River. These deposits are seen by scientists as examples of one of the richest plant histories and the clearest window into the Late Triassic plant and insect communities in the World (Anderson and Anderson, 1984; Johnson et al., 2009; MacRae, 1999; McCarthy and Rubidge, 2005). Although no vertebrate remains have been described from the Molteno Formation several dinosaur tracks have been described from the formation.

The Elliot Formation (Tre)

Outcrops of the Elliot Formation are restricted to badly eroded regions in the foothills of the Drakensberg. Due to these areas mainly falling in protected reserves, outcrops are not as abundantly present as in the more western part of the basin. In general the Elliot Formation is globally recognized for its abundance of early dinosaur and mammal remains, including dinosaur eggs containing embryos from the Golden Gate Highlands National Park in the Free State Province, which represent the oldest dinosaur embryos in the World (Bordy et al., 2020a; Bordy and Groenewald, 2026; Chapelle et al., 2025; Reisz et al., 2005,

2012; Viglietti et al., 2020). At present, one fish genus, two amphibian genera, 10 non-dinosaurian reptiles, at least 17 dinosaur genera, seven cynodont genera and two mammalian genera are known from this formation. Importantly, *Australochelys*, the oldest known fossil turtle is also known from the Elliot Formation (Smith et al., 2012).

The Elliot Formation also contains the Triassic-Jurassic boundary, an important marker, which represents the end-Triassic mass extinction. This extinction resulted in a massive faunal turnover (Tanner et al., 2004), the reasons for which are still under debate.

The Clarens Formation (Trc)

The Clarens Formation has produced some dinosaur remains and footprints as well as invertebrate burrows (Linstrom, 1981; MacRae, 1999). The fish genus, *Semionotus*, has also been recovered from the Clarens Formation (MacRae, 1999). Several new studies are presently done on the vertebrate fossils of the Clarens Formation with new information becoming available (Bordy, 2018; Bordy et al., 2020a, 2020b, 2020a; Bordy and Groenewald, 2026; McPhee et al., 2018; Smith et al., 2012).

The Drakensberg Formation (Jd)

The Jurassic aged Drakensberg Formation is a well-known flood basalt deposit that caps the geology of the Karoo Basin (Groenewald, 2024; MacRae, 1999; McCarthy and Rubidge, 2005). The Drakensberg Formation is obviously not rich in fossil remains, but several significant finds are now known from the areas at Clarens and in Lesotho where dinosaur remains are associated with interbedded sandstone and shale beds in the Basalts (Bordy et al., 2020b; Groenewald, 2024).

Karoo Dolerite (Jd)

The Jurassic aged dolerite of the Karoo Supergroup will, as an igneous rock, not contain any fossils.

Recent Alluvium

Extensive alluvium deposits are associated with the river valleys and some of the footslopes are underlain by deposits of the Quaternary aged Masotcheni Formation. To date, no significant fossils have been recorded from these

sediments. These deposits are allocated a moderate sensitivity for Palaeontological heritage.

PRELIMINARY ASSESSMENT RESULTS

The paleontological sensitivity was predicted after identifying potentially fossiliferous rock units; ascertaining the fossil heritage from the literature and evaluating the nature and scale of the development itself. The paleontological sensitivity varies from very highly sensitive for the Karoo Supergroup rocks to moderately and very low sensitive in areas underlain by the younger Quaternary aged sedimentary sequences and dolerite (Figure 4).

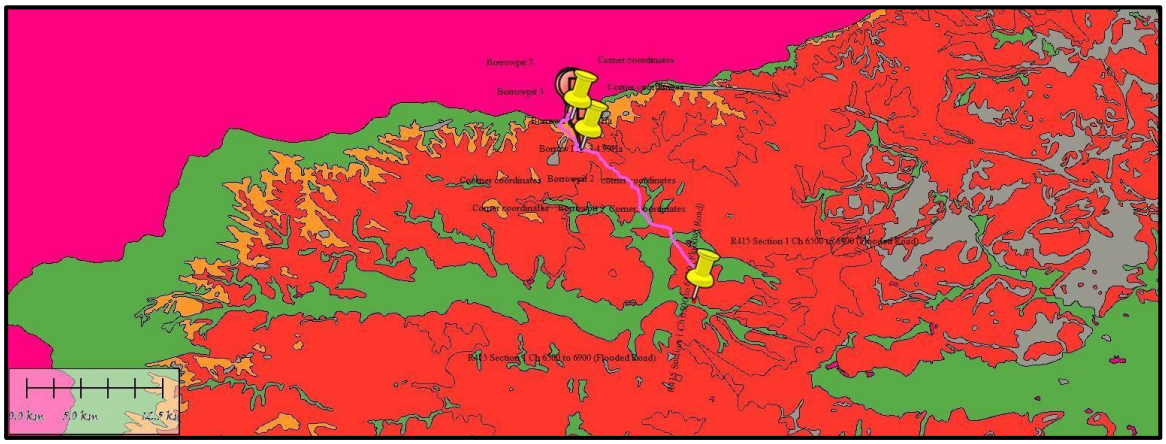


Figure 4 The study area is underlain by highly sensitive geological formations

Site specific assessments confirm the variations from very high to very low sensitivity of the areas proposed for upgrading of the road infrastructure due to flooding as well as two specific borrow pits (Figure 5).

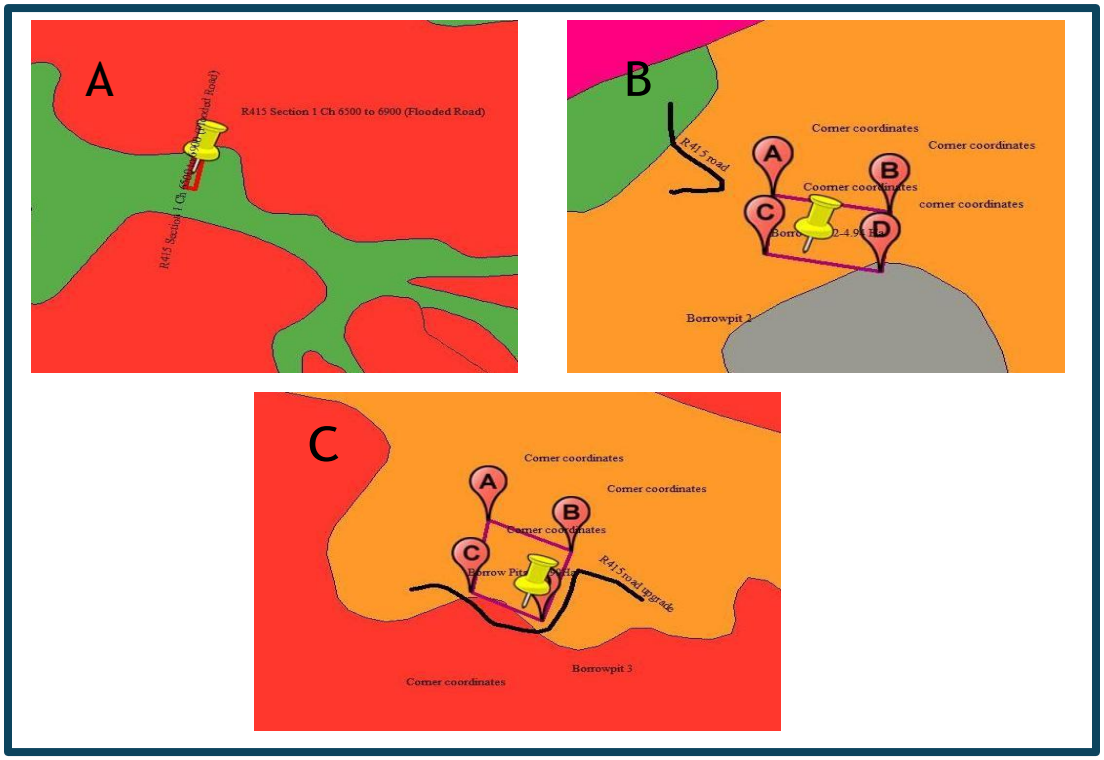


Figure 5 Sensitivity for palaeontological heritage at the site where flooding is experienced (A), borrow pit development 2 (B) as well as borrow pit development 3 (C). For colour coding see Table 1

FIELD INVESTIGATIONS

Dr Gideon Groenewald, experienced fieldworker (GGG Consultants) visited the sites of the project on Wednesday, 1 April 2026. Our observations are that valuable and significant fossils are preserved in the surface exposures of the geological formations on site and that significant finds will be present where excavations of deeper than 1,5m are planned for upgrading of the road and installation of infrastructure.

Photographic recordings of geological information at specific localities (Figure 6) were recorded for record purposes (Table 2).

In cases where deep excavation (>1,5m) are planned for development purposes (geotechnical reports), the author expects that the “chance find” of well-

preserved, highly significant fossils (vertebrates, plants and trace fossils) is **very high** (Figure 7).

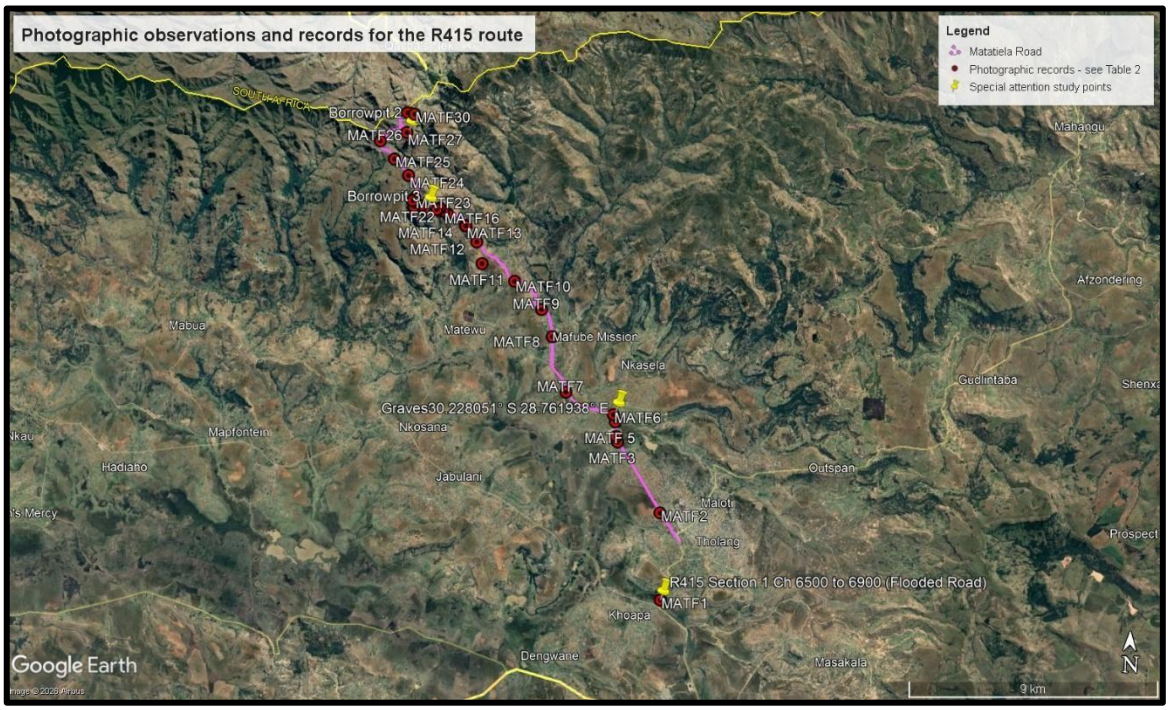


Figure 6 Localities of Photographic recordings at specific observation points in the development area and summarised in Table 2



Figure 7. Fossil remains of the plant genus Equisetaceae (horsetail ferns attributed to the *Heidiphyllum* thickets (MacRae, 1999)*(page 162)* from the Molteno Formation as well as a large femur bone of a Dinosaur (maybe Massospondylus) from the Elliot Formation on site

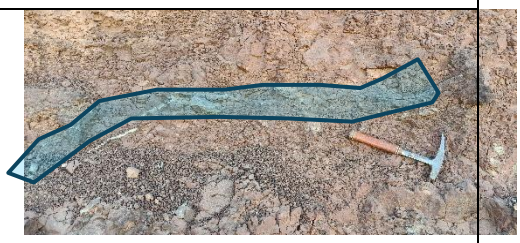
Table 3 Photographic recordings in the study area for the R415 route upgrade (see Figure 8)

Photo	(GPS station) Coordinates	Comments	Photographic Record
MATF 1	30.2876 60° S 28.7816 23° E	Typical wetland in the floodplain of the Botsola River at the road crossing where flooding of the road must be addressed. No fossils was observed	
MATF 2	30.2596 10° S 28.7801 43° E	Deep Hutton Form soils on the Molteno Formation sandstone. No fossils were observed.	
MATF 3	30.2373 35° S 28.7632 61° E	Deep alluvium on the banks of the Kinra River and associated water ways. No fossils were observed in the alluvium.	
MATF 3	30.2373 35° S 28.7632 61° E	Deep alluvium on the banks of the Kinra River and associated water ways. No fossils were observed in the alluvium..	
MATF 4	30.2355 57° S 28.7626 74° E	Extensive wetlands on the floodplains of the Kinra River. All indications are that this section of the road is well above the flood level of the river. No fossils were expected and no fossils observed	

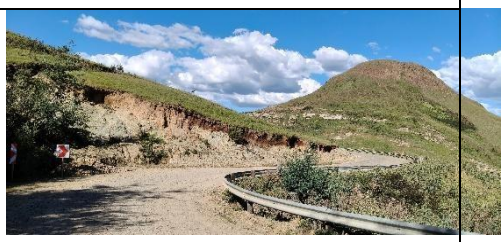
MATF 5	30.2308 67° S 28.7621 27° E	Fossils of “horsetail” like ferns *Equisetaceae* in the Molteno Formation. These packs of leaves resemble the fossils attributed to the *Heidiphyllum* thickets (MacRae, 1999)*(page 162)*	
MATF 5	30.2308 67° S 28.7621 27° E	Khaki coloured mudstone of the Molteno Formation with mats of plants fossils	
MATF 5	30.2308 67° S 28.7621 27° E	Thin, highly significant coal beds in the Molteno Formation	
MATF 6	30.2285 86° S 28.7612 53° E	Old graveyard. Not directly in the line of the upgrading but must be avoided	
MATF 6	30.2285 86° S 28.7612 53° E	Flintstone. Artefact associated with hornfels outcrops along a dolerite dyke	
MATF 6	30.2285 86° S 28.7612 53° E	Outcrop of very coarse-grained sandstone of the Molteno Formation, overlying a grey-coloured laminated shale with plant fossils	
MATF 6	30.2285 86° S 28.7612 53° E	Deep (>1,5m) red coloured Hutton form soils on coarse-grained sandstone of the Molteno Formation. No fossils observed.	

MATF 7	30.2219 78° S 28.7432 80° E	Alluvial deposits of the local streams, filling very extensive valley floor elements in the landscape. No fossils observed	
MATF 8	30.2043 00° S 28.7373 15° E	Grey and red-coloured mudstone in the Molteno Formation. No fossils observed.	
MATF 9	30.1957 02° S 28.7329 48° E	Deep sandy Hutton and Westleigh soil on Molteno sandstone and mudstone	
MATF 10	30.1869 80° S 28.7224 46° E	Deep clay-rich loam Westleigh soil on mudstone of the Elliot Formation	
MATF 11	30.1817 26° S 28.7101 05°	Dolerite dyke mined. Outcrops of red mudstone of the Elliot Formation. No fossils observed.	
MATF 12	30.1747 87° S 28.7077 68° E	Deep clay-rich loam Westleigh soil on mudstone of the Elliot Formation. No fossils observed	

MATF 13	30.1697 62° S 28.7034 79° E	Maroon coloured mudstone of the Elliot Formation. Fossils of *Massospondylus*, with indication of severe damage due to drying out of bones in the sun. Indication of harsh palaeon-environments	
MATF 14	30.1696 81° S 28.7032 14° E	Sun burnt fossilised dinosaur bone in the mudstones of the Elliot Formation	
MATF 15	30.1661 93° S 28.6964 89° E	Typical outcrop of maroon coloured mudstone of the Elliot Formation.	
MATF 15	30.1661 93° S 28.6964 89° E	Unidentified siliceous concretion – possible rhizome in the Elliot siltstone on site	
MATF 16	30.1653 07° S 28.6949 08° E	Typical landscape on the middle slopes with shallow soils on the Elliot Formation. Casts of burrows and several concretions resembling trace fossils	
MATF 16	30.1653 07° S 28.6949 08° E	Burrows resembling *Scholithos-like* structures in the sandy substrate of the Elliot Formation	

MATF 17	30.1643 92° S 28.6935 10° E	Outcrops of the Elliot Formation in the study area. The road upgrade will cut into the mudstones of this formation and allow for unique opportunities to find fossils	
MATF 17	30.1643 92° S 28.6935 10° E	Massive siltstone of the Elliot Formation. Casts of vertebrate burrows.	
MATF 17	30.1643 92° S 28.6935 10° E	Cast of vertebrate burrow in the siltstone of the upper Elliot Formation.	
MATF 18	30.1648 90° S 28.6924 58° E	Sandstone of the lower Clarens Formation. No fossils were observed	
MATF 19	30.1648 95° S 28.6877 80° E	Resistant quartzitic sandstone with basaltic inter-bedding and indications of a “gas-rich” intrusion of magma into the Clarens Formation. Entire area of proposed borrow pit no3 underlain by this rock type, no fossils observed.	
MATF 19	30.1648 95° S 28.6877 80° E	Resistant quartzitic sandstone with basaltic inter-bedding and indications of a “gas-rich” intrusion of magma into the Clarens Formation. Entire area of proposed borrow pit no3 underlain by this rock type, no fossils observed.	

MATF 20	30.1638 02° S 28.6865 18° E	Deeply weathered, fossil-rich clay deposit at the base of the Clarens Formation, with rich plant fossil layers, albeit not identified due to extreme state of carbonization. Very high groundwater tables and extremely dispersive and expansive rock formation.	
MATF 21	30.1642 01° S 28.6837 72° E	Enigmatic small-scale (4mm) burrows and trace fossils in a specific layer of red coloured fine-grained, laminated sandstone in the lower Clarens Formation. burrowing resembles present day termite burrows and the structures are randomly spaced and cut at random angles into the sandstone..	

MATF 22	30.1623 65° S 28.6833 44° E	Fine-grained red to light-grey siltstone with enigmatic trace-fossils as described at MATF21 above.	
MATF 23	30.1613 44° S 28.6840 33° E	Pyroclastic material (P) associated with volcanic activity in the upper Clarens Formation (Jurassic).	
MATF 24	30.1542 89° S 28.6813 73° E	General view of the upper Clarens Formation and basaltic lava of the Drakensberg Formation.	
MATF 25	30.1491 97° S 28.6758 95° E	Fine-grained sandstone and pinkish-red coloured siltstone of the Clarens Formation. Outcrops are difficult to assess but it is highly likely that significant fossils will be present in these sedimentary rocks.	
MATF 26	30.1435 46° S 28.6703 66° E	General view of the upper Clarens Formation and basaltic lava of the Drakensberg Formation.	
MATF 27	30.1404 71° S 28.6800 94° E	Outcrops of mudstone and sandstone of the upper Clarens Formation and first lava layers of the Drakensberg Formation at the site of borrow pit no 2. No fossils observed	

MATF 27	30.1404 71° S 28.6800 94° E	Pillow lava layers at the base of the Drakensberg Formation. Indicating outflow of lava into water bodies.	
MATF 27	30.1404 71° S 28.6800 94° E	Pyroclastic flows associated with first lave flows and volcanic eruptions.	
MATF 28	30.1341 23° S 28.6801 08° E	Red and pinkish-red coloured mudstone and siltstone of the upper Clarens Formation .	
MATF 29	30.1343 99° S 28.6810 86° E	Very well preserved fossil bones of a vertebrate in the pinkish coloured siltstone of the Clarens Formation. Preliminary investigation indicates that most of the fossil is still in situ and must be collected before any further construction takes place at this site	
MATF 29	30.1343 99° S 28.6810 86° E	Very well preserved fossil bones of a second vertebrate in the pinkish coloured siltstone of the Clarens Formation. Preliminary investigation indicates that most of the fossil is still in situ and must be collected before any further construction takes place at this site	

MATF 30	30.1344 88° S 28.6826 36° E	Very shallow soils on outcrops of fine-grained pinkish-red sandstone and siltstone of the Clarens Formation. No fossils were observed but more time is needed to investigate this site.	

PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the project is based on the initial mapping assessment and literature reviews. Following the field investigation (Table 2) the initial palaeontological sensitivity for all sections of the proposed upgrading of the R415 route vary from very highly sensitive for most of the development footprint to moderate in only a few places (Figure 8).

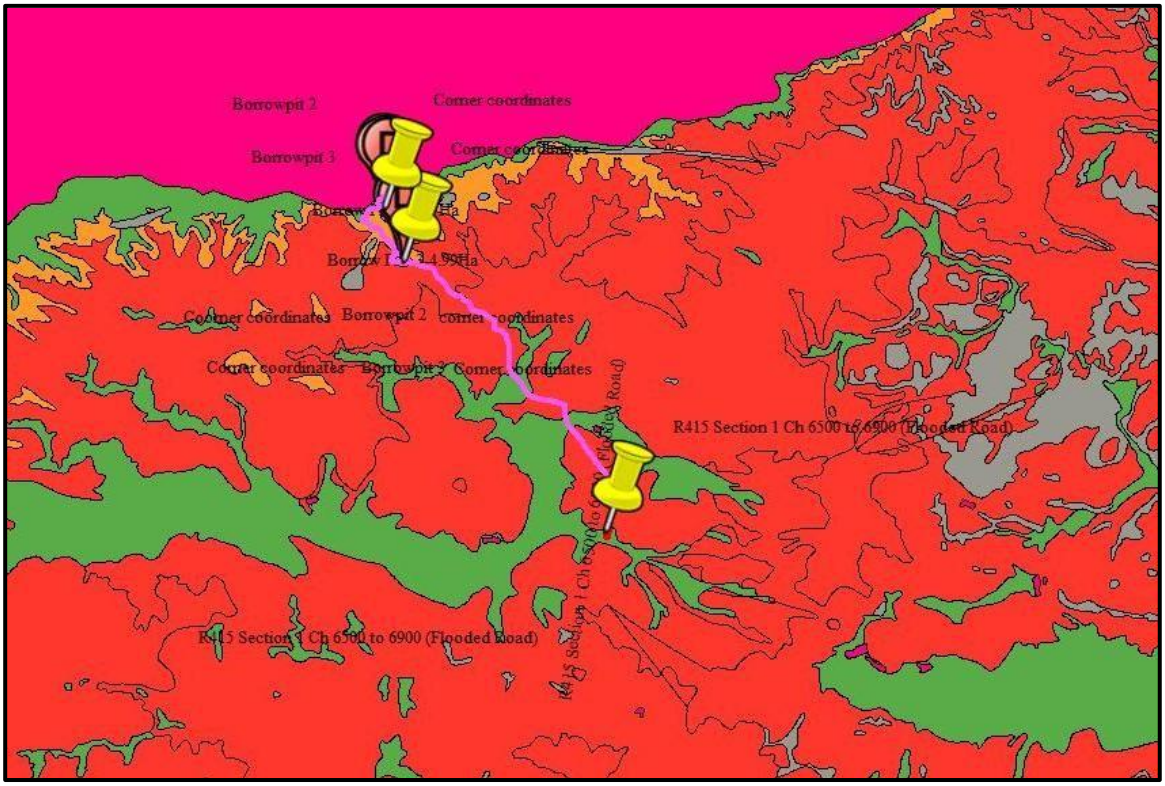


Figure 8 Palaeontological sensitivity for the R415 route area is very high

An example of the very high possibility of the presence of significant fossils is the site recorded at Photographic recording site MATF29 (Table 2) where two significantly well preserved vertebrate fossils were recorded.

The chance find of vertebrate and plant fossils in the Molteno, Elliot and Clarens Formations is **very high**, and the outcrops are encountered in all the areas where engineering of the road along the steep slopes are required. This implies that fossils will potentially be present in most excavations of more than 300mm depth.

It is important to note that, although the indications are that large areas in the study area are highly sensitive for palaeontological heritage, the fossils will most probably only be found where deep (>1,5m) excavations are planned.

Mitigation for fossils will allow preservation of highly significant vertebrate, plant and trace fossils and it is therefore recommended that, where Palaeozoic aged fossils are exposed, a palaeontologist be appointed who can take responsibility for the palaeontological treasures in this part of the Karoo Supergroup.

The conclusion for the entire route holds for the individual sites, borrow pit 2, burrow pit 3 as well as the section where the road must be built to prevent flooding of the road.

CONCLUSIONS

The geology underlying the project area for the upgrading of the R415 route between Maloti and the Cacha's Nek border post, Matatiele **Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province**, comprises Palaeozoic to Cenozoic aged sedimentary rocks of the Karoo Supergroup, as well as Quaternary alluvial deposits.

The study site is underlain by deeply weathered sandstone and shale of the Molteno, Elliot, Clarens and Drakensberg Formations of the Strormberg Group, Karoo Supergroup. The wealth of fossil data from the Karoo Supergroup is universally well-known.

It is, however important to note that, although a very high sensitivity rating is allocated to areas underlain by rocks of the Karoo Supergroup (SAHRIS database), the actual impact per site of excavation might be limited. Although it is imperative to indicate the very high sensitivity on the initial maps, the *modus operandi* of the project palaeontologist, when appointed, must be to train the ECO and team members to adhere to the "Chance Find Protocol" recommendation. The full-time presence of a professional palaeontologist would be preferred during initial excavation into the areas allocated a red colour on the sensitivity maps for the R415 route areas. It might, however, be much less expensive to train the environmental officers to know what to look for during excavation and inform the palaeontologist of a significant find immediately. Fossils recorded during excavation on site, must be curated and moved to the institute indicated by ECPHRA/SAHRA.

The discovery of uniquely sensitive fossilized remains of vertebrate animals in the *Elliot Formation* during this Phase 1 PIA study, necessitated very urgent action and the author immediately initiated the process of application for a collection and destruction permit on behalf of the developer. The highly fragile fossilised remains must be collected and the curator at the National Museum in Bloemfontein, where it preferably will be curated for further studies, indicated a preliminary interest in assisting with the professional excavation as well as safe-keeping of the fossils.

It is however imperative to note that the final instructions from the responsible regional Authority (ECPHRA) must be adhered to for this project. (*Please refer to Ayanda Mncwabe-Mama*: ayanda.mncwabe-mama@ecsrac.gov.za).

Recommendations

- The EAP and developer must be informed that significant areas are underlain by rocks with a very high sensitivity for palaeontological heritage. **Following the site visits on Wednesday 1 April 2026, it is the professional opinion of Dr Gideon Groenewald, accredited palaeontologist, that the chance-find of significant fossils in several sections of the R415 Route Project is very high.**

- The appointed palaeontologist will be responsible for the formal application for a collection and/or destruction permit on behalf of the developer. It remains of critical importance that the incentives given in the CFP (attached) are followed.
- The project will require a formal “Chance Find Protocol” that will have to be upgraded during the construction phases of the project. (The Chance Find Protocol document is attached to this report).
- **Without mitigation** the project will have a **very high negative impact** on palaeontological heritage. **With mitigation** (see CFP attached) the project will have a **very high positive** impact on Global palaeontological heritage, mainly because excavations of more than 300mm deep will expose new bedrock that would never have been exposed for thousands of years.
- Recommendations for palaeontological monitoring and mitigation (CFP Document attached) will have to be incorporated into the EMPr for approval by ECPHRA/SAHRA.
- It is recommended that, with the mitigations proposed, there are no reasons why this project cannot be implemented.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeo-ecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



Dr Gideon Groenewald

Geologist

CHANCE FIND PROTOCOL FOR PALAEONTOLOGICAL HERITAGE

Heritage Authority Approval for the proposed upgrading of the R415 Route Project in the Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province

Mitigation for excavation Impact on Palaeontological Heritage Resources in the excavation areas on the sites of the R415 Route Project

It is essential that the appointed palaeontologist, in consultation with the Project Environmental Manager and the contractors and ECO's of excavation works during the implementation phase of the project, develop a short-term strategy for the **immediate recovery** of significant fossils **before** any excavation operation. As part of such a strategy, the discussions with the palaeontologist must include:

- Initially, and at least for the *duration of excavations*, visit the site on request of the ECO of the specific excavation site, to ensure recording of all potentially significant fossil strata. Due to the longevity of this contractual involvement it is not possible to have pre-determined timing on further visits and it is a conclusion from present observations, that more frequent visits by the Palaeontologist during excavations into the soils on site **will be required** at this stage.
- Determine a short-term strategy and budget for the recording of significant fossils. Following an assessment of the sensitivity of the project area for Palaeontological Heritage, a budget must be proposed as an estimated amount needed to safeguard Palaeontological Heritage items during construction. The above mentioned strategy is simply an oral agreement on when the site is to be inspected and what the finds are that might be recorded. The site visit must include an introduction session with all the managers of the Project Team, including training of the ECO and site managers by the appointed palaeontologist, to basically train people to know what to look out for in terms of fossil heritage on site. This action will be required at the start of each individual exploration activity for the duration of exploration in the "greenfield sections" of the site.

- **Following the Phase 1 Survey, follow-up site visits (Phase 2 PIA) are essential.**
- In the **very high likely** case of reporting of any unusual sedimentary structures and fossils along the access routes, the Palaeontologist must be notified, and a site visit must be arranged at the earliest possible time with the Palaeontologist. In the case of the site ECO or the Site Manager becoming aware of suspicious looking material that might be a "Significant Find", the excavation must be halted in that specific area and the Project Environmental Manager (PEM) must be informed who will inform the Project Engineer. The Palaeontologist must be given enough time to reach the site and the PEM will request a Site Instruction from the Engineer to allow for removal the material before excavation continues.

Mitigation Measures Normally Encountered

1. Mitigation of palaeontological material must begin as soon as possible and preferably when "trial excavation" takes place. The appointed specialists must acquaint themselves with the operation and determine feasible mitigation strategies.

2. A plan for systematic sampling, recording, preliminary sorting and storage of palaeontological and sedimentological samples will be developed during the early stages of the project, in collaboration with the Albany Museum in Makanda and the National Museum in Bloemfontein, which are the closest Institutes to the site. It is essential that coordination between the Palaeontological specialist and the engineering teams ensure minimum standing time, and if possible, no standing time.

3. Mitigation will involve an attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labelled, boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer

1. Ensuring, at their cost, that a representative archive of palaeontological samples and other records is assembled to characterise the palaeontological occurrences affected by the exploration operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas. In the case of this project it is foreseen that invertebrate and trace fossils will be present. (*If fossils of Triassic age are exposed, it will be Very Highly significant and the Palaeontologist will obviously be in close communication with the site ECO and the PEM to act as required by SAHRA without causing undue standing time for the contractors).*

3. "Facilitate" systematic recording of the stratigraphic and palaeo-environmental features of exposures in the fossil-bearing excavations, by allowing time to describe and measure geological sections, and by providing aid in the surveying of positions where significant fossils are found*. (In the case of this specific development, the likelihood of such finds in the sediments is* ***highly likely****. The total estimated time that needs to be allowed for specialist involvement during construction is one working day for every week of construction).*

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as "normal" fossil finds.

5. Provide covered, dry storage for samples and facilities that is defined as a work area for sorting, labelling and boxing/bagging of samples. (This storage facility is normally one secure shipping container measuring **2mX3m** that is placed at the main site office for the project.

6. Costs of basic curation and storage in the sample archive at the Albany Museum in Makanda and/or the National Museum in Bloemfontein (labels, boxes, shelving and, if necessary, specifically-tasked temporary employees).

Documentary record of palaeontological occurrences

1. The contractors will, after consultation with the PEM and in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which the following information are indicated on the plan in the site office at the excavation site. This must be done in conjunction with the appointed specialist and form part of the on-going revision of this "Chance Find Protocol" (CFP), during the excavation stage of the project:

1.1. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.

1.2 Locations of samples and measured sections are to be pegged, and routinely accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any significant fossils are recorded during the time of excavation. This information must be recorded during the first site visit and a clearance from the Palaeontologist (e-mail message will suffice) must be followed up with subsequent e-mail communications with the Site Specific ECO, Site Manager and the PEM.

Functional responsibilities of the appointed Palaeontologist

1. If applicable after completion of the Phase 1 site visit, **apply for a permit** to collect fossils during the lifetime of the Project and establishment of a representative collection of fossils and a contextual archive of appropriately documented and sampled palaeoenvironmental and sedimentological geodata in collaboration with the Albany Museum in Makanda, the National Museum in Bloemfontein as well as the ESI at WITS University.

2. Undertake an initial evaluation of potentially affected areas and of available exposures in excavations. A short training session, inclusive of the PEM, Project Managers and the ECO's or their representatives, must preferably be presented during the second site visit to this project.

3. On the basis of the above, and evaluation during the early stages of excavation development, in collaboration with the PEM and the contractor management team, more detailed practical strategies to deal with the fossils encountered routinely during excavation, as well as the strategies for major finds must briefly be agreed on.

4. Informal on-site training in responses applicable to “normal” fossil finds must be provided for the PEM, ECO and environmental staff by the appointed specialist. This step is will only be arranged following the discovery of significant fossils at the time of the Phase 2 site visits, if applicable.

5. Respond to significant finds and undertake appropriate mitigation.

6. Initially, for the first month of construction, and if the PEM or the appropriate ECO indicates significant “strange looking rocks” that might be similar to the fossils indicated to the staff during the information sessions, visit at least once in twelve weeks to “touch base” with the monitoring progress. Document interim “normal” finds and undertake an inspection and documentation of new excavation faces. A strategy for further visits during the life of the excavation must be discussed.

7. Transport of material from the site to the Institute that is recommended by ECPHRA, and/or the National Museum in Bloemfontein and /or the ESI, Wits University.

8. Reporting on the significance of discoveries, as far as can be preliminarily ascertained. This report is in the public domain and copies of the report must be deposited at ECPHRA, the Albany Museum, the National Museum, ESI and the South African Heritage Resources Authority (SAHRA). It must fulfil the reporting standards and data requirements of these bodies.

9. Reasonable participation in publicity and public involvement associated with palaeontological discoveries.

Exposure of palaeontological material

1. In the event of excavations exposing new palaeontological material, not regarded as normative/routine as outlined in the initial investigation, such as a **major fossil find**, the following procedure must be adhered to:

1.1 The appointed specialist or alternates (ECPHRA/SAHRA; Albany Museum, National Museum, ESI at WITS University) must be notified by the responsible officer (e.g. the PEM, Chief Engineer, ECO or Contractor Manager), of major or unusual discoveries during excavation, found by the Contractor Staff.

1.2 Should a major *in situ* occurrence be exposed, excavation will immediately cease in that area so that the discovery is not disturbed or altered in any way until the appointed specialist or scientists from the recommended Institute, or its designated representatives, have had reasonable opportunity to investigate the find. Such work will be at the expense of the Developer.

1.3 Significant fossil finds are known from this area and the appointed palaeontologist must clear continued excavation on the proviso that any suspicious material will be indicated by the ECO to the Palaeontologist via emailed photographic information.

CONCLUSION

The development site for the proposed Upgrading of the R415 Route in the **Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province,** has a very high rating for Palaeontological Heritage. Highly sensitive and very unique vertebrate and plant fossils have been recorded during the Phase 1 PIA and the Triassic aged sediments contain significant fossil remains. Further mitigation for Palaeontological Heritage (Phase 2 field inspection and report) is **compulsory** and the ECO must be vigilant and inform the Project Palaeontologist of any suspicious material.

It is recommended that:

- The PEM and ECO's must be informed of the fact that a very high rating for Palaeontological Sensitivity is allocated to the areas underlain by rocks of the Karoo Supergroup. A medium sensitivity is however, allocated to the areas underlain by alluvium.
- This "Chance Find Protocol" must be included in the EMPr of the Project and a reasonable budget must be allocated to ensure compliance with the legal responsibility of the developer in terms of the proper conservation of and storage of Palaeontological Heritage.
- ECPHRA/SAHRA must be informed of the content of this "Chance Find Protocol".
- **Following the Phase 1 survey, it is the professional opinion of Dr Gideon Groenewald, accredited palaeontologist, that FURTHER MITIGATION for Palaeontological Heritage is compulsory,**

specifically where parts of the development is underlain by rocks of the Stormberg Group.

- Recommended action is to engage with a suitably qualified palaeontologist (member of PSSA) to be on standby during the time of excavation. In the highly likely event of recording of significant fossils, the ECO must inform the appointed palaeontologist and arrange for formal engagement and a site visit.
- **It is the professional opinion of Dr Gideon Groenewald that, on the proviso that these mitigation measures are adhere to, there is no reason why ECPHRA/SAHRA cannot approve the continuation of this project.**

APPENDIX B

CHANCE FIND PROTOCOL

CHANCE FIND PROTOCOL – HERITAGE RESOURCES

PURPOSE

Potential impacts on heritage resources can occur during construction as a result of unearthing during construction. This protocol outlines the procedures to be followed in the event that a heritage resource is uncovered.

Palaeontological finds

Monitoring Programme for Palaeontology is to commence once the excavations for all structures and infrastructure begin. The following procedure is only required if fossils are seen on the surface and when excavations commence.

1. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (silicified wood, plants, insects, bone, shells) should be put aside in a suitably protected place. This way the construction activities will not be interrupted.
2. Where possible, photographs of similar fossils must be provided to the contractor to assist in recognizing the fossil plants and bones that might be encountered on site. This information must be built into the EMPr's training and awareness plan and procedures.
3. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
4. If there is any possible fossil material found by the Contractor/environmental officer, then a qualified palaeontologist should visit the site to inspect the selected material and check the excavations where feasible.
5. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made

available for further study. Before the fossils are removed from the site, a South African Heritage Resources Agency (SAHRA) permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

6. If no good fossil material is recovered, then any site inspections by the palaeontologist will not be necessary.

7. If no fossils are found and the excavations have finished, then no further monitoring is required.

Archaeological finds

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

1. The heritage resource must be avoided and all activities in the immediate vicinity temporarily ceased.

2. A suitably qualified specialist must be informed and commissioned to consider the heritage resource, either via communicating with the Environmental Officer via telephone or email or based on a site visit.

3. Appropriate measures are to be provided by a qualified specialist towards immediate management of the heritage resource.

Should the specialist conclude that the find is a heritage resource protected in terms of the KZN Heritage Act of 2018 (KZNHA), the specialist must notify SAHRA on behalf of the Developer.

If required by SAHRA, the specialist must conduct a HIA in terms of NHRA Section 38 that must include rescue actions/excavations.

Graves

Should any unmarked human burials/remains be found during the course of construction:

1. Work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or SAHRA.
2. Where human remains are part of a burial, they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500).
3. For newer graves, should the specialist conclude that the find is a heritage resource protected in terms of the KZNHA. SAHRA may require that an identification of interested parties, consultation and /or grave relocation take place.
4. Consultation must take place in terms of KZNHA;
5. Grave relocation must take place in terms of KZNHA,
6. These measures should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions, laws and by-laws pertaining to human remains.

If required by current, relevant legislation, a full social consultation process should occur in conjunction with the mitigation of cemeteries and burials. Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.

AGRICULTURAL COMPLIANCE STATEMENT

For the Improvement of Portions of the R415 between Matatiele and the Qacha's Nek Border Post in the Alfred Nzo District Municipality, Eastern Cape Province, South Africa, linking to Lesotho.

Prepared in accordance with the Protocol for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (GN R320 of 20 March 2020)

Prepared by: EnterpreBiz (Pty) Ltd

Agricultural Specialist: Mrs. Mahlatse Phala

On Behalf of: Earthlink Environmental Services

Date: April 2026

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1. INTRODUCTION

This Agricultural Compliance Statement was prepared to support the Environmental Impact Assessment (EIA) for the R415 Matatiele to Qacha's Nek Border Road Improvement Project in the Alfred Nzo District Municipality, Eastern Cape Province. The assessment covers Section 1 (km 0–32) and Section 2 (km 0–10).

The proposed project involves improving the R415 road corridor from Matatiele toward the Qacha's Nek Border Post, a key regional route linking South Africa and Lesotho. The project is intended to improve transport infrastructure, accessibility, road safety, regional mobility, and socio-economic linkages for surrounding rural communities.

Key components of the road improvement project include the following:

- Improvements to cross-drainage structures along sections of the R415, particularly in the Bosola floodplain
- Improving the existing road to a surfaced standard
- Relocation of services and utilities where required
- Construction of a new prestressed bridge
- Widening of the road to accommodate climbing lanes and surfaced shoulders
- Vertical and horizontal geometric improvements to enhance safety and driving conditions
- Widening of existing river bridges and selected major and minor culverts
- Construction of a 6.5 m-wide temporary deviation to carry two-way traffic during construction
- Opening and operation of one hard-rock quarry and five potential borrow pits for construction materials
- Establishment of stockpile areas and clearing of vegetation outside the road reserve where the affected area exceeds one hectare

This report evaluates agricultural sensitivity, soil characteristics, land capability, existing agricultural activities, drainage systems, and environmental constraints associated with the proposed project. It combines desktop analysis with field verification to provide a clear understanding of the receiving agricultural environment and to identify potential impacts of the proposed project.



Figure 1: Proposed alignment of Road R415 Section 1 (km 0–32) within the Eastern Cape Province.



Figure 2: Proposed alignment of Road R415 Section 2 (km 0–10) within the Eastern Cape Province.

2. TERMS OF REFERENCE AND SCOPE OF WORK

The assessment was undertaken in accordance with the requirements of the Protocol for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (GN R320 of 2020).

The scope of work included:

- Desktop assessment of agricultural resources;
- Review of Agricultural Geo-Referenced Information System (AGIS) information, soil maps, topographical data, and land capability datasets;
- Assessment of drainage systems and environmentally sensitive areas;
- Site inspections and field verification;
- Identification of existing agricultural land use practices;
- Evaluation of agricultural sensitivity;
- Assessment of potential impacts associated with the proposed project;
- Development of mitigation and management measures.

The study forms part of the broader Environmental Impact Assessment process and provides specialist agricultural input into the environmental authorisation process.

3. APPLICABLE ENVIRONMENTAL LEGISLATION AND SOIL MANAGEMENT GUIDELINES

The study is guided by key legislation, notably the National Environmental Management Act (NEMA), the Conservation of Agricultural Resources Act (CARA), and the Subdivision of Agricultural Land Act.

National Environmental Management Act (NEMA): Ensures that development is environmentally sustainable and does not harm ecosystems.

Conservation of Agricultural Resources Act (CARA): Protects soil, water, and vegetation to prevent land degradation and maintain agricultural productivity.

Subdivision of Agricultural Land Act: Prevents unnecessary fragmentation of farmland, preserving its productivity and long-term agricultural use.

Together, these laws promote responsible land use, protect soil and water quality, and support sustainable agricultural productivity, ensuring that farming practices adhere to environmental standards and that agricultural resources are managed for long-term benefit.

4. PURPOSE AND OBJECTIVES

4.1 Purpose of the Report

The purpose of this report is to assess the agricultural sensitivity of the study area and evaluate the potential impacts associated with the R415 Matatiele to Qacha's Nek Border Road Improvement Project.

4.2 Objectives

The objectives of the study are to:

- Identify existing agricultural land uses;
- Assess soil characteristics and agricultural capability;
- Determine agricultural sensitivity;
- Assess environmental constraints and drainage systems;
- Evaluate impacts associated with the proposed project;
- Recommend mitigation measures to minimise impacts on agricultural resources;
- Support informed environmental decision-making.

5. METHODOLOGY OF THE STUDY

The methodology for this study is aligned with GN 320 of 2020 (GN R320), which sets out the requirements for assessing impacts on agricultural resources. The approach combines desktop analysis with field verification to ensure a comprehensive and reliable assessment.

5.1 Desktop Study

A desktop study was undertaken to analyse the agricultural characteristics of the study area. The assessment drew on the AGIS, soil maps, and topographic data to establish the spatial distribution and physical characteristics relevant to agricultural sensitivity.

This process helped identify soil types, land capability, and areas with varying agricultural potential. It also supported a focused evaluation of the likely impacts associated with the proposed project.

5.2 Site Inspection

A site visit was conducted in March 2026 to confirm grazing activity, vegetation patterns, and existing disturbances within the study area. The inspection provided direct insight into current land use, the extent of agricultural activity, and the distribution of vegetation, while also identifying areas affected by human activity and other environmental influences.

Observations recorded during the site inspection were used to validate the findings of the desktop study. This strengthened the reliability of the assessment by confirming that mapped information and field conditions were consistent.

5.3 Sensitivity Confirmation

The assessment confirmed that the site has medium agricultural sensitivity. This finding differs from the higher screening classification and indicates that on-site conditions are more moderate than initially suggested.

The medium sensitivity rating reflects observed disturbances and the prevalence of subsistence farming within the area. These factors shape the current agricultural profile of the site and inform the overall sensitivity classification.

6. LIMITATIONS

The assessment is considered adequate for compliance purposes, but several limitations should be noted when interpreting the findings.

- **No laboratory soil testing was undertaken**, which limits the precision of findings on soil quality, fertility, and agricultural suitability.
- **Seasonal variation may affect site conditions**, as the assessment reflects conditions observed at a single point in time.
- **The depth of evaluation is therefore constrained**, and some aspects of the site may require further investigation if more detailed design information becomes available.

Despite these constraints, the findings remain suitable for compliance assessment and provide a reasonable basis for decision-making.

7. POTENTIAL IMPACTS

The proposed improvement of Road R415 may result in several impacts on soil resources and agricultural activities, particularly during the construction phase.

Key potential impacts include:

- Soil erosion due to vegetation clearing and land disturbance
- Soil compaction from construction vehicles and machinery
- Disturbance to grazing activities through restricted access
- Loss or degradation of topsoil
- Disruption of natural drainage patterns

Vegetation clearing and earthworks may expose soils to erosion, reduce topsoil quality, and alter drainage patterns. Construction traffic may also compact soils and temporarily disrupt

grazing access and other local agricultural activities. These impacts are expected to be localised and manageable if appropriate mitigation measures are implemented.

Despite these impacts, the project presents operational benefits, including:

- **Improved access and mobility**
- **Enhanced transport of agricultural goods**
- **Potential economic upliftment**

Overall, impacts are considered localised and manageable, provided that appropriate mitigation measures are implemented.

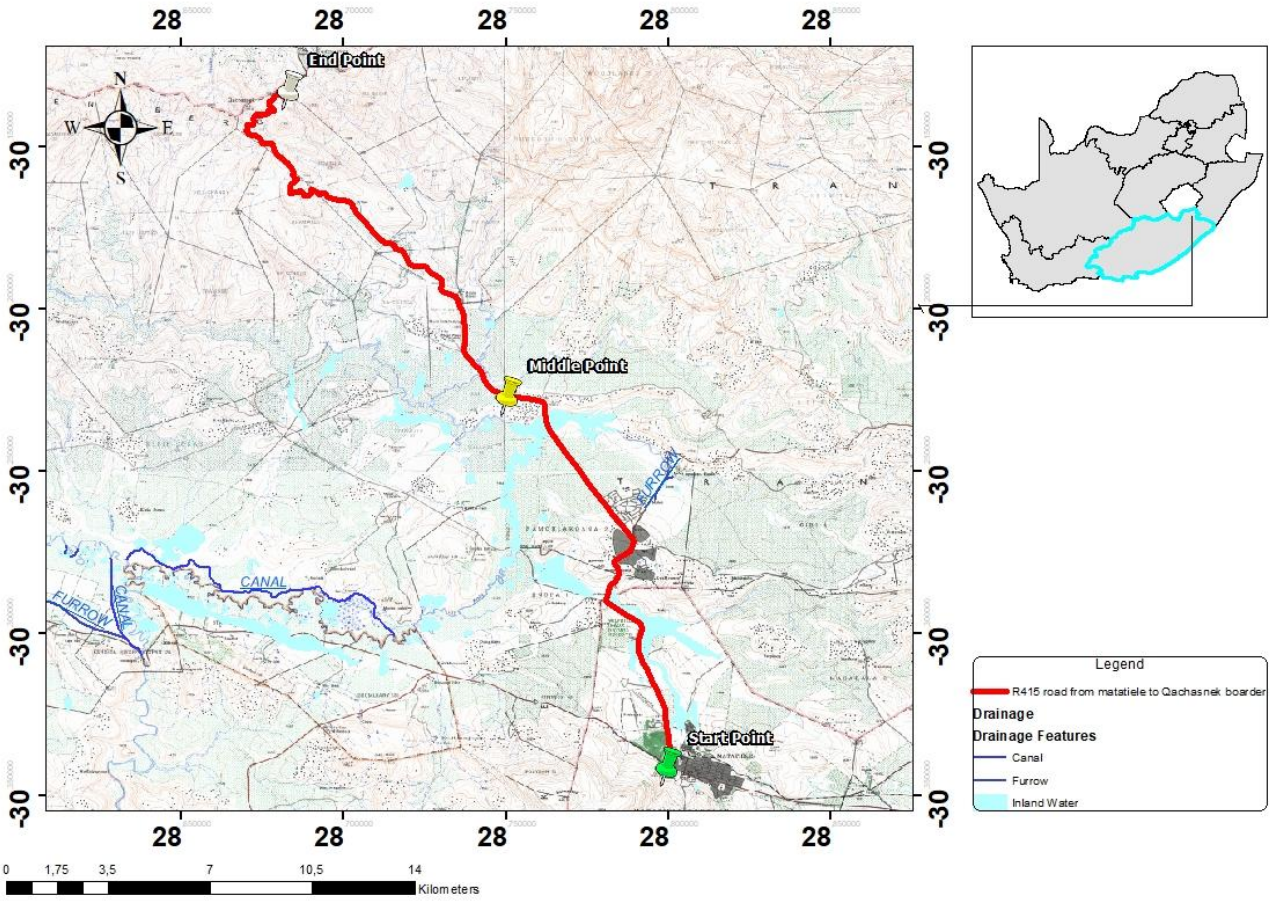


Figure 3: Topographical map illustrating the terrain and elevation of the study area along Road R415.

8. AGRICULTURAL AND ENVIRONMENTAL SITE ASSESSMENT

The study area reflects a rural agricultural landscape with mixed sensitivity, shaped by grazing, subsistence farming, drainage features, and existing infrastructure.

8.1 Identified soil characteristics

The site contains a range of soil types, including Acrisols, Cambisols, Gleysols, and Regosols. These soils differ in fertility, drainage, and susceptibility to erosion, which in turn affects land capability and agricultural suitability. Acrisols and Cambisols generally offer moderate agricultural potential, although productivity may be limited by drainage constraints or nutrient availability. Gleysols are typically associated with poor drainage and possible waterlogging, while Regosols are less developed and may be more vulnerable to erosion. The distribution of these soil types across the site influences both crop production potential and grazing suitability.

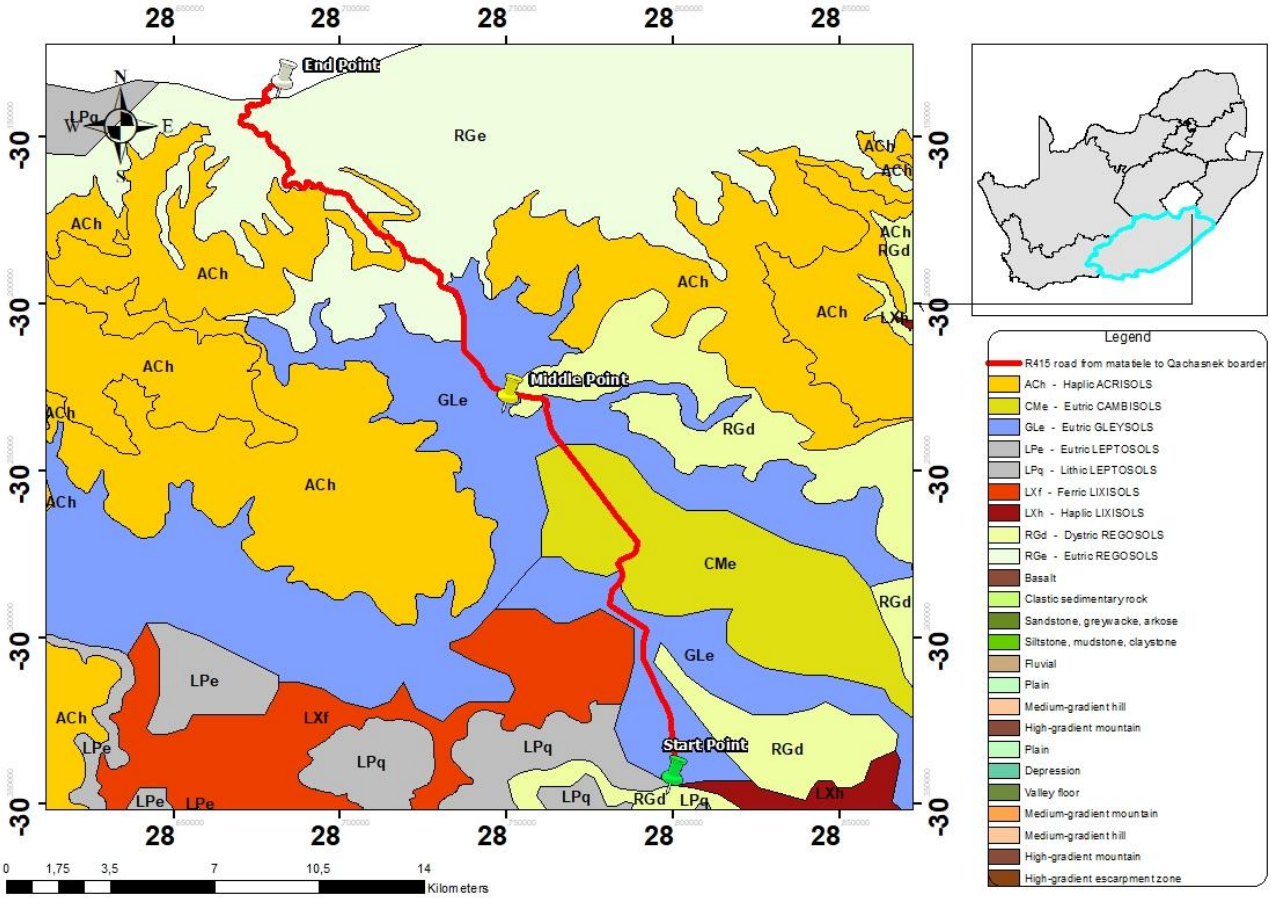


Figure 4: Soil map indicating the distribution of soil types within the proposed R415 improvement corridor.

8.2 Site conditions and vegetation

Vegetation within the study area is dominated by grass species, with limited evidence of intensive cultivation. The area also shows signs of moderate disturbance associated with grazing, settlement expansion, and informal land use practices.

Overall, the site represents a rural-agricultural interface with important considerations for watercourse management, soil conservation, and sustainable land use.

The agricultural value and long-term sustainability of these grasslands depend on sound land management practices and prevailing environmental conditions throughout the year.



Figure 5: Vegetation cover and grazing land observed during the site visit.



Figure 6: Subsistence farming activity within the study area, showing cultivated land adjacent to grazing areas.

8.3 Road Infrastructure and Subsistence Farming

The site lies within a rural landscape characterised by low-density settlements and small-scale agricultural activity. Open grassland and patches of natural vegetation dominate the surrounding area, indicating a semi-managed agricultural environment.

A narrow drainage line crosses the site and is bordered by grasses, reeds, and other riparian vegetation. This feature contributes to local hydrology and ecological functioning and should be considered sensitive from a water-resource management perspective.

The topography is gently undulating, rising toward a hillside with scattered dwellings in the background. Fencing, small structures, and farming equipment indicate ongoing subsistence or small-scale farming activity.

Overall, the site demonstrates the close relationship between transport infrastructure and subsistence farming, both of which influence how the surrounding land is used and managed.



Figure 7: Natural watercourse and surrounding grazing land within the study area.



Figure 8: Existing road infrastructure, including gravel road conditions and livestock activity along the road.

9. RECOMMENDATIONS AND MITIGATION MEASURES

To minimise potential impacts on soil resources and agricultural activities, the following mitigation measures are recommended for the construction phase:

- **Limit the construction footprint** to existing disturbed areas to avoid unnecessary land degradation
- **Implement erosion control measures** such as silt fences, berms, and stabilisation of exposed soils
- **Manage stormwater effectively** to prevent runoff and protect natural drainage systems
- **Control dust generation** through water spraying and proper material handling
- **Restrict movement of vehicles and machinery** to designated areas to reduce soil compaction
- **Stockpile and protect topsoil** for use during rehabilitation
- **Maintain access for livestock and farmers**, including provision of safe crossings where necessary
- **Rehabilitate disturbed areas** by re-establishing vegetation and stabilising soils

Implementing these measures will reduce the risk of soil degradation, protect agricultural land capability, and support continued grazing activities. Effective planning and site management during construction will be essential to maintaining environmental integrity.

Overall, the potential impacts on agricultural resources can be effectively minimised and managed through the consistent application of these mitigation measures.

10. CONCLUSION

The proposed R415 Matatiele to Qacha's Nek Border Road Improvement Project is considered compatible with the surrounding agricultural environment.

The assessment confirms the following:

- The study area exhibits moderate agricultural sensitivity.
- Agricultural activities are dominated by communal grazing and subsistence farming.
- Localised areas of higher sensitivity occur within wetlands, floodplains, and drainage systems.
- Potential impacts are expected to be primarily temporary and localised.
- No significant long-term loss of agricultural capability is anticipated.

With the implementation of the recommended mitigation measures, the identified impacts can be effectively managed and reduced to acceptable levels.

The proposed project is therefore supported from an agricultural perspective, subject to the following:

- Compliance with mitigation measures.
- Ongoing environmental monitoring.
- Protection of environmentally sensitive areas.

The project is expected to contribute positively to regional development by improving mobility, strengthening access, and supporting socio-economic opportunities for surrounding communities.

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AIR QUALITY IMPACT ASSESSMENT REPORT

THE IMPROVEMENT OF R415 ROAD BETWEEN MATATIELE AND QACHA'S NEK BORDER POST, EASTERN CAPE

Prepared By	Arundel Climate Advisory (Pty) Ltd
Prepared For	Earthlink Environmental Services
On Behalf Of	South African National Roads Agency SOC Ltd (SANRAL)
Project	R415 Road Upgrade Air Quality Impact Assessment
Report Status	Draft Report
Date	May 2026

Prepared by Arundel Climate Advisory in association with Earthlink Environmental Services

AIR QUALITY IMPACT ASSESSMENT REPORT

The Improvement of R415 Road between Matatiele and Qacha'snek Boarder Post, Eastern Cape

Draft incorporating AERMOD fugitive dust modelling data, WRF-derived wind-rose analysis, silica dust assessment, and Fugitive Dust Management Plan

Applicant / Proponent	South African National Roads Agency SOC Ltd (SANRAL)
EAP / Environmental Consultant	Earthlink Environmental Services
Project Name	The Improvement of a portion of R415 between Matatiele and Qacha'snek Boarder Post with Lesotho, Eastern Cape
Specialist Discipline	Ambient Air Quality Impact Assessment
Project Components Considered	Road cutting/widening, two potential borrow pits, crushing and screening, loading, hauling, stockpiles, blasting and associated construction traffic
Assessment Type	NEMA EIA specialist air quality assessment with AERMOD-ready dispersion modelling data
Primary Pollutants	TSP/dustfall, PM10, PM2.5 and respirable crystalline silica (RCS proxy fraction)
Assessment Area	R415 Section 1 between Matatiele and Qacha's Nek Border Post, Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape
Coordinate System Used for Modelling	WGS84 / UTM Zone 35S (EPSG:32735)
Data Status	Regulatory draft - to be validated against final construction method statement, verified WRF/AERMET meteorology, SAAQIS baseline and materials test results
Report Status	Draft for technical review
Date	May 2026
Prepared by	Dr R. Akanbi PhD (Environment & Society): University of Pretoria, South Africa
Reviewer	Professor M. Chitakira PhD (Environment & Society): University of Pretoria, South Africa
Declaration	Arundel is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of specialised services as stipulated in the terms of reference.
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Abbreviations and Symbols

Abbreviation	Meaning
AEL	Atmospheric Emissions Licence
AQIA	Air Quality Impact Assessment
AQO	Air Quality Officer
AQSR	Air Quality Sensitive Receptor
AERMET	AERMOD meteorological pre-processor
AERMOD	AMS/EPA Regulatory Model
AERMAP	AERMOD terrain pre-processor
CBA	Critical Biodiversity Area
DEA/DEFF/DFFE	Department responsible for environmental affairs (current national department naming to be confirmed)
FDMP	Fugitive Dust Management Plan
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act, 1998
NEM:AQA	National Environmental Management: Air Quality Act, 2004
NDCR	National Dust Control Regulations
PM10	Particulate matter with aerodynamic diameter <=10 micrometres
PM2.5	Particulate matter with aerodynamic diameter <=2.5 micrometres
RCS	Respirable Crystalline Silica
SAAQIS	South African Air Quality Information System
TSP	Total Suspended Particulate
US EPA	United States Environmental Protection Agency
WRF	Weather Research and Forecasting model
XRD	X-ray diffraction

Symbols and Units

°C	Degree Celsius
g	Gram(s)
g/s	Grams per second
kPa	Kilopascal
K	Temperature in Kelvin
kg	Kilogram (1 000 grams)
l	Litres
m	Metre
m/s	Metres per second
mamsl	Metres above mean sea level
µg	Microgram(s)
µm	Micron or micrometre, one millionth of a metre
µg/m³	Micrograms per cubic metre
m²	Square metre
m3	Cubic metre
mg/Am3	Milligram per actual cubic metre
mg/Nm3	Milligram per normal cubic metre (normalised to 273 K; 101.3 kPa)
TVOC	Total volatile organic compounds
VOCs	Volatile organic compounds

Executive Summary

South African National Roads Agency SOC Ltd proposes to improve a portion of the R415 between Matatiele and the Qacha's Nek Border Post. The construction scope considered in this air quality assessment includes road widening and surfacing, geometric improvements, culvert and bridge works, a temporary deviation, opening of two borrow pits, stockpiles, cutting of sandstone along the route, blasting, crushing, screening, loading and hauling. The primary air-quality risk is fugitive dust, especially respirable crystalline silica generated from cutting, blasting, drilling, crushing and handling sandstone-rich material.

The assessment include regulatory requirements under NEMA Appendix 6, a conservative source inventory, AERMOD-ready source and receptor files, WRF-derived period/diurnal/seasonal wind roses, a provisional baseline air-quality table, screening dispersion plots, recommended dustfall bucket locations, a colour-coded pre- and post-mitigation impact matrix, and a Fugitive Dust Management Plan for inclusion in the EMPr.

The preliminary modelling indicates that the largest incremental PM10 and respirable silica risks are expected close to the hard-rock quarry/crusher, unpaved haul routes and active sandstone cutting faces. Without controls, short-term dust plumes are most likely to travel towards receptors downwind of north-westerly daytime winds and along nocturnal easterly/ENE drainage flows. With robust mitigation (wet cutting, wet drilling, controlled blasting, crusher sprays/enclosures, speed controls, haul-road watering or chemical suppression, progressive rehabilitation and monitoring), off-site PM10 and dustfall impacts are expected to reduce materially; however, respirable crystalline silica remains a key occupational and near-field community risk requiring strict controls and verification monitoring.

Table ES-1: Key outcomes of the R415 AQIA.

Finding	Summary
Main pollutant of concern	Fugitive particulate matter: dustfall/TSP, PM10, PM2.5 and RCS
Highest-risk activities	Crushing/screening, unpaved hauling, hard-rock blasting, sandstone cutting and loading
Sensitive receptors	Maluti residential edge, central homesteads, Qacha's Nek receptor, Kinira River crossings and floodplain wetlands
Main seasonal finding	Dry/windy winter-spring and pre-storm summer conditions present greatest dust potential; wet summer periods reduce entrainment but increase sedimentation/runoff risk

Finding	Summary
Regulatory opinion	Authorisation can be supported only if the DFMP, dustfall monitoring, silica controls, EMPr conditions and validation modelling are implemented
Residual significance	Moderate for respirable crystalline silica during intensive cutting/crushing/blasting; low to moderate for PM10/dustfall after mitigation

NEMA Regulation (2017), Appendix 6 Compliance Table

Appendix 6 requirement	Relevant section in this report
Details of the specialist who prepared the report.	Report Details; signed specialist declaration to be inserted before submission.
The expertise of that person to compile a specialist report including curriculum vitae.	Competency Profile Placeholder Appendix C
A declaration that the person is independent in a form as may be specified by the competent authority.	Report Details; Declaration of Independence to be appended.
An indication of the scope of, and the purpose for which, the report was prepared.	Introduction: Background and Context; Purpose and Scope.
An indication of the quality and age of base data used for the specialist report.	Assumptions and Limitations; Meteorology; Ambient Air Pollutant Concentrations; AERMOD Data Package.
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Receiving Environment; Ambient Air Pollutant Concentrations; Dispersion Results; Impact Assessment Rating.
The date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Field data source is the aquatic survey of 21 March 2026; no dedicated air-quality field survey was supplied. Seasonal effects are evaluated using WRF-derived wind roses and climate data.
A description of the methodology adopted in preparing the report or carrying out the specialised process.	Study Methodology; Emissions Inventory; AERMOD Modelling Protocol; Impact Assessment Methodology.
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.	Project Location and Sensitive Receptors; Screening Tool sensitivities; Aquatic and wetland sensitivities.
An identification of any areas to be avoided, including buffers.	Sensitive receptors, wetland buffers, dustfall monitoring design and EMPr conditions.
A map superimposing the activity including associated infrastructure on environmental sensitivities.	Figure 2: Project sources, receptors and monitoring buckets.
A description of any assumptions made and any uncertainties or gaps in knowledge.	Assumptions and Limitations; Data Quality and Validation Requirements.
A description of the findings and potential implications of such findings on the impact of the proposed activity.	Dispersion Modelling Results; Impact Assessment Rating; Main Findings.
Any mitigation measures for inclusion in the EMPr.	Fugitive Dust Management Plan; Recommendations.
Any conditions for inclusion in the environmental authorisation.	Recommendations and Proposed Authorisation Conditions.
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	Dustfall Bucket Monitoring Programme; PM10/RCS monitoring recommendations.
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised.	Main Findings, Conclusion and Reasoned Opinion.
If authorised, any avoidance, management and mitigation measures that should be included in the EMPr and closure plan.	FDMP, rehabilitation, progressive closure of borrow pits/quarry and monitoring.
A description of any consultation process undertaken during the course of carrying out the study.	Not applicable to this draft; EAP to incorporate public participation record.

Appendix 6 requirement	Relevant section in this report
A summary and copies of any comments received during consultation.	Not applicable to this draft; EAP to append comments and response report.
Any other information requested by the competent authority.	To be appended if requested.

1 Introduction

1.1 Background and Context

Arundel Climate Advisory (Pty) Ltd was appointed by Earthlink Environmental Services to compile an Atmospheric Impact Assessment Report (AIAR) for the proposed improvement of a portion of R415 between Matatiele and the Qacha's Nek Border Post with Lesotho within Alfred Nzo District Municipality and Matatiele Local Municipality.

The proposed project activities include surfacing, road widening, cutting, a new prestressed bridge, river bridge and culvert widening, a temporary two-way traffic deviation, two potential borrow pits, stockpile areas and vegetation clearance outside the road reserve.

The proposed activity does not trigger any listed activities in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA) and the Listed Activities and Associated Minimum Emission Standards published under Government Notice No. 893 of 22 November 2013, as amended. However, an Air Quality Impact Assessment has been undertaken as a precautionary and risk-based specialist study due to the geological characteristics of the material that will be excavated, cut, processed, and handled during the construction phase of the proposed development.

The proposed route is underlain predominantly by sedimentary rocks of the Karoo Supergroup, including mudstones and sandstones of the Beaufort Group, with additional geological formations such as the Molteno, Elliot, and Clarens Formations occurring along portions of the route. Towards the mountainous border areas adjacent to Lesotho, the geology comprises Clarens Formation sandstone and Elliot Formation sandstone, siltstone, and mudstone, with localized Drakensberg basaltic lava flows.

These geological units are of particular relevance from an air quality perspective because quartz-bearing sandstone formations have the potential to generate respirable crystalline silica dust during activities such as cutting, drilling, blasting, crushing, excavation, and grinding. Respirable crystalline silica is recognised internationally and nationally as a potentially hazardous airborne pollutant associated with adverse human health effects when inhaled over prolonged periods. Accordingly, although the proposed activity does not constitute a listed activity under NEM: AQA, the assessment has been conducted in line with the general duty of care principles contained in Section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which requires reasonable measures to prevent pollution and environmental degradation.

Furthermore, the assessment aligns with the objectives of the National Dust Control Regulations, 2013 (GN R827 of 1 November 2013), promulgated under NEM: AQA, which seek to prevent and manage dust nuisance and dust-related impacts. The specialist assessment therefore aims to identify potential dust and particulate matter impacts associated with construction activities, evaluate the potential generation of crystalline silica-containing dust, and recommend appropriate mitigation and monitoring measures to ensure protection of surrounding environmental receptors and human health during the construction phase of the project.

1.2 Purpose and Scope

The main purpose of this study is to develop an AIR in support of the application for the proposed improvement. To successfully develop an AIR, the following tasks were included in the scope of work:

- Identify air quality sensitive receptors (AQSRs) along and near the R415 alignment, borrow pits, crusher and haul routes.
- Develop a regulatory-style emission inventory for road cutting, blasting, borrow-pit mining, crushing, screening, loading, stockpiling and hauling.
- Prepare AERMOD-ready input datasets and modelling assumptions for PM10, PM2.5 and respirable crystalline silica screening.
- Draw period, diurnal and seasonal wind roses using a WRF-derived hourly dataset framework.
- Assess PM10 and RCS dispersion potential during different seasons and identify dust plume directions.
- Recommend dustfall monitoring bucket positions and a monitoring protocol aligned with South African dust-control practice.
- Provide a Fugitive Dust Management Plan for incorporation into the EMPr.
- Rate impacts pre- and post-mitigation using a clear colour-coded significance matrix.

1.3 Assumptions and Limitations

- No final construction programme, blasting schedule, crusher throughput, haul road lengths, borrow-pit designs, or material moisture measurements were supplied. Activity rates are conservative placeholders for regulatory screening and must be updated once contractor method statements are available.

- A reproducible WRF-like hourly meteorological surrogate for 2021-2023 was generated to draw wind roses and structure the AERMOD data package.
- Respirable crystalline silica was modelled as a conservative proxy fraction of PM10 pending site-specific XRD mineralogical testing of sandstone and quarried materials.

2 Project Details

2.1 Project Location and Extent

Table 2-1: R415 route reference points used for the model domain.

Route point	Latitude	Longitude	UTM 35S Easting (m)	UTM 35S Northing (m)
R415_START_Maluti	-30.27	28.79	671954.40	6650034.00
R415_MID	-30.20	28.73	666959.50	6658192.70
R415_END_QachasNek	-30.13	28.68	662146.60	6665327.60

Item	Description
Project description	Improvement of R415 between Matatiele and Qacha's Nek Border Post
Province	Eastern Cape
District Municipality	Alfred Nzo District Municipality
Local Municipality	Matatiele Local Municipality
Road length considered	Approximately 32 km
Designated air-quality priority area	Not Applicable
Elevation / terrain	Mountainous Drakensberg foothills with steep to moderately sloping terrain; terrain treatment required in final AERMOD/AERMAP run

2.2 Description of Surrounding Land Use and Sensitive Receptors

The alignment traverses a rural mountainous landscape with subsistence farming, communal grazing, scattered homesteads, wetlands, river crossings and the Qacha's Nek border area. These receptors are sensitive both to airborne dust deposition and to secondary sediment mobilisation from dust/soil disturbance during rainfall events.

Table 2-2: Discrete AQSRs included in the AERMOD-ready receptor file.

AQSR	Latitude	Longitude	UTM Easting (m)	UTM Northing (m)
AQSR01_Maluti_residential_edge	-30.27	28.79	671713.60	6650501.50
AQSR02_Floodplain_wetland	-30.24	28.76	669530.70	6653816.90
AQSR03_Kinira_River_bridge_1	-30.24	28.76	669663.90	6653643.60
AQSR04_Kinira_River_bridge_2	-30.22	28.74	667691.80	6655561.80
AQSR05_Central_homesteads	-30.19	28.73	667029.80	6658888.80
AQSR06_QachasNek_border_receptor	-30.13	28.68	662145.90	6665336.50
AQSR07_Mont_Plaisir_farmstead	-30.21	28.73	666686.80	6656425.20

3 Emission-Generating Activities

The project is a linear road construction project. The air emission sources are fugitive and intermittent, with dust generated where mechanical energy is applied to soil, sandstone, crushed rock and unpaved road surfaces. The principal activities are summarised below.

Table 3-1: Unit processes and fugitive particulate sources.

Unit process/activity	Description	Pollutants of concern
Road cutting and widening	Excavation/cutting into sandstone and mixed sedimentary units; grading; ripping; loading; wind erosion of exposed cut faces.	TSP, PM10, PM2.5, RCS
Borrow pits	Excavation and loading of natural gravel/soil/rock, temporary stockpiling and haul-out.	TSP, PM10, PM2.5
Processing plant	Mobile crushing, screening, transfer points, conveyor drops, bin loading and aggregate stockpiles.	High PM10/TSP and RCS potential
Hauling	Unpaved haul roads, public road track-out, loading/unloading and vehicle entrainment.	PM10 dominant; dustfall near roads
Blasting	Short-duration high-intensity dust plume from quarry faces or hard cuttings.	Coarse dust, PM10 and silica-containing respirable fraction
Stockpiles	Wind erosion, loading/unloading and dozer shaping.	TSP/dustfall, PM10

4 Technical Information and Material Characteristics

4.1 Raw Material, Geology and Silica-Relevant Mineralogy

The route is underlain mainly by Karoo Supergroup sedimentary rocks; as well as the mudstones and sandstones of the Beaufort Group, with additional Molteno, Elliot and Clarens Formation units along the route. Near the mountainous Lesotho border, Clarens Formation sandstone and Elliot Formation sandstone, siltstone and mudstone occur, with Drakensberg basaltic lava flows in places. These sandstone units are critical for air-quality assessment because quartz-bearing sandstone can generate respirable crystalline silica when cut, drilled, blasted, crushed or ground.

4.2 Why Silica Dust is a Major Issue for this Project

Crystalline silica occurs naturally in sand, stone and rock. When sandstone is cut, crushed, drilled, blasted or ground, a portion of the dust can be generated in the respirable size range. The respirable fraction can penetrate deeply into the gas-exchange region of the lungs. Although the general community assessment focuses on ambient PM10/PM2.5 and dustfall, the occupational and near-field health risk from RCS is potentially more severe than nuisance dust alone. The project should therefore treat silica as a specific hazard, not merely as generic dust.

- The sandstone cutting faces, crusher, screens, transfer points and blast plume are priority silica-risk sources.
- RCS cannot be reliably assessed from visible dust alone; fine respirable silica may remain airborne when coarse visible dust settles.
- The report uses a conservative RCS proxy fraction of PM10 for dispersion screening. Final RCS modelling should use XRD mineralogical testing of bulk sandstone, crusher product and PM10/respirable dust samples.
- Workplace control must follow the hierarchy of controls: elimination/substitution where practical, wet methods, enclosure/local extraction, isolation/exclusion zones, administrative controls, respiratory protection and medical surveillance.
- Community protection should focus on preventing off-site dust transport, especially during dry windy periods and blasting events.

Table 4-1: Silica-specific technical assumptions and validation requirements.

Parameter	Regulatory-grade assumption / requirement
Silica source material	Sandstone and sandstone-rich aggregates from route cuttings, quarry and borrow pits
Provisional RCS fraction for ambient screening	12% of PM10 until XRD data are available
Mandatory test recommendation	Bulk mineralogy by XRD and RCS content in PM4/respirable samples before major cutting/crushing
Primary controls	Wet cutting, wet drilling, crusher water sprays/enclosure, reduced drop heights, sealed/covered loads, road watering/chemical suppressants, wind shutdown
High-risk conditions	Dry exposed surfaces; wind speeds above site action thresholds; blasting under wind towards receptors; crusher operation without sprays; unpaved haul-road silt loading

5 Atmospheric Emissions

5.1 Emission Quantification Method

A conservative construction-phase emissions inventory was developed using United States EPA AP-42 methods and emission factors for crushed stone processing, aggregate handling and unpaved haul roads. These methods are commonly used where direct emission measurements are not available. For final modelling, site-specific activity rates, moisture contents, silt loading, road lengths and control efficiencies must replace the assumptions used here.

- Aggregate handling and loading: AP-42 predictive equation using mean wind speed U = 3.6 m/s and material moisture M = 2%.
- Crushing/screening: AP-42 11.19.2 factors for tertiary crushing, screening, fines screening and conveyor transfer points; controlled scenario includes wet suppression at crusher, screen and transfer points.
- Unpaved haul roads: AP-42 unpaved road equation using representative silt content s = 8%, mean vehicle weight W = 30 tons and 120 precipitation days/year.
- Blasting: conservative hourly event source for a single blast plume; final HOUREMIS file should be based on the blast schedule and shot size.
- RCS: preliminary ambient proxy fraction of PM10 because no XRD or respirable sample mineralogy was supplied.

Table 5-1: Model-ready source emission rates for AERMOD screening.

Source ID	Activity	AERMOD source type	PM10 pre (g/s)	PM10 post (g/s)	RCS pre (g/s)	RCS post (g/s)	Controls
RCUT_SOUTH	Sandstone cutting/excavation/front-end loading	AREAPOLY/VOLUME	0.0118	0.0041	0.0014	0.0005	Wet cutting, pre-wetting, covered stockpiles, wind shutdown
RCUT_CENTRAL	Sandstone cutting/excavation/front-end loading	AREAPOLY/VOLUME	0.0118	0.0041	0.0014	0.0005	Wet cutting, pre-wetting, covered stockpiles, wind shutdown
RCUT_NORTH	Sandstone cutting/excavation/front-end loading	AREAPOLY/VOLUME	0.0118	0.0041	0.0014	0.0005	Wet cutting, pre-wetting, covered stockpiles, wind shutdown
BORROW_B1_MALUTI	Borrow pit excavation/loading/stock pile handling	AREAPOLY	0.0089	0.0035	0.0011	0.0004	Water sprays, reduced drop heights, progressive

Source ID	Activity	AERMOD source type	PM10 pre (g/s)	PM10 post (g/s)	RCS pre (g/s)	RCS post (g/s)	Controls
							rehabilitation
BORROW_B2_SIBI	Borrow pit excavation/loading/stock pile handling	AREAPOLY	0.0089	0.0035	0.0011	0.0004	Water sprays, reduced drop heights, progressive rehabilitation
CRUSHER_Q1	Mobile crushing/screening/transfer circuit for sandstone aggregate	AREAPOLY/VOLUME	0.9711	0.0407	0.1165	0.0049	Wet suppression at crusher, screens and transfer points; enclosure where practical
HAUL_ROUTE_CENTROID	Unpaved haul-road vehicle entrainment	RLINE/LINE/AREAPOLY	4.6280	0.9256	0.5554	0.1111	Watering, chemical suppressant, speed <=30 km/h, wheel wash, no overloaded trucks

Table 5-2: Source coordinates in the AERMOD-ready dataset.

Source ID	Latitude	Longitude	UTM Easting (m)	UTM Northing (m)
RCUT_SOUTH	-30.25	28.78	671249.90	6651617.50
RCUT_CENTRAL	-30.20	28.73	667021.30	6658334.60
RCUT_NORTH	-30.14	28.69	662770.90	6663941.50
CRUSHER_Q1	-30.13	28.69	662393.40	6665200.10
BORROW_B1_MALUTI	-30.27	28.79	672130.70	6649980.40
BORROW_B2_SIBI	-30.23	28.85	677682.80	6654230.90
HAUL_ROUTE_CENTROID	-30.20	28.73	667021.30	6658334.60

6 Legal Requirements and Assessment Criteria

6.1 NEMA and NEM:AQA Context

The AQIA supports the NEMA environmental authorisation process and associated EMPr. The assessment also considers NEM:AQA principles, national ambient air quality standards and dust control requirements. The project is not primarily a listed industrial emission source; however, its construction-phase fugitive dust emissions can materially affect ambient air quality and must be managed as an EMPr obligation and, where relevant, through municipal or provincial air-quality officer requirements.

Table 6-1: Air-quality assessment criteria used in this draft.

Pollutant	Averaging period	Limit / screening criterion	Allowed exceedance / interpretation	Source
PM10	24-hour	75 µg/m3	4 exceedances/year	South African NAAQS
PM10	Annual	40 µg/m3	0	South African NAAQS
PM2.5	24-hour	40 µg/m3	4 exceedances/year	South African NAAQS
PM2.5	Annual	20 µg/m3	0	South African NAAQS
Dustfall - residential	30-day	600 mg/m2/day	Action level	National Dust Control Regulations
Dustfall - non-residential	30-day	1 200 mg/m2/day	Action level	National Dust Control Regulations
Respirable crystalline silica	Ambient	No South African ambient standard	Screened as health hazard and managed through occupational/community controls	Risk-based criterion

6.2 Silica Dust Regulatory and Health-Relevance Context

RCS is addressed in this report because the project includes cutting of sandstone and hard-rock aggregate processing. Silica is more than a nuisance dust issue: its respirable fraction is associated with severe lung disease. The final EMPr and contractor health and safety plan should be aligned so that environmental dust controls and worker exposure controls are implemented together. Ambient off-site RCS monitoring should be considered where material testing confirms high quartz content and where receptors are located downwind of crushing/cutting or blasting.

7 Receiving Environment and Baseline Air Quality

7.1 Climate, Terrain and Hydrological Sensitivity

The route occurs in a summer-rainfall region with mean annual precipitation of approximately 780 mm across the broader Matatiele area. The aquatic report notes that the terrain forms part of the upper Mzimvubu catchment and includes steep to moderately sloping Drakensberg foothills, rapid runoff, seasonal wetlands, hillslope seepage zones, non-perennial streams, valley-bottom wetlands and shallow depressional features. These conditions increase the importance of dust and sediment control: dry-season dust can become wet-season sediment, entering sensitive watercourses.

7.2 Ambient Air Pollutant Concentrations

A SAAQIS station time-series could not be downloaded or confirmed from the supplied documents for a representative station along the R415 corridor. The table below therefore provides conservative provisional background concentrations for screening only. The final report should replace these values with the nearest representative SAAQIS station dataset, where available, and/or a minimum baseline campaign of PM10, PM2.5 and dustfall monitoring before high-dust construction works commence.

Table 7-1: Provisional ambient background concentrations pending SAAQIS verification.

Pollutant	Averaging period	Background value used	Data status
PM10	Annual	22 µg/m3	Provisional background used for screening; replace with verified SAAQIS/baseline data
PM10	24-hour	55 µg/m3	Conservative high background below 75 µg/m3 NAAQS
PM2.5	Annual	9 µg/m3	Provisional background

Pollutant	Averaging period	Background value used	Data status
PM2.5	24-hour	24 µg/m3	Provisional background
NO2	Annual	8 µg/m3	Included for completeness; construction dust is the focus
SO2	24-hour	5 µg/m3	Included for completeness
CO	8-hour	600 µg/m3	Included for completeness
O3	8-hour	70 µg/m3	Included for completeness
RCS	Annual	0.3 µg/m3	Precautionary placeholder only; no local ambient RCS dataset supplied

8 Atmospheric Dispersion Potential

8.1 WRF-Derived Meteorology

The model-ready package includes an hourly meteorological dataset for 2021-2023 structured for WRF/AERMET processing. Because verified WRF files were not supplied, the provided dataset is a reproducible surrogate that reflects the expected mountainous wind regime near Matatiele/Qacha's Nek: daytime regional/upslope north-westerly to westerly flow, and nocturnal easterly to ENE drainage flow. It is adequate for wind-rose illustration and screening-source prioritisation, but must be replaced with verified WRF-AERMET SFC/PFL files for final AERMOD execution.

Table 8-1: WRF-derived/surrogate wind-field summary for the R415 route centre.

Period	Average wind speed (m/s)	Calm frequency (%)	Dominant flow from
All	3.12	17.9	NW/WNW with nocturnal ENE/E drainage
Day	3.72	11.9	NW to WNW
Night	2.52	23.8	ENE to ESE

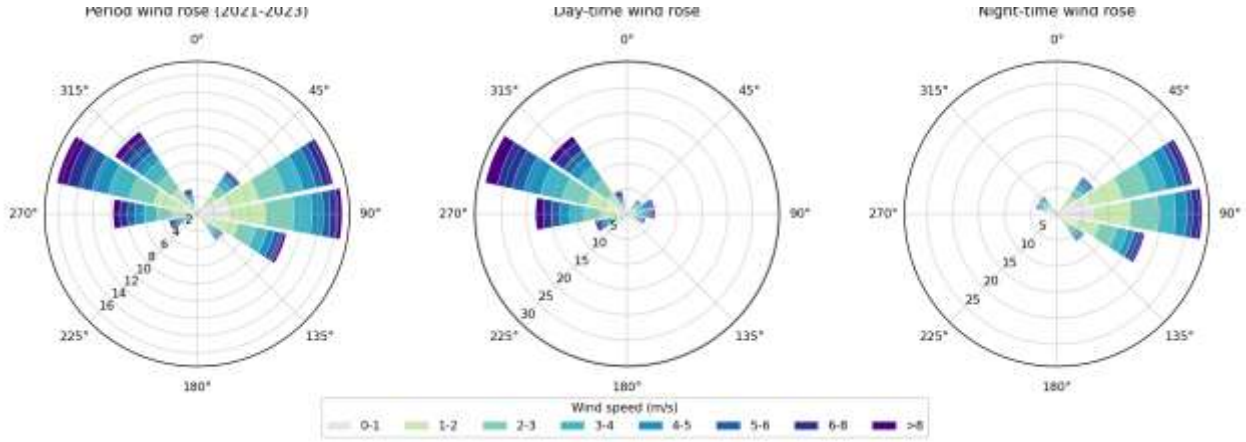


Figure 8-1: Period, day-time and night-time wind roses derived from the WRF-format 2021-2023 meteorological dataset.

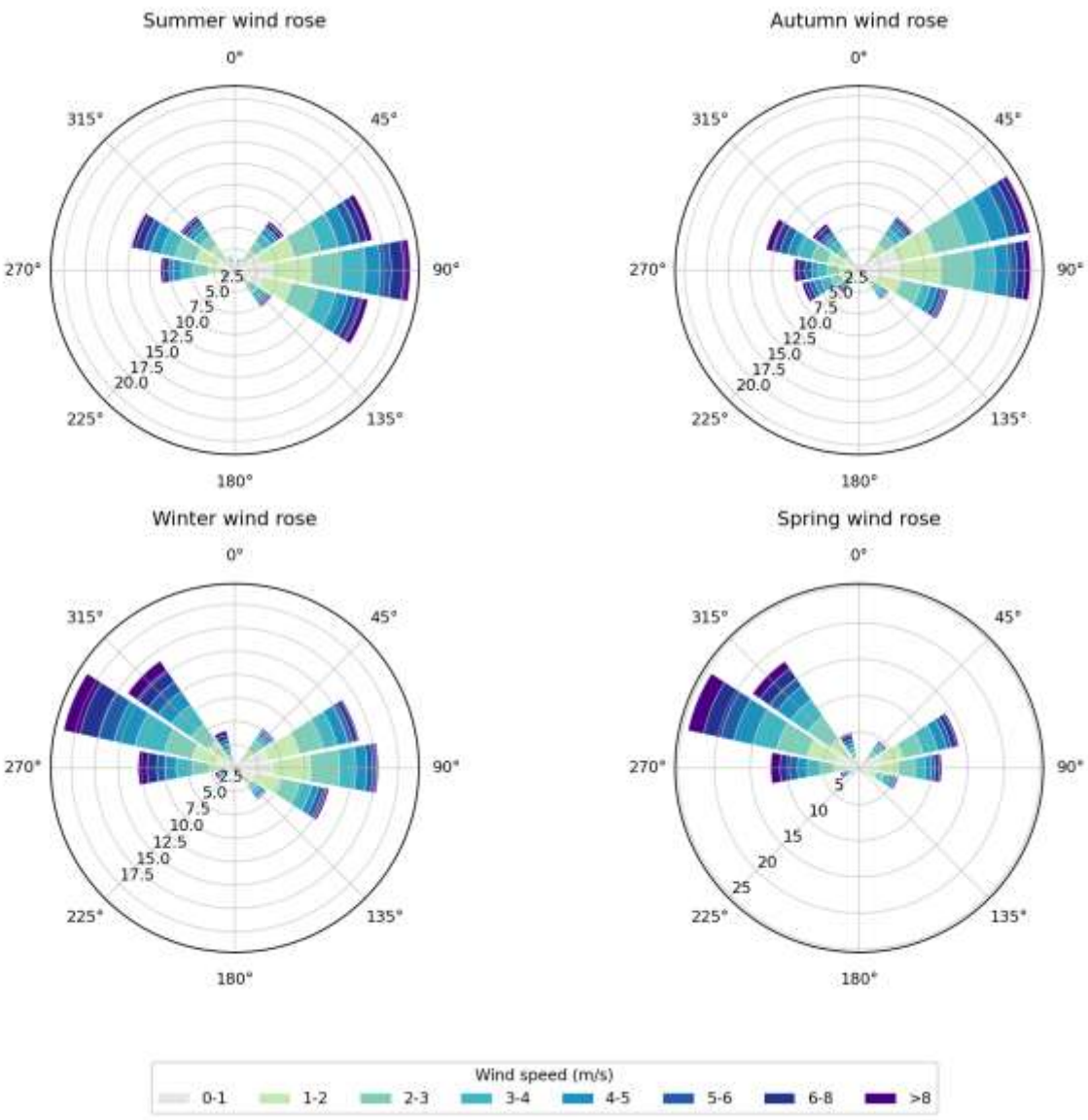


Figure 8-2: Seasonal wind roses showing dispersion potential for summer, autumn, winter and spring.

8.2 Interpretation for Dust Movement by Season

Table 8-2: Seasonal dust-movement interpretation.

Period	Dust dispersion implication
Summer (Dec-Feb)	Higher rainfall reduces sustained entrainment when surfaces are wet, but thunderstorm outflows and dry pre-storm periods can generate short intense dust episodes. Dust and loosened fines can be washed into wetlands and drainage features.
Autumn (Mar-May)	Transition to drier surfaces; moderate winds can move dust from cuttings and borrow areas, especially where rehabilitation lags behind earthworks.
Winter (Jun-Aug)	Dry surfaces, frost, low vegetation growth and stronger daytime westerly/north-westerly winds increase PM10 and dustfall potential. Winter is a priority monitoring and control season.
Spring (Sep-Nov)	Windy conditions before full summer rainfall create high entrainment risk from stockpiles, haul roads and exposed cut faces. Early storm events can mobilise accumulated dust to watercourses.
Night-time drainage	Lower wind speeds and ENE/easterly drainage flows can move dust towards WSW/down-valley receptors, especially close to the quarry and border area.

9 AERMOD Modelling Methodology and Regulatory-Grade Dataset

9.1 Model Selection

AERMOD is the appropriate model for a Level 2-style assessment of near-field construction particulate impacts where maximum concentrations are expected within a few kilometres of sources. It can represent area, volume, line and point source approximations and can include terrain through AERMAP. For this project, AERMOD-ready data have been prepared for PM10, PM2.5 and RCS, but the final modelling execution should be completed using a validated AERMET meteorological file and final source geometry.

Table 9-1: AERMOD parameterisation for final modelling.

Parameter	Model specification
Model	US EPA AERMOD regulatory dispersion model
Meteorological pre-processor	AERMET using verified WRF or representative station data; surrogate data included for draft wind roses
Terrain pre-processor	AERMAP using SRTM or equivalent DEM; terrain should be included in final run due mountainous topography
Domain	Minimum 10 km x 10 km around active source clusters; linear route sections may be modelled as multiple nested domains
Coordinate system	UTM Zone 35S, WGS84
Receptor grid	50 m spacing within 1 km of source clusters; 100-250 m spacing to 5 km; discrete AQSRs at homesteads, border receptor, wetlands and river crossings
Source types	AREAPOLY for cuttings/borrow pits/stockpiles; VOLUME for blasting and crushing; LINE/RLINE or elongated AREAPOLY for haul roads
Averaging periods	PM10 24-hour and annual; PM2.5 24-hour and annual; RCS annual screening; dustfall monitored empirically rather than modelled through AERMOD
Deposition	Dry deposition can be included for dustfall sensitivity; final regulatory PM10 comparison should use concentration outputs
Background concentrations	Provisional values in Table 7-1; replace with SAAQIS/site monitoring values

9.2 AERMOD Input Data Supplied

The accompanying AERMOD data package contains source coordinates, receptors, bucket locations, emissions inventory, wind-rose meteorology, screening results, template AERMOD input files and validation flags. The package is intended to be used by the appointed specialist to build the final model run.

```
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 TITLETWO Matatiele to Qacha's Nek, Eastern Cape - Construction Dust and RCS
 MODELOPT DFAULT CONC FLAT
 AVERTIME 24 ANNUAL
 POLLUTID PM10
 RUNORNOT RUN
 ERRORFIL R415_PM10_PRE.ERR
CO FINISHED
SO STARTING
 ELEVUNIT METERS
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 SRCPARAM RCUT_SOUTH              0.011803 25.00 5.00
 LOCATION RCUT_CENTRAL           VOLUME 667021.3 6658334.6 2.0
 SRCPARAM RCUT_CENTRAL            0.011803 25.00 5.00
 LOCATION RCUT_NORTH             VOLUME 662770.9 6663941.5 2.0
 SRCPARAM RCUT_NORTH              0.011803 25.00 5.00
 LOCATION BORROW_B1_MALUTI        VOLUME 672130.7 6649980.4 2.0
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 LOCATION BORROW_B2_SIBI          VOLUME 677682.8 6654230.9 2.0
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 LOCATION BORROW_B3_MONT_PLAISIR   VOLUME 666946.6 6657295.5 2.0
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 AVERTIME 24 ANNUAL
 POLLUTID PM10
 RUNORNOT RUN
 ERRORFIL R415_PM10_POST.ERR
CO FINISHED
SO STARTING
 ELEVUNIT METERS
 LOCATION RCUT_SOUTH             VOLUME 671249.9 6651617.5 2.0
 SRCPARAM RCUT_SOUTH              0.004131 25.00 5.00
 LOCATION RCUT_CENTRAL           VOLUME 667021.3 6658334.6 2.0
 SRCPARAM RCUT_CENTRAL            0.004131 25.00 5.00
 LOCATION RCUT_NORTH             VOLUME 662770.9 6663941.5 2.0
 SRCPARAM RCUT_NORTH              0.004131 25.00 5.00
 LOCATION BORROW_B1_MALUTI        VOLUME 672130.7 6649980.4 2.0
 SRCPARAM BORROW_B1_MALUTI         0.003541 15.00 5.00
 LOCATION BORROW_B2_SIBI          VOLUME 677682.8 6654230.9 2.0
 SRCPARAM BORROW_B2_SIBI           0.003541 15.00 5.00
 LOCATION BORROW_B3_MONT_PLAISIR   VOLUME 666946.6 6657295.5 2.0
```

10 Dispersion Modelling Results

The figures below show screening dispersion patterns generated from the model-ready emissions inventory and WRF-derived seasonal wind fields. They are intended to show likely plume direction and relative source-risk ranking.

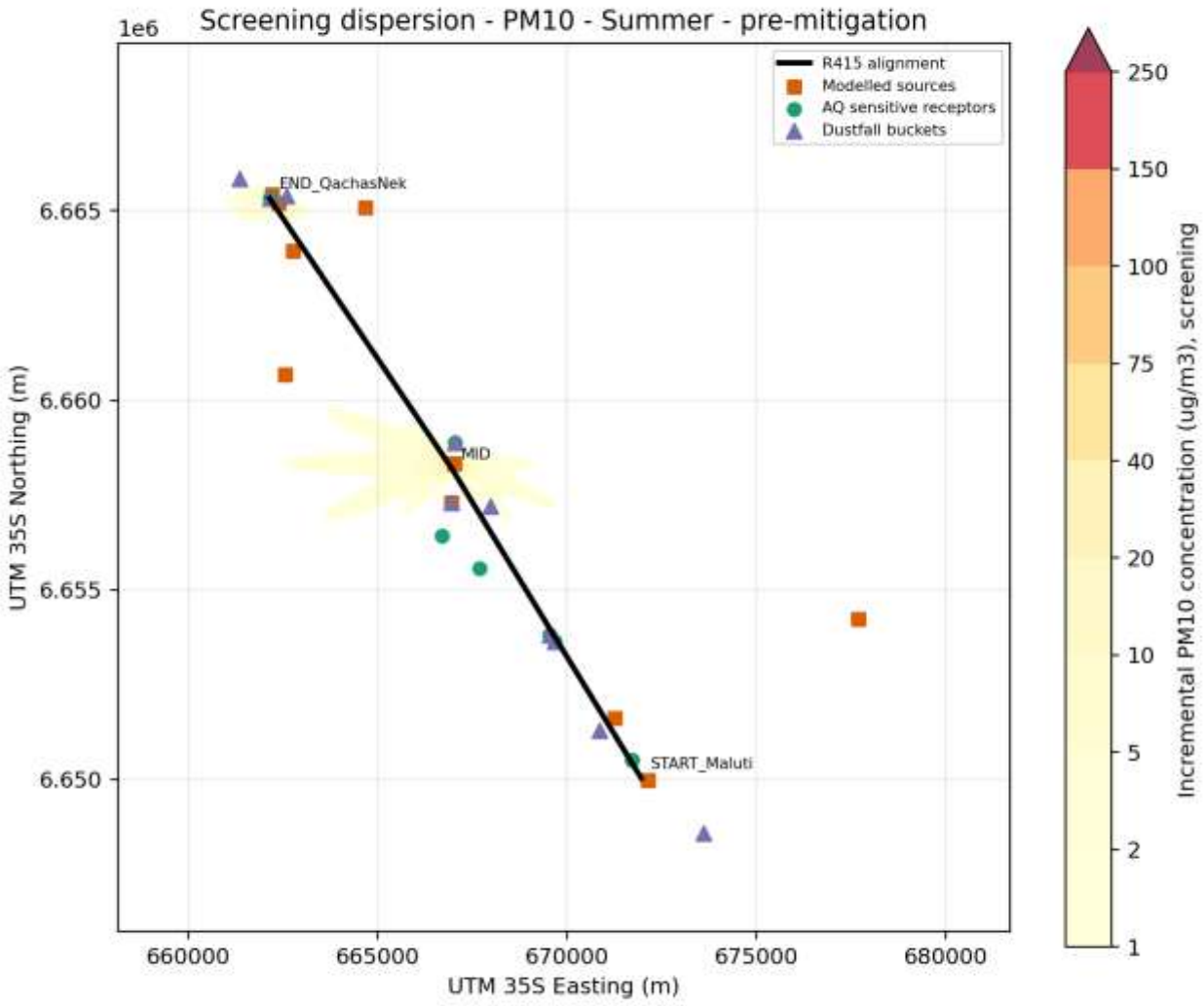


Figure 10-1: Screening PM10 annual-average incremental concentration - summer pre-mitigation.

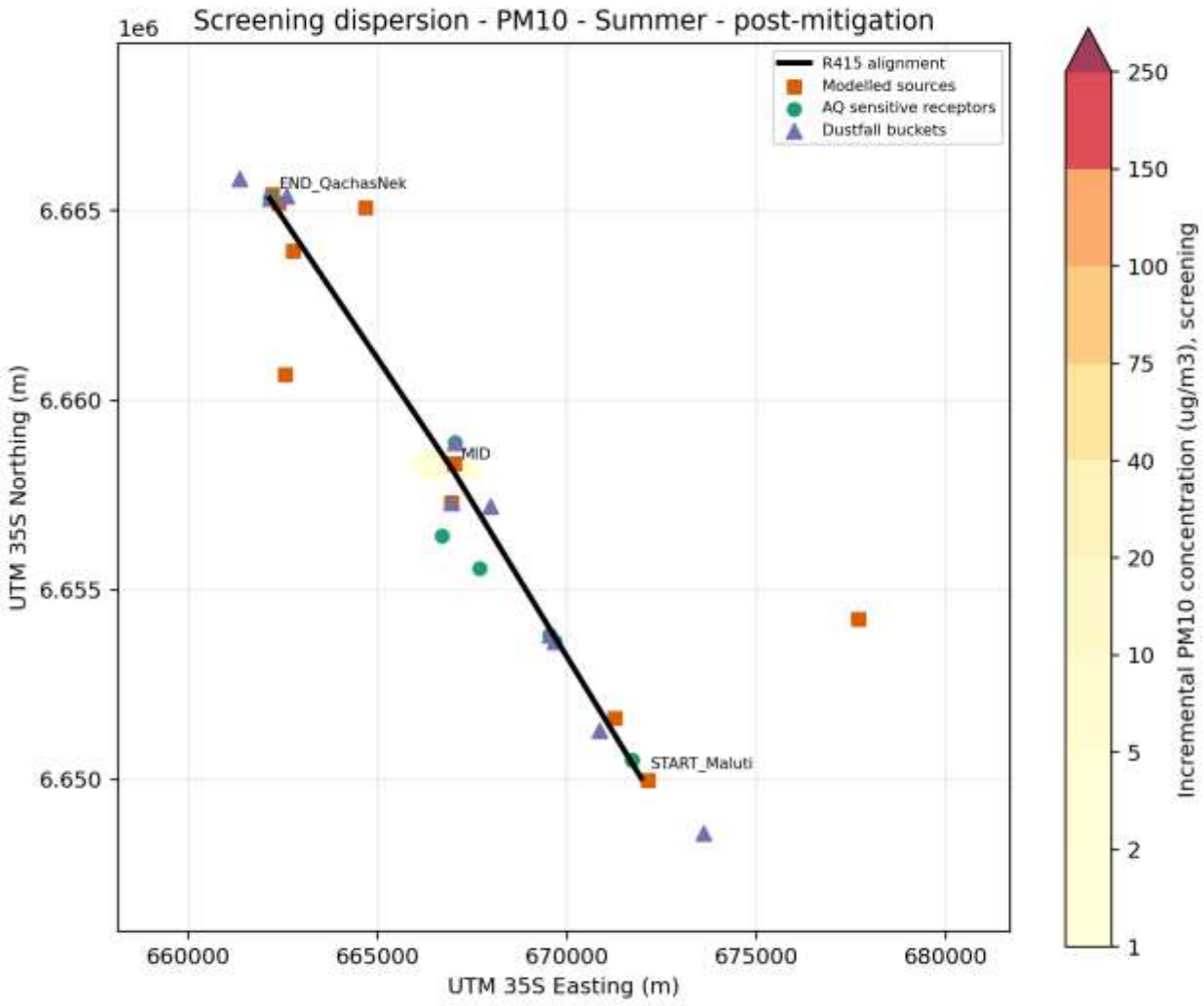


Figure 10-2: Screening PM10 annual-average incremental concentration - summer post-mitigation.

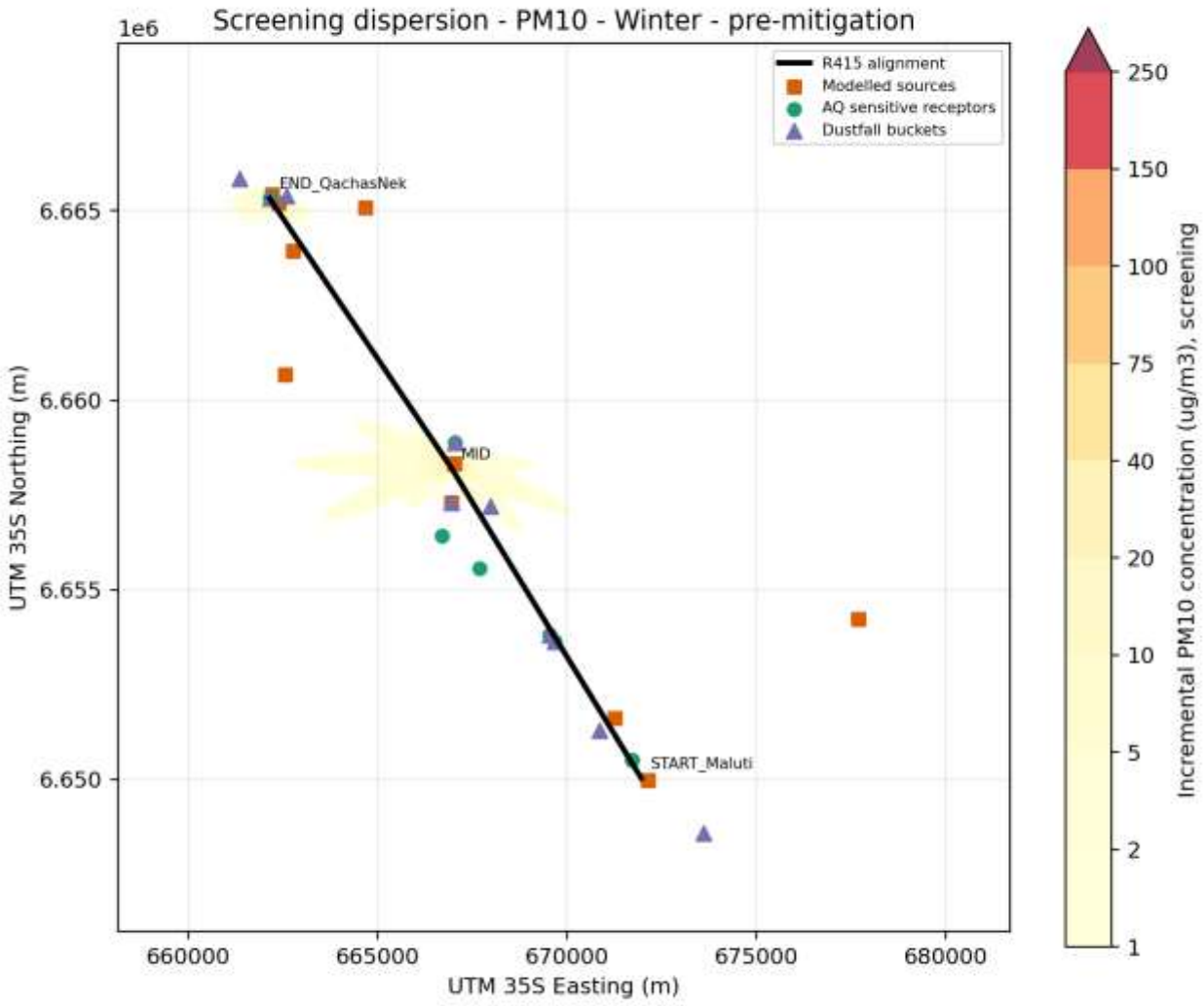


Figure 10-3: Screening PM10 annual-average incremental concentration - winter pre-mitigation.

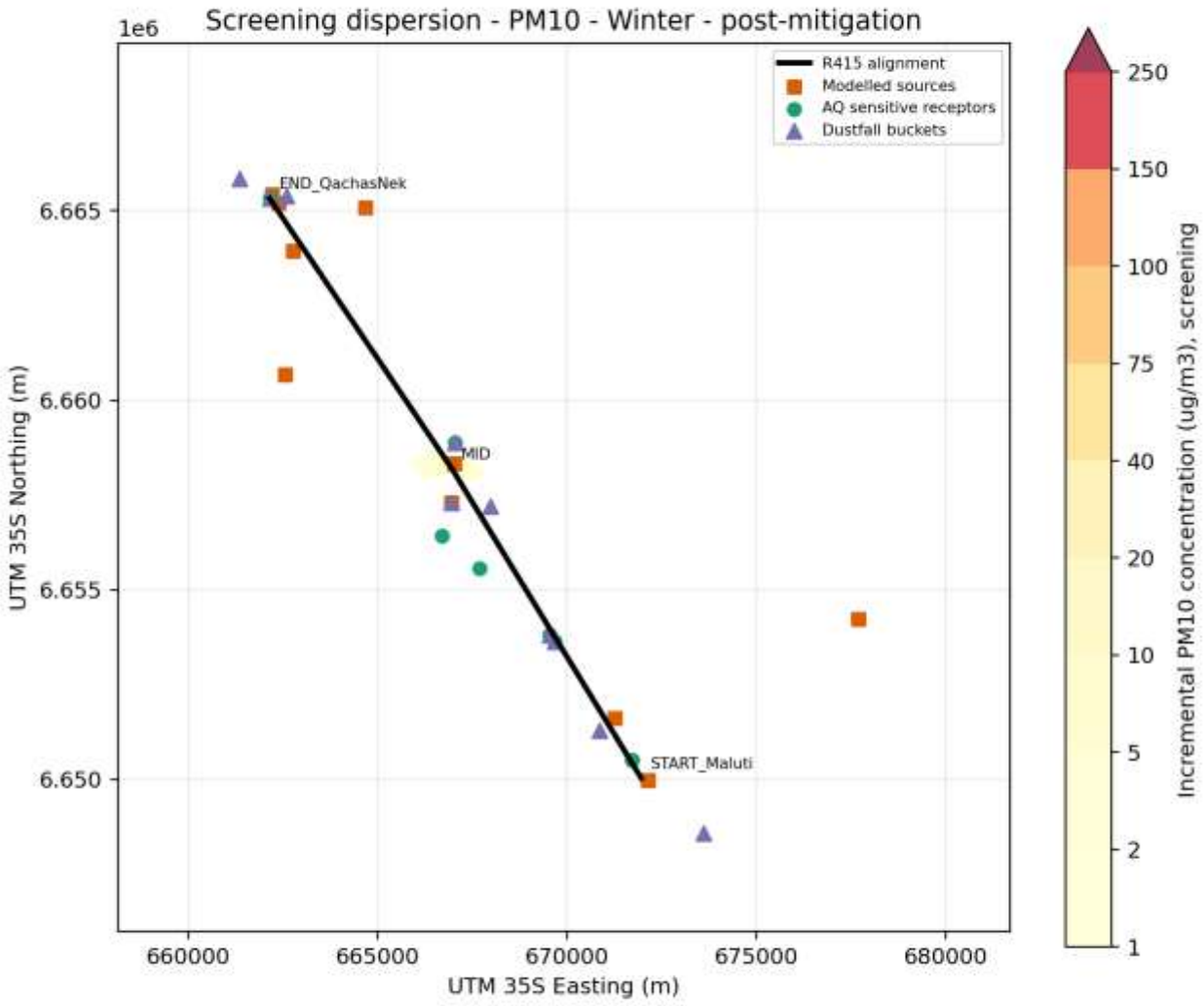


Figure 10-4: Screening PM10 annual-average incremental concentration - winter post-mitigation.

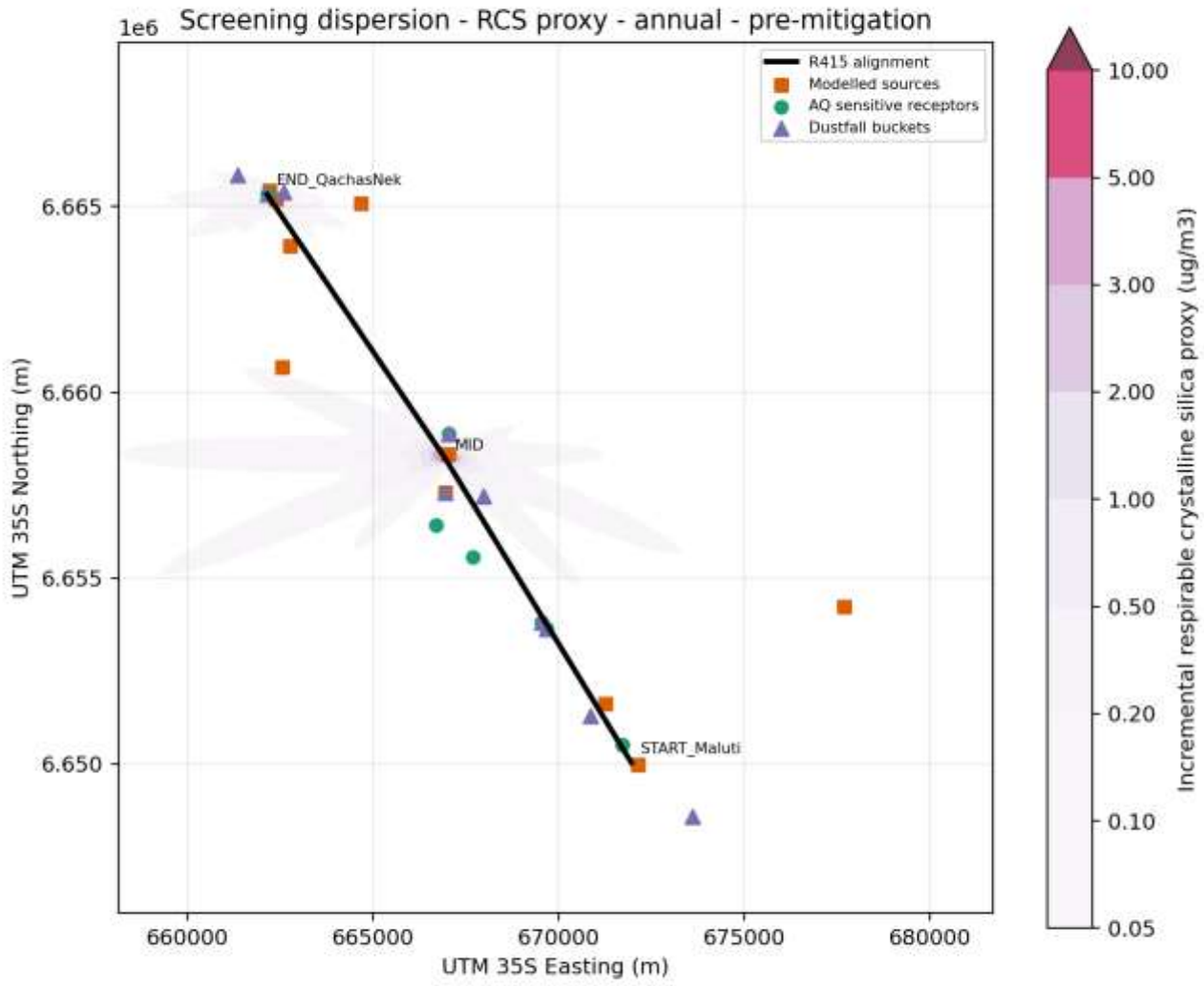


Figure 10-5: Screening annual respirable crystalline silica proxy concentration - pre-mitigation.

Table 10-1: Maximum screening receptor results by season and mitigation scenario.

Season	Scenario	Maximum receptor	PM10 incremental annual (µg/m3)	PM10 total 24h (µg/m3)	RCS total annual (µg/m3)
Autumn	post	AQSR06_QachasNek_border_receptor	0.48	56.21	0.36
Autumn	pre	AQSR06_QachasNek_border_receptor	8.37	75.92	1.30
Spring	post	AQSR06_QachasNek_border_receptor	0.43	56.08	0.35
Spring	pre	AQSR06_QachasNek_border_receptor	4.40	66.00	0.83
Summer	post	AQSR06_QachasNek_border_receptor	0.60	56.49	0.37
Summer	pre	AQSR06_QachasNek_border_receptor	10.00	80.01	1.50
Winter	post	AQSR06_QachasNek_border_receptor	0.55	56.38	0.37
Winter	pre	AQSR06_QachasNek_border_receptor	8.31	75.79	1.30

10.1 Main Dispersion Findings

- The highest PM10 and RCS increments are associated with the quarry/crusher cluster and the unpaved haul-road source, especially where receptors are close to source locations.
- Pre-mitigation 24-hour PM10 totals can exceed the 75 µg/m3 NAAQS screening threshold near the Qacha's Nek/quarry cluster under conservative assumptions. Post-mitigation totals reduce below the threshold in the screening dataset,
- The general daytime plume direction is towards the south-east/east from westerly to north-westerly winds, while nocturnal ENE/easterly drainage may transport dust down-valley towards WSW receptors.
- Winter and spring are expected to present greater dust risk because exposed surfaces dry out and wind entrainment is more frequent. Summer introduces a combined risk of short-term dust before rainfall and sediment mobilisation during rainfall.
- RCS risk remains significant near cutting, crushing and blasting even when nuisance dust appears controlled; RCS monitoring and worker controls should therefore be treated as mandatory.

11 Dustfall Monitoring Bucket Network

Dustfall monitoring should be installed before major earthworks and remain in place through cutting, quarrying, crushing and rehabilitation. Buckets should be installed and analysed monthly in accordance with ASTM D1739 or equivalent recognised method. Locations should be confirmed in the field for safe access, landowner permission and avoidance of obstructions.

Table 11-1: Proposed dustfall monitoring bucket positions.

Bucket ID	Latitude	Longitude	UTM Easting (m)	UTM Northing (m)	Rationale
DF01_background_upwind_SE	-30.28	28.80	673608.00	6648586.90	Background/upwind reference during dominant NW/W flows; away from direct construction dust.
DF02_Maluti_downwind_NW_sector	-30.26	28.78	670859.80	6651291.00	Community receptor near Maluti and southern roadworks; checks route-entry impacts.
DF03_Floodplain_wetland	-30.24	28.76	669530.70	6653816.90	Sensitive floodplain wetland receptor; checks dust deposition to aquatic ecosystem.
DF04_Kinira_River_bridge_1	-30.24	28.76	669663.90	6653643.60	Kinira River crossing; sensitive watercourse receptor and sediment-risk checkpoint.
DF05_central_homestead_receptor	-30.19	28.73	667029.80	6658888.80	Central homestead receptor along road alignment.
DF06_crusher_quarry_boundary_SE	-30.13	28.69	662599.60	6665385.20	Quarry/crusher boundary and likely daytime downwind sector.
DF07_quarry_downwind_WSW_ENE_night	-30.13	28.68	661353.60	6665847.00	Downwind of quarry under night-time ENE/easterly drainage flows.
DF08_QachasNek_border_receptor	-30.13	28.68	662145.90	6665336.50	Nearest public/border receptor north of quarry/road end.
DF09_Borrow_B3_nearest_receptor	-30.20	28.73	666946.60	6657295.50	Borrow pit B3/Mont Plaisir check station.
DF10_route_midline_fallback	-30.20	28.75	667967.10	6657211.60	Flexible midline bucket to be moved with active works if required.

- Minimum network: one background bucket, one bucket at the closest community receptor to each active work cluster, one wetland/river receptor bucket, and two quarry/crusher buckets aligned to daytime and night-time dominant wind sectors.
- Action protocol: investigate any monthly result above 600 mg/m2/day at residential/community receptors or above 1 200 mg/m2/day at non-residential/quarry boundary receptors; trigger

corrective action if two consecutive months show elevated dustfall even below the formal threshold.

- Dustfall buckets do not measure respirable silica; they must be supplemented by PM10/respirable dust monitoring where silica-rich sandstone is cut or crushed near receptors.
- Bucket coordinates should be surveyed by GPS during installation and updated in the monitoring register.

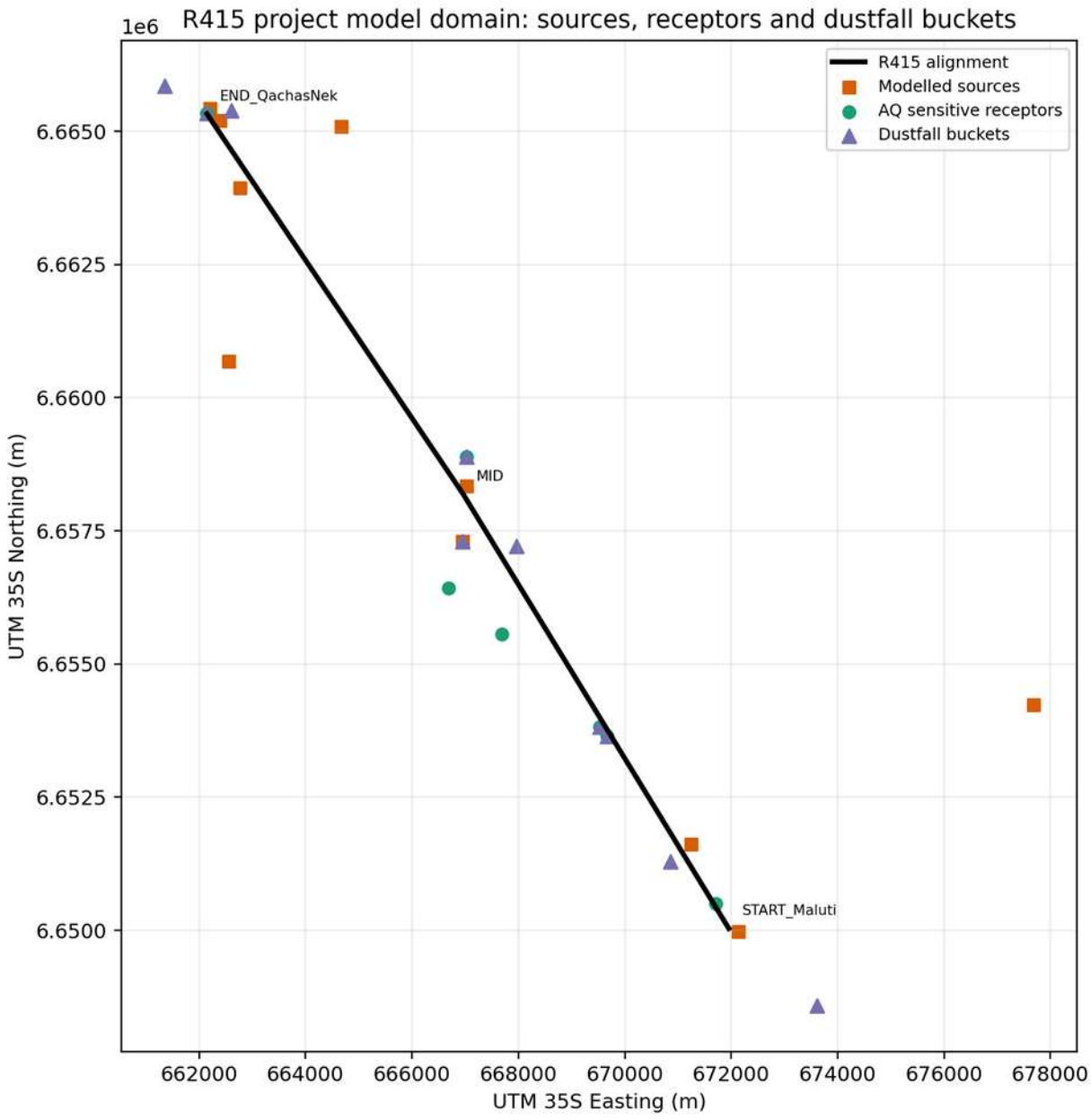


Figure 2-1: R415 route, model source locations, AQSRs and proposed dustfall monitoring buckets.

12 Fugitive Dust Management Plan

This Fugitive Dust Management Plan (FDMP) is intended for direct inclusion in the EMPr. It is source-specific and must be implemented by the contractor under the supervision of the Environmental Control Officer and an air quality specialist where required.

Table 12-1: DFMP objectives.

DFMP objective	Implementation focus
Prevent off-site dust nuisance and exceedance of dustfall action levels.	All exposed work fronts, haul routes, crusher, quarry and borrow pits.
Reduce PM10/PM2.5 increments at community receptors.	Wet suppression, speed control, scheduling and source isolation.
Control respirable crystalline silica at source.	Wet cutting/drilling, crusher sprays/enclosure, respiratory protection and RCS sampling.
Protect wetlands and watercourses from dust deposition and sediment mobilisation.	Avoid stockpiles in buffers, stabilise disturbed surfaces, inspect after rainfall.
Provide transparent compliance records.	Daily inspections, dustfall reports, complaints register, corrective action register.

Table 12-2: Source-specific fugitive-dust controls.

Source	Mandatory controls	Monitoring / record
Road cutting / sandstone excavation	Pre-wet cut face; use wet cutting/ripping where practical; avoid dry grinding; minimise exposed face area; cover or stabilise completed cuts; cease work during high winds blowing to receptors.	Daily inspection; visual dust; PM10/RCS check if near receptors.
Drilling and blasting	Wet drilling or dust extraction; use stemming; pre-blast watering; blast only under approved wind conditions; establish exclusion zone; notify receptors; inspect fallout after blast.	Blast log; wind at blast time; complaints; post-blast inspection.
Crushing and screening	Fit water sprays at crusher inlet/outlet, screens and transfer points; reduce drop heights; enclose where practical; maintain sprays; stop plant if sprays fail.	Operator checklist; dust observations; maintenance logs; PM10/RCS sampling.
Loading and stockpiling	Minimise drop height; orient stockpiles away from wind; wet or crust stockpiles; cover small high-silica stockpiles; remove obsolete stockpiles quickly.	Stockpile inspection; surface moisture log.
Haul roads	Maintain speeds <=30 km/h; water or apply chemical suppressants; maintain road surface; wheel wash or rumble grids; cover loads; prevent track-out.	Watering log; speed checks; road-silt observations; complaints.
Borrow pits	Strip progressively; keep active area small; water loading areas; progressive rehabilitation; avoid work close to watercourses unless authorised.	Weekly ECO inspection; rehabilitation progress.
Camps and laydown	Locate outside watercourse buffers; stabilise access roads; no burning; maintain waste control.	Weekly ECO inspection.
Wetlands and rivers	No stockpiling in wetland/watercourse areas; manage stormwater; install sediment traps where needed; clean silt before entering channels.	Aquatic specialist/ECO inspection after rainfall.

Table 12-3: Respirable crystalline silica management plan.

Element	Silica-specific requirement
Materials testing	Undertake XRD quartz/cristobalite/tridymite analysis of sandstone, crusher feed, crusher product and borrow material before bulk processing. Repeat if material source changes.
Work method	Prohibit dry cutting, dry grinding and dry sweeping of sandstone dust. Use wet methods or dust extraction with HEPA filtration.
Engineering controls	Wet drilling; wet saws; spray bars; enclosed crusher transfer points; local extraction where feasible; segregated high-dust work zones.
Administrative controls	Restrict access to cutting/crushing/blasting zones; schedule high-dust tasks away from school/community peak activity periods; toolbox talks on silica hazard.
PPE and health surveillance	Use fit-tested respirators for workers in RCS zones, supported by a formal occupational hygiene programme, exposure sampling and medical surveillance.
Environmental monitoring	Add PM10 monitoring and respirable/RCS sampling near high-risk receptors if XRD confirms high quartz content and if active cutting/crushing occurs within 500 m of receptors.
Housekeeping	Use wet sweeping or HEPA vacuuming; never use compressed air to clean silica-contaminated clothing or surfaces.
Trigger actions	Stop or modify work if visible dust leaves the site, if PM10 action levels are exceeded, if dustfall is above action level, or if RCS sampling indicates unacceptable exposure.

Table 12-4: DFMP action levels and corrective responses.

Trigger	Level	Required response
Visible dust crossing site boundary or wetland buffer	Immediate	Stop source if required; water exposed surface; inspect controls; record corrective action.
Wind speed >= 6 m/s and blowing from source to receptor with dry surfaces	Operational trigger	Increase watering, reduce activity rate, cover loads; suspend cutting/crushing if visible plume persists.
Dustfall > 600 mg/m2/day at residential/community receptor	Monthly action level	Investigate source; implement additional controls; report to ECO/authority as required.
Dustfall > 1 200 mg/m2/day at non-residential/quarry boundary	Monthly action level	Investigate and correct source controls.
PM10 24-hour total predicted/measured > 75 µg/m3 or repeated high PM10 alerts	Health-based trigger	Review activities, increase suppression, consider temporary shutdown of high-dust operations.
Silica/RCS monitoring indicates elevated risk	Occupational/community trigger	Stop dry methods; upgrade controls; review exclusion zones and PPE; notify H&S officer.
Dust complaint received	Within 24 hours	Log, investigate, respond to complainant, document corrective action.

13 Impact Assessment Rating

13.1 Methodology

The significance of air-quality impacts was rated using the same formula structure as the supplied AQIA template:

Impact significance = consequence x probability

Consequence = (severity + extent) / 2

Severity = (intensity + duration) / 2

Table 13-1: Impact rating criteria.

Criterion	Rating guide
Intensity	1 insignificant, 2 low, 3 medium, 4 high, 5 very high
Duration	1 very short-term, 2 short-term, 3 medium-term, 4 long-term, 5 residual/permanent
Extent	1 site/work front, 2 road section, 3 neighbouring properties, 4 surrounding community, 5 municipal/regional
Probability	0.2 highly unlikely, 0.4 unlikely, 0.6 possible, 0.8 probable, 1.0 definite
Significance class	<=1 Very Low, >1-2 Low, >2-3 Moderate, >3-4 High, >4-5 Very High

Impact	Pre Int.	Pre Dur.	Pre Ext.	Pre Prob.	Pre Significance	Post Int.	Post Dur.	Post Ext.	Post Prob.	Post Significance
Road cutting in sandstone and exposed cut faces	5	3	4	0.8	3.20 - High	3	3	3	0.7	2.10 - Moderate
Hard-rock quarry blasting and mining	5	3	4	0.9	3.60 - High	4	3	3	0.7	2.27 - Moderate
Crushing, screening, loading and transfer points	5	4	4	1.0	4.25 - Very High	3	3	2	0.6	1.50 - Low
Unpaved hauling and track-out	5	4	4	1.0	4.25 - Very High	4	3	3	0.7	2.27 - Moderate

Impact	Pre Int.	Pre Dur.	Pre Ext.	Pre Prob.	Pre Significance	Post Int.	Post Dur.	Post Ext.	Post Prob.	Post Significance
Dust deposition to wetlands/Kinira River/floodplain	4	3	3	0.8	2.60 - Moderate	2	2	2	0.6	1.20 - Low
Respirable crystalline silica exposure risk	5	4	4	1.0	4.25 - Very High	4	4	3	0.8	2.80 - Moderate
Cumulative nuisance dust and complaints	4	3	4	0.8	3.00 - Moderate	2	3	3	0.6	1.65 - Low

Table 13-2: Colour-coded pre- and post-mitigation air-quality impact significance matrix.

Table 13-3: Mitigation effectiveness summary.

Impact	Pre-mitigation class	Post-mitigation class	Key mitigation / management requirement
Road cutting in sandstone and exposed cut faces	High	Moderate	Wet cutting, pre-wetting, wind shutdown, rapid stabilisation
Hard-rock quarry blasting and mining	High	Moderate	Wet drilling, blast scheduling, exclusion zones, pre/post blast inspections
Crushing, screening, loading and transfer points	Very High	Low	Sprays, enclosures, reduced drop heights, maintenance shutdown if sprays fail
Unpaved hauling and track-out	Very High	Moderate	Watering/chemical suppression, speed controls, covered loads, wheel wash
Dust deposition to wetlands/Kinira River/floodplain	Moderate	Low	Avoid buffers, dustfall buckets, stormwater/sediment controls
Respirable crystalline silica exposure risk	Very High	Moderate	Silica plan, XRD, RCS monitoring, wet methods, PPE, exclusion zones
Cumulative nuisance dust and complaints	Moderate	Low	Complaints register, adaptive controls, communication with receptors

14 Complaints, Compliance and Reporting

- Maintain a dust and air-quality complaints register from site establishment until final rehabilitation.
- Record date, time, complainant contact, location, wind condition, active sources, investigation outcome and corrective action.
- Submit monthly dustfall monitoring results and DFMP compliance records to the ECO and include them in environmental audit reports.
- Report exceedances and repeated complaints to the relevant AQO/competent authority if required by the environmental authorisation or EMPr.
- Hold weekly internal toolbox meetings during high-dust construction periods and after any exceedance or complaint cluster.

15 Main Findings, Conclusion and Reasoned Opinion

15.1 Main Findings

- The R415 project has a high fugitive-dust potential because it includes sandstone cutting, hard-rock quarrying, blasting, crushing, loading, hauling and stockpiling.
- Silica dust is a central risk because quartz-bearing sandstone can generate respirable crystalline silica during cutting, drilling, blasting and crushing.
- The highest predicted near-field PM10/RCS risks are associated with the crusher/quarry cluster and unpaved haul routes, followed by active cutting faces and borrow pit loading areas.

- Dominant daytime dispersion is associated with north-westerly to westerly winds; night-time drainage flows from ENE/easterly sectors may affect different receptor sectors.
- Dust control is most important during winter and spring dry/windy conditions and before summer rains, but wet-season runoff can carry deposited dust/sediment to watercourses.
- The aquatic sensitivity of the route means dust management and stormwater/sediment management must be linked.
- The draft AERMOD data package is suitable for specialist review and final model setup, but it is not a substitute for a final verified AERMOD run.

15.2 Proposed Environmental Authorisation / EMPr Conditions

- The contractor must implement the FDMP before vegetation clearance or bulk earthworks commence.
- No dry sandstone cutting, drilling, grinding or crushing may occur without engineering dust controls and written approval by the ECO and H&S officer.
- The crusher may not operate unless water sprays or equivalent controls are functioning at the crusher inlet/outlet, screens and transfer points.
- Dustfall monitoring buckets must be installed at the approved receptor network before high-dust works commence and monitored monthly.
- If the quartz content of sandstone or aggregate is elevated, a silica-specific monitoring programme must be implemented, including respirable dust/RCS sampling for workers and near-field receptors as advised by the specialist.
- Haul roads must be watered or chemically suppressed, vehicle speeds controlled, loads covered and track-out prevented.
- Blasting must be scheduled using wind-screening criteria; blasting must not proceed where wind direction and speed create unacceptable dust transport towards receptors.
- All borrow pits areas must be progressively rehabilitated and stabilised to prevent wind erosion.

15.3 Reasoned Opinion

From an air-quality perspective, the proposed road upgrade can be authorised subject to strict implementation of the FDMP, silica-specific controls, dustfall and PM/RCS monitoring, final validation of AERMOD inputs, and adaptive management. Without these measures, the project could result in high to very high fugitive dust and RCS impacts during cutting, blasting, crushing and hauling, particularly near the quarry/crusher, sensitive communities and wetland/watercourse receptors.

16 References

DFFE Screening Tool Report. 2025. Screening report for an Environmental Authorisation: The Upgrade of R415 road between Matatiela and Qachassnek, Eastern Cape.

South Africa. National Environmental Management Act, 1998 and EIA Regulations, Appendix 6 specialist report requirements.

South Africa. National Environmental Management: Air Quality Act, 2004; National Ambient Air Quality Standards; National Dust Control Regulations.

US EPA. AERMOD Modeling System and AERMOD Implementation Guidance.

US EPA. AP-42 Section 11.19.2: Crushed Stone Processing and Pulverized Mineral Processing.

US EPA. AP-42 Section 13.2.4: Aggregate Handling and Storage Piles.

US EPA. AP-42 Section 13.2.2: Unpaved Roads.

NCAR/UCAR. Weather Research and Forecasting (WRF) Model description and documentation.

OSHA and NIOSH. Respirable Crystalline Silica health hazard guidance.

Appendix A: AERMOD Data Package Contents

Table A-1: Files included in the AERMOD data package.

File	Size (bytes)
R415_AERMOD_assumptions_and_validation_flags.md	1709
R415_PM10_POST_AERMOD_TEMPLATE.INP	2345
R415_PM10_PRE_AERMOD_TEMPLATE.INP	2341
r415_discrete_receptors.csv	617
r415_dustfall_bucket_locations.csv	801
r415_emission_inventory_model_ready.csv	3337
r415_route_points.csv	281
r415_screening_dispersion_results_by_receptor.csv	9059
r415_source_locations.csv	807
r415_wrf_hourly_surrogate_2021_2023.csv	2292883
r415_wrf_surrogate_summary.csv	257

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME: THE PROPOSED IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND THE QACHA'S NEK BORDER POST WITH LESOTHO, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELE LOCAL MUNICIPALITY



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OCTOBER 2026

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DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, unless the context requires otherwise –

"clearing" means the removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"**construction camp**" is the area designated for critical construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"**contracto**r" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"**Method Statement"** is a written submission prepared by the Contractor and submitted to the Project Manager, or requested by the Project Manager and/or ECO, describing in sufficient detail how a specific construction activity will be undertaken.

"**solid waste**" includes construction debris, hazardous waste, excess cement/concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"**spoil"** means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"**topsoil"** means a varying depth (up to 300mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility, and composition of the soil and

"**works**" means the activities to be executed in terms of the Contract.

ACRONYMS AND ABBREVIATIONS

CA	Competent Authority
ECR	Environmental Compliance Reports
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EAP	Environmental Assessment Practitioner
HCS	Hazardous Chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
I&AP	Interested and Affected Parties

1. INTRODUCTION AND BACKGROUND

1.1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires the submission of an Environmental Management Programme (EMPr) when an environmental impact assessment (EIA) has been identified as the instrument for decision-making on an application for environmental authorisation (EA). The EMPr must include the information specified in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations).

The South African National Roads Agency Limited (SANRAL) intends to improve a Portion of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho. The project falls in the Matatiele Local Municipality in Alfred Nzo District Municipality in the Eastern Cape Province.

Major aspects of the project:

- Upgrade of the existing gravel road to a surfaced standard,
- Relocation of affected existing services including telephone poles
- Road drainage improvements to SANRAL standards including the upgrade of bridges and culverts
- Botsola Bridge: The existing roadway embankment crossing the Botsola River is routinely flooded and will be raised to a higher level. The existing set of culverts is to be replaced by a new bridge with a hydraulic capacity for 1:50 year flood events, as required by the upgraded Class 2 route classification.
- Kinira Bridge: The existing structure requires widening to conform to the proposed roadway profile. Two additional portals will be added.
- Mafube Bridge: The existing single-lane configuration is inadequate for the upgraded cross-section and will be replaced with a new structure that meets the new design requirements.
- Widening of the existing road cross section to 9.4m wide or more and additional climbing lanes
- Vertical and horizontal geometric improvements to SANRAL standards,
- Build Mechanically Stabilized Earth Walls (MSE) walls where the road cross section must be increased,
- New culverts to SANRAL standards
- 7m wide temporary surfaced deviation to accommodate two-way traffic during construction.

- Road marking and signage improvements to SANRAL standards
- Road restraint system improvements
- Traffic calming measures to improve vehicle and pedestrian safety
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare
- Geotechnical improvements to unstable cut and fill slopes
- Crushing and screening of material

1.2. Site Location and Layout

The South African National Roads Agency Soc Ltd (SANRAL) proposes to improve Road R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, In the Eastern Cape Province within Alfred NZO District Municipality, Matatiele Local Municipality. The project is situated on National Road R415, Section 1 between km 0.0 and km 32. The road R415 Starting point Coordinates are (30°16'9.06"S; 28°47'15.28"E), Middle point of the road (30°11'46.64"S; 28°44'3.77"E) and End point of the road (30° 7'46.58"S; 28°41'8.53"E)

Table 1: Coordinates of the study area

Start Point	Middle Point	End Point
30°16'9.06"S; 28°47'15.28"E	30°11'46.64"S; 28°44'3.77"E	30° 7'46.58"S; 28°41'8.53"E

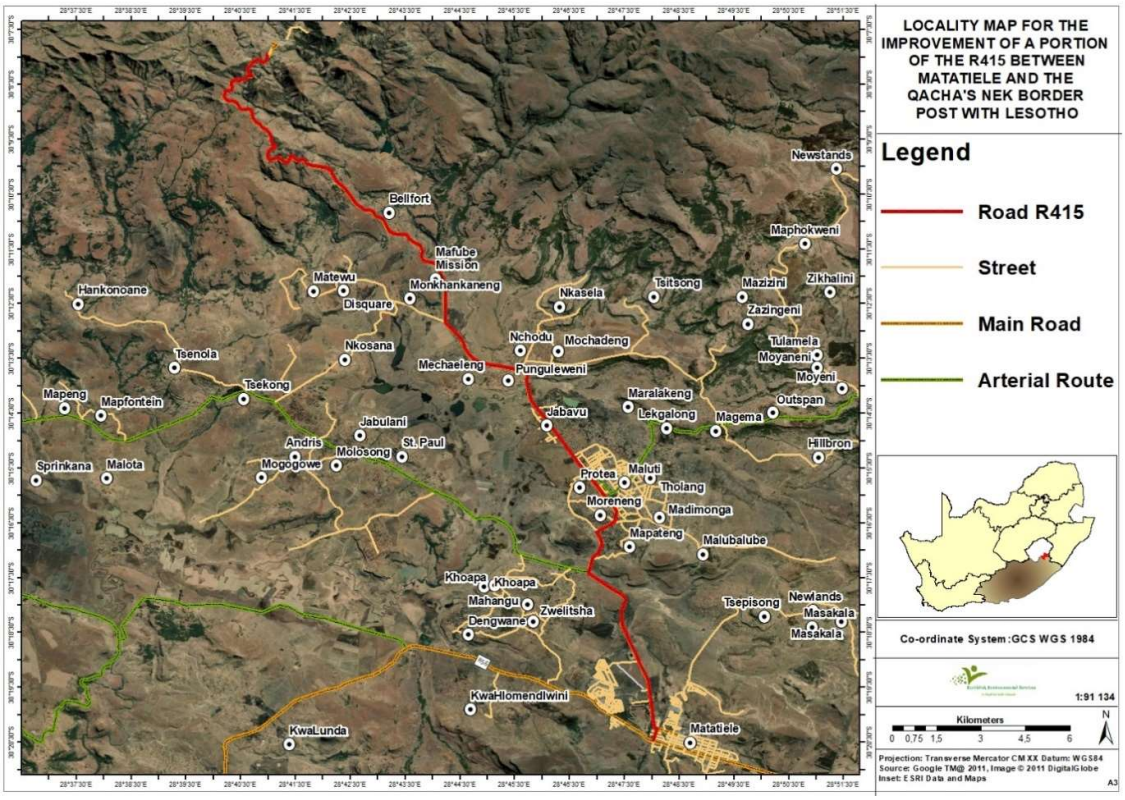


Figure 1: Locality Map of the proposed Project

1.3. Details of the Applicant

Table 2: Details of the Applicant

Contact Person	**Mr Mbulelo Peterson**
Physical Address	20 shoreward, Baywest, Gqeberha, Eastern Cape, 6025
Contact Details	Tel: +27 (0) 41 398 3201 Email: SongxabaN@nra.co.za

1.4. Details of the EAP

Earthlink Environmental Services (Pty) Ltd was appointed as the independent Environmental Assessment Practitioner (EAP) to manage the application process. Details of the EAP are provided below.

Table 3: Details of the EAP

Project Team	**Ms. Amukelani Khosa- EAP**

	Ms. Kgakile Mapoulo- Project Manager **Mr. Chauke Hlahla Wisdom- Candidate EAP**
Email Address	amuckhosa@gmail.com kgakile@earthlinkenvironmental.co.za
Physical Address	572 24th Rd, Withok Estates, Brakpan, 1541
Contact Details	071 633 4485 071 878 8295

2. PURPOSE, SCOPE AND OBJECTIVES OF THE EMPR

2.1. Purpose and Objectives of the EMPr

An EMPr can be defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced". EMPrs are, therefore, essential tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle.

The objectives of an EMPr should include:

- Ensuring compliance with regulatory authority stipulations and guidelines.
- Verifying environmental performance through information on impacts as they occur;
- Responding to changes or unforeseen events in project implementation not considered in the EIA; and
- Providing feedback for continual improvement in environmental performance.

2.2. Scope of the EMPr

To achieve the above-stated objectives, the scope of an EMPr includes the following:

- Definition of the environmental management objectives to be realised during the life of a project to enhance benefits and minimise adverse environmental impacts.
- Detailed actions needed to achieve the objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring/verification, and to what target or performance level.
- Institutional structures, roles, communication and reporting processes required to implement the EMP.
- Description of the link between the EMP and associated legislated requirements.

- Description of requirements for record-keeping, reporting, review, auditing, and updating the EMP.

3. ROLES AND RESPONSIBILITIES

Effective implementation of the EMPr depends on established and clear roles, responsibilities, and reporting lines within an institutional framework. This section details the various environmental roles and reporting lines. However, if no specific person, for example, an environmental control officer (ECO), is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 4: Guide to roles and responsibilities for the implementation of an EMPr

Responsible Person(s)	Role and Responsibilities
South African National Road Agency (SANRAL) (The Proponent)	SANRAL, and anyone acting on SANRAL's behalf, is accountable for the potential environmental impacts of activities undertaken for the project and is responsible for ensuring that the impacts are appropriately managed.
Designated Environmental Officer (DEO)	<u>Role</u> The DEO is responsible for overseeing and facilitating the implementing the EMPr , conducting environmental monitoring and reporting, providing environmental input and advice to the Engineer and Contractor's Manager, liaising with contractors and the landowners and a range of environmental coordination responsibilities. <u>Responsibilities</u> ✓ Be fully conversant with the EMPr. ✓ Be familiar with the recommendations and mitigation measures of this EMPr and implement these measures. ✓ Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees and Contractor(s). ✓ Confine the development site to the demarcated area. ✓ Conduct environmental internal audits regarding EMPr and authorisation compliance (on). ✓ Assist the contractors in addressing environmental challenges on site. ✓ Assist with environmental incident management and investigations ✓ Reporting environmental incidents to the developer and ensuring corrective action is taken, and lessons learnt shared. ✓ Follow-up on pre-warnings, defects, non-conformance reports. ✓ Measure and communicate environmental performance to the Contractor. ✓ Conduct environmental awareness training on-site together with ECO and ✓ Ensure that the necessary legal permits and/or licenses are in place and up to date. ✓ Acting as contractor's Representative on site and working with the contractor. ✓ Maintain records of environmental inspections, audits, incidents, corrective actions, and compliance reporting as required by the EMPr in environmental file

Engineer	SANRAL has appointed a Consulting Engineer to fulfil the role of Project Co-Ordinator/Project Manager on behalf of SANRAL for the duration of the project. The Consulting Engineer is responsible and accountable for the overall management and implementation of the Environmental Management Programme (EMPr), ensuring that all parties involved in the construction phase comply with the environmental requirements, conditions of Environmental Authorisation, and applicable environmental legislation. <u>Responsibilities</u> ✓ Act as SANRAL's on-site implementing agent and ensure that the Contractor undertakes construction activities in a manner that does not compromise SANRAL's environmental responsibilities and obligations. ✓ Be fully familiar with the requirements, recommendations, and mitigation measures contained in the EMPr, and ensure that these measures are effectively implemented throughout the construction period. ✓ Ensure that all construction activities remain within the approved and demarcated construction footprint and that environmentally sensitive areas are protected from unnecessary disturbance. ✓ Issue instructions to the Designated Environmental Officer (DEO) and the Contractor where environmental considerations require preventative or corrective action. ✓ Ensure that environmental non-compliances and transgressions are addressed promptly through the implementation of appropriate corrective actions and follow-up monitoring. ✓ Liaise with SANRAL, the Environmental Control Officer (ECO), the Contractor, specialists, and relevant authorities on environmental matters relating to the project. ✓ Issue site instructions and, where necessary and in accordance with the contract, variation orders to the Contractor to ensure compliance with environmental requirements and project specifications.

Contractor	Role The Contractor is responsible for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. Subcontractors must ensure compliance with this EMPr while performing the onsite activities. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development. Responsibilities: ✓ Appoint a suitably qualified and experienced Designated Environmental Officer (DEO) to oversee and monitor the Contractor's compliance with the environmental requirements of the project. ✓ Ensure that the requirements and conditions contained in this EMPr are communicated to and implemented by the Contractor's personnel and subcontractors involved in the work ✓ Ensure that all activities undertaken by the Contractor and its subcontractors comply with the requirements of this EMPr and the applicable environmental approvals. ✓ Implement safe, environmentally acceptable working methods and practices. Also, ensure that equipment is properly operated and maintained to facilitate proper access and enable any operation to be carried out safely. ✓ Ensure that contractors' staff repair, at their own cost, any environmental damage caused by contravention of the specifications contained in EMPr, to the satisfaction of the ECO.

Environmental Control Officer (ECO)	Role The Environmental Control Officer (ECO) shall be independently appointed by SANRAL (or its appointed Consulting Engineer) for the duration of the construction phase of the road upgrade project. The ECO shall operate independently of the Contractor and shall objectively monitor and audit compliance with the Environmental Authorisation, this Environmental Management Programme (EMPr), and all other applicable environmental legislation, permits, and licence conditions. The ECO shall undertake regular environmental inspections and audits at a frequency specified in the Environmental Authorisation and as required by SANRAL's environmental management procedures. The ECO shall report directly to SANRAL and the Consulting Engineer on all environmental compliance matters. Responsibilities The Environmental Control Officer shall: ✓ Monitor and audit the Contractor's compliance with the Environmental Authorisation, approved EMPr, and all applicable environmental legislation and permit conditions. ✓ Conduct regular site inspections and independent environmental audits throughout the construction period. ✓ Verify that environmental mitigation measures contained in the EMPr are implemented effectively and maintained on site. ✓ Identify environmental non-compliances, incidents, and potential environmental risks, and recommend appropriate corrective and preventative actions. ✓ Issue environmental audit findings and non-compliance notices to the Consulting Engineer and Contractor and monitor the implementation and close-out of corrective actions. ✓ Attend site meetings where environmental matters are discussed and provide advice on environmental management and compliance requirements. ✓ Monitor the protection of environmentally sensitive areas, including wetlands, watercourses, protected vegetation, heritage resources, and rehabilitation areas. ✓ Verify that environmental monitoring records, incident registers, waste records, rehabilitation records, and other environmental documentation are maintained by the Contractor. ✓ Prepare and submit environmental compliance audit reports to SANRAL and, where required, to the competent authority in

	accordance with the Environmental Authorisation. ✓ Advise SANRAL and the Consulting Engineer on environmental issues that may require specialist input or additional mitigation measure

4. DOCUMENTATION AND REPORTING

Appropriate documentation, reporting systems, information controls, and compliance mechanisms must be in place for the implementation of the projects. As a minimum these requirements must provide for accountability and ensure understanding in the implementation of the EMPr.

4.1. Document Control System

The holder of the EA is responsible for the upkeep and management of the Environmental file. At a minimum, all documentation detailed below will form part of the file. Project documentation shall be maintained in electronic format and made readily accessible to relevant personnel. Hard copies may be maintained where required for site use or regulatory purposes. A duplicate file may be maintained in the site office (where applicable). This duplicate file must remain current and up to date. The filing system must be updated, and relevant documents must be kept as required. The file must be made available at the request of the Competent Authority (CA) or other appropriate authorities. The availability and completeness of the file will be checked during the environmental audits prescribed in the EIA Regulations.

4.2. Documentation to be Available

The following documents shall be placed in the Environmental File and maintained in an up-to-date and readily accessible format throughout the construction period:

- A full copy of the Environmental Authorisation (EA) issued by the Competent Authority in terms of NEMA, including any amendments, variations or extensions applicable to the project;
- A copy of the approved site-specific EMPr, including any approved amendments or revisions;
- All approved method statements relating to activities with environmental implications;
- Minutes and attendance registers of environmental site meetings, environmental discussions and relevant site meetings;
- An up-to-date environmental incident register, including details of incidents, actions taken and close-out status;
- Records and evidence of all corrective actions implemented in response to environmental non-compliances, including close-out documentation;
- Up-to-date complaints register, including details of complaints received, investigations undertaken, responses provided and actions taken;
- ECO environmental inspection and audit reports;
- DEO environmental monitoring reports;

- Records of environmental inductions and training;
- Relevant permits, licences and approvals;
- Waste management and disposal records, where applicable;
- Photographic records demonstrating environmental compliance, incidents, rehabilitation and corrective actions.

4.3. Environmental Checklist

Depending on the frequency of environmental monitoring and auditing prescribed by the Environmental Authorisation and approved EMPr, the ECO may complete an Environmental Inspection Checklist during site visits. The format of the checklist shall be agreed upon by SANRAL, the Consulting Engineer and the ECO prior to commencement of construction, where applicable. The ECO shall sign and date the completed checklist, retain a copy in the Environmental File, and provide a copy to the Consulting Engineer and DEO following each inspection. The ECO's inspection findings and audit reports shall be used to assess the Contractor's compliance with the Environmental Authorisation and approved EMPr and shall inform corrective actions where necessary.

The DEO remains responsible for the Contractor's day-to-day environmental management, maintaining environmental records and preparing the Contractor's monthly environmental reports.

4.4. Method Statements

Method statements shall be prepared by the Contractor in sufficient detail to enable the ECO to assess whether the proposed activity and associated environmental management measures are in accordance with the approved EMPr.

The method statement must cover applicable details about:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from the site;
- how the equipment/material will be moved while on site;
- how and where the material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/non-compliance with the EMPr; and
- any other information deemed necessary by the ECO.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager before the commencement of the activity:

- Watercourse crossings, diversions and work within or near watercourses;
- Blasting;
- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Handling, transport and storage of Hazardous Chemical Substances;
- Waste management – transport, storage, segregation, classification, disposal (a l waste streams);
- Emergency preparedness – Spills, training, other environmental emergencies;

The ECO shall review Method Statements where they relate to environmental aspects or activities that may have an environmental impact. The ECO may provide comments and recommendations to the Consulting Engineer and Contractor to ensure that appropriate environmental mitigation measures are incorporated. The Contractor remains responsible for preparing, implementing and complying with the approved Method Statements, while the Consulting Engineer is responsible for their review and approval in accordance with the contract requirements. All completed and approved Method Statements shall be retained in the Environmental File.

4.5. Environmental Incident Log (Diary)

The DEO is required to maintain an up-to-date Environmental Incident Log (Environmental Diary). The Environmental Incident Log shall be used to record all environmental incidents, including incidents that may result in environmental harm, pollution, damage to sensitive areas, or non-conformance with the approved EMPr and Environmental Authorisation. All incidents, regardless of severity, must be reported to the Engineer or ECO. The Log is to be kept in the environmental file, and at a minimum, the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident, including the location and nature of the environmental impact;
- The name of the Contractor, subcontractor or responsible party associated with the incident;
- The incident must be rated as significant or minor;
- Remedial or corrective action taken to mitigate the incident; and
- Measures implemented or proposed to prevent recurrence of a similar incidents
- Date of closure and , where applicable confirmation that the required corrective or rehabilitation measures have been implemented.

The Environmental Incident Log shall be reviewed by the ECO during environmental inspections, and the relevant incidents, findings and corrective actions shall be recorded in the ECO's environmental monitoring report, where applicable. Significant incidents shall also be included in the ECO Audit Report, where required.

4.6. Non-Conformance

A non-conformance notice will be issued in writing to the responsible Contractor by the ECO through the Project Manager. The notice shall be filed in the Environmental File and shall, at a minimum, include:

- The time and date of the non-conformance;
- The name of the responsible Contractor;
- The nature and description of the non-conformance;
- The required corrective action; and
- The date by which the corrective action must be completed.

The Contractor shall take immediate action to address the non-conformance within the stipulated timeframe. Environmental complaints received in relation to activities on the site shall be recorded in the Complaints Register, including the response and corrective action taken. The ECO shall be informed of all environmental complaints.

Failure by the Contractor to conform to the requirements of the approved EMPr may constitute a contractual non-conformance and, where applicable, may also result in non-compliance with the conditions of the Environmental Authorisation or other applicable environmental legislation. Where a non-conformance is not adequately addressed within the required timeframe, the matter shall be escalated to the Project Manager and, where necessary, reported to the relevant Competent Authority (CA) for further action.

4.7. Corrective Action Records

The ECO shall verify the corrective action during an inspection or through supporting evidence and confirm whether the non-conformance has been adequately addressed. Once satisfied, the ECO shall sign off the corrective action report, and the report shall be retained with the relevant non-conformance notice in the Environmental File. The corrective action shall be considered closed once the ECO has verified and signed off the corrective action.

4.8. Photographic Record

A digital photographic record will be kept. The photographic record will be used to show before, during and post-rehabilitation evidence of the project and in cases of damages claims if they arise. Each image must be dated, and a brief description note must be attached. The Contractor shall allow the ECO to take photographs of all areas, activities, and actions.

The ECO shall keep an electronic database of photographic records, which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Topsoil storage areas;
5. All areas to be cordoned off during construction;
6. Waste management sites;
7. Ablution facilities;
8. Any non-conformances deemed to be “significant”;
9. All completed corrective actions for non-compliance;
10. All required signage;
11. Photographic recordings of incidents;
12. All areas before, during and post-rehabilitation; and
13. Include relevant photographs in the Final Environmental Audit Report.

4.9. Complaints Register

The Contractor shall keep a current and up-to-date complaints register. The complaints register records all complaints from communities, stakeholders, and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant.
2. Record the time and date of the complaint;
3. Contain a description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage; and
5. Contain a copy of the contractor’s written response to each complaint received and record any further correspondence with the complainant. The Contractor’s written response will include a description of any corrective action to be taken and the timeframe for implementation and close-out.

4.10. Interactions with Affected Parties

Open, transparent, and good relations with affected landowners, communities, and regional staff are essential to successfully manage and mitigate environmental impacts. The Liaison Officer shall:

1. Ensure that all queries, complaints and claims are dealt with within an agreed timeframe;
2. Ensure that any or all agreements are documented and signed by all parties and kept in the EMPr file;
3. Ensure that complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is always courteous.

5. IMPACT MANAGEMENT OUTCOMES AND ACTIONS

This section sets out the prescribed impact management outcomes and associated impact management actions that have been identified. The developer is responsible for ensuring the implementation of these outcomes and actions to mitigate the impact of such aspects identified for the development.

It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all times. To simplify the EMPr requirements, each aspect related to the EMPr has been addressed in the table below. The period when a requirement must be implemented supports each action within the EMPr.

Each of these aspects is briefly described below for ease of reference.

- Environmental Measures, Actions and Controls

  This section indicates the actions required to either prevent and/or minimise the potential environmental impacts associated with the project.
- Responsibility

  This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.
- Monitoring Frequency

  This section indicates when the actions for that specific aspect must be implemented and/or monitored

6. PLANNING AND DESIGN PHASE

Table 5: Planning and Design Phase

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
PHASE OF THE DEVELOPMENT: PRE-CONSTRUCTION PHASE				
Legal and policy compliance	All necessary authorisations, permits and licenses must be obtained for the implementation of the activity.	• The development must comply with relevant legislation (municipal by-laws etc.). • GA must be obtained from the DWS. • Obtain the required ECPHRA palaeontological permit and complete the approved fossil mitigation/excavation prior to commencement of construction in the identified sensitive areas.	Proponent/ Developer	To be undertaken prior to the commencement construction phase. Once- off
Preparation of Method Statements	To control methods of works on site	• Relevant environmental method statements shall be prepared by the Contractor and submitted to the Engineer for approval, with the ECO providing environmental review and comments, prior to commencement of the relevant activities.	Contractor	As and when required

5.1. CONSTRUCTION PHASE

Table 6: Construction Phase

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
PHASE OF THE DEVELOPMENT: CONSTRUCTION PHASE				
Hazardous and toxic materials	• Prevention of pollution of soil and ground water resources • Minimise chances of transgression of the	• Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in caged areas or under lock and key, as appropriate • Sufficient care must be taken when handling these materials to prevent spills and pollution. Training on the handling of dangerous and toxic materials must be conducted for staff.	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
	acts controlling pollution and ensure safety of workers.	• Storage areas must display the appropriate safety signs depicting "no smoking", No naked lights" and "Danger". • containers must be clearly marked to indicate contents as well as safety requirements. • Hazardous substances waste materials and construction debris shall be handled, stored and disposed of in a manner that does not cause contamination of stormwater runoff by, e.g. bunding storage areas that contain hazardous substances, etc. • Good housekeeping practices must be employed where hazardous substances and waste are stored or handled to minimise the risk of spills and pollution. • Clean up spills in bunded areas, remove and dispose of safely from the bunded area as immediately after detection.		
Oils and Chemicals	• Prevention of pollution of soil and ground water resources • Minimise chances of transgression of the acts controlling pollution and ensure safety of workers	• The contractor must provide method statements for the "handling & storage of oils and chemicals", "fire", and "emergency spills procedures". • These substances must be confined to specific and secured areas, and in a way that does not pose a danger of pollution even during times of high rainfall. • These areas must be imperviously bunded with adequate containment (for potential spills or leaks. • Drip trays must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. • The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing. • Spill kits must be available on site and in all vehicles that	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (example for consideration SUNSORB is a recommended product that is environmentally friendly). • All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material). • All construction vehicles should be kept in good working conditions.		
Stockpiles	• Minimise scarring of the soil surface and land features • Minimise disturbance and loss of soil • Minimise construction footprint • Minimise sedimentation of nearby drainage lines • Maintain the integrity of topsoil for landscaping and rehabilitation • Containment of invasive plant growth • Minimise contamination of storm water run-off	• All stockpiles must be stored on flat areas where run-off will be minimised and be surrounded by berms. Stockpiles must also only be stored for the minimum amount of time necessary. • All stockpiled material must be easily accessible without any environmental damage. • All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised. • Stockpiles shall be stabilised upon establishment and before erosion occurs to prevent loss of soil material • Soils from different horizons must be stockpiled such that topsoil stockpiles do not get contaminated by sub-soil material. • Topsoil stockpiles must be clearly demarcated as no-go areas. • Soil Stockpiles must not be higher than 2m to avoid compaction thereby maintaining the soil integrity and chemical composition (for the topsoil stockpiles that will be used for re-vegetation).	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
Cement (if Applicable)	• Minimise the possibility of cement residue entering into the surrounding environment • Minimise pollution of soil and ground water resources	• The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils, rocky outcrops, streams and natural vegetation. • Cleaning of cement mixing and handling equipment must be done using proper cleaning trays. • All empty cement bags and containers must be stored in a designated area and subsequently removed from the site for appropriate disposal at an appropriately waste management facility. • Any spillage that may occur must be cleaned up and immediate remedial action must be taken. • Visible concrete remains, whether solid or from washings, must be removed immediately and, where practicable, reused or recycled, subject to the Engineer's approval • Cement batching areas must be located in consultation with the Engineer Representative, and the ECO and must be situated to minimise the risk of contamination of soil, groundwater, surface water, and surrounding vegetation	Contractor, CEO, ECO	As and when required
Bulk Storage of Fuel	• Prevent pollution of soil and groundwater and surrounding environments.	• Bulk fuel storage tanks on the site shall be on an impervious surface with an appropriate bunding and be able to contain at least 110% of the volume of the tanks. • Bulk fuel storage tanks shall be located such that they do not pose a high risk in terms of water pollution (i.e. they must be located away from water courses). • Bulk fuel storage tanks shall be positioned away from traffic, to minimise the risk of the tanks being damaged by vehicles • The combined volume of Diesel and/or dangerous goods stored on site must not be greater than 500m^3, at any one time.	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
Eating areas and camp followers	• Control potential influx of vermin and flies • Neat work place and hygienic environment • Minimise negative social impacts to local residents and businesses	• The Contractor must, in conjunction with the ECO, designate dedicated eating areas for eating during normal working hours. Adequate closed refuse bins must be provided and cleaned on a daily basis. • No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the ECO. • The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited. • Camp followers/ informal traders must not be allowed to congregate outside the construction site. • Litter (even if originating outside the camp but within the site boundary) and concrete bags, etc. must be picked up and put into suitably closed bins.	Contractor, DEO, ECO	Mitigation measures to be monitored as and when required
Toilets and Ablution Facilities	• Minimise potential of diseases on site • Minimise potential to pollute soils, water resources and natural habitats	• The Contractor is responsible for providing all sanitary arrangements for the Contractor's and subcontractors' workforce. Adequate chemical toilets must be provided on site throughout the construction period. • Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper at all toilets at all times. Toilet paper dispensers must be provided in all toilets. • Toilets must be easily accessible. All toilets will be located within the site but not within sensitive areas. Should toilets be needed elsewhere, their location must first be approved taking into consideration the input of the DEO. • The contractor must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor must ensure that all toilets are cleaned and emptied weekly or as required.	Contractor, DEO, ECO	Mitigation measures to be monitored as daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		• Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times. • Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat.		
Solid Waste Management	• To keep the site neat and tidy • Reduce visual impact • Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment • Minimise potential to pollute soils, water resources and natural habitats	• The contractors must provide and maintain a record for "solid waste management" including e information on the facility utilised and details of the nature and amount of waste disposed of and proof thereof. • Waste must be separated into recyclable and non-recyclable waste. • Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. • Bins must be clearly marked for ease of management. • All refuse bins must have a secured lid so that animals cannot gain access. • Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site. • All solid waste, including chemical waste generated during the construction activities, must be collected, removed from the site, and disposed of at an appropriate waste management facility. The contractor is to provide proof of such to the ECO, and copies must be kept in the Environmental file • Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site. • A skip, with a cover, must be used to contain refuse from	Contractor, DEO, ECO	Mitigation measures to be monitored daily.

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		campsite bins, rubble and other construction material.		
Workshop equipment, maintenance and storage	• Prevent pollution of the environment • Minimise chance of transgression of the acts controlling pollution • Disposal of hazardous substances in an appropriate manner	• All maintenance and washing of vehicles and equipment must take place in an area that is equipped with a bund wall and grease trap oil separator. During servicing of vehicles/equipment, a suitable drip tray must be used, especially where emergency repairs are done outside the workshop/ camp laydown area. Leaking equipment must be repaired immediately/ be removed from site to facilitate repair. All wastes must be collected and removed to an appropriate registered waste site. • Workshop areas must be monitored for oil and fuel spills and such spills must be cleaned and remediated to the satisfaction of the ECO or Engineer Representative. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. SUNSORB • The Contractor must be in possession of an emergency spill kit that is complete and available at all times on site. The Contractor must ensure that senior and other relevant members of the workforce are trained in dealing with spills by using emergency spill kits. • The following must be applied: o All contaminated soil/yard stone shall be removed and disposed of as hazardous waste at a registered facility or placed in containers to be taken to one central point where bio-remediation can be done. o A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site. o All spills of hazardous substances must be reported to the ECO,	Contractor, DEO, ECO	Mitigation measures to be monitored daily.

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		Engineer Representative or ECO.		
Site Establishment	• Minimise water pollution • Minimise dust fallout • Minimise unwarranted environmental damage outside the footprint • Maintain a clean and healthy working environment • Minimise impact to surrounding environment	• The contractors must provide and maintain a method statement for "Crew camps and construction lay down areas". • Accommodation for members of the workforce is not permitted on site. • Dedicated wash areas must be situated 30m away from watercourses, areas of shallow groundwater. • The contractor must provide labourers plastic bags to clean up the contractor's camp and construction site. The contractor is responsible for cleaning the contractor's camp and construction site of all structures, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.	Contractor, DEO, ECO	Mitigation measures to be monitored as and when required
Fires	• Minimise risk of fires • Minimise destruction of natural fauna and flora • Maintain safety on site • Conduct management review of fire preparedness and response before onset of fire season	• No burning of waste is permitted. • Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.	Contractor, DEO, ECO	Mitigation measures to be monitored as and when required
Crime, Safety and Security	• Reduce the risk of potential incidences • Minimise the potential	• Staff must regularly be informed of the necessary safety procedures and be competent in the work they are employed to do.	Contractor, DEO, ECO	Mitigation measures to be monitored as

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
	impact on the environment	• No site staff, other than security personnel will be housed on site. Security personnel must be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities, facilities for cooking and heating so that open fires are not necessary. • The contractor must ensure that an emergency preparedness procedure is in place prior to commencing work. The emergency procedure must include (but not be limited to) fire, spills, , injuries, major spills of hazardous substances and materials, etc. • The contractor must ensure that lists of all emergency telephone numbers/ contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site. • The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.		and when required
Visual Impact	• Minimise littering on site • Prevent adverse health effects on workers and the surrounding community • Maintain a peaceful environment for the community during construction	• Should overtime/night work be authorised, the Contractor shall be responsible to ensure that lighting does not cause undue disturbance to neighbouring residents. In this situation low flux and frequency lighting shall be utilised. • Dust levels must be kept down by regularly wetting dirt roads and exposed soil areas inside the site. • Clearly demarcate the construction site to limit the area of disturbance. • Remove all waste, including cleared vegetation from site as soon as possible unless the material will be reused on site. A dedicated area for the placement of waste that will either be	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		removed or reused must be identified and demarcated. • Domestic waste generated from the site camp must be kept in labelled bins with lids and be disposed of at a registered or municipal landfill. Proof of the disposal must be kept. • Ensure that 'good housekeeping 'is practiced on the construction site • Road cuts, embankments and other disturbed areas must be stabilised and rehabilitated as soon as practicable after construction using indigenous vegetation and plant species similar to those naturally occurring in the surrounding area (surrounding grassland vegetation types: East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland, and Mabela Sandy Grassland). Where practicable, rock cuts should be shaped and rehabilitated to blend with the surrounding landscape.		
Noise Impact	• Minimise noise pollution from construction activities • Prevent adverse health effects on workers and the surrounding community • Ensure compliance with local noise regulations and standards • Mitigate impacts on	• On-site signage should be created to alert the public to construction operations. • The Contractor is required to take action to prevent workers from lingering and making noise disturbances in the vicinity. • All construction plant and other equipment must be in a good working order to reduce possible noise pollution • In areas where construction will be taking place near residential areas, residents must be informed in advance of construction activities that are expected to generate high levels of noise • Avoid undertaking construction activities after daylight hours. In instances when this is not possible ensure that potentially affected parties are informed.	Contractor, DEO, ECO	Mitigation measures to be monitored daily.

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
	nearby sensitive receptors, such as schools, hospitals, and residential areas • Maintain a peaceful environment for the community during construction	• If blasting is required ensure that potentially affected parties are informed prior to any blasting taking place. • Noise complaints must be recorded and investigated, and reasonable measures must be implemented to address the complaints • Construction vehicles and equipment must not be left idling when not in use. • The use of hooters must be limited to emergencies and necessary safety warnings.		
Dust Impact	• Minimise Air pollution during construction	• Implement dust suppression measures in all areas affected by construction activities and where dust will be generated, especially close to residential and other sensitive areas. Dust suppression must also be undertaken during windy and dry weather conditions. • Speed restriction of no more than 40km/h must be implemented for all construction vehicles within the construction site. Heavy vehicles and machinery should be serviced regularly to minimise exhaust fume pollution. • Soil stockpiles shall be appropriately located, managed and stabilised to minimise wind-blown dust, with wetting or other suitable dust-suppression measures implemented where necessary. • Existing vegetation cover shall be retained for as long as practicable and vegetation clearance shall be limited to the minimum area required for construction, in order to minimise exposed surfaces and reduce wind-blown dust and erosion	Contractor, DEO, ECO	Mitigation measures to be monitored daily

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
Degradation and/ or Destruction of wetland Habitats	• Reduce the risk of potential degradation of wetland habitats • Minimise the potential impacts on the environment	• Any construction activities in or within a delineated buffer zone of a water resource may only take place after the necessary water use license has been obtained. • The wetland and buffer zones must be clearly demarcated on site prior to the commencement of construction and maintained as no-go areas for the duration of construction. Suitable, highly visible barriers, such as danger tape, temporary fencing, or equivalent approved barriers, must be used to prevent unauthorised access, disturbance, or encroachment into the wetland and buffer areas **Appendix 1** wetland map. • Strictly no vehicles, equipment or construction materials may enter the demarcated wetland area, and vehicles or machinery may not be refuelled within or near the wetland • A well-designed storm water system must be put in place to avoid erosion into wetlands. Natural runoff from the natural terrestrial habitat surrounding the wetlands should however not be restricted unnecessarily. • The use of potential pollutants (paint, chemicals, etc.) during construction and operational phases must be strictly controlled and a high quality of management and supervision concerning such materials must be enforced, especially close to wetland buffer zone areas. • Sanitary facilities must be made available to construction workers to prevent urine and human waste entering the wetlands. • If construction activities encroach on wetlands, the DEO shall monitor activities to ensure that the EMPr mitigation measures are implemented. The ECO shall oversee compliance, and a suitably qualified wetland/aquatic specialist shall be consulted if unforeseen impacts occur	Contractor, DEO, ECO	Mitigation measures to be monitored on regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
Loss of Indigenous Fauna and Flora Diversity Associated with Wetlands	• Reduce the risk of potential loss of indigenous fauna and flora.	• Destruction of natural wetland vegetation must be avoided. • Alien and invasive vegetation control must take place throughout all development phases to prevent loss of habitat of indigenous fauna and flora. • Movement of vehicles and construction workers in wetlands and buffer zones must be strictly prohibited. No harvesting of plants or animals is allowed. • Include environmental awareness aspects into the site induction program to ensure all staff are aware of the location and importance of wetland habitats. • Establish emergency response measures and a clearly defined chain of communication to rapidly deal with any unforeseen impacts to wetlands, e.g. spills. • No stockpiling of materials may take place within wetland/ watercourse areas and temporary construction camps and infrastructure should be located outside the wetland footprint. • Prevent litter from entering the wetland. • Design and implement a construction stormwater management plan that aims to minimise the concentration of flow and increase in flow velocity, as well as minimising sediment transport off site. • Where practically possible, the major earthworks should be undertaken during the dry seasons (roughly from April to August) to limit the erosion during rainfall. • Store and handle potentially polluting substance and waste in designated bunded facilities. • Waste should be regularly removed from the construction site by suitably equipped and qualified operators and disposed of in approved facilities. • Locate temporary waste and hazardous substance storage	Contractor, DEO, ECO	Mitigation measures to be monitored on regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		facilities a minimum of 100m from any wetland edge • Keep sufficient quantities of spill clean-up material on site.		
Introduction of Alien Invasive Species	• Reduce the risk of potential loss of species.	• Ongoing alien plant control must be undertaken, particularly in the disturbed areas as these areas will quickly be colonised by invasive alien species, especially in the riparian zone, which is particularly sensitive to AIP infestation. • Herbicides must be carefully applied, in order to prevent any chemicals from entering the river. Spraying of herbicides within or near to the wetland areas is strictly forbidden. • Re-instate indigenous vegetation (grasses and indigenous trees) in disturbed areas. • After rehabilitation, re-vegetate any exposed surfaces and mulch re-vegetated areas. • Select suitable indigenous wetland and terrestrial species to increase vegetation diversity, using species naturally occurring within the surrounding wetland and East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland and Mabela Sandy Grassland vegetation types, as the wetland occurs within Endangered and Vulnerable vegetation types and is currently dominated by homogeneous growth of Phragmites australis.	Contractor, DEO, ECO	Mitigation measures to be monitored on a regular basis
Pollution of Water Resource and Soils	• Reduce the risk of potential loss of species.	• Wetland areas must be clearly demarcated prior to the commencement of construction using visible marker posts, fencing or danger tape. The demarcated wetland areas must be identified as no-go areas and communicated to all construction personnel during site induction to prevent unauthorised access and disturbance. **see Appendix 1** of this EMPr • No washing of any equipment in close proximity to a watercourse is permitted.	Contractor, DEO, ECO	Mitigation measures to be monitored on a regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		• No releases of any substances that could be toxic to fauna or faunal habitats within the watercourses is permitted. • No release, discharge, or spillage of any substance that may be toxic or harmful to fauna or faunal habitats is permitted into or within any watercourse. • Spillages of fuels, oils and other potentially harmful chemicals must be cleaned up immediately and contaminants properly disposed of using proper solid/hazardous waste facilities (not to be disposed of within the natural environment). Any contaminated soil must be removed, and the affected area rehabilitated immediately. • Education of workers is key to establishing good pollution prevention practices. Training programs must provide information on material handling and spill prevention and response, to better prepare employees in case of an emergency. • Signs should also be placed at appropriate locations to remind workers of good housekeeping practices including litter and pollution control. • The proper storage and handling of hazardous substances (hydrocarbons and chemicals) need to be ensured. All employees handling fuels and other hazardous materials are to be properly trained. Storage containers must be regularly inspected so as to prevent leaks. • All contractors and employees should undergo induction which is to include a component of environmental awareness.		
Sedimentation and Soil Erosion	• Reduce the risk of potential loss of species.	• Implement a stormwater management plan • Do not allow surface water or stormwater to be concentrated, or to flow down cut or fill slopes without erosion protection measures being in place. • Exposed soils must be rehabilitated as soon as practically	Contractor, DEO, ECO	Mitigation measures to be monitored on a regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		possible to limit the risk of erosion. Erosion control measures must be employed where required. • Riparian vegetation bordering on drainage lines, wetlands and rivers will be considered environmentally sensitive and impacts on these habitats should be avoided. • If erosion has taken place, rehabilitation will commence as soon as possible.		
Destruction, loss of habitat and fragmentation of vegetation	• Reduce the risk of potential loss of habitat.	• Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. • Rehabilitation of all disturbed areas must be prioritised immediately after construction activities are completed. All disturbed areas must be revegetated using indigenous plant and grass species that are endemic to the surrounding grassland vegetation types (East Griqualand Grassland, Southern Drakensberg Highland Grassland, Lesotho Highland Basalt Grassland, and Mabela Sandy Grassland). Species used for rehabilitation should include, but not be limited to (*Festuca*, together with *Themeda triandra, Heteropogon contortus, Eragrostis racemosa, E. chloromelas, E. curvula, Elionurus muticus, Trachypogon spicatus, Andropogon appendiculatus, Harpochloa falx and Tristachya leucothrix*) • All construction activities must be restricted to Low and Medium Sensitivity Areas. High Sensitivity Areas, including wetlands, riparian areas, CBAs and areas adjacent to the Wilfred Baur Nature Reserve, must be treated as No-Go Areas unless authorised and demarcated by the ECO. Refer to **Appendix 2** if this EMPr. • All construction/operational and access must make use of the existing roads as far as possible.	Contractor, DEO, ECO	Mitigation measures to be monitored on regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		• All laydown areas, chemical toilets and temporary facilities must be restricted to Low and Medium Sensitivity Areas. High Sensitivity Areas, including wetlands, riparian areas, CBAs and areas adjacent to the Wilfred Baur Nature Reserve, must be treated as No-Go Areas as much as reasonably possible. Materials must be removed after construction/closure. See **Appendix 2** • Minimise the impacted area and clear only what is required • Avoid erosion, manage alien invasive species establishment, ensure the re-establishment of natural vegetation • Employ stormwater management measures		
Loss of species of special concern (SSC)	• Reduce the risk of potential loss of species. (*Boophone disticha* and *Hypoxis hemerocallidea*)	• Minimise the impacted area and clear only what is required • Restricting blasting and operation of machinery to daylight hours • A botanical walkdown is recommended before commencing with the construction to search for SCC's (I.e *Boophone disticha* and *Hypoxis hemerocallidea*. If populations of Vulnerable SCC are found, a permit must be obtained for their relocation to a similar habitat type within the site where they will not be disturbed.	Contractor, DEO, ECO	Mitigation measures to be monitored on regular basis
Protection of Cultural Heritage Resources	• To protect known and previously unidentified archaeological, cultural, historical and burial resources from damage, disturbance or destruction during construction.	• The Contractor and all construction personnel must be informed of the location of known heritage resources and instructed to avoid unnecessary disturbance of these areas. • Known heritage resources identified during the specialist assessment must be clearly identified and protected from construction-related activities. • The Contractor and construction personnel must be made aware of the possibility of encountering previously unidentified archaeological, cultural or burial resources during excavation and other ground-disturbing activities. • The ECO must monitor ground-disturbing activities, particularly	Contractor, DEO, ECO	Mitigation measures to be monitored on regular basis

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		excavation, trenching, drilling, blasting, clearing and removal of overburden, for possible heritage resources. • Should any archaeological artefacts, cultural material, structures or other potential heritage resources be uncovered during construction, work in the immediate area must cease immediately and the ECO must be notified. • The affected area must be demarcated as a temporary no-go area until it has been inspected by a suitably qualified heritage specialist. • All heritage discoveries must be reported to the relevant heritage practitioner and/or heritage authority for assessment and advice on the appropriate mitigation measures. • No heritage material may be removed, damaged, collected or disturbed without the necessary assessment and authorisation. • Should any graves or human remains be uncovered during construction, all work in the affected area must cease immediately. The ECO must ensure that the appropriate heritage authority, including the Eastern Cape Provincial Heritage Resources Authority (ECPHRA), and the South African Police Service (SAPS) are notified, as applicable. • The ECO must provide induction and/or training to the Contractor and construction workers on the identification of potential archaeological, cultural and burial resources and the procedures to be followed in the event of a discovery. • A Heritage Chance Find Procedure is included in this EMPr and made available to the Contractor and ECO for implementation throughout the construction phase (**Appendix 3**).		
Disturbance of protected areas and	• Protect protected areas and culturally significant sites from	• Clearly mark the Wilfred Bauer Nature Reserve and culturally significant initiation sites as highly sensitive areas prior to construction to prevent inadvertent disturbance	Contractor / DEO / ECO / Engineer	Ongoing monitoring throughout

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
culturally significant initiation sites.	construction-related disturbance.	• No construction activities, storage of materials, parking of vehicles or temporary facilities shall occur within these areas unless authorised. • Restrict access to approved routes. • Brief all workers on the sensitivity of these areas and applicable restrictions. • Report any unauthorised access, damage or disturbance immediately to the DEO, ECO and Engineer.		construction
Air Quality Deterioration of ambient air quality due to fugitive dust generated during vegetation clearance, road cutting and widening, sandstone excavation, blasting, crushing and screening, loading, stockpiling, borrow-pit activities and vehicle movement on unpaved haul roads. Dust may affect nearby communities, homesteads, wetlands, watercourses, road	• Minimise fugitive dust and respirable crystalline silica emissions, prevent off-site dust nuisance and protect nearby communities, sensitive environmental receptors and workers throughout construction.	• Implement the Fugitive Dust Management Plan (FDMP) before vegetation clearance or bulk earthworks commence. • Schedule blasting under suitable wind conditions and do not blast where wind direction and speed are likely to transport dust towards sensitive receptors. • Provide silica-awareness training/toolbox talks to workers and implement appropriate occupational hygiene measures, including fit-tested respiratory protection and medical surveillance where required. • Maintain a dust and air-quality complaints register and investigate complaints within 24 hours. • No dry sandstone cutting, drilling, grinding or crushing may occur without engineering dust controls and written approval by the ECO and Engineer. • The crusher may not operate unless water sprays or equivalent controls are functioning at the crusher inlet/outlet, screens and transfer points. • Dust fall monitoring buckets must be installed at the approved receptor network before high dust works commence and monitored monthly. • If the quartz content of sandstone or aggregate is elevated, a	Contractor / DEO / ECO / Engineer	Daily visual inspections throughout construction. Continuous monitoring/control during rehabilitation activities.that generate dust

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
users and other sensitive receptors		silica-specific monitoring programme must be implemented, including respirable dust/Respirable Crystalline Silica (RCS) sampling for workers and near-field receptors as advised by the specialist. • Haul roads must be watered or chemically suppressed, and a maximum speed of 30 km/h must be enforced on unpaved haul roads. • Where wind speeds are ≥6 m/s and conditions are dry, increase dust suppression measures and suspend or reduce high-dust activities where dust is being transported towards sensitive receptors. • Loads transported by haul trucks must be covered to prevent dust emissions and track-out onto public roads must be prevented • Stockpiles must be appropriately managed through wetting, covering or stabilisation, and must be located away from wetlands and watercourses.		

5.2. OPERATIONAL PHASE

Table 7: Operational Phase

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
PHASE OF THE DEVELOPMENT: PRE-CONSTRUCTION PHASE				
Impact on freshwater sources	• Manage water resources	• During routine road maintenance operations, clear all channels located upstream of the road crossings of any debris and sediment build-up, particularly at the culverts and bridge structures where flows maybe impeded; and • Remove any invasive alien plants occurring in the river channels	Developer (SANRAL)	On going

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		at the river crossings and the road reserve on an ongoing basis.		
Increased impervious area (Hardened surfaces)	• Manage stormwater flows and pollution to watercourses.	• Stormwater runoff generated by the road upgrade must be appropriately managed and attenuated to reduce flow velocities and prevent uncontrolled discharge and erosion towards the stream. The stormwater management and attenuation measures, including their location and design, must be confirmed by the suitably qualified stormwater/civil engineer. Direct discharge of concentrated stormwater into the stream must be avoided. • Address increased runoff volumes at source. • Disturbed area in the watercourse as a result of road upgrade must be rehabilitated as soon as soon as possible and not left until the end to be rehabilitated (progressive rehabilitation). • Bank erosion must be monitored at regular intervals during the operational phase in order to assess whether further riverbank protection/stabilisation works are required. • Ensure the stream banks are well maintained and vegetated to prevent any scouring of the supporting structures. • The grass must be allowed to lengthen and thicken naturally to facilitate reduction in runoff velocity and volume, increase sediment deposition within the buffer zone and increase infiltration of stormwater. • Areas sensitive to erosion must be identified and monitored to ensure that erosion risks are minimised. • Watercourse crossings must be e kept clear to avoid impeding flows to downstream areas. Stockpiled topsoil must be replaced following construction activities and be shaped to match the	Developer (SANRAL)	On going

ENVIRONMENTAL RISK OR ISSUE	MANAGEMENT OBJECTIVE	MITIGATION MEASURE	RESPONSIBILITY	FREQUENCY OF ACTION
		natural topography of the site. All stripped topsoil MUST be appropriately replaced on the site.		

7. CONCLUSION

Although this document contains all foreseeable and potential mitigations or management actions, the EMPr should be seen as a live day-to-day management document. If continuously reviewed and managed correctly, the EMPr will result in the successful construction and operation of the proposed development.

All attempts should be made to include this EMPr in any contractual documentation so that the contractors know the requirements and timing implications needed to fulfil its provisions.

Further guidance should also be taken on any conditions in the Environmental Authorisation and the conditions thereof are an integral part of the final EMPr.

APPENDIX

Appendix 1: Wetland Map

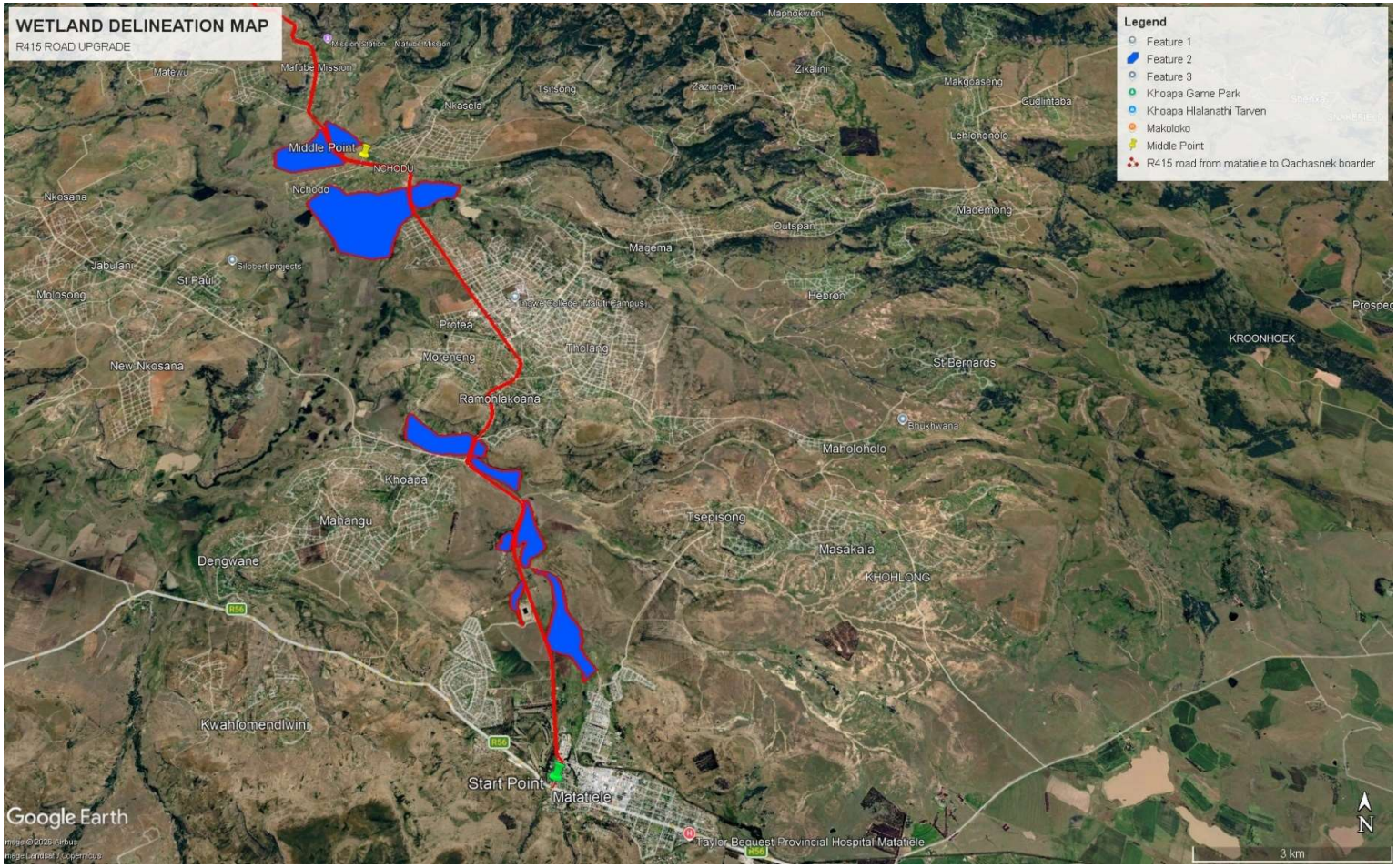


Figure 2: Wetland Map

Appendix 2: Sensitivity Map

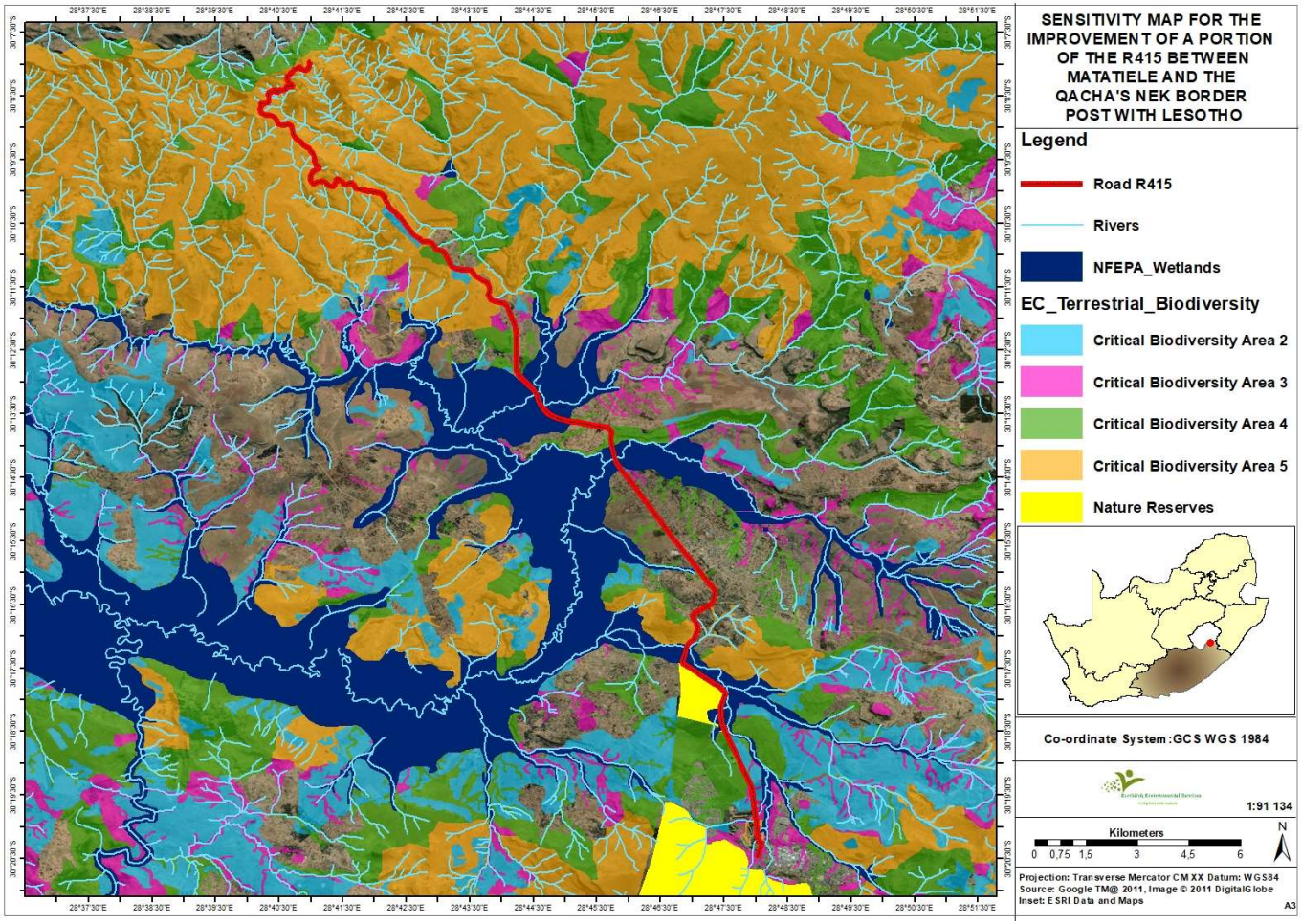


Figure 3: Sensitivity Map

Appendix 3: Chance and Find Protocol

EASTERN CAPE PROVINCIAL HERITAGE RESOURCES AUTHORITY (ECPHRA)

NATIONAL HERITAGE RESOURCES ACT NO. 25 of 1999 (NHRA 1999)

ECPHRA CHANCE FINDS PROTOCOL (CFP)

1. Purpose

This protocol provides procedures to follow when archaeological, paleontological or heritage resources are unexpectedly discovered during construction or development activities in the Eastern Cape. It ensures compliance with the National Heritage Resources Act (Act 25 of 1999) and protection of cultural heritage.

2. Definitions (see NHRA Section 2 for more details)

- *Chance Find*: Any unexpected discovery of archaeological materials, human remains, fossils, or heritage objects during project activities.
- *Archaeological Material*: Includes stone and bone tools, artefacts, bone, shells, pottery, metal, glass, beads, historical artifacts, ruined or disused structures and buildings, pigment or rock art (engravings / paintings), monuments and memorials, wrecks (maritime or aircrafts) and associated artefacts.
- *Palaeontological Material:* Preserved bones, animal & plant fossil remains and trace fossils.
- *Burial Grounds & Graves:* Stone packed, marked & unmarked graves, human remains, associated grave goods, and historical cemeteries.

3. Legal Framework

3.1. National Heritage Resources Act (Act 25 of 1999):

- Section 35: Archaeology, palaeontology and meteorites.
- Section 36: Burial grounds and graves.
- Section 37: Public monuments and memorials

3.2. Eastern Cape Provincial Heritage Resources Authority (ECPHRA) guidelines**.**

4. Scope

The CFP applies to all project phases where clearing, excavation, grading, or earthworks occur. This must be executed by:

- All contractors,
- Subcontractors,
- Environmental Control Officer (ECO) and project personnel
- All personnel involved in ground disturbance activities – vegetation clearing, excavation and earthworks.

5. Types of Finds and Actions

Archaeology and Palaeontology:

- Secure the find in-situ in place by cordoning it off and notify an archaeologist and/or palaeontologist and ECPHRA.

Human Remains:

- Treat as highly sensitive and secure the find; notify an archaeologist, ECPHRA and South African Police Services (SAPS) immediately.

Structures / Rock Art:

- Stop work, protect the area and notify an archaeologist and ECPHRA.

6. Responsibilities

6.1. Site Manager / Contractor:

- Immediately stop work in the affected area.
- Secure the find to prevent disturbance.

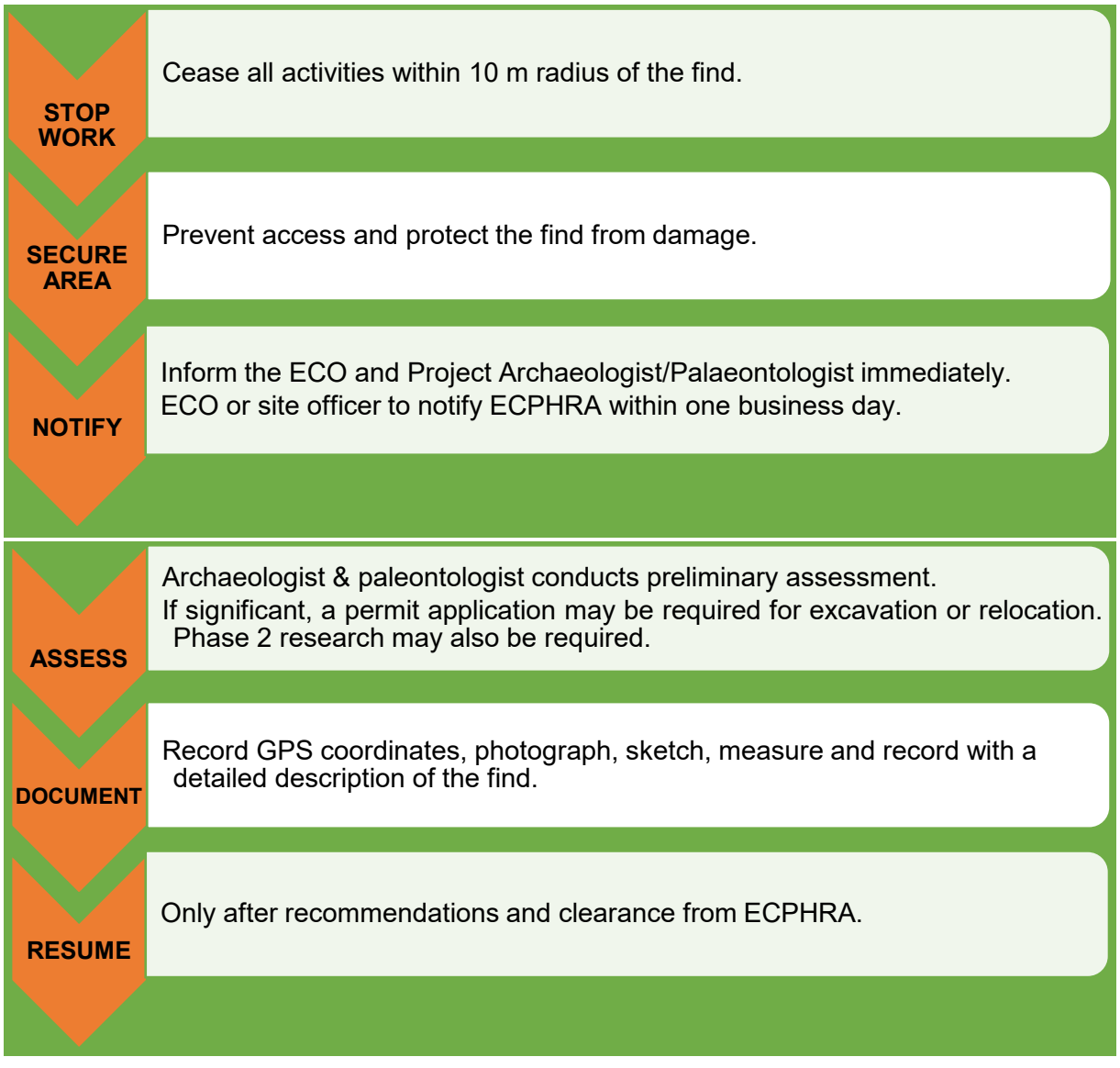
6.2. Environmental Control Officer (ECO):

- Notify the Project Archaeologist/Palaeontologist and ECPHRA.

6.3. Project Archaeologist and/or Palaeontologist:

- Assess the find and recommend mitigation measures.

7. Procedure



8. Training before work commences

All personnel (ground staff and contractors) must receive training on the kinds of heritage finds that may be uncovered. Induction on this chance finds protocol must also be included in the training.

9. Emergency Contacts

9.1. Eastern Cape Provincial Heritage Resources Authority (ECPHRA)
Address: 16 Commissioner Street, Old Elco Building, East London, 5201
(043) 492 1940/1/2 or 081 434 3544 / lungiswam@ecphra.org.za
Website: www.ecphra.org.za
OR Ayanda.mncwabe-mama@ecsrac.gov.za / (043) 492 1370 / 077 603 3035

9.2. Project archaeologist / palaeontologist who undertook the HIA and are familiar with the site (if possible).

9.3. SAPS (for human remains).

TRAINING GUIDE FOR CONTRACTORS

This short guide ensures that all contractors understand and know how to implement the *Archaeological & Fossil Chance Find Protocol:*

1. Induction Training:

- All site personnel must receive training before starting work.
- Training should cover legal requirements, chance finds protocol, identification of heritage materials, and reporting procedures.

2. Recognising Heritage Materials:

- Archaeological: Stone and bone tools and artefacts, bone, shells, pottery, metal and glass artefacts, beads, historical artefacts, ruined or disused structures and buildings, pigment or rock art (engravings, paintings), monuments and memorials, wrecks (maritime or aircraft) and associated artefacts.
- Palaeontological: Preserved remains of plants and animals and other remains such as trace fossils.
- Burial Grounds & Graves: Stone packed, marked and unmarked graves, human remains, associated grave goods, and historical cemeteries.

3. Immediate Actions on Discovery:

- Stop work within a 10m radius minimum.
- Secure the area and prevent access.
- Notify the Environmental Control Officer (ECO), Project Archaeologist and Palaeontologist and ECPHRA.
- For human remains, notify ECPHRA and SAPS immediately.
- Document the find with GPS coordinates and photographs.
- Further mitigation measures may be necessary.

4. Resumption of Work:

- Only after clearance/permission from ECPHRA.

HERITAGE ON SITE

STOP • PROTECT • REPORT

The Heritage on Site – Induction Training Guideline was formulated by the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) to practically implement the legal obligations under the **National Heritage Resources Act (Act 25 of 1999)** and related environmental legislation, which require the identification, protection, and lawful management of heritage resources during development. Sections 35, 36, 37 and 38 of the Act, which make it a legal offence to damage graves particularly those over 60 years old, monuments and memorials, archaeological material, and palaeontological finds without authorisation.

Most heritage resources are not visible on ground surfaces and can be uncovered during vegetation clearing, construction and earthworks. When this occurs, all work must cease in the vicinity of the find (minimum 10m radius) and the find must be reported. **The heritage induction training ensures that site workers, contractors, and managers understand their legal duty to stop work, protect the find, and report the finds to an archaeologist, palaeontologist and ECPHRA** thereby preventing unlawful damage, avoiding project delays and legal penalties while ensuring compliance as we safeguard irreplaceable heritage resources.

The following guidelines can be placed at site offices, notice boards, induction office, common rooms **and** contractor briefing areas.

A. WHAT IS HERITAGE?

Heritage includes objects, places, and remains from the past that are legally protected.
On construction sites, heritage may include the following:

Stone and bone tools and artefacts, bone, shells, pottery, metal and glass artefacts, beads, historical artefacts
Old foundations, ruined or disused structures and buildings
Graves (marked or unmarked)
Rock paintings or engravings and pigment
Fossils and trace fossils in rock or soil
Wrecks (maritime or aircraft) and associated artefacts

B. WHERE COULD YOU FIND IT?

NOTE: Heritage finds are often situated underground or are unmarked.
If you are clearing, digging, cutting, or drilling, you may uncover heritage.

Heritage finds often appear during:

Vegetation clearing
Earthworks & trenching
Bulk services excavation
Road construction
Excavation
Mining quarrying and blasting

C. IF YOU FIND SOMETHING - STOP!

IMMEDIATE ACTION REQUIRED:

1.	**STOP WORK** in the affected area
2.	**DO NOT TOUCH, MOVE, OR COLLECT ANYTHING**
3.	**MARK & SECURE THE AREA** (cones/tape)
4.	**REPORT** to the Site Manager or EAP and archaeologist/palaeontologist
5.	**REPORT to ECPHRA**
6.	**WAIT FOR INSTRUCTION** from ECPHRA

WARNING: *Damaging, disturbing, or removing heritage resources, graves older than 60 years, archaeological and palaeontological finds, and monuments and memorials without a permit is a* ***criminal offence*** *under the National Heritage Resources Act (Act 25 of 1999) and may result in a* ***fine and/or imprisonment****.*

D. PLEASE DO NOT:

1.	Take items as souvenirs
2.	Rebury or cover up finds
3.	Continue construction work within the area without permission

E. GRAVES & HUMAN REMAINS

Graves are extremely sensitive.

If human remains are suspected**:**

- **STOP WORK IMMEDIATELY**
- **SECURE** the area, minimum 10 m radius
- **NOTIFY** Site Manager or ECO and archaeologist
- **CONTACT** ECPHRA and SAPS

They may look like:

Stone-packed mounds and mounds
Shallow pits
Old cemeteries
Rocks/stones placed in an upright position
Areas with different coloured soils, vegetation, topography and shape

LEGAL NOTICE: *Not reporting graves may have legal implications. All graves and human remains older than 60 years are protected by law.*

In terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), no person may damage, disturb, exhume, or relocate any grave or human remains without a permit from the heritage authority. Disturbing a grave is a criminal offence and may result in a fine and/or imprisonment.

F. FOSSILS & OLD BONES

These may include:

- bones
- shells
- fossil wood and plants
- tracks or impressions

Fossils are protected — even if found by accident.

Fossils are often found:

In rock cuttings
During vegetations clearing, trenching and excavation
During blasting
In hard layers below soil

G. WHY THIS MATTERS

✓ **Required by law (NHRA Act 25 of 1999)**

✓ **Prevents project delays**

✓ **Avoids fines & legal action**

✓ **Respects communities and history**

✓ **Protects irreplaceable resources**

ONCE DESTROYED, HERITAGE IS LOST FOREVER

H. WHO TO CONTACT

REPORT ALL HERITAGE FINDS TO:

- **Site Manager / Contractor**
- **Environmental Control Officer (ECO)**
- **Archaeologist/Palaeontologist**
- **Eastern Cape Provincial Heritage Resources Authority (ECPHRA)**

  Tel: 043 492 1942 / 1370 or 077 603 3035

  Email: lungiswam@ecphra.org.za /
  ayanda.mncwabe-mama@ecsrac.gov.za

  Website: **www.ecphra.org.za**
- **Nearest SAPS (South African Police Service) – for graves**

REMEMBER…
IF IN DOUBT - STOP AND REPORT
You will never be punished for reporting a suspected heritage find, but you can be prosecuted for ignoring it.

RECORDING FORM

Name of project:			
Date & time of discovery:			
GPS coordinates:	Lat: Long:		
If no co-ordinates available, describe the location:			
Type of find (tick):	Archaeology ☐ Grave/Human remains ☐	Fossils ☐ Other ☐	
Description of situation in which the discovery was found:			
Description of context in which the discovery was found:			
Description and condition of discovery identified:			
Depth of find in hole			
Photographs (tick as appropriate and indicate the number of the photographs)	Digital image of vertical (side) section		
	Discovery from different angles		
	Wider context of the find		
Temporary storage (where it is located and how it is conserved)			
Name of Person Identifying the finds:			

Contact:	
Recorder Name:	
Contact:	
Photographer Name:	
Contact:	

EXAMPLES OF FINDS

This guide is not intended to be extensive or exhaustive. The materials are examples of what you may find.

1. ARCHAEOLOGICAL MATERIAL

A. ROCK ART PAINTINGS & ENGRAVINGS



B. STONE & BONE



C. POTTERY & CERAMICS



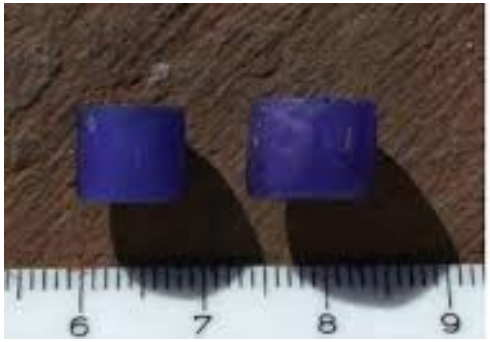








D. BEADS & SHELL BEADS













E. METAL









F. GLASS








G. SHELL MIDDENS







H. STRUCTURES (Stone Walling, Stelae, etc.)









I. BURIAL GROUNDS AND GRAVES

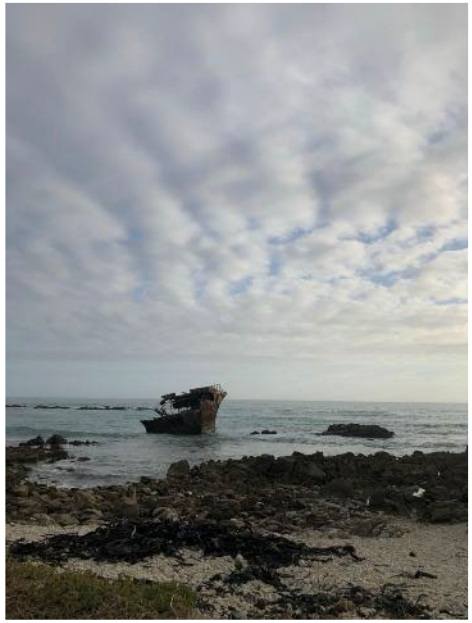
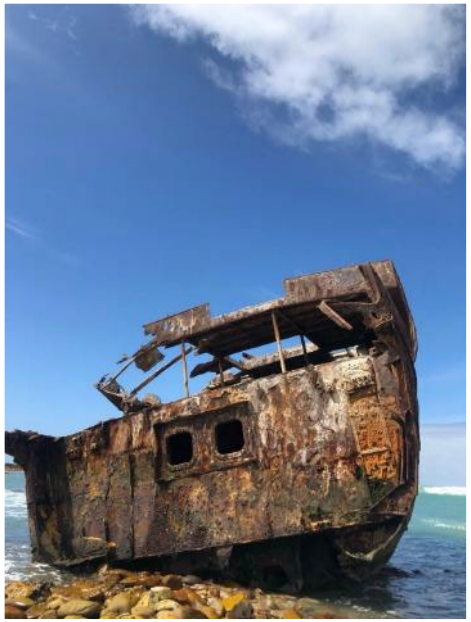









Maritime





2. PALAEONTOLOGICAL MATERIAL

A. PLANT FOSSILS









B. ANIMAL FOSSILS

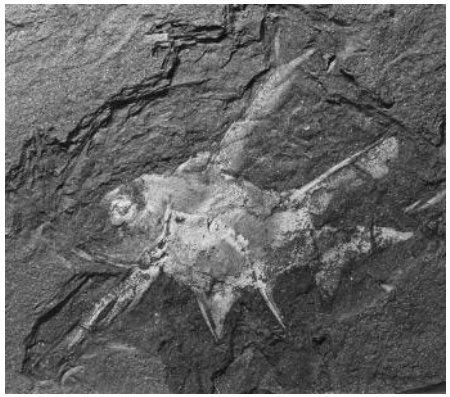




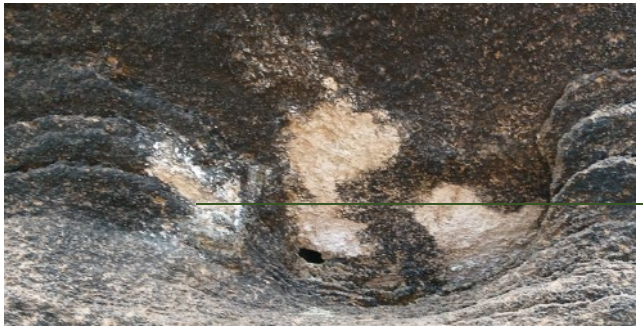








C. TRACE / PRINT FOSSILS








D. INVERTEBRATES








3. METEORITES

Look out for meteorites especially if there has been a “sighting” / falling meteorite reported in your area.





Thank you for assisting ECPHRA in protecting our heritage.

Earthlink Environmental Services

SITE SENSITIVITY VERIFICATION REPORT

FOR THE PROPORSED IMPROVEMENT OF A PORTION OF THE R415 BETWEEN MATATIELE AND MALUTI TOWN, IN THE EASTERN CAPE PROVINCE WITHIN ALFRED NZO DISTRICT MUNICIPALITY, MATATIELA LOCAL MUNICIPALITY.

CONTRACT SANRAL : R.415-010-2024/1F-ENV

Prepared by:

Earthlink Environmental Services

Applicant:

South African National Roads Agency SOC Limited

Competent Authority:

Department of Forestry, Fisheries, and the Environment

Engineers:

HHO Engineering consultants (Pty) ltd

NOVEMBER 2025

PURPOSE OF THE DOCUMENT

The main aim of the **Site Sensitivity Verification Report** is to confirm the current use of the land and the environmental sensitivity of the site under consideration (I.e., a proposed development site where an Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and associated 2014 Environmental Impact Assessment (EIA) regulations, as amended is required as identified by the national web-based environmental screening tool. This should be undertaken prior to commencing with any specialist assessment/s. The site sensitivity verification must be undertaken using:

- A desktop analysis using satellite imagery.
- A preliminary onsite inspection; and
- Any other available and relevant information

The outcome of the site sensitivity verification must be recorded in the form of a report that:

- Confirms or disputes 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.
- contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
- Is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations1 (EIA Regulations).

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1. INTRODUCTION

The South African National Roads Agency SOC Limited (SANRAL) proposes to improve and upgrade approximately 32 km of the R415 between Matatiele and the Qacha's Nek Border Post with Lesotho, within the Matatiele Local Municipality of the Alfred Nzo District Municipality in the Eastern Cape Province. The proposed project extends from approximately 30°16'9.06"S; 28°47'15.28"E to 30°7'46.58"S; 28°41'8.53"E. The project involves upgrading the existing gravel road to a safer, more reliable and surfaced road to improve road-user and pedestrian safety, access and mobility for local communities, public transport, agricultural activities and emergency services, as well as connectivity between Matatiele and the Qacha's Nek Border Post.

The project aims to improve the existing gravel R415 road to a surfaced road standard in order to improve road safety, accessibility, and mobility for local communities and road users. The upgraded route will provide safer and more reliable transport for pedestrians, public transport, agricultural activities, emergency services, and commercial traffic, while strengthening connectivity between South Africa and Lesotho.

The proposed upgrade is motivated by the poor condition of the existing gravel road, which is particularly affected by steep mountainous terrain and adverse weather conditions. The improvement of the R415 is expected to reduce travel times and vehicle operating costs, improve access to healthcare, education, and economic opportunities, and support regional trade, tourism, and socio-economic development. As a strategic cross-border transport corridor, the project also contributes to improved movement of goods and people between Matatiele and the Qacha's Nek Border Post.

Major aspects of the proposed project include the following:

- Upgrade of the existing gravel road to a surfaced standard,
- Relocation of affected existing services including telephone poles
- Road drainage improvements to SANRAL standards including the upgrade of bridges and culverts
- Botsola Bridge: The existing roadway embankment crossing the Botsola River is routinely flooded and will be raised to a higher level. The existing set of culverts is to be replaced by a new bridge with a hydraulic capacity for 1:50 year flood events, as required by the upgraded Class 2 route classification.
- Kinira Bridge: The existing structure requires widening to conform to the proposed roadway profile. Two additional portals will be added.
- Mafube Bridge: The existing single-lane configuration is inadequate for the upgraded cross-section and will be replaced with a new structure that meets the new design requirements.
- Widening of the existing road cross section to 9.4m wide or more and additional climbing lanes

- Vertical and horizontal geometric improvements to SANRAL standards,
- Build Mechanically Stabilized Earth Walls (MSE) walls where the road cross section must be increased,
- New culverts to SANRAL standards
- 7m wide temporary surfaced deviation to accommodate two-way traffic during construction.
- Road marking and signage improvements to SANRAL standards
- Road restraint system improvements
- Traffic calming measures to improve vehicle and pedestrian safety
- Stockpile areas and vegetation clearance outside road reserve in excess of one hectare
- Geotechnical improvements to unstable cut and fill slopes
- Crushing and screening of material South African National Road Agency SOC Limited

2. PROJECT LOCATION

The South African National Roads Agency Soc Ltd (SANRAL) proposes to upgrade Road R415 between Matatiele and Maluti town, In the Eastern Cape Province within Alfred NZO District Municipality, Matatiela Local Municipality.

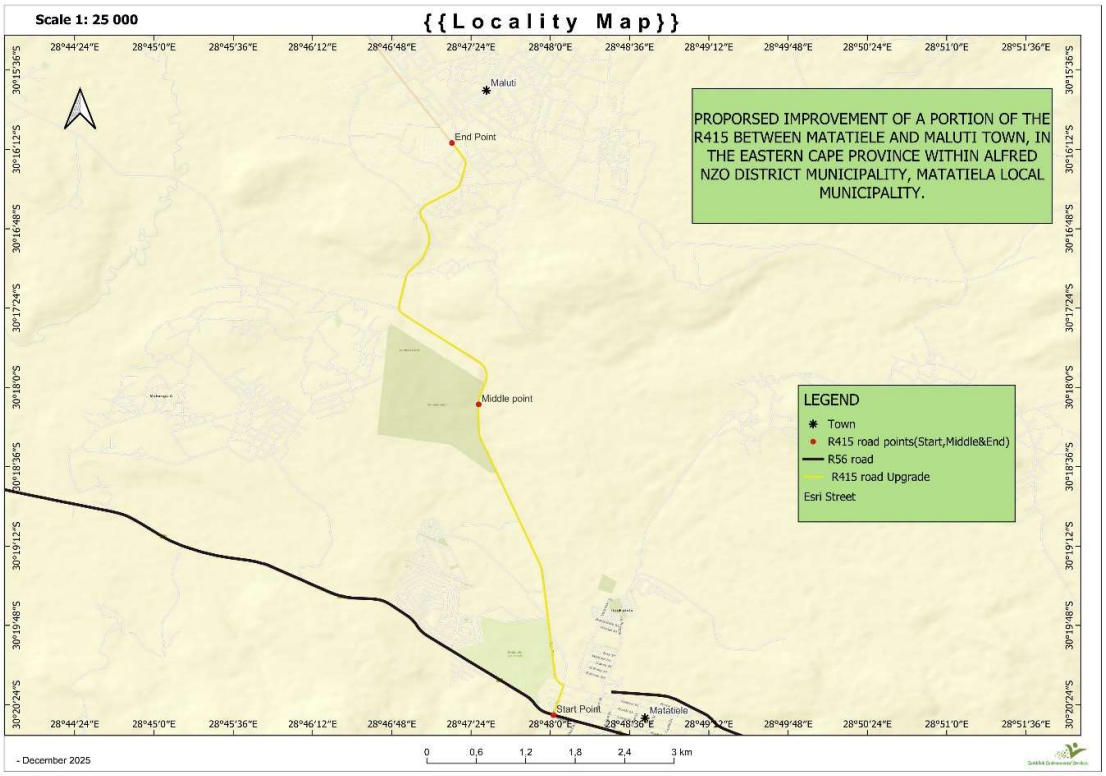


Figure 1: Locality Map for the proposed R415 road to be upgraded.

3. SCREENING TOOL RESULTS

The following environmental themes and their associated sensitivities were identified in the Screening Tool Report generated from the Department of Forestry, Fisheries, and the Environment (DFFE) national web. The screening tool is attached in this report as the Appendix 1.

According to the screening tool report, various specialist studies were identified and recommended to be undertaken as part of the environmental process.

Table 1: DFFE Screening tool Results

Theme	Very high sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Table 2: Themes and associated sensitivity as per the DFFE Screening Tool.

<table>
<tr><th>Theme</th><th>DFFE Screening</th><th>EAP Rating (Agree/ Disagree)</th><th>Motivation</th></tr>
<tr><td>Agriculture Theme</td><td>Very high sensitivity</td><td>High (Agree Agricultural compliance statement, has been undertaken and included in the Draft BAR)</td><td>The report generated from National web based environmental screening tool (screening tool) has classified the sensitivity of the R415 road to agricultural activities as Very high, while the sensitivity characteristics related to land capability are rated as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Subsistence_Farming_1</td></tr><tr><td>High</td><td>08. Moderate</td></tr><tr><td>High</td><td>09. Moderate-High</td></tr><tr><td>High</td><td>10. Moderate-High</td></tr><tr><td>Low</td><td>05. Low</td></tr><tr><td>Low</td><td>04. Low-Very low</td></tr><tr><td>Low</td><td>02. Very low</td></tr><tr><td>Low</td><td>03. Low-Very low</td></tr><tr><td>Medium</td><td>07. Low-Moderate</td></tr><tr><td>Medium</td><td>06. Low-Moderate</td></tr></table>The road transverse villages that rely on subsistence farming, domestic animals such as Sheep and cattle were observed grazing along the road.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>Although the road upgrade is temporary and is expected to have minimal impact on the surrounding agricultural activities, the upgrade of the R415 road is anticipated to provide long-term benefits to agricultural operations in the area.

An Agricultural Compliance Statement has been undertaken and included in the Draft BAR attached as Appendix C4.</td></tr>
<tr><td>Animal Species Theme</td><td>High sensitivity</td><td>Medium (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR)</td><td>The assessment of the Animal Theme revealed a high level of sensitivity, while the sensitivity features were rated as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Aves-Gyps coprotheres</td></tr><tr><td>High</td><td>Aves-Geronticus calvus</td></tr><tr><td>High</td><td>Aves-Balearica regulorum</td></tr><tr><td>Low</td><td>Subject to confirmation</td></tr><tr><td>Medium</td><td>Aves-Neotis denhami</td></tr><tr><td>Medium</td><td>Aves-Sagittarius serpentarius</td></tr><tr><td>Medium</td><td>Aves-Geronticus calvus</td></tr><tr><td>Medium</td><td>Mammalia-Ourebia ourebi ourebi</td></tr><tr><td>Medium</td><td>Invertebrate-Paracilacris lateralis</td></tr></table>
During the preliminary onsite inspection, the EAP primarily observed various bird species and nests near the road.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>Given the current condition of the R415 road, which is operational, the planned road upgrade will occur on the existing gravel road and its reserve that will require clearance of vegetation.

A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR attached as Appendix C1.</td></tr>
<tr><td>Aquatic Biodiversity Theme</td><td>Very high sensitivity</td><td>High (Agree, the Aquatic and Wetland Delineation study has been undertaken, the road passes through wetlands)</td><td>The R415 road to be upgraded crosses wetlands and rivers which will be impacted by the proposed project. The road upgrade may impact the aquatic biodiversity. According to the screening sensitivity features as per below table:
Sensitivity Features:<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>Very High</td><td>CBA 2</td></tr><tr><td>Very High</td><td>ESA 1</td></tr><tr><td>Very High</td><td>Wetlands_Floodplain</td></tr><tr><td>Very High</td><td>FEPA Subcatchment</td></tr><tr><td>Very High</td><td>Rivers</td></tr><tr><td>Very High</td><td>SWSA (sw)_Southern Drakensberg</td></tr></table>An Aquatic and Wetland Delineation Study has been undertaken and included in the Draft BAR attached as Appendix C2.</td></tr>
<tr><td>Archaeological and Cultural Heritage Theme</td><td>Very high sensitivity</td><td>High (Agree, a study has been undertaken in terms of Section 38(1) of the</td><td>The DFFE screening tool indicates that the proposed R415 upgrade is located within areas of Very high heritage sites sensitivity as per below table.</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>National Heritage Resources Act of 1999, since the proposed development will exceed 5000m² in extent)</td>
<td>
Sensitivity Features:
<table>
<tr><th>Sensitivity</th><th>Feature(s)</th></tr>
<tr><td>High</td><td>Within 150m of a Grade IIIa Heritage site</td></tr>
<tr><td>Low</td><td>Low Sensitivity</td></tr>
<tr><td>Very High</td><td>Within 100m of an Ungraded Heritage site</td></tr>
</table>
The gravel road is already in existence and operational, the site has been previously cleared and disturbed.

A Heritage Impact Assessment study has been undertaken and included in the Draft BAR (attached as Appendix C3)
</td>
</tr>
<tr>
<td>Civil Aviation Theme</td>
<td>High sensitivity</td>
<td>Very Low (Disagree, not necessary to undertake a Civil Aviation study as upgrades will not impact Civil aviation)</td>
<td>
The DFFE screening tool has classified the civil aviation theme as follows:
Sensitivity Features:
<table>
<tr><th>Sensitivity</th><th>Feature(s)</th></tr>
<tr><td>High</td><td>Within 8 km of other civil aviation aerodrome</td></tr>
<tr><td>Low</td><td>Low sensitivity</td></tr>
<tr><td>Medium</td><td>Between 8 and 15 km of other civil aviation aerodrome</td></tr>
</table>
It is anticipated that this development will not pose any risks to civil aviation operations in the vicinity, and thus, it is expected that the road upgrade will not affect any civil aviation activities.

Consultation with the avian authority is ongoing.
</td>
</tr>
</table>

<table>
<tr><td>Defence Theme</td><td>Low sensitivity</td><td>Very Low (Disagree, the R415 road upgrade will not affect any defence operations)</td><td>The DFFE screening tool has classified the defence theme as having low sensitivity. There are no defence-related structures or zones on the site or in the vicinity of the site/R415 road to be improved.

Given the nature of the proposed project, which involves upgrading an existing gravel road, it is anticipated that the project will not have any impact on defence-related activities.

Consultation with the defence authority is ongoing.</td></tr>
<tr><td>Palaeontology Theme</td><td>Very High sensitivity</td><td>Medium (Agree, rocks identified which could be signs of palaeontology remains)</td><td>According to the National web based environmental screening tool (screening tool), The road to be upgraded is sensitivity is classified as per below table:
Sensitivity Features:<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Features with a High paleontological sensitivity</td></tr><tr><td>Medium</td><td>Features with a Medium paleontological sensitivity</td></tr><tr><td>Very High</td><td>Features with a Very High paleontological sensitivity</td></tr></table>Graves were identified very close to the road to be upgraded, and Rocks were identified which might be the indication of graves.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>According to the South African Heritage Resource Agency (SAHRIS) website, it was noted that the proposed upgrade is located within the high Palaeo sensitive area.

Palaeontological impact assessment has been undertaken and included in the Draft BAR, attached as Appendix C3</td></tr>
<tr><td>Plant Species Theme</td><td>High sensitivity</td><td>Medium (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR)</td><td>The DFFE screening report classifies the plant species theme as having the following sensitivity:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Erica cooperi var. cooperi</td></tr><tr><td>Low</td><td>Low Sensitivity</td></tr><tr><td>Medium</td><td>Sensitive species 215</td></tr><tr><td>Medium</td><td>Carex subinflata</td></tr><tr><td>Medium</td><td>Sensitive species 767</td></tr><tr><td>Medium</td><td>Sensitive species 148</td></tr><tr><td>Medium</td><td>Schizochilus bulbinella</td></tr><tr><td>Medium</td><td>Cotula paludosa</td></tr><tr><td>Medium</td><td>Erica cooperi var. cooperi</td></tr><tr><td>Medium</td><td>Sensitive species 535</td></tr><tr><td>Medium</td><td>Sensitive species 441</td></tr><tr><td>Medium</td><td>Sensitive species 1248</td></tr></table>
The site inspection revealed that the road is gravel and as much as it is operational and has already been disturbed and cleared, more clearing may be required. The site has a number of sensitive vegetation along the road such as Protea tree.</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td>A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR, attached as Appendix C</td></tr>
<tr><td>Terrestrial Biodiversity Theme</td><td>Very High sensitivity</td><td>High (Agree, A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR</td><td>The report generated from the National web based environmental screening tool (screening tool) categorized the sensitivity of the R514 road as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>Very High</td><td>CBA1</td></tr><tr><td>Very High</td><td>CBA2</td></tr><tr><td>Very High</td><td>ESA2</td></tr><tr><td>Very High</td><td>FEPA Subcatchment</td></tr><tr><td>Very High</td><td>SWSA (sw)_Southern Drakensberg</td></tr><tr><td>Very High</td><td>National Protected Area Expansion Strategy (NPAES)</td></tr><tr><td>Very High</td><td>CR_Mabela Sandy Grassland</td></tr><tr><td>Very High</td><td>EN_East Griqualand Grassland</td></tr></table>The EAP observed that the road's reserve has not been cleared or disturbed. During the site inspection, various animals, grass including birds were observed.

A Terrestrial Biodiversity Impact Assessment including flora and fauna has been undertaken and included in the Draft BAR, attached as Appendix C1.</td></tr>
</table>

Table 3. Specialist assessments identified as per the DFFE Screening Tool.

No	Proposed Specialist Assessment	Verification of Site Sensitivity and Motivation on The Need for Specialist Investigation
1	Agricultural Impact Assessment	The region is situated in a very high agricultural zone and is distinguished by a subsistence Farming practices. Cattles were observed grazing along the road. An **Agricultural compliance statement** is considered essential for the proposed upgrade of the R415 road.
2	Landscape/Visual Impact Assessment	It is not considered necessary to conduct a landscape/visual impact assessment for the proposed project, as it involves the improvement of an already existing road. Any potential landscape or visual impacts and corresponding mitigation measures will be outlined in the Environmental Management Programme (EMPr).
3	Archaeological and Cultural Heritage Impact Assessment	**The Archaeological & Cultural Heritage Assessment** is deemed necessary to be undertaken for the proposed upgrade.
4	Palaeontology Impact Assessment	The **Paleontological Compliance Statement** is deemed necessary to be undertaken for the proposed R415 road upgrade.
5	Terrestrial Biodiversity Impact Assessment	The report generated by the DFFE screening tool categorized the sensitivity of the R415 road as very high sensitivity passing through Critical biodiversity areas and Ecological Support Areas. The features identified as having very high sensitivity include the following: **Sensitivity Features:** Sensitivity / Feature(s) Very High – CBA1 Very High – CBA2 Very High – ESA2 Very High – Wilfried Baur Nature Reserve Very High – CR_Mabela Sandy Grassland Very High – EN_East Griqualand Grassland

<table>
<tr><td></td><td></td><td>The Environmental Assessment Practitioner (EAP) observed that the road is paved, already existing and operational. During the site inspection, various animals, including birds were observed near the road reserve.

A Terrestrial Biodiversity Compliance statement Assessment (which includes both fauna and flora species assessment) Compliance Statement is considered necessary.</td></tr>
<tr><td>6</td><td>Aquatic Biodiversity Impact Assessment</td><td>According to the DFFE screening report for the sensitivity features as per below table:
Sensitivity Features:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>Very High</td><td>CBA 2</td></tr><tr><td>Very High</td><td>ESA 1</td></tr><tr><td>Very High</td><td>Wetlands_Floodplain</td></tr><tr><td>Very High</td><td>Wetlands_Unchannelled valley-bottom</td></tr></table>The road is located within the high sensitivity feature such as CBA 2, ESA 1 and Wetlands. The EAP observed that the road is existing and operational, however it crosses wetlands and rivers.

The Aquatic Biodiversity Compliance Statement Assessment is deemed necessary for the proposed road upgrade.</td></tr>
<tr><td>7</td><td>Noise Impact Assessment</td><td>It is expected that minimal noise will be generated because of the upgrade of the R415 road project. Any potential noise impacts and corresponding mitigation measures will be outlined in the Environmental Management Programme (EMPr).</td></tr>
<tr><td>8</td><td>Traffic Impact Assessment</td><td>No standalone Traffic Impact Assessment has been undertaken for the proposed road upgrade. Traffic considerations will be addressed as part of the engineering design process, with the existing and anticipated traffic conditions taken into account.

No additional input is deemed necessary.</td></tr>
</table>

9	Geotechnical Assessment	No standalone geotechnical assessment has been undertaken for the proposed road upgrade. Geotechnical conditions will be considered during the detailed design and construction phases, and any constraints identified will be addressed through appropriate engineering measures. No additional input is deemed necessary.
10	Socio-Economic Assessment	The socio-economic impacts will be assessed further in the Basic Assessment Report. Any negative socio-economic impacts envisaged will be addressed in the EMPr. The proposed road improvement has the potential to benefit the society on a socio-economic level. Lastly, as part of the Public Participation Process Interested and Affected parties (I&APs) will have the right to comment on the Draft Basic Assessment Report raising any concerns they might have in this regard, and their comments will be incorporated into the Final BAR by the Environmental Assessment Practitioner.
11	Ambient Air Quality Impact Assessment	The proposed project activities include surfacing, road widening, cutting, a new prestressed bridge, river bridge and culvert widening, a temporary two-way traffic deviation, two potential borrow pits, stockpile areas and vegetation clearance outside the road reserve. The proposed activity does not trigger any listed activities in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA) and the Listed Activities and Associated Minimum Emission Standards published under Government Notice No. 893 of 22 November 2013, as amended. However, an Air Quality Impact Assessment has been undertaken as a precautionary and risk-based specialist study due to the geological characteristics of the material that will be excavated, cut, processed, and handled during the construction phase of the proposed development. The proposed route is underlain predominantly by sedimentary rocks of the Karoo Supergroup, including mudstones and sandstones of the Beaufort Group, with additional

<table>
<tr><td></td><td></td><td>geological formations such as the Molteno, Elliot, and Clarens Formations occurring along portions of the route. Towards the mountainous border areas adjacent to Lesotho, the geology comprises Clarens Formation sandstone and Elliot Formation sandstone, siltstone, and mudstone, with localized Drakensberg basaltic lava flows.

These geological units are of particular relevance from an air quality perspective because quartz bearing sandstone formations have the potential to generate respirable crystalline silica dust during activities such as cutting, drilling, blasting, crushing, excavation, and grinding.

An Air Quality Impact Assessment was conducted for the proposed R415 Project. The assessment</td></tr>
<tr><td>12</td><td>Plant Species Assessment</td><td>The site inspection revealed that the R415 road is an existing paved road which may require clearance of vegetation. The EAP observed trees along the road that may require to be cleared.

A Terrestrial Biodiversity Compliance statement from the specialist, which will include flora/ plant species assessment is considered necessary to confirm the anticipated low potential impact.</td></tr>
<tr><td>13</td><td>Animal Species Assessment</td><td>The assessment of the Animal Theme revealed a High level of sensitivity, while the sensitivity feature was rated as per below table:
<table><tr><th>Sensitivity</th><th>Feature(s)</th></tr><tr><td>High</td><td>Aves-Balearica regulorum</td></tr><tr><td>Medium</td><td>Aves-Circus ranivorus</td></tr><tr><td>Medium</td><td>Aves-Neotis denhami</td></tr><tr><td>Medium</td><td>Aves-Sagittarius serpentarius</td></tr><tr><td>Medium</td><td>Mammalia-Ourebia ourebi ourebi</td></tr><tr><td>Medium</td><td>Invertebrate-Paracilacris lateralis</td></tr></table></td></tr>
</table>

		During the preliminary onsite inspection, the Environmental Assessment Practitioner primarily observed various birds' species, as well as animals inside the reserve near the road to be upgraded. Given the current condition of the R415 road, which is operational and existing paved road, the planned road upgrade will occur on the existing road reserve. **A Terrestrial Biodiversity compliance statement** from the specialist, which will include fauna/ animal species assessment is considered necessary to confirm the anticipated low potential impact.

4. DESKTOP ANALYSIS OF POTENTIAL SITE SENSITIVITY

4.1. SATELITE IMAGERY

Provides a satellite image of the study area created on Google earth.

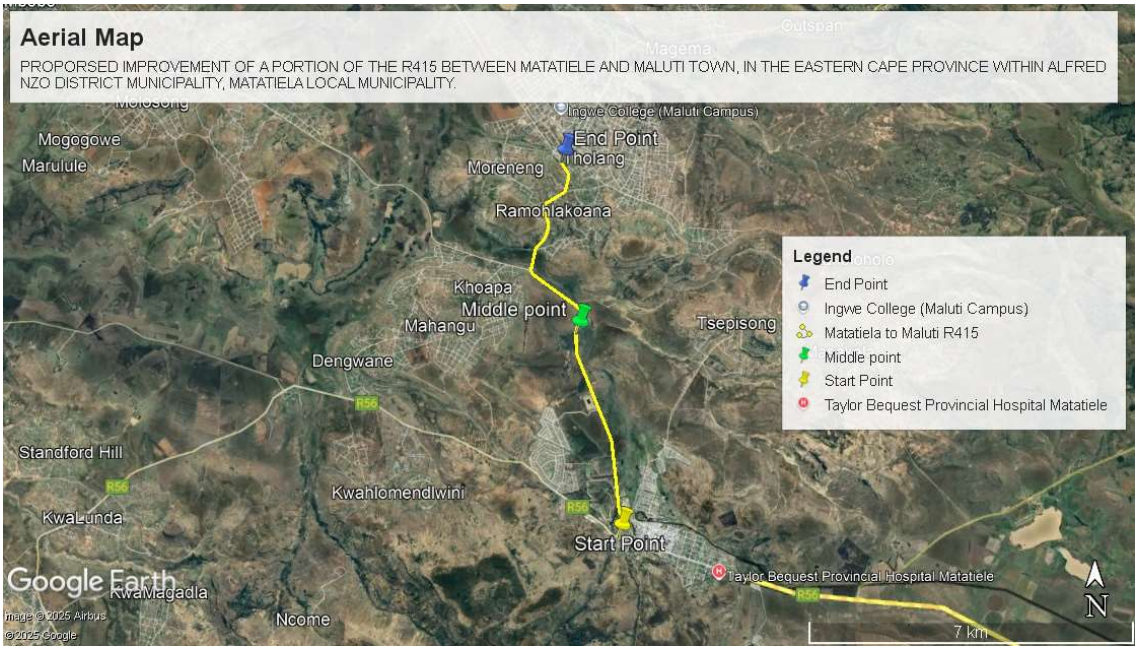


Figure 2: Google Image of the proposed R415 Road to be upgraded.

4.2. 2019 EASTERN CAPE BIODIVERSITY CONSERVATION PLAN

The proposed R415 road to be upgraded falls within the Critical Biodiversity Area (CBA) and Ecological Support Area (ESA).

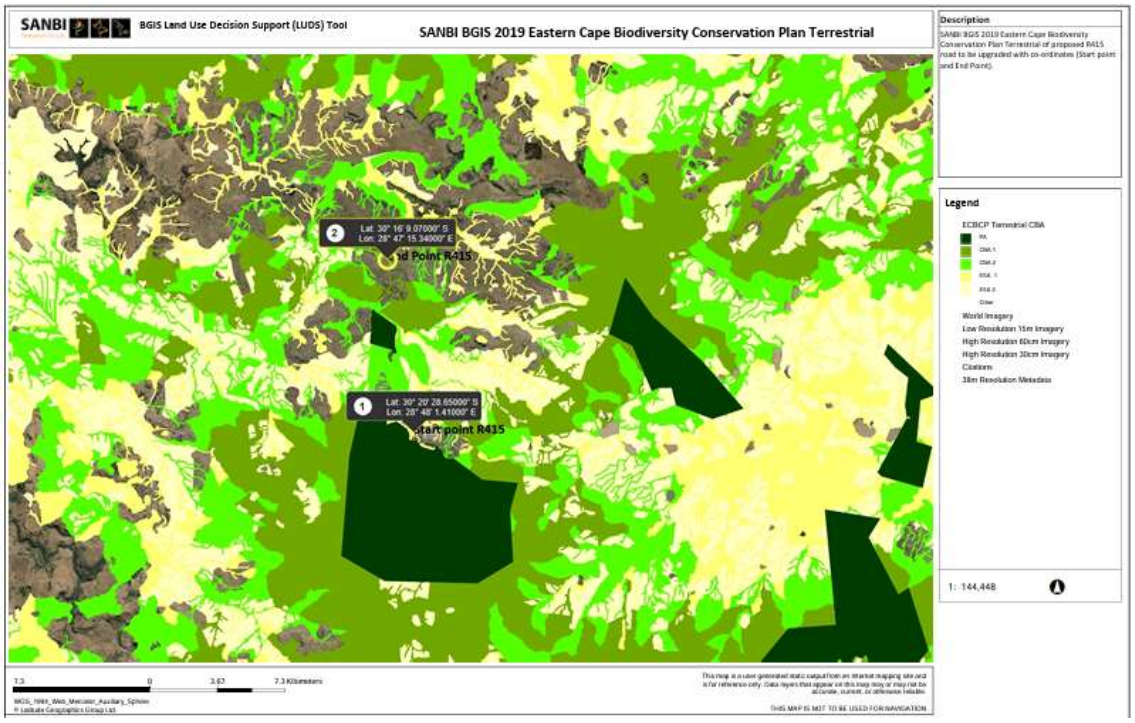


Figure 3: SANBI BGIS 2019 Eastern Cape Biodiversity Conservation Plan Terrestrial of proposed R415 road to be upgraded with co-ordinates (Start point and End Point).

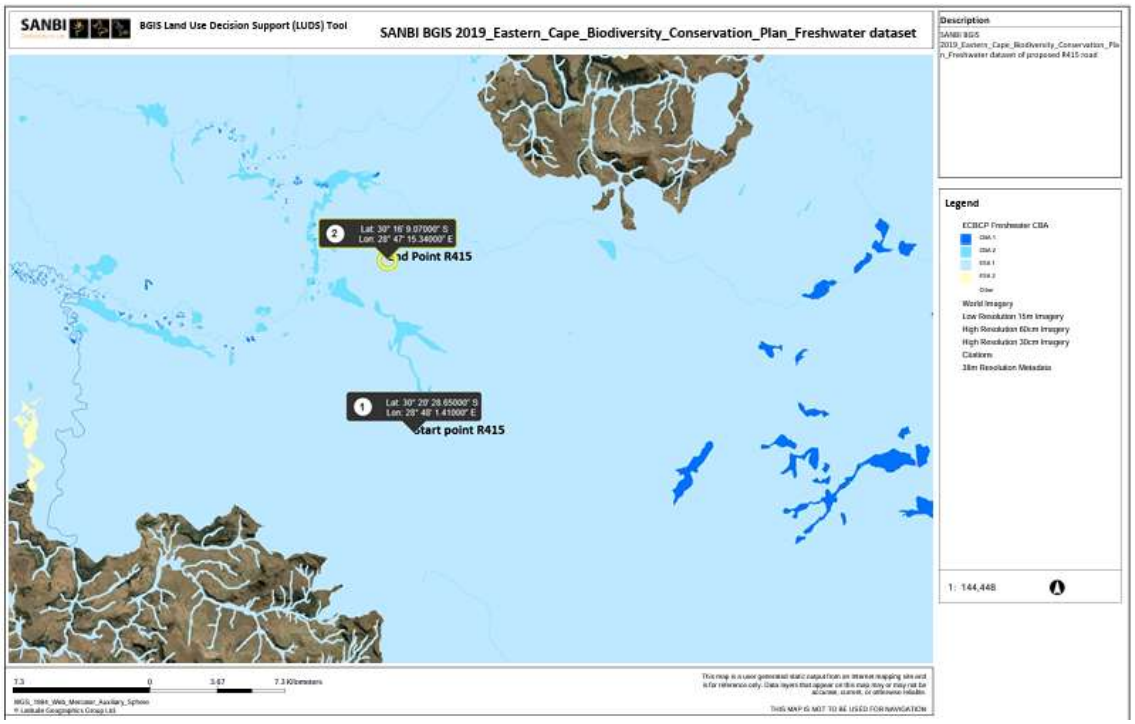


Figure 4: SANBI BGIS 2019_Eastern_Cape_Biodiversity_Conservation_Plan_Freshwater dataset of proposed R415 road to be upgraded with co-ordinates (Start point and End Point).

5. ON-SITE ASESSMENT

On 14 November 2025, a site visit was carried out, during which the Environmental Assessment Practitioner (EAP) conducted a personal inspection of the area. Several photographs were taken to capture a general overview of the site's sensitivities.

Table 4: The starting position is on the intersection of the R415 and Road R56 Matatiela in the Matatiela Local Municipality.

Photo Plate: The starting position is near the intersection of the R415 and Road R56 in Matatiela.


Table 5: End point of the R415 road to be upgraded. The end position is at the R415 at Maluti.

Photo Plate: The end position of the R415 road is at Maluti town.



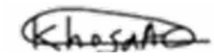
6. CONLCUSION

SANRAL SOC LTD intends to upgrade R415 road Between Matatiele and the Qacha's Nek Border Post with Lesotho, In the Eastern Cape Province within Alfred Nzo District Municipality, Matatiela Local Municipality. Earthlink has been appointed by HHO engineers to manage the necessary EA Application process in accordance with the EIA Regulations, 2014 (as amended) issued under NEMA.

A Screening Tool Report has been produced for the proposed project. As per the Screening Tool Report, several specialist studies and compliance statements have been identified and suggested to be conducted as part of the environmental process.

We trust you find this in order.

Kind Regards,



Amukelani Khosa
Environmental Assessment Practitioner
EAPASA Reg No: 2022/4943

Appendix 1: Screening Report

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number:

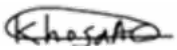
Project name: R415 road upgrade from Matatiela to Maluti-Eastern Cape

Project title: R415 road upgrade from Matatiela to Maluti-Eastern Cape

Date screening report generated: 02/12/2025 13:12:31

Applicant: SANRAL SOC LTD

Compiler: Amukelani Khosa

Compiler signature: 

.....

Application Category: Infrastructure|Transport Services|Roads|Public

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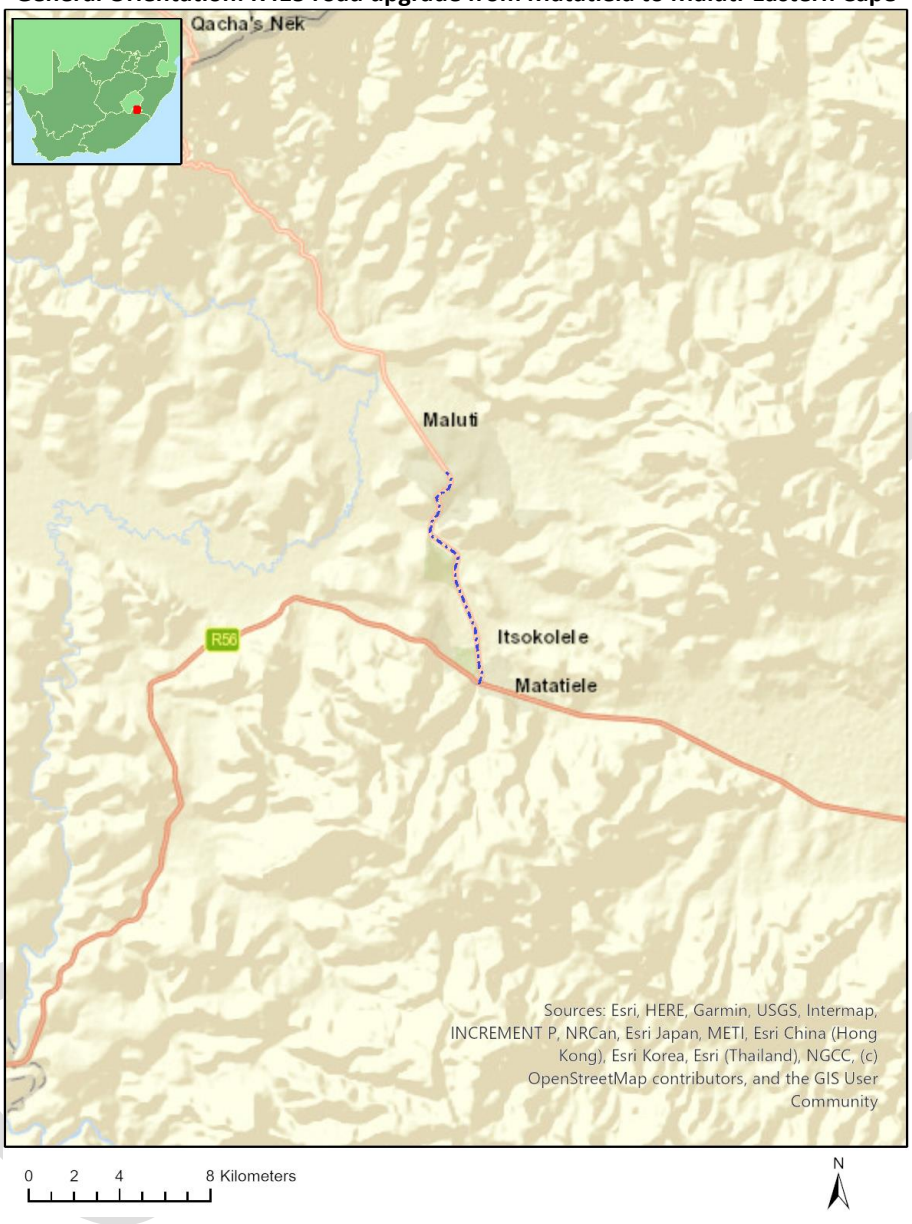
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Map of proposed site and relevant area(s) 4
Cadastral details of the proposed site 4
Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area 5
Environmental Management Frameworks relevant to the application 5
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Proposed Project Location

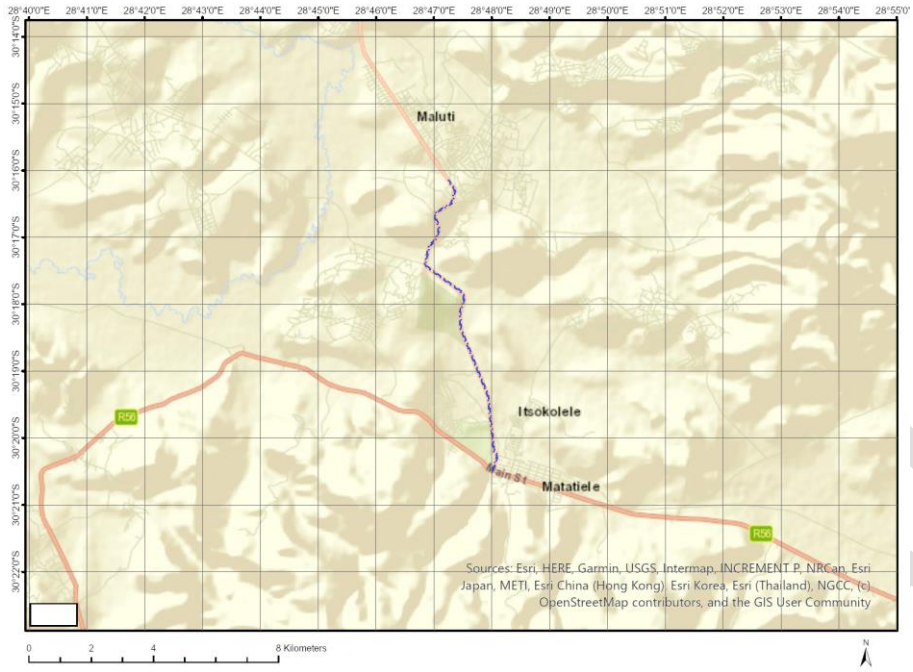
Orientation map 1: General location

General Orientation: R415 road upgrade from Matatiela to Maluti-Eastern Cape



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Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	MATATIELE	1	0	30°21'11.21S	28°48'29.77E	Erven
2	MATATIELE	177	0	30°20'18.64S	28°48'4.96E	Erven
3	MATATIELE	180	0	30°20'18S	28°48'6.29E	Erven
4	MATATIELE	181	0	30°20'17.3S	28°48'4.2E	Erven
5	MATATIELE	189	0	30°20'21.49S	28°48'4.96E	Erven
6	MATATIELE	266	0	30°20'23.27S	28°48'4.42E	Erven
7	MATATIELE	268	0	30°20'26.32S	28°48'3.44E	Erven
8	MATATIELE	269	0	30°20'27.73S	28°48'2.93E	Erven
9	MATATIELE	530	0	30°20'16.8S	28°48'5.13E	Erven
10	MATATIELE	531	0	30°20'20.23S	28°48'3.88E	Erven
11	MATATIELE	1090	0	30°19'50.81S	28°48'1.2E	Erven
12	MATATIELE	1091	0	30°19'47.86S	28°48'1.33E	Erven
13	MATATIELE	2668	0	30°20'29.67S	28°47'59.56E	Erven
14	MALUTI	3074	0	30°16'10.71S	28°47'21.91E	Erven
15	MALUTI	3074	0	30°16'6.94S	28°47'18.22E	Erven
16	MATATIELE	5437	0	30°19'46.48S	28°48'0.58E	Erven
17	MATATIELE	5318	0	30°20'24.21S	28°48'4.08E	Erven
18	MATATIELE	5365	0	30°20'16.4S	28°48'6.71E	Erven
19	MATATIELE	5366	0	30°20'17.23S	28°48'6.44E	Erven
20	MATATIELE	5367	0	30°20'15.93S	28°48'4.7E	Erven
21	MATATIELE	5368	0	30°20'19.9S	28°48'5.55E	Erven
22	MATATIELE	5421	0	30°19'39.16S	28°48'1.14E	Erven
23	MATATIELE	5434	0	30°19'49.46S	28°48'0.92E	Erven
24	MATATIELE	5435	0	30°19'48.59S	28°48'0.62E	Erven
25	MATATIELE	5436	0	30°19'47.59S	28°48'0.59E	Erven
26		434	0	30°15'33.6S	28°46'54.49E	Farm
27		24	0	30°17'5.7S	28°47'11.65E	Farm
28		434	0	30°15'33.23S	28°46'54.51E	Farm Portion

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29		24	0	30°17'5.7S	28°47'11.65E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Infrastructure|Transport Services|Roads|Public**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
South African Protected Areas	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/SAPAD_OR_2025_Q2_Metadata.pdf

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High	High	Medium	Low

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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	sensitivity	sensitivity	sensitivity	sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforHIA.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforPIA.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
8	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
9	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/Asse

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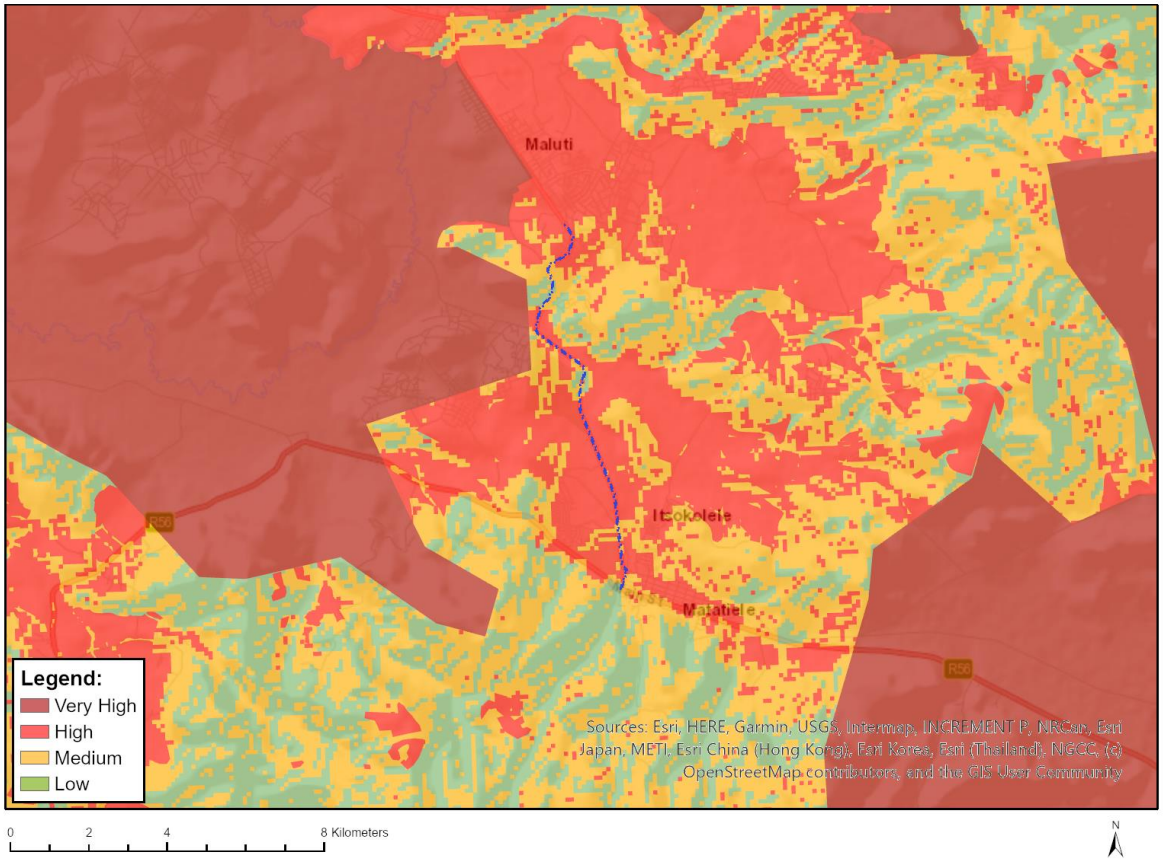
		ssmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
13	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

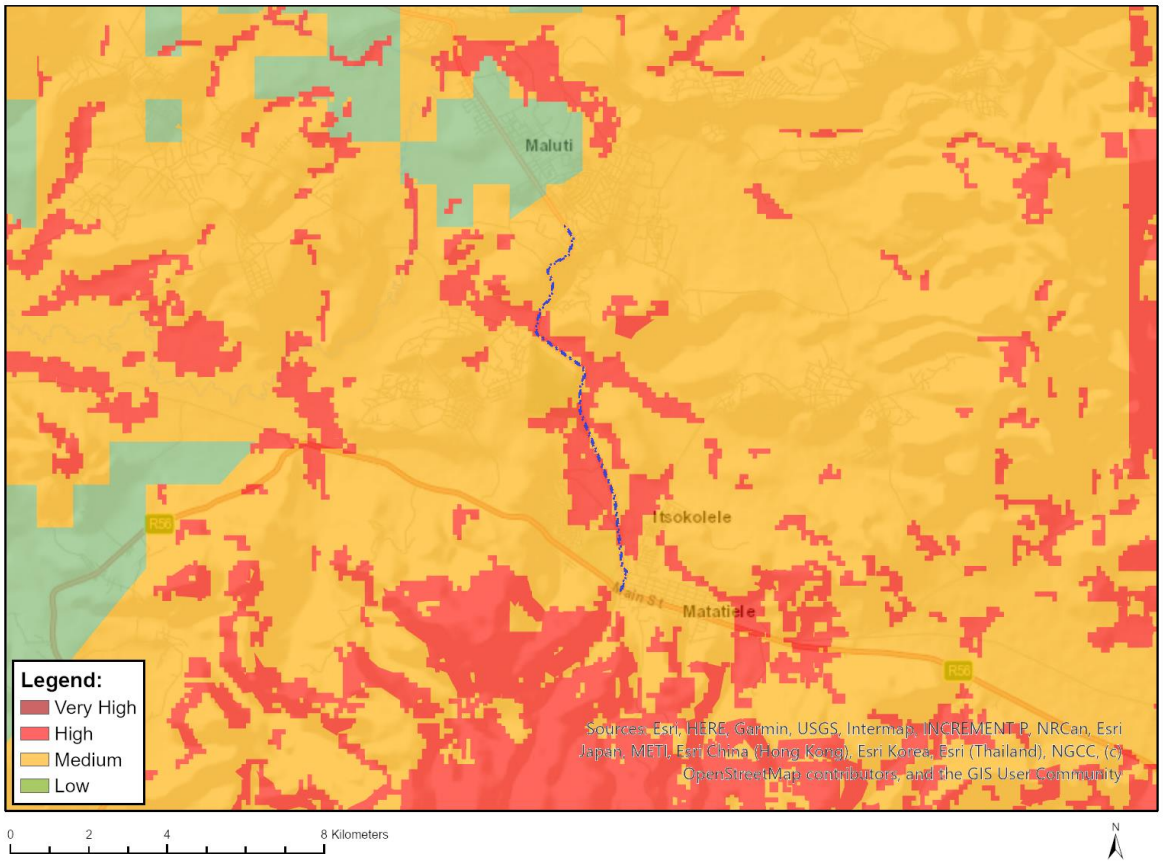


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Subsistence_Farming_1
High	08. Moderate
High	09. Moderate-High
High	10. Moderate-High
Low	05. Low
Medium	06. Low-Moderate
Medium	07. Low-Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

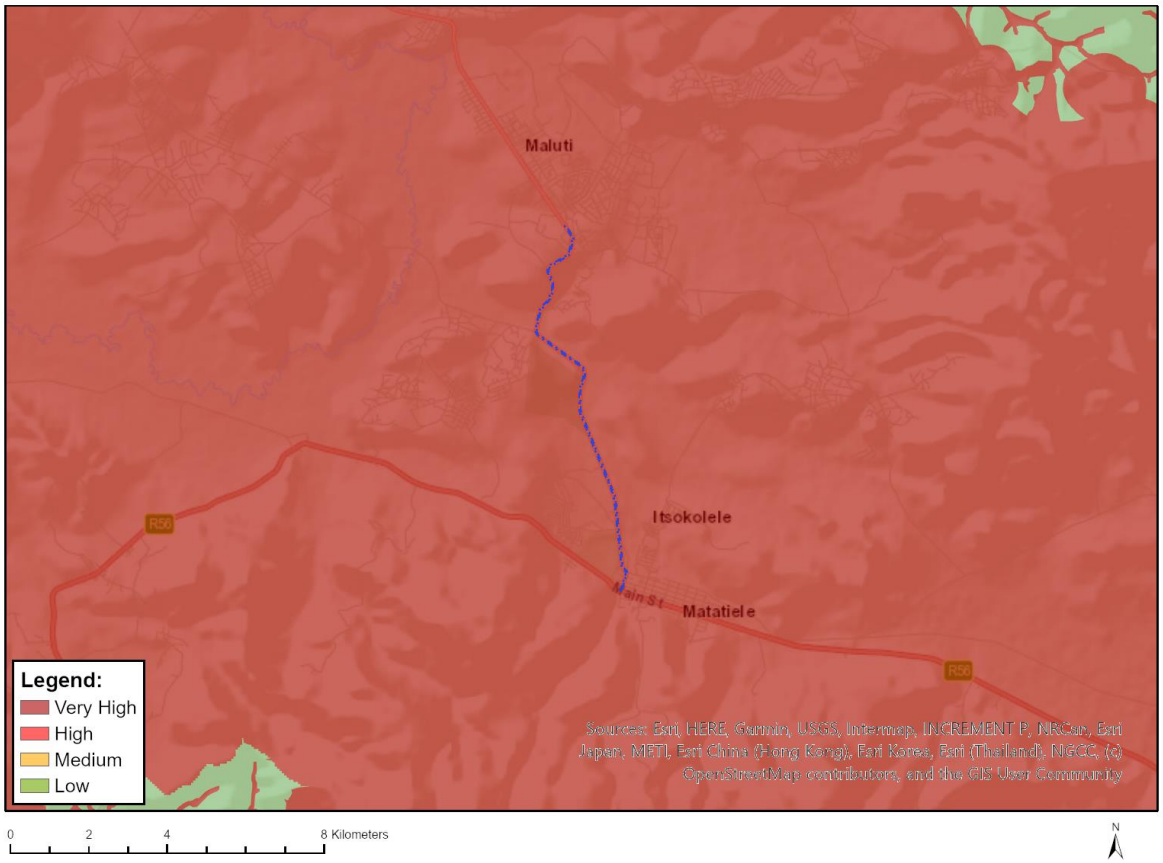
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Balearica regulorum
Medium	Aves-Circus ranivorus
Medium	Aves-Neotis denhami
Medium	Aves-Sagittarius serpentarius
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Invertebrate-Paracilacris lateralis

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MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



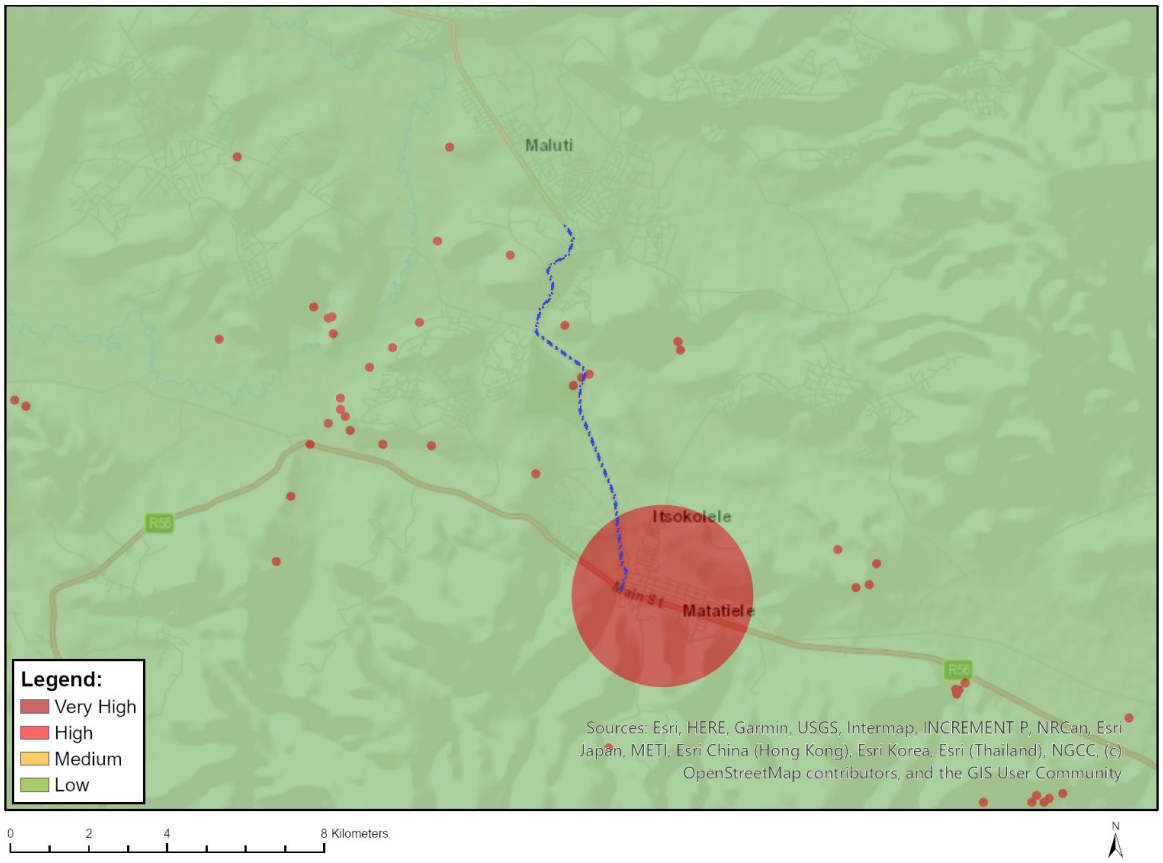
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 2
Very High	ESA 1
Very High	Wetlands_Floodplain
Very High	Wetlands_Unchannelled valley-bottom

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MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



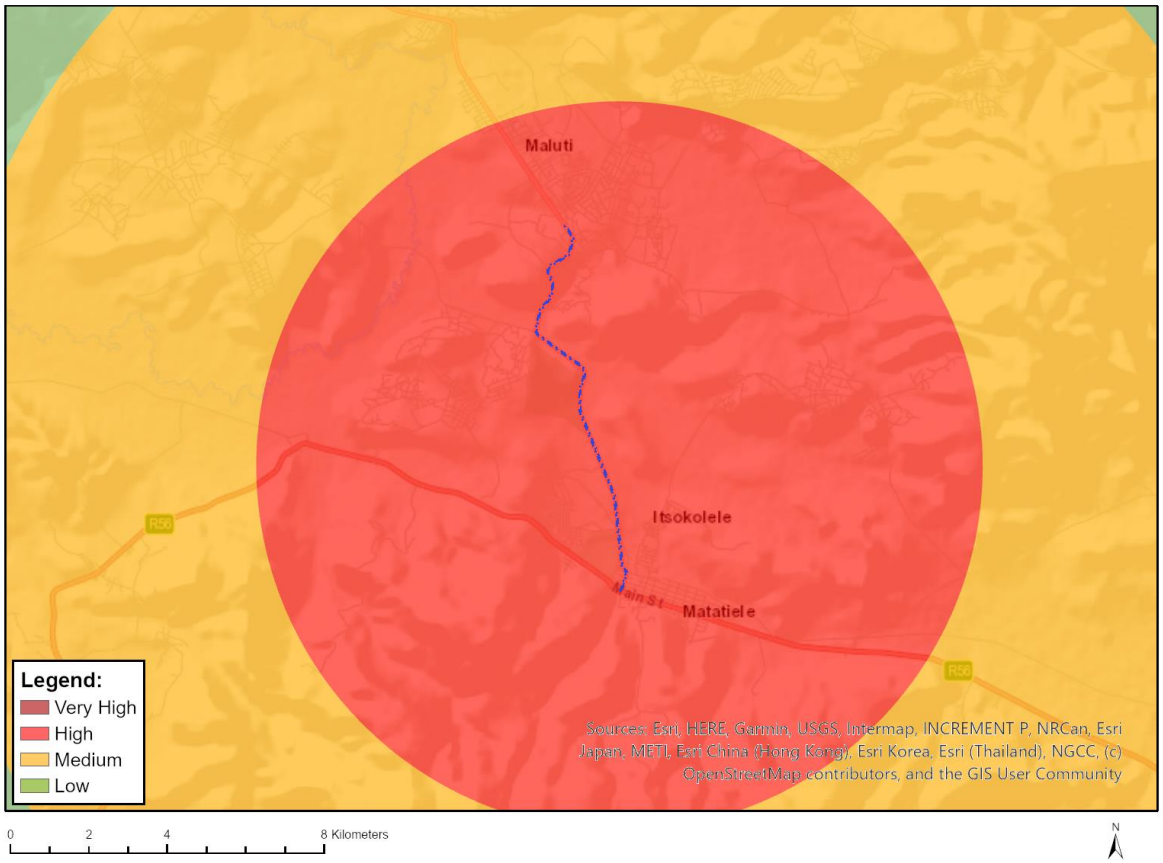
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Within 2km of a Grade II Heritage site
Very High	Within 100m of an Ungraded Heritage site

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MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



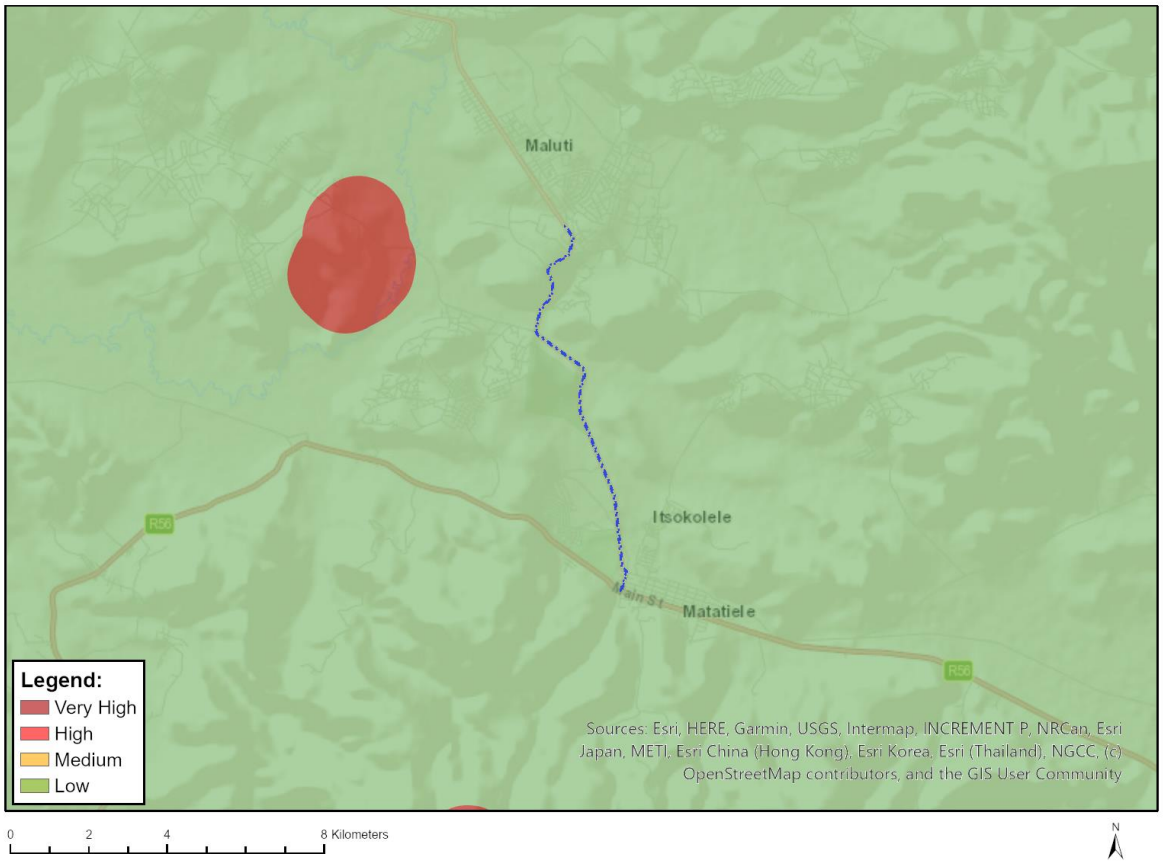
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 8 km of other civil aviation aerodrome

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY



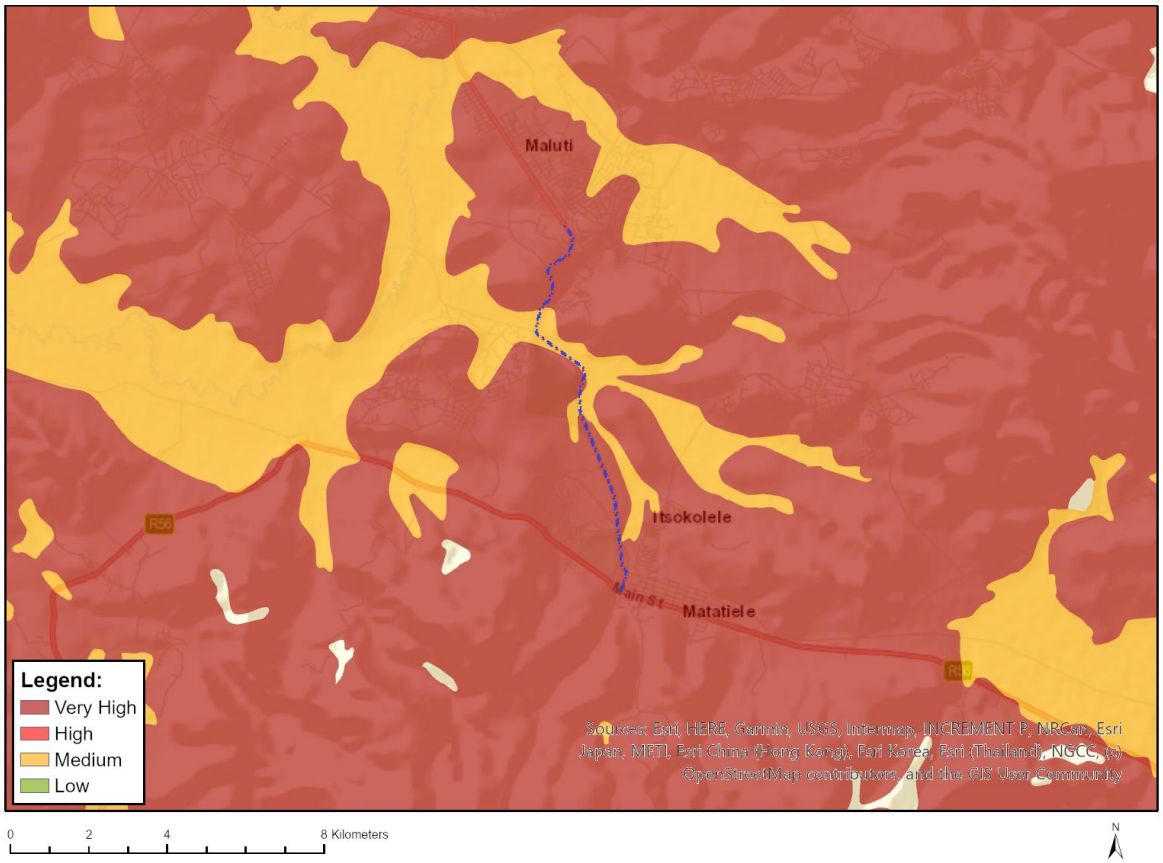
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



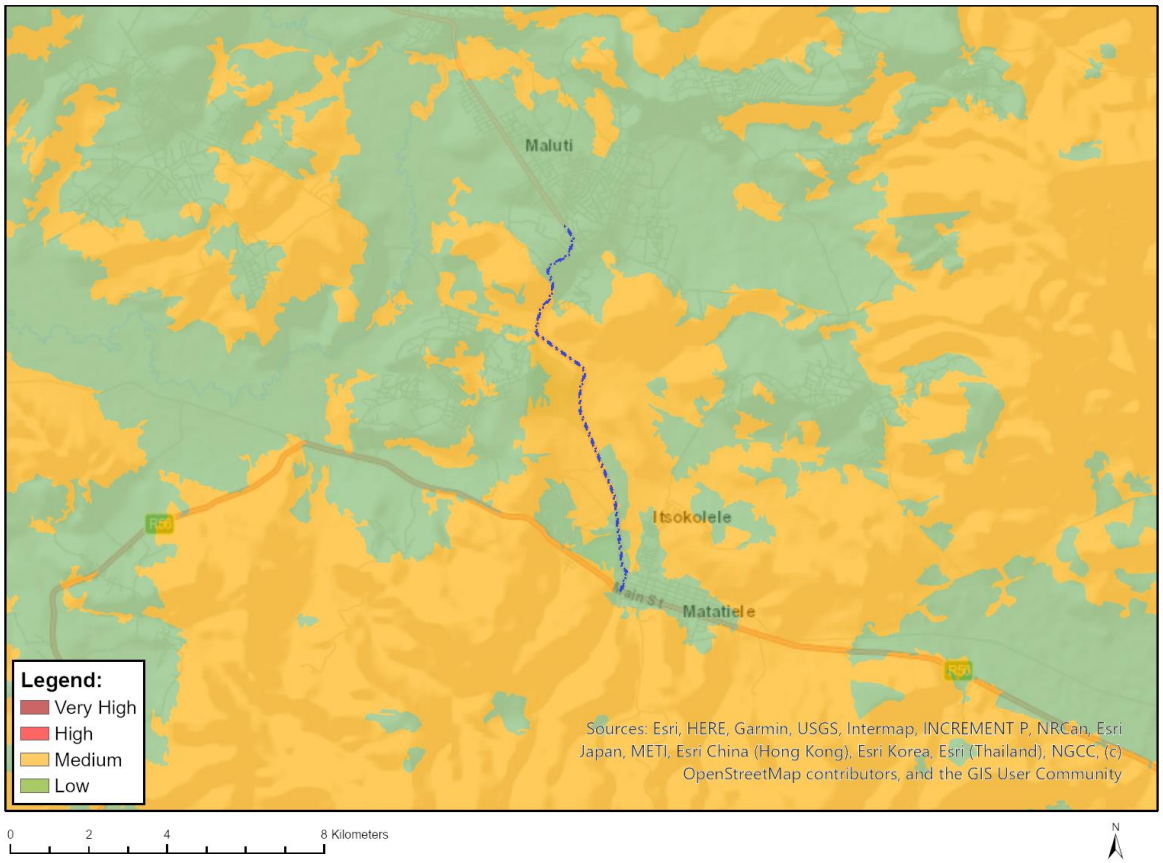
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

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MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

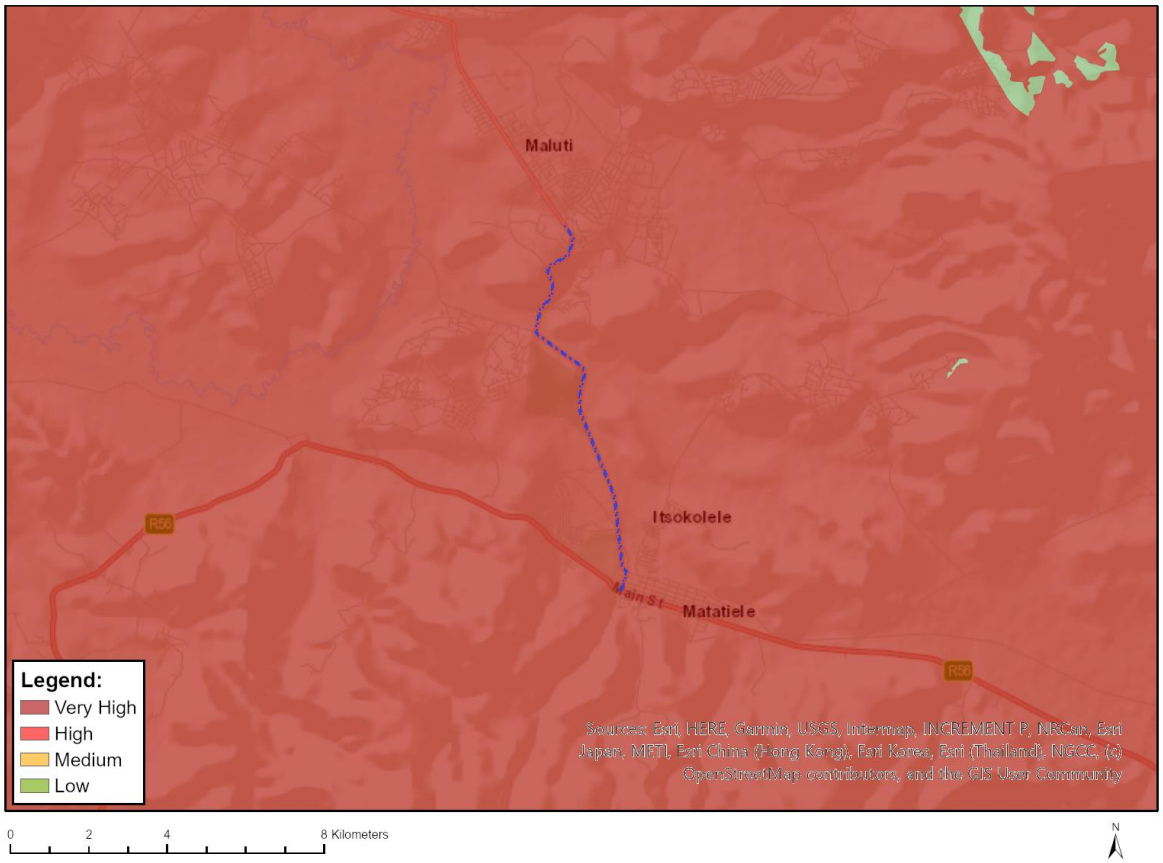
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 148
Medium	Sensitive species 441
Medium	Sensitive species 1248

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MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA1
Very High	CBA2
Very High	ESA2
Very High	Wilfried Baur Nature Reserve
Very High	CR_Mabela Sandy Grassland
Very High	EN_East Griqualand Grassland

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